1. Introduction

Ash-Shatra City lies in the north of Thi- Qar Province about 40 kilometers, on the road between Baghdad and Al-Nasseriyah (see Figure 1).

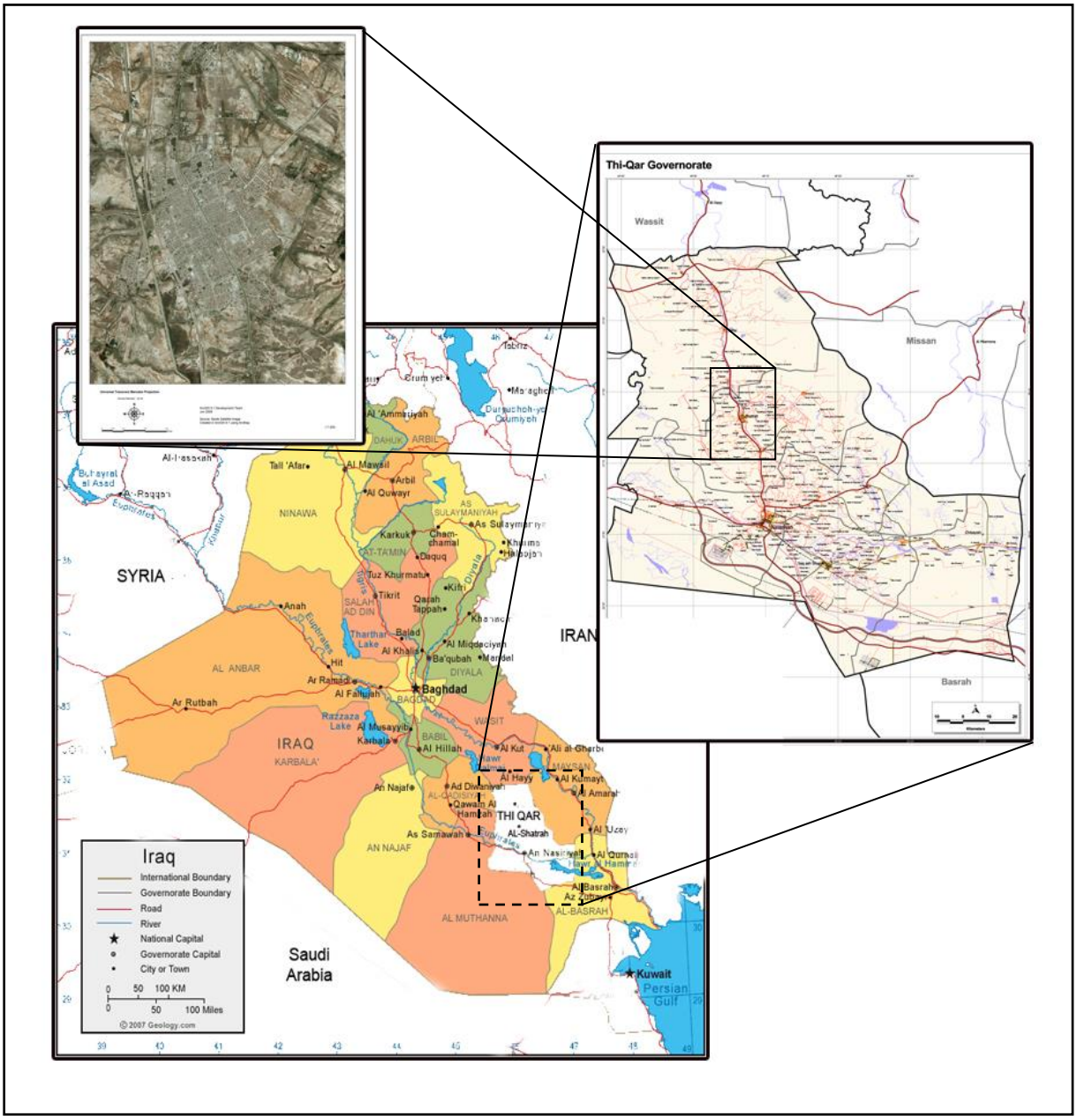

Figure (1): The orientation of Ash-Shatra (Al-Shatrah).

