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Investigation of Lands Cover Changes with Emphasis on Isfahan Urban Green Space using Manuscripts Tissues, Isfahan, Iran

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Abstract: *In this research lands cover changes of Isfahan city between 2002 and 2014 period of time accomplished by using satellite images interpretation. In 2002 +ETM sensor punchromatology band was used and in 2014 OLI-TIRS sensor punchromatology band was used. We used tissues filters in Envit 4.8 software for calculating changes. Lands cover has been extracted according to properties of phenomena`s manuscript tissue. Intended area was determined in six lands cover, grass, roads, wastelands, agronomy lands and trees. Ultimate precision in 5*5 average filter for Landsat images have been 79 percent in 2002 and have been 81 percent in 2014. We got the rate of lands cover changes and urban green space with via cross-tab tool in IDRISI software. Urban green space area became from 98319800 meter in 2002 to 57359700 meter in 2014.*

Keywords: *changes monitor, lands cover, manuscripts tissues, Isfahan.*

1. Introduction

Availability to field datainorder to changes cover checking out and supervising in global and zonal scale is usually difficult and limited. Using of satellite images is very important because of specific features such as wide view, low costly, using different parts of electromagnetic spectrums to record the features of phenomena, short return period, automatic analysis possibility, faster review and providing area supervising possibility. In recent years, high resolution sensors images have been considered one of the new useful results of remote sensing. Intoday`s satellite images spectral changes have increased because of their high spatial resolution. As result variance goes up in each class. This case make classes possible density functions extend and as result make them more overlap, and this case by its own raises the classification error. To have less error in this kind of images we should use their spatial information (tissues information) in addition to spectral information. To achieve to sustainable development, planning accurately, control and management of land control cover changes, that they occurred by natural or artificial factors including human interference, are very necessary. Urban managers and planners are needful a tool that offers information correctly, quickly and betimes. Mokhtary began to check out the impacts of drought on herbal cover changes and Isfahan city green space with Landsat satellite +ETM and TM multiple times images that displays impact of drought in urban control change as well in course desired [1-8].Matinfar and partners examined determination of control type and lands cover by +ETM7 Landsat data by using object-oriented programming methods (Kashan area) Kashan drought areas. Object-oriented programming methods precision is equal to 95 and it can be concluded that object-oriented programming method is assort for checking out drought areas [9-14]. Feizizade and partners studied remote sensing data in revelation of Tabriz urban green space changes and according to obtained 16 years old period results that gained by SPOT and LANDSAT images object-oriented programming classification, shows city green space decreases more than 46 percent in study case period and its capitation achieve from 14 square meter in 1988 to 7.5 square meter in 2005 [15-19]. Abdolalizade predicted about green mountain protected area lands cover future changeswith MARKOV model and conclusion of changes shows that agricultural, bush and forest lands area have increased but herb pastures and bare grounds have decreased [20-25]. Kite and colleagues(2012) in a perusal identified urban poor neighborhood in HeidarAbad, India according to manuscript tissues. Unique features of Slumdog areas are lots of numbers of buildings and small size of houses. Used method to prepare Slumdog areas plan in crowded cities is reliable and it can be used to survey multiple times data in developing cities [26-34]. Gutierrez studied with Object-oriented programming and base pixel combined method to improved classification accuracy in land cover changes survey to recognize changes in a mountainous area in Mexico and the following results was obtained:

Precision comparison for pixel method was equal to 74.0 and 81.0 and for Object-oriented programming method was equal to 71.0 and 77.0 and for Object-oriented programming and base pixel combined method was equal to 88.0 and 87.0 that shows precision increase in combined method [35-38]. Srivastava and colleagues used excerpt of remote sensing techniques such as SVM, neural network and most likely classification to survey lands cover changes. Images which used in this research are LANDSAT collection of images. Results demonstrated SVM technique is more suiTable than two others technique. Changes have surveyed in England LANDSAT images by CCDC algorithm since 1982 to 2011 and overall accuracy based on CCDC algorithm was equal to 98.0. Kappa coefficient was equal to 86.0 shows successfully of this algorithm with this level of accuracy [39-45].

