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ASSESSMENT OF VEGETABLE COVER IN SOUTH IRAQ BY REMOTE SENSING METHODS

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ABSTRACT

The vegetable cover plays an important role in the environment and Earth resource sciences. In south Iraq, the region is classified as arid or semiarid area due to the low precipitations and high temperature among the year. In this paper, the Landat-8 satellite imagery will be used to study and estimate the vegetable area in south Iraq. For this purpose many vegetation indices will be examined to estimate and extract the area of vegetation contain in and image. Also, the weathering parameters must be investigated to find the relationship between these parameters and the arability of vegetation cover crowing in the specific area. The remote sensing packages and Matlab written subroutines may be use to evaluate the results.

Keywords: date palm, wheat, barley, image processing, classification.

1. INTRODUCTION

Due to Turkey's ongoing projects, in the coming years will become Iraq's water situation is very critical as a result of storing more than the first (40-50%) of water from the Euphrates River and (17.5 -34%) of the Tigris River, and this of course, will lead to the emergence of a large water deficit in Iraq, which will reflect negatively on the overall conditions of economic and social damage inflicted by heavy in the whole areas and particularly agricultural. [1]

The scarcity of water resources in Agricultural sector is very critical now. The irrigated agricultural sector in Iraq balled about (85%) from water resources that belongs to the agricultural sector, [2]. In the same time there was decreasing in water amount supplying to Iraq from Tigris and Euphrates by the rate (1.5%), the decreasing in water amount in Tigris was (3.2 %), while the increasing in water amount in Euphrates record annual average growth about (1.3 %) in period (1991-2008), this decreasing influence on quality of two rivers water because the salt increasing in both of them. The receptor water rate belong to agriculture in this period was (47.35) milliard cubic meter yearly, while the total requirements of water to agricultural purposes was (29.88) milliard cubic meter yearly in study period. The water lost rate was (17.47) milliard cubic meter yearly in (1990-2008).This indicate that the cause of water scarcity in irrigated Agricultural Sector is non rational-classical methods of irrigation more than the decreasing of receptor water rate belong to agriculture, [3].

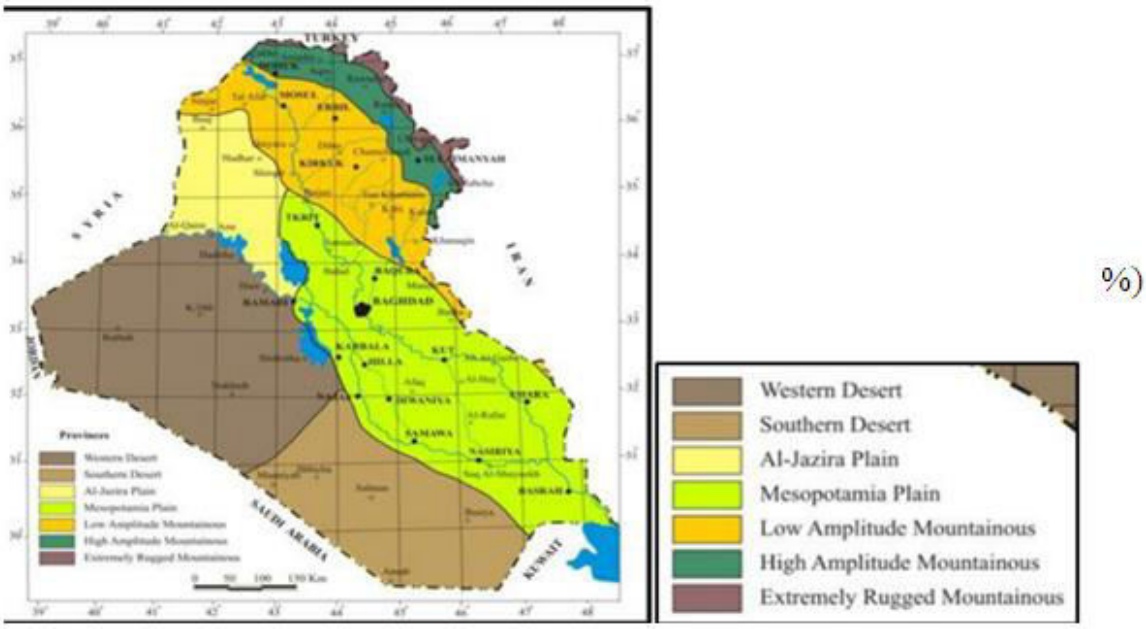
The provinces of central and southern Iraq are the food basket of Iraq, but (80%) of the region suffers from varying degrees of salinity due to several factors, including climate change and poor administration also, and that the fact that main rivers in Iraq are from neighbouring countries, this is a major threat to ensure access to water resources on an ongoing basis and this matter threatens agricultural production where and displays large areas where desertification and what the resulting environmental problems and economic and social, [1].

1.1 Study area

The study area is located in the south of Iraq (Map 1-a), shares borders with Kuwait and Saudi Arabia to the south, Jordan to the west, Syria to the northwest, Turkey to the north, and Iran to the east (Map 1- b)[10]. The area of Muthanna province (51740) Km^2, and the proportion of the amount (11.9%) of the total area of Iraq, Regarding its astronomical location, it lies between latitudes (31°43 ′ 43″ - 29° 03′ 45″) north and longitudes (46°41′ 15″ - 43° 48′ 45″) east, [4]. The map (Map 1-c) shows the main sections or large geospatial units from which a surface is formed the study area, which extends over two main sections of Iraq's surface, is the Mesopotamia Plain and Southern Desert, [5].

(a)

(b)



(c)

Figure-1. a- The Provinces of Iraq b- Iraq in the Middle East [4] c-Surface sections in Muthanna Governorate [5].

1.2 Iraqi sand dunes

The deserts lands represent (42.5%) of the Iraqi lands, and about (90%) of the Iraqi lands are.

1.2.1 Al-Muthanna Badia

Al-Muthanna Badia is characterized by fertile land suitable for agriculture, but suffers from scarcity of surface water, high temperatures, low rainfall and dry climate. For this reason, the investment of underground water in the desert of Muthanna has a promising future. In the study area there are large amounts of groundwater resources as well as the spread of good lands and fertile, so it helped farmers to agriculture, especially Crops such as wheat and barley. Government subsidies have helped farmers by giving them loans to dig wells the area cultivated with wheat reached 92,900 donum and 27,000 donum barley According to the Directorate of Agriculture for 2016, Figure-2 shows the desert of Muthanna and the spread of wells and springs.