Most of buildings are small houses, super markets, or small government buildings. There are agricultural fields around the city, arid areas, and gardens of palm and high trees. There are some

irrigation projects around the city like Al-Bad'ah gate way. The agricultural fields neighboring Ash-Shatra well affect the atmosphere there (see figure 2).

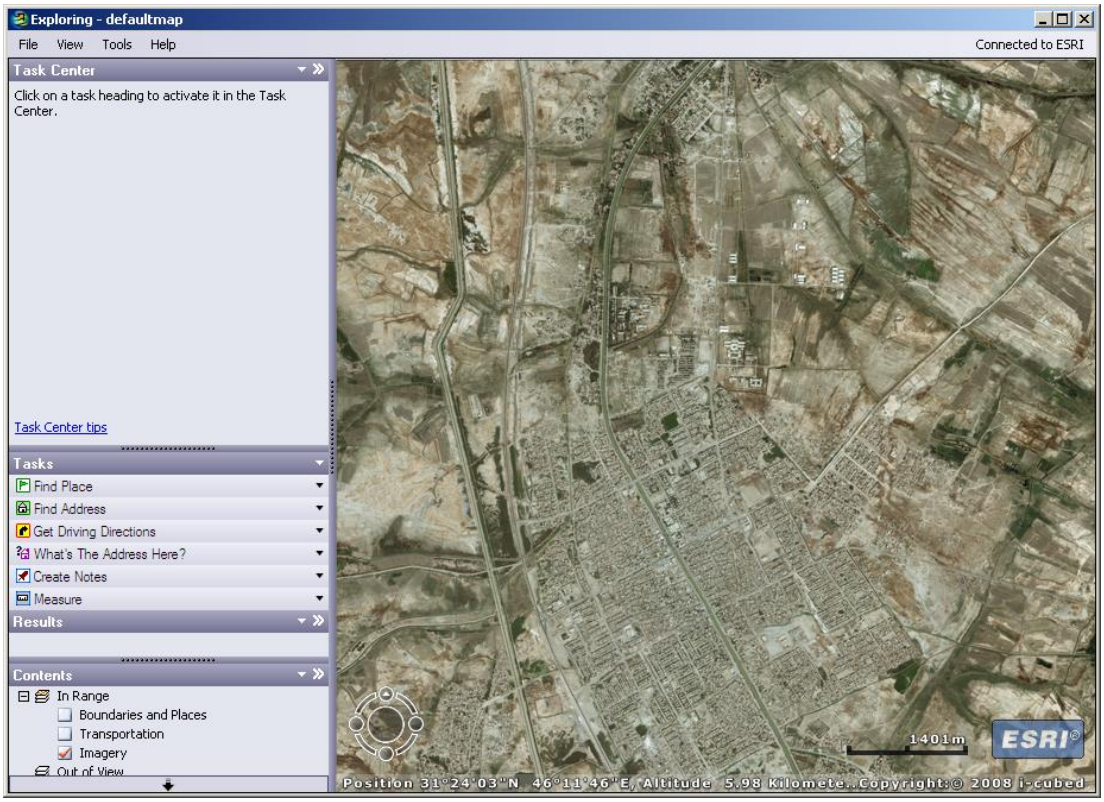

Figure (2): The used satellite imagery of Al- Shatrah from ESRI Explorer.
(SPOT 5 satellite image, RGB Colored, 10 m resolution)

Ash-Shatra center location is in 31°24'31"N latitude, 46°10'31"E longitude [1], and 10.3 m over the sea level [2].

Figure (3): The region of Ash-Shatra in Google Earth Software.

The imagery used in this research was imported from ESRI company, and was corrected geometrically according to six points were obtained from Google Earth data base. The spatial resolution of imagery is 10 meter. It was taken at 9:30 o'clock.

2. Supervised Classification

I live in Ash-Shatra, and this helps me to get enough information to make good supervised classification. I know so much about the city; streets, buildings and even the types of trees. Some of the city features are well known for me and that enables me to recognize any ambiguity in the imagery just like the black color in the right side of the main street which looks rather odd while it is due to the shadow of the commercial building on the right of the street when the sun is to the east at 9 o'clock which is always the time of satellite imaging[5].

Figure (4): The shadows on the right side of the street.

A tour on the imagery is very important to test the resolution and recognize the features of the city by sight.

