Government of the Syrian Arab Republic
Ministry of Local Administrations and Environment

Land Degradation Neutrality Target Setting Programme
Final Country Report

Syrian Arab Republic

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Introduction

I. Overview of Syrian Arab Republic:

Area, location and terrain in the Syrian Arab Republic: The area of the Syrian Arab Republic is 185180 km 2, located on the eastern coast of the Mediterranean Sea. Its lands slopes from the west to the east and from the north to the south, with a general tendency towards the Arabian Gulf. **Syrian land can be divided into four main sections:**

1- The coastal plain: It is a narrow plain, which is several kilometers in the south, and starts to narrow further as it turns north, until it completely disappears when the mountains reach the coast, as in Banias and near the Turkish border.

2- Western Mountain Region: includes the coastal mountains and the parallel series to the east. The most important mountains in the region are Mount Kurds, Mount Lebanon, and Mount Hermon.

3- Plains area: The areas in the eastern part of the western mountains, the most important of which is the Houran Plain in the south, the plains stretching from Homs to the Turkish border, the Euphrates River plain, and the Upper Jazirah Plain which is bordered by the Khabour River to the west.

4- Badia area: It covers more than half of the area of Syria, and it is located in the Middle Euphrates valley, and the Lower Khabur. In the Badia, there are some mountainious areas, the most important of which are the Tadmuria Mountains, the Kalamoun Mountains, Jabal al-Bishr and Jabal Abdul Aziz Mountains.

The lowest elevation point in Syria is located near Lake Tiberias, it is about 200 meters below sea level. The highest point is the peak of Al-Sheikh mountain (Hermon mountain), rising 2,814 meters, above sea level.

Climate in Syrian Arab Republic: Syrian Arab Republic is characterized by a mild and warm climate, which falls within the Mediterranean climate, characterized by moderate rainfall in the winter and dry climate in the summer. The country's lands can be divided into five zones of stability as follows:

1. Stability Zone One: the precipitation of more than 350 mm / year and divided into two parts:

1.1. Stability Zone One - A: Over 600 mm / year and rainfed agriculture is guaranteed.

1.2. Stability Zone One - B: More than 350 and less than 600 mm / year. Two agricultural seasons of three seasons can be guaranteed. It is cultivated with wheat and legums and has an area of 27000 km2, or 14.6% of the country's area.

2. Stability zone Two: precipitation is between 250 and 350 mm / year. Two thirds of the observed years, barley can be guaranteed. It has an area of 24750 km2, or 13.3% of the country's area.

3. Stability zone Three: precipitation is more than 250 mm / year in half of the observed years. 1-2 barley season can be guaranteed every 3 years. It covers an area of 13030 km2, equivalent to 7.1% of the country's area.

4. Stability zone Four (marginal Zone): precipitation ranges between 200 and 250 mm / year and not less than 200 mm / year in half of the observed years. Only suitable for the cultivation of barley and pastures. It covers an area of 18,300 km 2, equivalent to 9.9% of the country's area.

5. Stability Zone Five (Badia and steppe): the rest of the territory of the country. Precipitation is less than 200 mm in most of the observed years, it is not suitable for rainfed crops. It has an area of about 102,000 km2, or 55.1% of the country's area.

Land Use in the Syrian Arab Republic: Land use is distributed according to the statistics of the Ministry of Agriculture and Agrarian Reform in 2015 as follows:

1. Forests 586110 Hectar

2. Meadows and pastures 8185674 Hectar

3. Rocky and sandy lands 8185674 Hectar

4. Rivers and lakes 155144 Hectar

5. Buildings and facilities 703583 Hectar

6. Arable Lands 6080811 Hectar. Invested land of about 5730683 Hectar and non-invested land is about 350128 Hectar. The invested land is about: 1112379 Hectar irrigated land and about 2794404 Hectar rainfed lands.

Forests in the Syrian Arab Republic: According to the statistics of the Ministry of Agriculture and Agrarian Reform in 2015, the forest lands in Syria is 2.8.8%. The area of natural forests is 232840 H (44.5%) of Syrian forests, while the artificial forests represent 290083 H (55.5%). Forests in Syria play an important role in stabilizing organic carbon in the soil and environmental and tourism role. They have no economic objective other than the benefits of beekeeping and access to medicinal plants and aromatic ones.

Biodiversity in the Syrian Arab Republic: The Syrian Arab Republic is characterized by a very rich and diverse plant life due to its unique geographical location and diverse climate, which has created a rich environment with natural habitats that are suitable for many plant life.

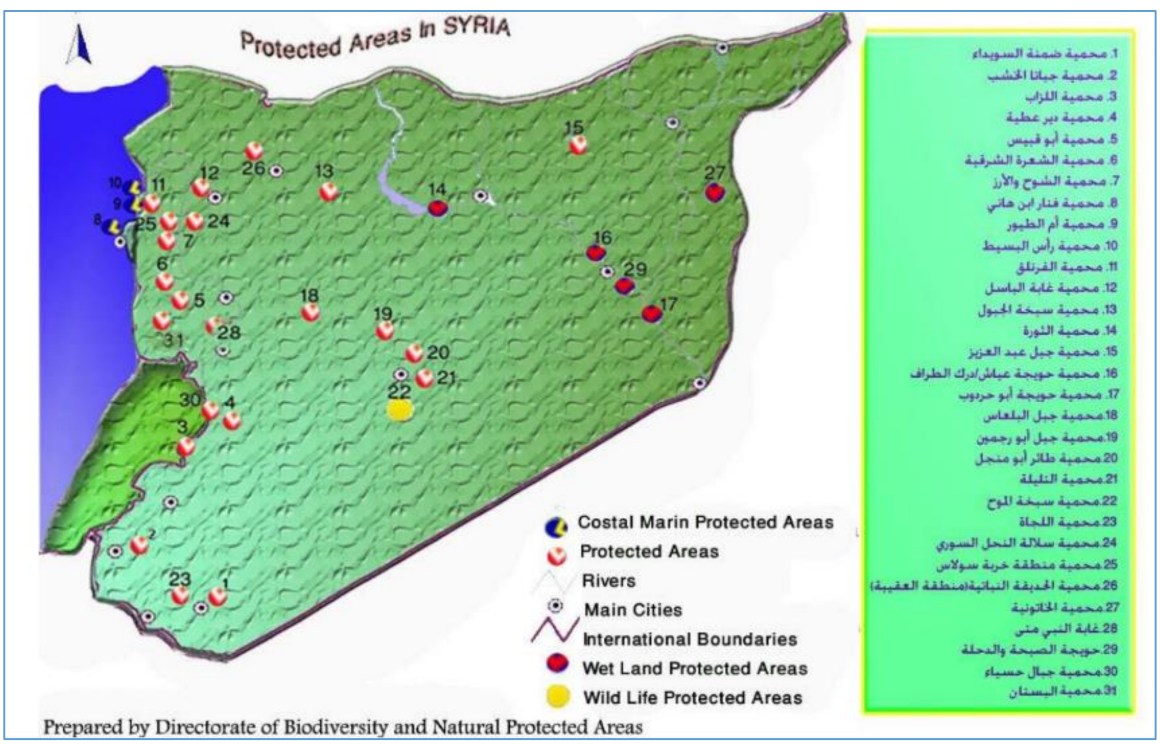
Most of the Syrian plants belong to the Mediterranean fluorine, or Asian continental origin from Turkey, Iraq and Iran. The plant species in Syria are estimated at more than 3300 species, belonging to 130 families. (Ministry of Local Administration and Environment, 2009)

The animal species in Syria are 3150 species.

- **Species currently available:** There are /3300/ plant species, /3150/ animal species, /125/ mammal species, /17/ Bud species, /394/ bird species and /16/ amphibian species.
- **Endangered species:** /17/ species of mammals, /26/ species of birds, /8/ species of reptiles, /33/ species of fish, and /13/ species of plants.
- **Extinct species:** There are /17/ plant and animal extinct species.

Natural Protected areas in Syrian Arab Republic: The number of protected areas declared until 2019 is 32 protected areas, as shown in the following diagram.

Figure (1): protected areas in the Syrian Arab Republic



The global war on Syria after 2011 has resulted in considerable environmental pressures on land, natural habitats and biodiversity, making the management of these resources more difficult and requires increased national and international efforts.

Population in the Syrian Arab Republic: According to estimates of the Central Bureau of Statistics in Syria in 2010, the population is 23 million, with a growth rate of 2.84%.

The average density in 2010 is estimated at 110 persons per square kilometer.

Less than half of the population lives in urban areas. The rest of populations live in rural and Syrian Badia. They are mainly depend on grazing and livestock farming.

Factors contributing to land degradation in the Syrian Arab Republic:

According to the definition of land degradation by the United Nations Convention to Combat Desertification (UNCCD), the most important factors contributing to land degradation in Syria are:

1. **Climate change,** especially the process of shifting seasons, rainy seasons, extremes of heat waves, precipitation, or long-term precipitation.

2. **Increasing the frequency of the drought phenomenon,** which reduces soil moisture and affects the vegetation cover, thus reducing land productivity and causing damage to different ecosystems.

3. **Water and wind erosion.**

4. **Improper management of natural resources such as soil and water, such as:**

    - Unsustainable use and depletion of surface and groundwater, some of which are contaminated.
    - Destruction of ecosystems, leading to a decline in biodiversity and land degradation.
    - Improper agricultural processes such as planting with slope lines, excessive use of agricultural machinery in some areas, extra fertilization, over using of picticides and other wrong agricultural practices.
    - Soil fertility decrease in some agricultural lands.
    - Competition for the use of natural resources, especially water, and even agricultural soils in some areas.

Land degradation in Syrian territory can be summarized as follows:

- Wind erosion in Syrian Badia mainly, causes dust and sand storms and the movement of sand dunes.

- Water erosion in coastal and mountainous areas.
- The deterioration of forest cover in Syria as a result of cutting and burning during the war against Syria (2011-present).
- The deterioration of the pastoral cover, especially in Syrian Badia due to overgrazing and shrubs cutting for heating and cocking.
- Saline, salting and alkaline problems in irrigation projects in Raqqa and Al-Ghab.
- The physical, chemical and fertility properties of some agricultural lands have declined.
- Pollution of agricultural land and rangelands as a result of the irregular refining of oil in the period of war on Syria (2011-present)
- Pollution of land with liquid and solid wastes.
- The depletion of surface and groundwater resources and the contamination of part of them.
- Conversion of agricultural lands and some forest lands into urban areas.

Land degradation neutrality Program in the Syrian Arab Republic:

Syrian Arab Republic joined the land degradation neutrality program at the end of 2016. The program was launched by forming two committees for this program, which includes all national institutions related to land, as well as popular organizations, NGOs and some relevant international organizations in Syria. The First Committee included the **decision executers** from these institutions, organizations and associations, while the Second Committee included **decision makers** from the same institutions, organizations and associations. Technical task teams have also been established to calculate the baseline and indicators for the program and all other points relating to the development of voluntary targets, the levarage plan, transformative projects towards achieving land degradation neutrality and other technical issues related to the program. The program was launched through the program's inception workshop on 14 February 2017 in Damascus.

Baseline and indicator for land degradation neutrality in Syrian Arab Republic

Indicator 1 of Sustainable Development Goal No. 15 / Target 3 (Indicator 15.3.1)

Indicator (15.3.1): This indicator reflects the percentage of degraded land in the country out of the total area of the country.

To calculate this indicator, the United Nations Convention to Combat Desertification (UNCCD) has identified three main sub-indicators for its calculation and has allowed different countries to propose additional indicators for calculating this indicator and each country by its specificity.

The main sub-indicators according to UNCCD are:

1. **Changes in land cover / land use:** This reflects the change of the country's basic ecosystems.

2. **Net Primary Productivity and Land Productivity Dynamic**, which reflects the productivity of the ecosystem and the services it performs (Forestry – Agricultural - pastoral).

3. **Organic Carbon Stock:** Organic carbon above and below the surface of the soil is one of the indicators indicating soil fertility and the amounts of carbon that can be trapped by the land cover of the earth, which reduces their emission and reach the atmosphere. It is often measured by measuring the carbon in soil (within 0-30 cm of the soil) Soil organic Carbon Stock (SOC). As increasing the percentage of organic carbon in the soil indicates an increase in soil fertility, the calculation of organic carbon changes negatively or positively gives an idea of deterioration or improvement of soil fertility and hence the degradation or improvement of the soil and its productivity.

I. Changes in land cover / land use

For the calculation of this indicator, two LandSat images for the years 2000 and 2015 were used for the entire territory of the Syrian Arab Republic. The visual interpretation of both coverage of images were made and land cover and land cover / land use maps were produced for the two years.

Table (1) shows the Land Cover areas of the Syrian Arab Republic for the years 2000 and 2015, while Table (2) shows the land cover changes matrix between 2000 and 2015.

Maps in figures 1-A and 1-B show the land cover of the Syrian Arab Republic for the years 2000 and 2015.

Map in figure 1-C shows the land cover of the Syrian Arab Republic, which has not changed between 2000 and 2015, and map in figure 1-D, land covers that have changed from class to class in 2015 compared to 2000.

Map in figure 1-E shows the classes that changed from forest cover to other classes between 2000 and 2015, and map in figure 1-F, shows the changes from agricultural to other classes between 2000 and 2015.

Figure 2 shows the areas and percentages of land cover in 2000 and 2015.

Table (3) shows land use areas for the Syrian Arab Republic in 2000 and 2015

Maps in figure (3-A) and (3-B) show the land use maps of the Syrian Arab Republic in 2000 and 2015.

Figure (4) shows the area of land use and the values of land use changes in 2000 and 2015.

Table 1: Land cover in the Syrian Arab Republic in 2000 and 2015 (Areas - changes – change percentage)

No	Land cover	Area 2000 Km2	Area 2015 Km2	Area change	Change Percent
1	Forest	8850.343	8139.2	-711.144	-8.04
2	Shrubs - grassland – sparsely vegetated areas	4189.129	3592.307	-596.823	-14.25
3	Arable land	67208.84	67154.4	-54.4391	-0.08
4	Pasture (badeyah)	59968.63	57654.92	-2313.71	-3.86
5	Water bodies- wetlands	2343.933	2361.627	17.69364	0.75
6	Artificial Areas	4032.892	6053.448	2020.556	50.10
7	Bare lands - others	40363	42000.87	1637.876	4.06
	Total	**186956.8**	**186956.8**	0.008623	0.00

Figure (1-A): Land Cover Map of Syrian Arab Republic in year 2000

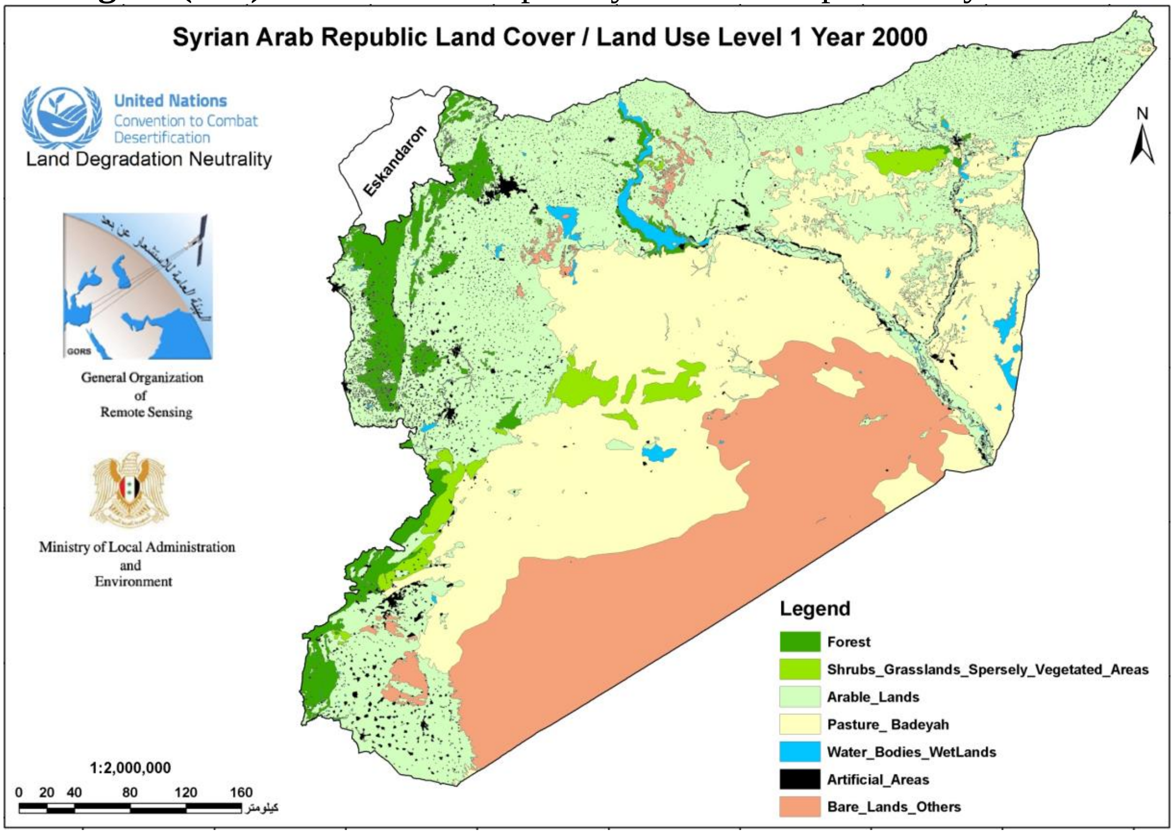


Figure (1-B): Land Cover Map of Syrian Arab Republic in year 2015

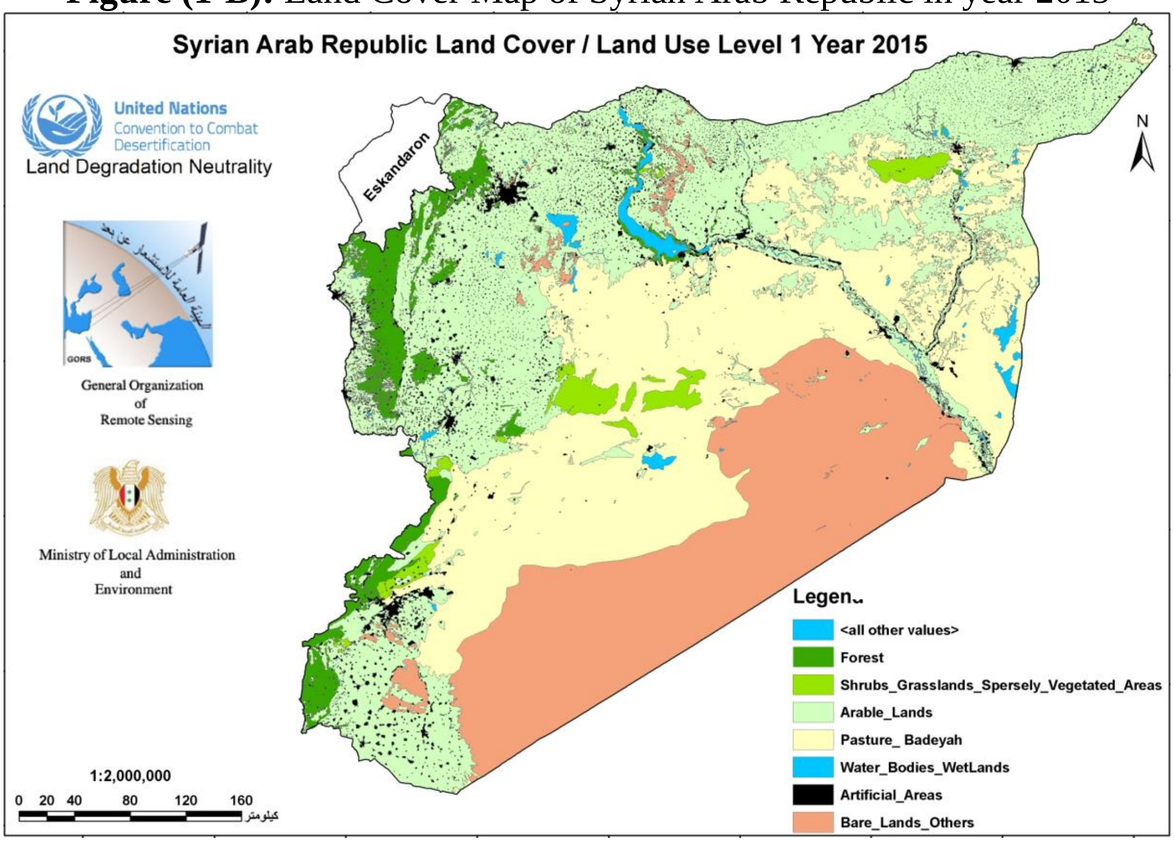


Figure (1-C): Land cover map of Syrian Arab Republic for classes that remained unchanged between 2000 and 2015

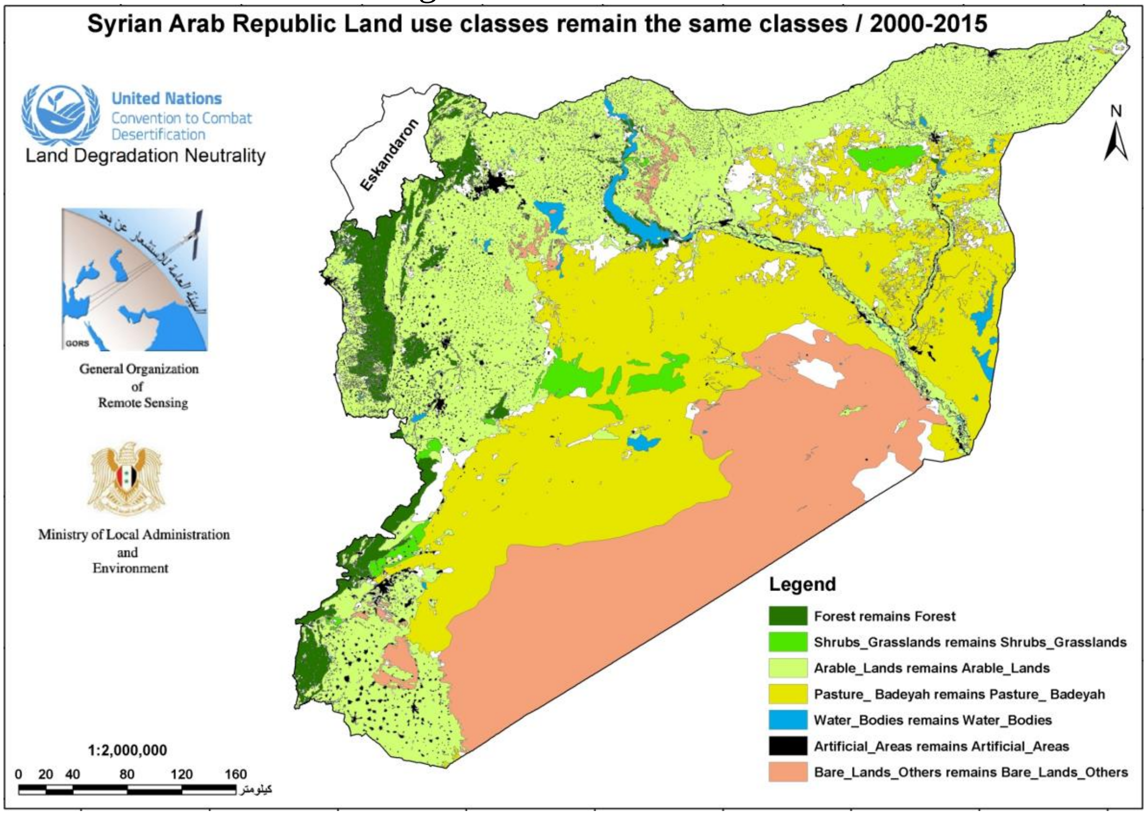


Figure (1-D): Land cover map of Syrian Arab Republic for land that has changed from one class to another classes between 2000 and 2015

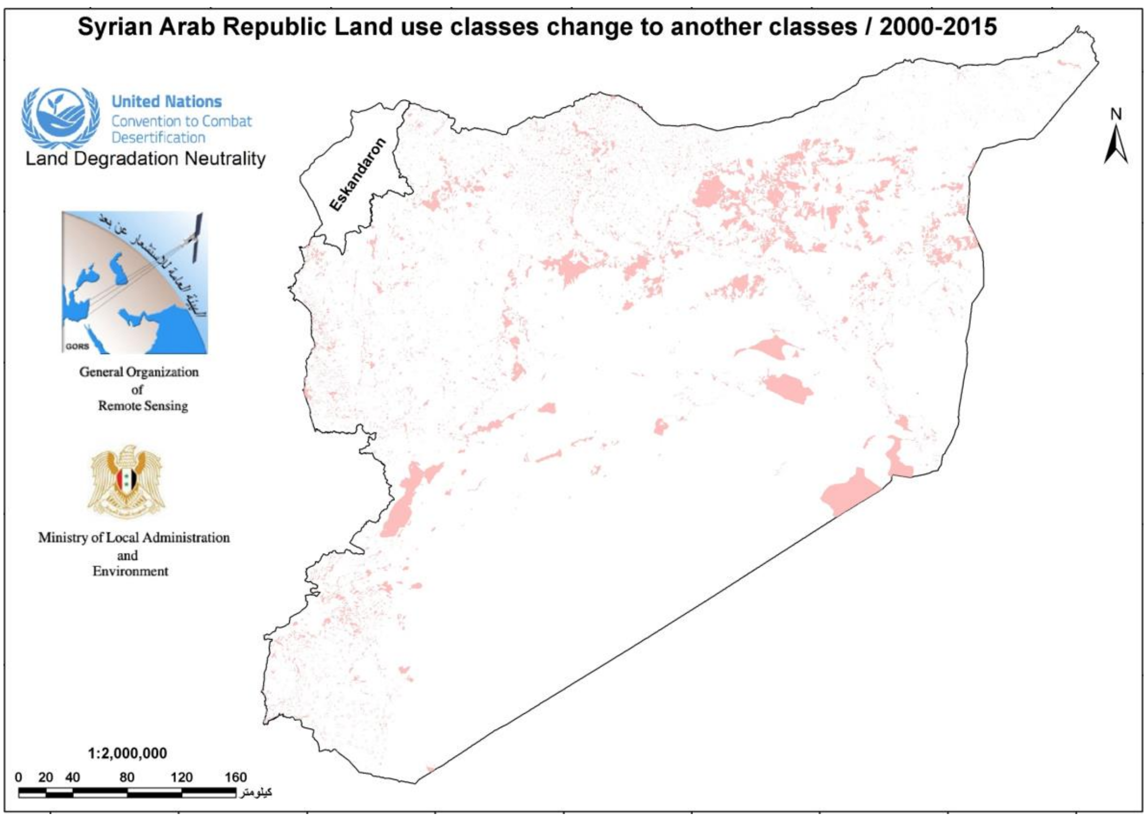


Figure 1-E: Map of forest cover changes into another classes between 2000 and 2015

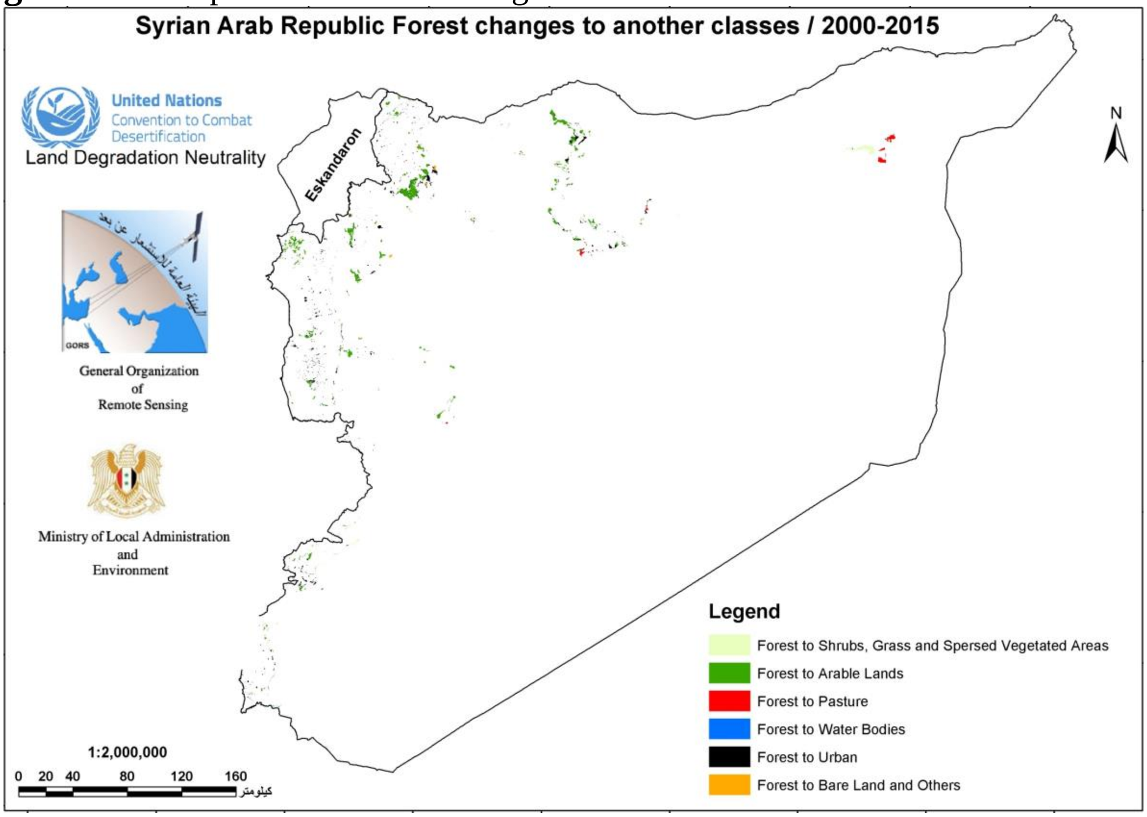


Figure (1-F): Map of Arable lands changes into another classes between 2000 and 2015

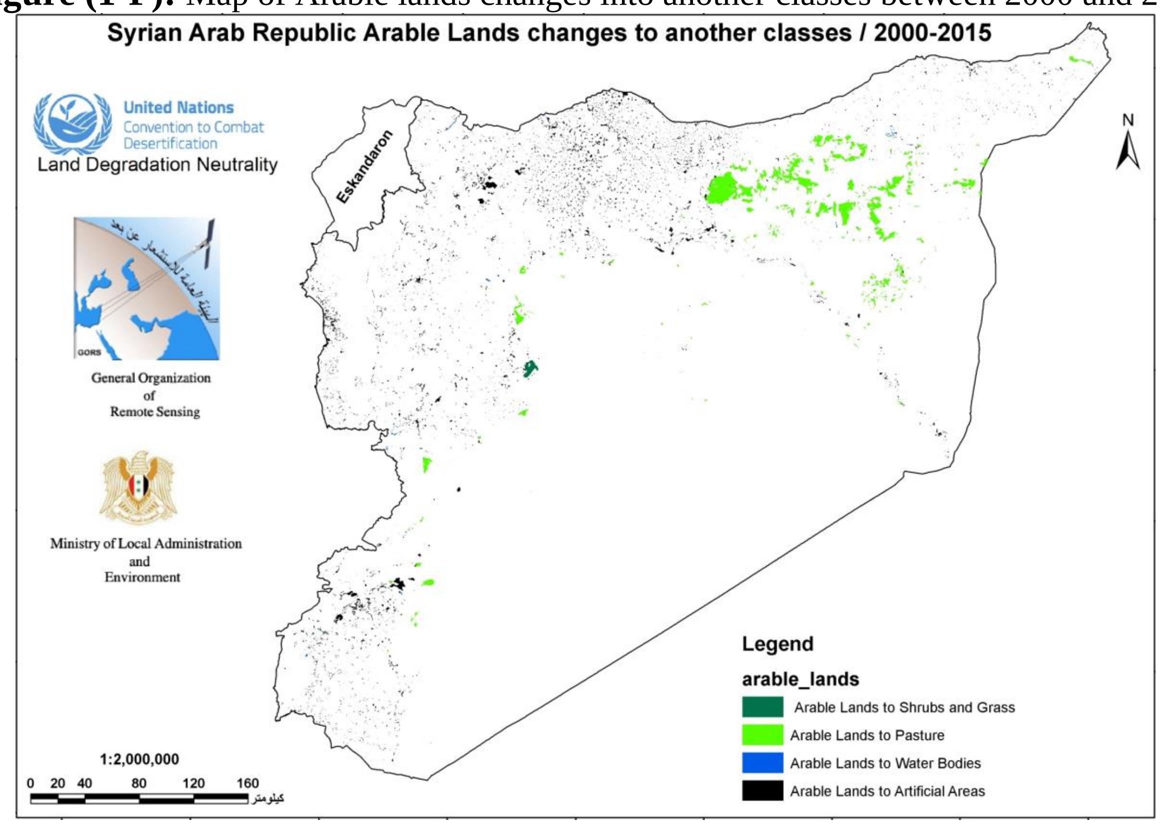
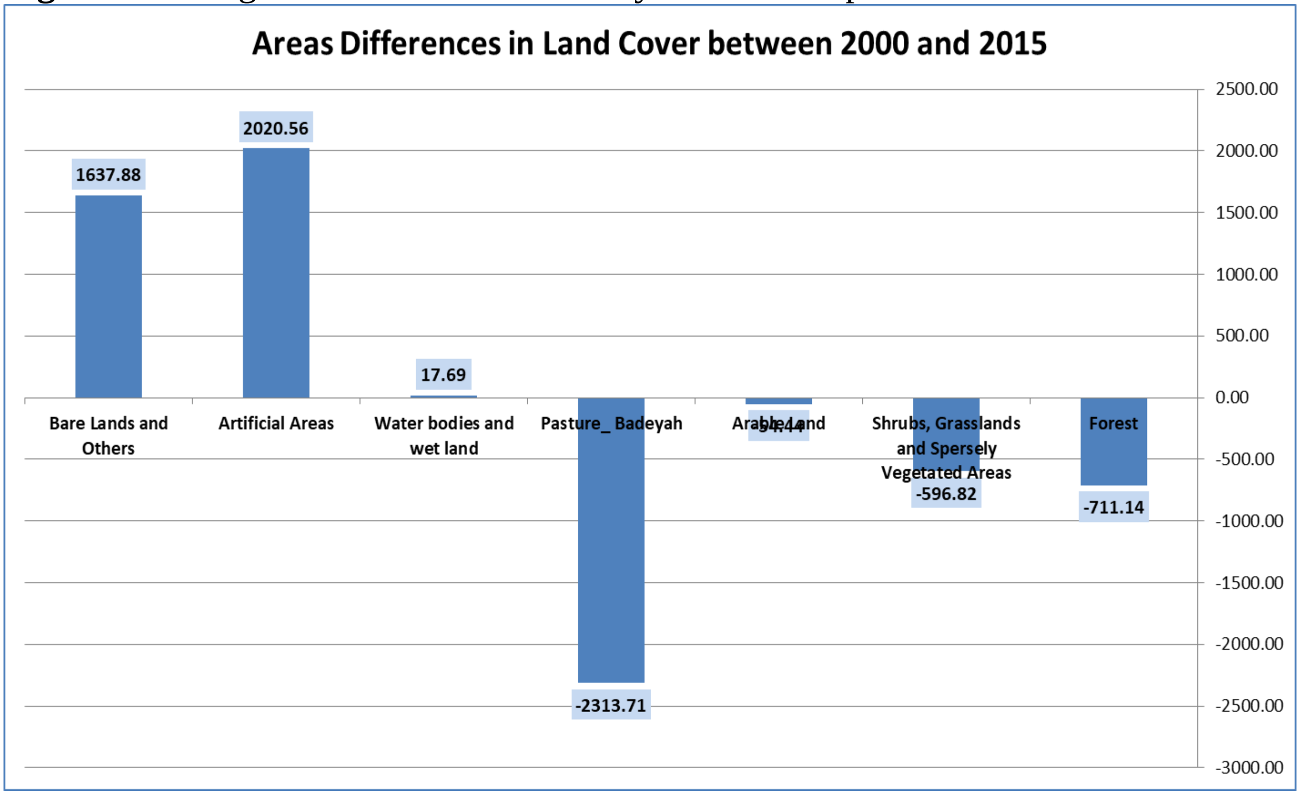


Figure 2: Changes in land cover area of Syrian Arab Republic between 2000 and 2015



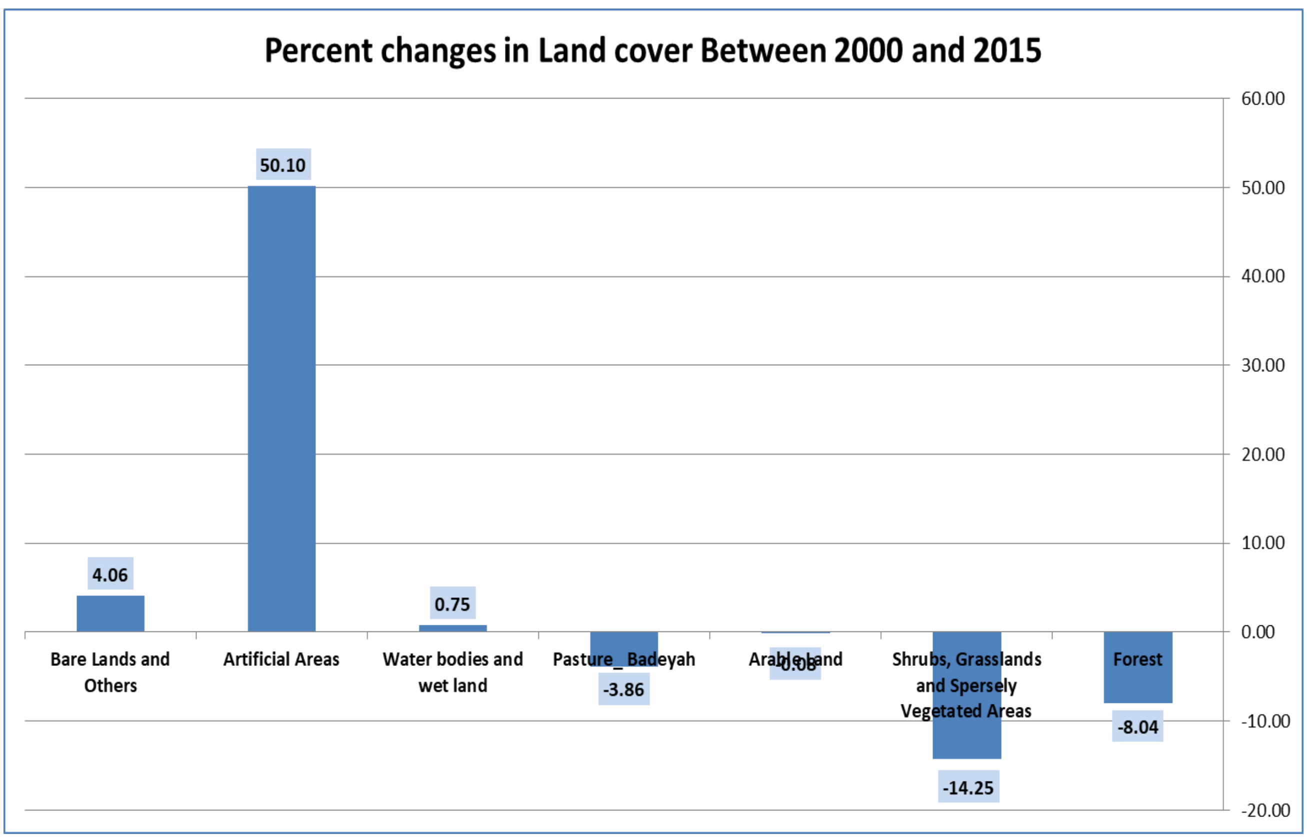


Table 2: The land cover change matrix in Syrian Arab Republic between 2000 and 2015

2015 / 2000	Forest	Shrubs, Grass and Spersed Vegetation	Arable Land	Pasture (Badeyah)	Water Bodies and Wet Lands	Artificial Areas	Bare Land & Other land	
Forest	**7839.84**	57.42	**595.04**	59.02	4.45	**253.76**	11.33	**8820.86**
Shrubs, Grass and Spersed Vegetation	52.33	**3369.10**	61.27	**680.89**	1.67	17.62	0.14	**4183.03**
Arable Land	137.57	83.80	**62803.96**	**2082.84**	**51.37**	**1865.41**	**77.06**	**67102.02**
Pasture (Badeyah)	17.56	73.61	**3040.67**	**54732.64**	10.72	**250.39**	**1869.71**	**59995.31**
Water Bodies and Wet Lands	4.85	0.87	36.47	8.13	**2310.06**	3.26	0.27	**2363.92**
Artificial Areas	52.92	1.20	314.31	25.67	2.37	**3721.73**	1.90	**4120.09**
Bare Land & Other land	3.30	0.02	179.71	101.70	0.61	35.77	**40061.60**	**40382.71**
	8108.37	**3586.02**	**67031.43**	**57690.90**	**2381.25**	**6147.94**	**42022.03**	

Table (3): Area and percentages of the land uses of Syrian Arab Republic between 2000 and 2015

No	Land Cover	Area 2015 Km2	Area 2000 Km2	Land use	Area 2000 Km2	Area 2015 Km2	Area Change	Change percent
11	**Forest**	8139.20	8850.34	High Denes Forest	3203.06	3101.47	-101.592	-3.17
12				Mid Denes Forest	2616.24	1974.90	-641.335	-24.51
13				Low Denes Forest	427.22	358.06	-69.1539	-16.19
14				Forest & Orchard	2603.83	2704.77	100.9366	3.88
21	**Shrubs – Grass – Spersed Vegetated Areas**	3592.31	4189.13	Shrubs – Grass – Spersed Vegetated Areas	4189.13	3592.31	-596.823	-14.25
31	**Arable Lands**	67154.40	67208.84	Orchard	2731.97	2170.47	-561.498	-20.55
32				Crops	50312.86	49349.63	-963.238	-1.91
33				Orchard & Crops	11480.30	10916.61	-563.686	-4.91
34				Degraded Arable Lands	2683.71	4717.69	2033.984	75.79
41	**Pasture**	57654.92	59968.63	Good Pasture	20806.07	18388.05	-2418.02	-11.62
42				Bad Pasture	39162.56	39266.87	104.3076	0.27
51	**Water Bodies and wetlands**	2361.63	2343.93	Rivers	264.05	268.67	4.616882	1.75
52				Lakes	899.34	894.54	-4.79556	-0.53
53				Dams	222.11	238.82	16.71402	7.53
54				Sabkha	958.43	959.59	1.158294	0.12
61	**Artificial Areas**	6053.45	4032.89	**Artificial Areas**	4032.89	6053.45	2020.556	50.10
71	**Bare land - thers**	42000.87	40363.00	Rock outcrops	28655.35	28612.34	-43.0123	-0.15
72				Sands	11707.65	13388.53	1680.888	14.36
	Total	**186956.77**	**186956.76**		**186956.76**	**186956.77**	0.008623	0.00

