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**Investigation of the Effect of Transportation Network
on Urban Growth by Using Satellite Images and
Geographic Information Systems**

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**EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:
ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES**

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1.INTRODUCTION

- Urbanization is a significant problem in many parts of the world, particularly in densely populated territories. In countries like **Turkey** rapid increase in population are exposed to rapid urbanization.
- the destruction of agriculture and forest areas,
- pollution of the environment,
- transportation distress,
- noise pollution,
- deterioration of the ecosystem balance, and etc.
- Analyses of urban development and population distribution provide an opportunity to **visualize and understand** the human use of the landscape.

1.INTRODUCTION

- In order to control urban growth, it is possible first to determine the **current situation** and to determine **the parameters** that guide urban growth such as population, road network.
- Most widely used technique to measure the extent of urban sprawl with the integration of **Remote Sensing** and **GIS**.
- For this reason, the relationship between the urban development of **Konya** and the transportation route, which is rapidly growing in this study, was investigated by means of Remote Sensing and Geographical Information System (GIS) methods and the relation between **population and road network** and **urban growth** was evaluated.



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2.MATERIAL AND METHODS

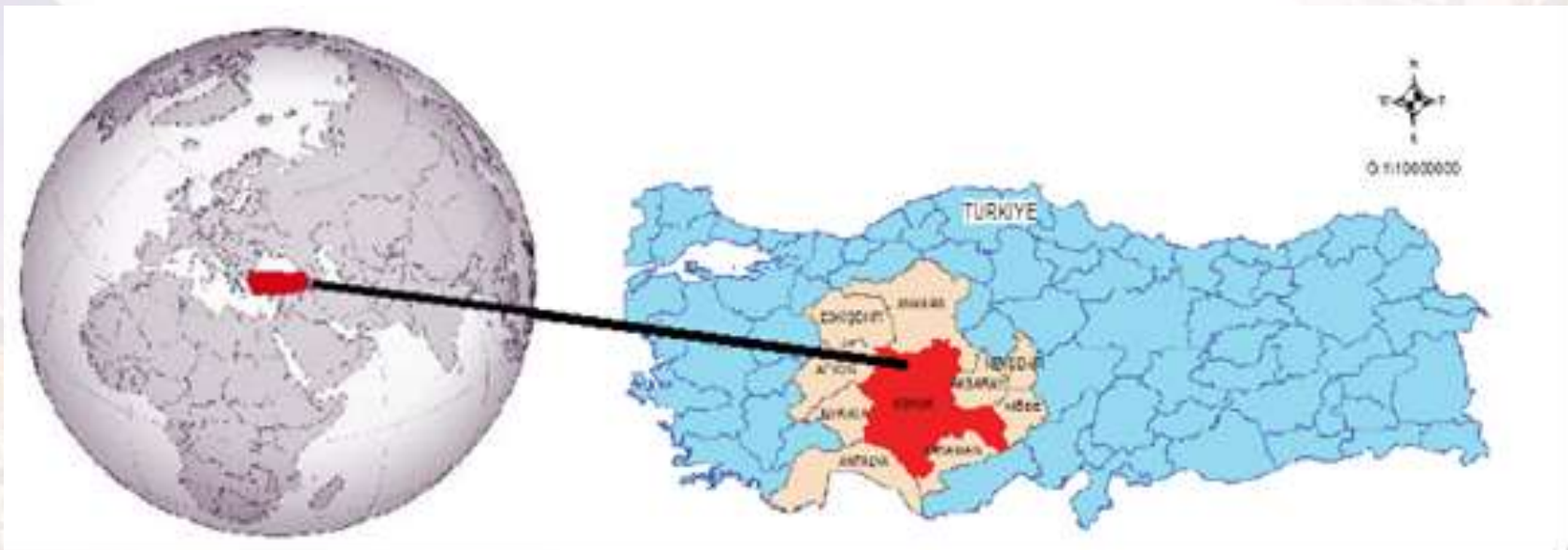


Figure 1: Study Area

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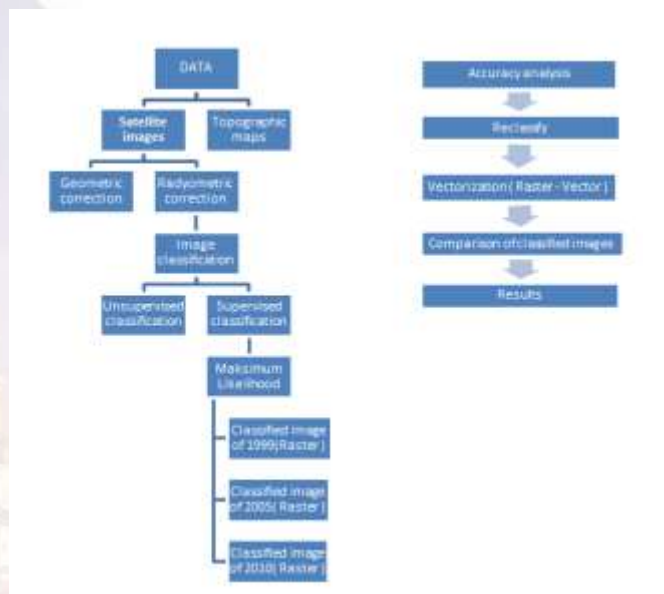
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2.MATERIAL AND METHODS

- Landsat satellite images for 1999, 2005 and 2010.
- Satellite images of Landsat 7 of Konya province on 27.07.1999 and of Landsat 4-5 TM of 27.07.2005 were obtained on 01.07.2010. The Landsat images used are obtained from Tiff format digital media.
- The projection system of the images was selected the UTM (Universal Transverse Mercator) 36th Region and "WGS84 Datum" which are the most suitable for the location of the maps.
- ENVI 5.0 was used to process remotely sensed images, ENVI Classic to classify and evaluate, ArcGIS 10 for temporal analysis of the results obtained, and Google Earth Pro software as an aid tool for defining the classification training areas

2.MATERIAL AND METHODS



- The area values of each land class are calculated in hectares and percent (%) by subjecting these polygon data processed to the numerical database to the area account.
- The Map Comparison Kit program was used to determine the land change maps for different years (1999-2005, 2005-2010, 1999-2010).