3. Land Cover Classification

The main purpose of satellite imagery classification is the recognizing of objects on the Earth's surface and presenting them in form of thematic maps. Land cover is determined by the observing of grey values in the imagery. Classification is one of the most important steps in processing remote sensing imagery and represents important input data for geographic information systems (GIS) [4].

The classification of satellite and other images is divided into supervised and unsupervised. The main difference between the two is in the way the spectral signatures are created. With

supervised classification the operator determines the areas, where a distinct particular type of land cover is present and then the computer computes the spectral signatures. On the other hand, in the unsupervised classification the computer creates the spectral signatures using mathematical data clustering in the multidimensional feature space [5].

The first step in the classification is the selecting the suitable data (images). We use an imagery of ESRI Company in our project. The imagery has an excellent spatial properties, good spectral detection, and well spatial characteristics (10 m resolution).

The first processing on the imagery is correcting it geometrically by six points obtained from Google Earth image for the city.

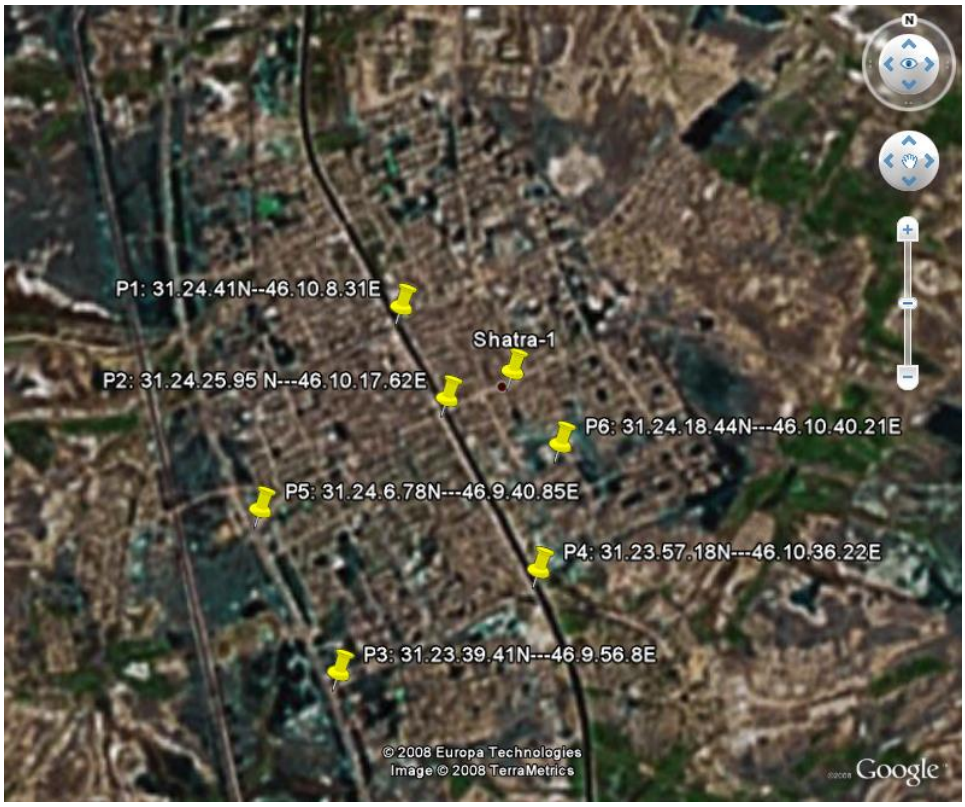

Figure (5): The six point in the city image.

Table (1): The coordinates of the correction points.

Points	Latitude N	Longitude E	Description
P1	31° 24" 41.00'	46° 10" 8.30'	On the end of the 1st bridge.
P2	31° 24" 25.95'	46° 10" 17.62'	On the end of the 2nd bridge.
P3	31° 23" 39.41'	46° 09" 56.8'	At the 1st interior on the highway.
P4	31° 23" 57.18'	46° 10" 36.22'	In the site of the constructed bridge.
P5	31° 24" 6.78'	46° 9" 40.85'	At the 2nd interior on the highway.

P6	31° 24" 18.44'	46° 10" 40.21'	In the oil station in the western part.