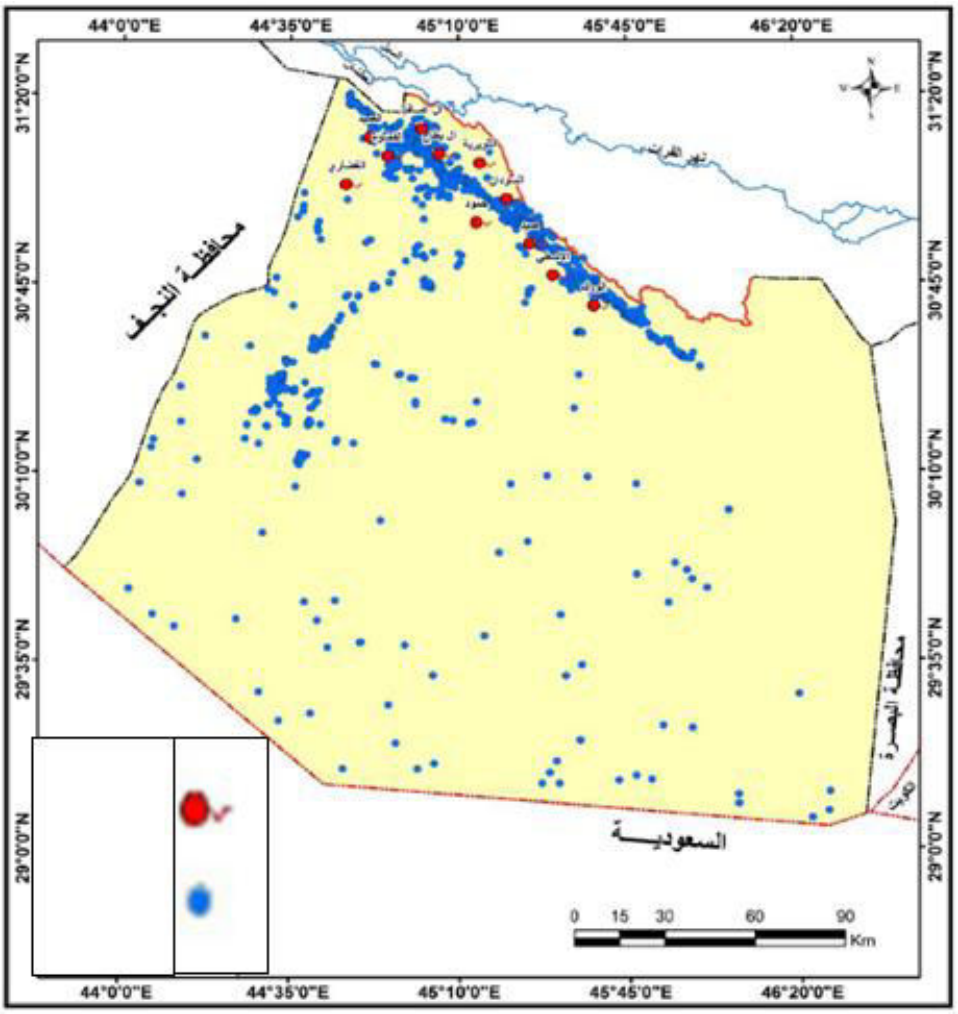


Figure-2. Distribution of water wells and springs in Muthanna desert for 2016, [6].

1.2.2 Climate

Climate is an important physical element because it indicates the atmospheric condition of heat, moisture and circulation; Physical processes in the atmosphere include the transfer of incoming solar radiation through the atmosphere to the surface, the heating of the surface, the emission of outgoing infrared radiation, the absorption of infrared radiation by atmospheric gases, the evaporation of water, the condensation of atmospheric water vapor into clouds, and precipitation.

A. Solar radiation

Solar radiation first and foremost heats the Earth's surface which in turn determines the temperature of the air above. The receipt of solar radiation drives evaporation, so long as there is water available. Heating of the air determines its stability, which affects cloud development and precipitation, [7].

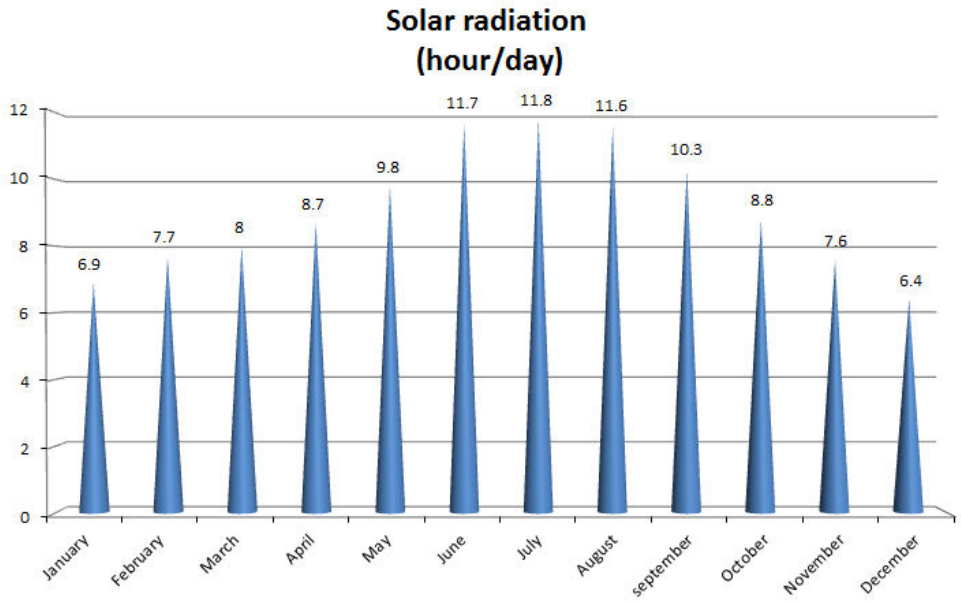


Figure-3. Monthly rate of actual solar hours (hour / day) of Samawah station during the period (1985-2015), [6].

B. Temperature

To a large extent, the temperature of the Earth's surface is determined by the amount of radiation received from the Sun. The atmosphere is mostly transparent to incoming solar radiation, i.e., this radiation is not absorbed by gases in the atmosphere, with the notable exception of solar ultraviolet radiation, which is absorbed by ozone mostly located in the stratosphere, [8].

Temperature is a very important factor in determining the weather, because it influences or controls other elements of the weather, such as precipitation, humidity, clouds and atmospheric pressure, [e]. Figure-4 shows that the highest temperature in July was 44.5 ° C while the lowest temperature was 17 ° C in January, starts to rise from April and continues to rise to its highest levels during the summer months (June, July and August) and then starts to decline from October to the lowest Monthly rates during January.

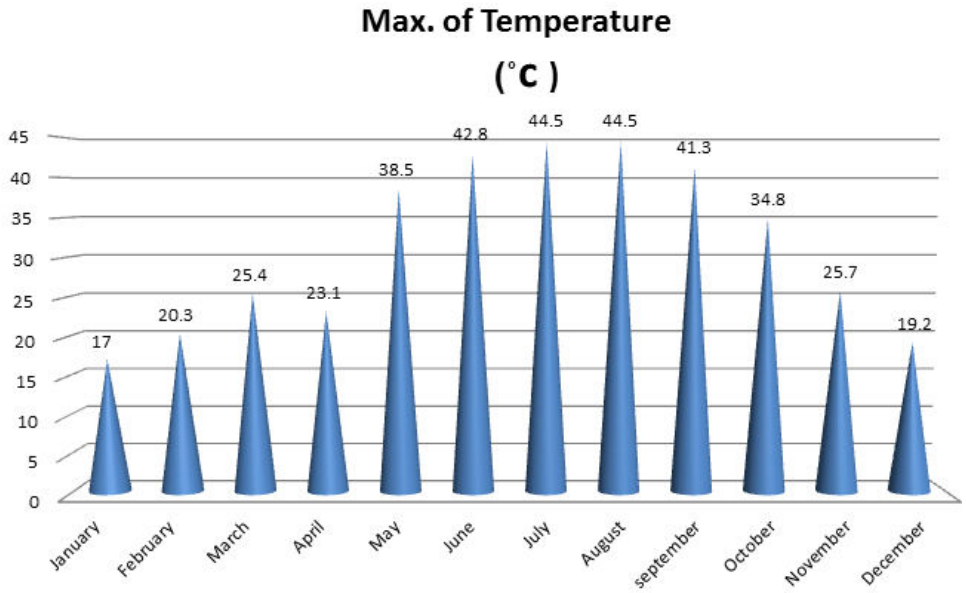


Figure-4. Monthly average of maximum temperature for the period 1985-2015, [6].