Figure (3-A): Land Use Map of Syrian Arab Republic in 2000

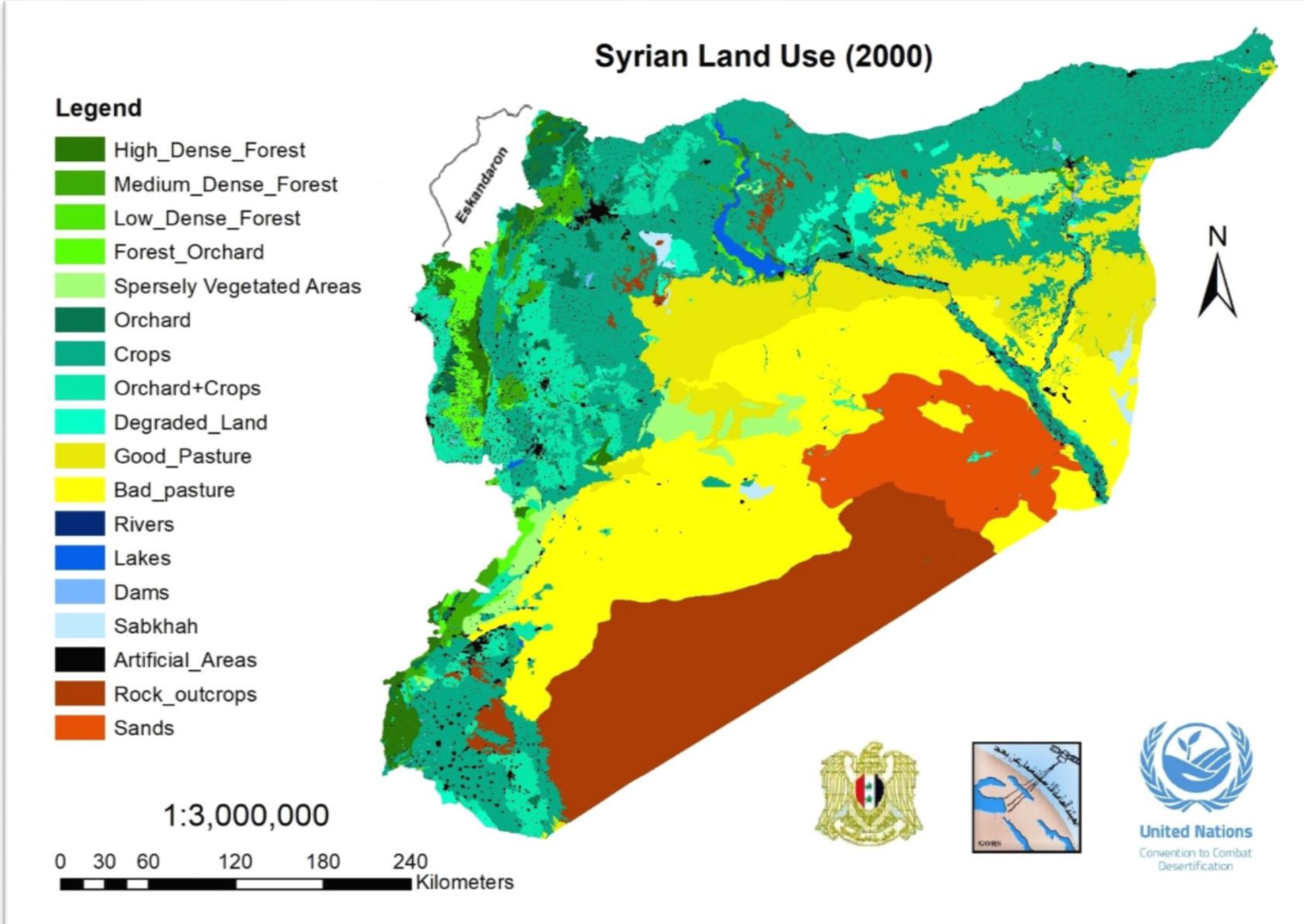


Figure (3-A): Land Use Map of Syrian Arab Republic in 2015

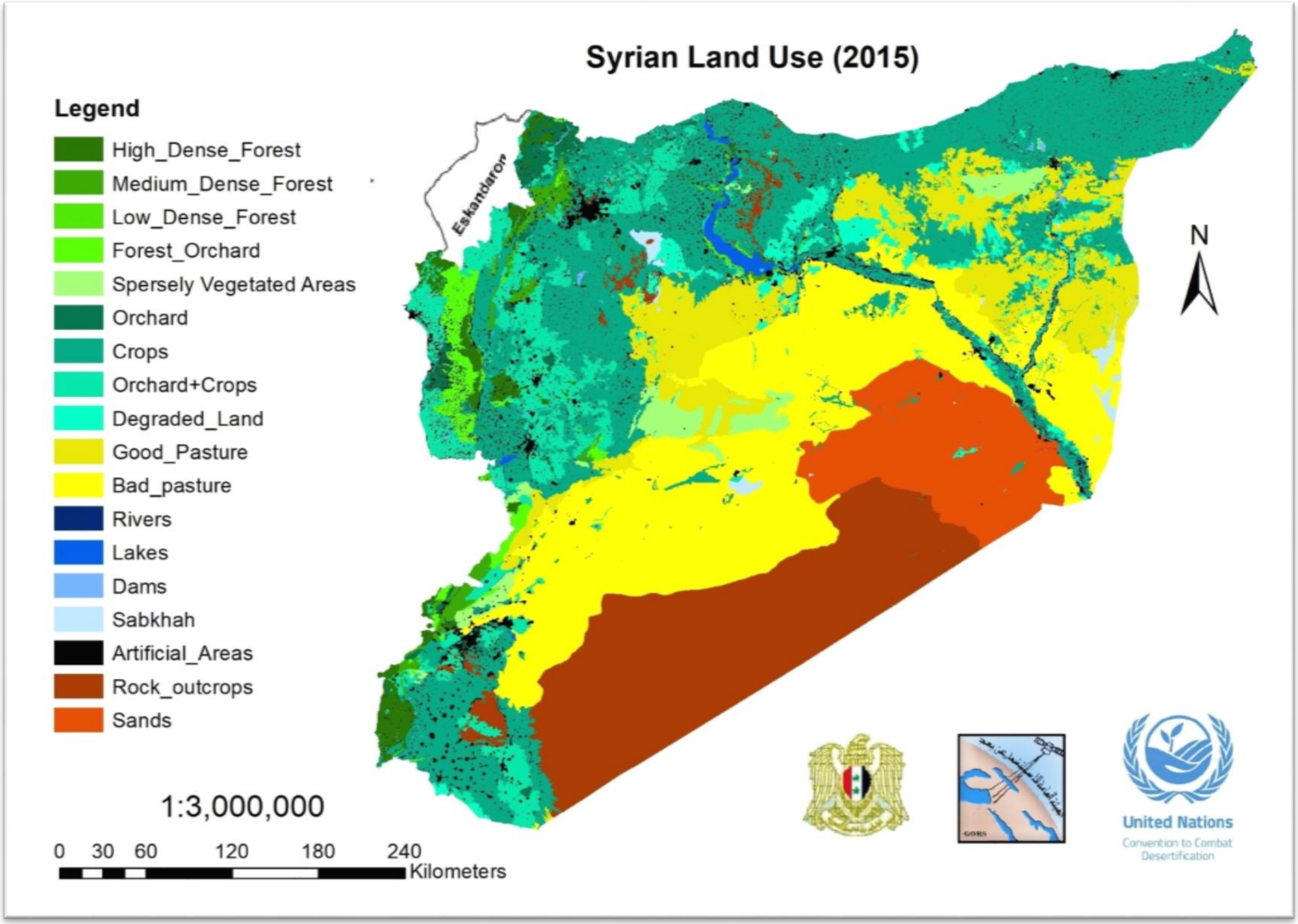
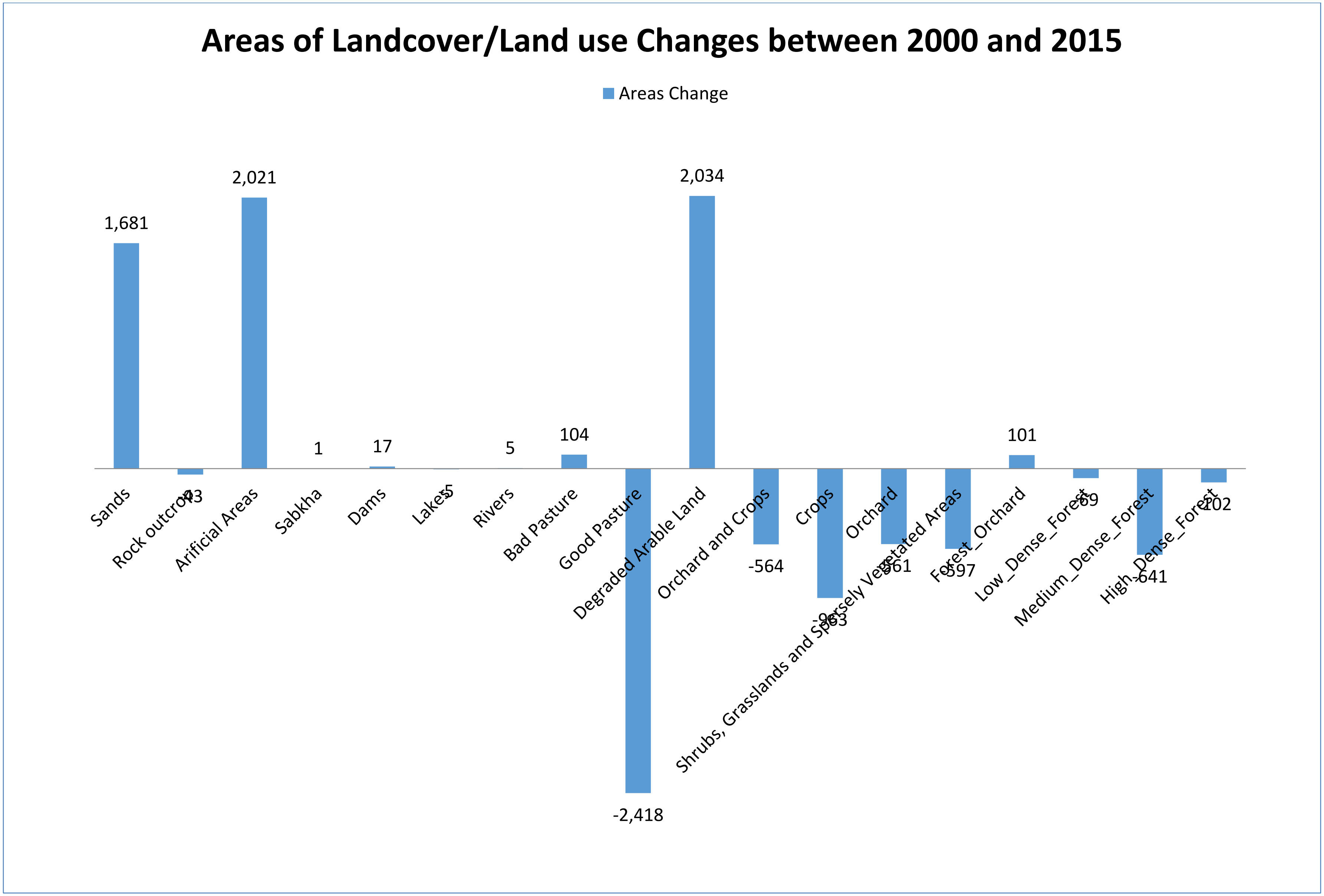
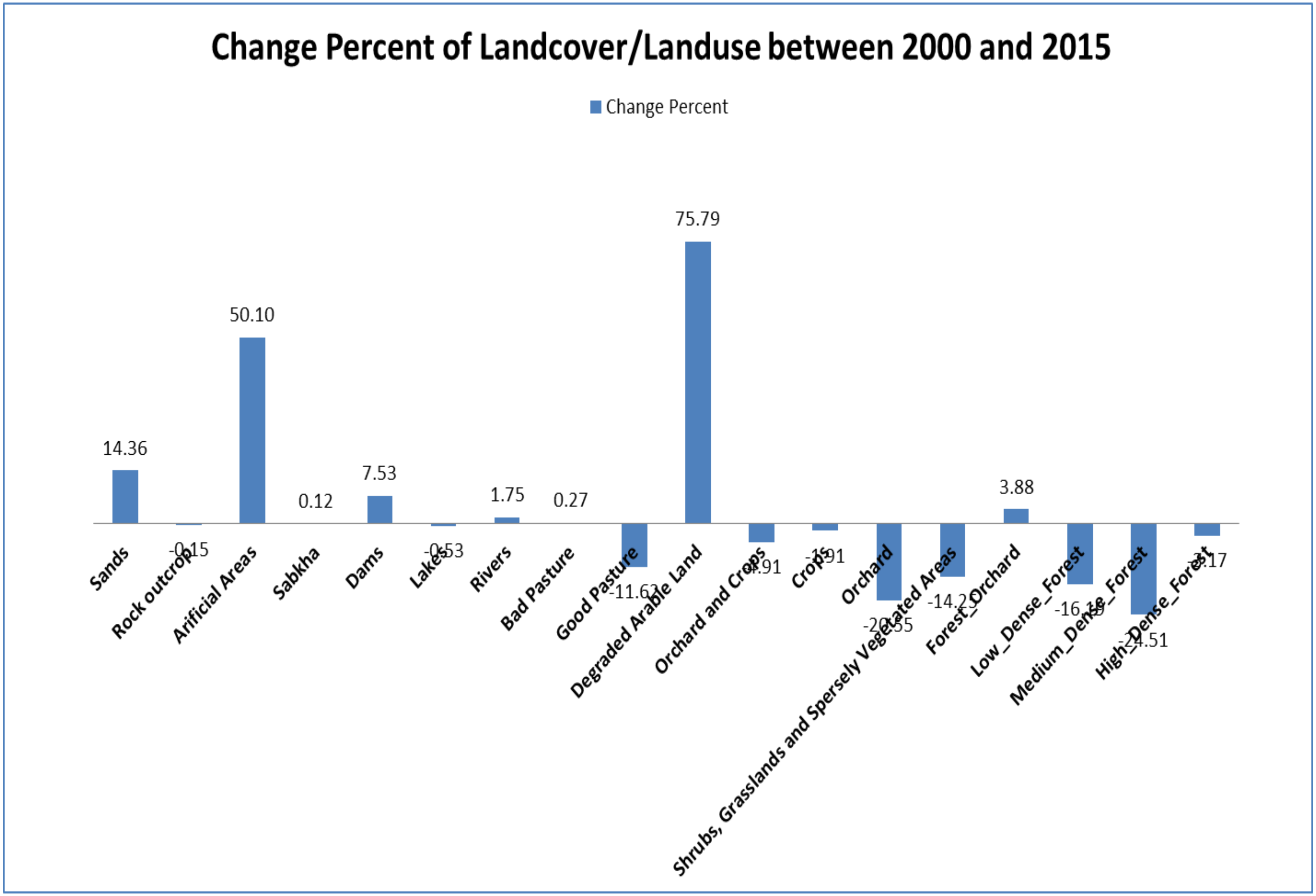


Figure 4: Land use area changes between 2000 and 2015





Change Percent of Landcover/Landuse between 2000 and 2015
Change Percent
14.36
50.10
0.12
7.53
1.75
0.27
75.79
3.88
Sands
Rock outcrop
Arificial Areas
Sabkha
Dams
Lakes
Rivers
Bad Pasture
Good Pasture
Degraded Arable Land
Orchard and Crops
Crops
Orchard
Shrubs, Grasslands and Spersely Vegetated Areas
Forest_Orchard
Low_Dense_Forest
Medium_Dense_Forest
High_Dense_Forest

Second: Sub-indicator: Land productivity (Net Primary Productivity) and changes in Land Productivity Dynamic:

Land productivity is an important factor in the country's economy. The higher the land productivity, the higher is the economic returns. Land productivity can be affected by many factors, including natural factors such as climatic factors such as tempreture, humidity and rain, and human as land management. These factors are a factor in increasing land productivity if climatic conditions and land management good are good. It also can cause of land productivity declining if these conditions and factors are unfavorable and land management is not suitable.

Different methods can be used to estimate productivity. Traditional methods are calculated from collecting field data for samples of land, and statistical analysis, thus estimating of land productivity. This method is expensive, time-consuming, and may can be characterized as less accuracy and neutrality. Other methods that have already been used are the use of remotely sensed data derived from satellite imageries.

It was used to calculate this sub-indicator, the Normalized Difference Vegetation Index (NDVI). It was calculated using MODIS satellite images with special resolution of 250 meters every 16 days.

This equation is calculated by the following equation:

$$NDVI = NIR - R / NIR + R$$ (Rouse et al., 1974)

Where R is the visible red spectral band and NIR is the near infrared spectral band.

The value of this inicator is between -1 and +1 and the positive values are for plants. In general, the value of this indicator is correlated with the amount of plant vegetation, such as leaf area index (LAI), biomass and plant Cover percentage which can be used as an indicator of vegetative growth and thus productivity.

(Tucker, 1979; Choudhury, 1987; Clevers, 1989; Malingreau et al., 1989; Baret and Guyot, 1991; Gutman, 1991; Cihlar et al., 1991; Wiegand et al., 1991; Abd El-Gawad et al., 2000).

This indicator was calculated in the period 2000-2015 at a rate of image (map) every 16 days. Equivalent to 23 maps per year, equivalent to 368 maps during the 16-year of study period.

The land productivity was studied in each date at the level of the country territory and at the level of the provinces and at the level of the various stability areas.

- **In order to study changes in the seasonal productivity of the land**, the average of maps produced for one date was taken in 16 years (2000-2015). (See Annex 1).
- **To study land productivity in year base,** specific or average dates of two or three consecutive dates were studied for the study period. This report will present a single date, the maximum of vegetation, on 22/4 of each year (the maximum of vegetation cover in Syria usually). (See Annex 1).
- To study land productivity changes from year to year, the study was conducted in two ways:
    - **Method 1:** Study specific or average dates of two or three dates for the Study period and compare them with the average of 16 years for the same date or the average of the two or three dates taken. One date will be presented on 22/4 of each year (the maximum of vegetation in Syria usually) and compared with the average of 16 years for the same date. It is therefore possible to determine whether productivity is increasing or decreasing compared to the average of 16 years. (See Annex 1).
- **Method 2:** Study the dynamics of land productivity changes through all satellite images for 2000-2015 (23 images per year * 16 years = 368

images). This study was carried out by using a program prepared by the Trier University of Germany in cooperation with the Arab Center for dry Lands and Arid Zones (ACSAD) and used to estimate the dynamics of vegetation cover in the Arab region, including Syria 2000-2010. This report is in the period 2000 - 2015. This methodology was used to produce a dynamic map of land productivity for Syria in this report in the period 2000-2015. The land productivity in the study period was divided into the following classes:

Land Productivity
Declining Productivity Or (High Declining)
Early sign Declining Productivity Or (Moderate Declining)
Stable, But Stressed Or (Low Declining)
Stable, Not Stressed Or (No Change)
Increasing Productivity Or (improving productivity)

Table (4) and Figure (5) show the dynamics of land productivity in Syrian Arab Republic in the period 2000-2015. Figure 6 shows the areas and percentages of land productivity dynamics in Syrian Arab Republic in the period 2000-2015.

The results of the first sub-indicator (land cover change) were then merged with the second sub-indicator (land productivity daynamic) as follows:

1. Lands that have not changed according to land cover. They have been divided into the five land productivity dynamic classes (Table 5 and Figure 7).

2. In the same way, lands that changed from one class to another class. They also divided into land productivity dynamic classes (Table 6 and Figure 8).

Table 4: Land productivity dynamics in the Syrian Arab Republic in the period 2000-2015.

Code	Land Productivity	Area (km2)	Percent
1	Declining Productivity (High Declining)	12781.9288	6.84
2	Early sign Declining Productivity (Moderate Declining)	31763.7739	16.99
3	Stable, But Stressed (Low Declining)	46924.74273	25.10
4	Stable, Not Stressed (No Change)	80309.72119	42.95
5	Increasing Productivity (improving productivity)	15186.64269	8.12
	Sum	**186967.0843**	**100**

Figure 5: Land productivity dynamics in the Syrian Arab Republic in the period 2000-2015

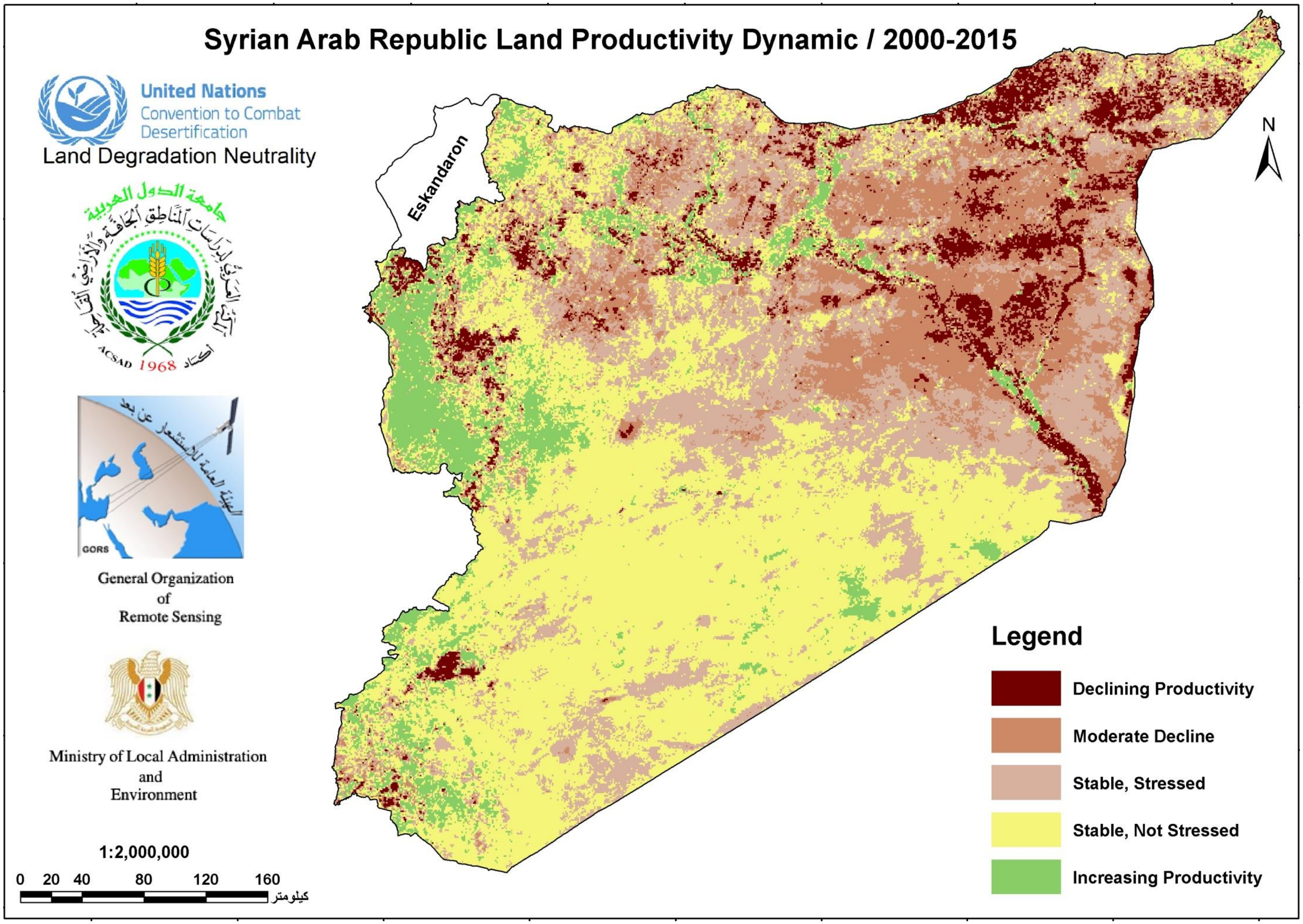
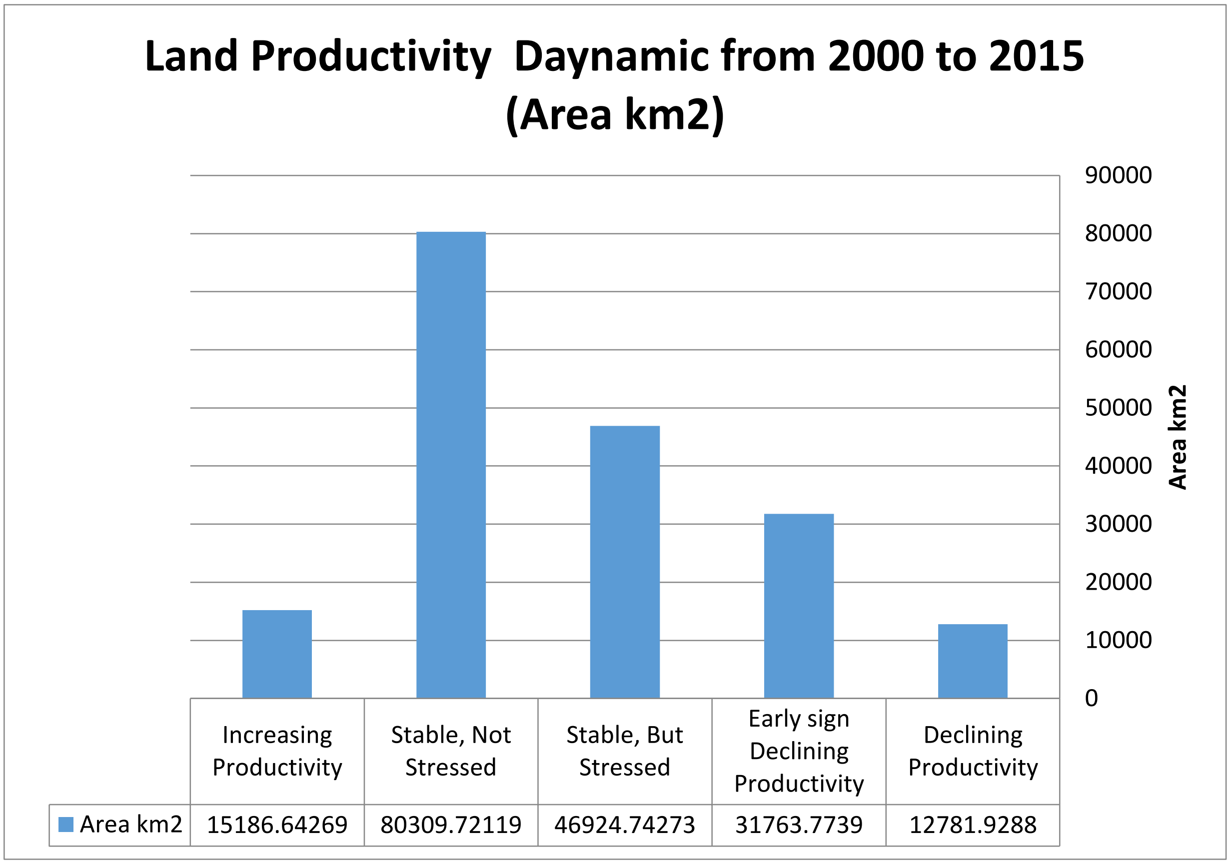


Figure 6: Area and Percentage of land productivity in the Syria 2000 - 2015



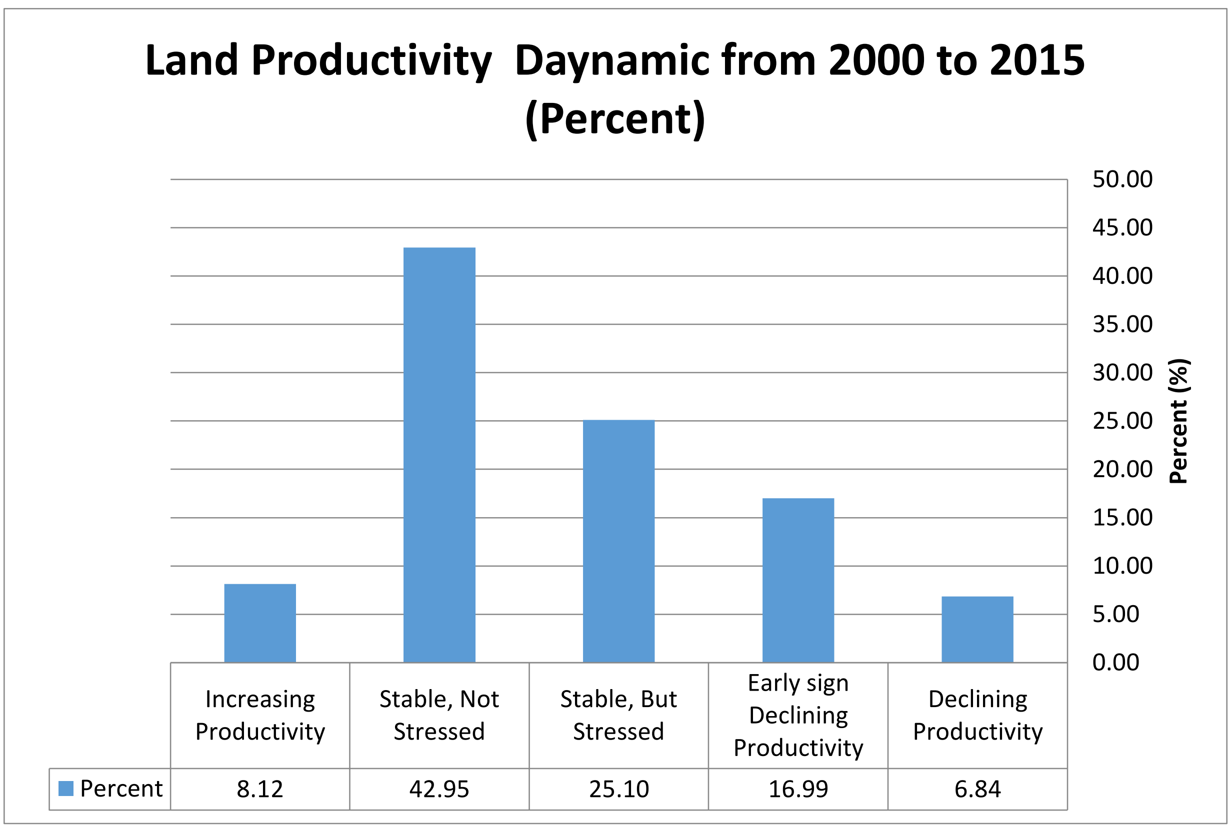


Table 5: land productivity Dynamics on land use classes that have not changed to other classes

Land cover class	Net land productivity dynamics 2000-2015 (km 2)					
	Declining Productivity	Early Sign Declining Productivity	Stable, But Stressed	Stable, Not Stressed	Increasing Productivity	Sum
Forest	491.73	642.51	932.14	751.72	5021.71	**7839.80**
Shrubs, Grass and Spersed Vegetation	186.06	804.82	1313.87	427.46	636.91	**3369.13**
Arable Land	8217.63	11097.92	14035.41	6065.52	23388.78	**62805.26**
Pasture (Badeyah)	2234.61	13818.24	15582.14	10091.86	12924.31	**54651.15**
Water Bodies and Wet Lands	439.68	356.16	397.33	251.27	865.61	**2310.05**
Artificial Areas	443.09	678.47	796.91	335.72	1467.20	**3721.39**
Bare Land & Other land	38.02	1330.00	10797.10	11482.54	16413.89	**40061.56**
	12050.81	**28728.11**	**43854.92**	**29406.09**	**60718.42**	**174758.35**

Figure 7: land productivity Dynamics on land cover that have not changed to other classes

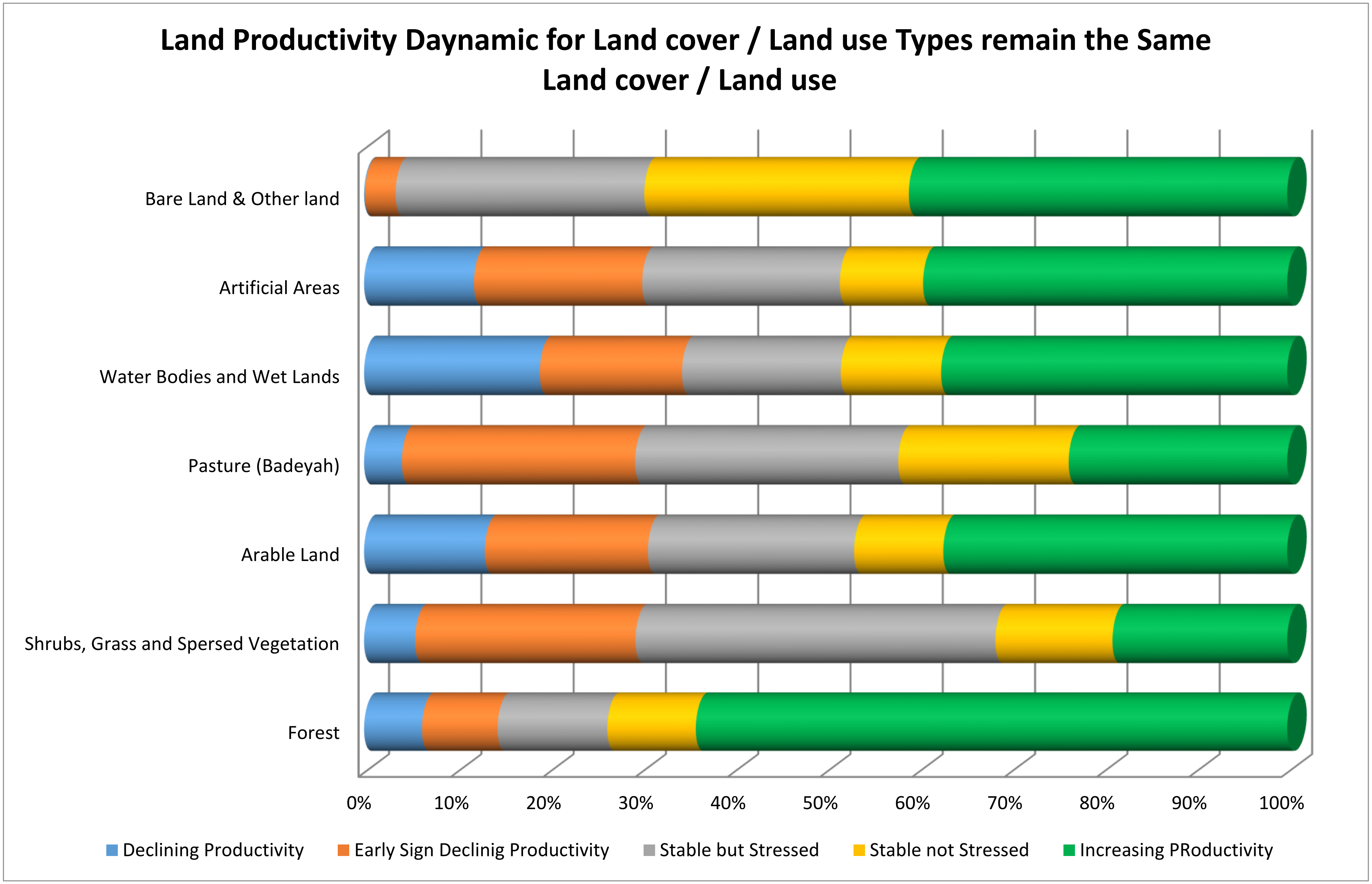
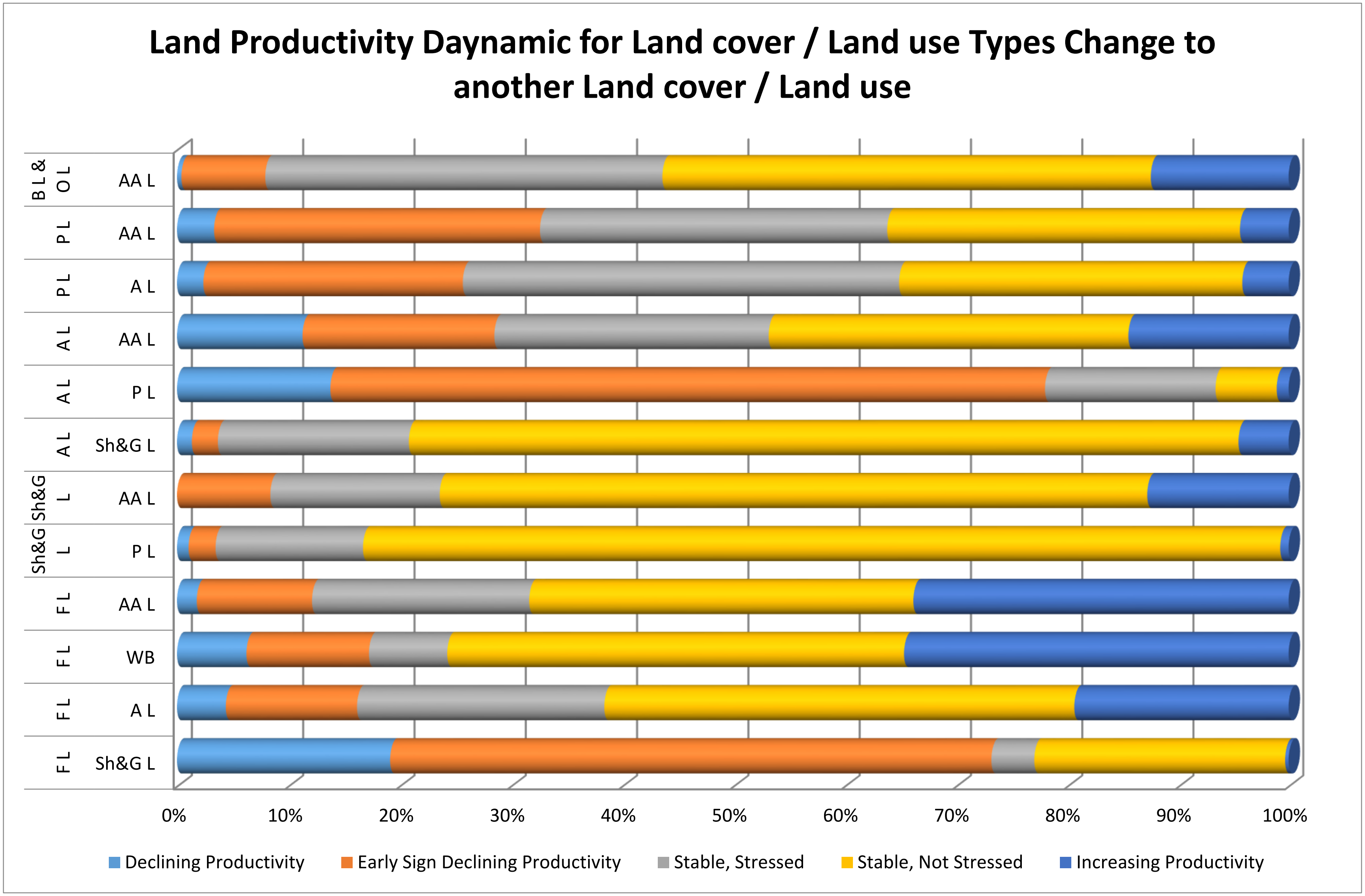


Table 6: land productivity Dynamics on land cover classes that have changed to other classes

Land conversion		Net area change (km2)	Net land productivity dynamics 2000-2015 (km 2)					
From	To		Declining Productivity	Early Sign Declining Productivity	Stable, But Stressed	Stable, Not Stressed	Increasing Productivity	Sum
F L	Sh&G L	57.4185	10.9943	31.0197	2.2140	13.0095	0.1810	57.4185
F L	A L	594.9619	26.0821	70.1551	132.1909	251.2407	115.2931	594.9619
F L	WB	4.4420	0.2772	0.4889	0.3125	1.8231	1.5403	4.4420
F L	AA L	253.6739	4.5008	26.2734	49.5072	87.5478	85.8447	253.6739
Sh&G L	P L	680.8859	7.0680	16.5291	90.1919	561.9166	5.1803	680.8859
Sh&G L	AA L	17.6104	0.0001	1.4766	2.6800	11.1952	2.2585	17.6104
A L	Sh&G L	83.7943	1.1198	1.9558	14.3813	62.5128	3.8246	83.7943
A L	P L	2082.7694	286.9070	1337.4641	319.8324	115.9864	22.5796	2082.7694
A L	AA L	1864.6621	210.2148	321.4686	459.6340	602.5910	270.7537	1864.6621
P L	A L	3040.5878	71.9708	708.8143	1191.8942	939.6312	128.2774	3040.5878
P L	AA L	250.3547	8.3376	73.3145	78.1057	79.5021	11.0948	250.3547
B L & O L	AA L	35.7699	0.1417	2.6957	12.7621	15.6968	4.4736	35.7699
		8966.9309	**627.6141**	**2591.6558**	**2353.7061**	**2742.6532**	**651.3017**	**8966.9309**

Figure 8: land productivity Dynamics on land cover classes that have changed to other classes



III. Sub-indicator III: Changes in organic carbon stored in the soil (Organic Carbon Stock):

There is no organic carbon stock dat at the National level of the country territory. It is only available in limited areas and are calculated in a specific time. Two methods have been adopted to calculate this indicator. They are as following:

1. Based on the land cover maps for 2000 and 2015 and based on the data provided by the UNCCD to different countries, showing the amount of organic carbon stored in the thickness of (0-30 cm), the lost amounts of organic carbon were calculated between 2000 and 2015 . As shown in Table (7).
2. The maps provided by the United Nations Convention to Combat Desertification (UNCCD) for Syria, showing the amount of organic carbon stored in the thickness of (0-30 cm). As shown in Figure (9).

The following table shows an explanation of the symbols used in Tables 6 and 7 and Figure 8:

Symbol	**Explanation**
FL	Forest
Sh&G L	Shrubs & Grass Land
AL	Arable Land
PL	Pasture
B L & O L	Bad Land & Other Land
WB	Water Bodies
AAL	Artificial Area Land

Table 7: Changes in organic carbon in Syrian Arab Republic in the period 2000-2015

Land conversion		Net area change (km2)	Soil organic carbon (SOC) stock change (2000-2015)				
From	To		Initial SOC stock (t/ha)	Final SOC stock (t/ha)	Initial SOC stock total (t)	Final SOC stock total (t)	SOC stock change (t)
F L	Sh&G L	57.4185	63	30.2	3617.367802	1734.039803	-188333
F L	A L	594.9618	63	48.7	37482.59629	28974.6419	-850795
F L	WB	4.4420	63	0	279.8479516	0	-27985
F L	AA L	253.6739	63	38	15981.45424	9639.607317	-634185
Sh&G L	P L	680.8859	30.2	11.5	20562.75408	7830.187812	-1273257
Sh&G L	AA L	17.6104	30.2	38	531.8347844	669.1960864	13736
A L	Sh&G L	83.7943	48.7	30.2	4080.782468	2530.587896	-155019
A L	P L	2082.7694	48.7	11.5	101430.8715	23951.84851	-7747902
A L	AA L	1864.6618	48.7	38	90809.02728	70857.14654	-1995188
P L	A L	3040.5878	11.5	48.7	34966.76007	148076.6274	11310987
P L	AA L	250.3547	11.5	38	2879.078523	9513.476858	663440
B L & O L	AA L	35.7699	10	38	357.6994173	1359.257786	100156
		8966.9305			**312980.0744**	**305136.6179**	**-784346**

Figure 9-A: Soil organic carbon map (0-30 cm) in Syrian Arab Republic in 2015

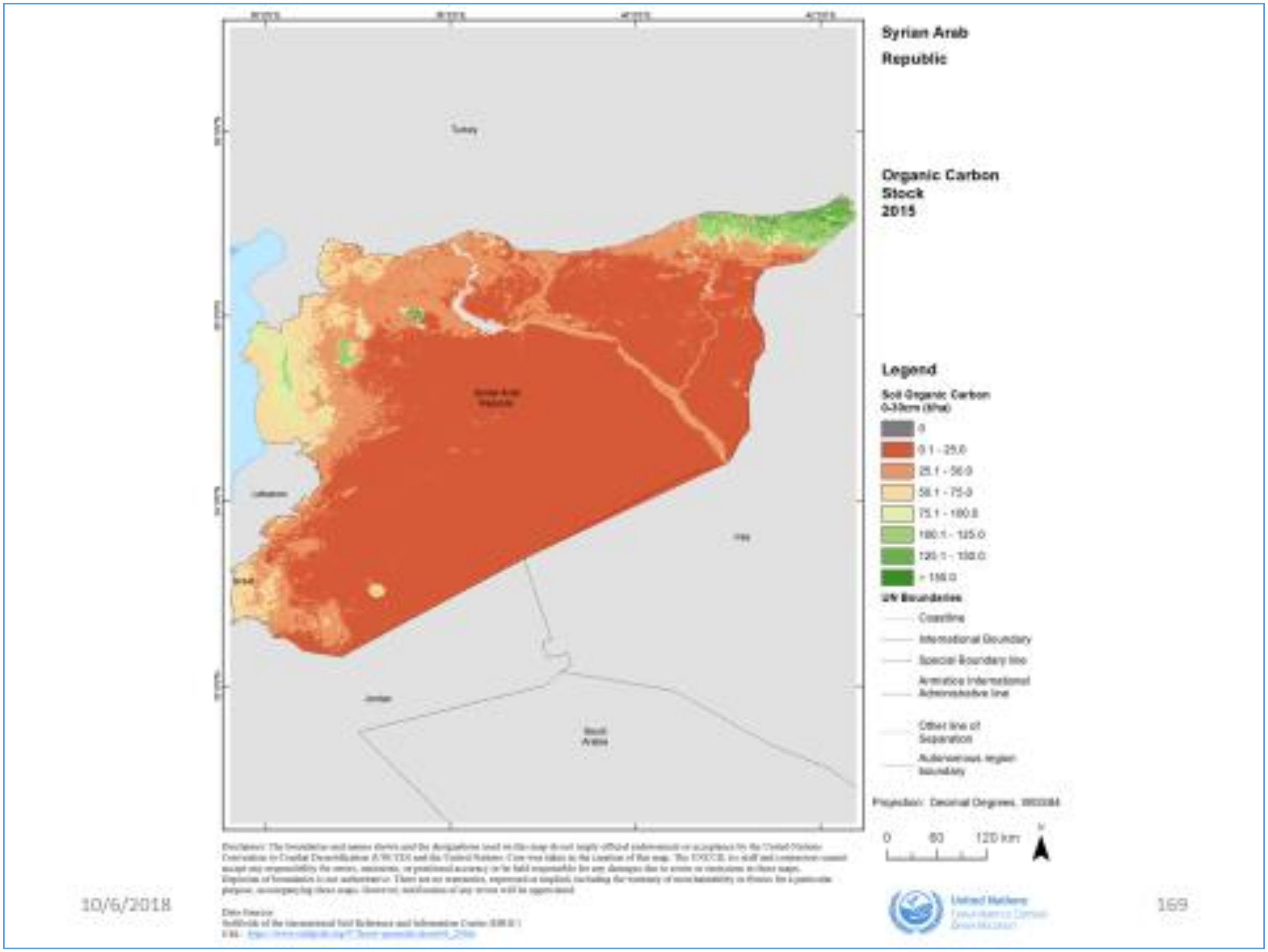
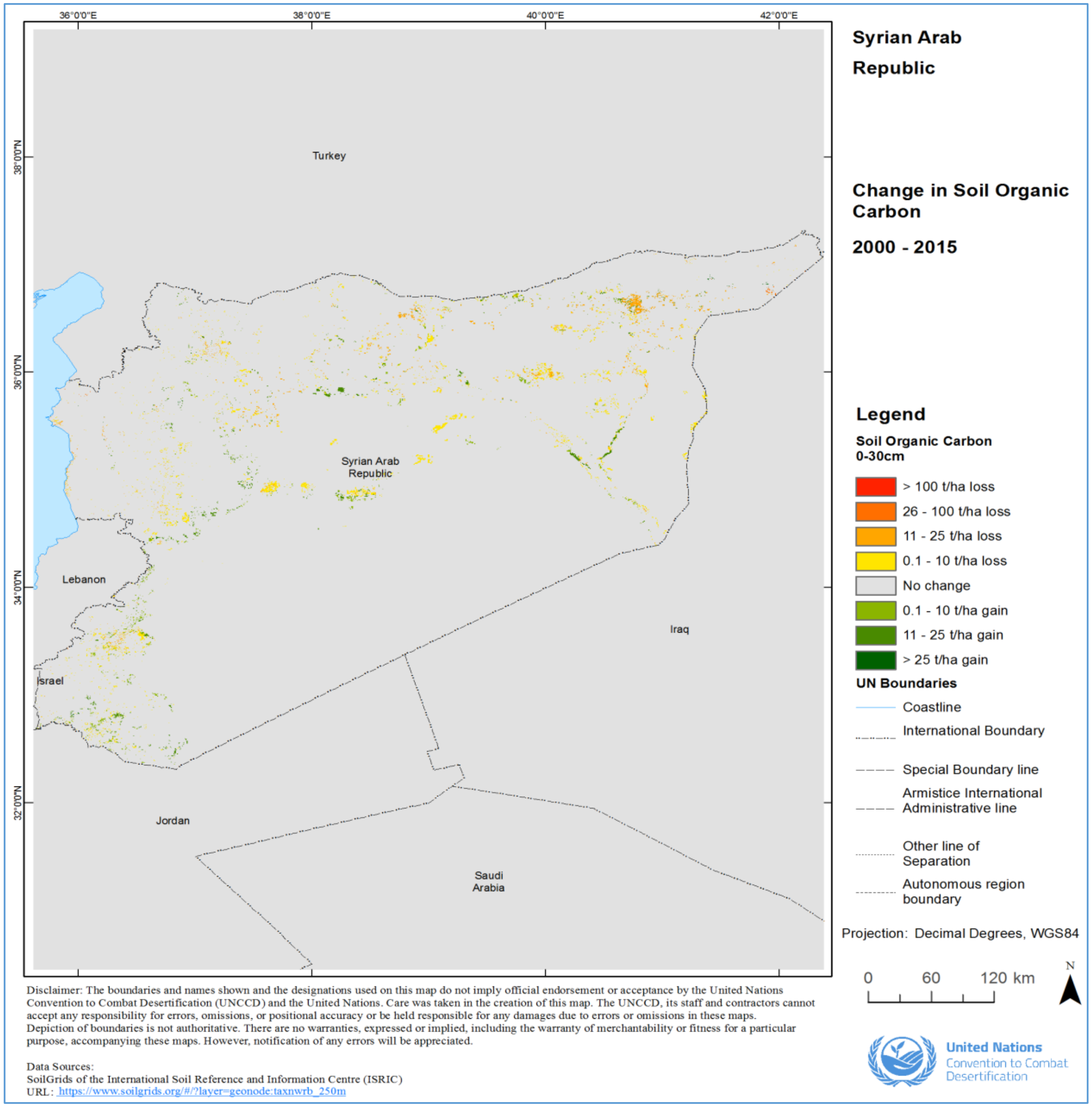


Figure 9- B: Map of soil organic carbon changes (0-30 cm) in Syrian Arab Republic between 2000 and 2015



Fourth: Drought Indicator: Vegetation Health Index VHI

Syria has recently suffered from a decline in the area of agricultural land and a decline in productivity due to some factors, foremost of which is the drought, where Syria has recently suffered a drought that affected the agricultural crops, especially rainfed, located in the areas of stability III and IV, which led to the exit of these Lands with continous years of drought and the lack of rainfall. These lands turned to unplanted lands. So, the study of this phenomenon and tracking the changes in the area of agricultural land in general and crops in particular became an important need. Remote sensing techniques is very important tool to monitor this phenomenon with various advantages. MODIS satellite images were used to calculate the drought indicators such as VCI, TCI and VHI.

Article 1 of the United Nations Convention to Combat Desertification (UNCCD) states the following definition of drought: "Drought" is the natural phenomenon that occurs when the rain is significantly below its recorded levels and thus causes hydrological imbalances that adversely affect land production systems.

Remote sensing techniques were used, represented by vegetation indices for drought monitoring, biomass changes, crop area and yield estimation. The following indicators are used:

- Normalized Difference Vegetation Index (NDVI).
- Normalized Difference Water Index (NDWI).
- Vegetation Condition Index (VCI).
- Temperature Condition Index (TCI).
- Vegetation Health Index (VHI).
- Standard Precipitation Index (SPI).
- Aridity Index (AI)
- Soil Moisture Index (SMI).

From these studies and researches in the world and Syria we mention the following:

- Kogan 2001 studied drought status in 20 countries, using a set of indices VCI, TCI and VHI, and was accepted as a diagnostic tool for grain production.
- Evans and Greeken 2004 compared climate factors and human factors to land degradation in Syria and used climate data, land use data and the NDVI index derived from 8-km AVHRR images in the period 1981-1996.
- Hammouri and El-Naqa 2007 studied drought in the Amman-Zarqa basin, northern Jordan using the SPI and NDVI derived from satellite images.
- Wardle and his colleagues in 2007 used space MODIS images and the NDVI and EVI indices to distinguish and map different crops in Kansas State.
- ChengLin and JianJun noted in 2008 that the drought of natural disasters that usually hit northern China and the plant indices used to monitor drought NDVI, VCI and TCI.
- Tsiros and his colleagues in 2011 identified suitable areas for sustainable production in the province of Tally in central Greece through the use of the AI and VHI index.
- Yagci AL and his colleagues used 2011 MODIS data for the years 2000-2011 to monitor the effect of drought and damage on cotton yield in Texas through the NDVI, VCI and TCI indicators.
- Owrangi and his colleagues in Iran in 2011 attempted to find a fast, efficient and reliable method that could be used to produce drought maps in which AVHRR satellite images were processed and NDVI, VCI, TCI and VHI indicators were used and compared with the SPI index.
- Al-Arian and his colleagues used the VHI index derived from MODIS data for the study of drought in Syria in 2000 and 2010. The results showed the effectiveness of this indicator in the drought study. The 2007/2008 season was the driest season.
- Khalill and his colleagues used 2013 VHI as a drought indicator to monitor drought in Egypt.
- Moghadam and his colleagues in 2014 noted that the VCI and SPI indices are suitable for assessing drought conditions in eastern Azerbaijan.
- Shofiyati and his colleagues 2014 analyzed the SPI index of daily and monthly rainfall data for 10 years. While the agricultural drought index was studied for the same period by monitoring the VCI, VTI and VHI indicators.

- YAN and his colleagues 2016 developed an operational drought monitoring system in China. Based on different components such as spatial image data, processing and calculation of the VCI, VTI, VHI and EVI indicators.
- Al-Khalid and his colleagues (2016) used MODIS satellite images of April during the time series 2000 to 2012 for Syria to track the spatial and temporal changes of the living mass and area of cultivated land during this period in Syria. They classified the values of NDVI to 13 classes of different land uses and productivity of agricultural land. Results showed that the lowest value of NDVI was recorded during this series in 2008 with a mean average of 0.185, which expressed the most drought years and the lowest productivity in the period studied, while the highest values in 2003 with an average of 0.302, and thus expressed the lowest years of drought and higher Productivity over the same chain. A strong and significant correlation was found (0.744) between the amount of annual rainfall with the recorded NDVI values.
- Al-Khalid and Kasouha (2016) studied the temporal and spatial changes in vegetation area, productivity and drought control in agricultural stabilization areas in Syria and linked them with rainfall data using NDVI from MODIS satellite images during the 2001-2012 time series. Their results showed that the lowest registered value of NDVI for the stability zones from 1 to 5 during the studied series was in 2008 with an average of 0.412, 0.289, 0.172, 0.131, and 0.109 respectively in terms of the driest and least productive years during this time series. While the highest values were in 2003 with a mean average of 0.546, 0.49, 0.37, 0.284 and 0.182 respectively, thus expressing the lowest drought years and the most productive during the same series. A strong and significant correlation (0.891) was found between the mean rainfall of the studied time series and the general average of NDVI values,
- Amalo and his colleagues in 2017 used VCI, TCI and VHI indices derived from MODIS to monitor drought in East Java, Indonesia, in 2015.
- Safari Shad and his colleagues 2017 used vegetation indices extracted from (MODIS) during 2000-2008. In Isfahan province of Iran, monthly precipitation data from 25 stations were used to extract the SPI to validate the results of three drought indicators (VCI, TCI, NDVI). The results showed a correlation between SPI index and the drought indicators used, where the best correlation was with the VCI index while the lowest corrolation was with the TCI index.