We take only the correcting points from Google Earth because the image of Ash-Shatra was old and less resolute than ESRI imagery.

The coordinates system in Google Earth is WGS 84, and when it converted it to the Clarke 1880, we had get a very small difference in the coordinates of our image because of the small area of the city.

The determination of the used classes of land cover was supported by the previous knowledge of the region and site visits. This enabled the comparison and difference analysis of the final results.

After the tour in the imagery, the following categories can be noted:

1- Palm garden.

2- Eucalyptus trees,

3- Grass and low plantation fields.

4- Depressed areas.

5- Built-up areas: city house, villages, commercial buildings.

6- Agriculture fields, with grains or different vegetations.

7- Streets of the city, rural roads, and parking places, construction sites,

8- Rivers, lakes, salt-pans.

The first and most important step in supervised classification is selecting the training samples. We should recognize the areas with known land cover on the screen. Then the image processing software computes the spectral signatures of the land cover types. The process runs interactively according to the quality of the test samples. The process has to be constantly evaluated and some times has to be improved or even excluded.

The observed area is classified into three layers. The first layer determines the built-up areas class, streets class, and river or water resource projects class, while the second determines the agricultural fields' class.

The third layer determines the palms and other trees regions.

3.1 Partial Histograms

We need to take a histogram for every type of land use, and for every channel, this will help us to select the proper channel for classification.

We had noted that the blue channel is suitable to display the built-up regions, the green

channel is suitable for trees area, and the red one is suitable for the semi arid areas.

The figure below shows this idea.

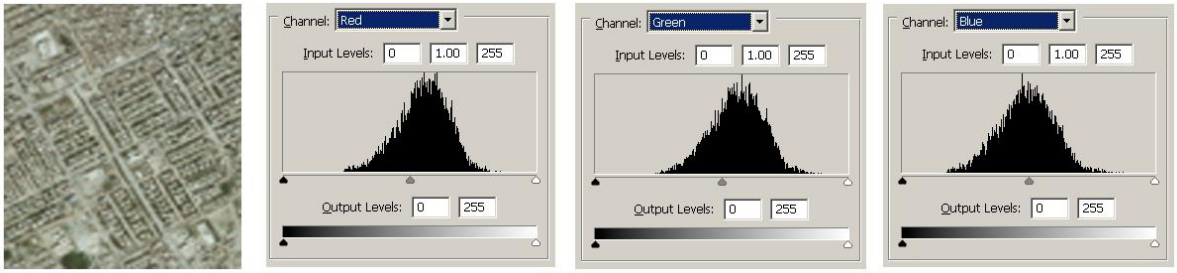

Figure (6): Histograms for every channel in part of built-up area.

3.2 Classification of Built-up Areas

For the built-up areas, which we consider as a first layer, we take the blue channel of the image because the response of the other features is low, and it has a wider gradient than green and red channels. The wider stretching of its histogram means it has a wider color resolution [6].

Then, we erase all agricultural areas by Adobe Photoshop program; make sharp edge detection to recognize the geometric edges of the buildings and streets.

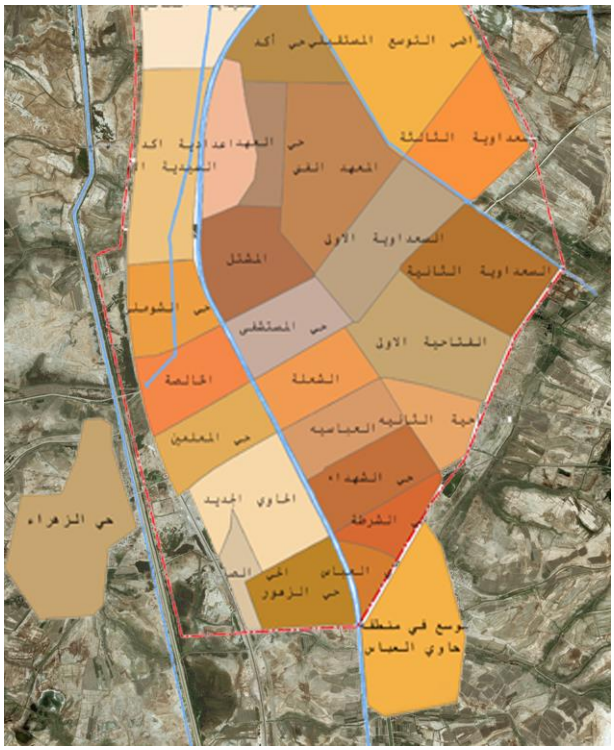

Figure (7): Working with two layer in Adobe Photoshop.