Figure 2. Flow Chart of Study

3. RESULTS AND DISCUSSION

Years	Accuracy Rate
1999	%79.48
2005	%85.77
2010	%84.80

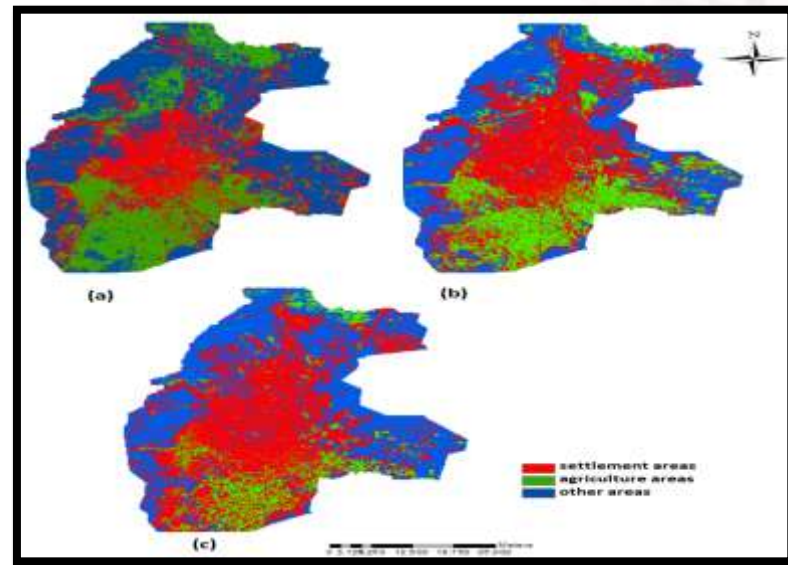


Figure 3. The land use of Konya Province, a. 1999: b.2005: c. 2010

3. RESULTS AND DISCUSSION

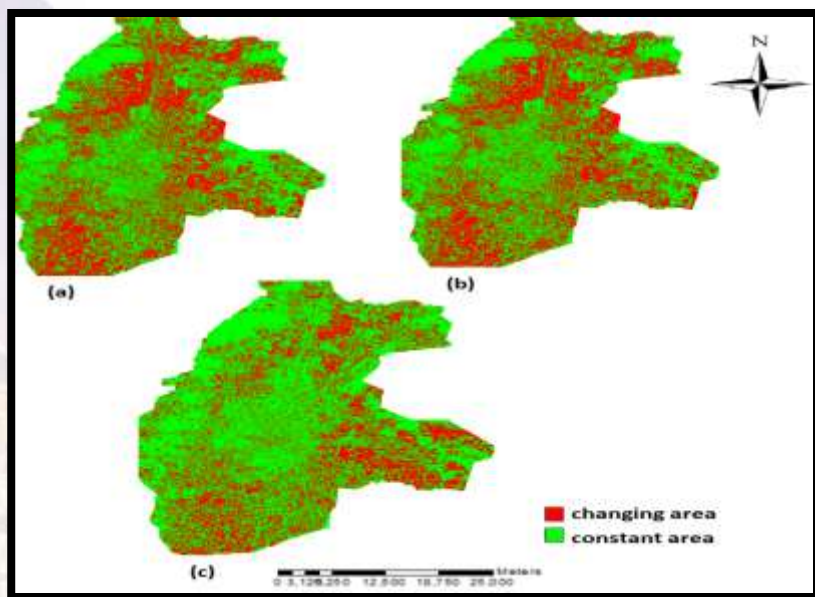


Figure 4. The land use map of Konya Province, a. 1999: b.2005: c. 2010 (Kappa Method)

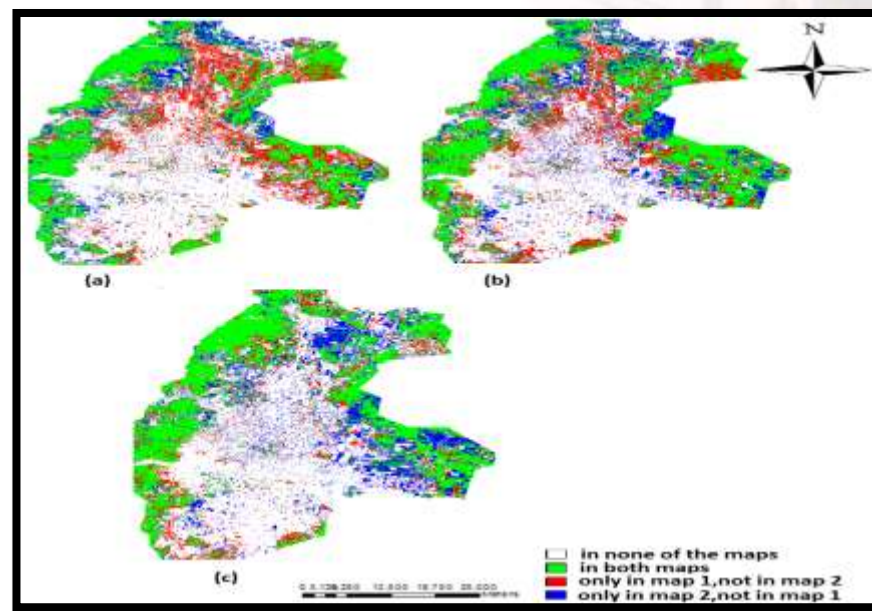


Figure 5. The land use map of Konya Province, a. 1999: b.2005: c. 2010 (Per Category Method)



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3. RESULTS AND DISCUSSION

LAND CHANGE DURING 1999-2005-2010 IN KONYA (MAXIMUM LIKELIHOOD METHOD)							
Land Use Classes	Total Area	Settlement Areas		Agriculture Areas		Other Areas	
		(ha)	%	(ha)	%	(ha)	%
1999	53408.31	14445.62	27.05	14784.70	27.68	24177.99	45.27
2005	53409.69	21314.23	39.91	11706.55	21.92	20388.90	38.17
2010	53407.79	24674.76	46.20	6030.48	11.29	22702.55	42.51
2010_2005 Land Change	-	3333.53	6.29	-5676.07	-10.63	2313.65	4.34
2010_1999 Land Change	-	10229.14	12.86	-8754.22	-16.39	-1475.44	-2.76
2005_1999 Land Change	-	6868.61	12.86	-3078.15	-5.76	-3789.09	-7.10