2. METHOD MATERIALS

Isfahan is located in south of Tehran and 435 kilometers far from it. Isfahan city has 51 degrees and 39 minutes and 40 seconds eastern longitude and 32 degrees and 38 minutes and 30 seconds northern latitude. Figure (1) is divided to fourteen urban areas and out of urban area is leaded Khomeinishahr and Najafabad from the west, Sofeh Mountainand Sepahanshahr from the south, Shahinshahr from the north and Segzi plain from the east. The red borderline is Isfahan city and the blue borderline is added to illustrate agricultural cover in northeast part. Isfahan city 7Landsat image is in 2002 and Isfahan city 8Landsat image is in 2014. Only panchromatic band of this collection of images is used in Table (1).

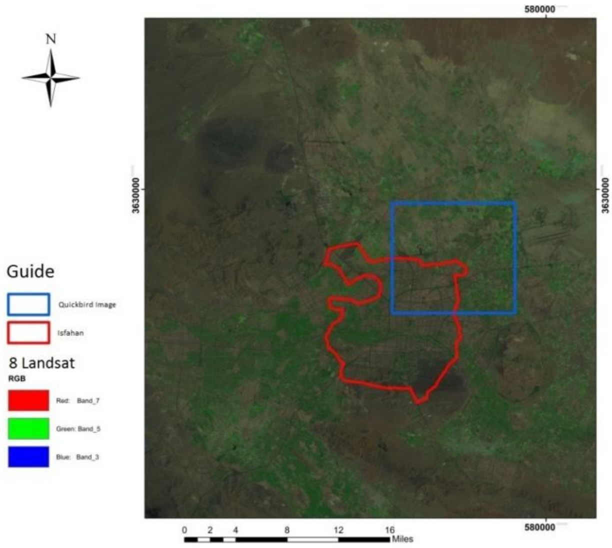

Figure1. *Area of Study*

Table1. *Features of Landsat images*

Radio metric resolution	Panchromatic band spatial resolution	Path and Row number of image	Date of taking image	Type of sensor	Satellite
8 Bit	15 Meter	P162,R 39	2002	ETM+	7Landsat
8 Bit	15 Meter	P162,R 39	2014	OLI_TIRS	8Landsat

2.1. Maximum Possibility Classification

Maximum possibility classification is one of the most popular methods of statistical classification that is a part of base pixel method. After applying tissue filters on panchromatic band of images and taking training samples, image classifying was performed based on most likely method as it is illustrated in Figure (2) and (3). Then we used Confusion Matrix tool for verification of classification precision and below results was obtained:

Table2. *Total precision and kappa coefficient of classified images in maximum possibility*

Kappa coefficient		Total precision		Satellite images
Green space	Lands cover	Green space	Lands cover	
0.44	0.42	0.79	0.55	7 Landsat
0.52	0.48	0.81	0.62	8 Landsat