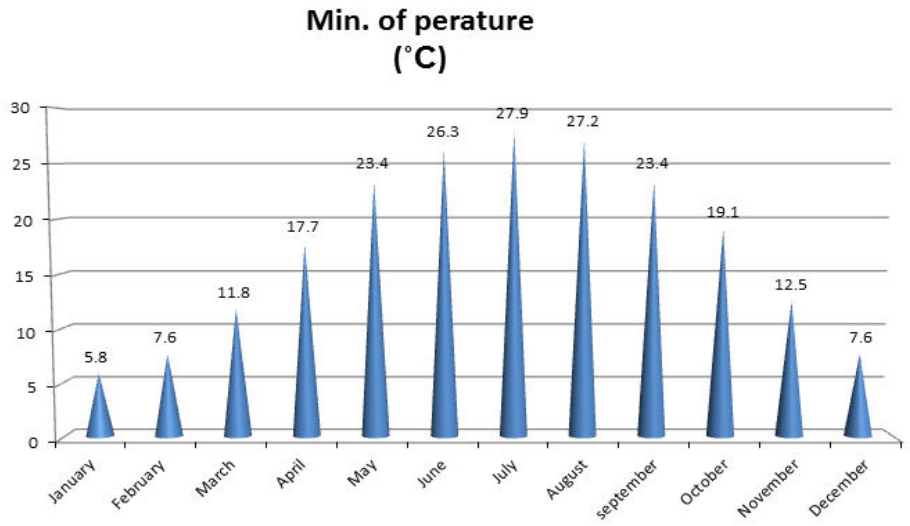


Figure-5. Monthly average of minimum temperatures of Samawah station during the period (1985-2015, [6].

C. Rainfall: The amount of rain falling in the study area varies from year to year, with rainfall falling in the study area during the period From October to May. On the other hand, rainfall is very low or nil during the summer from June to September The lack of precipitation and the rise in summer temperatures have contributed to increased evaporation rates and reduced humidity.

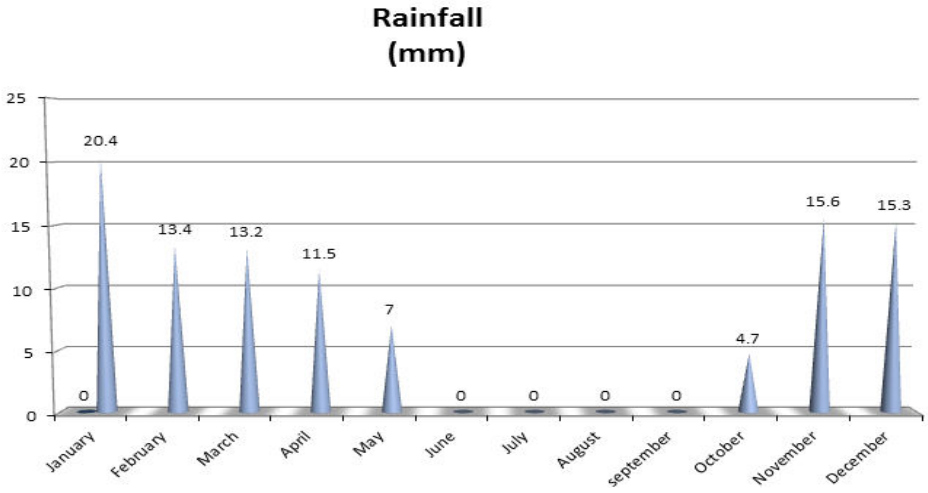


Figure-6. Monthly rainfall rate (mm) of Samawah station during the period (1985-2015), [6].

D. Wind

Wind is simply the movement of air from high pressure to low pressure, the speed of the wind is determined by the difference between the high and low pressure, the greater the difference the faster the wind speed. [7]

The prevailing winds in the study area are the Northwest Winds and constitute 75% of the total wind blowing on Iraq, especially the study area due to the presence of low pressure zone in Central Asia, the Indian Subcontinent and the Arabian Gulf, offset by a high pressure zone in the Anatolian Plateau, [8].

The prevailing winds in the study area play a major role, surpassing the rest of the other factors in the desertification of the region because they cause surface dryness as well as its obvious role in erosion and sedimentation; wind is the main factor in the formation of sand dunes in the sedimentary plain. Because the sand dunes extend longitudinally toward the north-west and south-east, indicating that the prevailing winds in the study area are the main cause, where it is recorded (28.4) at Samawah stations, as shown in Table-1.

Table-1. Wind direction of Samawah station for the period (1970-2007), [9].

NorthWest	West	Southwest	South	Eastern	East	Northeast	North	calm	Wind direction
28.4	21.8	4.8	2.7	5.8	7.0	5.2	12.0	12.3	

The annual average wind speed (3.1 m/ s) was in the study area, so recorded in the station of Samawah. Wind speed varies between seasons, Wind speed increases in the summer months (April, May, June, August), to its general average (3.5, 3.6, 3.7) m / s, In the July, While the maximum speed recorded in July, (3.8 m / s). As shown in the Figure-7.

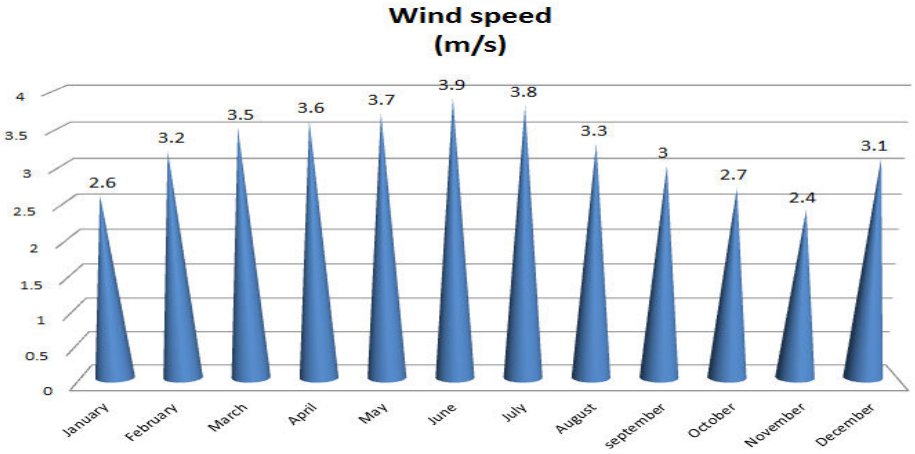


Figure-7. The annual average wind speed in Samawah station for the period (1985-2015), [6].

E. Evaporation

Evaporation is the process of transforming liquid water in the oceans and in the soil to water vapor, an invisible, odorless gas that enters the atmosphere. Four weather parameters - solar radiation (amount of sunshine), wind speed, humidity and temperature - impact the rate of Evaporation, [10].

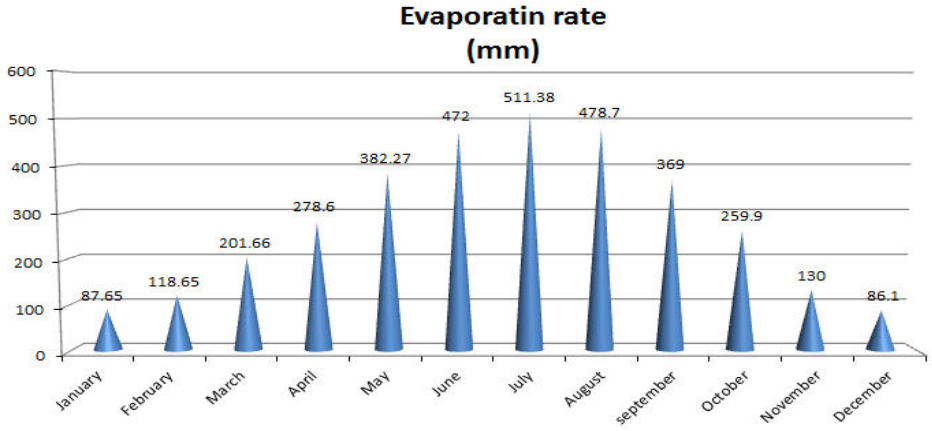


Figure-8. Monthly average of evaporation values (mm of Samawah station during the period (1985-2015), [6].