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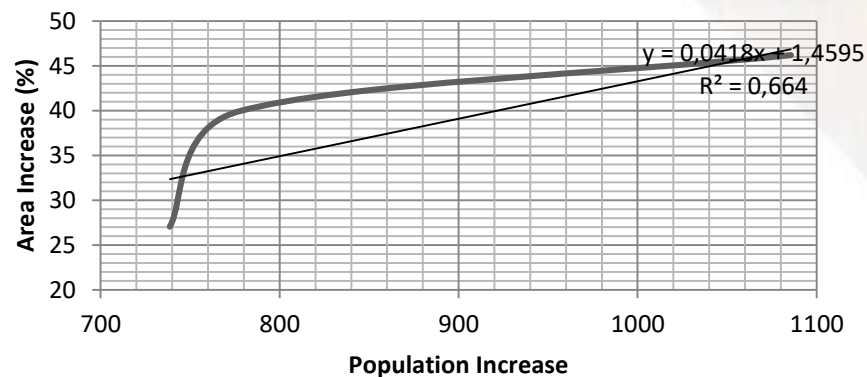
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3. RESULTS AND DISCUSSION

YEARS	Karatay	Meram	Selçuklu	Total Populati on
1999	182.677	230.386	325.627	738.690
2005	191.616	239.690	345.674	776.980
2010	263.071	314.421	508.102	1085.594

Population Increase - Land Change Relation Graph



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3. RESULTS AND DISCUSSION

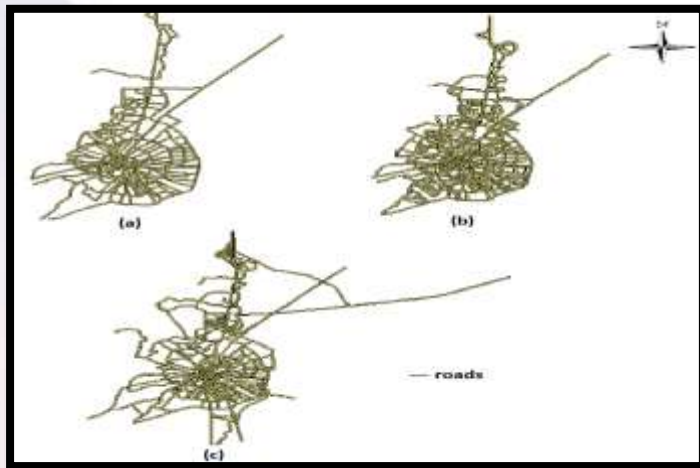
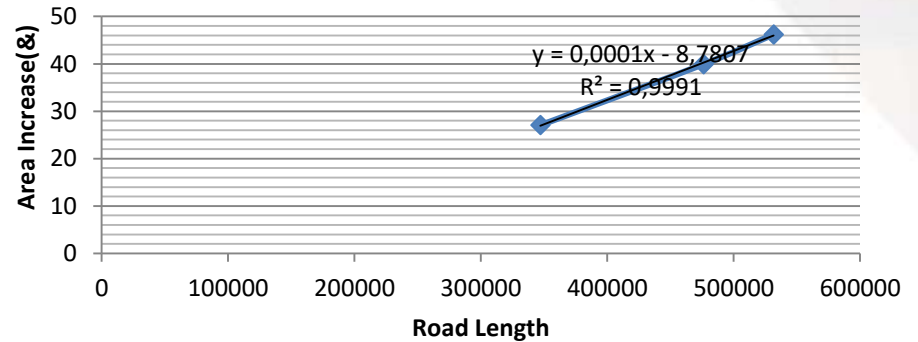


Figure 7. The road network of Konya Province, a. 1999: b.2005: c. 2010

Road Length - Area Change Relation Graph



4. CONCLUSION

- Between 1999 and 2005, the population increased by about 1.5 times.
- While the total population was 738,690 in 1999, the total transportation network is 347001.38 meters.
- In 2010, the total population is 1085,594 while the total transportation network is 531675.44 meters.
- However, there has been a decrease of 16.39% (8754.22 ha) in agricultural land and an increase of 12.86% (10229.14 ha) in residential area.
- This result shows that population growth and the development of the transport network affect urban expansion.