Conclusions

SRTM - Data has been used for modelling the sea level rise phenomena. The results obtained show the affect of this phenomenon on the economic sectors like urban area and the infrastructure of the cities. The urban area and roads are more affect than the pipe lines because of their locations.

Recommendations

1. There is a continuous need for vulnerability assessment within the framework Ofimproving coastal zone management.

2. Due to sea level rise, areas will be salted and hence will become uncultivable. Such areas can be protected by contracting the defending walls. But the price rather high.

3. Future land use planning can be done looking towards the different scenarios of sea level rise for instance making highway, railroad, new built up area etc.

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THE USE OF REMOTE SENSING AND GIS TO STUDY THE LAND COVER OF AN AREA CLOSE TO THE CITY OF TRIPOLI LIBYA

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The GREAT Jamahiriya is located in North Africa along the Mediterranean sea. The study area is subtended by the sea at north and a latitude line of $32^0 4\theta'$ south and longitude line of $12^0 57.8'$ east and longitude line of $12^0 39^z$ west. This section is very important because it is mainly an agricultural area as well as it is full of forests and trees. The technologies of Remote Sensing and Geographic Information System (GIS) are both used to study the changes of replacing the agricultural area by the small farms and residential projects. In other words it is

intended to study the random and unorganized regional planning on the land cover. The technology of Remote Sensing and GIS programs were obtained from the Libyan Center of Remote Sensing in Tripoli. The aim and the objective of this research is to study the changes that affect the land cover due to the random building and cutting the trees and replacing them by concrete buildings between 1986 and 1993 This study were carried out in three stages: Stage one obtaining the satellite images from the Remote sensing center using SPOT Satellite type xs. Stage two :Field Investigation to check the actual data. And Stage three analysis the obtained data by using the GIS programs. The result of this Study showed that a huge change in the land cover has occurred, in other words most of the forests and agricultural area that used to protect the City of Tripoli has been lost and instead concrete buildings and small recreational farms have been constructed.

This policy is due to the random and unorganized planning led to less water and more dessert around the City of Tripoli. This finding will be showed by maps and tables. As an examples of this wrong policy, in 1986 the total area of forests are 4328.83 hectares but in 1993 this area was reduced to 2449.19 hectares. And other example of different trees the area is also reduced 20151.70 hectares in 1986 but in 1993 this area was reduced to 16737.00 hectares. Other examples will be shown in the full paper. In summary this paper will focus on three points:

1. Use the available technologies of Remote Sensing and GIS programs.
2. Study the land cover, of the designated area.
3. Analyze the Data using the GIS programs.

Introduction

Satellite remote sensing can provide a variety of useful data for this type of research. A variety of sources for such data exist, and while the data can be expensive and require extensive digital image processing, they provide a synoptic view which is not available from aerial photography. It takes over 200 aerial mapping photos to cover the same area as a single satellite image. The data that is used in this research was obtained from the French Satellite SPOT. The French SPOT data is a commercial civil remote sensing system developed by the French. It has a special resolution of 20 meters for multi-spectral data, which records information in three bands of the spectrum, and a 10 meter spatial resolution for a panchromatic band. The resolution of these images available from space can provide significant improvements in the utility of these data for different applications especially as in Tripoli Libya. The amount, rate, and intensity of land use and land cover are high in Libya. There fore, there is an urgent need to

address these changes to serve the development plans of the country. In this study both the supervised and unsupervised classification are used.

The data were obtained for the years 1986 and 1993 in other words the study area is subtended by the sea at north and a latitude line of 32^0 40^z south and longitude line of $12°$ 57.8^z east and longitude line of 12^0 39^z west. This section is very important because it is mainly an agricultural area as well as it is full of forests and trees Figure 1 gives the general layout of the study area.
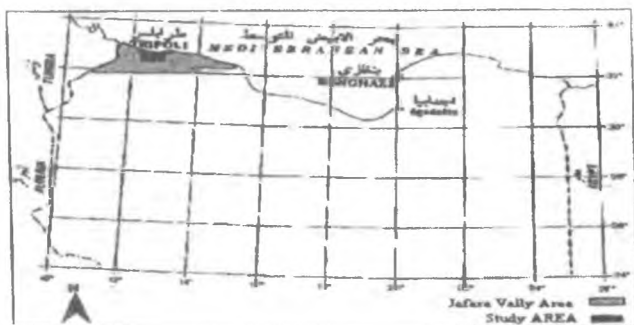