According to evaporation values shown in Figure-8, the highest evaporation value during July was 511.38 mm. The lowest evaporation value during December was 86.1 mm, January 87.65 mm. Evaporation has a negative impact on the environment as it builds up salts and increases saline deposits and eventually leads to deterioration of surface water quality.

F. Relative humidity

Humidity is a general term that refers to the water vapor content of the air. Absolute humidity is the actual amount of water vapor per volume of air. Relative humidity is the percentage of water vapor in the atmosphere compared with the maximum amount of water vapor that the atmosphere could contain at that

temperature. The dew point of a given parcel of air is the temperature, to which the parcel must be cooled, at constant pressure, for the water vapor component to condense, [10].

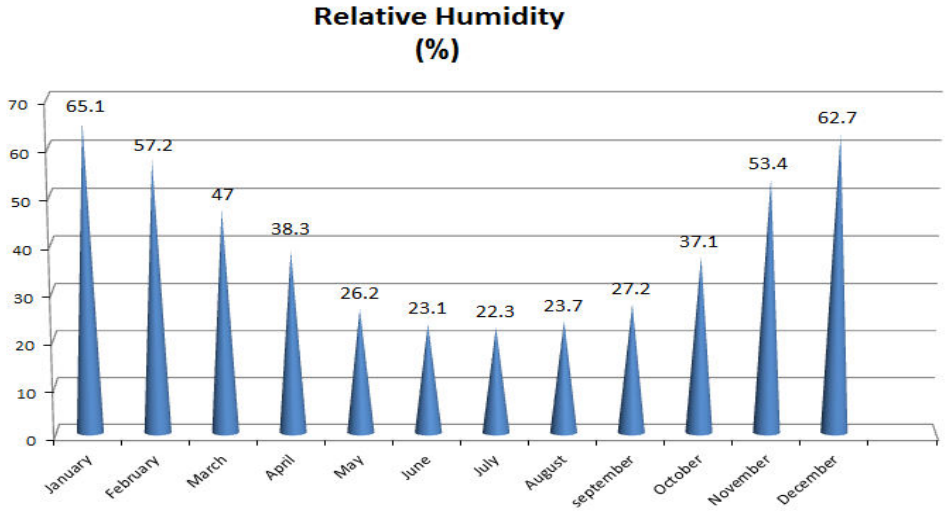


Figure-9. Monthly Relative Humidity Rate of Samawah station during the period (1985-2015), [6].

2. MATERIALS AND METHODS

2.1 Download satellite images

In this study, long-term satellite measurements were compared with field monitoring data for the assessment of desertification. For this reason, and in order to pursue change in the study areas for long periods, Landsat images were used to cover 26 years from 1990 to 2016. The main source which was adopted to obtain spectral bands of the studied area was the USGS Earth Explorer. Representing by using Landsat 4-5, Landsat 7 and Landsat 8. For more information see Table-2.

Table-2. Information about satellite images for the study area, [11].

information	1990	2000	2010	2016
Spacecraft Identifier	LANDSAT_5	LANDSAT_7	LANDSAT_7	LANDSAT_8
Collection Category	T1	T1	T1	T1
Data Type Level-1	TM_L1TP	ETM_L1TP	ETM_L1TP	OLI_TIRS_L1GT
Sensor Identifier	TM	ETM	ETM	OLI_TIRS
Map Projection Level-1	UTM	UTM	UTM	UTM
UTM Zone	38	38	38	38
Datum	WGS84	WGS84	WGS84	WGS84

2.2 Test sites and samples collection

Field measurements were conducted in spring season, 2017 and 2018 in Muthanna province. Each location was recorded using a GPS device for the purpose of integrating results with climate data and the landsat images data. Data on palm, wheat and barley were collected from the Directorate of Agriculture in Muthanna, and farmers were interviewed in the study area to identify changes in agriculture.

2.3 The date palm

The date palm (*Phoenix dactylifera* L.) is one of the oldest cultivated fruit trees and was well-known in Babylon, Iraq 4000 B.C. Iraq remains one of the leading date producing countries in the world. Before 1991, it was the world's largest producer and had the most extensive date forest in the world. However, a serious decline over the past 30 years occurred due to numerous military conflicts since the 1980s. During recent wars, large numbers of date palm trees were destroyed, [13]. Figure-10 shows the number of palm trees as per Table-3.

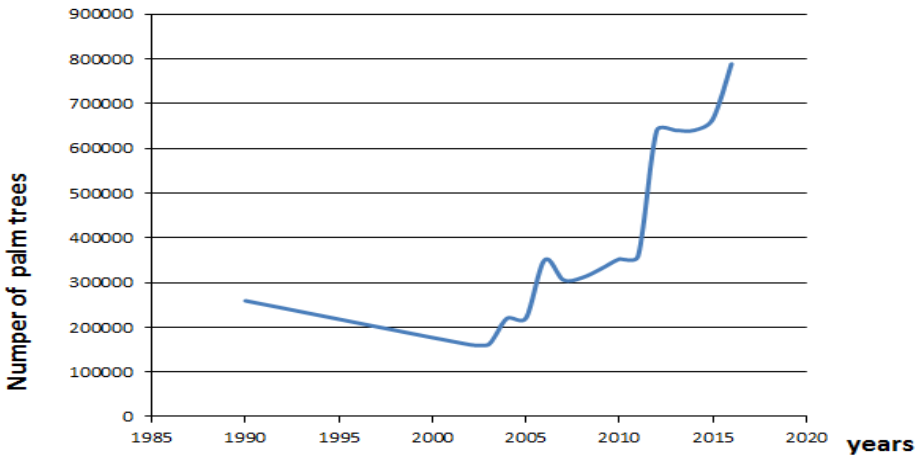


Figure-10. The number of palm trees According to Table-3.

Table-3. The number of palm trees in Muthanna province for the period (1990 - 2016), [12].

Years	Number of palm trees	Years	Number of palm trees
1990	259200	2009	330120
2002	161200	2010	352457
2003	161200	2011	358457
2004	220091	2012	639700
2005	220096	2013	640228
2006	350006	2014	640328
2007	305980	2015	665078
2008	310653	2016	788656

2.4 The wheat

Wheat The growing season for wheat in Iraq is commonly between October-November and March-April. The Figure-11 shows the areas (donum) of wheat fields for Muthanna province during the period (1990 - 2016) according to Table-4.

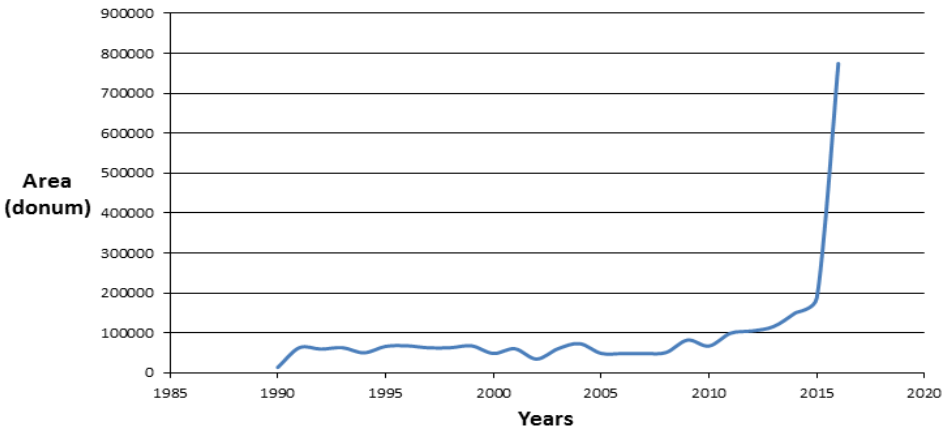


Figure-11. Area of wheat fields According to Table-4.