- Al-Khalid and his colleagues (2017) used NDVI from MODIS satellite images for the months of April and August during the time series 2000-2012 for Syrian governorates with rainfall data to study the spatial and temporal changes of the living mass and their relationship to drought. Their results showed that the lowest value of the NDVI was recorded in 2008, indicating the most dry years. The highest values were recorded in 2003, indicating the lowest drought years during this time series in the governorates of Damascus, Suweida, Homs, Hama, Idlib, Aleppo, Lattakia and Raqqa. Al-Hasakah and Deir al-Zour have behaved differently, since 2008 was not recorded for the lowest NDVI values and the driest. The results also showed that 2003 recorded the highest values of NDVI, the lowest drought years. The results also showed that the phenomenon of drought does not occur in Syria in the same way and intensity in all governorates and Syrian territory. Drought may hit part of Syria in a particular year and not hit another part of the country. The results also showed a strong correlation between the amounts of rain precipitation in Syrian governorates with the registered NDVI values for each governorate. The most powerful of these relations was in the province of Al-Hasaka (** 0.973).
- Doon 2017, tested the effectiveness of VCI index derived from the MODIS13A3_NDVI images in tracking environmental changes in Syria between 2000 and 2014, where more than 60% of its area of drought was found in most of the years mentioned, which foreshadows continuous environmental degradation.
- Al-Khalid and his colleagues (2018) studied the phenomenon of drought in Syria in the period 2000-2014 using the following plant indices: NDVI - VCI - LST - TCI - VHI - SPI derived from different satellite images with different spatial and temporal resolutions. The results showed the effectiveness of this indices in the study and control of drought in Syria. The results showed that the driest years were in 2008 and the lowest drought was in 2003. The results showed a strong correlation between the SPI and other drought indices NDVI-VCI-VHI.

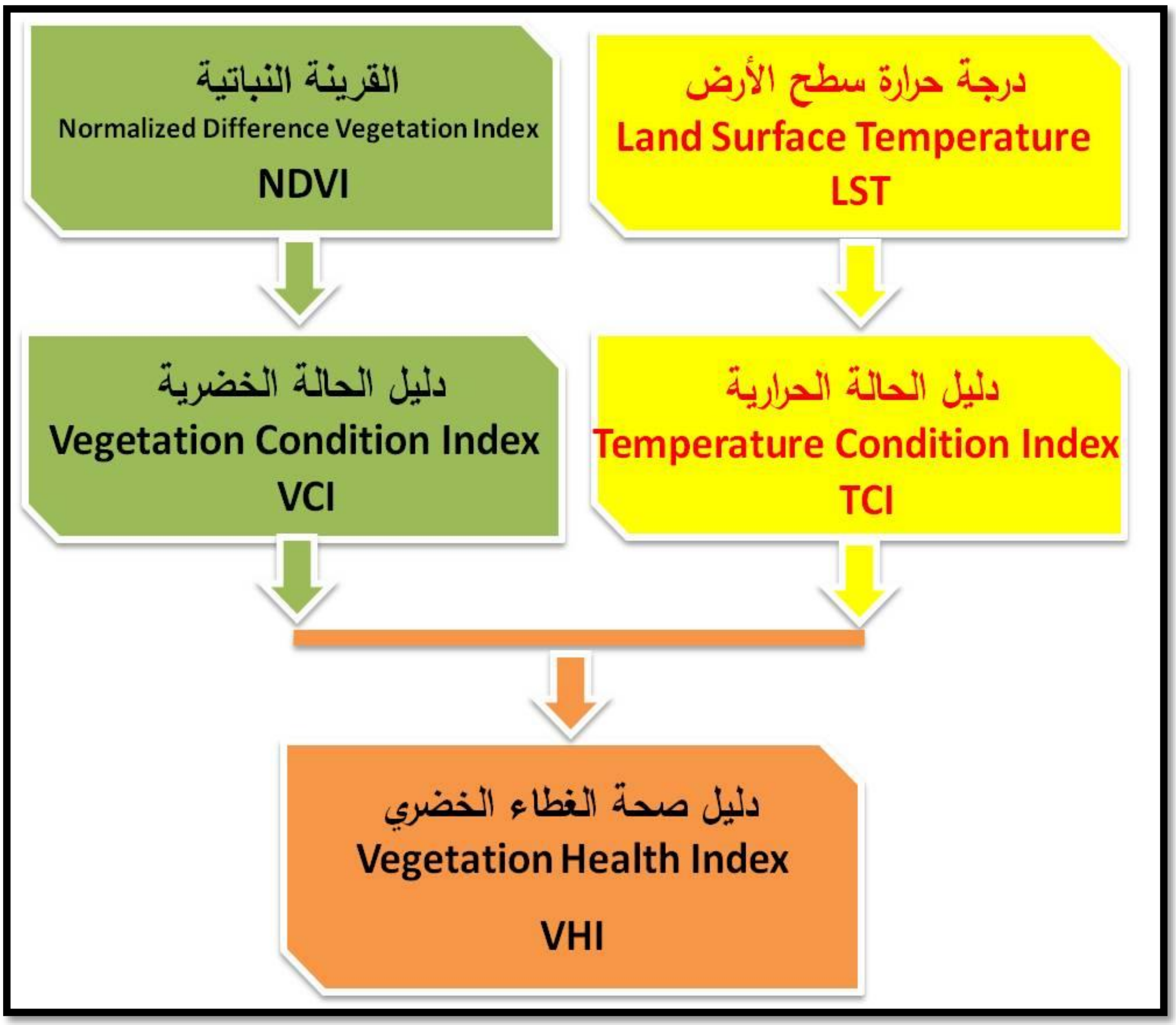
Methodlogy:

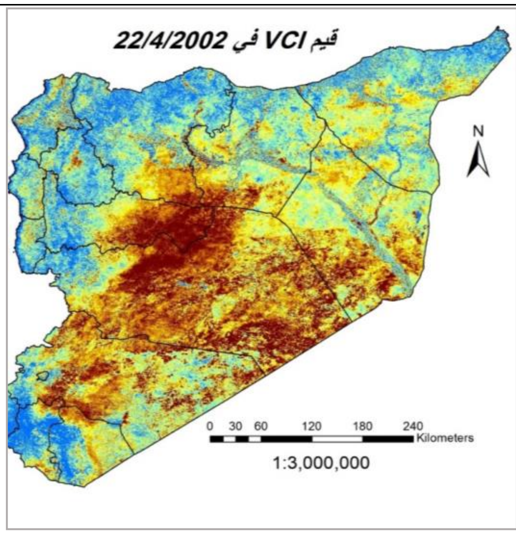
MODIS sensor data was used from Terra (1999) and Aqua, launched in 2002, which is one of the most important sensors that provide daily satellite images from which many products were derived after a series of different processing levels of up to 44 products. (36 spectral channels), as well as a spatial resolution capability of 250 m (channel 1 - 2 and the representatives of the red and infrared spectral channel used in calculating the NDVI and 500 m) channels (3 -7) and 1000 m channels (8-36), in addition to a product of Surface temperature LST with a spatial resolution of 1000 m. (See Annex 2).

The values of this indicator were produced every 16 days in the period 2000-2015. Maps will be displayed on April 22 of each year representing the maximum vegetation cover in Syria. (See Annex 2).

The following diagram shows the method of calculating the vegetation health index.

Vegetation Health Index (VHI)





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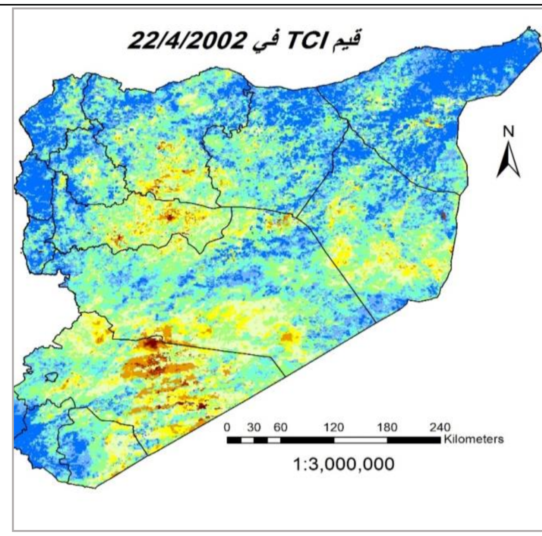

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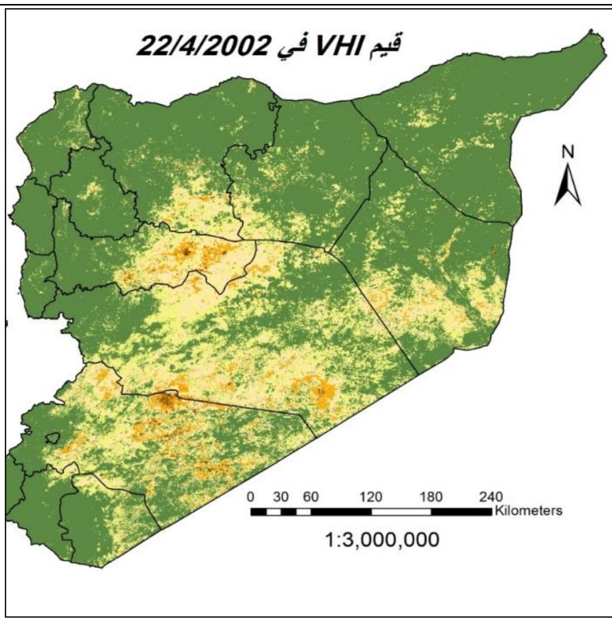

VHI Values	الصفوف
> 40	لايوجد جفاف No drought
< 40_ >= 30	جفاف خفيف Mild drought
< 30_ >= 20	جفاف معتدل Moderate drought
< 20_ >= 10	جفاف شديد Severe drought
< 10_ >= 0	جفاف شديد جداً Extreme drought

Figure (10): Map of average VHI values for the period 2000 - 2015 date April 22,

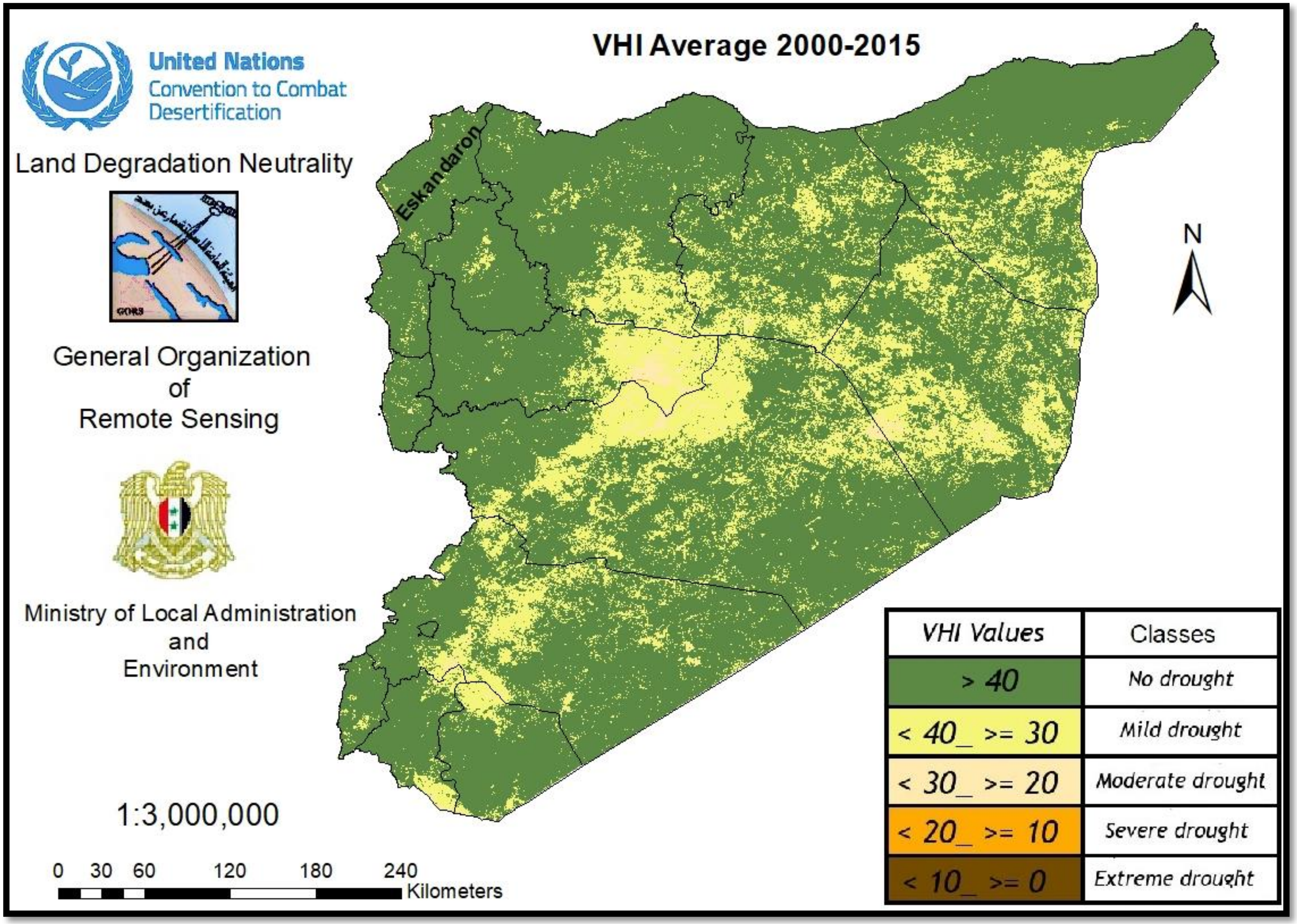

Figure 11: Map of the majority of VHI values for the period 2000 - 2015 of 22 April

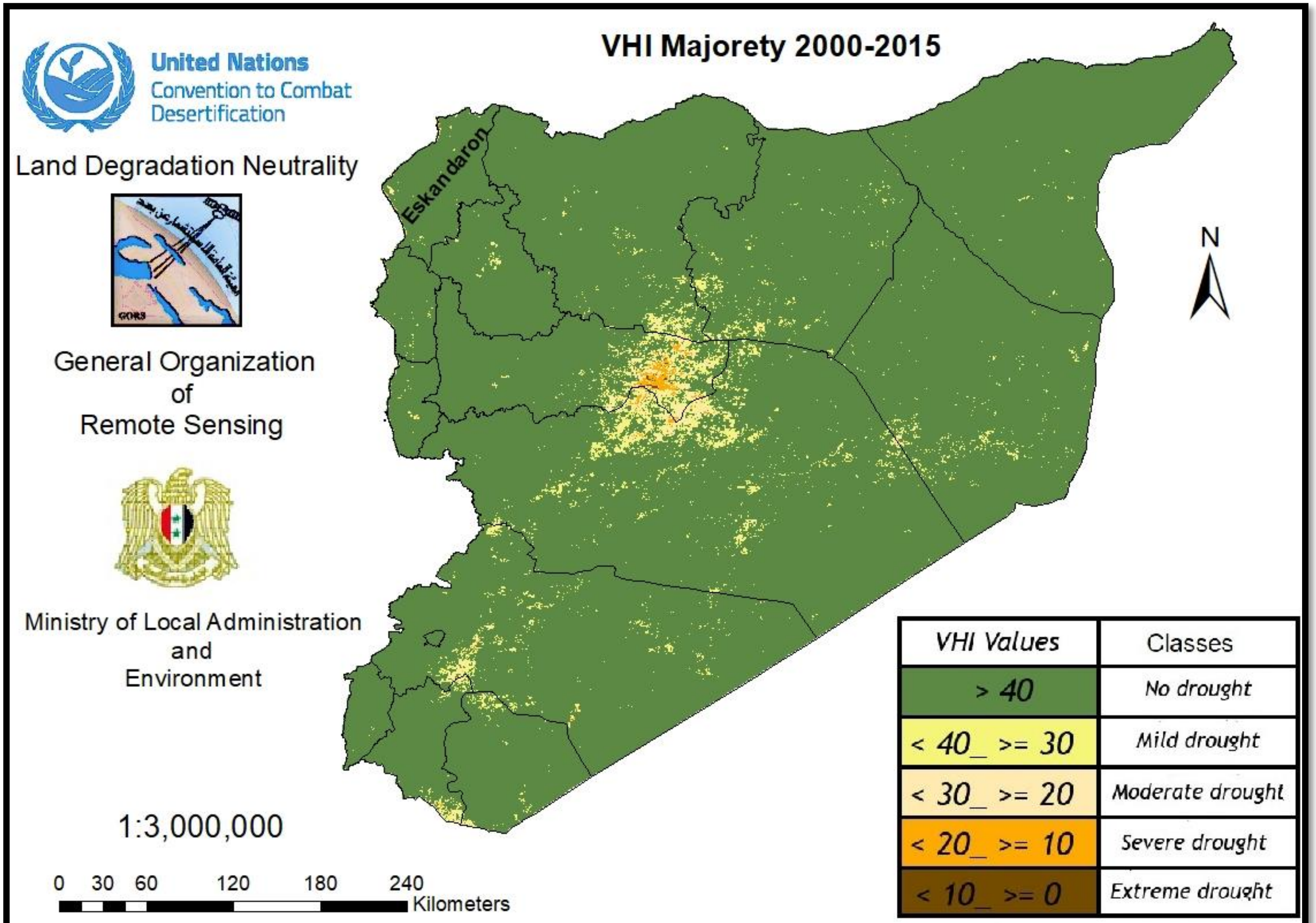

Figure 12: Areas of VHI Class of 22 April for the 2001-2015 time series

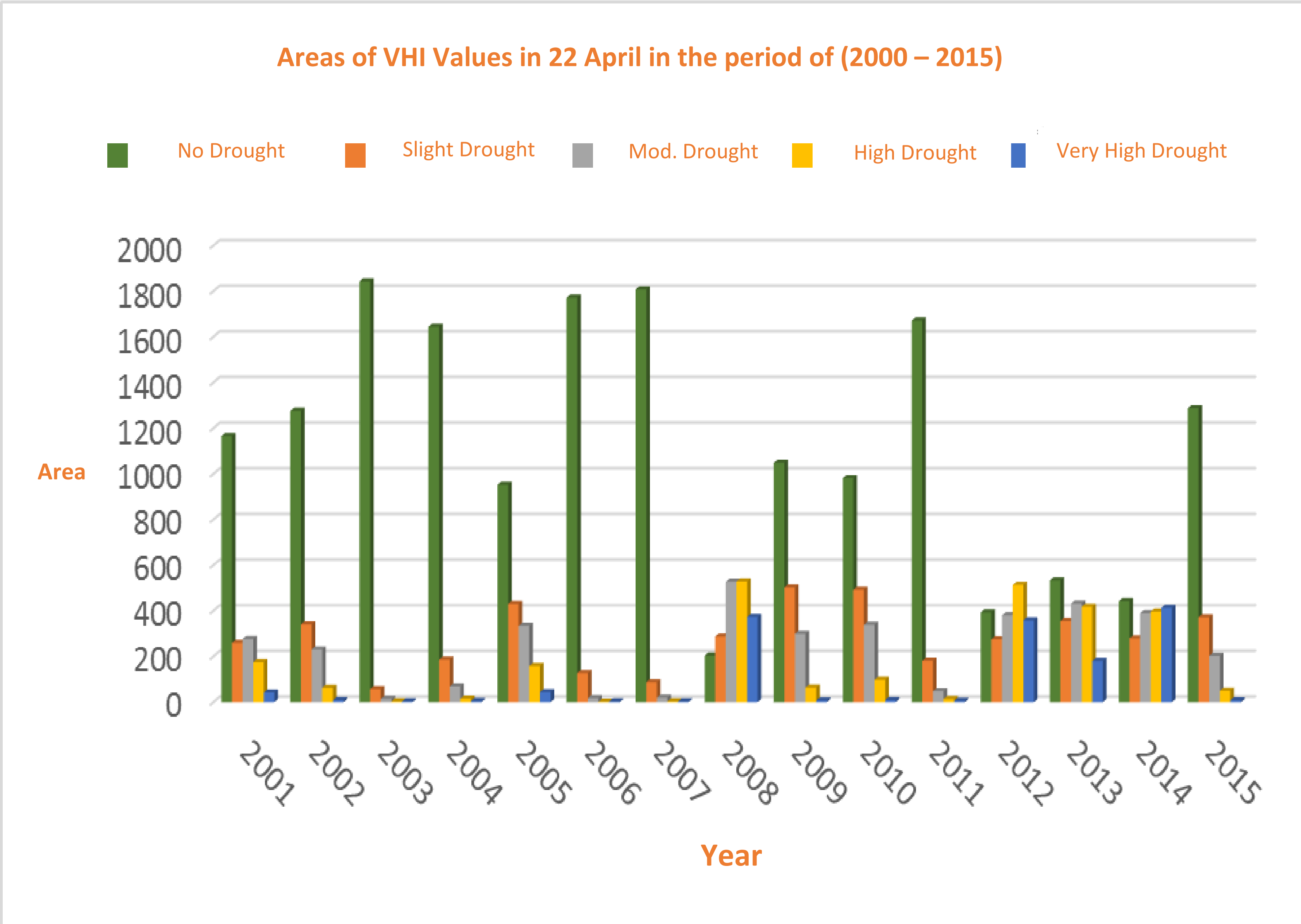

Table 8: Area of VHI Values in 22 April in the period of (2000 – 2015)

	Years														
Classes	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
No Drought	116593	127642	**184341**	164514	95148	177188	180766	**20293**	104775	98117	167185	**39288**	53362	**44270**	128759
Slight Drought	25984	34107	5708	18639	43053	12647	8689	28736	50147	49171	18122	27505	35533	27882	37133
Mod. Drought	27642	23040	1350	6865	33475	1695	1935	52761	29878	33955	4762	38028	43230	38957	20237
High Drought	17551	6297	260	1494	15879	138	288	52862	6402	9805	1324	51317	41755	39593	4983
Very High Drought	4167	851	**280**	427	4383	270	260	**37286**	737	891	545	**35800**	18059	**41237**	826

Land Management Plan in the Syrian Arab Republic

Potential voluntary Targets of land degradation Neutrality in the Syrian Arab Republic:

First: The general national targets of land degradation Neutrality in the Syrian Arab Republic:

By 2030, the Syrian Arab Republic seeks to achieve land degradation neutrality on the entire territory of the country.

Second: Special voluntary targets of land degradation neutrality in the Syrian Arab Republic:

The specific targets of land degradation neutrality in Syria address the various land cover that constitute the land of Syrian Arab Republic, as follows:

1- land degradation neutrality targets in agricultural lands:

A- By 2025, Protect (avoid - reduce) of entire agricultural land from degradation, through the following measures:

- Follow the integrated land management of the entire agricultural land that has begun to show signs of initial deterioration or is stable but stressed to degradation.
- Preparation of training programs for technicians working in the management of agricultural land.
- Avoid and minimize as much as possible the transformation of agricultural land into urban land through firm enforcement of laws.
- For areas marked with salinization: improved irrigation and drainage system and appropriate crop selection.

- For areas that are beginning to show signs of waterloning: improving irrigation and drainage system and carrying out agricultural operations at appropriate times.
- Land that has begun to show signs of low productivity: improve irrigation and drainage system, applay proper fertilization and control, and improved physical and chemical properties of soils.
- For lands that are beginning to show signs of low organic matter: implementing of fertilization especially organic, improve the physical and chemical properties of soil, cultivation of crops that enrich the soil with organic matter and implementing of appropriate agricultural courses.
- Land that has begun to show signs of water erosion: Contour tillage, building terraces, stone walls, and other agricultural processes.
- Land that has started to show signs of pollution: management of sewage and industrial operations and the extraction and refining of oil properly so that their residues do not reach the agricultural land.
- Increase irrigated areas through new irrigation projects and introduce new irrigation techniques.
- Mitigation and adaptation to drought impacts.

B- By 2030, riverse 20% of the degraded agricultural lands (rehabilitation, reclamation and restoring) through the following measures:

- Preparation of capacity building programs for technicians working in the management of agricultural land: (maintenance - rehabilitation - reclamation).
- Salined areas: maintenance of irrigation and drainage systems, selection of suitable crop varieties, implementation of agricultural operations at appropriate times and implementation of appropriate reclamation programs.

- Waterlogged or eroded lands: maintenance of irrigation and drainage systems, carrying out agricultural operations at appropriate times and conducting deep tillages to break deep layers.
- Land showing low productivity or have clearly reduced productivity: use of modern irrigation systems, agricultural drainage, proper fertilization and control, improved physical and chemical properties of soil, and use of conservation crops.
- For lands with water erosion: Contour tillages, building terraces and walls, implementing terraces and other agricultural processes that protect soil from water erosion.
- Lands with wind erosion: create windbreaks and carry out stabilization projects for sand dunes, especially in the south-eastern region and prevent sand from creeping around the surrounding areas.
- Land with contamination or pollution: rehabilitation of these lands and ensure the management of sanitary and industrial operations and the extraction and refining of oil properly so that their residues do not reach the agricultural land.
- Increase the efficiency of investment of cubic meter of water by 20% in the unit area of irrigated land.
- Reclaiming 1000 hectares of agricultural land annually and investing in agriculture.
- Rehabilitation of 50 hectares of saline land annually and reinvestment in agriculture.

2- land degradation neutrality targets in range lands (Badia):

A- By 2030, 1.4 million hectares of range land will be protected from degradation (water erosion, wind erosion, overgrazing, and pollution) and increase productivity by 2015 or earlier by the following measures:

- Follow the integrated land management in the protection of the range land.

- Preparation of capacity building programs for technicians working in rangeland management.
- Support the local population and finance small and micro-projects in order to keep them in the range land and not leave the grazing profession.
- Ensure that range lands lows (Badia laws) are strictly enforced and not violated, and that practices that offend the Badia lands are not carried out, in particular: Badia cultivation - overgrazing - early grazing - hunting.
- Increasing the number of water harvesting projects in the Badia.
- Rehabilitation and support of existing pastoral nurseries and raising their production capacity.
- Increase the area of production and propagation of pastoral seeds.
- Reduce the creep and movement of sand on agricultural land, roads and implement appropriate projects and technologies.
- Protection of oases that showed initial signs of deterioration in the Badia.
- Improve vegetation cover in the Badia.
- Raise awareness and apply participatory approaches.

B- By 2030, the rehabilitation of 0.9 million ha of the Badia lands, which showed different types of degradation (water erosion, wind erosion, overgrazing, and pollution) through the following procedures:

- Raising the productivity of the improved and rehabilitated Badia lands (increasing the yield per hectare from 50 forage units to 400 forage units per year).
- Increase the number and area of pastoral reserves by 450 thousand H from the range lands at the rate of 3 reserves annually (36 protected until 2030).
- Reduce the creep and movement of sand on the land through various technical procedures and implementation of appropriate projects.

- Support and rehabilitate oases that have different degradation levels in the Badia.
- Increasing the number of water harvesting projects in the Badia in a balanced manner.
- Supporting existing pastoral nurseries, rehabilitating them and raising their production capacity.
- Increase the number and area of production and propagation sites of pastoral seeds.
- Expanding the establishment of natural and ecological reserves projects, stabilizing sand dunes and growing medicinal and aromatic plants.

3- land degradation neutrality Targets in forest lands:

A- By 2025, protect the entire forestland from degradation, through the following measures:

- Applaying the Integrated land management of forest land protection.
- Preparation of capacity building programs for technicians working in the field of forest management.
- Apply a participatory approach in forest management.
- Support local people and finance them for micro and small projects, in order to involving them in forest management (participatory approach).
- Ensure strict and non-discriminatory enforcement of forest laws and non-implementation of practices that harm forest land, particularly: cutting and burning.
- Updating the forestry law and ensure the complementarity of the law with other environmental laws that guarantee the management of forest resources.
- Development of a national plan for forestry awareness and extension.

- Increase the number of forest controls, guards and forest technicians in forest sites.
- Protection of threatened forest ecosystems, for example the degraded Atlantic Botanic forests (threatened with extinction) in Jabal al-Belaas, Jabal Abdul Aziz, Jabal Abu Rjmin and the mountains of Hasia.

B- By 2030, rehabilitate 50% of the forest land with different signs of deterioration (cut-fires), through the following measures:

- Rehabilitation of forests areas that have been subjected to various types of deterioration as a result of the war.
- Rehabilitation of the degraded Atlantic Botanic Forests (threatened with extinction) in Jabal El-Belaas, Jabal Abdel-Aziz, Jabal Abu Rjmin and Hasia Mountains.
- Increased number of forest nurseries.
- Increasing the number and area of forest reserves.
- Declaration of most natural forest sites as natural reserves.
- Improved infrastructure and equipment for forest protection.

4- land degradation neutrality targets in the sector of water resources and wetlands:

A- By 2025, 100% of water resources and wetlands are protected from degradation through the following measures:

- Applying integrated management of water resources and wetlands.
- Traininig of professionals working in the management of water resources and wetlands.
- Continue to apply and develop laws and legislation to ensure the protection of water resources and wetlands.
- Declaration of wetlands in the country as protected areas.

- Protect water resources and wetlands from pollution by industrial and sewage.

A- **By 2030, rehabilitation of 50% of water resources and wetlands that subjected to different degradation levels and increased efficiency of water resources, through the following actions:**

- Rehabilitation of polluted water bodies and wetlands.
- Rehabilitation of war-affected irrigation systems in Syria.
- Rehabilitation and replacement of war-damaged water pumping stations in Syria.
- Rehabilitation of dams affected by the war on Syria.
- Ensure adequate water resources in fragile areas (Badia – stability zone IV) to promote the stability and non-migration of affected populations.
- To establish sufficient number and proper distribution of sewage networks and stations in Syria to protect the Syrian natural resources from pollution and to benefit from non-conventional water in irrigation.
- Drowing the water from rivers and dams for irrigation of new areas.

5- land degradation neutrality targets in sector of biodiversity:

A- By 2025, protect (avoid - reduce) ecosystems and habitats through the following measures:

- Integrated environmental management of different ecosystems.
- Set the Red List of Threatened Natural Species.
- Protect and rehabilitate 100% of ecosystems and habitats of endangered species.
- Cultivation of local medicinal and aromatic plants.

B- By 2030, rehabilitate 50% of ecosystems and natural habitats through the following measures:

- Rehabilitation of 50% of ecosystems and natural habitats of endangered species.

- Rehabilitation of 10% of ecosystems and natural habitats with different deterioration level.
- Establish natural corridors between protected areas to ensure easy movments of organisms between protected areas.

6- land degradation neutrality targets in the urban areas:

A- By 2025, urban land management according to the principles of land degradation netrality, through the following measures:

- By 2020, to determine the optimal locations for urban expansion beyond the agricultural and other natural cover areas of interest.
- By 2020, estimate the extent of urban damage and infrastructure caused by the war on Syria.
- By 2025, ensure the application of the law of green architecture in rebuilding and reconstruction.
- Integrated urban area management and infrastructure (improving environmental performance and increasing environmental efficiency through economic incentives and participatory approaches).

7- land degradation neutrality in the sector of regulatory and legislative matters:

By 2030, improve regulatory and legislative matters in Syria to ensure that the land degradation neutrality targets are implemented and achieved through the following measures:

- By 2020, to harmonize the national plan to combat desertification with the new UNCCD strategy.
- By 2020, to build the capacity of national staff to calculate the indicators of land degradation and to implement measures to protect the land from degradation with according to land degradation neutrality principles.
- By 2020, to establish the principle of integrated natural resources management.

- By 2020, to establish the principle of sustainable development of natural resources.
- By 2020, the development of the system of urban control and the mechanism of expansion of organizational charts
- By 2020, the effective implementation of the laws and legislations related to the conservation of natural resources (urban control, forest control, pastoral control, environmental law, green architecture, etc.).
- By 2025, to increase awareness and to establish the concept of participatory approach among the population in general and the population of the affected areas in particular.
- By 2025, improve the living conditions of people who affected by desertification and drought.
- By 2025, strengthening the role of the community in participation in development programs and natural resources management.
- By 2025, new jobs were created for the inhabitants of the fragile areas (Badia – stability zone IV).
- By 2030, to provide a sufficient number of professionals and specialists in the management, maintenance and development of natural resources, ecosystems and habitats.
- By 2030, to promote the economic, social and cultural level and raise environmental awareness in fragile areas (Badia - stability zone IV).

The degree of ambition mentioned in these vulintary targets in terms of the time required to achieve, the targeted areas for protection and rehabilitation depends on the end of the war and crisis and easy access to the entire territory of the country, as well as provide adequate funding for it.

Management Plan:

Land Cover	Negative Changes	Area Km2	Remedial Measures	LDN Target		Needed Fund Million $
				Area Km2	Time year	
Forest	Declining productivity	491.73	1- Identify the reasons of productivity decline and choose the appropriate measures	2066	2020	**0.2**
	Early Sign declining	642.51				
	Stable but stressed	932.14	2- Management, correction and rehabilitation	2066	2030	**45**
	Total	**2066.38**				
Shrubs, Grass and sparse vegetated plants	Declining productivity	186.06	1- Identify the reasons of productivity decline and choose the appropriate measures	2300	2020	**0.2**
	Early Sign declining	804.82				
	Stable but stressed	1313.87	2- Management, correction and rehabilitation	2300	2030	**20**
	Total	**2304.75**				
Arable lands	Declining productivity	8217.63	1- Identify the reasons of productivity decline and choose the appropriate measures	33000	2020	**0.5**
	Early Sign declining	11097.92				
	Stable but stressed	14035.41	2- Management, correction and rehabilitation	15000	2030	**182**
	Total	**33350.96**				
Range land	Declining productivity	2234.60	1- Identify the reasons of productivity decline and choose the appropriate measures	31000	2020	**0.7**
	Early Sign declining	13818.00				
	Stable but stressed	15582.00	2- Management, correction and rehabilitation	10000	2030	**112**
	Total	**31635.00**				
Total						**360.6**

SWOT Analysis:

Strength points:	**Weaknesses:**
• There are laws that serve to protect the land from degradation such as the Badia Protection Act, the Forest Law and the Environment Act. • Provide a high level of education, knowledge and environmental awareness of a number of researchers in some universities and research centers competent. (Merge with next item) • The development of LDN indicators will improve awareness of land degradation among stakeholders, decision makers, policy makers and strategies. • National land management institutions at the national level adopt and implement policies that include a good framework for land protection from degradation, primarily the Ministry of Agriculture and Agrarian Reform and the Ministry of Local Administration and Environment, through which LDN activities can be supported. • This is an opportunity to combat land degradation as one of the key measures included in climate change adaptation measures (National Adaptation Strategy for Climate Change - nationally defined contribution document) • The existence of the three Rio conventions in the Ministry of Local Administration and the Environment	• Lack of strict enforcement of land protection laws. • The national action plan to combat desertification is not prioritized by decision-makers at the highest levels. • Poor coordination between ministries concerned with land and its protection and other ministries that are interested in the investment of land resources • The issue of desertification and land degradation is not included in the list of most important priorities at the decision-making level. • Lack of an appropriate institutional regulatory framework and lack of financial resources for this issue. • The weakness of networking at the regional and international level in terms of protecting the land from degradation and combating desertification, especially during the war on Syria 2011 until now • Failure to assess the costs of land degradation and therefore not to know the benefits of measures implemented to combat desertification. • Lack of precise identification of areas affected by desertification and land degradation. • Addressing the issue of land degradation and desertification in part of the research program in the researches institutions and universities.

Opportunities:	**Threats**
• Combating degradation is one of the major measures included in adaptation measures to climate change (National Adaptation Strategy for Climate Change - nationally defined contribution document) • Opportunities are still available to stop the degradation of new land, to reduce the chances of further degradation of already marked or already degraded land, and to rehabilitate land that has degraded. • There are opportunities to develop new tools to support policy in combating land degradation. • LDN can be clear objectives to facilitate the management of agricultural and environmental policy implementation both nationally and locally. • Integration in the development and measurement of LDN indicators makes it easy to measure progress towards land degradation neutrality. • The implementation of the LDN principles helps to implement agricultural, environmental, and climatic and biodiversity policies. • Dissemination and dissemination of LDN principles creates special attention by stakeholders and the media on the loss and degradation of land resources that can not be renewed. • Dissemination and meanstreaming of LDN principles creates opportunities for strengthening national funding and attracting international funding for	• Degradation of natural and vital land is accelerated from affected areas where available resources are insufficient to adapt and mitigate impacts. • The continuation and ferocity of the war against Syria, which is causing great damage to the land resources, which has brought some lands to irreversible cases that can not be rehabilitated. • A potential reduction in funds for research in general and for research in the environmental and agricultural sectors, in particular because of the crisis. • Lack of adequate financial and technical support from international organizations concerned with land degradation and halting funding for projects that help protect land from deterioration due to unilateral sanctions on Syria. • Lack of high coordination between ministries that have a direct and indirect relationship to land, which increases potential threats to land. • Lack of high coordination and potential conflict between policies on climate change and policies on desertification if the links between the two phenomena are not carefully considered. • Lack of awareness of the importance of desertification and land degradation among some decision makers may be seen as a small problem that is not important to increase threats to land.

projects dealing with land resources and protecting them from degradation as well as to encourage funding by the national private sector. • The LDN principles help simplify the reporting and data exchange process under the UNCCD and the UNFCCC, increasing the chances of land protection from degradation. • Data and indicators resulting from LDN activities can be used effectively in adaptation policies, planning measures and project implementation, both nationally and locally.	

Levarage Plan for LDN in Syrian Arab Republic:

First: What should be put in place to levarage and activate the land degradation neutrality program?

1- **What should be put in place to levarage the program of land degradation neutrality at the national development programs level and national goals and priorities:**

- Formation of a national committee of land degradation neutrality program.
- Develop the concept of LDN as a priority and as a target when developing policies and plans related to land, environment, climate and biodiversity.
- Disseminate the concept of LDN in all development plans and programs in the country at all levels and in all sectors (agriculture, industry, tourism, etc.).
- Monitoring the necessary funding from public budgets (budgets of the relevant ministries) to implement the merger plan. As well as to obtain additional funding

from active international organizations in the region and other donor institutions through the International Planning and Cooperation Authority in the country.

- Develop innovative funding mechanisms for LDN activities.
- Develop a monitoring system for achieving the targets and objectives of LDN within the national action plans and the UNCCD working plan.
- Form national technical team to collect data and indicators for LDN by 2030 and follow up the targets of the land degradation neutrality developed nationally.
- Promote researches on topics related to LDN. Graduate students can be employed in relevant colleges.
- Encourage joint programs of action to land degradation neutrality.
- Adopting an integrated approach to the sustainable management of land resources and land degradation neutrality.
- Develop short- and medium-term awareness programs at the national and local level for LDN.
- Activate the Coordination among the makers of various national strategies, plans and policies (combating desertification - biodiversity - environmental strategy - drought management strategy - national climate change plan) and incorporating the concept of land degradation neutrality.
- Incorporate the concept of LDN into the laws of urban and industrial development.
- Development of different capacity-building programs for LDN, land, and protection from degradation, for different levels of decision makers in the country, and for NGOs.
- Encouraging the establishment of associations and non-governmental organizations (NGOs), aimed at assisting, and can communicate with similar bodies in developed countries for cooperation in material, moral and scientific support, and to take advantage of the steps taken by some of these organizations to help land degradation neutrality and Sustainable development goals SDGs in the affected areas.

- Support farmers and livestock breeders in affected areas interested in applying the principle of integrated and sustainable land management and support to local populations in forest areas interested in implementing integrated and sustainable forest management and applying participatory approaches.

2- **What should be put in place to levarage the program of land degradation neutrality on the level of the government's obligations towards international conventions:**

  - Ensuring compliance with the requirements of the three Rio conventions (UNCCD, CBD and UNFCCC) and their implications.
  - Preserving Syria's representation in all three Rio conventions, and all agreements related to land, environment and biodiversity.
  - Circulate the decisions and outcomes of the meetings of States parties to the three Rio conventions.
  - Support the achievement of sustainable development goals (SDGs) and the development of national strategies to achieve them, in particular target 15 "Protecting and restoring land ecosystems, promoting sustainable use, sustainable forest management, combating desertification, halting land degradation and reversing, Combating desertification, restoring land and degraded soils, including land affected by desertification, drought and floods, and seeking a world without land degradation by 2030 ".
  - Development of national plans and strategies (National Strategy to Combat Desertification - Biodiversity Strategy - National Environment Strategy - National Strategy for Climate Change) to achieve the objectives of sustainable development on one hand and programs of land degradation neutrality on the other hand.
  - Increase consultation and coordination between the relevant national institutions and regional and international organizations related to the issues of land

degradation neutrality and proposing projects related to neutralizing land degradation and financing them.

Second: Who are responsible for implementing the program of land degradation neutrality in the Syrian Arab Republic?

1- **Syrian Govrenmental instituríons:**

- Ministry of Local Administration and Environment.
- Ministry of Agriculture and Agrarian Reform and all its relevant institutions.
- Ministry of Water Resources.
- Ministry of Oil and Mineral Resources.
- Ministry of Public Works and Housing.
- Ministry of Higher Education and related Universities and Colleges.
- General Organization of Remote Sensing.
- Directorate General of Meteorology.
- Planning and International Cooperation Authority.
- Regional Planning Authority.
- Ministry of Finance.
- Ministry of Tourism.
- Ministry of Information.
- Ministry of Health.
- Ministry of Justice.
- Relevant research centers.

2- **Syrian NGOs:**

  - General Federation of Farmer.
  - Union of Youth Revolution.
  - National Union of Syrian Students.
  - Engineers Syndicate.

- Agricultural Engineers sandicate.
- Farmers.
- Agricultural workers.
- Chamber of Agriculture.
- Private sector.
- Non-governmental NGOs.
- Representatives of pastoralists and livestock breeders.

3- National coordinating mechanisms:

- Presidency of Ministers Council.
- Ministry of Foreign Affairs and Emigrants.
- Planning and International Cooperation Authority.
- Committee for the preparation of sustainable development goals.
- National Committee to Combat Desertification.
- Committees to prepare targets of land degradation neutrality in Syria at the level of decision executers and dicision makers.

4- Regional and international organizations:

- United Nations Convention to Combat Desertification (UNCCD).
- Global Mechanism of the International Convention to Combat Desertification (GM).
- The Global Environment Facility (GEF).
- Arab Center for the Studies of Arid Zones and Drylands (ACSAD).
- United Nations Development Program (UNDP).
- Food and Agriculture Organization of the United Nations (FAO).
- World Food Program (WFP).
- United Nations Environment Program (UNE).
- International Union for the Conservation of Nature and Natural Resources (IUCN).
- United Nations Educational, Scientific and Cultural Organization (UNESCO).
- World Health Organization (WHO).