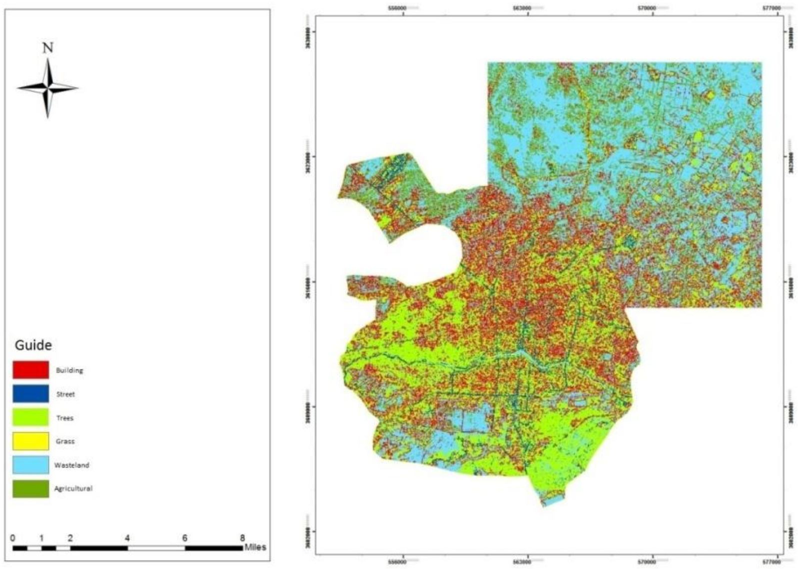

Figure2. *Maximum possibility classification in Isfahan 7 Landsat image*

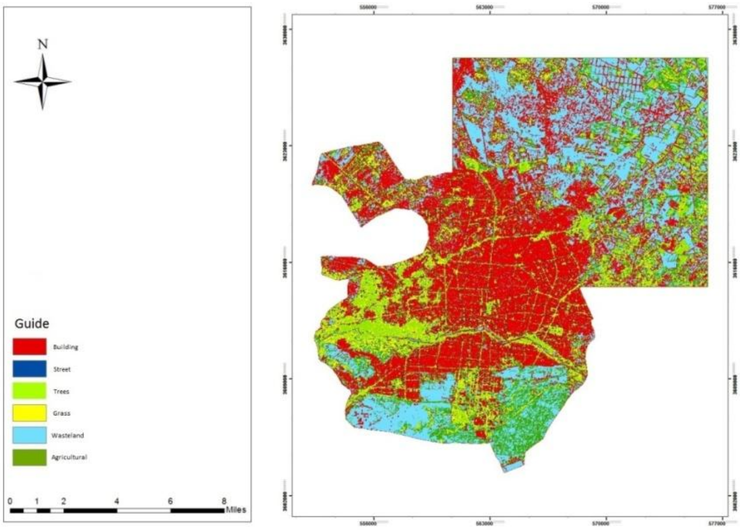

Figure3. *Maximum possibility classification in Isfahan 8 Landsat image*

2.2. Average Filter with 3*3 Window Size

We used average filter with 3*3 window size images to improve. In Figure (4) and (5) the main precision of lands cover reached to 69.62 and Kappa coefficient reached to 0.61 percent and in use of green space main precision equals to 78.0034 and Kappa coefficient increased to 0.66.

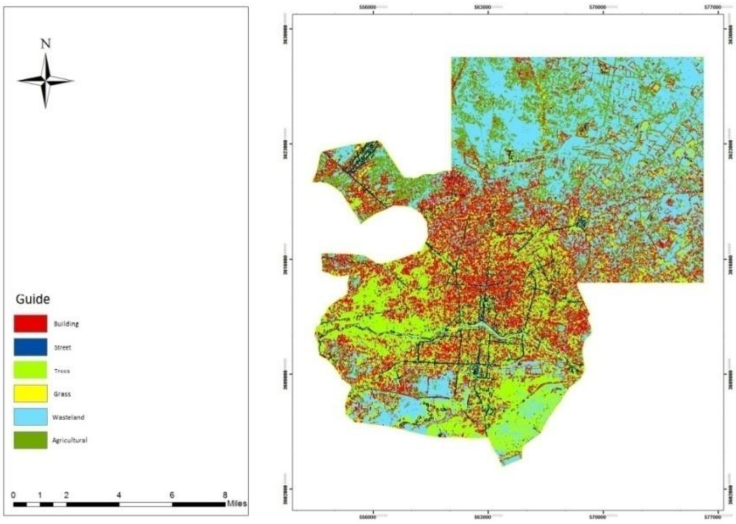

Figure4. *Maximum possibility classification in Isfahan 7 Landsat image with 3*3 window size average filter*

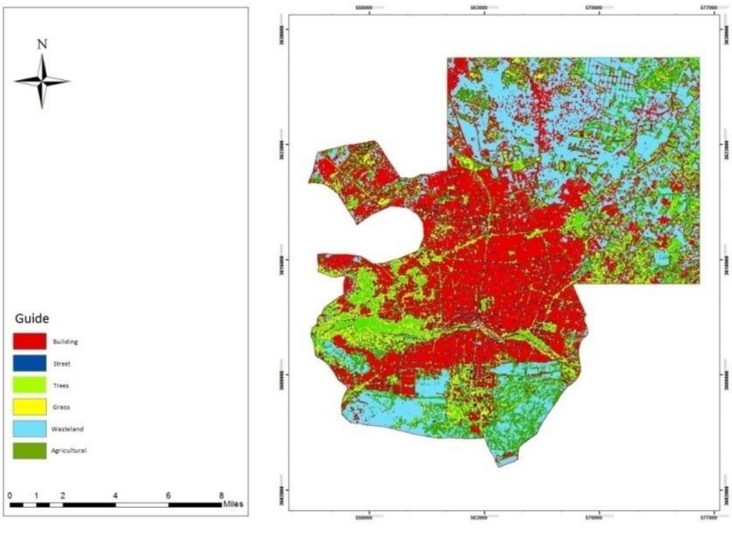

Figure5: *Maximum possibility classification in Isfahan 8 Landsat image with 3*3 window size average filter.*