The figure below represents the final result of the first layer processing.

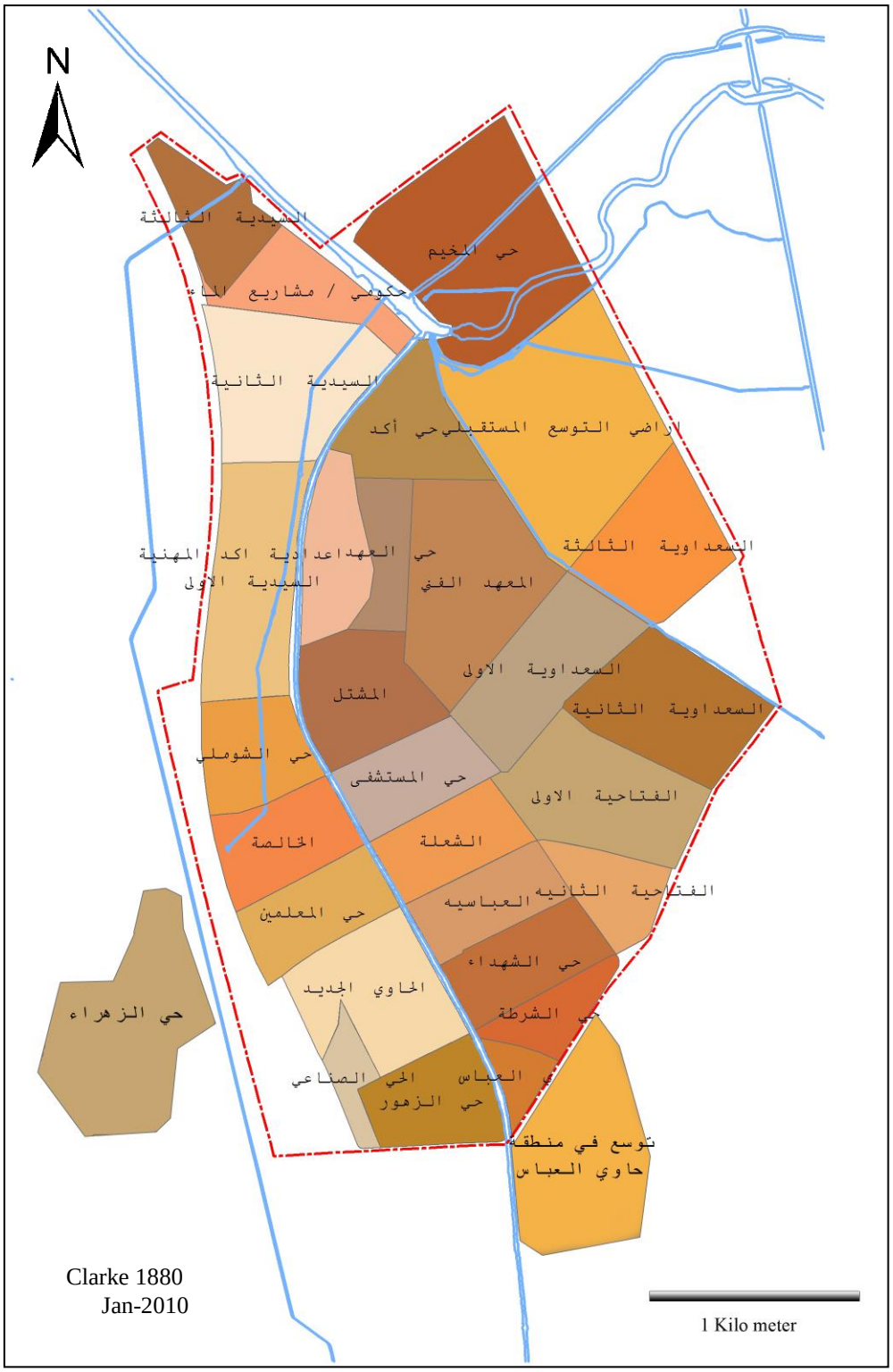

Figure (8): Ash-Shatra map

The map was completed and named by an information taken of the local municipality maps,

which assisted by a visits in site. The red line represent the old boundaries of the city, now it extended to the west and south.