Table-4. Area of wheat fields in Muthanna province for the period (1990 - 2016), [12].

Years	Area (donum)	Years	Area (donum)
1990	13187	2004	73097
1991	62719	2005	48619
1992	59340	2006	48246
1993	62858	2007	48439
1994	50184	2008	50574
1995	66101	2009	81960
1996	67638	2010	67032
1997	62500	2011	99014
1998	62830	2012	104895
1999	67384	2013	115850
2000	48447	2014	149892
2001	60192	2015	187625
2002	34480	2016	774389
2003	60225		

2.5 Barley

Barley The growing season for barley is similar as wheat in Iraq and is commonly grown between October-November and March-April. The Figure-12 shows the areas (donum) of Barley fields for Muthanna province during the period (1990 - 2016) according to Table-5.

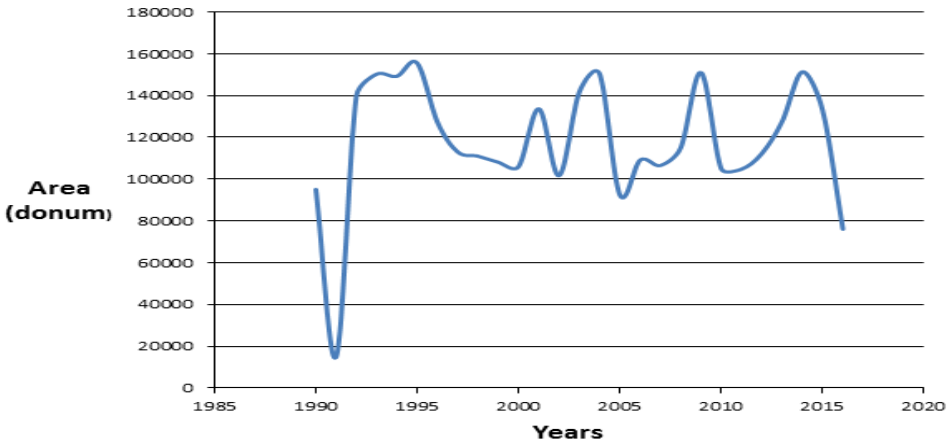


Figure-11. Area of Barley fields According to Table-5.

Table-5. Area of Barley fields in Muthanna province for the period (1990 - 2016). [10]

Years	Area (donum)	Years	Area (donum)
1990	95110	2004	150358
1991	14924	2005	92421
1992	139935	2006	109131
1993	150293	2007	106507
1994	149269	2008	115066
1995	155558	2009	151071
1996	127182	2010	104951
1997	113000	2011	104767
1998	111000	2012	112225
1999	108092	2013	127600
2000	105941	2014	151394
2001	133710	2015	132940
2002	101636	2016	76005
2003	141832		

3. RESULTS AND DISCUSSIONS

3.1 Covers the land classification of selected images

The classification methods used in the current study are classification techniques (unSupervised, Supervised) by program ENVI 5.1. Supervised classification techniques are (the minimum and maximum category of the banned supervision category). The unSupervised classification techniques in this study are Isodata classification techniques. The study area can be classified into 18 categories. When comparing the results obtained from the methods of classification with the real data we found that the best method is Minimum Distance classifier, as shown in the following Figure-13.

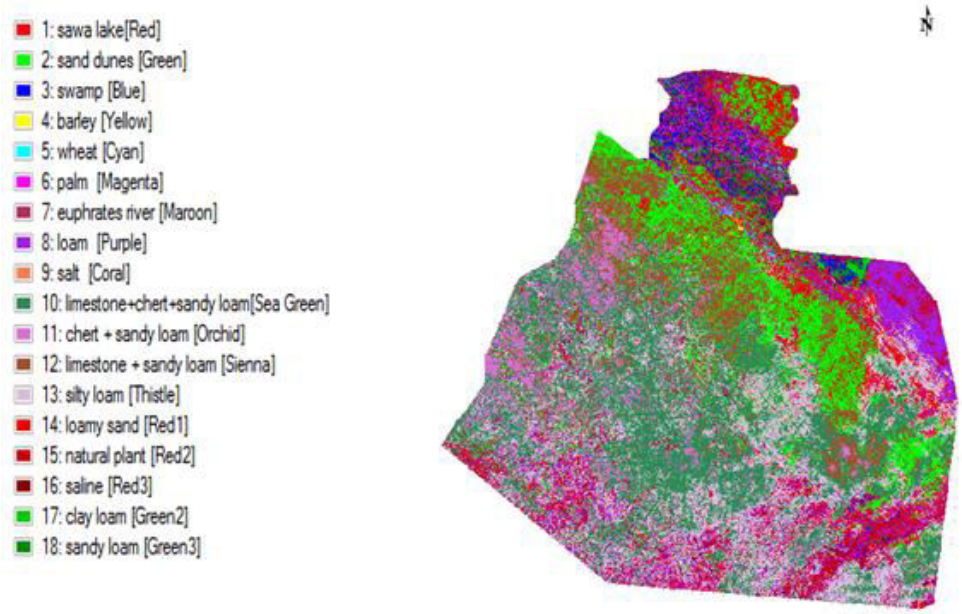


Figure-13. Classification of the Muthanna Province - 2016 using Minimum Distance classifier technique.

3.2 The date palm statistics

After processing images, the date palm distribution was obtained in the study area for the years (1990-2000 -2010- 2016) as shown in Figure-14. To calculate date palm statistics, we use (Class Statistics) to calculate statistics based on the classification results. From the observation of the resulting statistics, there was a decline in the area of palm orchards between 2000 and

2010, while the percentage rises in 2016. Date palm statistics were recorded in 1990 (474077700 m^2), while in 2016 (675269100 m^2), the area increased (201191400 m^2) During the last 26 years.