2.3. Average Filter with 5*5 Window Size

According to previous step's conclusions and lands cover classification improvement, we applied average filter with 5*5 window size on image and following results were obtained. Total precision for lands cover in 2002 Landsat's image is equal to 64% and for lands cover in 2014 Landsat's image is equal to 56%. Total precision for urban green space in Isfahan 2002 Landsat's images is equal to 86% and for 2014 Landsat's image is equal to 89%. Kappa coefficient for urban green space in 2002 is equal to 64% and in 2014 is equal to 71%. These conclusions illustrated that average filter with 5*5 window size has considerable impact on accuracy [46-69].

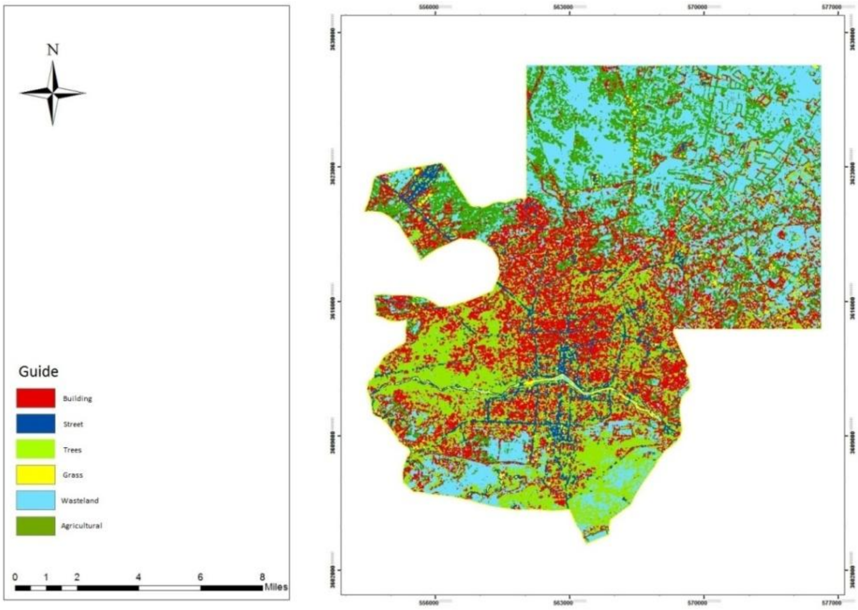

Figure6. *Maximum possibility classification in Isfahan 7 Landsat image with 5*5 window size average filter*

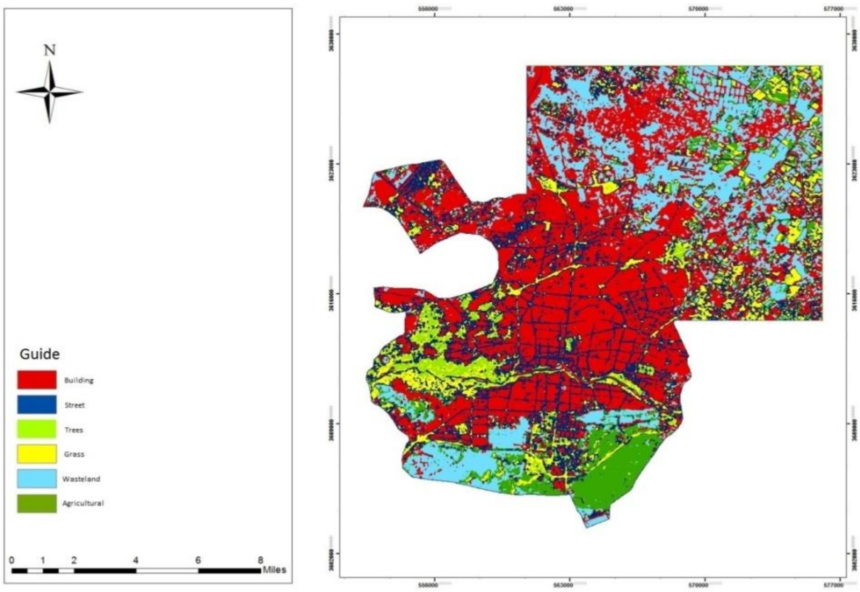

Figure7. *Maximum possibility classification in Isfahan 8 Landsat image with 5*5 window size average filter*