3.3 The Second Layer of the Agricultural Areas

We note that not all area about the city are agricultural, some of them are arid areas because of the high salt percentage in the soil.

We take a wide view to the region by the Google Earth program, and make unsupervised classification to the land cover. We used the ERDAS Imagine 8.3.1 for this work. The figure below shows the results, which are supported by our previous experience in the regions around the city.

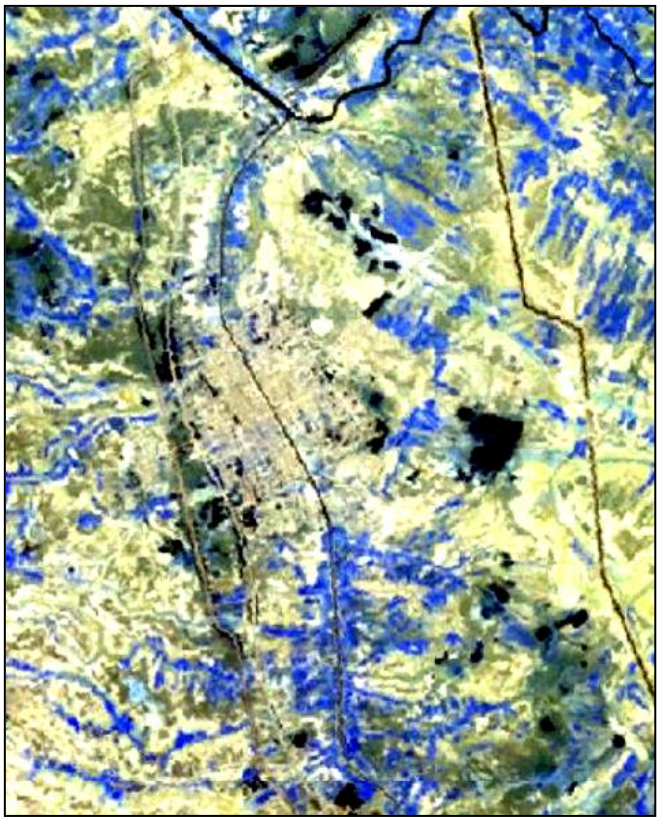

Figure (9): Pseudo colored image shows the land cover around the city.

Table (2): The percentage of the different classes of land cover.

Color	Name	Percent Of the total	Description
	Water	2.72 %	Water of rivers, lakes, and irrigated fields of rice.
	Plants	8.43 %	Palms, trees, and fruit gardens.
	Veget.	11.73 %	Agricultural fields of vegetables.
	L.veger.	14.10 %	Low grass areas.
	Arid	54.75 %	The depressed areas.

	Salt	2.23 %	Salted area.
Total		93.60	There are unknown areas in the rest percent.

Table (3): The Classification accuracy of the land cover map.

Class	**Accuracy %**		
	Producer's	**User's**	**Total**
Water	85.29	87.88	86.59
Plants	90.08	86.22	88.15
Veget.	86.23	88.13	87.18
L.veger.	84.57	89.25	86.91
Arid	82.07	83.29	82.68
Salt	84.35	84.96	84.66
Overall classification accuracy			86.03 %

3.4 The Third Layer of Trees and Garden Plants

The essential type of trees in Ash-Shatra is the palm trees, which appear rather dark green in image, there are a Eucalyptus trees, in the north of the city near Al-Bad'ah Gate way, and diffused Buckthorn trees in the garden of houses, we can not recognize between the types of trees, because of the difficulties in the classification of the high resolution image [7]. The high resolution images have the problem of shadows which effects the classification of buildings and trees.

So, we will classify according to three categories only:

1- Water areas (river, irrigated fields, and lakes).
2- High trees (palms and Eucalyptus).
3- Other plants and low trees

The other features will be classifies beyond these categories

After that, we had get the map shown in the figure below, which represents the distribution of trees in the city and near around. Table (4) illustrates the legend of the map.