Transformative projects towards achieving land degradation neutrality in the Syrian Arab Republic:

Transformative projects to protect the agriculture sector:

Target 1: By 2025, the entire agricultural land is protected from degradation

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Land managment	Follow the integrated management of the entire agricultural land	Project for the identification of degraded agricultural lands in the governorates of Hama, Homs, Deir al-Zour, Raqqa, Hasakah, Aleppo, Damascus - sub.	FAO - UNCCD	1 - 2 –15	1.05
		Project of operation the licensed agricultural wells by solar energy in the Syrian governorates and linking them with drip irrigation systems	FAO - UNDP	1 - 2 –15	10
		Project of the deployment of biogas and renewable energies in the Syrian governorates	FAO - UNDP	15	10
Land cover change	Avoidance and minimization of the transformation of agricultural land into urban land	Land Use Planning Scheme in the Coastal Area using Remote Sensing Techniques and Geographic Information Systems	LDN – UNCCD- FAO- GTZ- ACSAD-GCF	15	1
Salinization	Improving irrigation and drainage system and selecting appropriate crops	Survey and identification of saline lands in Syria	FAO	1 - 2 –15	0.5
Waterlogging	Improvement of irrigation and drainage system and the implementation of agricultural operations in the appropriate times.	Survey and identification of waterlogged land in Syria	FAO	1 - 2 –15	0.5
Productivity decline	• Improved irrigation and drainage system	Study of organic carbon stocks in Syrian soils and measure the rate of loss of organic carbon in degraded soils.	FAO , UNCCD , LDN and Possible international actors	15	4

	• Implementation of fertilization, especially organic • cultivation of crops that enrich the soil with organic matter • Proper control • Improve physical and chemical properties of soil,	Application of conservation agriculture in selected areas	FAO , UNCCD , LDN and Possible international actors	15	1
Drought	Mitigation and adaptation to the effects of drought	Update the drought strategy in Syria	FAO , UNCCD and Possible international actors	2 - 3 - 6 - 15	0.15
		Support and development of early warning system for natural disasters in Syria (drought - dust and sand storms - floods - ..)	FAO , UNCCD and Possible international actors	2 - 3 - 6 - 15	1
		Drought and natural disaster mitigation project on agricultural production	FAO , UNCCD and Possible international actors	2 - 15	5
		Inventory, documentation and dissemination of wild plant species adapted to climate change	FAO , UNCCD and Possible international actors	6 - 15	1
Wind erosion	• Establishment of windbreakers • Fixation of sand dunes • Improve the vegetation cover in the origen of dust storm areas.	Project for monitoring and controlling dust and sand storms using remote sensing techniques.	FAO , UNCCD and Possible international actors	13 - 15	0.2
		Project to expand the use of conservation agriculture in the lands of the third stabilization zones to reduce the wind erosion of the soil	LDN – UNCCD-FAO- GTZ - ACSAD-GCF	2 - 3 - 15	1
Water erosin	• Contour tillages • Construction of terraces and stone walls • Strip cropping • Other agricultural practices	Project of Management of Sloping Land in Mountain Areas to Reduce Water erosion	LDN – UNCCD-FAO- GTZ - ACSAD-GCF	2 - 3 - 15	0.5
Pollution	• Management of sanitary and industrial operations • Stop the illegal extraction and refining of petroleum	Project of Industrial and Medical Pollution Management	Possible international actors, UNDP and WHO	3 - 9 –12 -15	2

Budget required: 50% international funding and 50% National funding	**38.9**

Transformative projects to reverse the degradation of the agriculture sector:

Target 2: By 2030 (conservation - rehabilitation - reclamation) 20% of degraded agricultural land

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Productivity Decline	• Use modern irrigation systems • Care for agricultural drainage • Appropriate fertilization operations • Applying appropriate control programs • Improve physical and chemical properties of soils • Use of conservation agriculture, • Increase of irrigated areas • Reclamation of stony land	Project of reclamation of stony land	Possible international actors,	1 - 2 - 15	10
Waterlogging	• Maintenance of irrigation and drainage systems • The implementation of agricultural operations in the appropriate times • Deep tillages to break deep layers.	Project to improve soil fertility and water and using of technology of conservation agriculture (case study: Masqan Basin).	ACSAD and Possible international actors,	2 - 3 - 15	5
Salinization	• Maintenance of irrigation and drainage systems • Choose appropriate crop varieties • The implementation of agricultural operations in the appropriate times	Project of Rehabilitation of selected saline lands	Possible international actors,	2 - 1 – 15	10

	• Implement appropriate reclamation programs.				
Wind Erosion	• Create windbreakers • Fixation of sand dunes	Project for the rehabilitation of dust storm areas	ACSAD and Possible international actors,	2 - 3 - 15	5
		project of fixation of the sand dunes in Syrian Badia in the south-east region	ACSAD and Possible international actors,	2 - 3 - 15	10
Water Erosion	• Contour tillages • Construction of terraces and walls • Strips cropping • Other agricultural processes.	Project of protection against water erosion at the farm level	LDN – UNCCD- -FAO- GTZ ACSAD-GCF	2 - 3 - 15	5
Pollution	• Rehabilitation of contaminated land • Ensure the management of sanitary and industrial operations • Properly extract and refine the oil so that its waste does not reach the agricultural land.	رصد ومعالجة التلوث النفطي للترب	Possible international actors,	2 - 3 - 6 – 15	25

Budget required: 50% international funding and 50% National funding	**70**

Transformative Projects to protect range lands

Target 3: By 2030, 1.4 million hectares of Badia are protected from degradation

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Range lands Managment	• Integrated management in the protection of the Badia. • Capacity building programs for technicians working in rangeland management • Develop awareness programs and apply participatory approaches to local populations • Improvethe vegetation in the Badia • Protect oases in the Badia • Rehabilitation and support of existing pastoral nurseries and raising their productive capacity • Application of Badia laws • Increasing the number of water harvesting projects • Increase the area of seed propagation centers	Evaluation of the current status of pastoral reserves using remote sensing techniques and development of appropriate strategies for their rehabilitation	Possible international actors, and Arabian and international funds	15	0.1
		Preparation of a directory of pastoral reserves in Syria (documentation of flora and fauna).	Possible international actors, and Arabian and international funds	15	0.5
		Project of the use of alternative energies in the development of Syrian Badia	Possible international actors, and Arabian and international funds	7 - 12 - 15	10
		Proclamation of governmental and participatory pastoral reserves and the establishment of natural and environmental reserves (3 reserves annually)	Possible international actors, and Arabian and international funds	1 - 5 - 15	10
		Selection of ideal sites for water harvesting in Syrian Badia using remote sensing techniques	Possible international actors, and Arabian and international funds	15	0.1
		Establishing a genetic bank for pastoral plants in the country	FAO - ACSAD	15	2

Budget required: 50% international funding and 50% National funding	**22.7**

Transformative projects to reverse range land (Badia) degradation:

Target 4: By 2030, the rehabilitation of 0.9 million ha of Range land (Badia), which has degraded or begun to degrade

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Productivity Decline	• Raising the productivity of Badia lands (increasing the productivity); • Increase the number and area of pastoral reserves in the Badia • Rehabilitation of damaged oases and reserves in the Badia • Increasing water harvesting projects in the Badia • Raising the production capacity of pastoral nurseries. • Increase the area of seed propagation centers	Rehabilitation of degraded pasture lands in the Governorate of Raqqa and Homs on an area of 75 thousand hectares	Possible international actors, and Arabian and international funds	1 - 5 - 15	20
		The development of degraded pastures and the investment of medicinal and aromatic plants in the Governorate of Aleppo and Hama on an area of 25 thousand hectares	Possible international actors, and Arabian and international funds	1 - 5 - 15	10
		Project for the improvement of vegetation in pastoral sites and the promotion of income-generating activities in the Central Badia (Nasiriyah Site).	Possible international actors, and Arabian and international funds	2 - 5 - 15	10
		Integrated development project for the Badia of Damascus - Sub on an area of 55 thousand hectares	Possible international actors, and Arabian and international funds	1 - 5 - 15	10
		Project of Rehabilitation of pastoral reserves in Governorate Hama and Aleppo	Possible international actors, and Arabian and international funds	1 - 2 - 15	10
		Project of Implementation of Badia water harvesting (selected areas)	Possible international actors, and Arabian and international funds	1 - 2 - 15	20
Wind Erosion	• Cultivation of the dust storm site • Fixation of sand dunes	Project of Fixation of sand dunes in Badia (Deir Al-Zour Badia)	Possible international actors, and Arabian and international funds	3 - 15	10

Budget required: 50% international funding and 50% National funding	**90**

Transformative Projects for protection of forest land from degradation

Target 5: By 2025, the protection of all forest lands from degradation,

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Forest Lands Managment	• Integrated management of forest sites. • Preparation of capacity building programs for technicians working in forest management. • Apply a participatory approach to forest management • Support local people and finance micro and small projects with the aim of involving local people in forest protection • Ensure the integrity of forest law with other laws that guarantee the protection of forest resources • Development of a national forest awareness and extension plan • Increase the number of forest control and guards • update of the Forest Law. • Protection of threatened forest ecosystems	Forest fire early warning project	Possible international actors, and Arabian and international funds	13 - 15	0.5
		Project on the Application of Participatory Approaches to Forest Site Management	Possible international actors, and Arabian and international funds	13 - 15	0.5
		Project to promote income-generating activities in villages where forest lands are dominant	Possible international actors, and Arabian and international funds	2 - 5 - 15	5
		Protection of the Atlantic Botanic system in the Syrian Badia Mountains	Possible international actors, and Arabian and international funds	13 - 15	5

Budget required: 50% international funding and 50% National funding	**11**

Transformative Projects for reverse of forest land from degradation

Target 6: By 2030, the rehabilitation of 50% of the forest land with different signs of deterioration (cut - fires)

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Forest Degradation	• Rehabilitation of forests that have been subjected to various types of deterioration as a result of the war. • Rehabilitation of the degraded Atlantic Botanic Forests (threatened with extinction) in Jabal El-Belaas, Jabal Abdel-Aziz, Jabal Abu Rjmin, Hasia Mountains and similar environments.	Project of Rehabilitation of 100 ha annually of burned forest sites in different areas of forest land	Possible international actors, and Arabian and international funds	13 - 15	10
		Project of Rehabilitation of the Atlantic Botanic Forests in their natural sites	Possible international actors, and Arabian and international funds	13 - 15	10
		Project of Development of degraded forest sites (coastal forests)	Possible international actors, and Arabian and international funds	2 - 13 - 15	10
Management of forestry nurseries	• Increased number of forest nurseries. • Increasing the number and area of forest reserves. • Assign most natural forest sites as nature reserves • Implement breeding and development plans for degraded forest sites • Improved infrastructure and equipment to protect forests from degradation	Project of selection of priority forest sites for natural forest reserves	Possible international actors, and Arabian and international funds	13 - 15	1
		Project of Expansion of Protected Areas (Farnalq Protected Area)	Possible international actors, and Arabian and international funds	13 - 15	1
		Project of the improvement of the management of fire-sensitive forest sites	Possible international actors, and Arabian and international funds	13 - 15	2

Budget required: 50% international funding and 50% National funding	**34**

Transformative Projects to protect water resources and wetlands from degradation:

Target 7: By 2025, protect 100% of water resources and wetlands from degradation

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Management of water resources and wetlands	• Integrated management of water resources and wetlands. • Development of management plans for wetland • Declare Wetlands as Protected Areas • To qualify professionals working in the management of water resources and wetlands. • Protect water resources and wetlands from pollution by industrial and wastewater. • To establish sufficient number and proper distribution of sewage networks and stations • To benefit from non-traditional water for irrigation. • Continue to apply and develop laws and legislation to ensure the protection of water resources and wetlands	Integrated environmental studies of wetlands in Syria, such as Sabkha Al-Jubul, Sabkha Al-Mawah, Lake Khattouniya and other lakes and Sabkhas	UNDP	16	2
		Integrated environmental management of the Orontes basin and / or Al Sen basin	UNDP	15	1.5
		Project for the development of procedures for the application of the laws for protection of water resources and wetlands	UNDP	15	0.3

Budget required: 50% international funding and 50% National funding	**3.8**

Transformative Projects to reverse water resources and wetlands from degradation:

Target 8: By 2030, rehabilitation of 50% of water bodies and wetlands with different signs of degradation and increased efficiency in the use of water resources,

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Pollution	• Monitoring and rehabilitation of contaminated water bodies and wetlands.	Water and Soil Pollution Management Project in the Eastern Ghouta Region	FAO – WFP - UNDP	6 - 15	2
		Wetland Pollution Management Project (case study)	FAO – WFP - UNDP	6 - 15	2
Damage to water resources facilities	• Rehabilitation of some dams and water harvesting facilities in the Syrian Badia.	Rehabilitation of some dams and water harvesting facilities in the Syrian Badia (Al Badia Basin)	FAO – WFP - UNDP	1 - 2 - 6 - 15	20
Lack of water resources in some areas	• To ensure adequate water resources in fragile areas (Badia – Stability Zone IV) to promote the stability and non-migration of affected populations. • Draining rivers and dams to irrigate new areas of rainfed agricultural land.	Implementation of water harvesting projects in the Syrian Badia	FAO – WFP - UNDP	1 - 2 - 6 - 15	10
		Expansion of irrigation projects in Governorate Homs and Tartous	FAO – WFP - UNDP	1 - 2 - 6 - 15	20

Budget required: 50% international funding and 50% National funding	**54**

Transformative Projects to protect Biodiversity and natural habitats from degradation

Target 9: By 2025, protection of ecosystems and natural habitats from degradation

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Management of biodiversity	• Integrated management of different ecosystems • Qualifying technicians • Develop a red list of endangered species • 100% protection of ecosystems and habitats of threatened species from degradation • Cultivation of local medicinal and aromatic plants	Integrated management of exotic and invasive plants	Possible international actors, and Possible international funds	15	5
		Project of preparing administrative plans for the management of natural and pastoral reserves (different environmental systems).	Possible international actors, and Possible international funds	15	0.2
		The project of demarcation of existing reserves and the preparation of basic and infrastructure maps	Possible international actors, and Possible international funds	15	0.5
		Declaration of new reserves for selected areas in accordance with approved requirements	Possible international actors, and Possible international funds	15	0.1
		Project of propagating the cultivation of medicinal and aromatic plants using organic agriculture.	Possible international actors, and Possible international funds	1 - 2 -3 - 5 -15	0.5

Budget required: 50% international funding and 50% National funding	**6.3**

Transformative Projects to reverse degradation of Biodiversity and natural habitats

Target 10: By 2030, 50% of ecosystems, biodiversity and habitats will be rehabilitated

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Degradation of natural habitats and decline in biodiversity	• Rehabilitation of 50% of the ecosystems and natural habitats of threatened species from degradation • Rehabilitation of 10% of ecosystems and natural habitats with different signs of degradation • Construction of natural corridors between protected areas close to each other	Project of Rehabilitation of Abu Qabis Reserve	Possible international actors, and Possible international funds	15	5
		Project for the improvement of biodiversity in the forest areas (the mountains of the coastal zone as first phase).	Possible international actors, and Possible international funds	1 - 2 -3 - 5 -15	5

Budget required: 50% international funding and 50% National funding	**10**

Transformative projects on adminstrative matters and land management:

Target 12: By 2030, improve legislative matters in Syria to ensure enforcement and achieve the targets of of land degradation eutrality,

Problem / sector	Measures	Transformative projects	Suggested Donner	SDGs	Fund needed Million $
Lack of capacity building programs in land degradation and land management	• By 2020, training and calculation of indicators to land degradation neutrality and related indicators. • By 2020, promote the effective application of laws and legislation for the conservation of natural resources (urban law - forest law - pastoral law - environmental law - green architecture - ....). • By 2025, build the capacity of national staff to implement measures to protect the land from degradation in order to acheive the land degradation neutrality.	Land cover change indicator	UNCCD - FAO - UNCCC	15	0.15
		Land productivity daynamic indicator	UNCCD - FAO - UNCCC	15	0.05
		Organic carbon above and below ground indicator	UNCCD - FAO - UNCCC	15	1
		Drought indicator	UNCCD - FAO - UNCCC	15	0.05
		Dust strom indicator	UNCCD - FAO - UNCCC	15	0.05
		Program to establish the concept of land degradation neutrality	UNCCD - FAO - UNDP	15	0.03
		Program for establishing the principle of integrated management of natural resources	UNCCD - FAO - UNDP	15	0.03
		Program to establish the principle of sustainable development of natural resources.	UNCCD - FAO - UNDP	15	0.03
		Program for the management, maintenance and development of natural resources	UNCCD - FAO - UNDP	15	0.03
		Program of Management of Ecosystems and Natural Habitats	UNCCD - FAO - UNDP	15	0.03
Lack of management plans	• By 2020, the National Plan to Combat Desertification is aligned with the new UNCCD strategy	مشروع مواءمة الخطة الوطنية لمكافحة التصحر مع الإستراتيجية الجديدة للاتفاقية الدولية لمكافحة التصحر (2018 – 2030)	UNCCD	- 6 - 2 - 1 - 15 13 - 12 - 7	0.15

	• By 2020, the development of urban law and the expansion of planning scheme • By 2025, increase awareness and establish the concept of participatory approach among the population in general and the population of the affected areas in particular	project of developing urban law and the mechanism of expansion of urban scheme	UNDP	15	0.03
		project of networking between the laws and legislations related to the conservation of natural resources	UNCCD –UNDP - UNCCC	15	0.03
Lack of financial support for affected populations	• By 2025, strengthen the role of the community in participation in development programs and management of natural resources. • By 2025, improve the living conditions of people affected by desertification and drought. • By 2025, new jobs have been created for people in fragile areas (Badia – stability zone IV). • By 2030, promote the economic, social and cultural level and raise environmental awareness in fragile areas (Badia - stability zone IV).	Project on the application of participatory approaches to local populations in the management of natural resources in affected areas - selected case study	UNCCD - FAO - UNDP	- 6 - 2 - 1 - 15 13 - 12 - 7	0.1
		Project to support the local population in areas affected by grants and loans.	FAO - UNDP	- 6 - 2 - 1 - 15 13 - 12 - 7	10
		* Project to support the local affected populations by small and micro projects	FAO - UNDP	- 6 - 2 - 1 - 15 13 - 12 - 7	10
		Project of Strengthening the role of the community in development programs and natural resource management	UNCCD - FAO - UNDP	15	0.05
		Project of Environmental education in affected areas	UNCCD - FAO - UNDP	- 6 - 2 - 1 - 15 13 - 12 - 7	0.05

Budget required: 50% international funding and 50% National funding	**21.671**

Sumarry of required fund to achieve Land Degradation Neutrality in Syrian Arab Republic

No.	Sector	Required Funding To protect natural resources (Million dollars)	Required Funding To reverse degradation of natural resources (Million dollars)	Total (Million dollars)
1	Agriculture Sector	38.9	70	**108.9**
2	Range land Sector	22.7	90.0	**112.7**
3	Forest Sector	11.0	34.0	**45.0**
4	Water Sector	3.8	54	**57.8**
5	Biodiversity Sector	6.3	10.0	**16.3**
6	Ligislative and Management Sector	21.7		**21.7**
Total		**104.4**	**258**	**362.4**

Sumarry of National and International required fund to achieve Land Degradation Neutrality in Syrian Arab Republic:

Financing by Source (International - National)	Financing by Source (Million dollars)	Total Funding (Million dollars)
International required fund	**181.2**	**362.4**
National required fund	**181.2**	

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ANNEX No. (1)

Land productivity index in Syrian Arab Republic

Sub-Indicator II: Land Productivity (Net Primary Productivity) and Land Productivity Dynamics (Productivity Dynamic):

Land productivity is an important factor in the country's economy. The higher the land productivity, the higher the land is of high economic returns. Land productivity can be affected by many factors, including natural factors such as climatic factors like tempreture, humidity and rain, and human as land management. These factors can play a positive or negative role in land productivity. They are factors in increasing land productivity if climatic conditions and land management are good, and they are a cause of declining land productivity if climatic conditions are unfavorable and land management is not sound.

Different methods are used to estimate land productivity. Traditional methods are calculated from collecting field data for a sample of land, applying a statistical calculations, and thus estimating land productivity, which is expensive, time-consuming, and may not be characterized by high accuracy and neutrality. Other methods that have already been used are the use of remptly sensed data derived from satellite imagery.

In this sub-indicator of the program of land degradation neutrality, the normalized Difference Vegetation Index (NDVI) was used. It was calculated using MODIS satellite images with spatial resolution of 250 meters every 16 days.

This index is calculated by the following equation:

$$NDVI = NIR – R / NIR + R \qquad \text{(Rouse et al., 1974)}$$

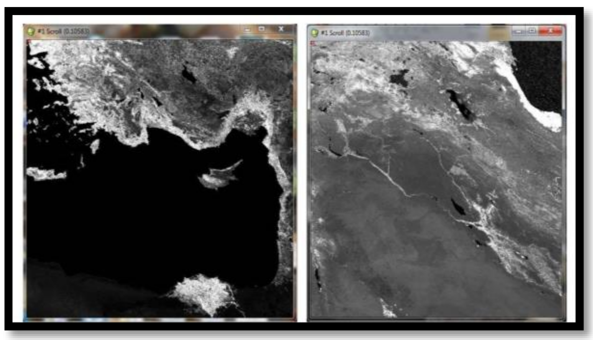
Where R is the visible spectral domain (Red) and NIR is the near infrared spectral domain.

The value of this index is between -1 and +1. the positive values are usually of plants. In general, the value of this index is correlated with the condition of vegetation cover, such as leaf area index (LAI), biomass and Cover percentage. So, this index can be used as an indicator of vegetative growth and thus productivity.

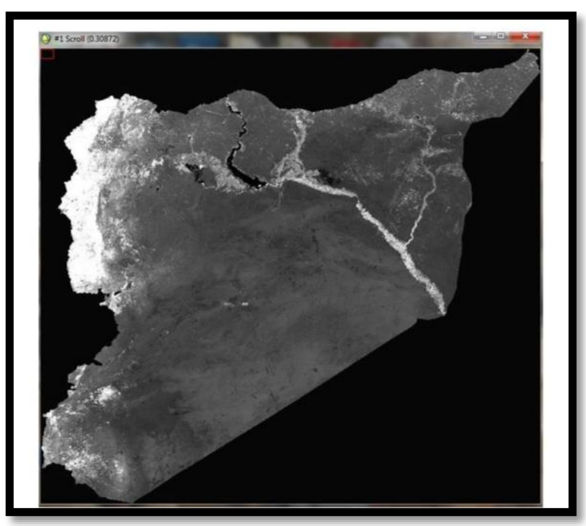
(Tucker, 1979; Choudhury, 1987; Clevers, 1989; Malingreau et al., 1989; Baret and Guyot, 1991; Gutman, 1991; Cihlar et al., 1991; Wiegand et al., 1991; Abd El-Gawad et al., 2000).

This index has been calculated and produced in the following stages:

First: Uploading satellite images for the Syrian Arab Republic:



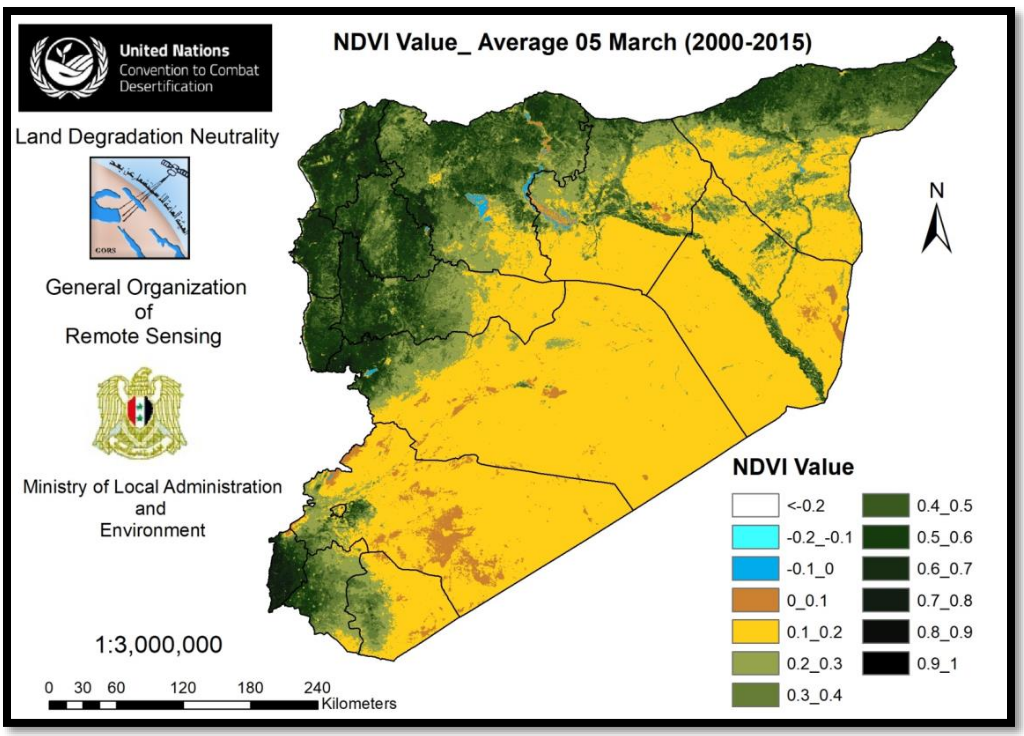
Second: mozayking the two pictures and cutting the lands of the Syrian Arab Republic



Third: Convert the digital values in the image into 13 classes that reflect the productivity of the land.

NDVI	Class	NDVI	Class
0.5 _ 0.4	8	0.2- >	1
0.6 _ 0.5	9	0.1-_ 0.2-	2
0.7 _ 0.6	10	0_0.1-	3
0.8 _ 0.7	11	0.1 _ 0	4
0.9_ 0.8	12	0.2_ 0.1	5
1_ 0.9	13	0.3 _ 0.2	6
		0.4 _ 0.3	7

Fourth: the production of maps according to the key map, which reflects the .productivity of the land



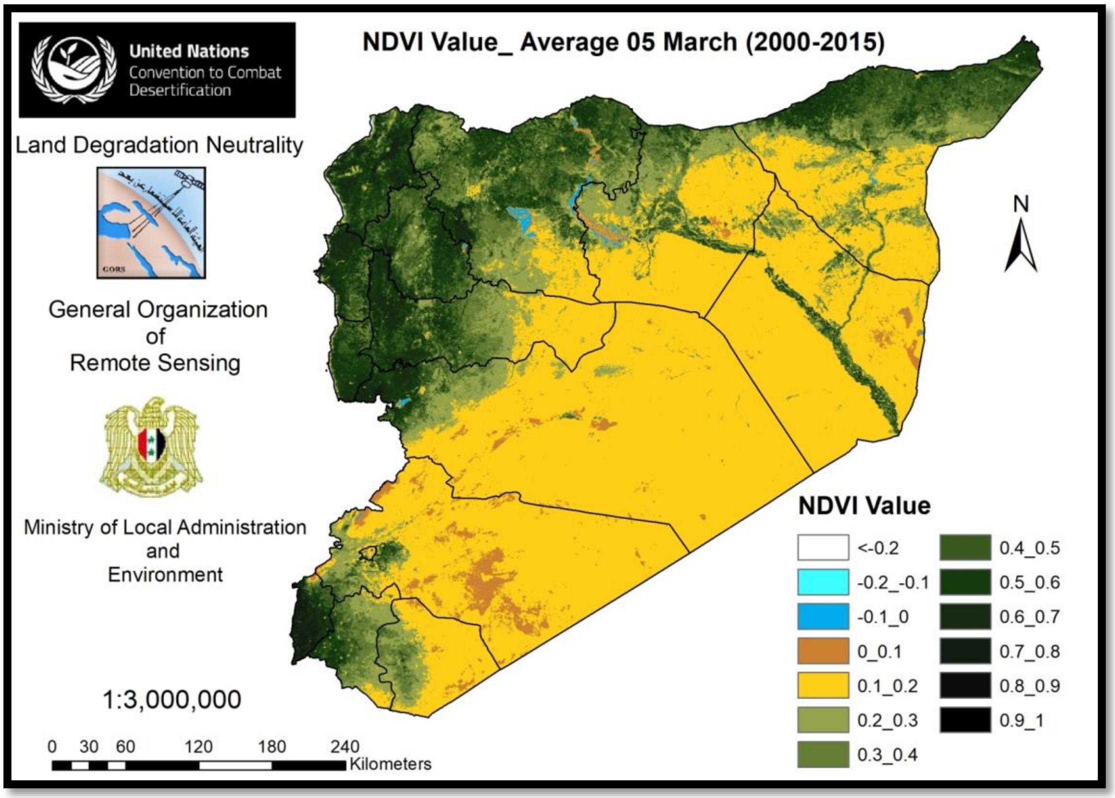
This indicator was calculated in the period 2000-2015 at a rate of image (map) every 16 days. Equivalent to 23 maps per year, equivalent to 368 maps during the 16-year study.

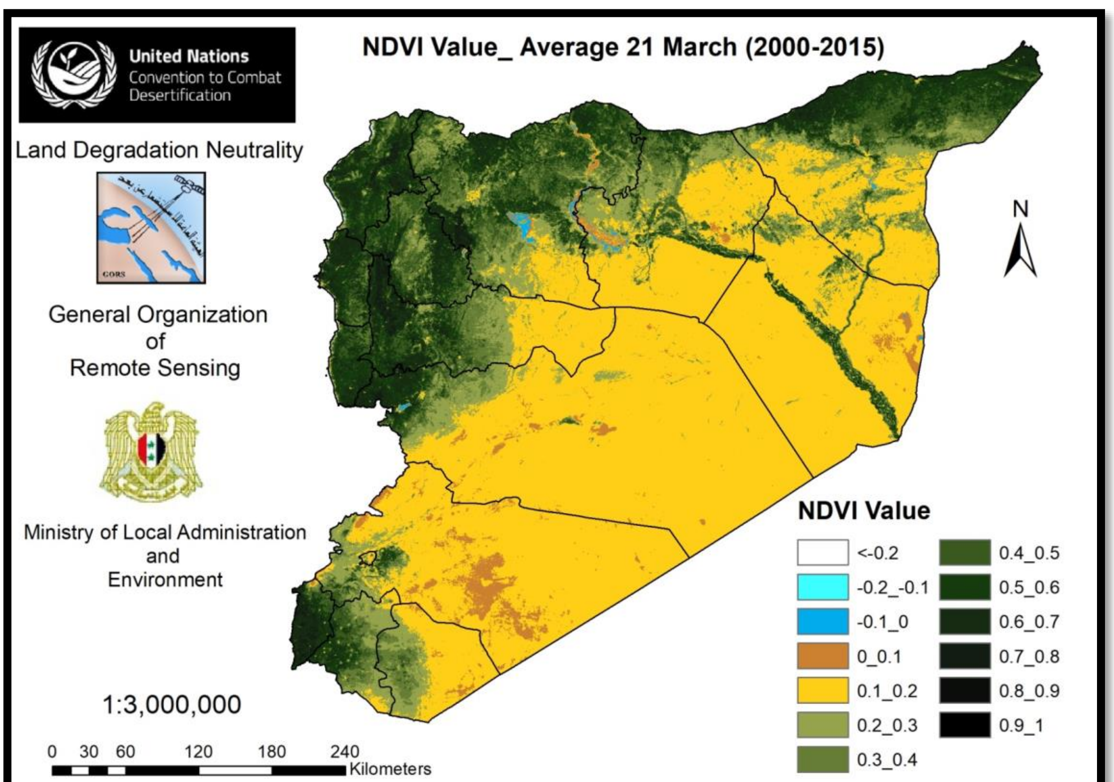
Changes in seasonaly productivity

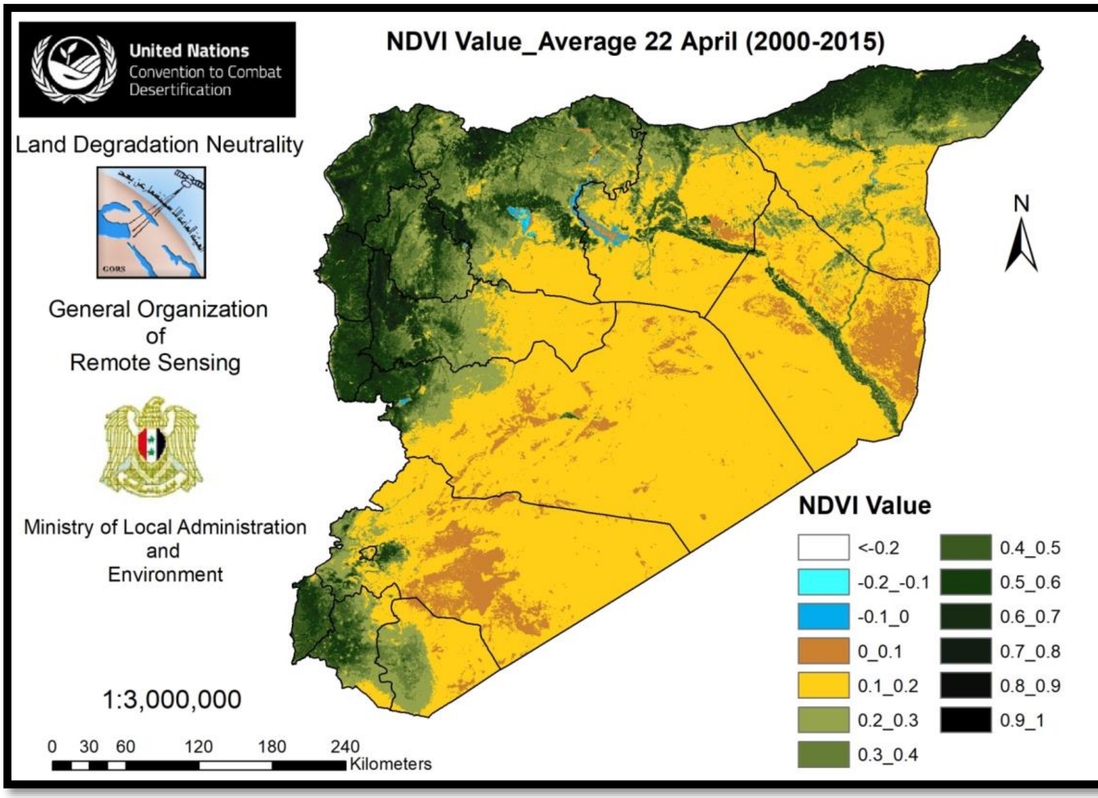
Average NDVI for each date during the study period

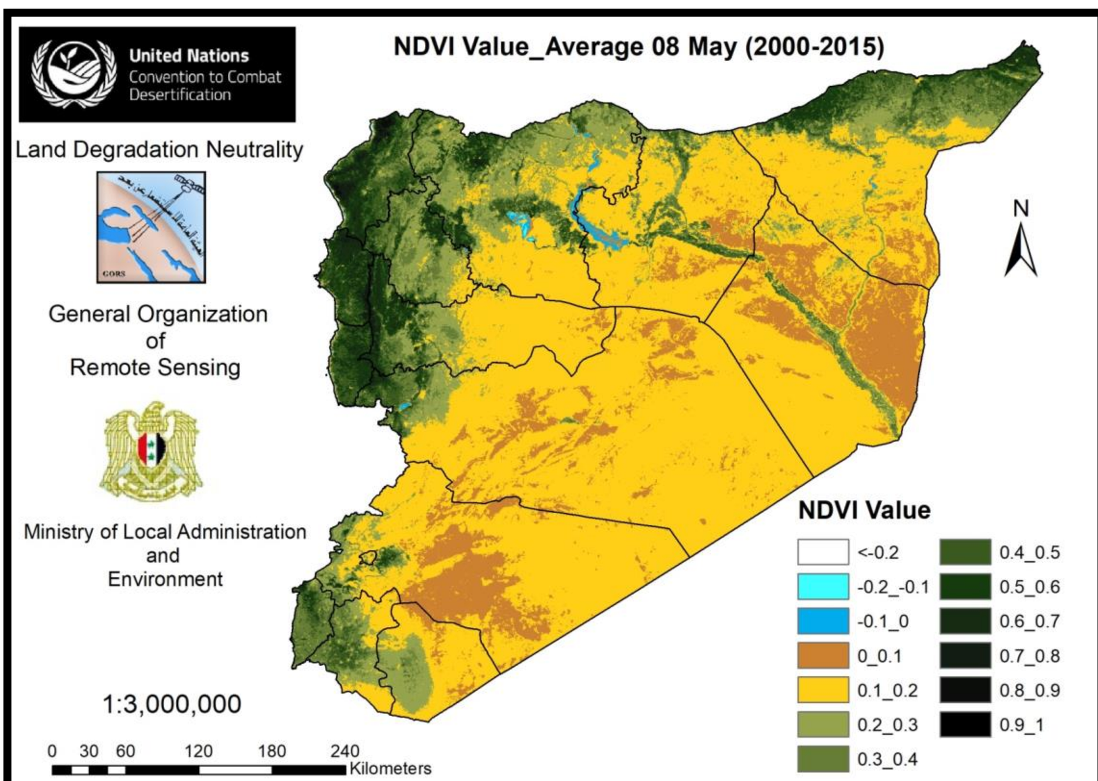
(23 dates per year) for the period 2000-2015

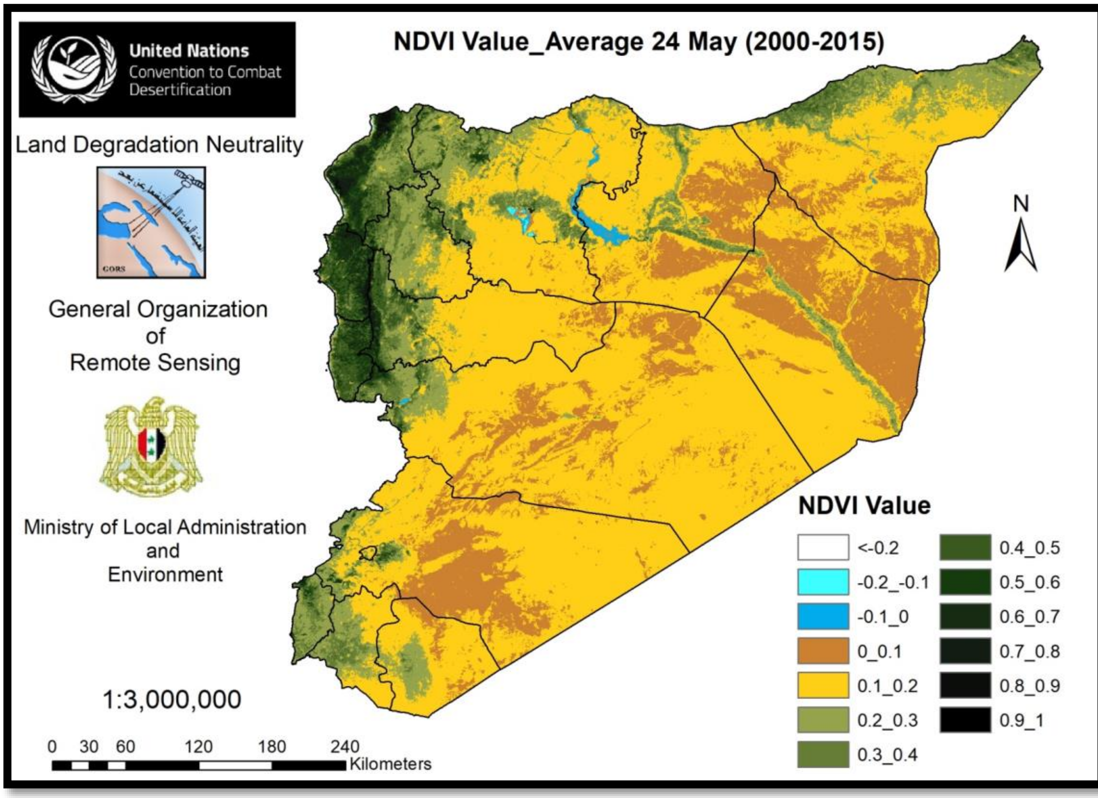
Figure 1: Average of NDVI index for each date during the period 2000-2015

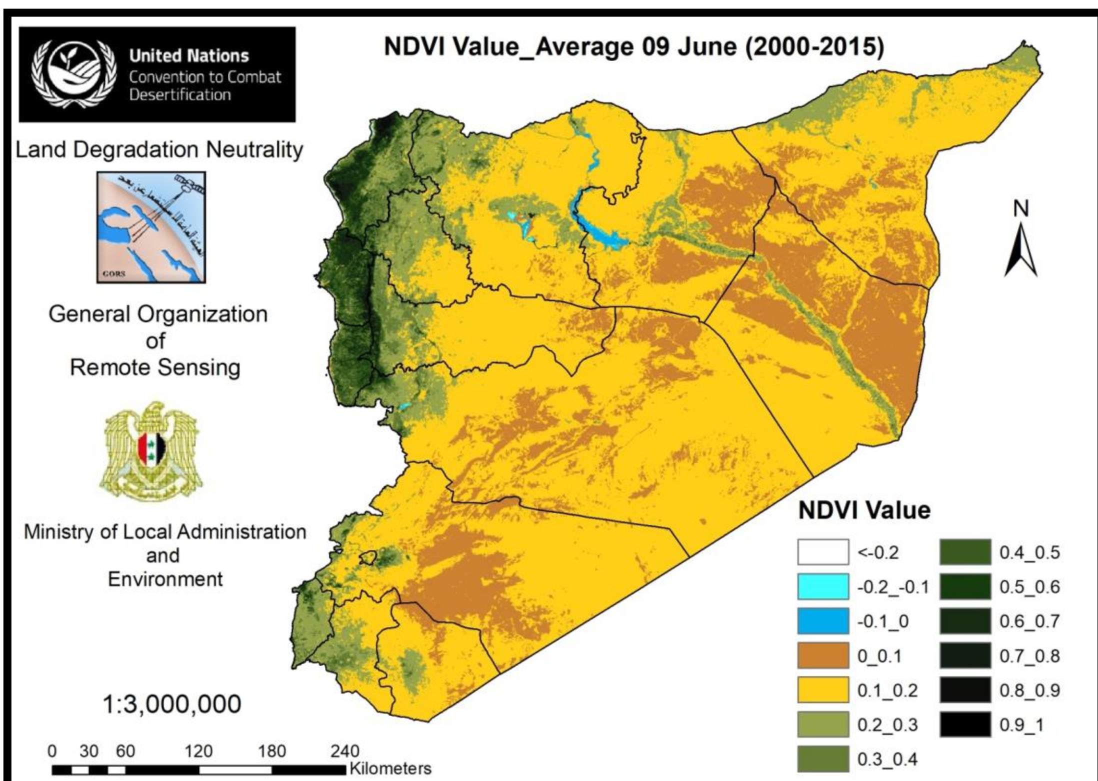


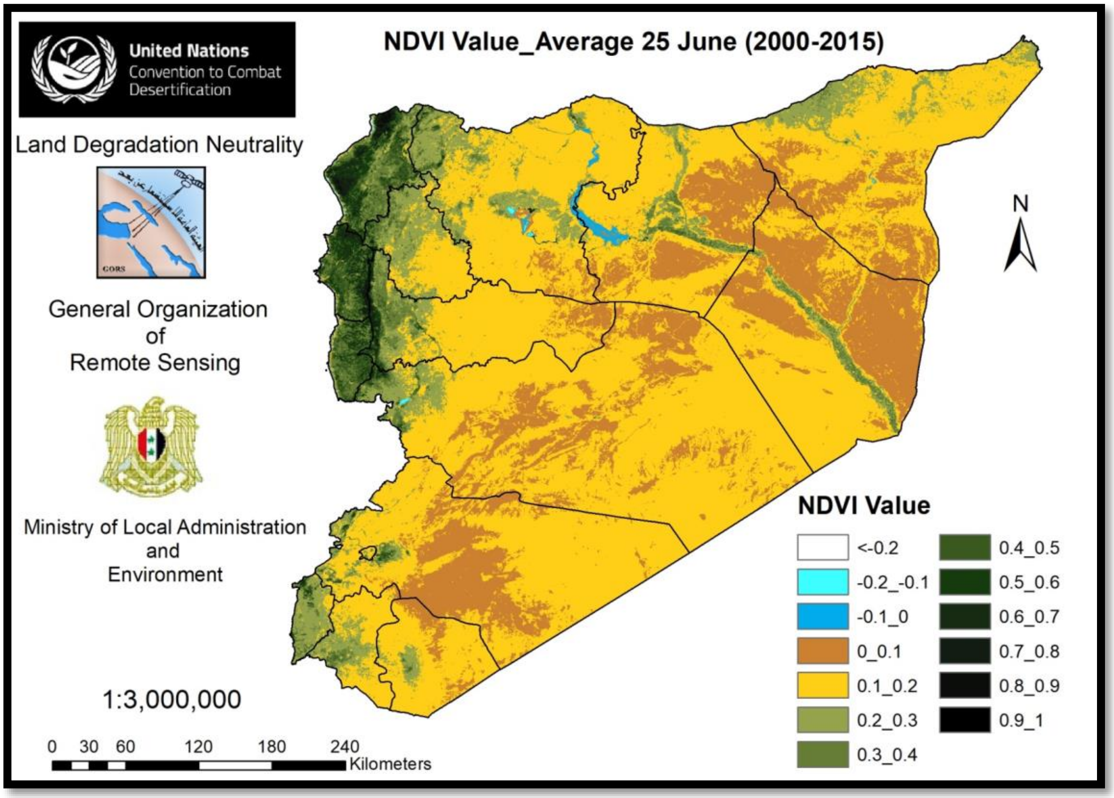


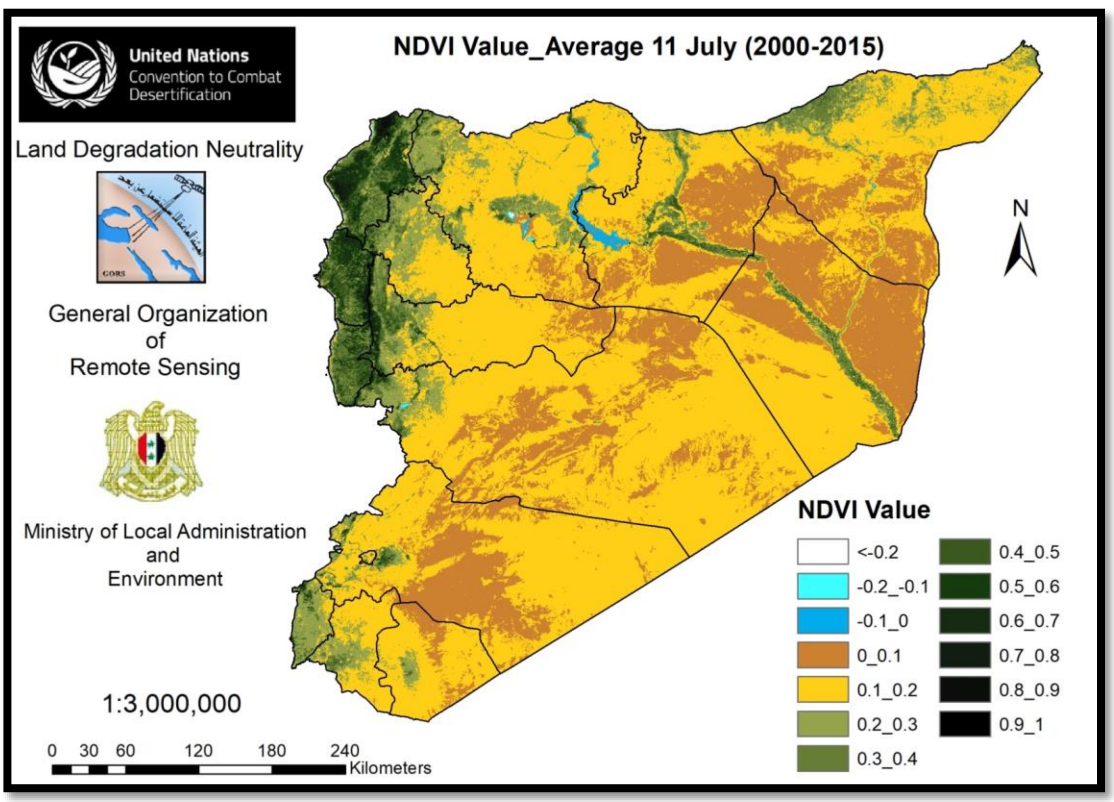

NDVI Value_Average 22 April (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240 Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

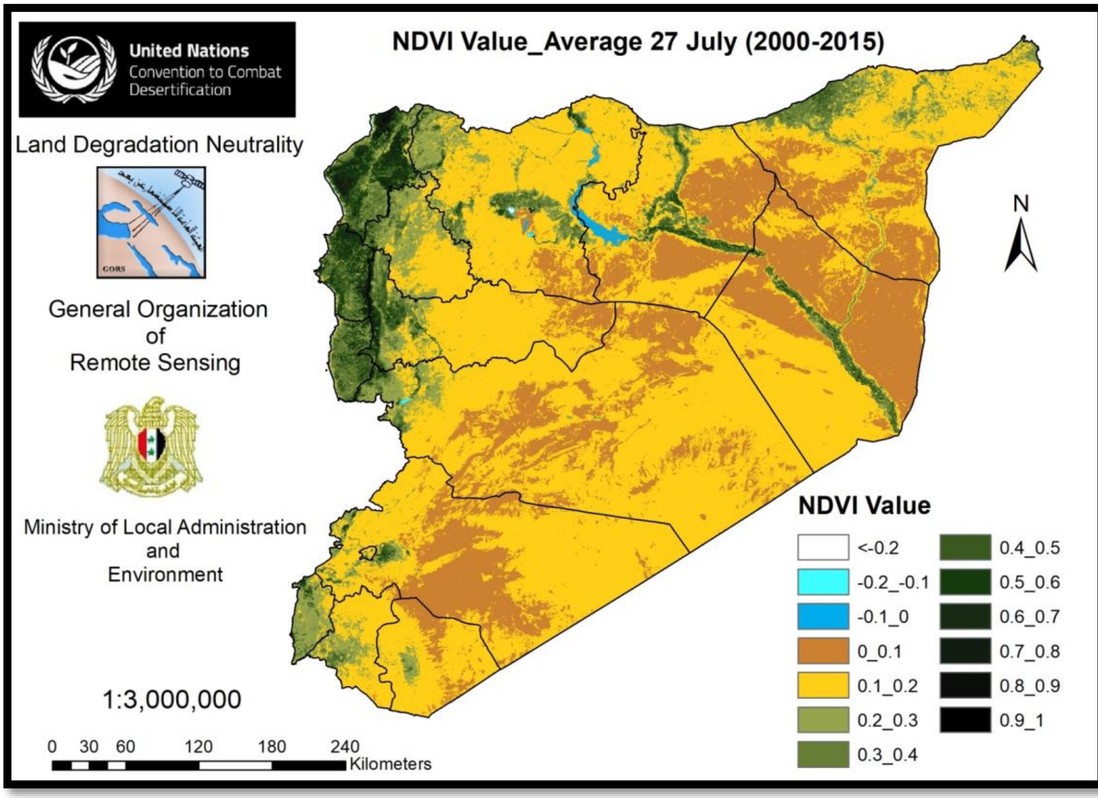

NDVI Value_Average 08 May (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240 Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1


United Nations
Convention to Combat Desertification
NDVI Value_Average 24 May (2000-2015)
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
N
1:3,000,000
0 30 60 120 180 240
Kilometers
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

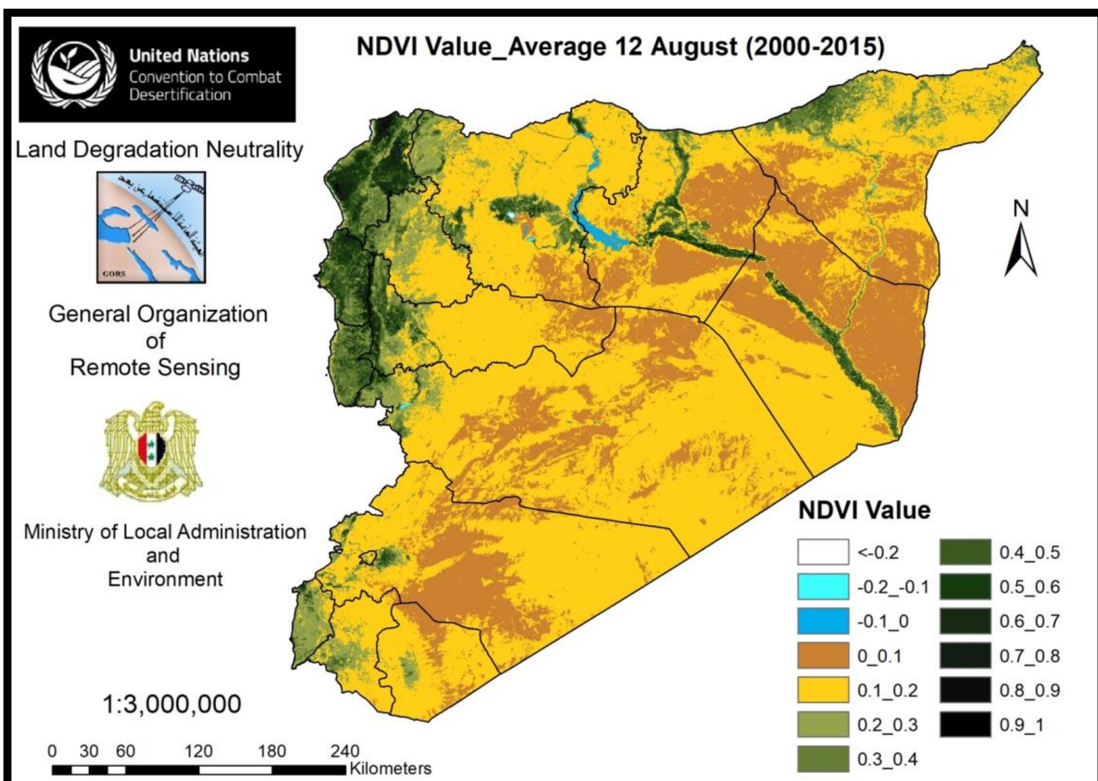

United Nations
Convention to Combat Desertification
NDVI Value_Average 09 June (2000-2015)
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
N
1:3,000,000
0 30 60 120 180 240
Kilometers
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1


NDVI Value_Average 25 June (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