2.4. Urban Green Space Durability

Cross-tab tool in Idris Tiga software has used to obtain change rate. Classified images in Envit4.8 software were converted to Idris Tiga software's file's format. Classified images were imported in cross-tab tool and all classes changes image was calculated (Figure8, Table3). Lands cover changes precision obtained 70% Kappa coefficient. Green space density in 2002 was equal to 0.25380784 meter and density in 2014 was equal to 13193007 meter. Table (4) illustrate reduction of urban green space. Rate of this change was equal to 12187777.0 meter [70-88].

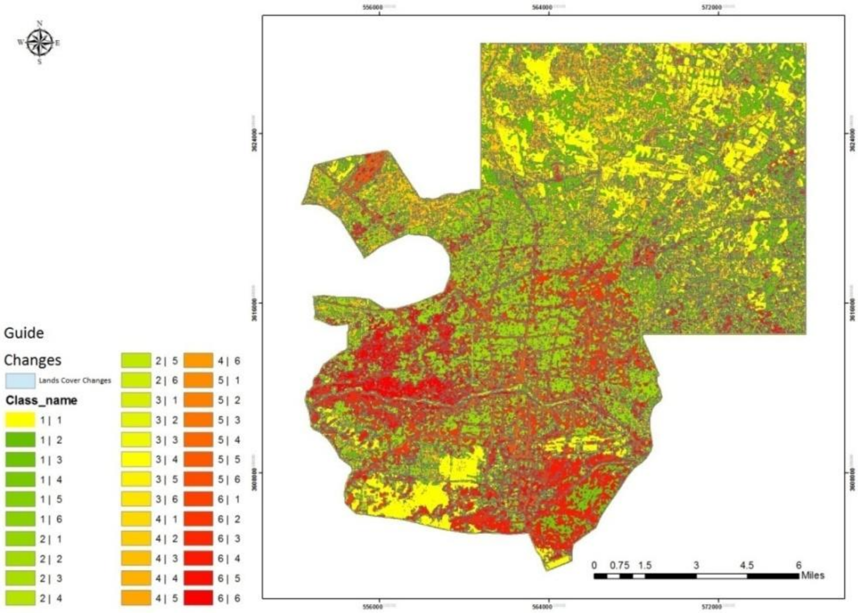

Figure8. *Lands Cover Changes Map 2002 to 2014*

Table3. *Lands cover change area and user to each other*

Levels changes area		Lands cover levels conversion
44.7039	1 | 1	Urban to urban
5.5575	2 | 1	Urban to street
0.5355	3 | 1	Urban to trees
13.4118	4 | 1	Urban to grass field
0.2052	5 | 1	Urban to wasteland
3.9771	6 | 1	Urban to agricultural land
39.5271	1 | 2	Street to building
61.0731	2 | 2	Street to street
5.3379	3 | 2	Street to trees
40.2858	4 | 2	Street to grass
6.4044	5 | 2	Street to wasteland
25.6572	6 | 2	Street to agricultural land
6.5151	1 | 3	Trees to urban
3.5163	2 | 3	Trees to street
0.6111	3 | 3	Trees to trees
2.4597	4 | 3	Trees to grass
1.9008	5 | 3	Trees to wasteland
7.8399	6 | 3	Trees to agricultural land
8.7021	1 | 4	Grass to urban
1.4445	2 | 4	Grass to street
0.1647	3 | 4	Grass to trees
1.3581	4 | 4	Grass to grass
0.2673	5 | 4	Grass to wasteland
11.1834	6 | 4	Grass to agricultural land
6.1686	1 | 5	Wasteland to urban
10.7568	2 | 5	Wasteland to street
13.5144	3 | 5	Wasteland to tress
21.1383	4 | 5	Wasteland to grass
0.0072	5 | 5	Wasteland to Wasteland
0.8046	6 | 5	Wasteland to agricultural
0.2718	1 | 6	Agricultural to urban
0.1989	2 | 6	Agricultural to street
1.0989	3 | 6	Agricultural to trees
7.9704	4 | 6	Agricultural to grass
1.0989	5 | 6	Agricultural to wasteland
799704000		Agricultural to agricultural