Figure 1. Study Area Location

These SPOT images which has been classified into land use and land cover map of the area, and accurate modem land cover maps can be produced using SPOT satellite imagery as shown in Figure 2 and Figure 3 in the next sections.
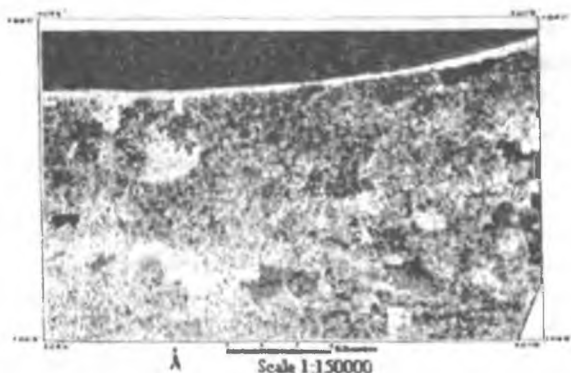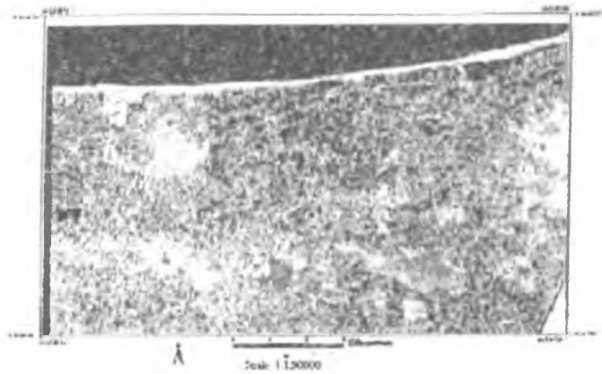

Scale 1:150000

Figure 2. Satellite imagery for the Study Area 86

Figure 3. Satellite imagery for the Study Area 93

Therefore, studying the land cover and understanding the changes that occur using the technology of remote sensing the GIS will facilitate the comparison between the different types of land cover. The research objectives can summarized as follows:

1. Using the technology of remote sensing and GIS for studying the great spreading of residential areas as well as agricultural areas.

2. Determination of the changes in the land cover and knowing the factors that cause these changes.

3. Link the results obtained with the GIS so that future analysis and usage will be very handful and easy to make certain recommendations for planners and preserve the green and forest areas.

Methodology

The following stages have been used to complete this study:

1. Obtaining the SPOT satellite images for the study area.

2. Obtaining the Topographic maps of scale of 1:50000 for the study area as well.

3. Classified and analyze the satellite images that are needed for the study area

4. Carry field investigations (field study) to see whether there are some differences between the data that are obtained by satellite images and the data obtained by the field studies.

5. The results stage and make the necessary analysis using some very well known programs such as Erdas Imagine for satellite images and Arcview for GIS.

The general classification of the land cover of the study area will be shown below:

a) Stage of collecting the satellite images for the study area.

b) Subset process of the needed part from the SPOT satellite image.

c) Preliminary treatment stage of the images for both periods 86 and 93.

d) Visual analysis stage.

e) Classification stage.

f) Comparison stage.

g) Results stage.

h) Converting into the GIS stage.

This study has been carried out using the satellite images from SPOT that are produced in may for the years 1986 and 1993. SPOT images with the resolution of 20 meters for the images of multi spectrum (XS) for wave lengths of: 0,5 - 0,59 micrometer (1st channel), 0,6 - 0,68 micrometer (2nd channel) and 0,79 - 0,83 micrometer (3rd channel). In this study the program Erdas for satellite image treatment and analyze was used through the ground control points and Arcview program was also used for the analysis of the data in GIS.

The subset process was done the subset the region needed from the satellite image (SPOT) which represents an area of 60 km × 60 km because the study area is a portion (scene) of this image Erdas imagine 8.3.1 was used for this process. Figure 2 and Figure 3 show the subset images for the study area in the period of 86 and 93. Satellite images(data) that are obtained from the space can be be analyzed directly because they contain some errors and distortions, therefore, a preliminary treatment was used in which encompass radiometric correction and then geometric correction that is caused due to the spherical of the earth and the satellite location. Then the data will be ready for the user, the satellite images treatment depends on the visual, photogrammetric, and electronic techniques.