We obtained this map by some manual operations in Adobe Photoshop program.

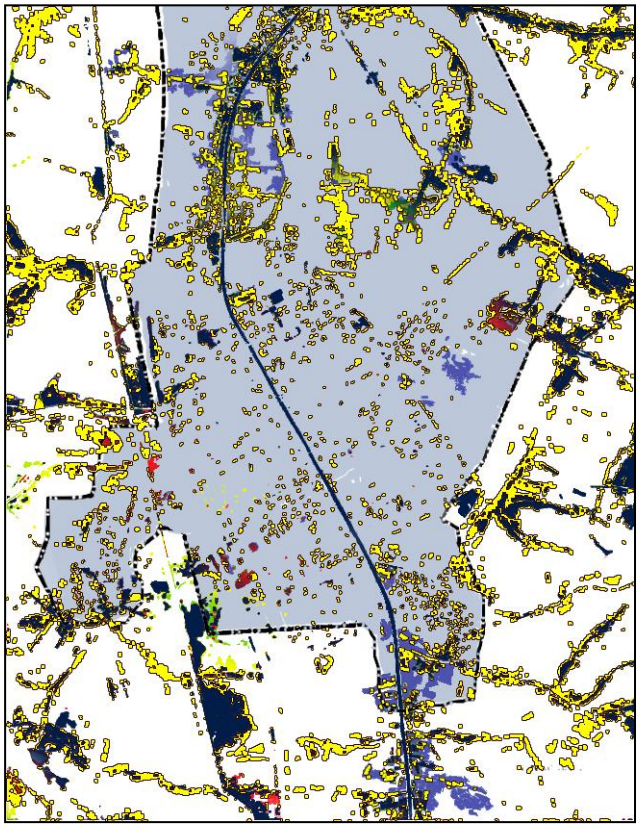

Figure (10): The map of trees distribution in the City.

Table (4): The legend of the last map.

Color	Percentage	Description
		The boundaries of the city
	62.53 %	The area of the city
	5.41 %	Water areas: river, irrigated fields, and lakes.
	1.06 %	High trees: palms and Eucalyptus.
	2.33 %	Other plants and low trees. (the board is for more recognition)
	29 %	Excluded areas.

We exclude the arid and agricultural regions because they are discussed previously.

4. Results and Conclusion

It has been known that the classification of satellite images is an efficient way to determine the land cover in Ash-Shatra city. By using the supervised classification, one can perform the mapping of a larger area around the city and observe its land features in a relatively short period of

time.

The Satellite imagery used in this study proved to be appropriate for distinguishing the land cover categories with a spatial resolution of 10 m. There are some problems in the digital classification with a high resolution image, so we make several enhancements, and use special treatment in Adobe Photoshop to produce the resulted map to get the final maps.

The satellite image is very important resource to get the proper data base about the cities.

Our study may be a good data base to develop GIS applications in the city, and can be depended as an urban map to the municipality uses.

The produced maps display a preview to the land cover around Ash-Shatra, the vegetation distribution, palm trees gardens, water resources, and the boundaries of the built-up areas in the city.

We had know the percentage of the vegetation areas in the neighboring fields, and the arid areas which need to many water resource projects to be reformed for agricultural purposes.

A lot of palm trees are there in the city on the right and left side of the main river.

Many houses have plants in their gardens, so this may be effect the atmosphere in the city.

5.References:

[1] NASA Data Base which is related with Google Earth programs.

[2] Taken by GPS instrument in the site.

[3] ERDAS IMAGINE Tour Guides, provided with the software, On-Line Help Copyright (c) ERDAS, Inc.., 1982-1999.

[4] Richards A. & Xiuping Jia, "**Remote Sensing Digital Image Analysis**", Springer – Verlag Berlin Heidelberg New York, 1999.

[5] Sabin F. F., J. R, "**Remote Sensing Prin**cipals and Interoperation", second edition. W. H. Freeman and Company, New York., 1987.

[6] Lillesand T.M., and Kiefer R.W., "**Remote Sensing and Image Interpretation**", John Willy and Sons New York, 2000.

[7] Gibson P.J., "**Introductory Remote Sensing: Principles and Concepts**"; Routledge Taylor and Francis group, 2000.