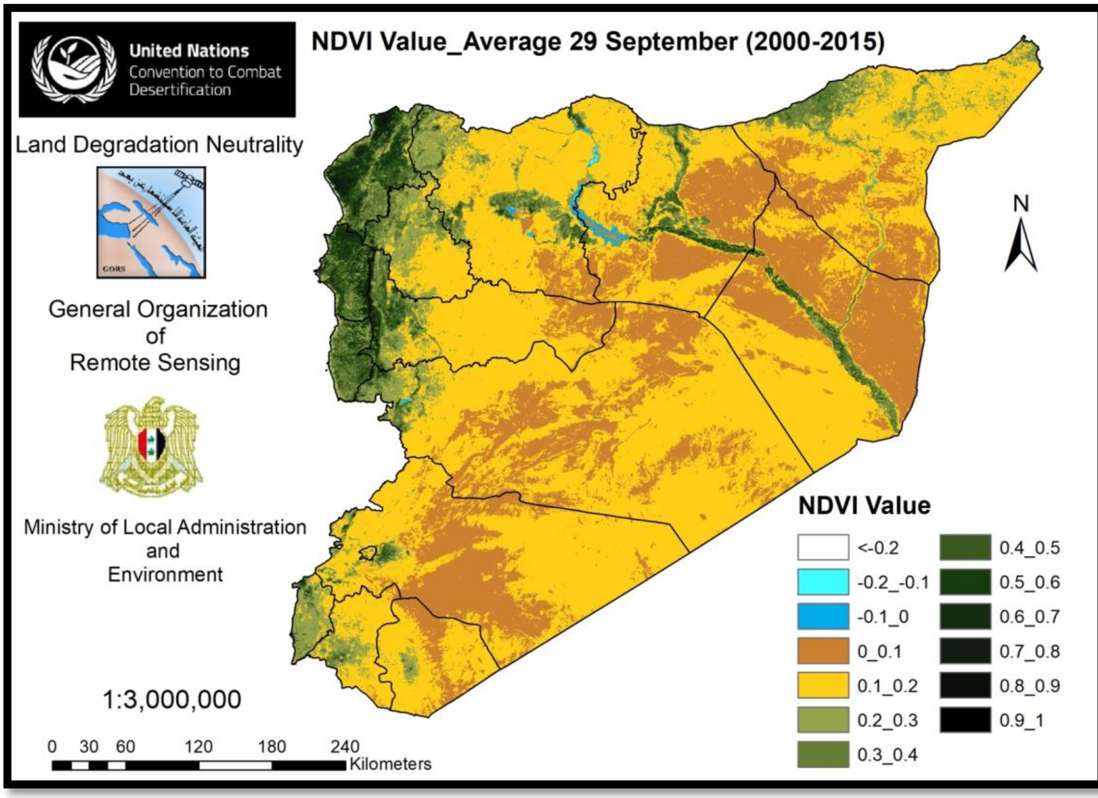

NDVI Value_Average 11 July (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

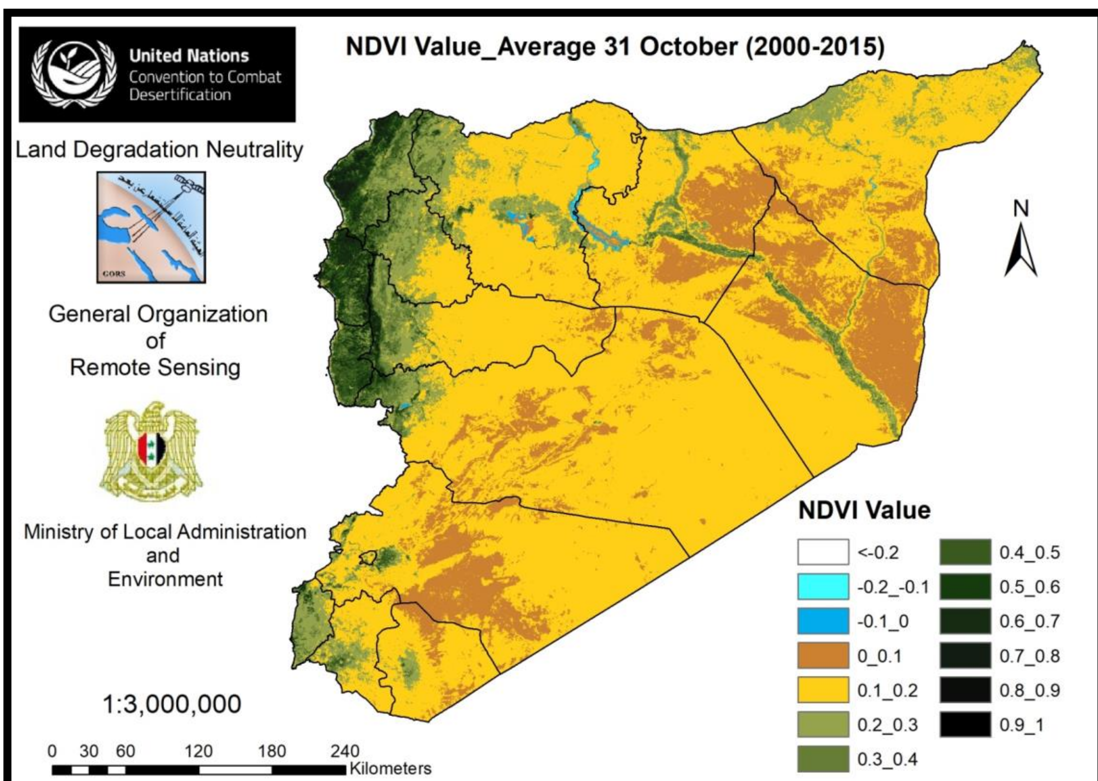


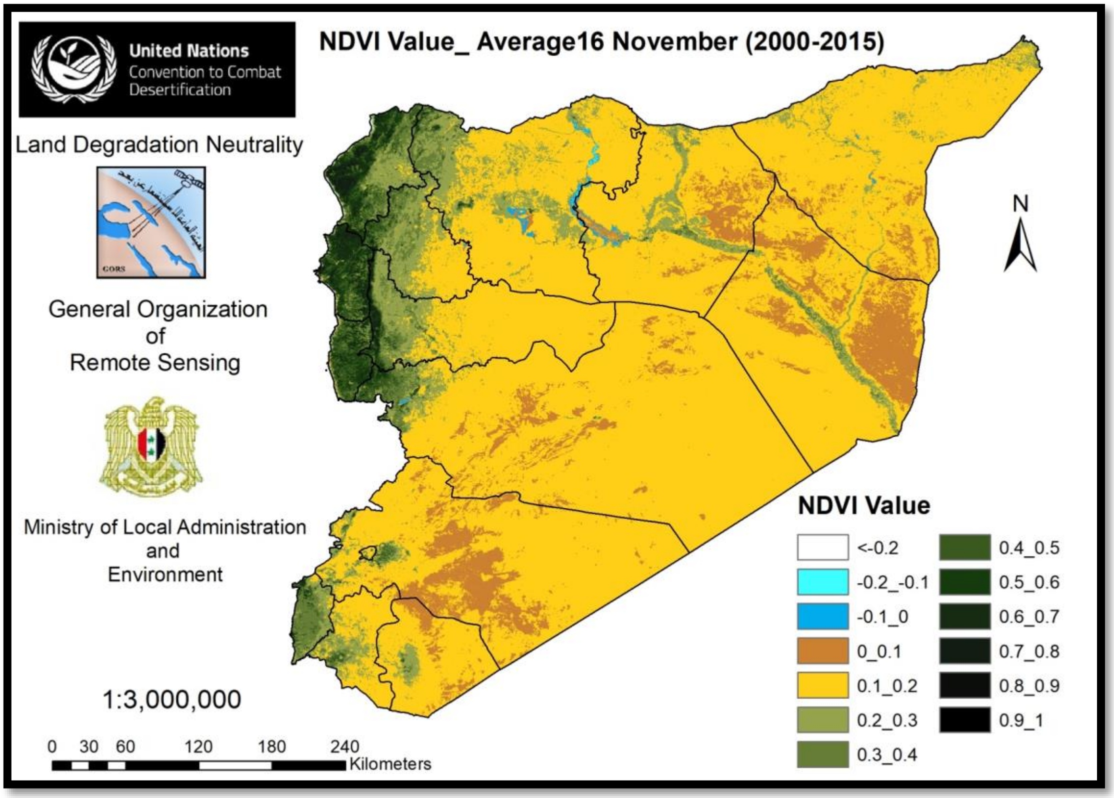
NDVI Value_Average 27 July (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1



NDVI Value_Average 12 August (2000-2015)
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1


United Nations
Convention to Combat Desertification
NDVI Value_Average 29 September (2000-2015)
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1


United Nations
Convention to Combat Desertification
NDVI Value_Average 31 October (2000-2015)
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1


United Nations
Convention to Combat Desertification
NDVI Value_ Average16 November (2000-2015)
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

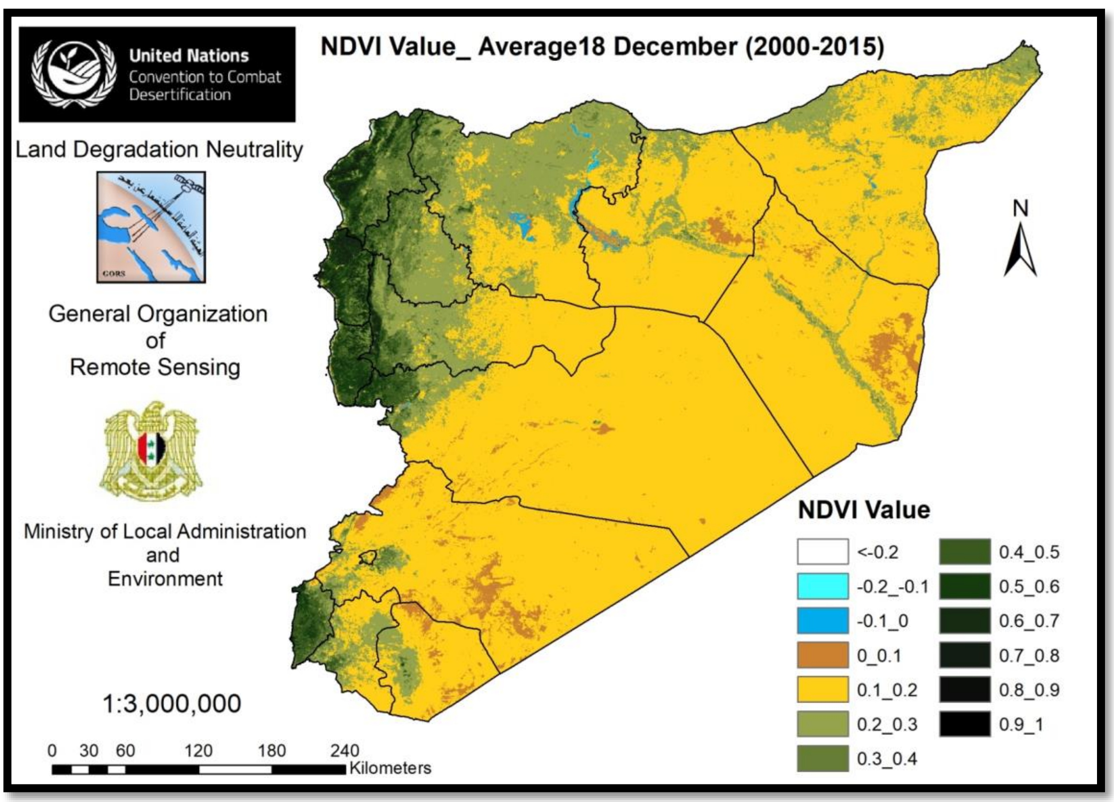
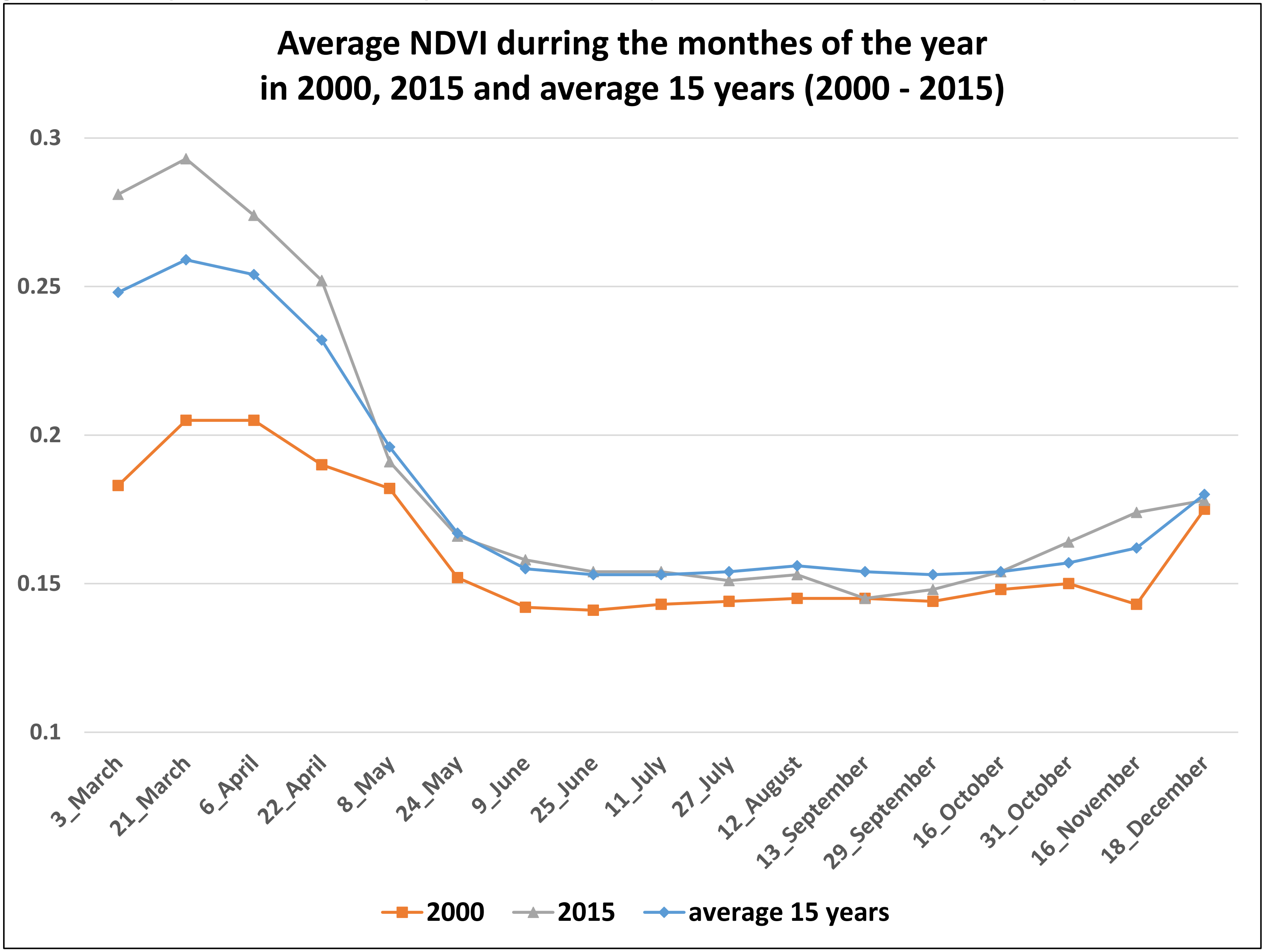

United Nations
Convention to Combat Desertification
NDVI Value_ Average18 December (2000-2015)
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
N
NDVI Value
<-0.2
-0.2_-0.1
-0.1_0
0_0.1
0.1_0.2
0.2_0.3
0.3_0.4
0.4_0.5
0.5_0.6
0.6_0.7
0.7_0.8
0.8_0.9
0.9_1

Figure 2: Average NDVI values during the months of the year 2000 and 2015 and the average years 2000 to 2015

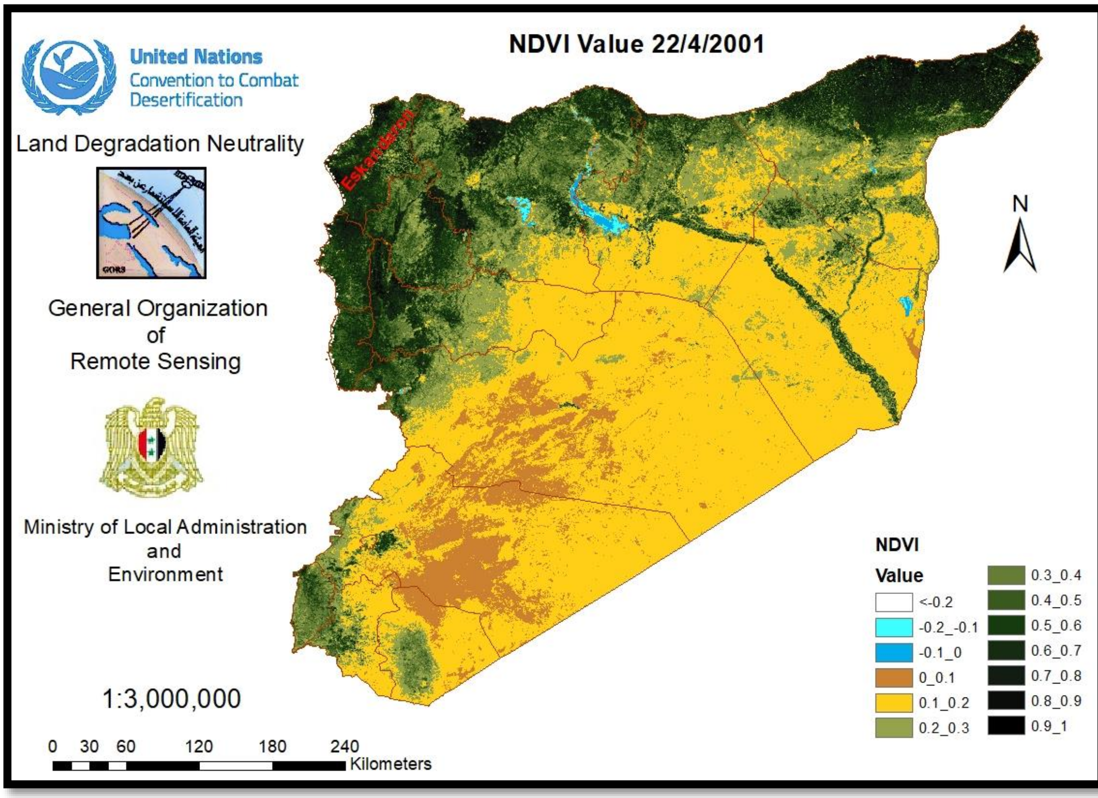


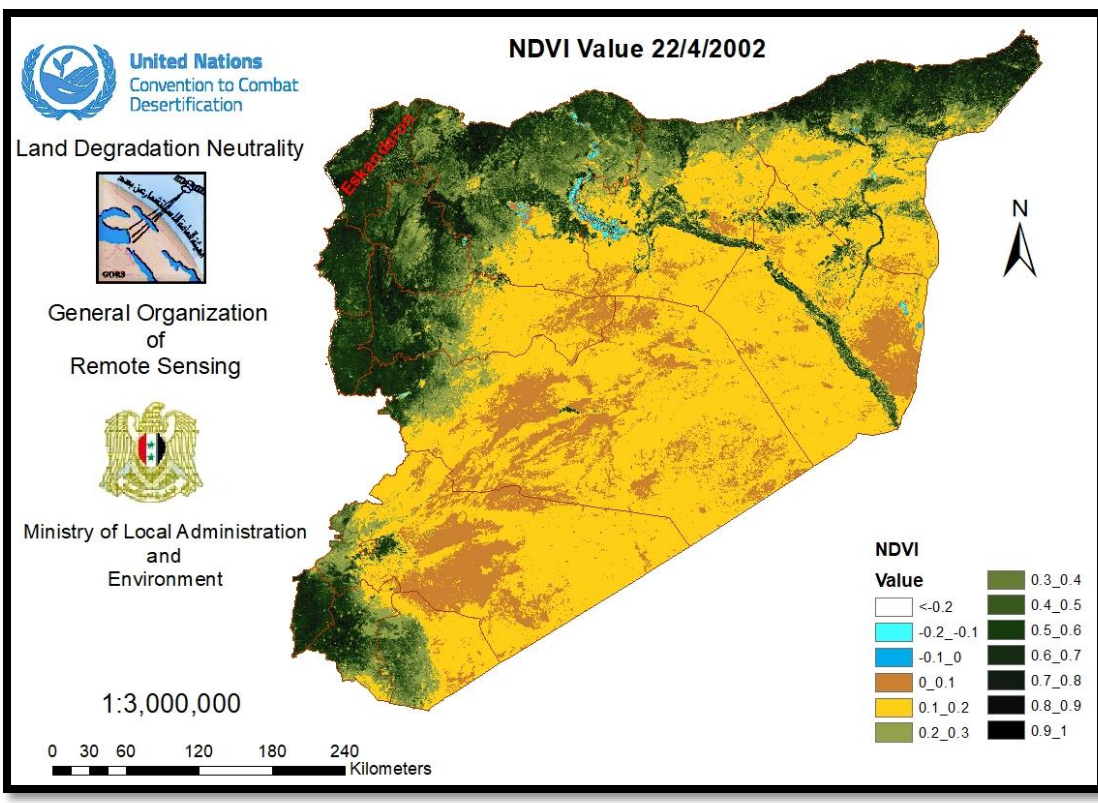
The averages of NDVI date 22/4

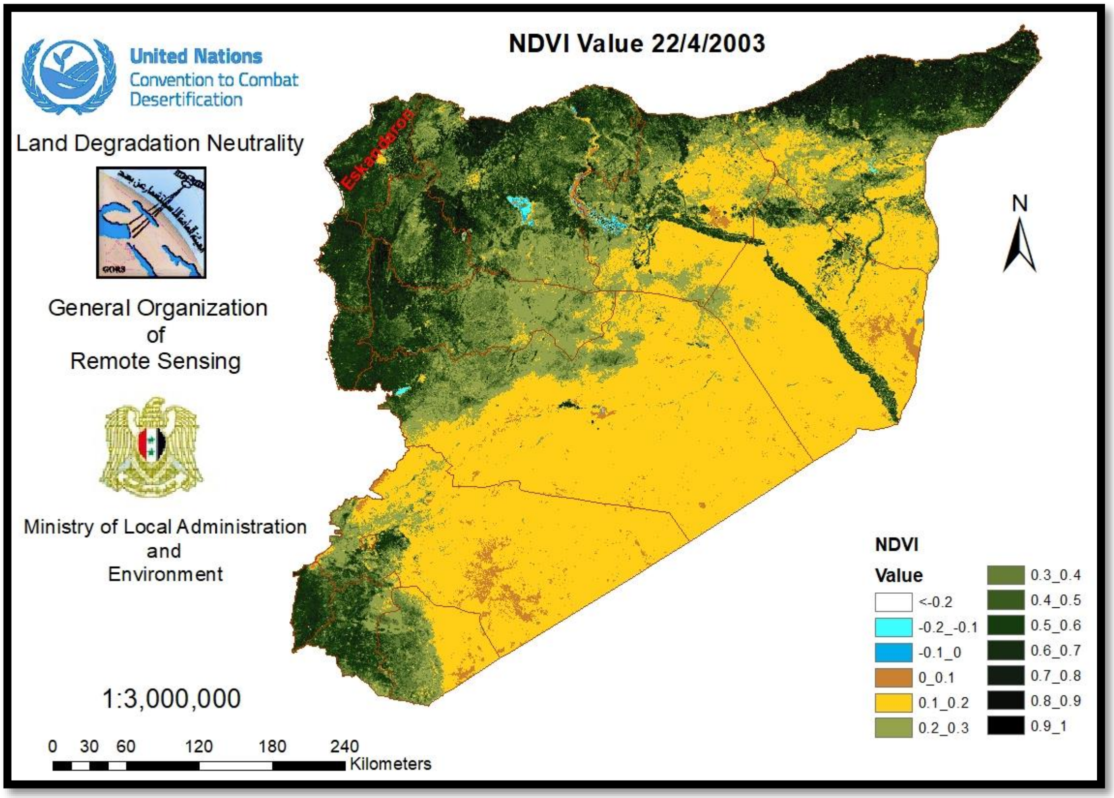
(maximum vegetation in Syria)

In the period 2000-2015

Figure 3: NDVI maps of 22/4 during the period 2000-2015






NDVI Value 22/4/2003
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
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NDVI
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<-0.2
-0.2_-0.1
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0.1_0.2
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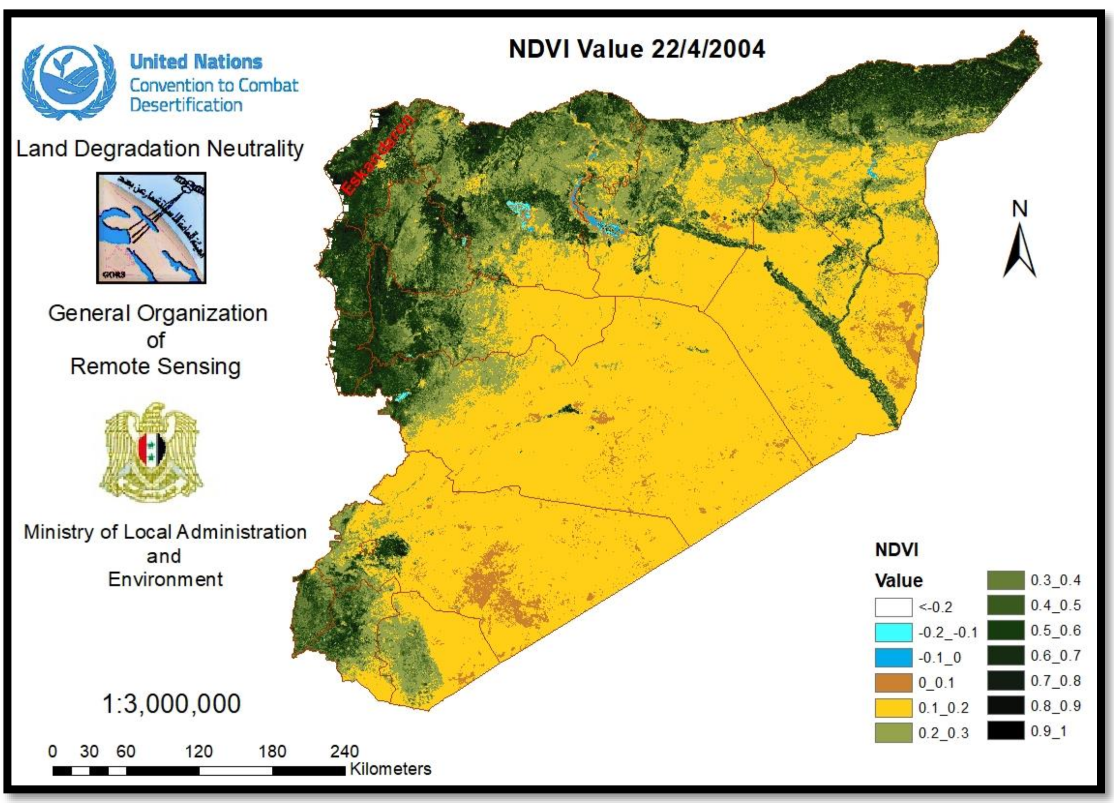
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Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
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Kilometers
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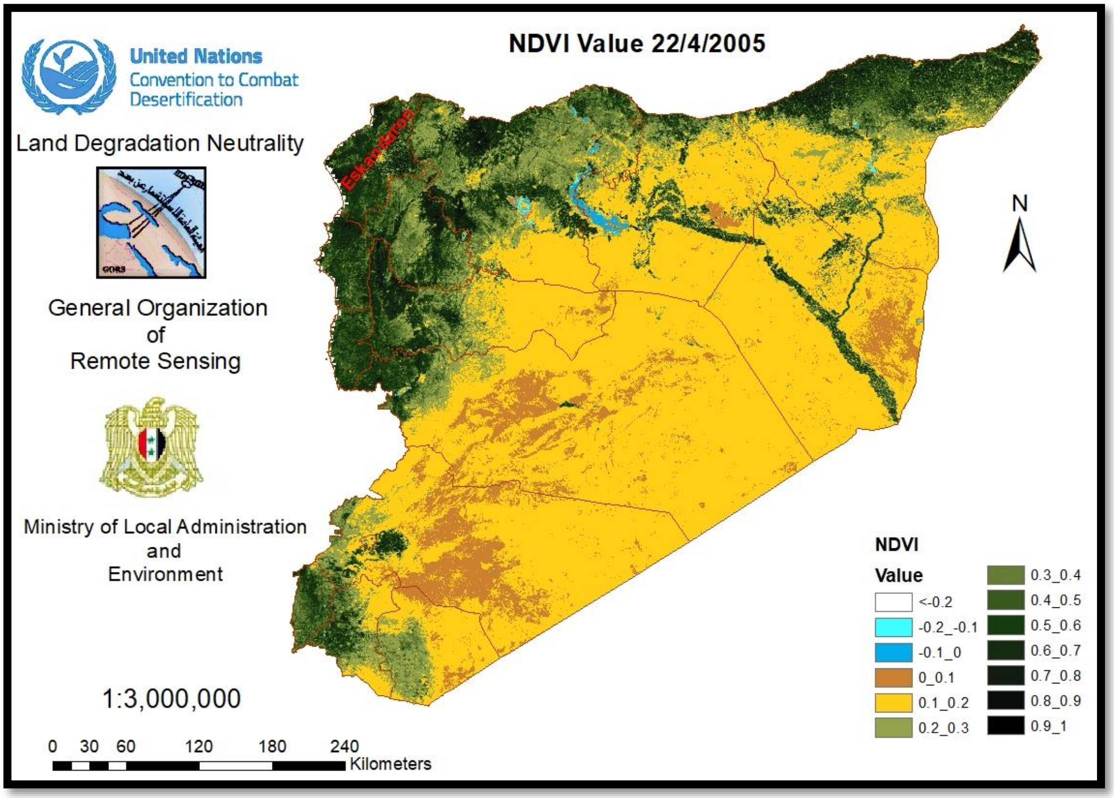
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Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
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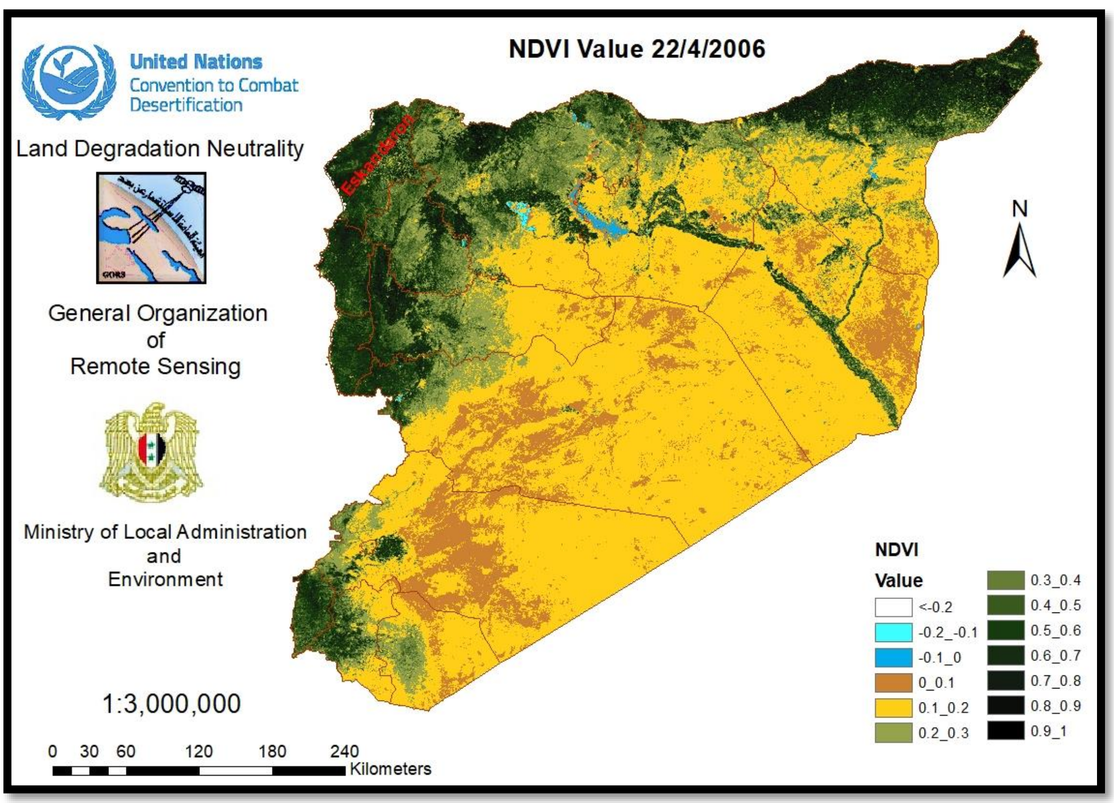
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Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
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Remote Sensing
Ministry of Local Administration
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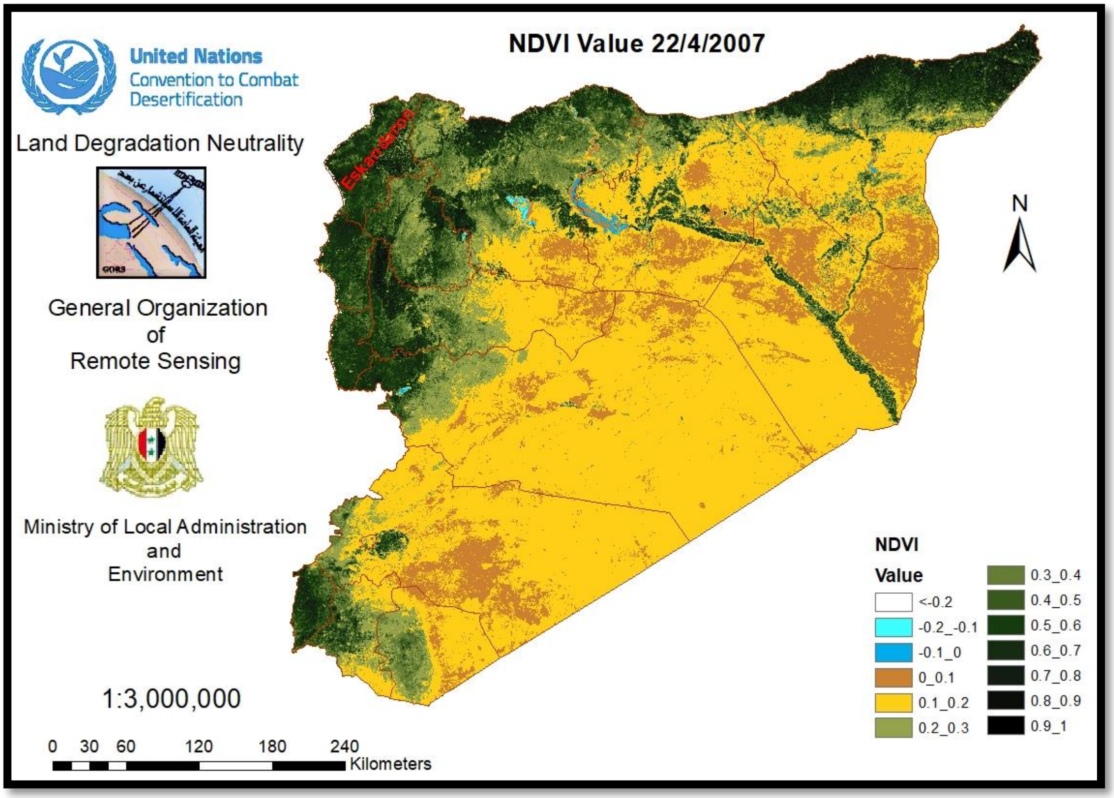
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Land Degradation Neutrality
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Ministry of Local Administration
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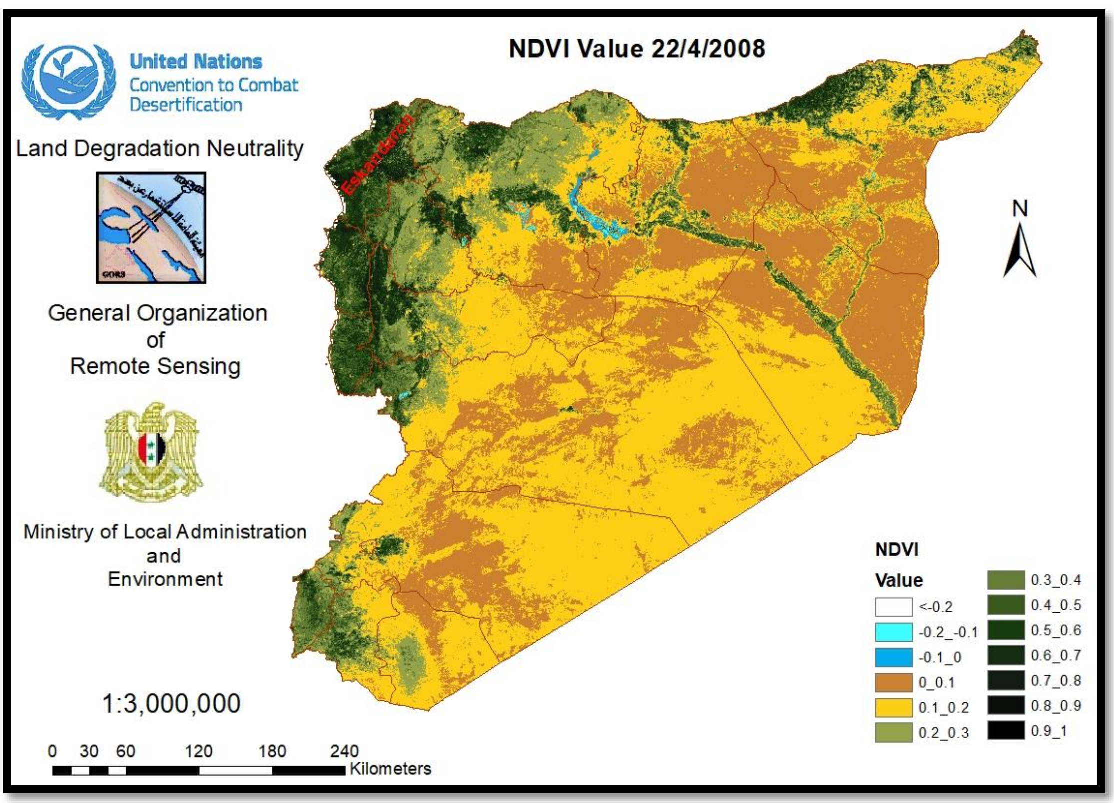
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Desertification
Land Degradation Neutrality
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Ministry of Local Administration
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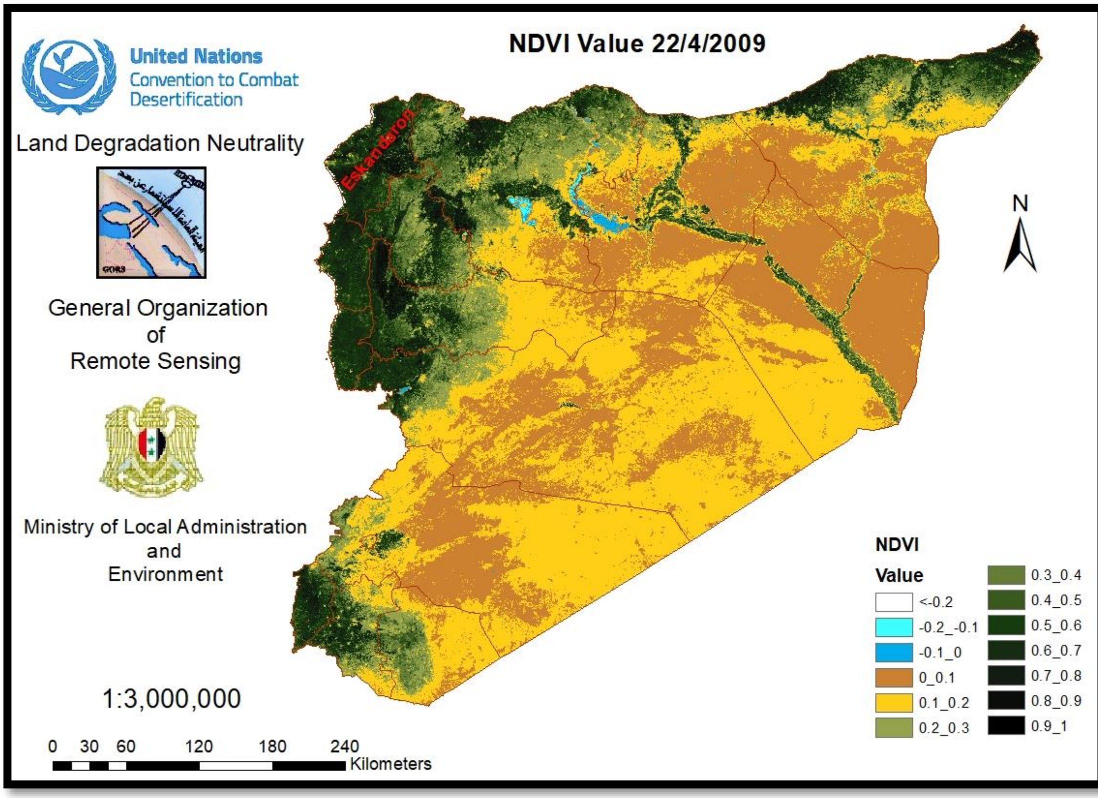
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Convention to Combat
Desertification
Land Degradation Neutrality
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Ministry of Local Administration
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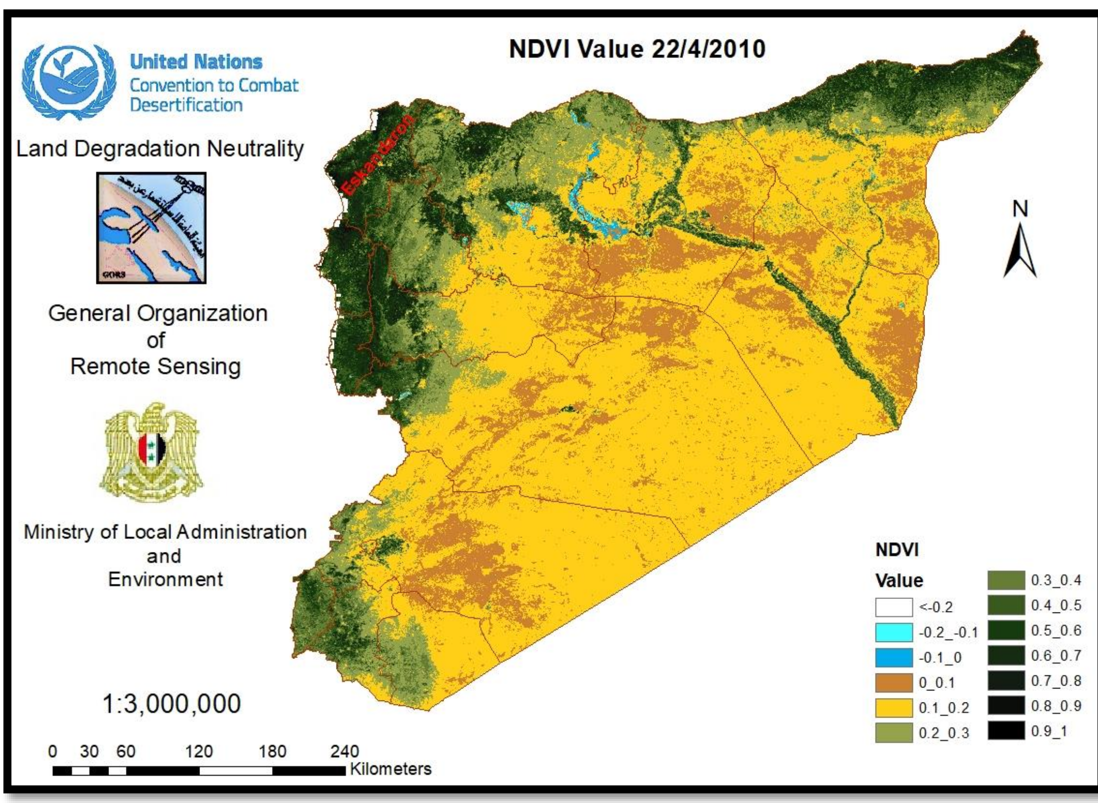
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Convention to Combat
Desertification
Land Degradation Neutrality
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Ministry of Local Administration
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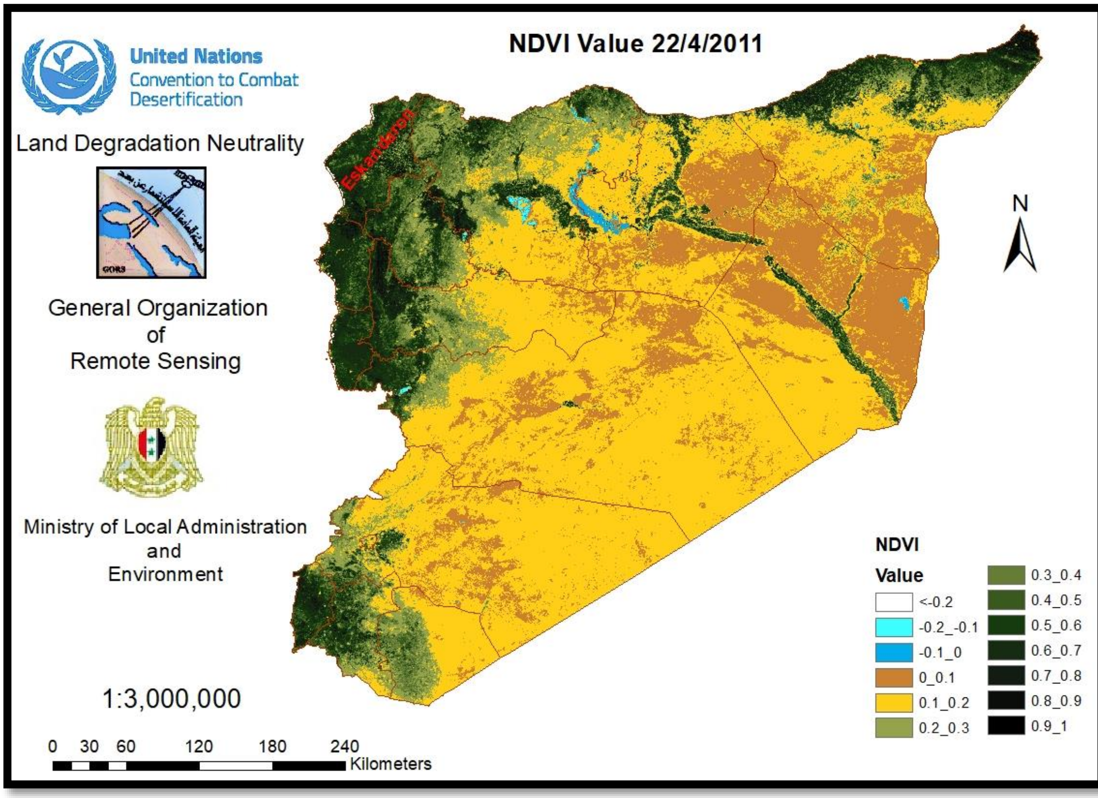
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Convention to Combat
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Land Degradation Neutrality
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Remote Sensing
Ministry of Local Administration
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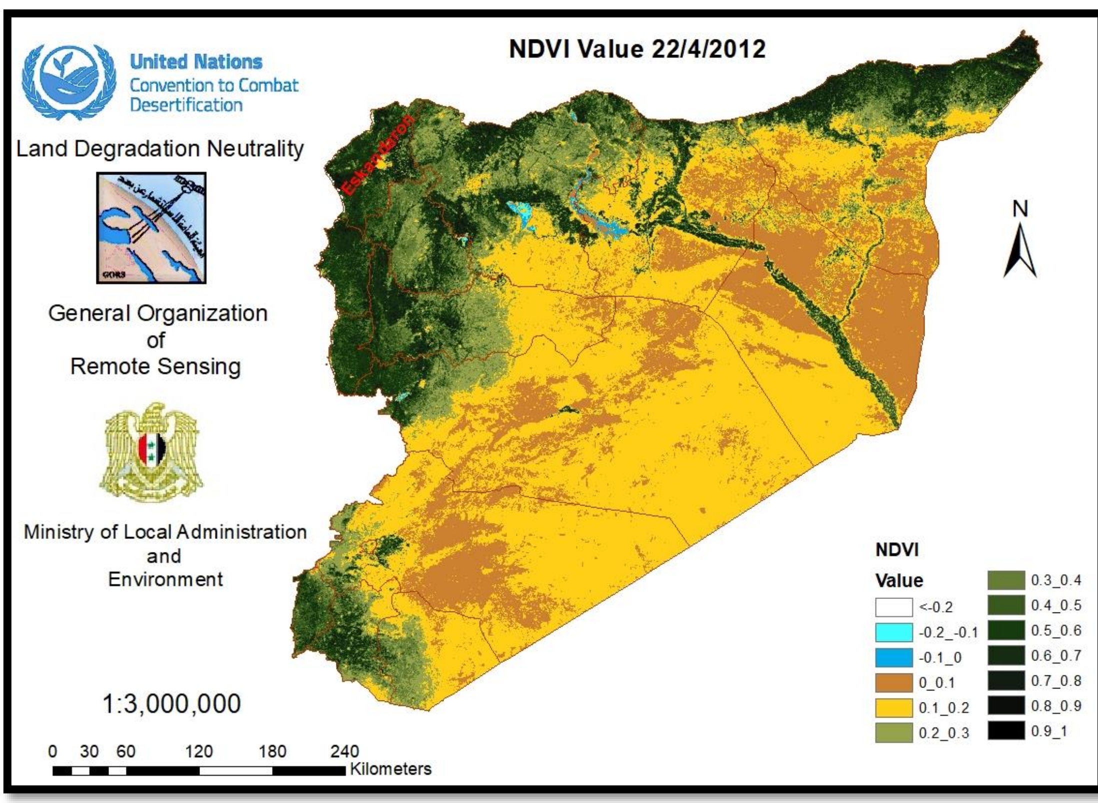
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Desertification
Land Degradation Neutrality
General Organization
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Remote Sensing
Ministry of Local Administration
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Environment
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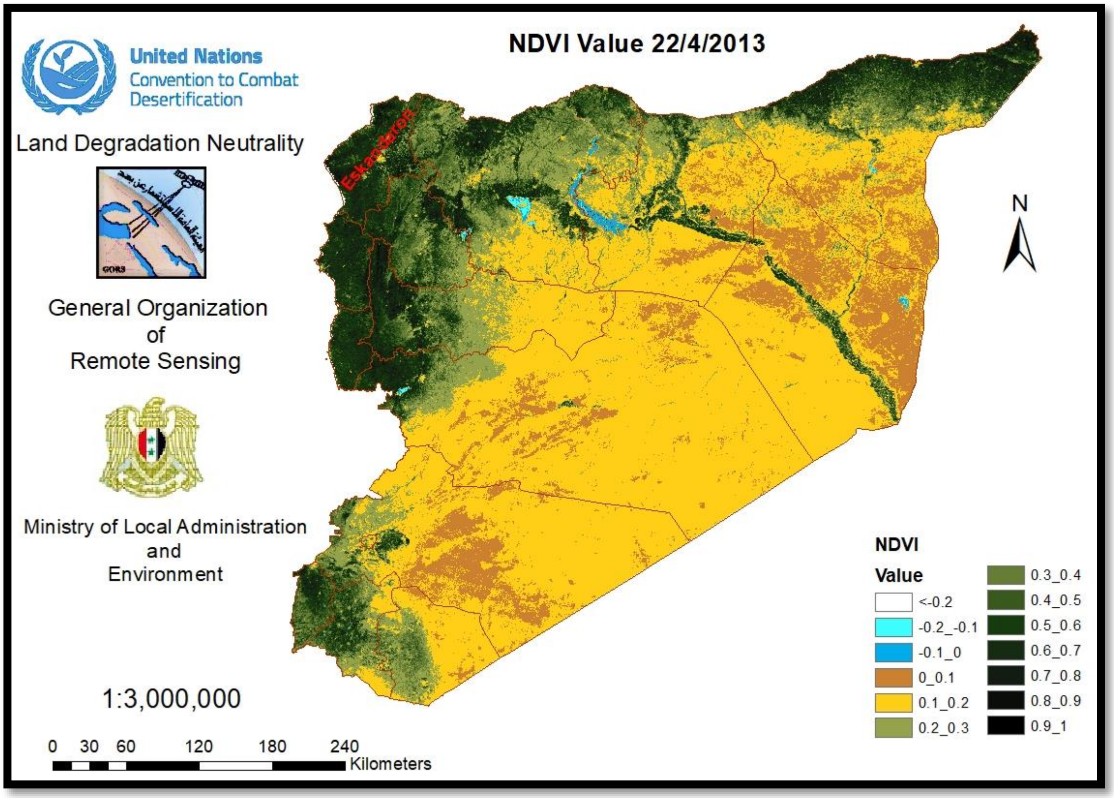
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Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
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Remote Sensing
Ministry of Local Administration
and
Environment
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Kilometers
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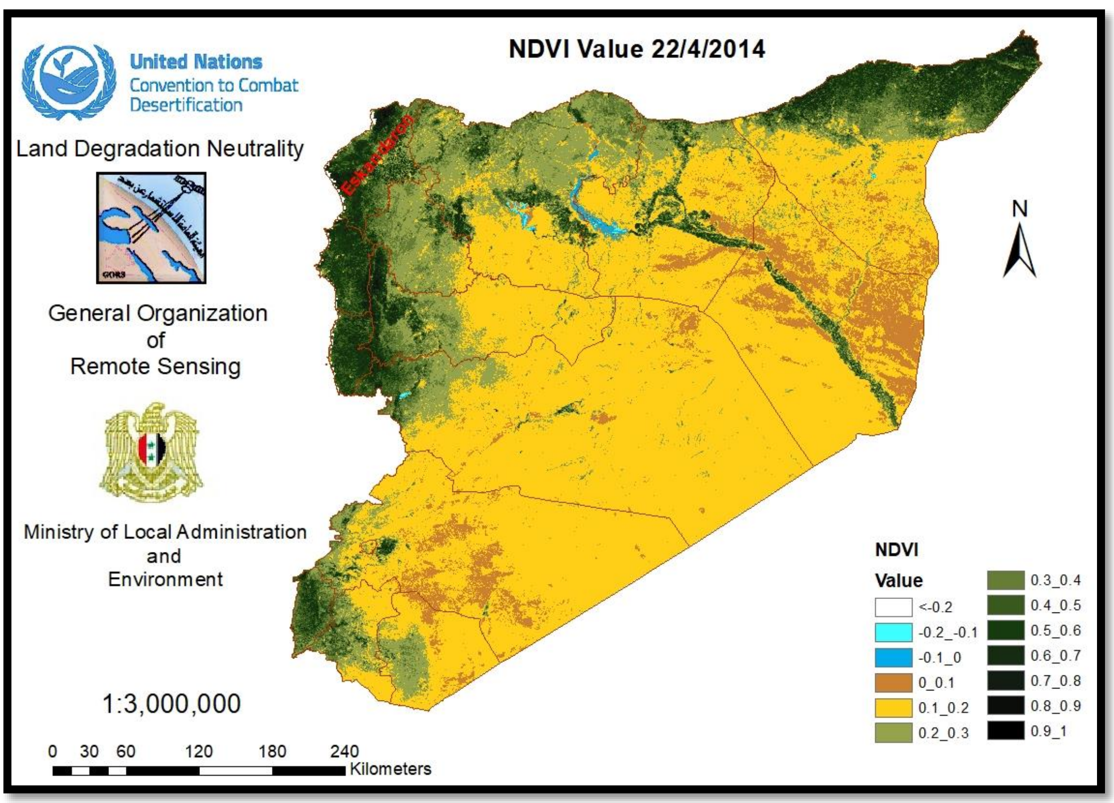
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Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
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Remote Sensing
Ministry of Local Administration
and
Environment
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Kilometers
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NDVI
Value
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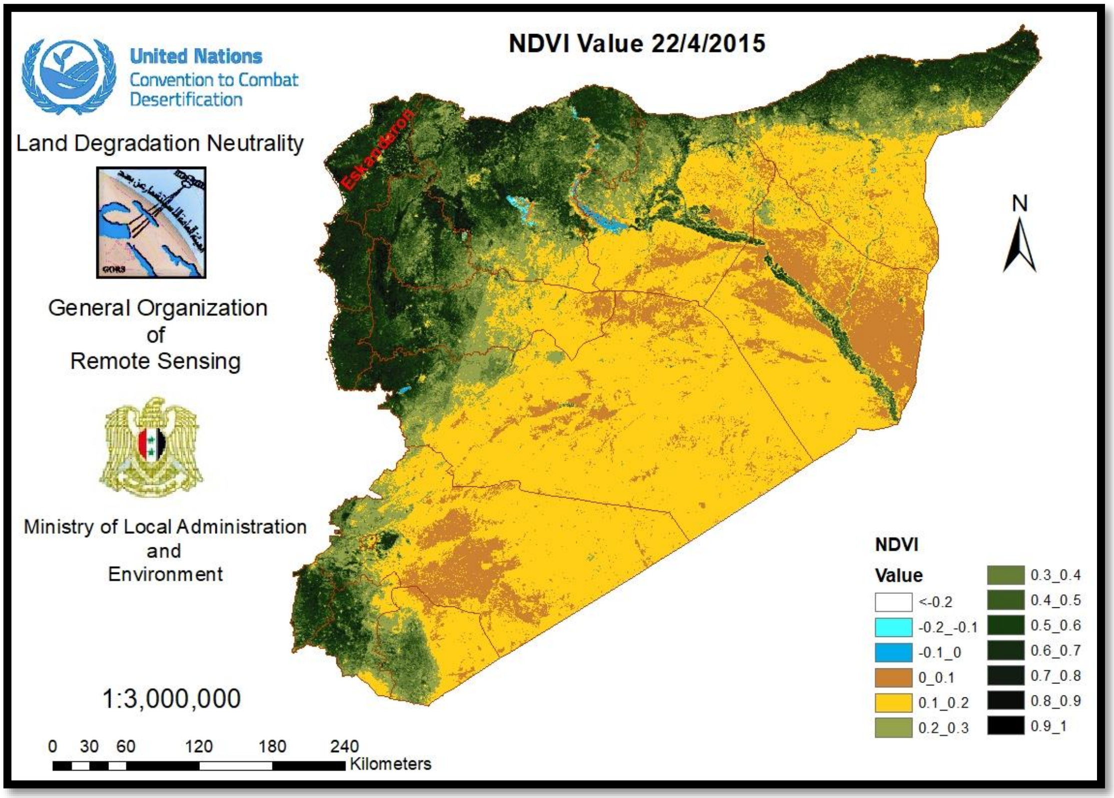
NDVI Value 22/4/2015
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
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Remote Sensing
Ministry of Local Administration
and
Environment
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Kilometers
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0.3_0.4
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0.5_0.6
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0.8_0.9
0.9_1