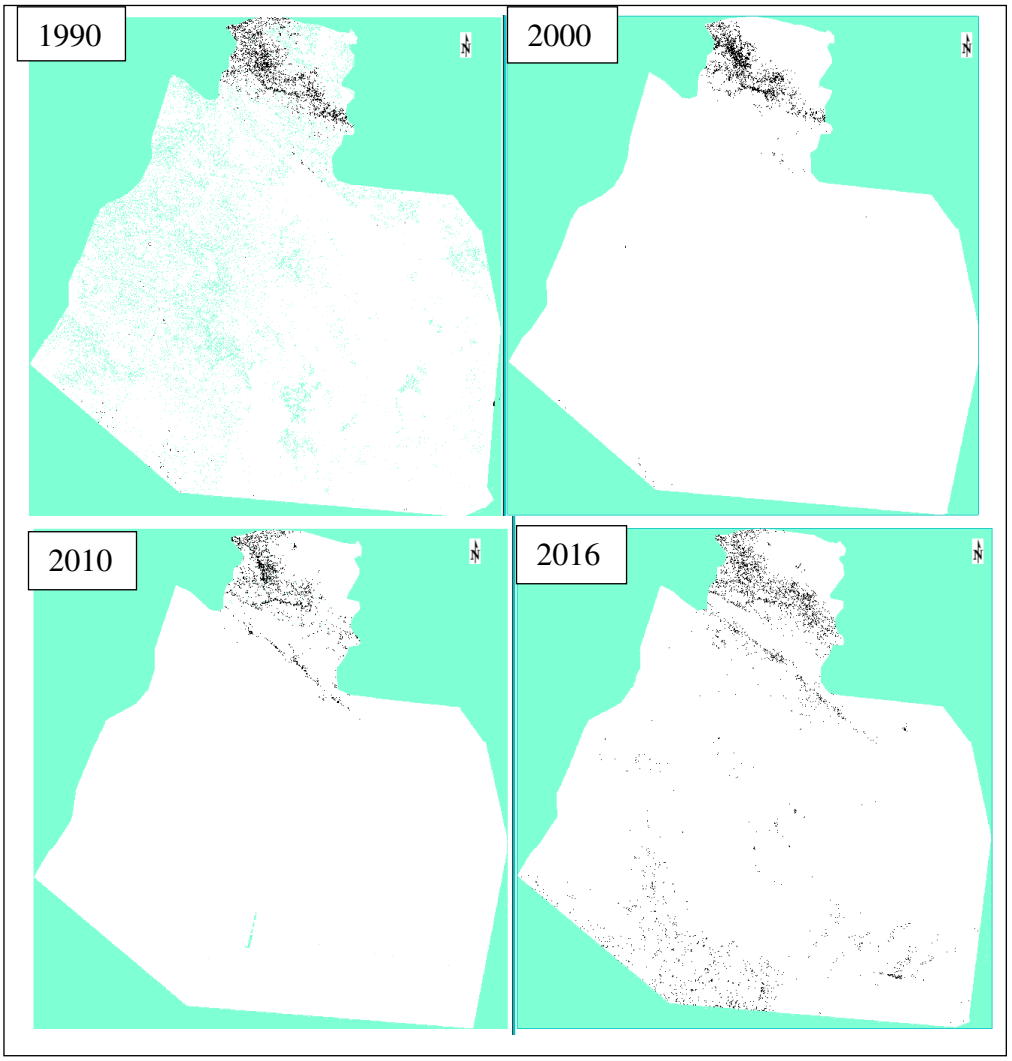


Figure-14. Distribution of palm trees in Muthanna Province for the period (1990-2000-2016).

3.3 The wheat statistics

A comparison between 1990 and 2016 shows a significant decline in wheat cultivation in the sedimentary plain due to lower imports from Euphrates. While the regions note the increase of areas of wheat crop in the desert of Muthanna, Due to the reliance on well water in irrigation. Wheat statistics were recorded in 1990 (67520700 m^2), while in 2016 (153253800 m^2), the area increased (85733100 m^2).

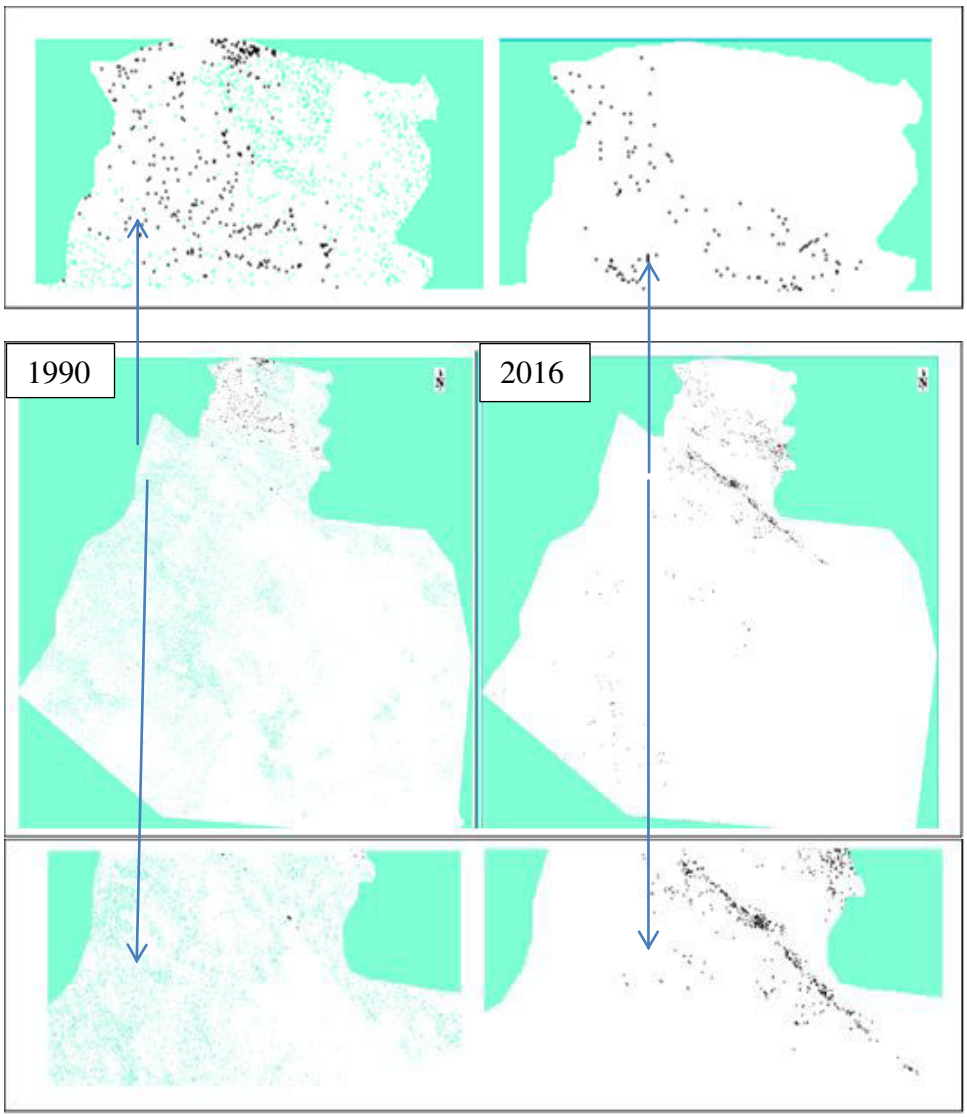


Figure-15. A: Spread of wheat fields in the Sedimentary Plain. B - Spread of wheat fields in the period 1990-2016 Muthanna province. C - Spread of wheat fields in Al-Muthanna Badia.

3.4 Barley statistics

A comparison between 1990 and 2016 indicates a significant decline in barley cultivation in the sedimentary plain due to the decrease in imports from Euphrates. Barley statistics were recorded in 1990 (13026600 m^2), while in 2016 (35273700 m^2), the area increased (22247100 m^2). Despite the increase in barley crop areas in the Muthanna desert, the barley harvest is less than the previous one, Where it was (190059300 m^2) in 2010.

Figure-16. A: Spread of Barley fields in the Sedimentary Plain. B - Spread of Barley fields in the period 1990-2016 Muthanna province C - Spread of Barley fields in Al-Muthanna Badia

3.5 Natural vegetation

Natural vegetation means the plants that have not been grown by humans. The natural plants in the study area vary from region to region and from year to year depending on climatic conditions such as temperature and rainfall. The importance of the natural plant, where the soil is established and prevents erosion, also acts as windbreaks and reduces the risk of spreading sand dunes as well as provide feed for grazing animals.

Natural vegetation in the area can be divided into two parts: First, perennial plants are permanent plants adapted to live in a dry desert environment and the most famous of these plants are (Handal, shayh, ramath, tarfa, siddur) and other species, and most of these plants are suitable for grazing. Second, annual plants, plants that grow in the spring only, they are not resistant to dry climate, these plants are important because they are medicinal and commercial herbs such as (kama), which are useful for grazing animals. Table-6 shows the most important Natural vegetation in the study area, [14].

After the processing of the images by Envi software, the prevalence of natural vegetation was determined for years (1990- 2000- 2010- 2016), as shown in Figure (16). Statistics were obtained, where the area of natural vegetation was (933 902 100 m^2) in 1990 and the area increased to (2 941 360 200 m^2) in 2000, While in 2010 it fell to (1 043 469 900 m^2), and returned to rise in 2016 to (3 634 922 700 m^2).