This help present the and show the image contents very clear and will ease the interpretation process and also the treatment process will be assisted by the use of topographic maps of a scale 1: 50 000 and the use of georefrence. The georefrence process is used due to the lack of coordinate system between the information from the satellite and the ground coordinate. In this process the ground coordinates from the topographic maps have been compared with the satellite images, (it is use Erdas imagine 8.3.1).

The most important image classification methods used in this research are:

1) Maximum Distance to mean classification.

2) Minimum likelihood classification and.

3) Parallelepiped classification.

The classification of the land cover for the study area was done according to the following steps:

Firstly UNSUPERVIZED CLASSIFICATION with the visual analysis to know the different types of land cover for 1986 and 1993. These types of land cover are: Forest areas, Mixed tress, Agricultural areas, Bushes areas Soil areas, Sand areas and Urban areas. **Secondly,** use the above three methods of classification. Figure 4 and Figure 5 (space maps) illustrate the classified satellite images for the years 86 and 93 for the study area.

Figure4: Satellite Image for the

Figure 4. Satellite Imagery for the Study Area 86
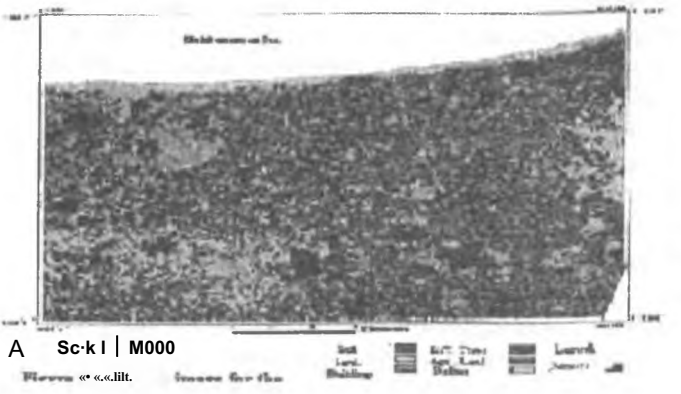

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Figure 5. Satellite Imagery for the Study Area 93

The area and percentage every type of land cover with respect to the whole area were calculated as shown in Table 1, 2.

Table 1

Area and percentage of each classified type in 1986

Type	Area in hectare	Percentage %
Forests	4328,83	10,12
Mixed Trees	20151,70	47,14
Agricultural areas	6562,38	15,35
Bushes Areas	4581,00	10,72
Soils areas	3729,53	8,72
Sand areas	1506,70	3,52
Urban areas	1893,12	4,42
Total	42753,26	100,00

Table 2

Area and percentage of each classified type in 1993

Type	Area in hectare	Percentage %
Forests	2449,12	5,73
Mixed Trees	16737,00	39,14
Agricultural areas	15321,80	35,83
Bushes Areas	2765,00	6,46
Soils areas	2140,00	5,00
Sand areas	863,65	2,03
Urban areas	2476,86	5,79
Total	42753,43	100,00