Figure 4: Averae classes of the NDVI index for 22/4 during the period 2000-2015

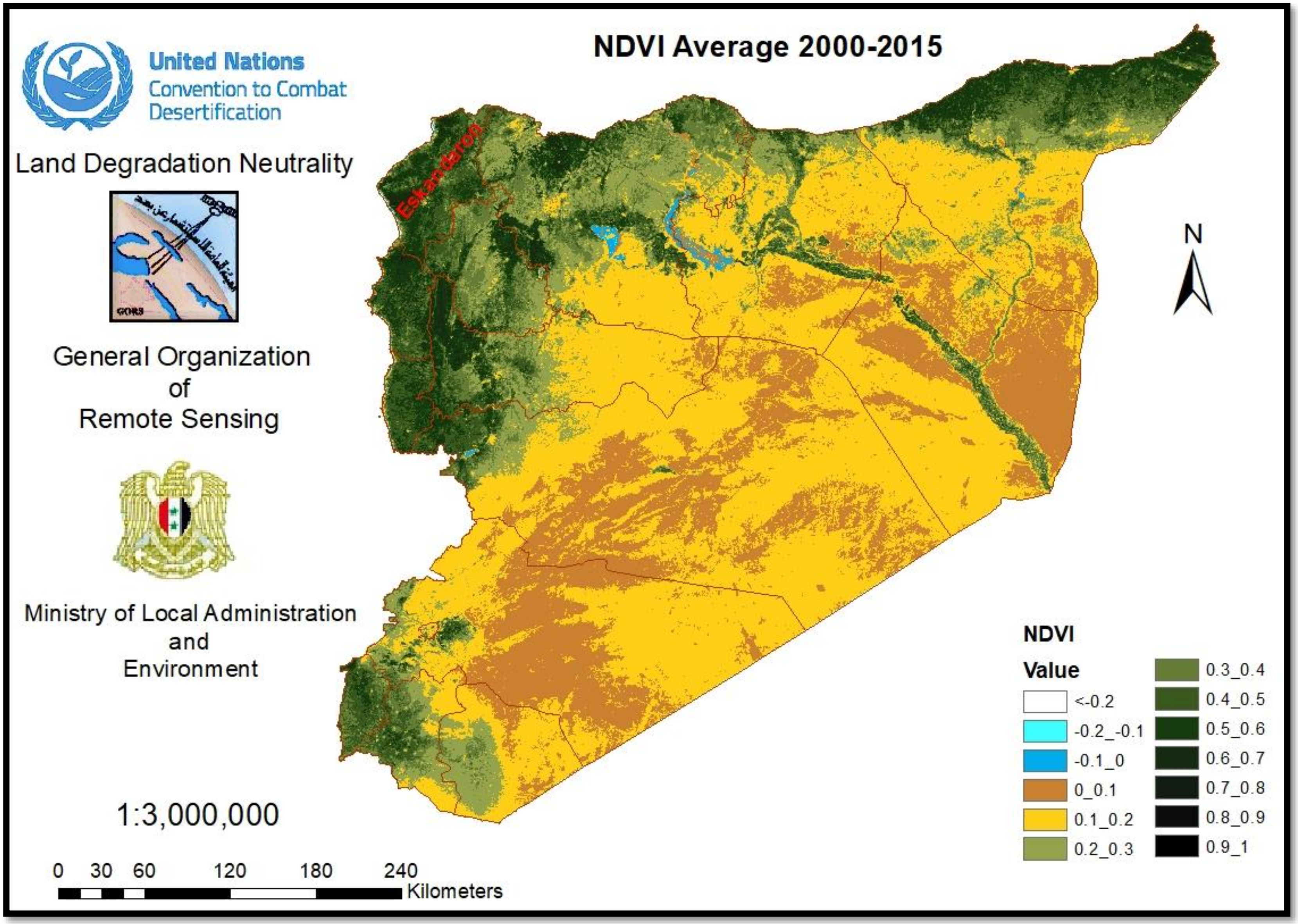


Figure 4: Majority classes of the NDVI index for 22/4 during the period 2000-2015

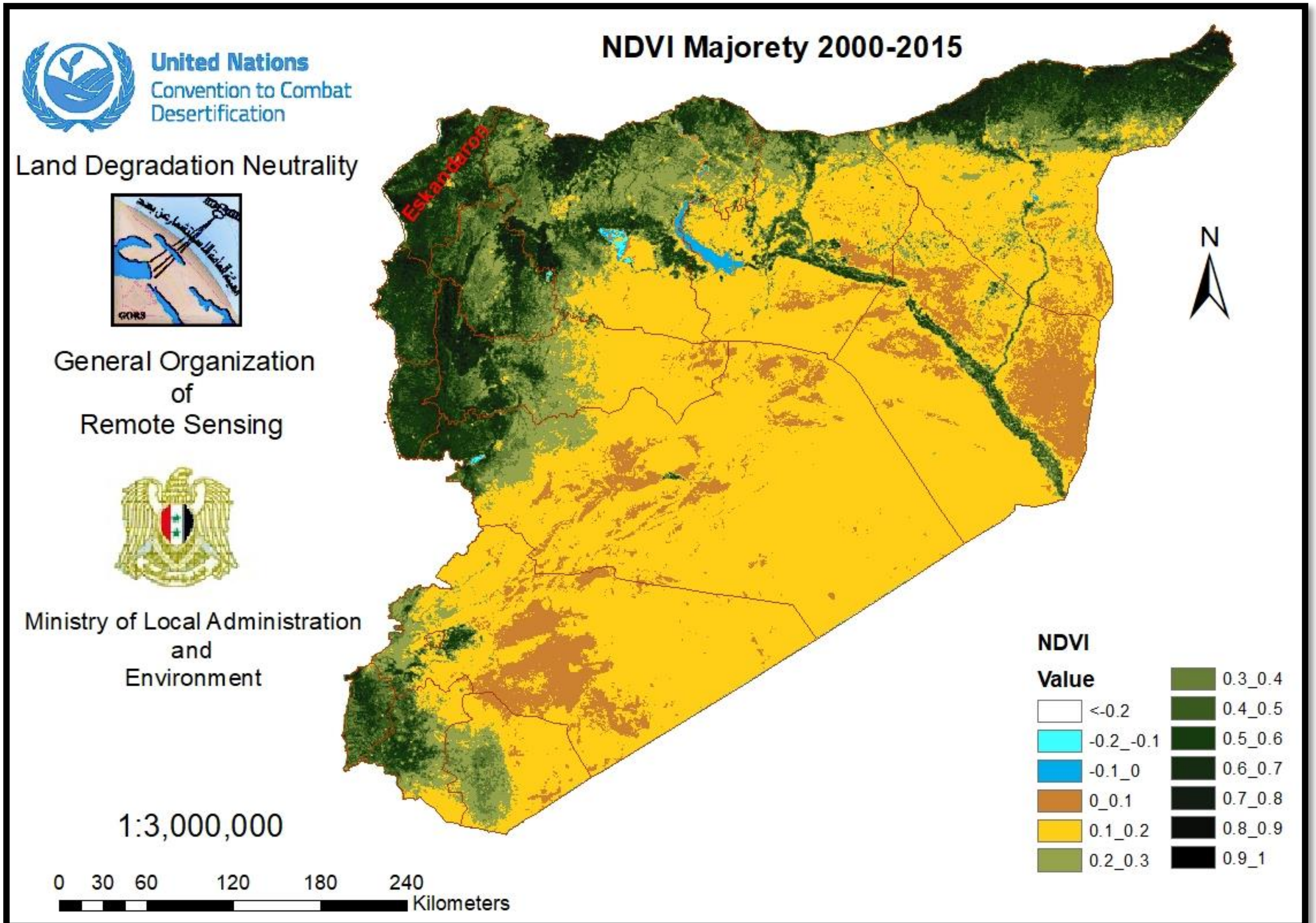


Figure 5: Average NDVI values for the time series 2000 - 2015 every 16 days

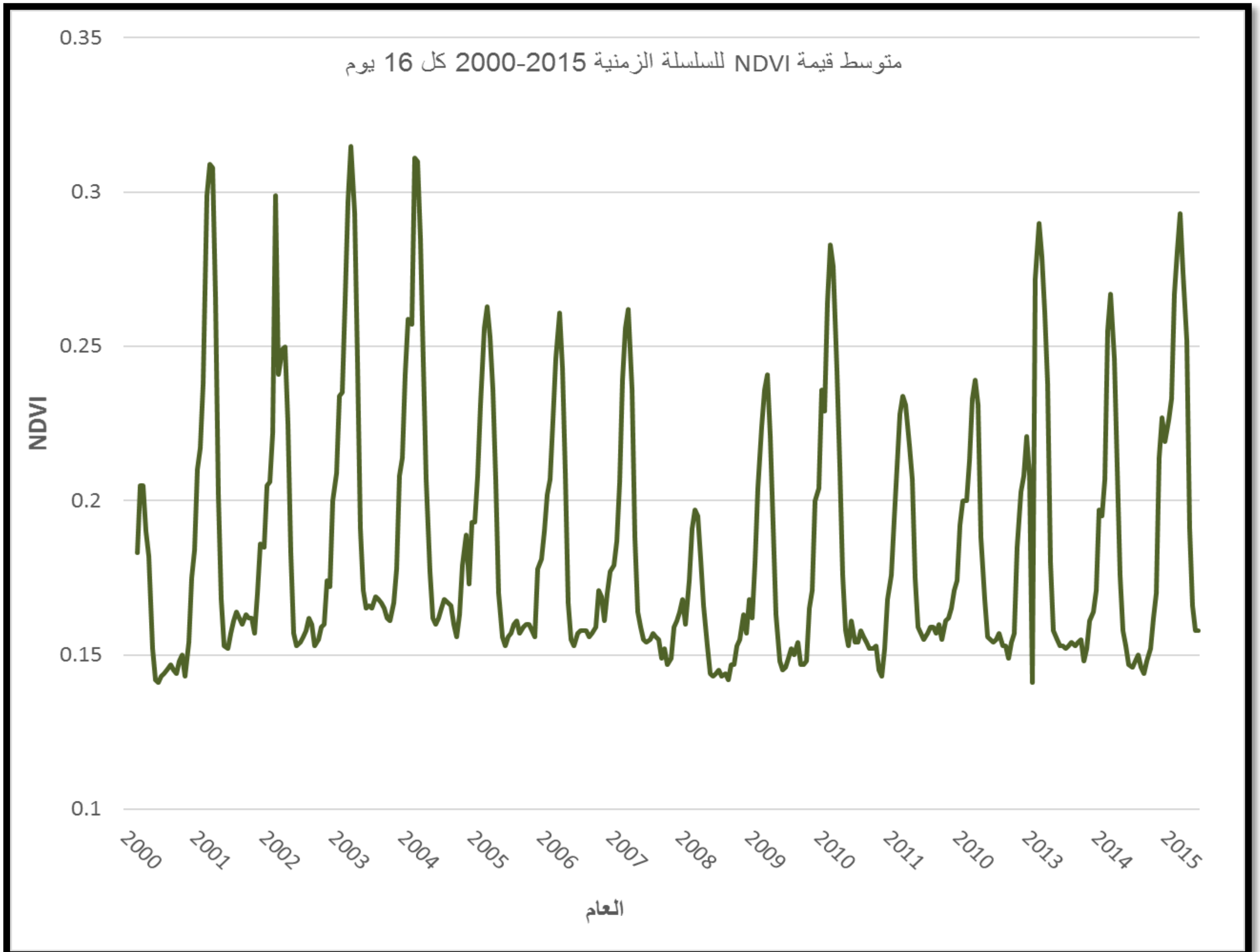
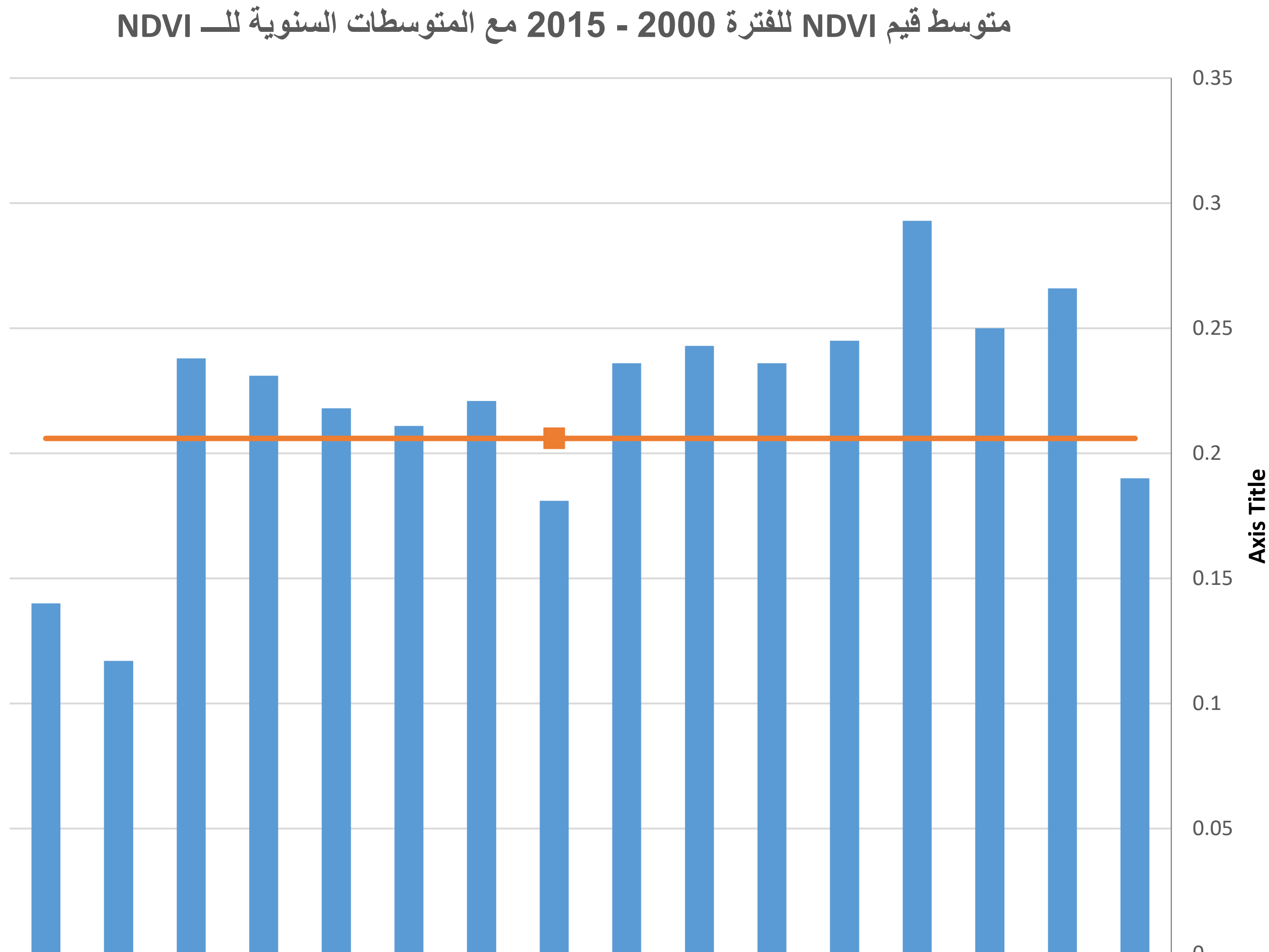


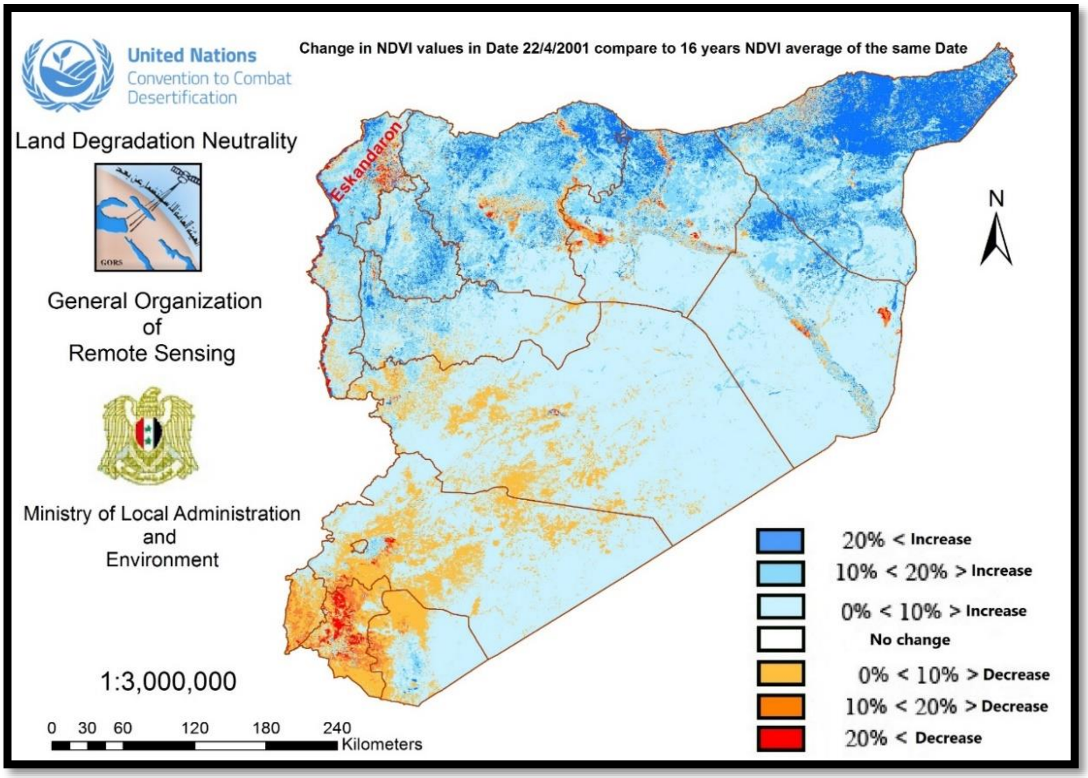
Figure 6: Average NDVI values in Syria for the years 2000 to 2015 and average 15 years (2000 to 2015)

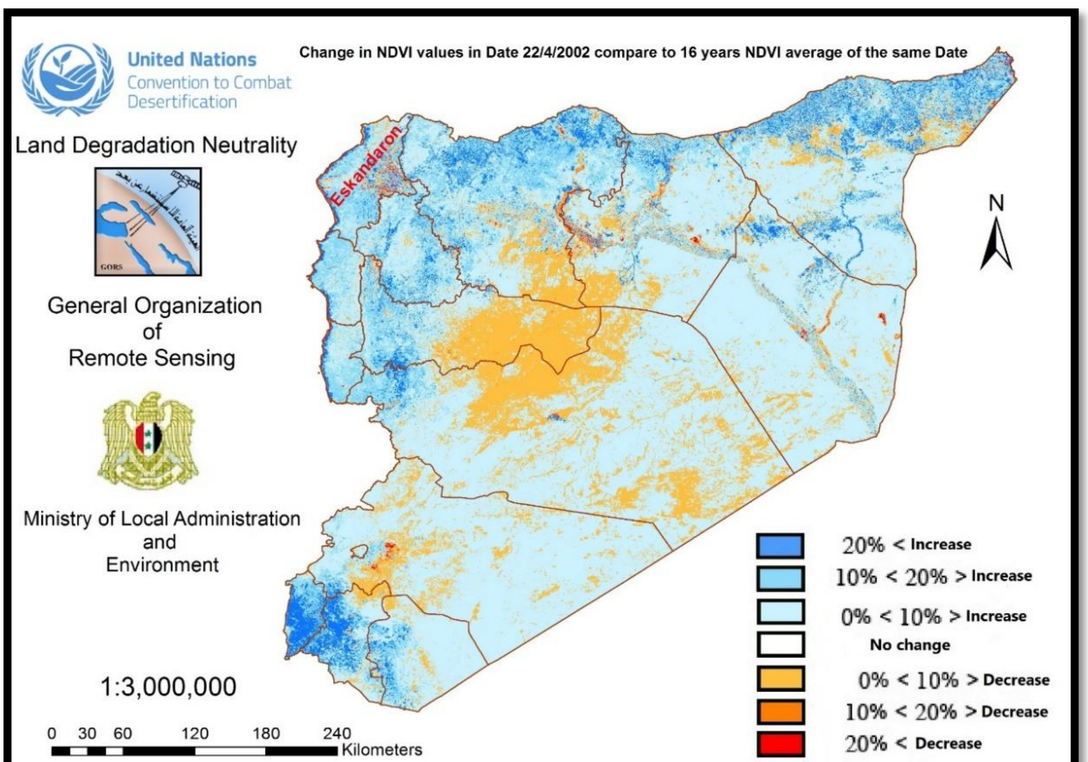


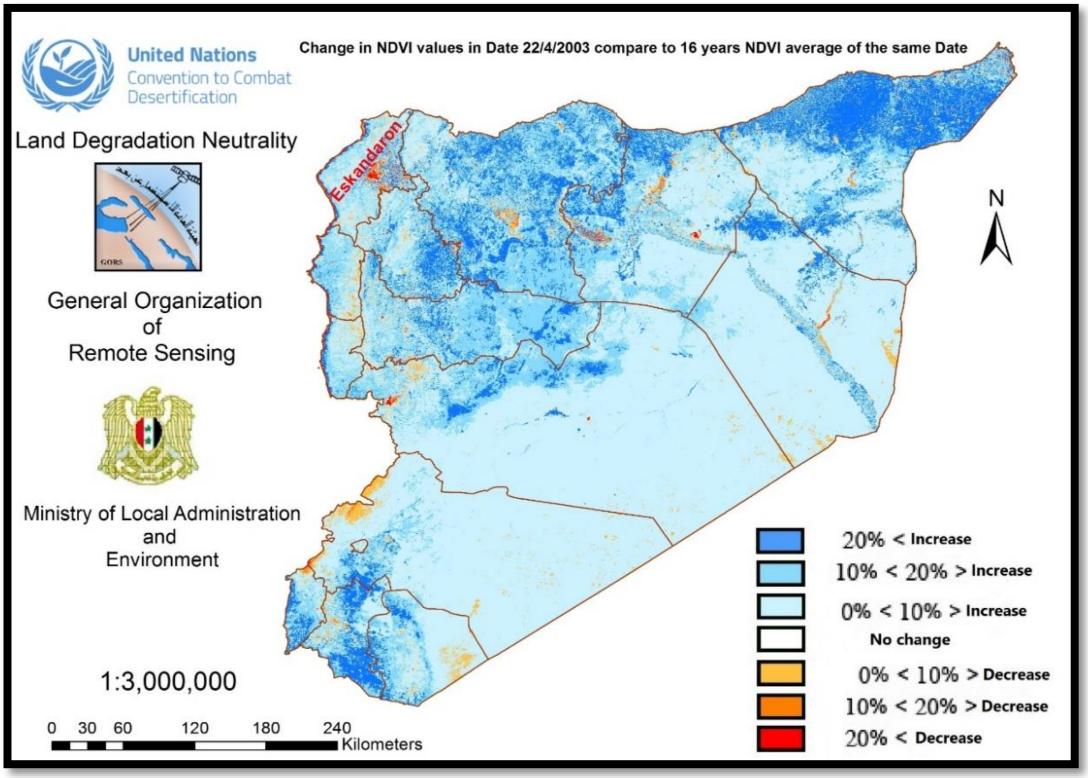
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
NDVI	0.14	0.117	0.238	0.231	0.218	0.211	0.221	0.181	0.236	0.243	0.236	0.245	0.293	0.25	0.266	0.19
Aveage	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206	0.206

Change in NDVI averages per year Date 22/4
(maximum vegetation in Syria)
(2015-2000) Compared to average 16 years

Figure (7): Comparison of NDVI on 22/4 for different years with average NDVI (2000 – 2015) for the same date







United Nations
Convention to Combat Desertification
Change in NDVI values in Date 22/4/2003 compare to 16 years NDVI average of the same Date
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
Eskandaron
N
20% < Increase
10% < 20% > Increase
0% < 10% > Increase
No change
0% < 10% > Decrease
10% < 20% > Decrease
20% < Decrease
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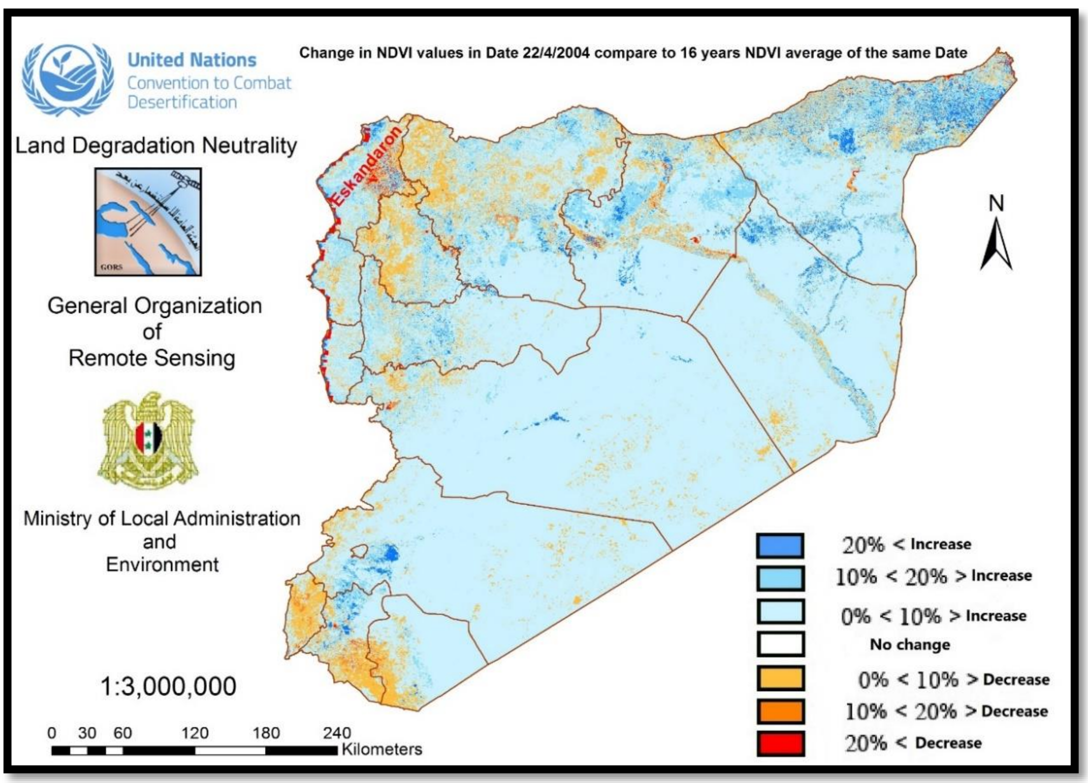

United Nations
Convention to Combat Desertification
Change in NDVI values in Date 22/4/2004 compare to 16 years NDVI average of the same Date
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
Eskandaron
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No change
0% < 10% > Decrease
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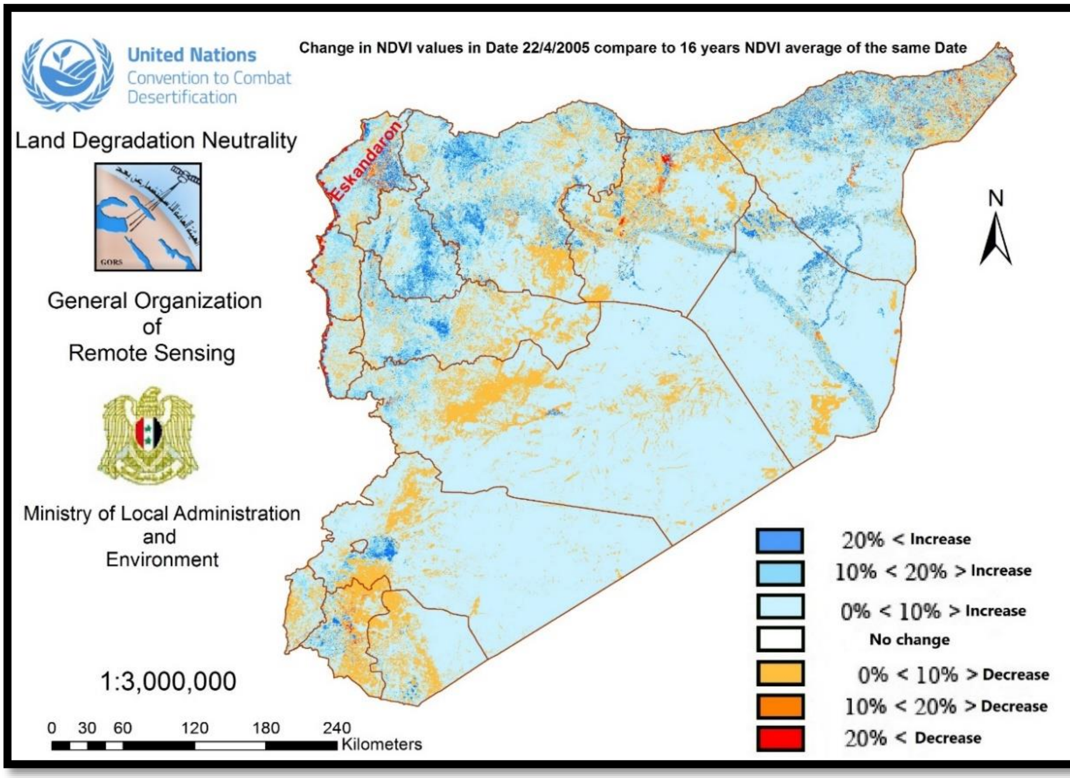
United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
Change in NDVI values in Date 22/4/2005 compare to 16 years NDVI average of the same Date
Eskandaron
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20% < Increase
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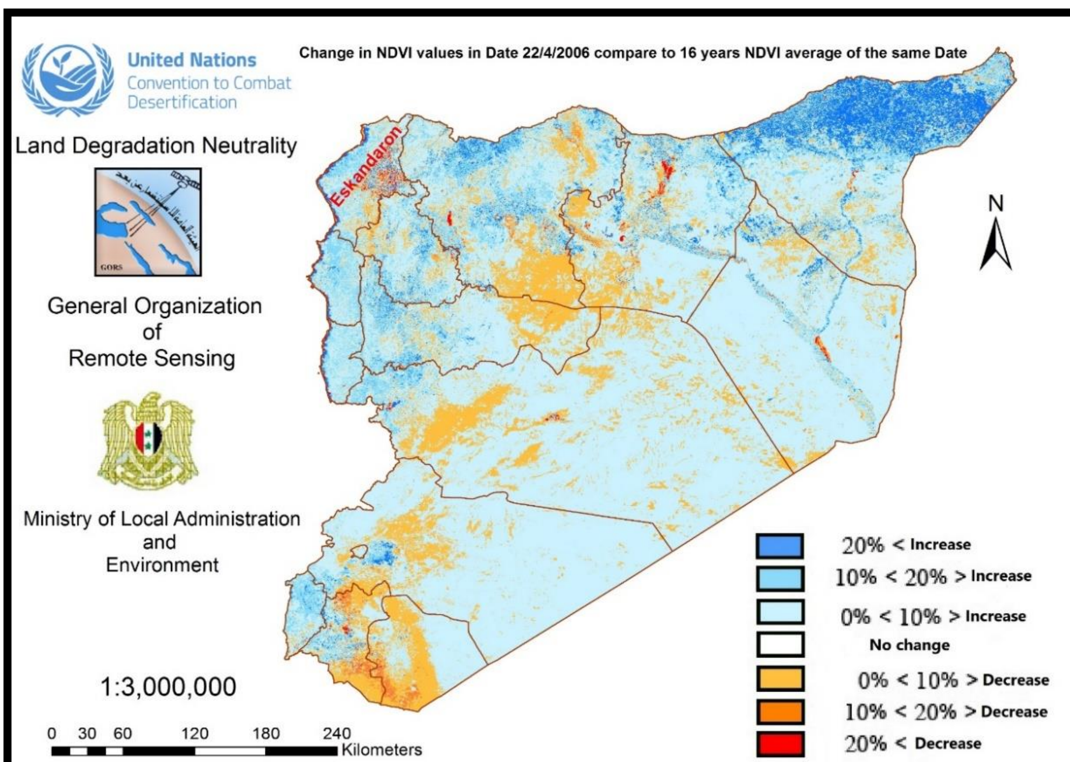
Kilometers


United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
Change in NDVI values in Date 22/4/2006 compare to 16 years NDVI average of the same Date
Eskandaron
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20% < Increase
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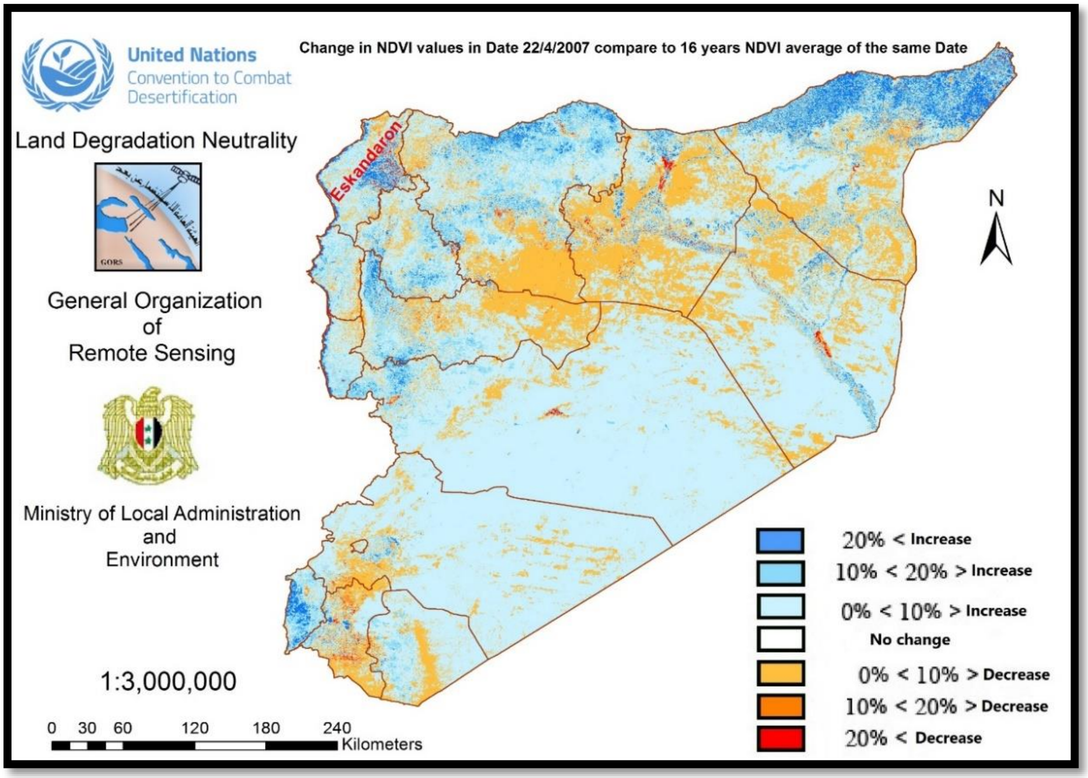
1:3,000,000
0 30 60 120 180 240
Kilometers