The annual rainfall of Muthanna Province (26.2, 115, 47, 115) was for years (1990 - 2000 - 2010 - 2016) respectively, [15]. When comparing the amount of rainfall with the area of Natural vegetation in Muthanna for the same years, it was found that there is a positive relationship between rainfall quantities and the area of natural plants. As shown in Figure17.

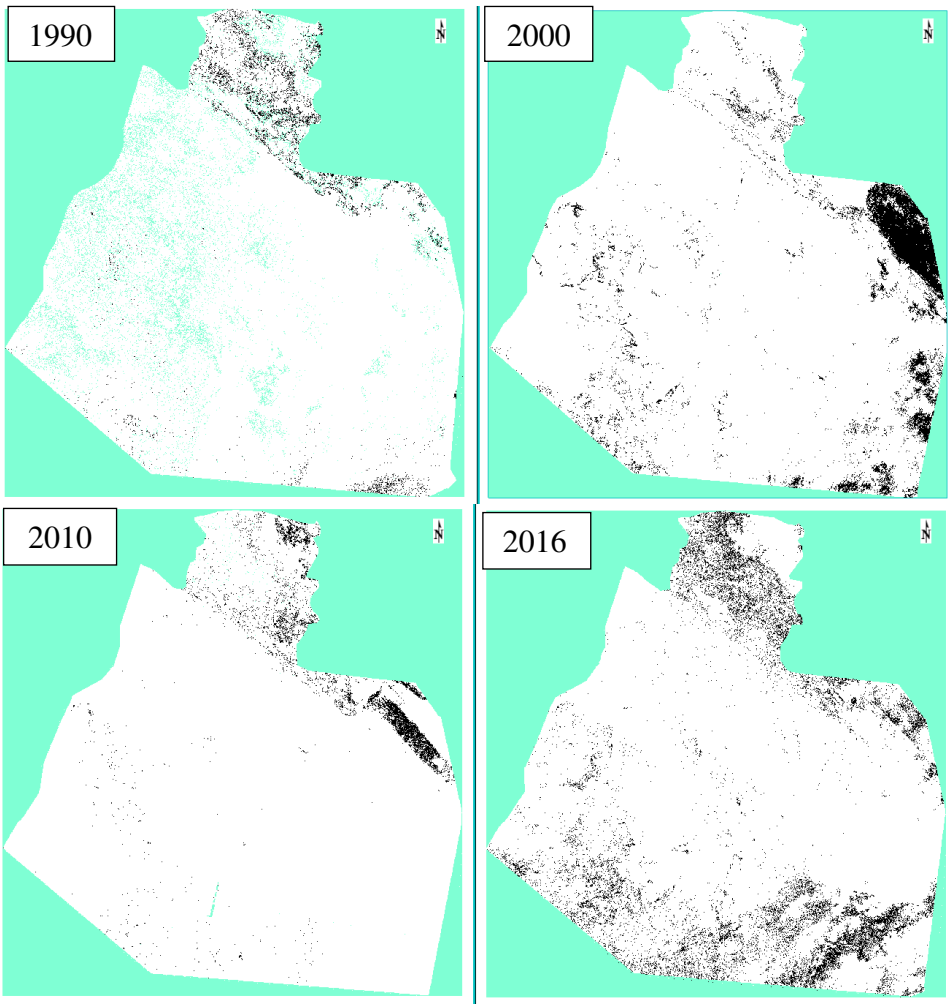


Figure-17. Shows the spread of natural plant in Muthanna Province for the years (1990-2000-2010-2016).

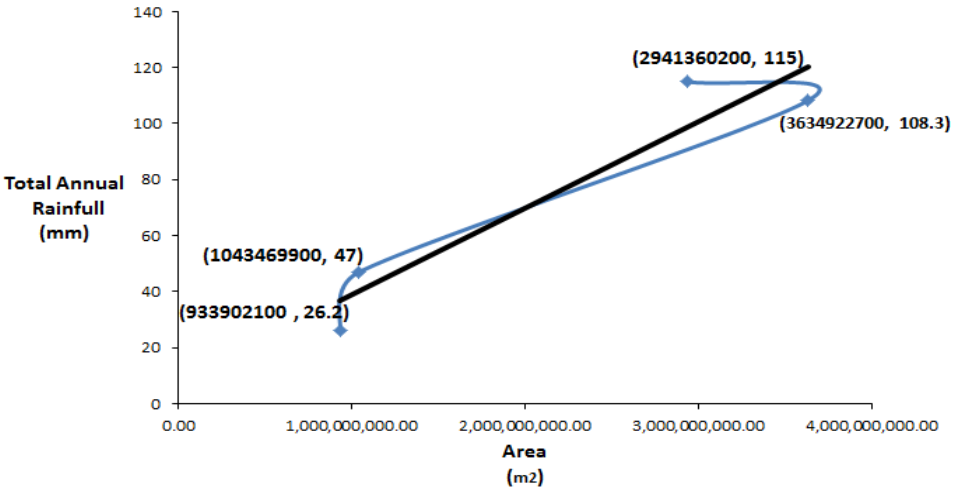


Figure-18. The relationship between the area of natural vegetation and the amount of annual rainfall.

Table-6. Natural vegetation in Muthanna Province, [14].

Number	the plant	The scientific name	Type
1	Altirtaye	Suaed spp	Permanent Tree
2	alsadar	Zizyphas numalariae	Permanent Tree
3	alsarim	Lyciumbarbarum	Permanent Tree
4	altarafa	Tamarix passorinoidesdel	Permanent Tree
5	alghada	Haloxylon	Permanent Tree
6	alramath	Haloxylon Saliconicum	Permanent Tree
7	alkhibaz	Malva coronopus	Annual Herbs
8	babunk	Martricaria	Annual Herbs
9	alhalba	Trigouena Arabica	Annual Herbs
10	earfaj	Rhanterium appaposum	Permanent Tree
11	handkuk	Melilot	Annual Herbs
12	himad	Rumex resicarias	Annual Herbs
13	hnkris	Foctororskyi	Annual Herbs
14	alharmal	Peganum harmala	Permanent Herbs
15	alhanadil	Citrullus Colocynthic schard	Permanent Herbs
16	alkurt	Medicagospp	Annual Herbs
17	alkharnub	Prosopis Stephamiam	Permanent Tree
18	lshannan	Seldilizia	Permanent Herbs

3.6 Change detection

Change detection analysis is performed using multi-date imagery. Single date imagery show the land uses and land covers for a particular point in time but multi-date imagery show the land use and the land cover of a particular place at different points in time, (t1, t2… tn). Land use (commercial, residential, transportation, utilities, cadastral, and land cover (agriculture, forest and urban etc). mapping have been especially improved over the years by the use of multi-date imagery, which have been used in cases of progressive or gradual environmental changes such as erosion or reforestation for which more than one image may be necessary, [16].

Can be used (Basic Tools > change Detection > Change detection statistics) to get, Pixel count, Percentage and Area (Square Meters) as in the following Table-7, Table-8, Table-9.