Then GIS techniques and methodologies are beyond the scope of the study it is well explained in several books and literature please refer to the references to get more knowledge about the subject. However, some programs were used for each classified type to produce maps representing the changes in the land cove for the 86 and 93 for all the classified types mentioned above. Figures 6, 7, 8, 9, 10, and 11 show the the distribution each classified type for the years 1986 and 1993.
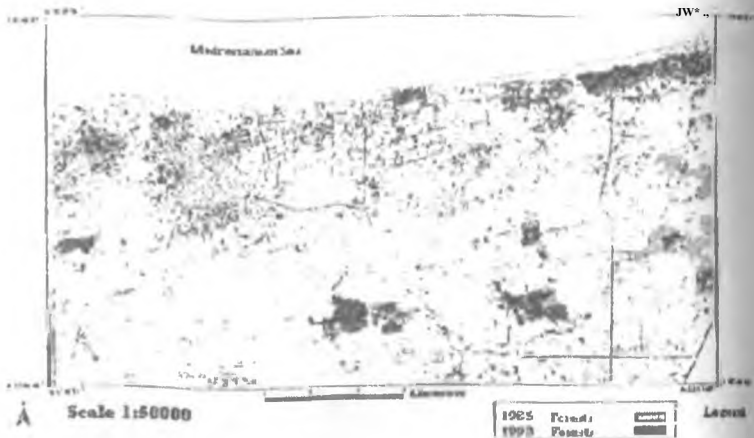
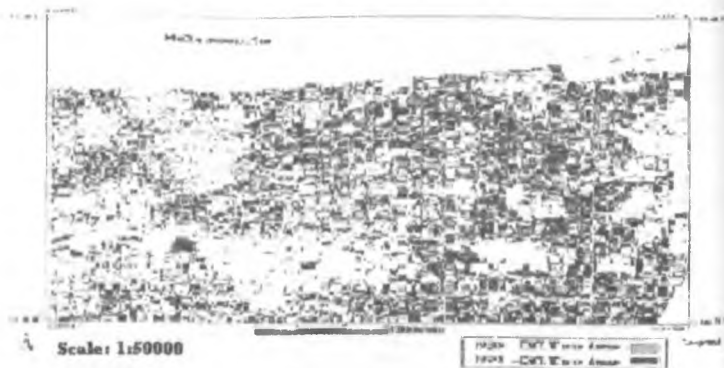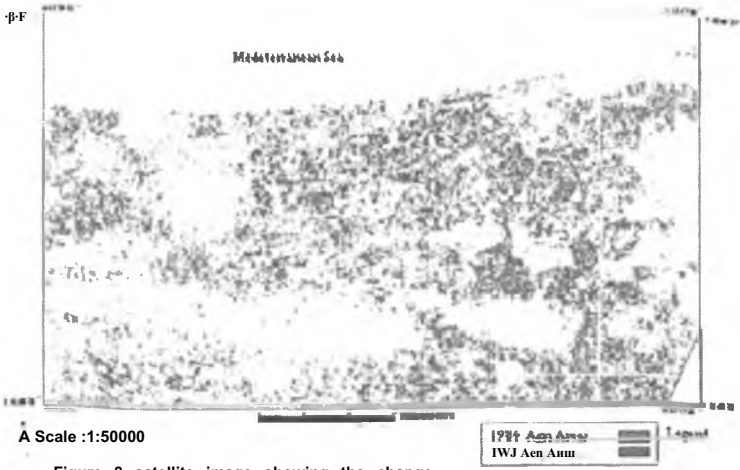**Figure 6 Satellite Imagery showing the shange in forest Areas**

Figure 7. Satellite Imagery showing the shange in Mixed Areas 86-93

Prior the this stage a GIS stages were followed as:

I) Producing the classified image for the two periods 86 and 93.

II) Produce the different types in raster format.

III) Converting these layers into vector format.

IV) Entering these layers into GIS.

V) Compare between these layers and.

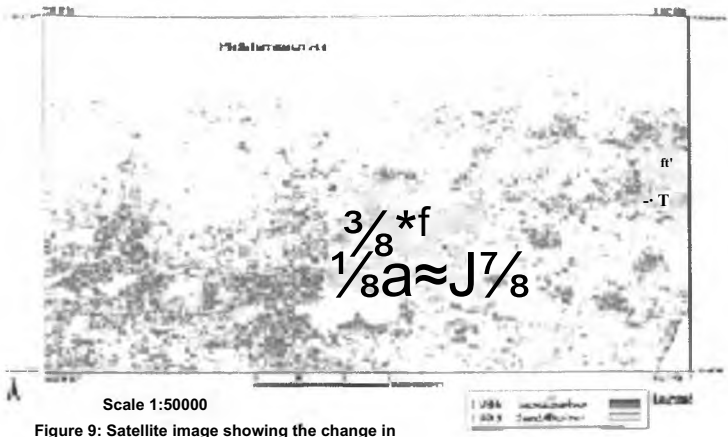VI) Produce the map representing the change for each classified type.