United Nations
Convention to Combat Desertification
Change in NDVI values in Date 22/4/2007 compare to 16 years NDVI average of the same Date
Land Degradation Neutrality
Eskandaron
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General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
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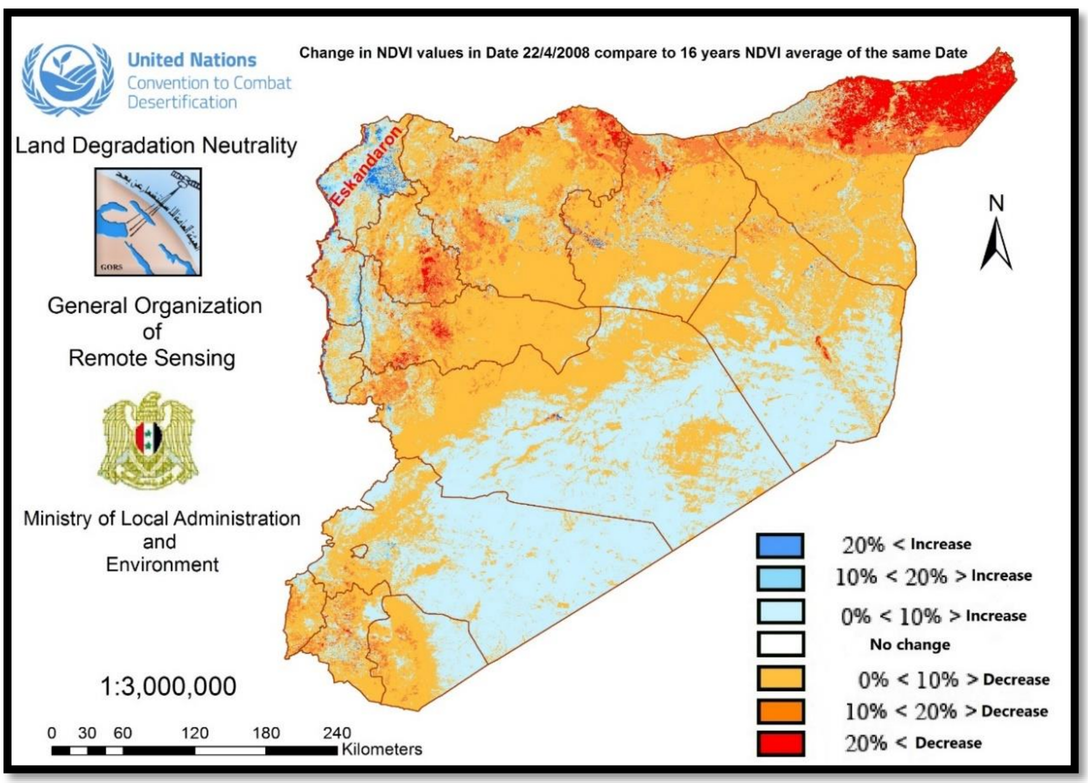
United Nations
Convention to Combat Desertification
Change in NDVI values in Date 22/4/2008 compare to 16 years NDVI average of the same Date
Land Degradation Neutrality
Eskandaron
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General Organization
of
Remote Sensing
Ministry of Local Administration
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Environment
1:3,000,000
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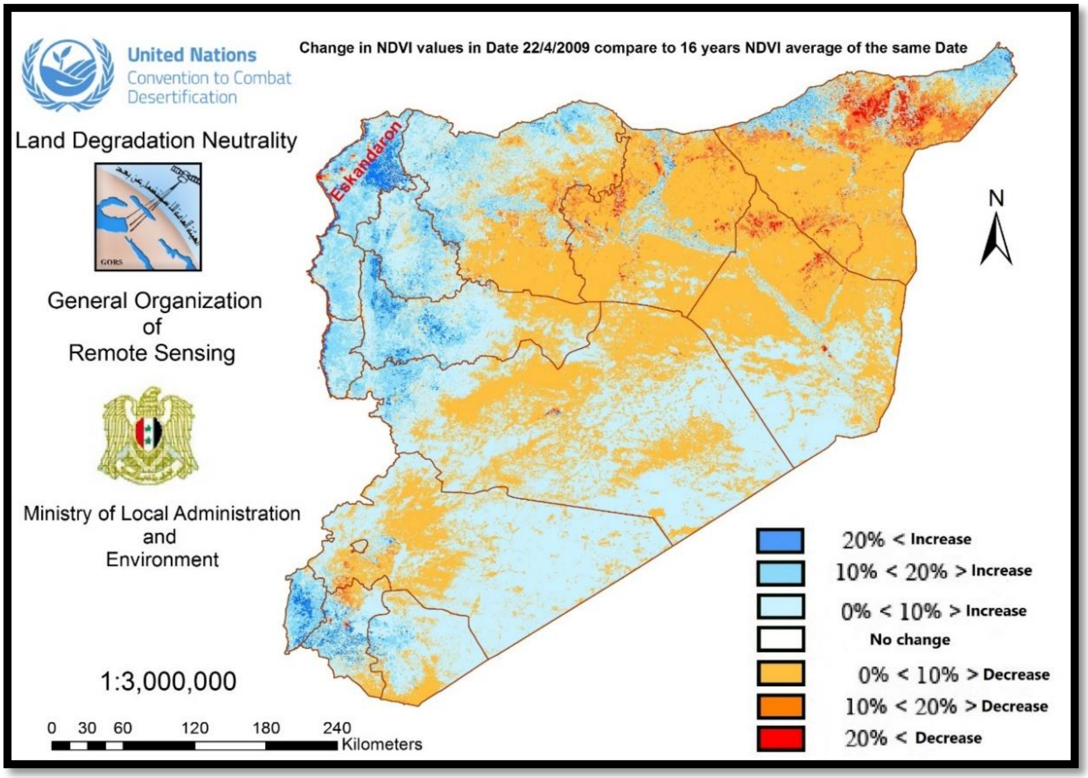
Change in NDVI values in Date 22/4/2009 compare to 16 years NDVI average of the same Date
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
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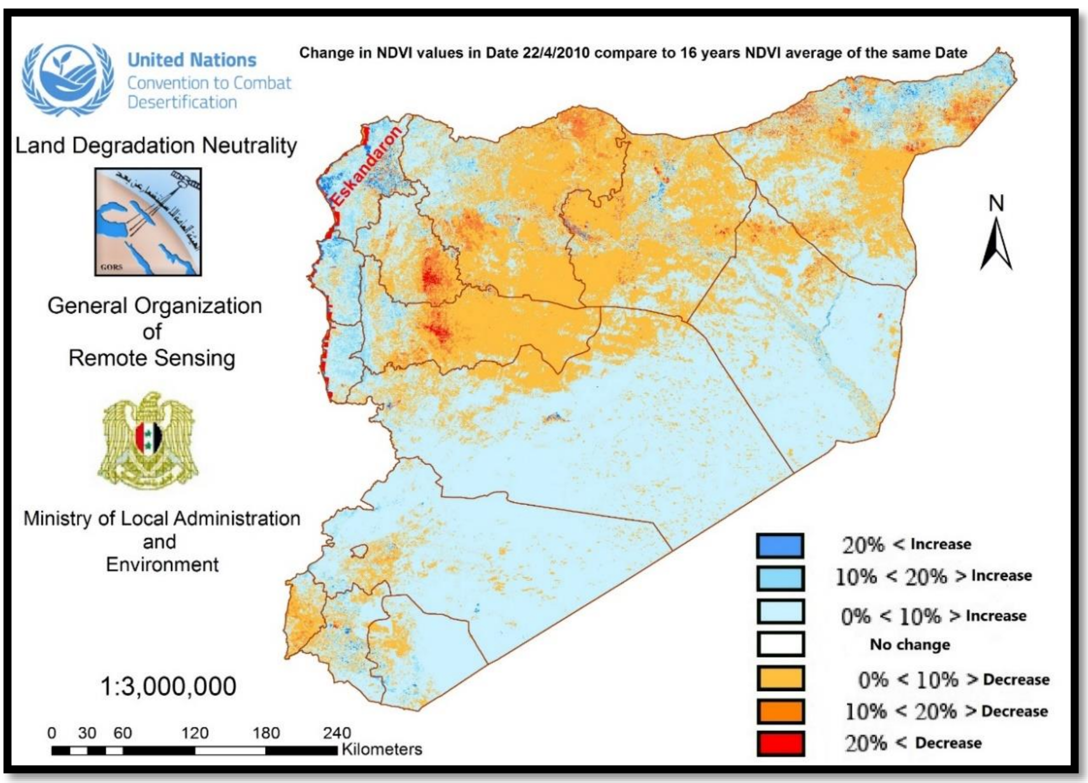
Change in NDVI values in Date 22/4/2010 compare to 16 years NDVI average of the same Date
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
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Kilometers
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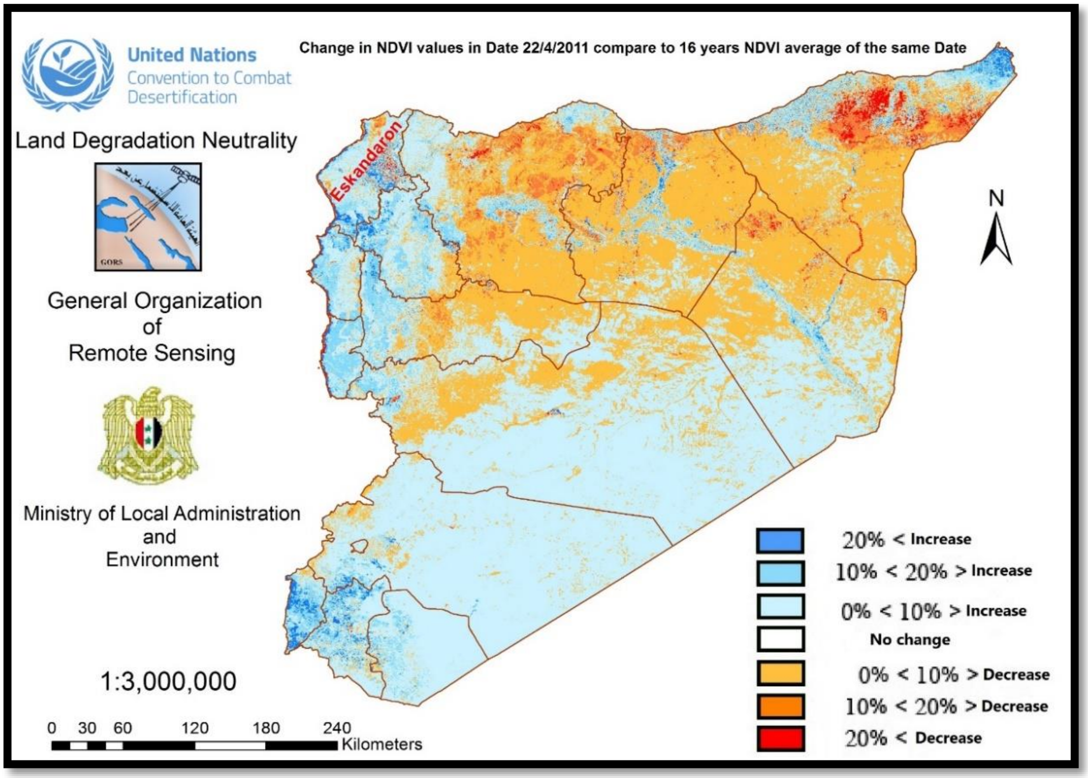
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Convention to Combat Desertification
Change in NDVI values in Date 22/4/2011 compare to 16 years NDVI average of the same Date
Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
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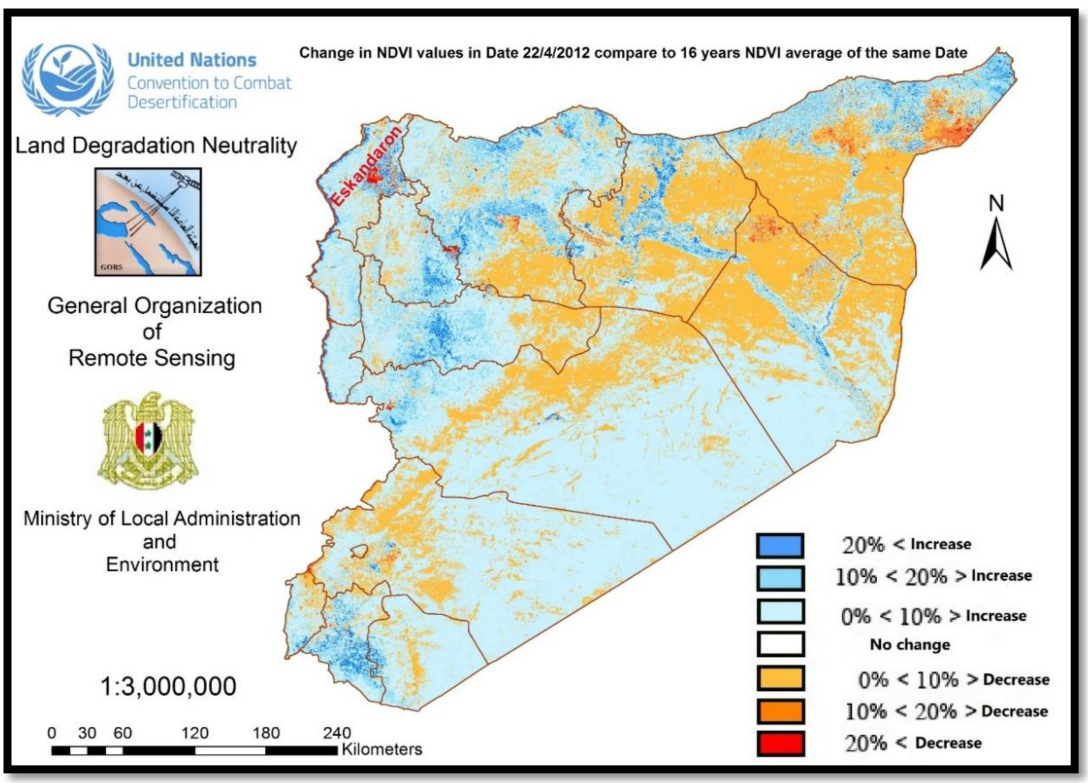
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Land Degradation Neutrality
General Organization of Remote Sensing
Ministry of Local Administration and Environment
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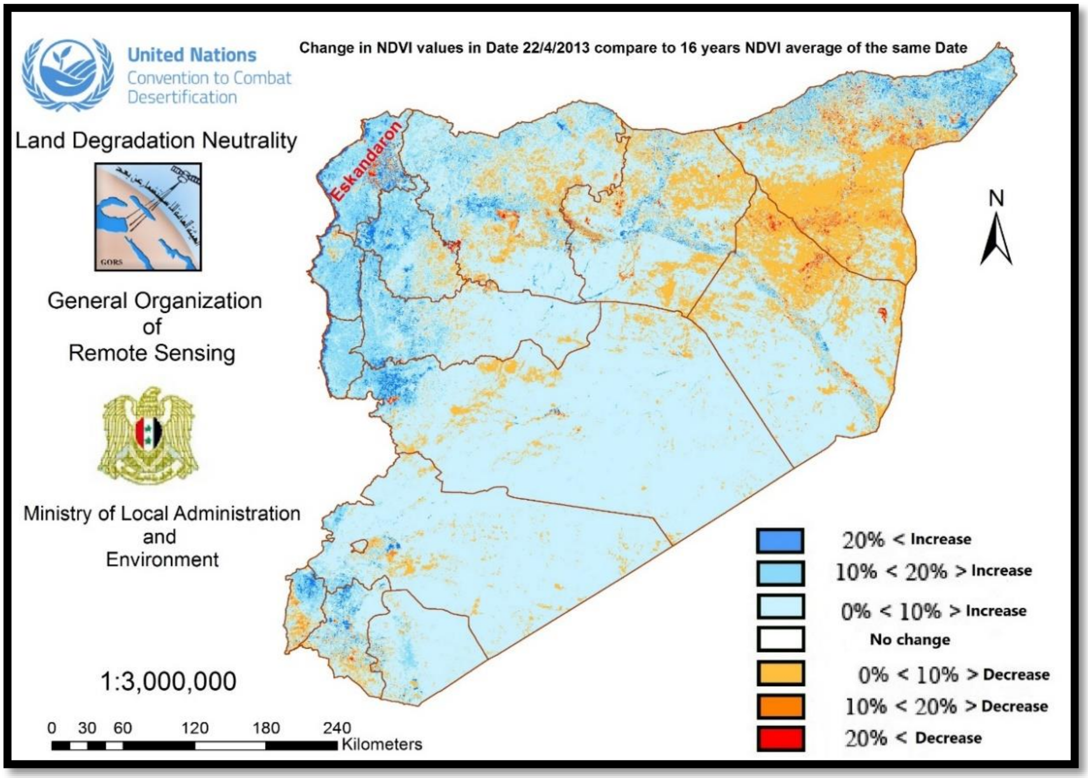
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Land Degradation Neutrality
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Ministry of Local Administration and Environment
Change in NDVI values in Date 22/4/2013 compare to 16 years NDVI average of the same Date
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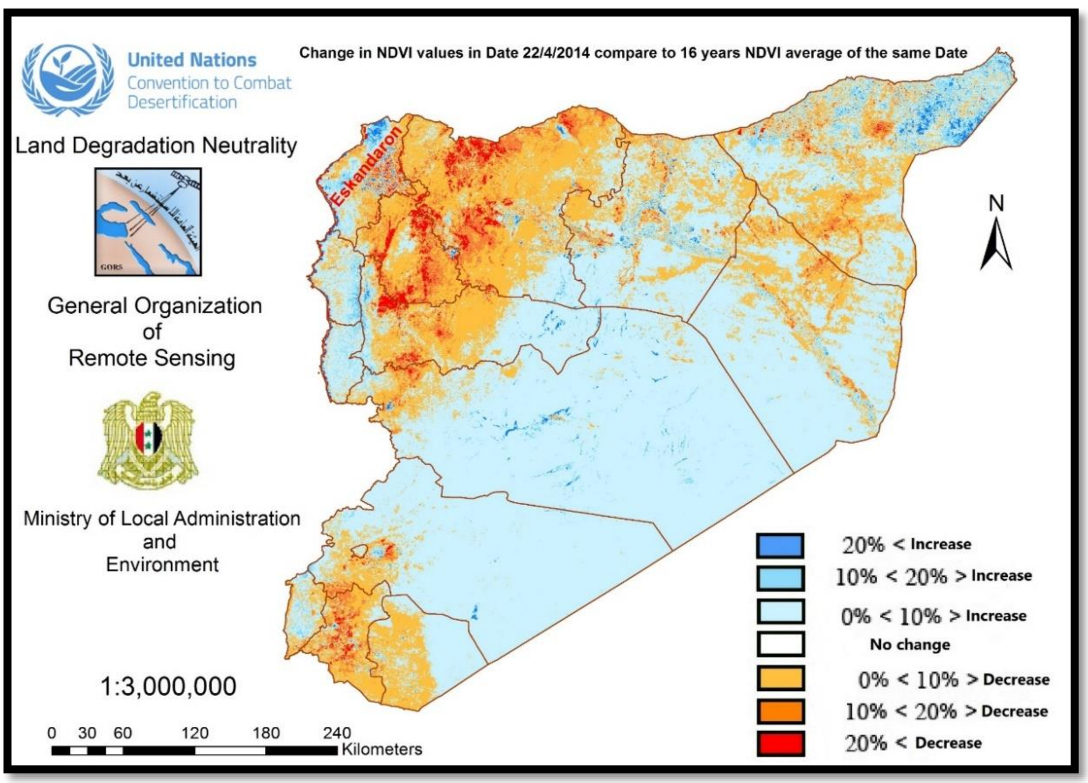
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General Organization of Remote Sensing
Ministry of Local Administration and Environment
Change in NDVI values in Date 22/4/2014 compare to 16 years NDVI average of the same Date
Eskandaron
N
20% < Increase
10% < 20% > Increase
0% < 10% > Increase
No change
0% < 10% > Decrease
10% < 20% > Decrease
20% < Decrease
1:3,000,000
0 30 60 120 180 240
Kilometers

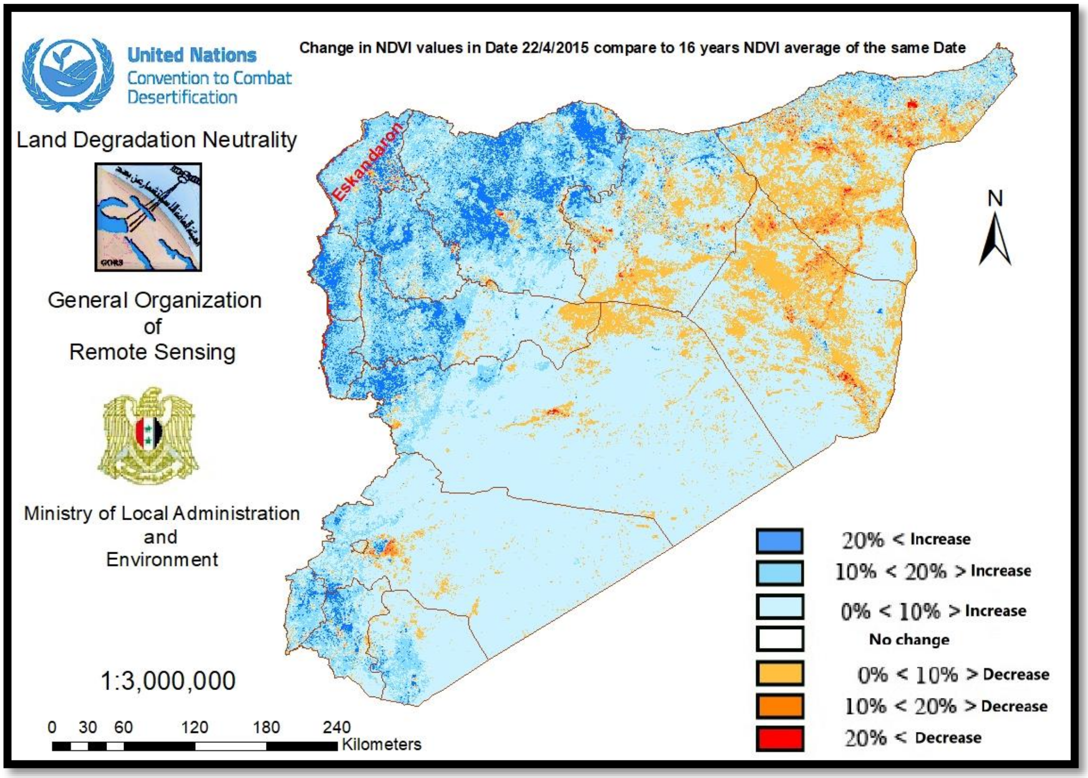
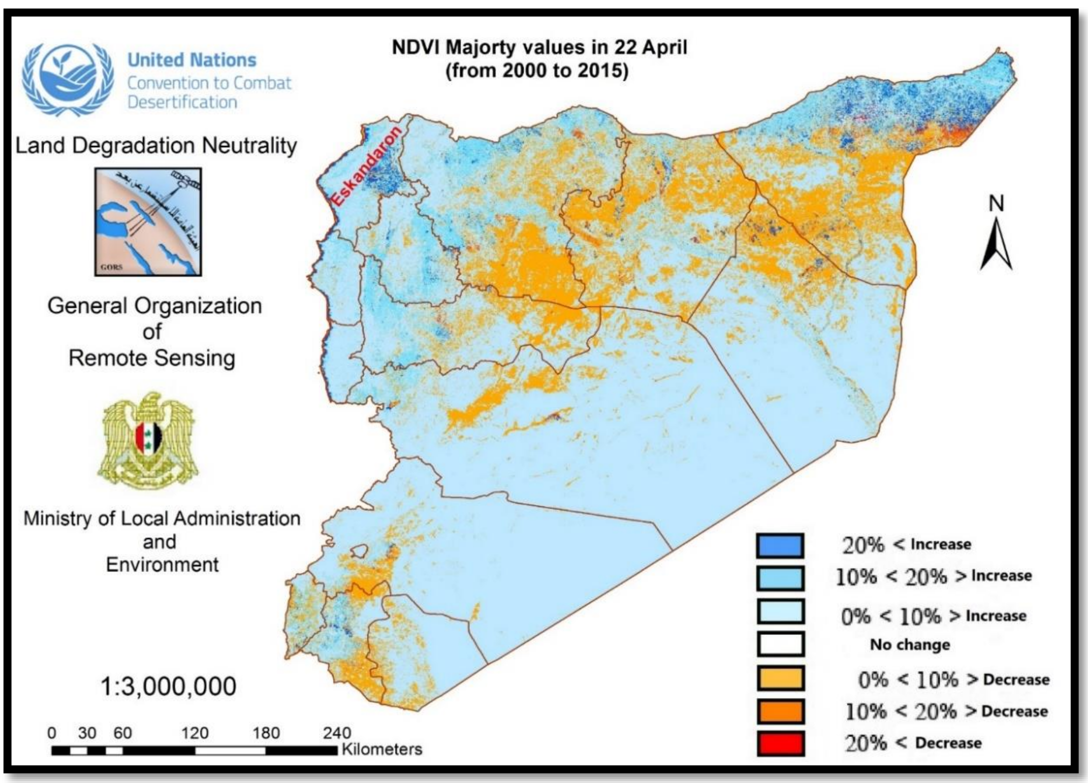


Figure (8): Map of the majority of NDVI classes on 22/4 in period 2000 – 2016



Annex (2)

Drought Indicator in Syrian Arab Republic

Drought Index: Vegetation Health Index VHI

Drought definition and causes:

Drought has taken on a number of occasions since the middle of the last century. It took a prominent news like severe famines, crop failures, disasters and other discouraging problems. It is affecting the life or human well-being;.Drought is not new, it is an old phenomenon that frequently or occasionally affects areas of the Earth, causing damage to periods in varying degrees of intensity. In the past three hundred years, devastating droughts have occurred in many parts of the world at different periods. Some examples can be cited, such as the major drought of the United States of America in 1726, which continued for 23 years, the subsequent drought in 1930 which continued for ten years, and the devastating droughts that occurred in the Sahel countries of Africa between 1968 and 1973 and most of the 1980s.

The facts of drought in their long record show that these are natural hazards. However, the human factor can be one of the contributing factors in increasing the occurrence of drought and multiplying its effects, while at the same time being the major contributor to mitigating these effects.

Drought definitions varied according to the nature of water or moisture requirements. The simplest of these definitions is the rain stop to fall as in its usual season. Drought can be in different mannars: seasonal drought, accidental drought, weather-related drought, agricultural drought and hydrological drought. Other terms were suggested to describe land-use drought, such as "pastoral drought" and "ecological drought".

The World Meteorological Organization (WMO) proposed two definitions of drought:

(A) The rain has failed to fall or has been poorly distributed for a long time.

(B) a period of unusually dry weather and prolonged enough to cause a serious hydrological imbalance.

In addition, article 1 of the UNCCD states the following definition of drought: "Drought" is the natural phenomenon that occurs when the rain is significantly below its recorded levels and thus causes hydrological imbalances that adversely affect the production of terrestrial ecosystems.

The methodology:

MODIS sensor is of the most important sensors that provide daily satellite images from which many products were derived of up to 44 products. (36 spectral channels) in different spatial resolutions: 250 m (channel 1 - 2 which represente of the red and infrared spectral channel used in calculating the NDVI, 500 m (channel 3 -7) and 1000 m (channel 8-36), in addition to a product of Surface temperature LST with a spatial resolution of 1000 m.

1- The Normalized Difference Vegetation Index (NDVI):

In studying in the vegetation cover, scientists developed a number of equations called indices or plant indices to distinguish plants generally from other targets, and developed these indices of the possibility of distinguishing plants from each other. Most of the established plant indices used the visible and near-infrared spectral fields. But the most famous and most used at all is the following index:

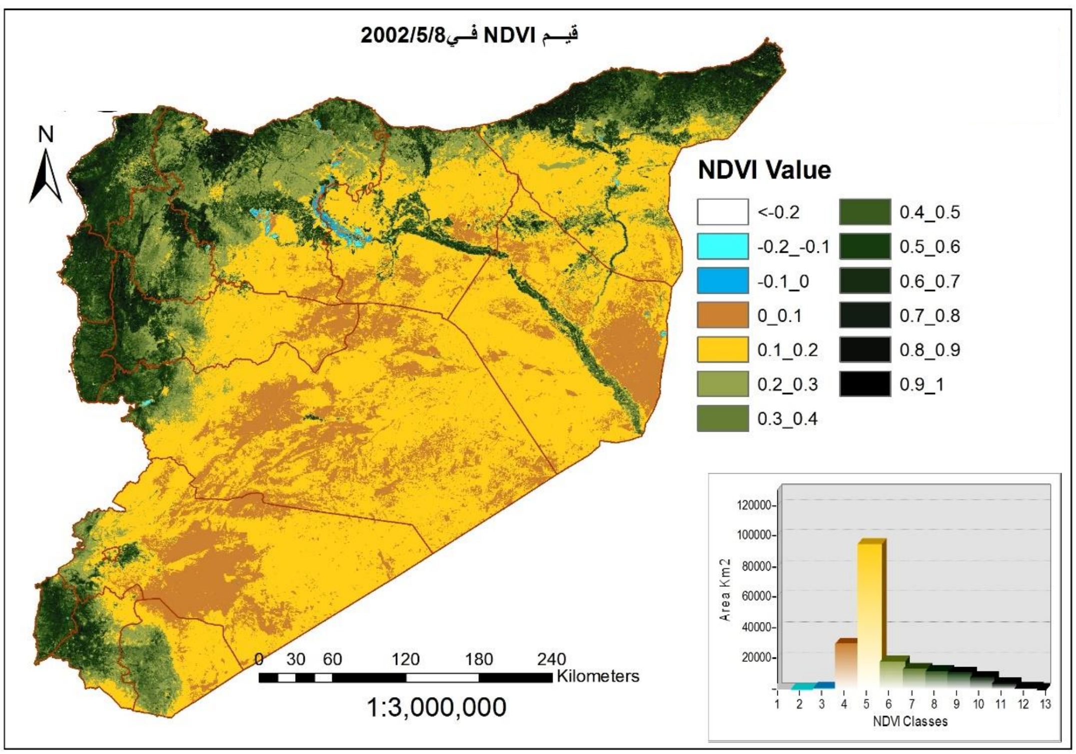
Normalized Difference Vegetation Index: NDVI= NIR – R / NIR + R

Pixel values are assigned to a number of classes after classifying the spatial images expressed in NDVI directory as follows:

Classes	NDVI values	Classes	NDVI values
1	< -0.2	8	0.4 _ 0.5
2	-0.2 _-0.1	9	0.5 _ 0.6
3	-0.1_0	10	0.6 _ 0.7
4	0 _ 0.1	11	0.7 _ 0.8
5	0.1 _0.2	12	0.8 _0.9
6	0.2 _ 0.3	13	0.9 _1
7	0.3 _ 0.4		

The final maps of the NDVI plant cornea were produced for Syria during the 2000-2015 time series according to the above classification values according to the model in Fig. 1

Figure 1: NDVI map with different classes



2- Vegetation Condition Index VCI

This index is commonly used to determine the drought state based on the NDVI values of the time series. It is expressed by the equation (Kogan 1995):

$$VCIi = \frac{NDVIi - NDVImin}{NDVImax - NDVImin} * 100$$

Where NDVIi is the NDVI value at the desired date, NDVImax and NDVImin are the highest and lowest value for NDVI over the time series,

The values of this index have been obtained according to the following steps:

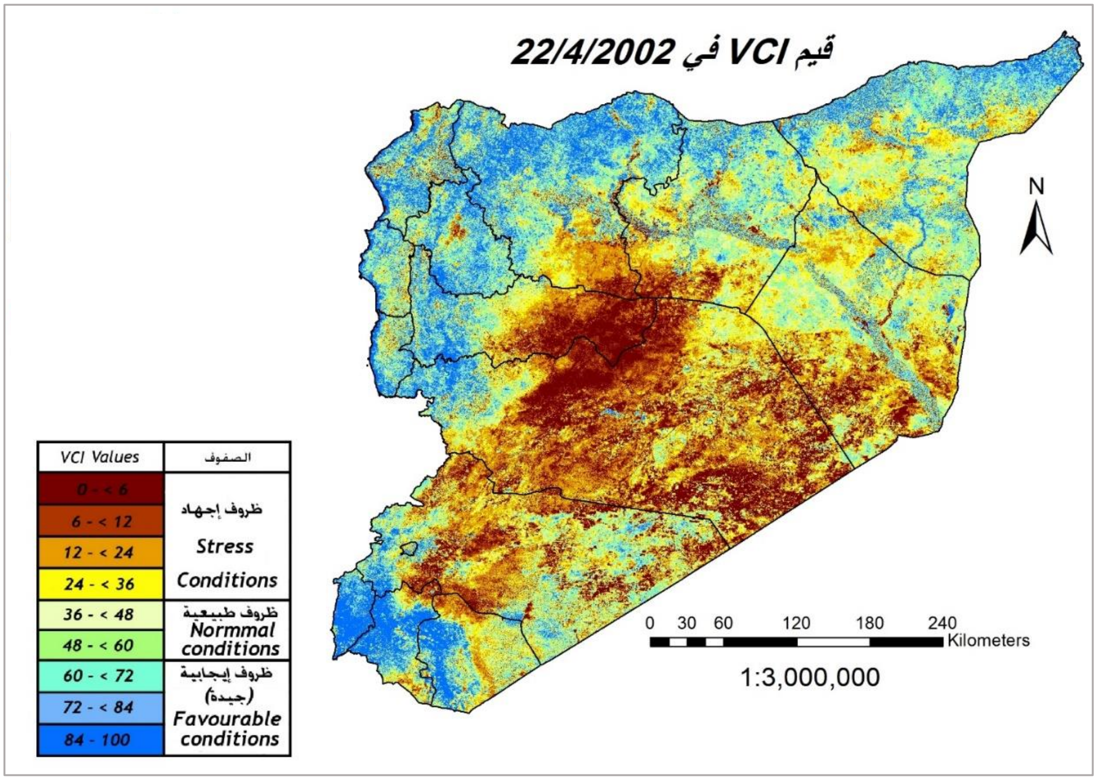
1- the highest and lowest NDVI images were obtained according to a model designed with ERDAS imagen.
2- VCI images that represent the values of the VCI obtained according to a model designed with ERDAS imagen.
3- Classification of the VCI image of Syrian Arab Republic to 9 classes (the following table) according to a model designed by the ERDAS imagen:

Number, values and characterization of classes resulting from the classification of VCI image

classes	VCI values	Stress discribtion	classes	VCI values	Stress discribtion
1	0 - < 6	Stressed	5	36 - < 48	Normal
2	6 - < 12		6	48 - < 60	
3	12 - < 24		7	60 - < 72	Not stressed
4	24 - < 36		8	72 - < 84	
			9	84 - < 100	

4- Production of the VCI maps for the time series 2001-2015 of date 22/4 according to the classification values mentioned above. See Figure.(2)

Figure 2: Satellite images classified into 9 classes represented the VCI classes



3- Land Surface Temperature LST

LST is a product of the MODIS sensor (MOD11). Its pixel value expresses the temperature of the surface of the earth. It includes several products, as following: MOD11A1, with a spatial resolution of 1 km and a daily frequency. MOD11B1 with a spatial resolution of 6 km and a daily frequency. MOD11A2 with a spatial resolution of 1 km and frequency of 8 days. It is calculated according to the following stages:

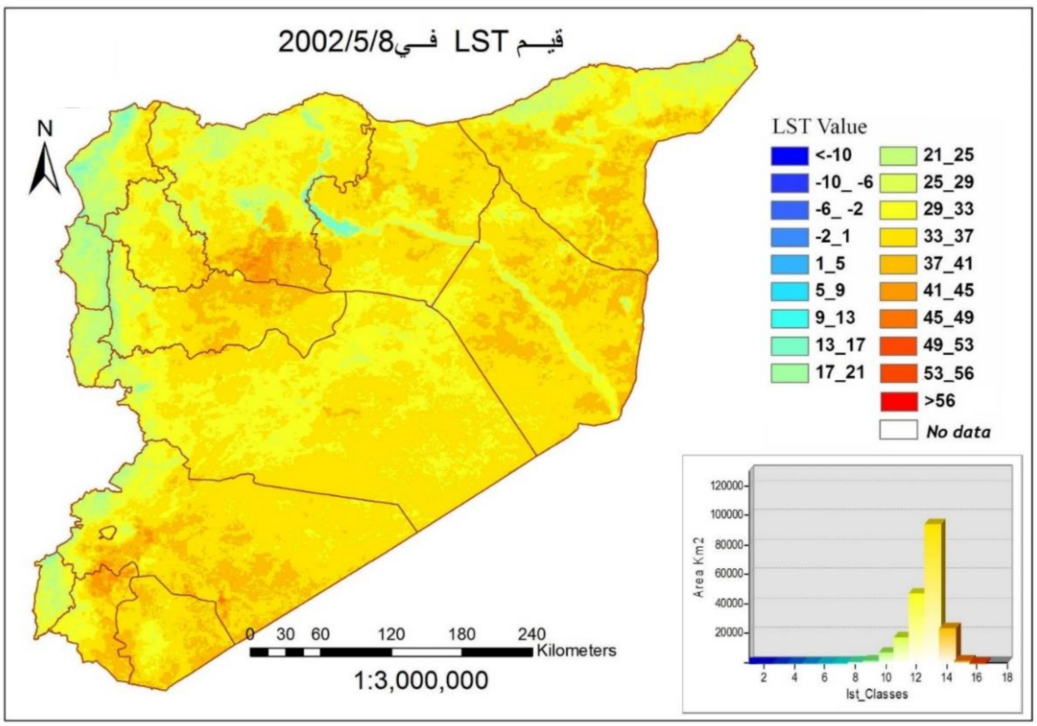
1- The satellite images of LST from the MODIS sensor were obtained at Level3 processing with a 16-day interval symbolized by MOD11A2 in corespondance with NDVI product dates.
2- The numeric values of each pixel in the image are converted to the value of a Celsius temperature according to the conversion factor (pixel value * 0.02-273).
3- The satellite image of the surface temperature of the Syrian Arab Republic was classified into 18 classes (as shown in the following table) according to a model developed by ERDAS imagen:

Number of classes and their values resulting from LST image classification

class	LST Values	class	LST Values
1	< -10	10	21 _ 25
2	-10 _-6	11	25 _ 29
3	-6 _ -2	12	29 _33
4	-2 _ 1	13	33 _37
5	1 _5	14	37 _ 41
6	5 _ 9	15	41 _ 45
7	9 _ 13	16	45 _ 49
8	13 _ 17	17	49 _ 53
9	17 _ 21	18	< 53

4- Final LST maps for Syria were produced during the 2000-2015 time series according to the above classification values. As shown in Figure.(3)

Figure 3: Satellite images classified into 18 classes representing LST



5- Temperature Condition Index TCI

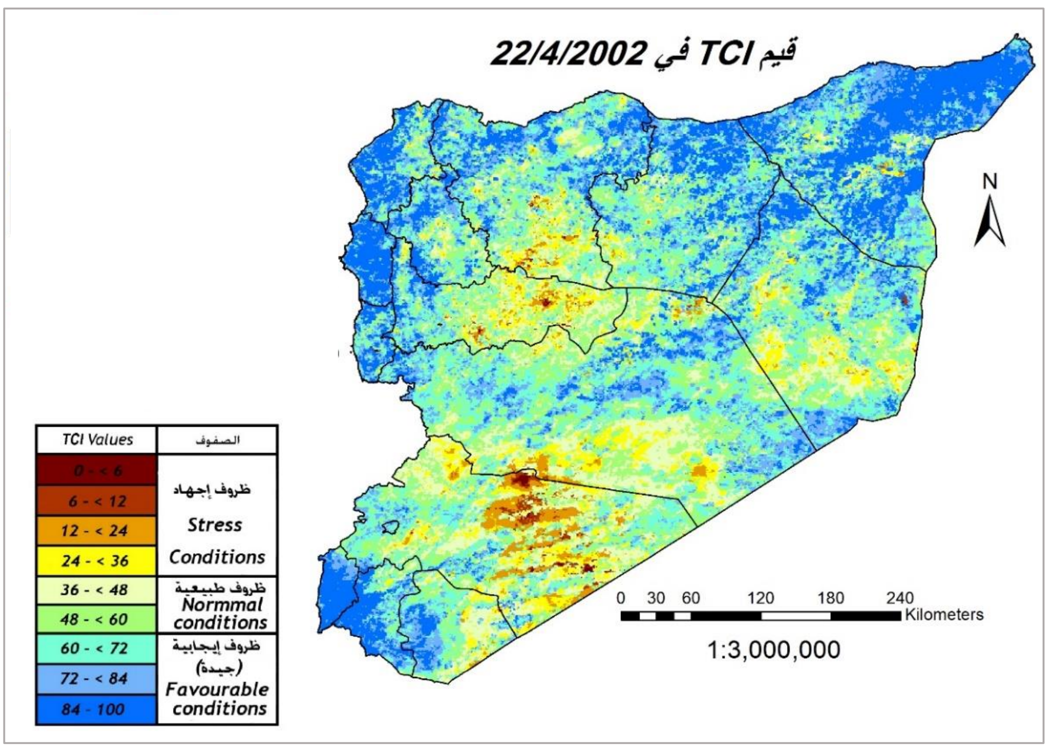
It is an index commonly used to determine the state of drought based on the LST values of the time series and is expressed by Kogan (1995):

$$TCIi = \frac{LSTmax - LSTi}{LSTmax - LSTmin} * 100$$

Where LSTi value at the desired date, LSTmax, and LSTmin is the highest and lowest value for the LST through the time series, and the values for this index have been obtained according to the following steps:

1- Get the images that represent the highest and lowest value of the LST according to a model designed with the program ERDAS imagen.
2- Acquiring images that represent the values of the TCI index according to a model designed with ERDAS imagen.
3- Classification of the satellite image represented by the TCI of the Syrian Arab Republic to 9 classes similar to the VCI values (Table 3) according to a model designed for the ERDAS imagen.
4- Production of the maps of index TCI for Syria during the time series 2000-2015 to 22/4 according to the values of the classification mentioned above according to the model shown in Figure (4).

Figure 4: Satellite images classified into 9 classes represented by TCI.



6- Vegetation Health Index (VHI)

It is an index used to determine the state of drought based on the values of both VCI and TCI for time series and is expressed by Kogan (1995). It is one of the most common and most commonly used index for drought status:

$$VHI = (VCI * a) + (TCI * b)$$

$$VHI = (VCI * 0.5) + (TCI * 0.5)$$

Where VCI is the vegetative condition index, TCI is a temperature condition index, and a and b are constant according to the contribution of each index in the equation and their value is in the Middle East with most references 0.5. The values of this index have been obtained according to the following steps:

1- Acquire images that represent the values of the TCI and VCI produced as mentioned earlier on the same date.

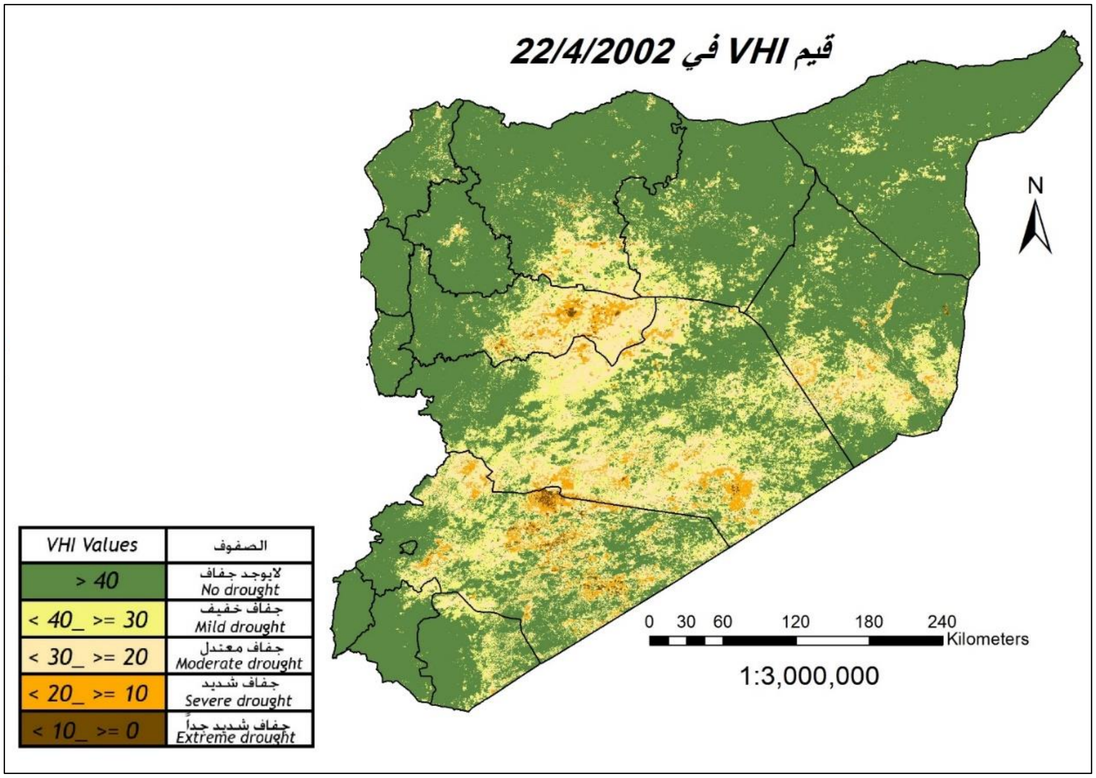
2- Classification of the satellite image represented by the VHI of the Syrian Arab Republic to 5 classes (the following table) according to a model designed by ERDAS imagen:

The number, values and characterization of the classes resulting from the spatial image classification of the VHI index

classes	**VHI Values**	**Discribtion**
1	>40	No Drought
2	<40_>=30	Mild Drought
3	<30_>=20	Moderate Drought
4	<20_>=10	Severe Drought
5	<10_>=0	Very Severe Drought

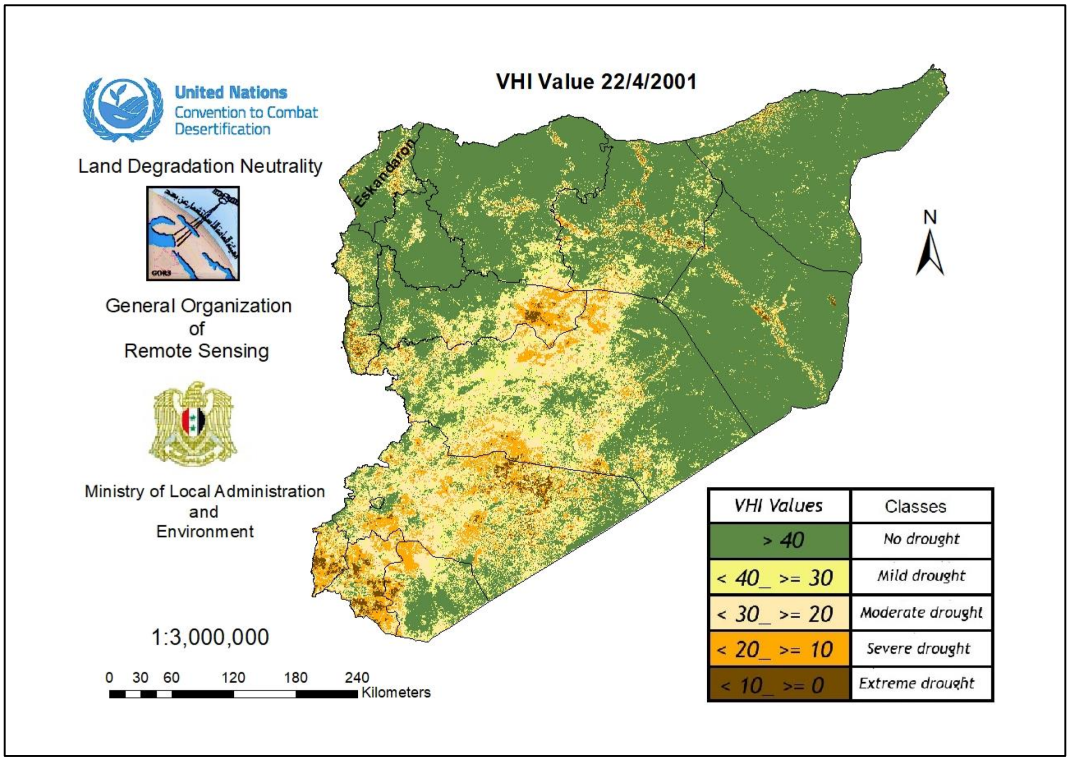
3- Production of the VHI index for Syria during the 2000-2015 time series at a rate of 16 days each, according to the above classification. As showen in Figure (5).