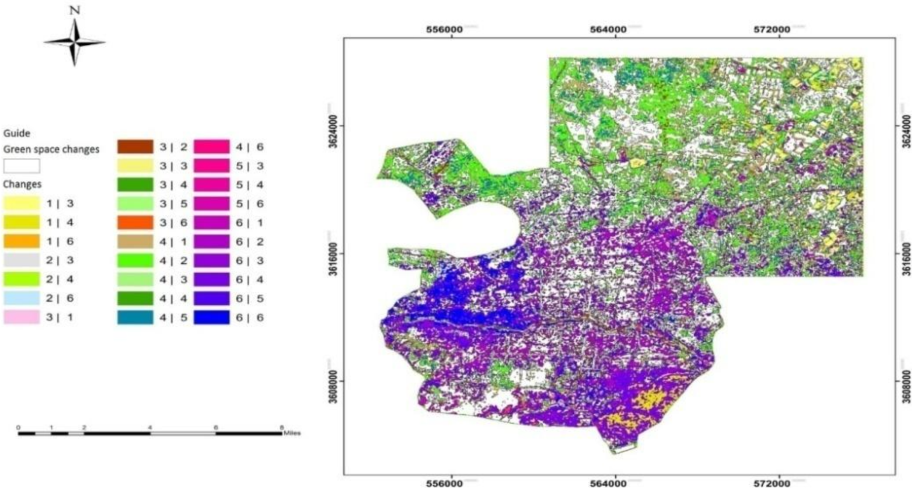

Figure9: *Green Spaces Type Changes Map 2002 to 2014*

Table4: *Lands cover's area change in meters in 2002 to 2014*

Image of 2014	Image of 2002	Lands cover / user
6844.1400000	11201.8500000	Building
17848.5300000	9201.9600000	Street
2286.4500000	1371.2400000	Trees
2314.0800000	6847.1100000	Grass
8286.3900000	2339.1000000	Wasteland
1135.4400000	7776.6300000	Agricultural land

3. Discussion and Conclusion

In this research panchromatic band was selected to obtain vegetation change because of higher spatial accuracy than other colored bands. Classification precision of Base Pixel maybe makes a mistake in areas which have various phenomena because of phenomena's spectral diversity. used neural network and automatic cells based on base pixel classification in their research for prediction of urban lands user changes. Instead of using base pixel methods for phenomena's separation and differentiation, features of phenomena such as color, shape, area, tissues and like these can be used. Vegetation has rough and uneven tissue. Because of that, tissue factor was used to separate vegetation in present research used manuscript tissue to classify satellite images. used manuscript tissues information to identify India poor areas [77-81]. used angular tissues information to extract way from satellite images. used a combination of base pixel and Object-oriented programming methods to improve precision of classification for investigation of land cover change of mountainous area in Mexico. In present research after lands cover classification, urban green space was distinguished. After achieving vegetation's map, vegetation's type change, vegetation's area Figure (9) and Table (4) [82-97]. achieved lands user changes durability.

4. Conclusion

Planning accurately and earth's lands cover changes management and control are necessary to achieve to sustainable development that happened by natural and artificial factors. In present research herbal cover changes investigated by 2002 Lands at images panchromatic band and 2014 Lands at. Panchromatic band has high spatial accuracy and low spectral accuracy. Because of emphasizing on urban green space changes, these changes were obtained based on manuscript tissue are for under uneven of green space are applied on images collection. Obtained Kappa coefficient for changes, shows manuscript tissue has ability to identify herbal cover in panchromatic image.

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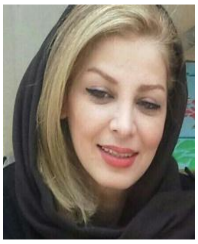

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