Figure 8. Satellite Imagery showing the shange in agricultural Areas 86-93

Figure 9. Satellite Imagery showing the shange in Soilandbushes Areas 86-93

Ficure Jfl: Satelliie unage showing the
change in «and areas 86-93

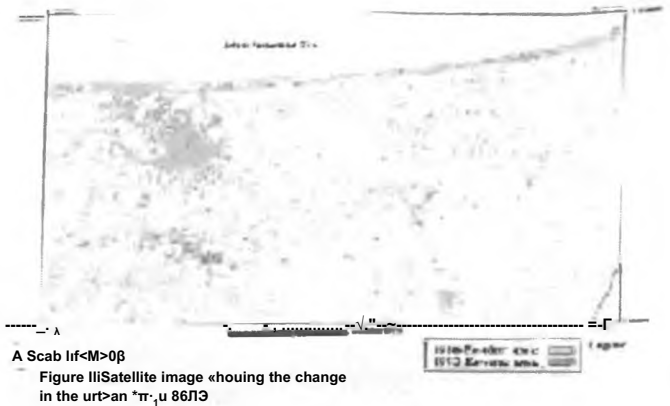**Figure 10. Satellite Imagery showing the shange in sand Areas 86-93**

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Figure IliSatellite image «houing the change
in the urt>an *π-₁u 86ЛЭ

Figure 11 Satellite Imagery showing the shange in the urban Areas 86-93

Results and Discussions

The results are summarized in Table 3.

Studying the results given in the above table, it can be said that:

1) A reduction in the area of forests by 4,4 %.
2) A reduction in the area of mixed trees by 8 %.
3) An increase in the agricultural area by 20,46 %.
4) A reduction in the area of soil and bushes by 8 %.
5) a reduction in the area of the soils by 1,5 % and.
6) an increase in the urban areas by 1,37 %.

Table 3

Summary Results

Type	Area in Hectares 1986	Areas in hectares 1993	The Change
Forests	4328,83	2449,19	-1879,64
Mixed Trees	20151,70	16737,00	-3414,60
Agric. Ares	15321,80	6562,38	+8759,12
Soil and bushes	4905,00	8310,53	-3405,53
Sand areas	868,65	1506,70	-638,00
Urban areas	2476,86	1893,12	+583,74

This changes in the land cover of the study area is due to wrong usage of the land sources and this led to unbalanced of the land cover. Comparing the different types in Table 3 a clear evidence of change in the land cover between 1986 and 1993.

Conclusion and Recommendations

From the above discussion, it can be concluded that:

1) The usage of space data to study the land cover will reduce the cost and time.

2) From this study it appears that the management of agricultural land is un organized and the crops are randomly distributed in the study section.

3) A clear reduction in the areas of forests i.e. these huge areas has been switched in to small farm and recreational area

4) The urban planning without the consulting of the different project management led to eliminate most of the trees area (green areas).

Finally, it can be recommended that:

1) Continue studying this subject for Ihis area and similar areas along the coast

2) Speed up the protection and reserve the areas of forests.

3) There should be a corporation between the different organization and managements relating to this subject.

4) There should be a specialized office to educate the farmers to manage there lands.

5) Plant several trees to replace the trees that have been removed.

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ДИСТАНЦИОННОЕ КАРТОГРАФИРОВАНИЕ БОЛОТ И ЗАБОЛОЧЕННЫХ ЗЕМЕЛЬ БЕЛАРУСИ

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Рассмотрены методические подходы дистанционного картографирования болот и заболоченных земель с позиций индикационного ландшафтоведения. Намечены наиболее перспективные направления исследований: морфогенетическое районирование, индикация экзогенных процессов, охрана природы.

Изучение болот Беларуси связано с различными аспектами их хозяйственного освоения и имеет длительную историю. Так, первые мелиоративные мероприятия относятся к началу XVI века, когда они проводились на территории нынешнего Кобринского района (землевладения польской королевы Боны Сфорцы) [1]. Характер заболачивания земель учитывался при изыскании лесосплавных и судоходных каналов, при составлении карт генерального межевания (начало XIX века). На картах времени работы экспедиции И.И. Жилинского (2-я половина XIX века) болота дифференцированы по характеру растительного покрова: лесные, закустаренные, травяномоховые, с открытыми водными акваториями. Невысокой информативностью отличаются и мелкомасштабные съемочные карты 20-х - 30-х годов прошлого века, а также первые послевоенные среднемасштабные съемки.

Позднее, с 50-х годов, в Беларуси начала осуществляться крупномасштабная геологическая съемка (преимущественно для целей мелиорации). В комплекте карт этой съемки составлялись карты болот и заболо-