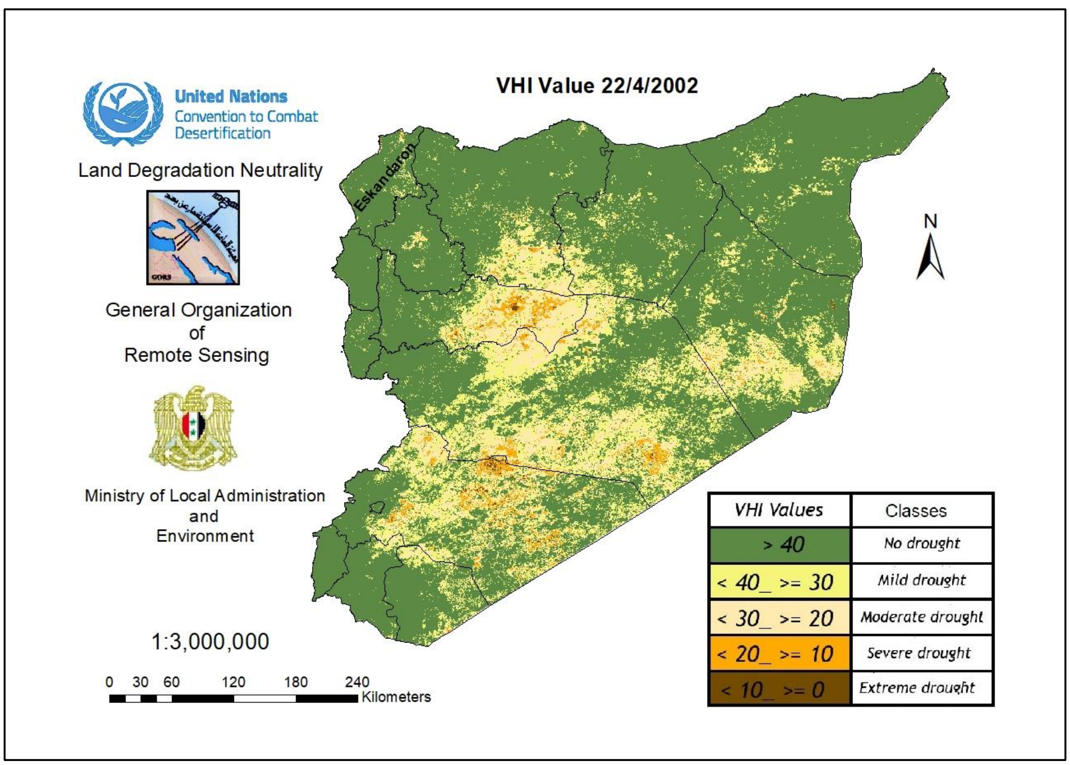
Figure 5: Satellite images classified into 5 classes represented by VHI index

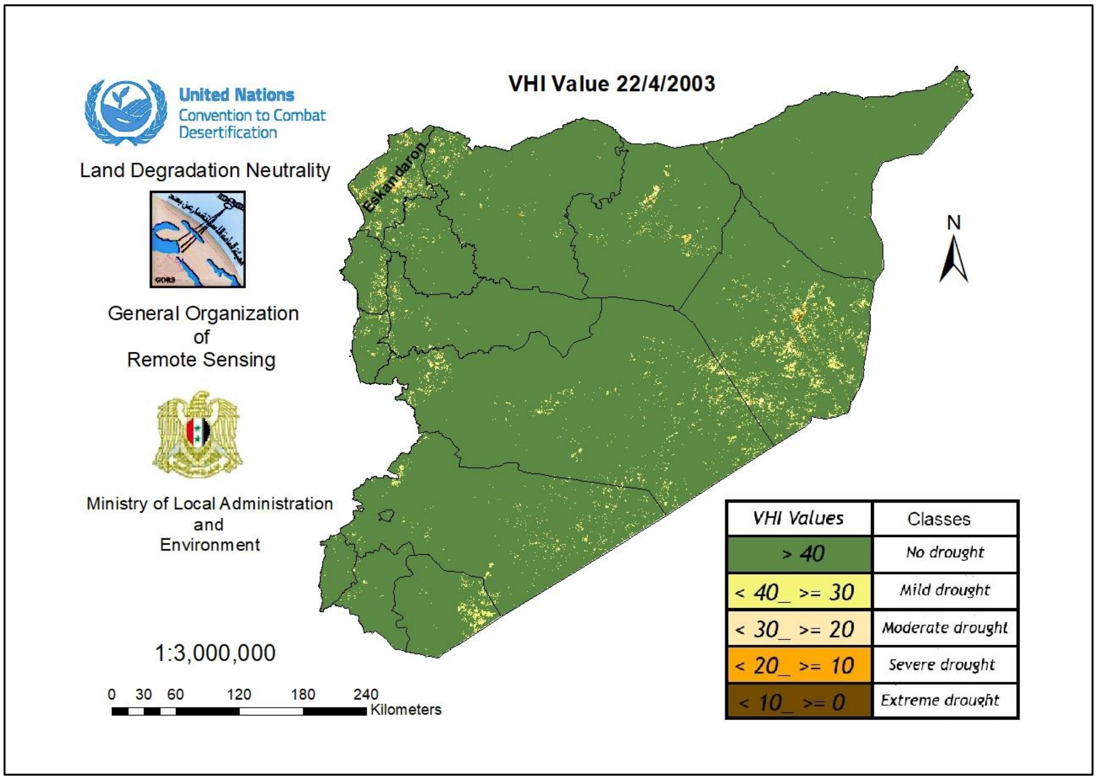


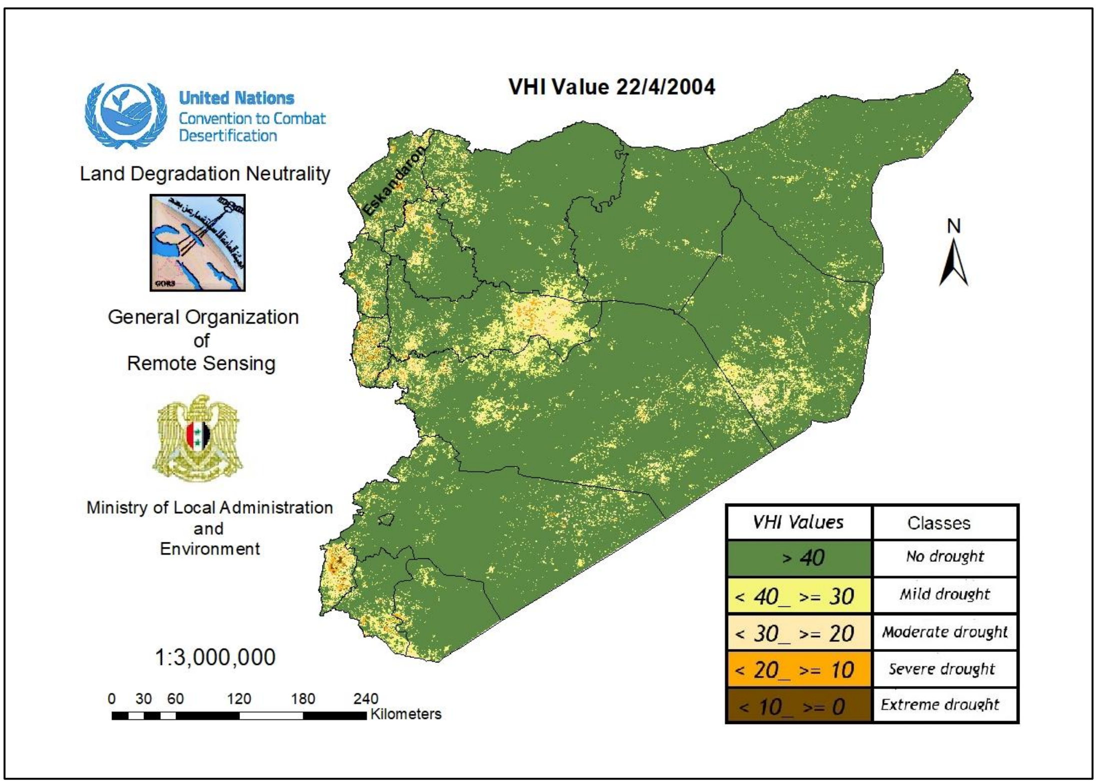
.Figure 6 shows the VHI maps of April 22, for the period 2000-2015

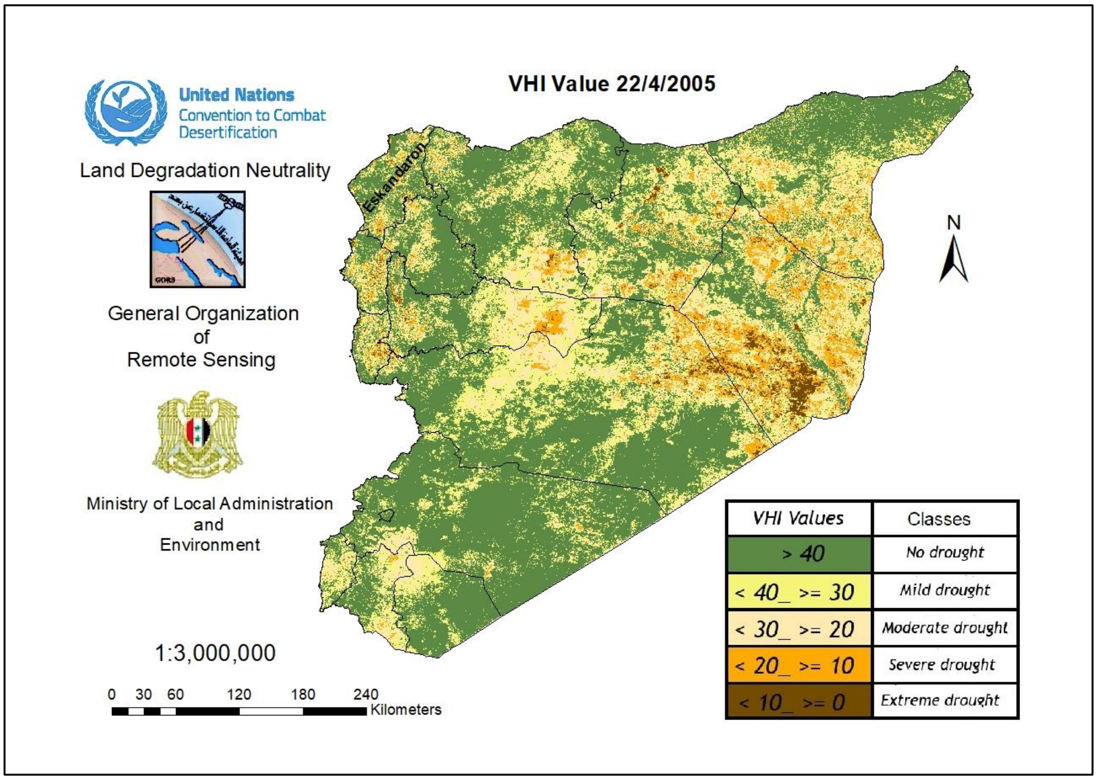
Figure 6: VHI index for 22 April for the period of 2000-2015






VHI Value 22/4/2003
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
N
VHI Values | Classes
> 40 | No drought
< 40_ >= 30 | Mild drought
< 30_ >= 20 | Moderate drought
< 20_ >= 10 | Severe drought
< 10_ >= 0 | Extreme drought


VHI Value 22/4/2004
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
N
VHI Values | Classes
> 40 | No drought
< 40_ >= 30 | Mild drought
< 30_ >= 20 | Moderate drought
< 20_ >= 10 | Severe drought
< 10_ >= 0 | Extreme drought


United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
VHI Value 22/4/2005
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
Classes
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Mild drought
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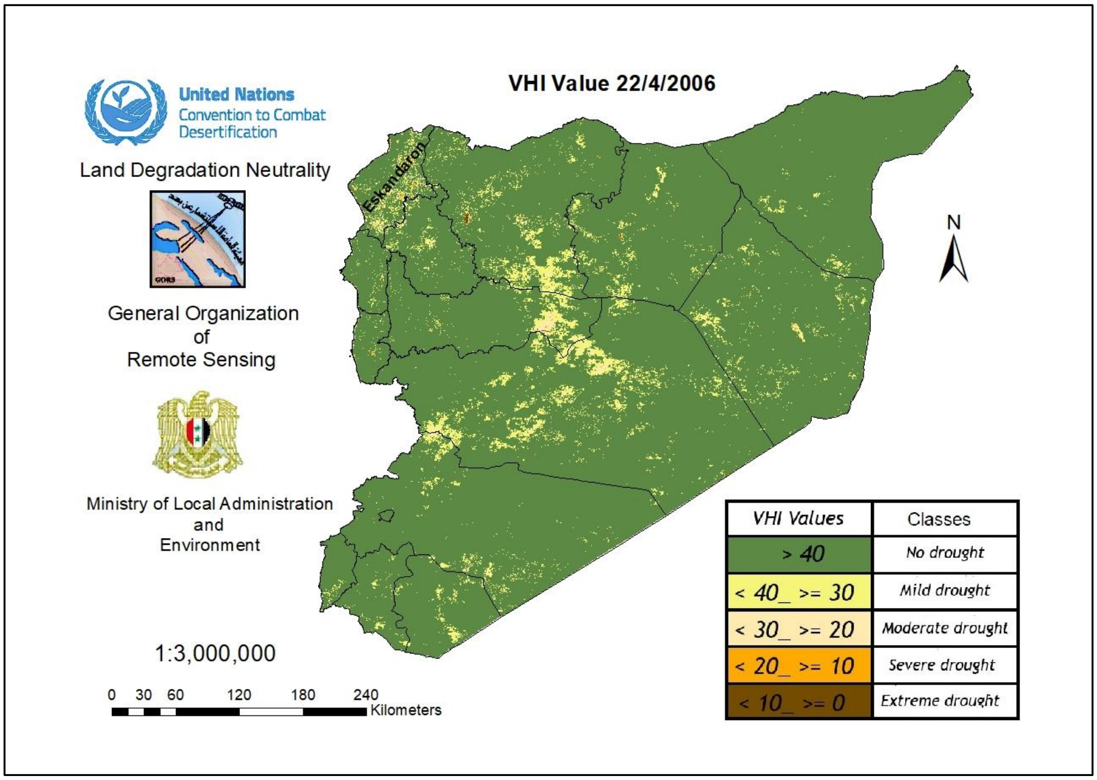
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought


United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
VHI Value 22/4/2006
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
Classes
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Mild drought
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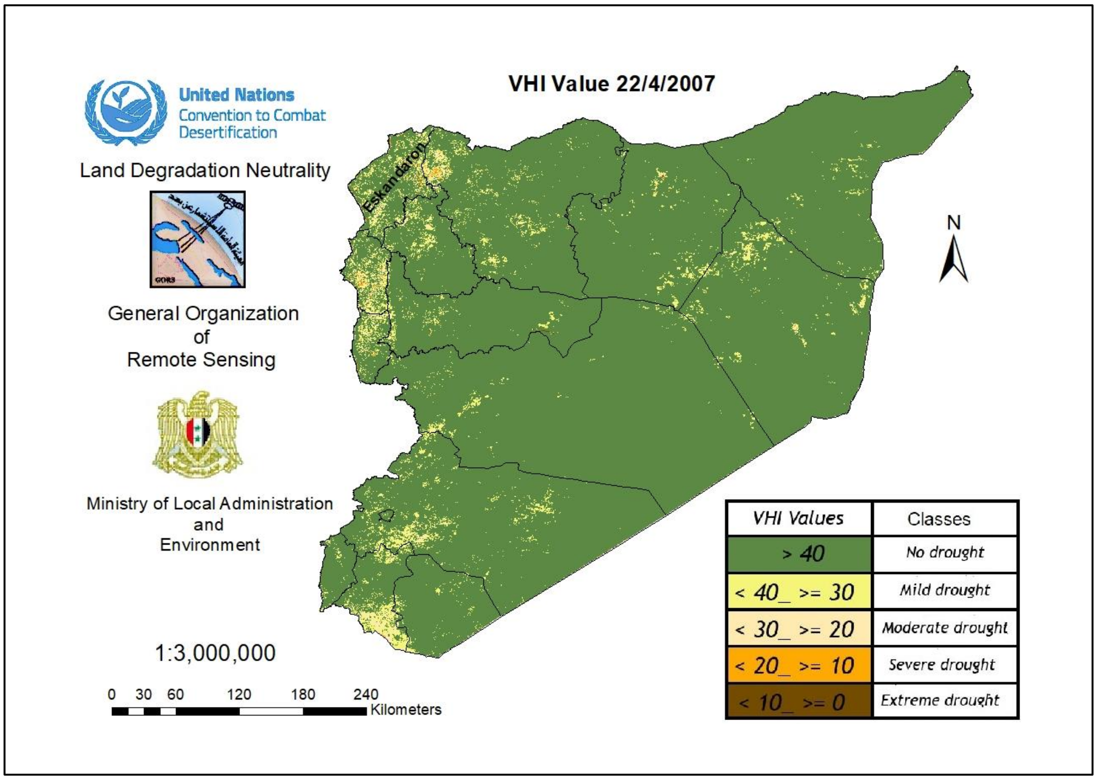
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought


VHI Value 22/4/2007
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
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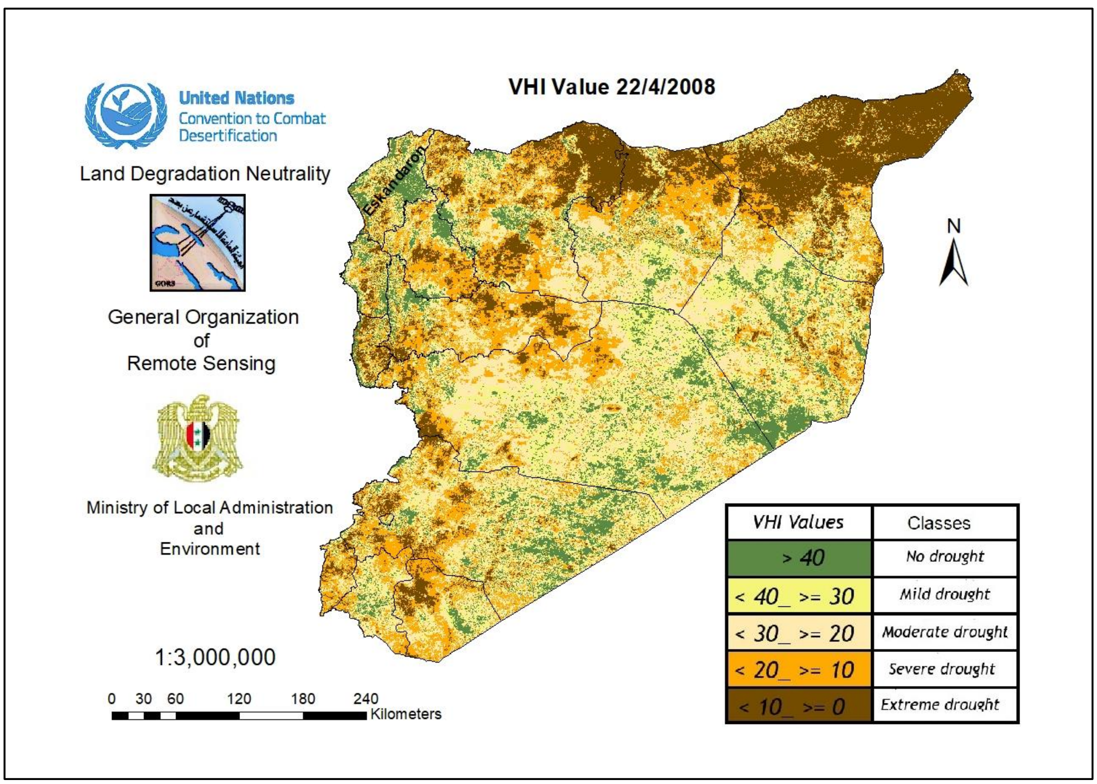
Mild drought
< 30_ >= 20
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought


VHI Value 22/4/2008
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
Eskandaron
N
1:3,000,000
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Kilometers
VHI Values
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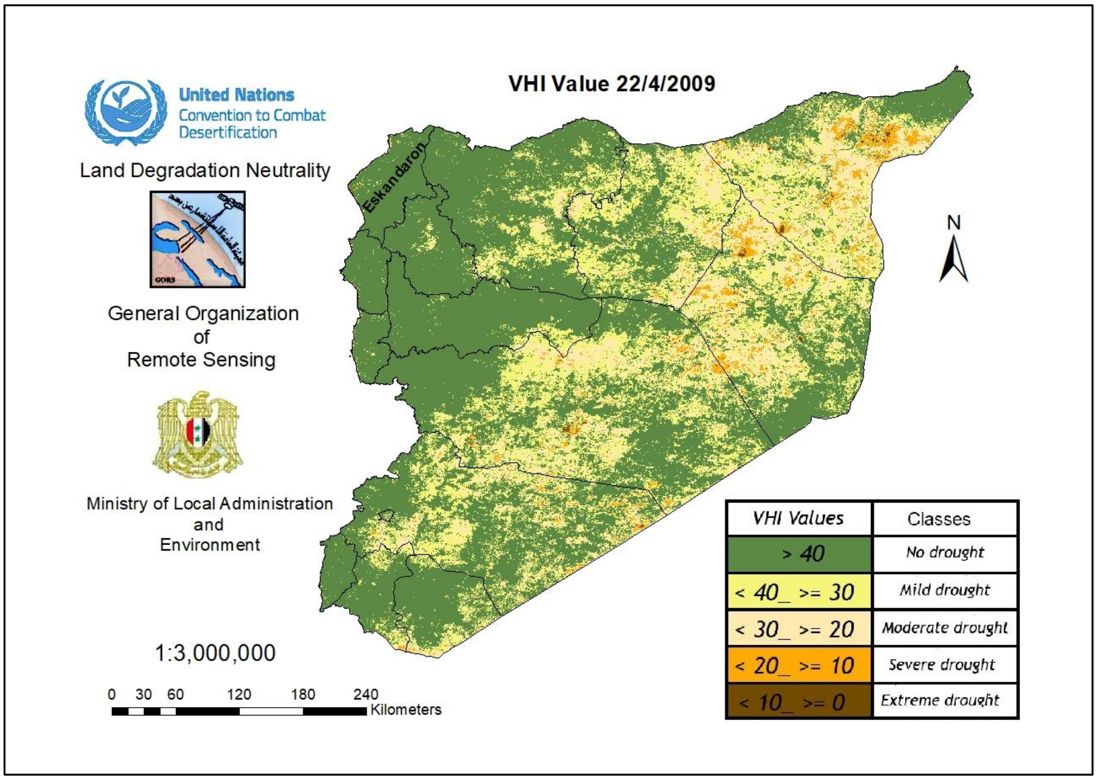
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought


United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
VHI Value 22/4/2009
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
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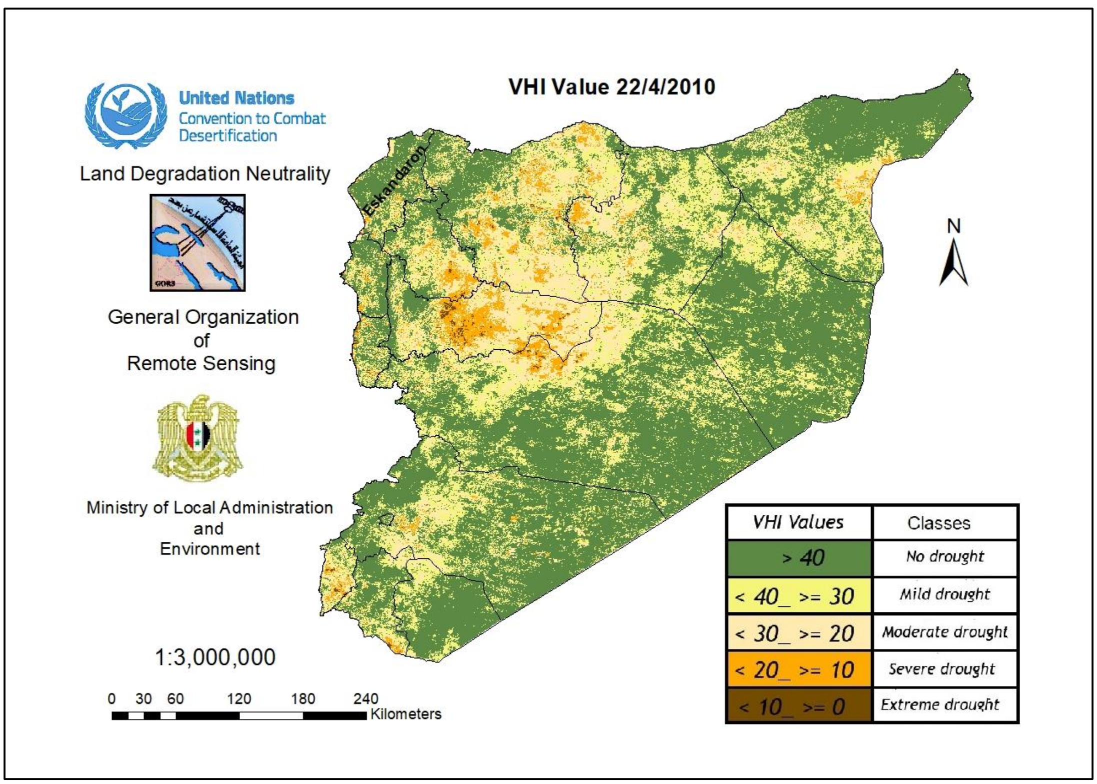
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought


United Nations
Convention to Combat Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
VHI Value 22/4/2010
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
Classes
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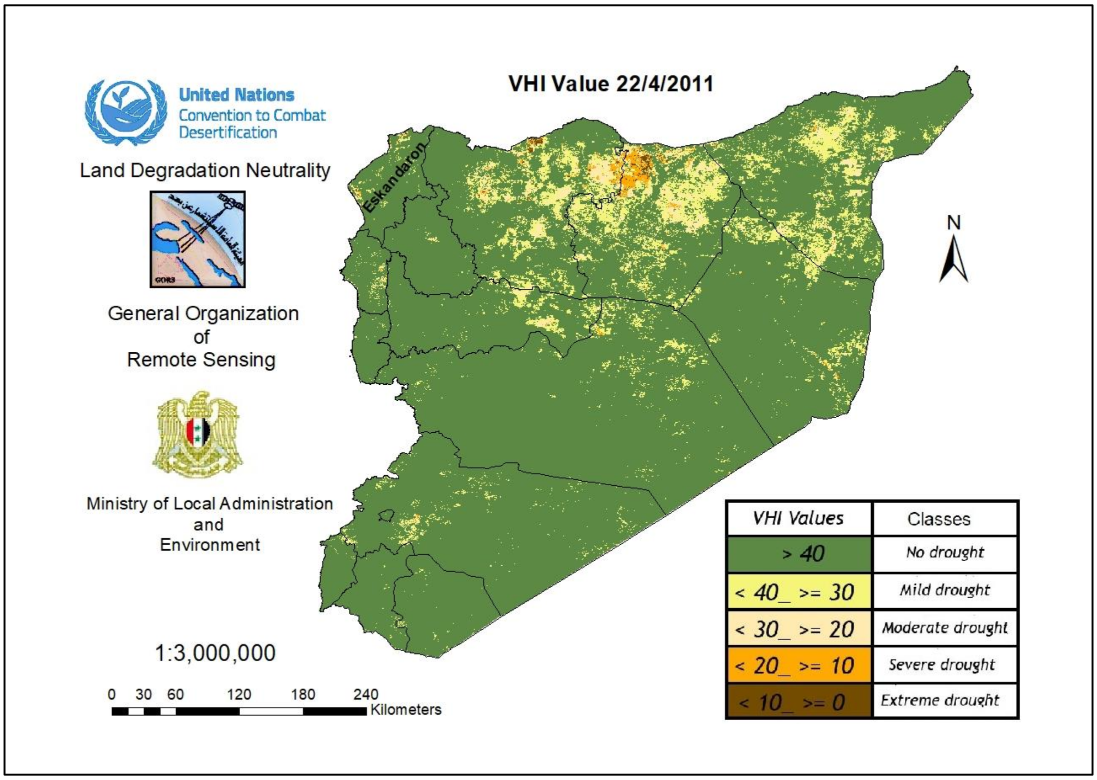
Mild drought
< 30_ >= 20
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought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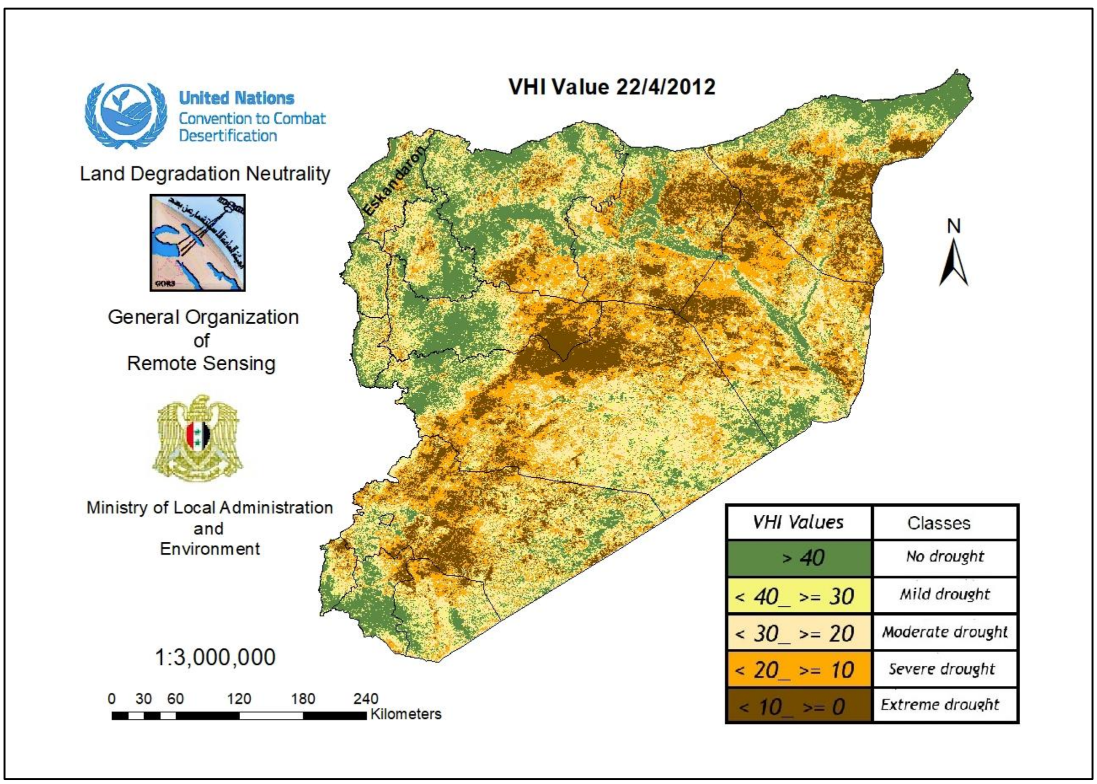
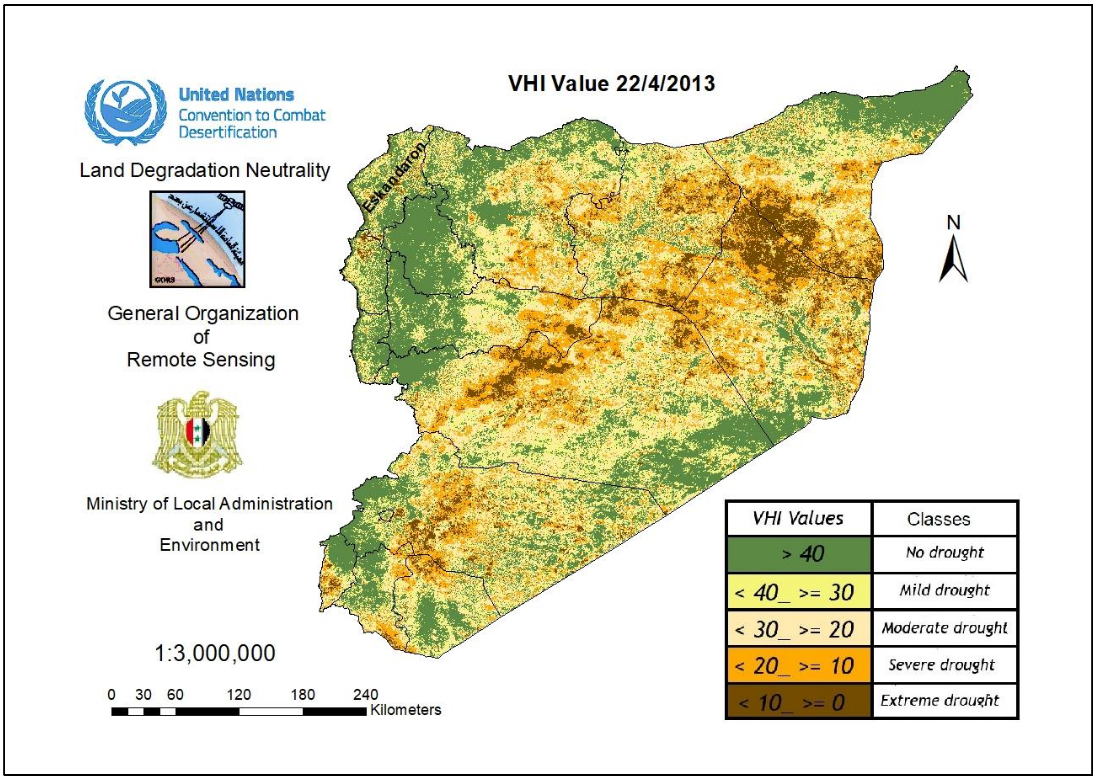
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
N
VHI Values | Classes
> 40 | No drought
< 40_ >= 30 | Mild drought
< 30_ >= 20 | Moderate drought
< 20_ >= 10 | Severe drought
< 10_ >= 0 | Extreme drought


VHI Value 22/4/2012
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
1:3,000,000
0 30 60 120 180 240
Kilometers
Eskandaron
N
VHI Values | Classes
> 40 | No drought
< 40_ >= 30 | Mild drought
< 30_ >= 20 | Moderate drought
< 20_ >= 10 | Severe drought
< 10_ >= 0 | Extreme drought


VHI Value 22/4/2013
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
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Environment
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Kilometers
Eskandaron
N
VHI Values
Classes
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Moderate drought
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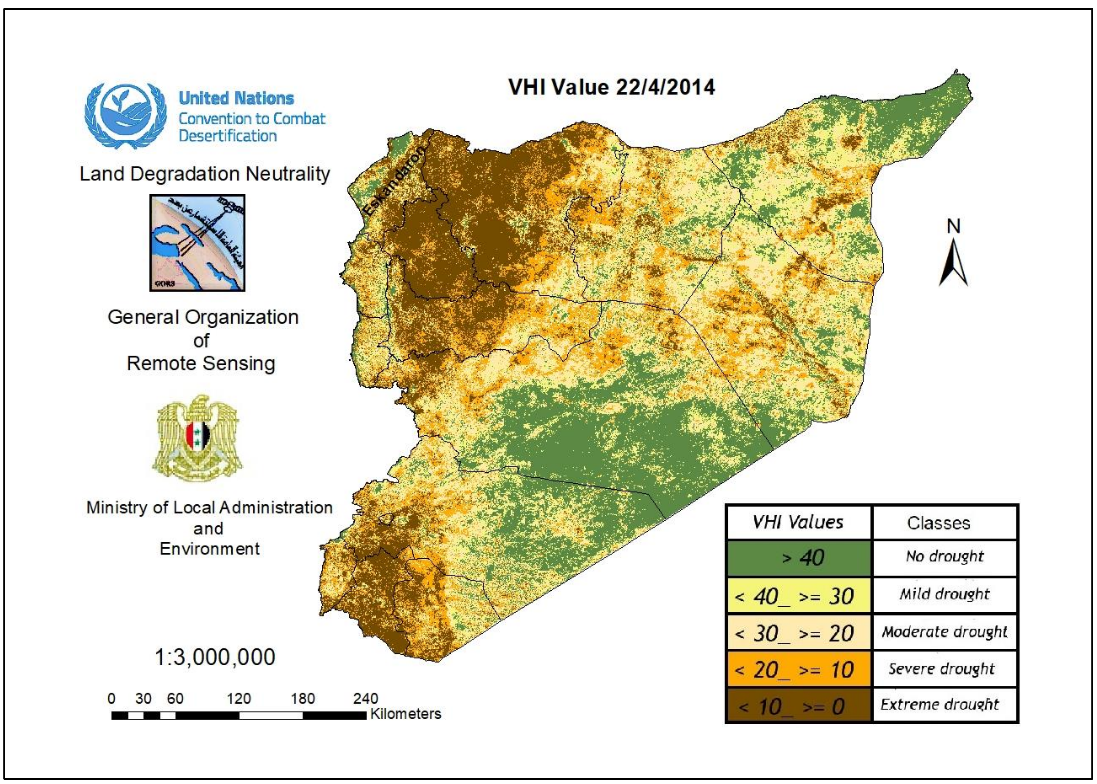
Severe drought
< 10_ >= 0
Extreme drought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and
Environment
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0 30 60 120 180 240
Kilometers
Eskandaron
N
VHI Values
Classes
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Mild drought
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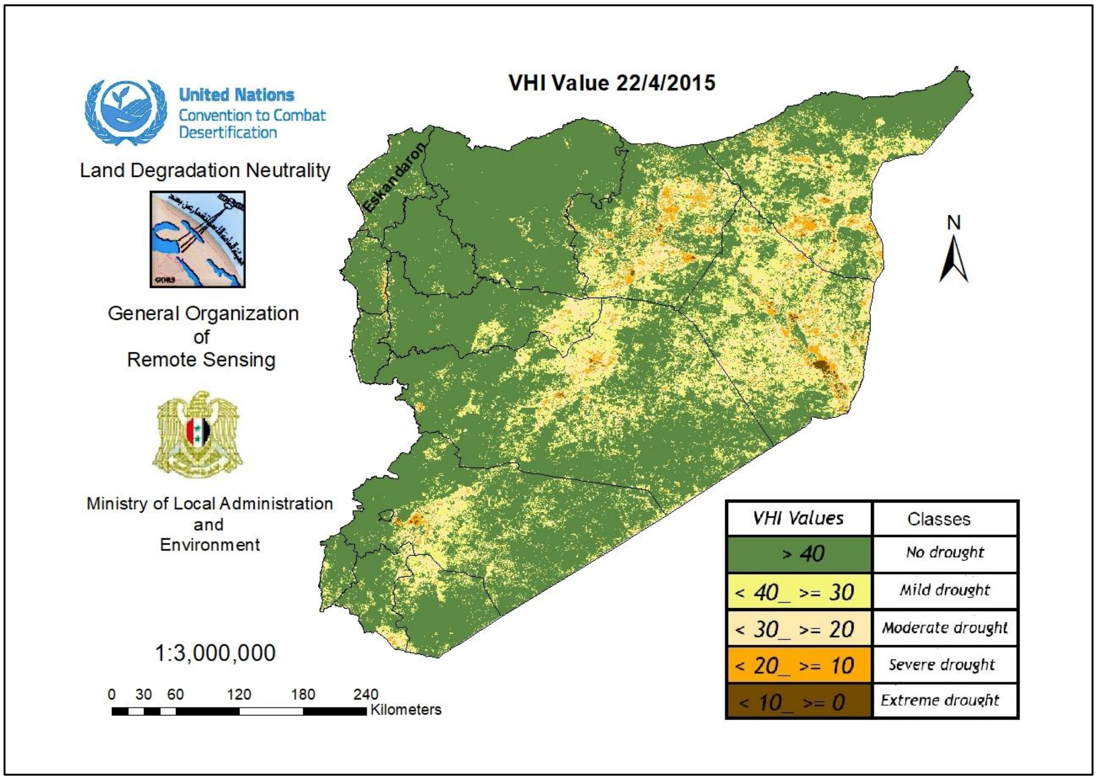
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought



VHI Value 22/4/2015
United Nations
Convention to Combat
Desertification
Land Degradation Neutrality
General Organization
of
Remote Sensing
Ministry of Local Administration
and
Environment
Eskandaron
N
1:3,000,000
0 30 60 120 180 240
Kilometers
VHI Values
Classes
> 40
No drought
< 40_ >= 30
Mild drought
< 30_ >= 20
Moderate drought
< 20_ >= 10
Severe drought
< 10_ >= 0
Extreme drought

Annex(3)

National Committees for

Land Degradation Neutralization Program

In the Syrian Arab Republic

قرار رقم /٩١٧/ و.م

وزير الإدارة المحلية والبيئة
بناء على أحكام القانون الأساسي للعاملين في الدولة رقم /50/ لعام 2004.
وعلى المرسوم رقم 203 تاريخ 2016/7/3.
وعلى أحكام القانون رقم /18/ لعام 2016.
وعلى أحكام قانون حماية البيئة رقم /12/ لعام 2012.
وعلى كتاب وزارة الخارجية والمغتربين رقم 2281 تاريخ 2016/3/7 القاضي بانضمام الجمهورية العربية السورية إلى برنامج تحييد تدهور الأراضي LDN.
وعلى كتب التسميات الواردة من الوزارات والجهات ذات العلاقة بناءً على كتبنا المرسلة إليهم لتسمية ممثليهم في اللجنة.
وعلى مقتضيات المصلحة العامة.

يقرر مايلي:

مادة 1– تشكل في وزارة الإدارة المحلية والبيئة لجنة برنامج إعداد أهداف تحييد آثار تدهور الأراضي LDN–TSP **على مستوى متخذي القرار** برئاسة السيد **المهندس محمد وضاح قطماوي معاون وزير الإدارة المحلية والبيئة لشؤون البيئة** وعضوية كل من السادة التالية أسماؤهم:

1. م. محمد أسامة الأخرس — معاون وزير الموارد المائية
2. د. ابراهيم خليل مصطفى — المدير العام للأرصاد الجوية
3. د. هيثم منيني — المدير العام للهيئة العامة للاستشعار عن بعد
4. السيد فضل الله غرز الدين — معاون رئيس هيئة التخطيط والتعاون الدولي
5. السيدة رغدة أحمد — رئيس اللجنة المؤقتة للاتحاد العام النسائي
6. السيد منهل هناوي — مدير الموازنة العامة – وزارة المالية
7. د. احمد نزار الوادي — مدير التخطيط والإحصاء والبحوث – وزارة المالية
8. م. بلال الحايك — مدير التنوع الحيوي والأراضي والمحميات– وزارة الإدارة المحلية والبيئة

9. م. صونيا عفيصة — مدير التعاون الدولي– وزارة الإدارة المحلية والبيئة
10. م. خالد الخضر — مدير النظم والمخططات– وزارة الإدارة المحلية والبيئة
11. م. عبد الكريم ساميز — مدير شؤون الطاقة والبيئة–وزارة النفط والثروة المعدنية
12. م. أدهم أبو خير — مدير المرصد الإقليمي– هيئة التخطيط الإقليمي
13. م. سوزان بشير — مدير التخطيط السياحي– وزارة السياحة
14. م. وجيه خوري — مدير الحراج– وزارة الزراعة والإصلاح الزراعي
15. د. عمر دودكي — مدير الأراضي والمياه– وزارة الزراعة والإصلاح الزراعي
16. م. محمد البحري — مدير صندوق التخفيف من آثار الجفاف والكوارث– وزارة الزراعة والإصلاح الزراعي
17. م. ماهر محمود — الهيئة العامة لإدارة وتنمية وحماية البادية– وزارة الزراعة والإصلاح الزراعي
18. د. صموئيل رزق — المدير القطري لبرنامج الأمم المتحدة الإنمائي UNDP
19. السيد محمد حمود الخليف — عضو المكتب التنفيذي للاتحاد العام للفلاحين
20. م. رضوان درويش — مدير التنمية العمرانية– وزارة الأشغال العامة والإسكان
21. السيدة سولينا حمادة — عضو قيادة اتحاد شبيبة الثورة
22. ممثل الهيئة العامة للبحوث العلمية الزراعية
23. م. عبد الرحيم لولو — خبير التصحر ودراسات الأراضي– المركز العربي لدراسات المناطق الجافة/ أكساد
24. د. حسن حبيب — مدير البحث العلمي– وزارة التعليم العالي
25. ممثل منظمة الأغذية والزراعة للأمم المتحدة/ FAO
26. كريستين كلارينس — مسؤولة برامج دولية – برنامج الغذاء العالمي/ WFP
27. ممثل منظمة الصحة العالمية/ WHO
28. م. عماد المرعي — معاون مدير التنوع الحيوي والأراضي والمحميات– وزارة الإدارة المحلية والبيئة
29. م. كوثر عيسى — رئيس دائرة الأراضي– وزارة الإدارة المحلية والبيئة
30. م. ميادة سعد — رئيس دائرة التنوع الحيوي والمحميات– وزارة الإدارة المحلية والبيئة

مادة 2- مهمة اللجنة:

1. تحديد أنواع واتجاهات والأسباب المباشرة والغير مباشرة لتدهور الأراضي في سورية.
2. وضع البرنامج الوطني الخاص بتحقيق أهداف تحييد آثار تدهور الأراضي LDN في سورية.
3. الإشراف على إدماج البرنامج الوطني لتحييد آثار تدهور الأراضي في الخطط الوطنية للوزارات والجهات ذات العلاقة في سورية.
4. الإشراف على إدماج برنامج تحييد آثار تدهور الأراضي في نماذج التخطيط الوطني لاستخدامات الأراضي في سورية.
5. وضع الإطار القانوني والمؤسساتي المتعلق بتنفيذ برنامج تحييد آثار تدهور الأراضي في سورية.

مادة 3- يتقاضى أعضاء اللجنة تعويضاً مالياً بقرار من الوزير.

مادة 4- تستعين اللجنة بمن تراه مناسباً لتنفيذ العمل.

مادة 5- ينهى العمل بالقرار رقم 17/ق تاريخ 2017/1/2.

مادة 6- يبلغ هذا القرار من يلزم لتنفيذه.

٢/٤/ ١٧ -٢٠

وزير الإدارة المحلية والبيئة

المهندس حسين مخلوف

صورة إلى:

- م. مكتب السيد الوزير
- م. مكتب السيد معاون الوزير
- م. التنوع الحيوي والأراضي والمحميات
- أعضاء اللجنة عن طريق مؤسساتهم ومنظماتهم
- الأرشيف

Syrian Arab Republic
Ministry of Local Administration & Environment

الجمهورية العربية السورية
وزارة الإدارة المحلية والبيئة

قرار رقم /١١٣٦/ و.ح

وزير الإدارة المحلية والبيئة

بناء على أحكام القانون الأساسي للعاملين في الدولة رقم /٥٠/ لعام ٢٠٠٤.

وعلى المرسوم رقم ٢٠٣ تاريخ ٢٠١٦/٧/٣.

وعلى أحكام القانون رقم /١٨/ لعام ٢٠١٦.

وعلى أحكام قانون حماية البيئة رقم /١٢/ لعام ٢٠١٢.

وعلى كتاب وزارة الخارجية والمغتربين رقم ٢٢٨١ تاريخ ٢٠١٦/٣/٧ القاضي بانضمام الجمهورية العربية السورية إلى برنامج تحييد تدهور الأراضي LDN.

وعلى كتب التسميات الواردة من الوزارات والجهات ذات العلاقة بناءً على كتبنا المرسلة إليهم لتسمية ممثليهم في اللجنة.

وعلى مقتضيات المصلحة العامة.

يقرر مايلي:

مادة ١– تشكل في وزارة الإدارة المحلية والبيئة لجنة برنامج إعداد أهداف تحييد آثار تدهور الأراضي LDN-TSP على مستوى منفذي القرار برئاسة السيد **المهندس محمد وضاح قطماوي معاون وزير الإدارة المحلية والبيئة لشؤون البيئة** وعضوية كل من السادة التالية أسماؤهم:

١.	م. بلال الحايك	مدير التنوع الحيوي والأراضي والمحميات – وزارة الإدارة المحلية والبيئة
٢.	م. صونيا عفيصة	مدير التعاون الدولي– وزارة الإدارة المحلية والبيئة
٣.	م. زياد بدور	مدير مديرية شؤون البيئة– وزارة الإدارة المحلية والبيئة
٤.	د. باسل كمال الدين	معاون مدير هيئة الموارد المائية– وزارة الموارد المائية
٥.	م. خالد الخضر	مدير النظم والمخططات– وزارة الإدارة المحلية والبيئة
٦.	م. عبد الرحيم لولو	خبير التصحر ودراسات الأراضي– المركز العربي لدراسات المناطق الجافة / أكساد
٧.	م. عبد الكريم ساميز	مدير شؤون الطاقة والبيئة–وزارة النفط والثروة المعدنية
٨.	م. ظلال رحيمة	مديرة التنمية المحلية– هيئة التخطيط والتعاون الدولي
٩.	السيدة سولينا حمادة	عضو قيادة اتحاد شبيبة الثورة

Syria- Damascus, Yousef AzmehSeq - P.O.Box: 3773 - Tel: +963 11 2318682/3Fax: +963 11 2312120

١٠. م. ماجد حمّاد — مديرية الأراضي والمياه- وزارة الزراعة الإصلاح الزراعي
١١. م. سامر بريغلة — الهيئة العامة للبحوث العلمية الزراعية
١٢. م. جلال حمود — مدير مكتب الشؤون الزراعية- الاتحاد العام للفلاحين
١٣. م. كريم ديوب — الهيئة العامة لإدارة وتنمية وحماية البادية
١٤. م. عمر زريق — مديرية الحراج- وزارة الزراعة والإصلاح الزراعي
١٥. د. حيان سفور — رئيس فريق إعداد تأهيل البنى التحتية- برنامج الأمم المتحدة الإنمائي UNDP
١٦. م. هلا سفر — مديرية الخطط الإقليمية- هيئة التخطيط الإقليمي
١٧. م. بارعة عبيد — رئيس دائرة المسح السياحي
١٨. م. نوهة مصطفى — وزارة الأشغال العامة والإسكان
١٩. م. محمد أنس القاضي — رئيس دائرة الأبحاث الزراعية- المديرية العامة للأرصاد الجوية
٢٠. د. أحمد ياغي — رئيس قسم الدراسات والبحوث البيئية-الهيئة العامة للاستشعار عن بعد
٢١. م. قيس زرقا — رئيس قسم إدارة الجفاف- وزارة الزراعة والإصلاح الزراعي
٢٢. السيدة لوريس يوسف — الاتحاد العام النسائي
٢٣. د. محمود عسكر — وزارة التعليم العالي
٢٤. د. هيثم الأشقر — مسؤول برامج محلي- ممثل برنامج الغذاء العالمي/ WFP
٢٥. ممثل منظمة الصحة العالمية/ WHO
٢٦. ممثل منظمة الأغذية والزراعة للأمم المتحدة/ FAO
٢٧. م. إبراهيم العلان — مدير سلامة الغلاف الجوي- وزارة الإدارة المحلية والبيئة
٢٨. م. رويدة نهار — مدير الطاقات المتجددة والإنتاج الانظف - وزارة الإدارة المحلية والبيئة
٢٩. ك. ناظم الثلاج — مدير السلامة الكيميائية - وزارة الإدارة المحلية والبيئة
٣٠. ك. رونق جبور — مدير المخابر المركزية- وزارة الإدارة المحلية والبيئة
٣١. م. أديب المصري — المنسق الوطني لاتفاقية استكهولم بشأن المركبات العضوية الثابتة POPs
٣٢. م. يارا حزوري — المنسق الوطني للاتفاقية الإطارية لتغير المناخ UNCCCF
٣٣. م. عماد المرعي — معاون مدير التنوع الحيوي والأراضي والمحميات- وزارة الإدارة المحلية والبيئة

٣٤. م. ميادة أحمد	معاون مدير النظم والمخططات- وزارة الإدارة المحلية والبيئة
٣٥. م. كوثر عيسى	رئيس دائرة الأراضي- وزارة الإدارة المحلية والبيئة
٣٦. م. ميادة سعد	رئيس دائرة التنوع الحيوي والمحميات- وزارة الإدارة المحلية والبيئة
٣٧. م. لمياء حسامو	مديرية التنوع الحيوي والأراضي والمحميات- وزارة الإدارة المحلية والبيئة
٣٨. م. بديعة صفية	مديرية التنوع الحيوي والأراضي والمحميات- وزارة الإدارة المحلية والبيئة
٣٩. م. رنا جبيل	مديرية التنوع الحيوي والأراضي والمحميات- وزارة الإدارة المحلية والبيئة
٤٠. م. ماهر النجار	مديرية التنوع الحيوي والأراضي والمحميات- وزارة الإدارة المحلية والبيئة

مادة ٢- مهمة اللجنة:

١. المشاركة في تحديد أنواع واتجاهات والأسباب المباشرة وغير المباشرة لتدهور الأراضي في سورية.
٢. المشاركة في وضع البرنامج الوطني الخاص بتحقيق أهداف تحييد آثار تدهور الأراضي LDN في سورية.
٣. دعم إدماج البرنامج الوطني لتحييد آثار تدهور الأراضي في الخطط الوطنية للوزارات والجهات ذات العلاقة في سورية.
٤. دعم إدماج برنامج تحييد آثار تدهور الأراضي في نماذج التخطيط الوطني لاستخدامات الأراضي في سورية.
٥. المشاركة بتحديد الإطار القانوني والمؤسساتي المتعلق بتنفيذ برنامج تحييد آثار تدهور الأراضي في سورية.

مادة ٣- يتقاضى أعضاء اللجنة تعويضاً مالياً بقرار من الوزير.

مادة ٤- تستعين اللجنة بمن تراه مناسباً لتنفيذ العمل.

مادة ٥- ينهى العمل بالقرار رقم ١٦٤٦/ق تاريخ ٢٢/١١/٢٠١٦.

مادة ٦- يبلغ هذا القرار من يلزم لتنفيذه.

٢٠١٧/٤/٢٧

وزير الإدارة المحلية والبيئة

المهندس حسين مخلوف

صورة إلى:

- م. مكتب السيد الوزير
- م. مكتب السيد معاون الوزير
- م. التنوع الحيوي والأراضي والمحميات
- أعضاء اللجنة عن طريق مؤسساتهم ومنظماتهم
- الأرشيف

ANNEX No(4)

Technical Teams

To calculate indicators of

Land degradation Neutrality Program

in Syrian Arab Republic

Technical committees to neutralize the effects of land degradation in the Syrian Arab Republic:

First: Technical Team of Land Cover and land cover changes Index:

Dr Ahmad Yaghi / General Organization of remote sensing	Dr Hussein Dabbit / General Organization of remote sensing
Dr Eyad Al khaled / General Organization of remote sensing	Dr Ghadeer Hmeidan / General Organization of remote sensing
Dr Geith Doon / General Organization of remote sensing	Eng Aesha Yazbek / General Organization of remote sensing
Eng Arwa Rassoq / General Organization of remote sensing	Eng Enas Ahmad / General Organization of remote sensing
Eng Reem Rayes / General Organization of remote sensing	Eng Tamem Hasan / General Organization of remote sensing
Eng Ruba Saleh / General Organization of remote sensing	Eng Safa Salti / General Organization of remote sensing

Second: Technical Team of land productivity index and the of land productivity dynamics:

Dr Eyad Al khaled / General Organization of remote sensing	Dr Ahmad Yaghi / General Organization of remote sensing
Eng Abdul Raheem Lolo / ACSAD	Eng Basem Qatalan / ACSAD
Eng Ghoson Mhamad / General Organization of remote sensing	Eng Razan Ahmad / General Organization of remote sensing

Third: Technical Team of Drought Index:

Dr Eyad Al khaled / General Organization of remote sensing	Dr Ahmad Yaghi / General Organization of remote sensing
Eng Ghoson Mhamad / General Organization of remote sensing	Eng Razan Ahmad / General Organization of remote sensing