Table-7. Change detection statistics (Pixel count).

	barley [Yellow]	wheat [Cyan]	palm[Magenta]	natural plant [Red2]
Unclassified	0	0	0	0
sawa lake[Red]	158	297	1539	2711
sand dunes [Green]	26	418	2417	33387
swamp [Blue]	1206	8941	104806	136060
barley [Yellow]	126	515	1570	3527
wheat [Cyan]	1589	5267	21652	24476
palm [Magenta]	3665	23825	153418	67183
euphrates river [Maroon]	302	403	5960	4409
loam [Purple]	1897	8316	27687	172383
salt [Coral]	0	0	0	29
limestone+chert+sandy loam[Sea Green]	0	0	118	12597
chert + sandy loam [Orchid]	0	0	6	78
limestone + sandy loam [Sienna]	1	3	222	9039
silty loam [Thistle]	5	10	403	53746
loamy sand [Red1]	162	2157	8538	84959
natural plant [Red2]	3565	16360	99044	281014
saline [Red3]	0	0	1	2179
clay loam [Green2]	143	605	7751	30271
sandy loam [Green3]	1170	5461	80755	93919
Masked Pixels	405	2218	10218	25346
Class Total	14420	74796	526105	1037313
Class Changes	14294	69529	372687	756299
Image Difference	24773	95486	224194	3001490

Table-8. Change detection statistics (Percentage).

	barley [Yellow]	wheat [Cyan]	palm[Magenta]	natural plant [Red2]
Unclassified	0.000	0.000	0.000	0.000
sawa lake[Red]	1.096	0.397	0.293	0.261
sand dunes [Green]	0.180	0.559	0.459	3.219
swamp [Blue]	8.363	11.954	19.921	13.117
barley [Yellow]	0.874	0.689	0.298	0.340
wheat [Cyan]	11.019	7.042	4.116	2.360
palm [Magenta]	25.416	31.853	29.161	6.477
euphrates river [Maroon]	2.094	0.539	1.133	0.425
loam [Purple]	13.155	11.118	5.263	16.618
salt [Coral]	0.000	0.000	0.000	0.003
limestone+chert+sandy loam[Sea Green]	0.000	0.000	0.022	1.214
chert + sandy loam [Orchid]	0.000	0.000	0.001	0.008
limestone + sandy loam [Sienna]	0.007	0.004	0.042	0.871
silty loam [Thistle]	0.035	0.013	0.077	5.181
loamy sand [Red1]	1.123	2.884	1.623	8.190
natural plant [Red2]	24.723	21.873	18.826	27.091
saline [Red3]	0.000	0.000	0.000	0.210
clay loam [Green2]	0.992	0.809	1.473	2.918
sandy loam [Green3]	8.114	7.301	15.350	9.054
Masked Pixels	2.809	2.965	1.942	2.443
Class Total	100.000	100.000	100.000	100.000
Class Changes	99.126	92.958	70.839	72.909
Image Difference	171.796	127.662	42.614	289.352

Table-9. Change detection statistics Area (Square Meters).

	barley [Yellow]	wheat [Cyan]	palm[Magenta]	natural plant [Red2]
Unclassified	0.00	0.00	0.00	0.00
sawa lake[Red]	142200.00	267300.00	1385100.00	2439900.00
sand dunes [Green]	23400.00	376200.00	2175300.00	30048300.00
swamp [Blue]	1085400.00	8046900.00	94325400.00	122454000.00
barley [Yellow]	113400.00	463500.00	1413000.00	3174300.00
wheat [Cyan]	1430100.00	4740300.00	19486800.00	22028400.00
palm [Magenta]	3298500.00	21442500.00	138076200.00	60464700.00
euphrates river [Maroon]	271800.00	362700.00	5364000.00	3968100.00
loam [Purple]	1707300.00	7484400.00	24918300.00	155144700.00
salt [Coral]	0.00	0.00	0.00	26100.00
limestone+chert+sandy loam[Sea Green]	0.00	0.00	106200.00	11337300.00
chert + sandy loam [Orchid]	0.00	0.00	5400.00	70200.00
limestone + sandy loam [Sienna]	900.00	2700.00	199800.00	8135100.00
silty loam [Thistle]	4500.00	9000.00	362700.00	48371400.00
loamy sand [Red1]	145800.00	1941300.00	7684200.00	76463100.00
natural plant [Red2]	3208500.00	14724000.00	89139600.00	252912600.00
saline [Red3]	0.00	0.00	900.00	1961100.00
clay loam [Green2]	128700.00	544500.00	6975900.00	27243900.00
sandy loam [Green3]	1053000.00	4914900.00	72679500.00	84527100.00
Masked Pixels	364500.00	1996200.00	9196200.00	22811400.00
Class Total	12978000.00	67316400.00	473494500.00	933581700.00
Class Changes	12864600.00	62576100.00	335418300.00	680669100.00
Image Difference	22295700.00	85937400.00	201774600.00	2701341000.00

4. CONCLUSIONS

a) Using Landsat 1-5, Landsat 4-5, Landsat 7 and Landsat 8, for many years provides a good assessment of vegetation and gives a prediction about the future of agriculture in the study area.

b) The Degradation of agriculture dependent on the Euphrates River, due to the decrease in water imports from Turkey and the traditional irrigation methods, while the agriculture based on groundwater has increased the abundance Because groundwater in the region.

c) Remote sensing data provide excellent maps of desertification and vegetation, in a short time and in a cost-effective manner

d) Based on the information obtained during the field observations, the data collected from the study area and the results of processing the satellite images, it seems that significant changes in the land cover occurred during the study period, the area of natural vegetation depends on the amount of rain falling.

REFERENCES

[1] Jabor E. J. and Jassim, S. N. 2015. Scarves waters of the Tigris and Euphrates and their effects on agricultural production (Provinces of central and southern Iraq model). Journal of Literature. (111): 475- 503.

[2] Al- Badri B. H. and Muhammad A. A. 2007. Water Crisis and its Influence on Agricultural Sector in Iraq for period (1990-2007). Dep. of Agricultural Economic-College of Agriculture / University of Baghdad. pp. 332-342.

[3] Al-Badri B. H. 2010. Impact of scarcity of water resources on irrigated agriculture Iraq. Journal of Administration and Economics, the number 80, pp 120-135.

[4] Sherko Kirmanj. 2013. Identity and Nation in Iraq. ISBN: 978-1-58826-885-3 hc,www.rienner.com.

[5] https://www.researchgate.net/ Provinces-Map-of-Iraq-1.png.

[6] Al-Jayshi J. W. 2017. Special Analysis of Water Resources and Sediments in Al-Muthanna Badia and their Investments. Master Thesis, University of Al-Muthanna. pp. 1-232.

[7] Balasubramanian A. 2017. Elements of climate and weather. Centre for Advanced Studies in Earth Science, University of Mysore. pp. 1-19.

[8] Obaid M. K. 2015. Hydrochemistry pollution water sediments of Slaibat Depression Southern Iraq. Master's Athesis, Faculty of Agriculture - University of Muthanna. pp. 1-120.

[9] Z. S. and Al-Jawdari and Jaber A. H. 2013. Spatial analysis of sand dunes distribution in Samawah district. http://www.uobabylon.edu.iq/publications/humanities. p. 7.

[10] Exline J. D., Levine A. S. and Levine J. S. 2006. Meteorology. Langley Research Center http://www.nasa.gov/centers/langley/homen. p. 7.

[11] https://earthexplorer.usgs.gov/.

[12] Iraqi Ministry of Agriculture, Directorate of agriculture in Muthanna Governorate.

[13] Khierallah H.S. and Azhar H. D. 2016. Study of Genetic Diversity of Iraqi Date Palms Using Some Morphological Markers. International Journal of Current Microbiology and Applied Sciences. 5(3): 317-327.

[14] Al-Ganimy A. K. 2015. Description and classification of some selected soils in the Rehab region of Muthanna province. Master's Athesis, Faculty of Agriculture - University of Muthanna. p. 95.

[15] Mustafa R. T. 2016. Study on rain forecasting of the rainy season (6102-6102). Ministry of Transportation, General Organization for Aeronautical and Seismic Monitoring, p 6.

[16] Kadhum M. J. 2017. Monitoring of South Iraq Marshes Contents Using Change Detection and Remote sensing Techniques. M.Sc. Thesis, University of Baghdad. p. 30.