Deriving the Relationship between NDVI value of NOAA images and biomass; dry mass; and range land capacity in eastern region of Syria

1st stage

Monitoring changes in vegetation cover over Syrian Arab Republic using NDVI index based on NOOA satellite Images

Introduction and Definition

Monitoring the bio mass of vegetation could be done by Measuring the reflected electromagnetic spectrum which is formed by reaction between vegetation cover and radiance incident on it .

So, we need tow channels to get the value of NDVI

- Red chanel 0.6-0.7 micro meter
- Infrared channel 0.7-1.3 micro meter

because of strong relationship between red channel and vegetation chlorophyll absorption .

All research ensured that the chlorophyll assumption for vegetation is maximum in red channel, the absorption is maximum and the reflectance is minimum. so, the vegetation mass is bigger, but for Infrared channel the case is vice versa.

Remote Sensing studies monitor vegetation cover and the changes Depending on this properties of chlorophyll and electromagnetic spectrum using satellite images.

So, there are a lot of indices for monitoring vegetation cover changes for example :

NDVI consider as the most important index for vegetation studies.

The NDVI shows the bio mass of vegetation and will calculated by this formula :

NDVI=(NIR – R) \ (NIR + R)

Where:

NIR the value of digital number in NIR channel.

R the value of digital number in red channel.

The value of NDVI changes from -1 to +1 :

- When the vegetation cover is more dense the absorption of radiation in red channel is more and the reflectance is low so, the value of NDVI will be close to +1 .
- When the vegetation cover is degraded and the bare soil will appear the absorption in red channel is low and the reflectance is high so, the value of NDVI will be close to -1 .

So, when NDVI value is less the vegetation cover is degraded .

The formula of calculating the NDVI value changes from one satellite to another

For example in Landsat-TM the formula is :

NDVI=(TM4 – TM3) \ (TM4 + TM3)

Monitoring the changes in NDVI over Syria using monthly NOOA satellite images received by GORS Meteorological satellite receiving station.

Working steps :

1-images georeferncing :

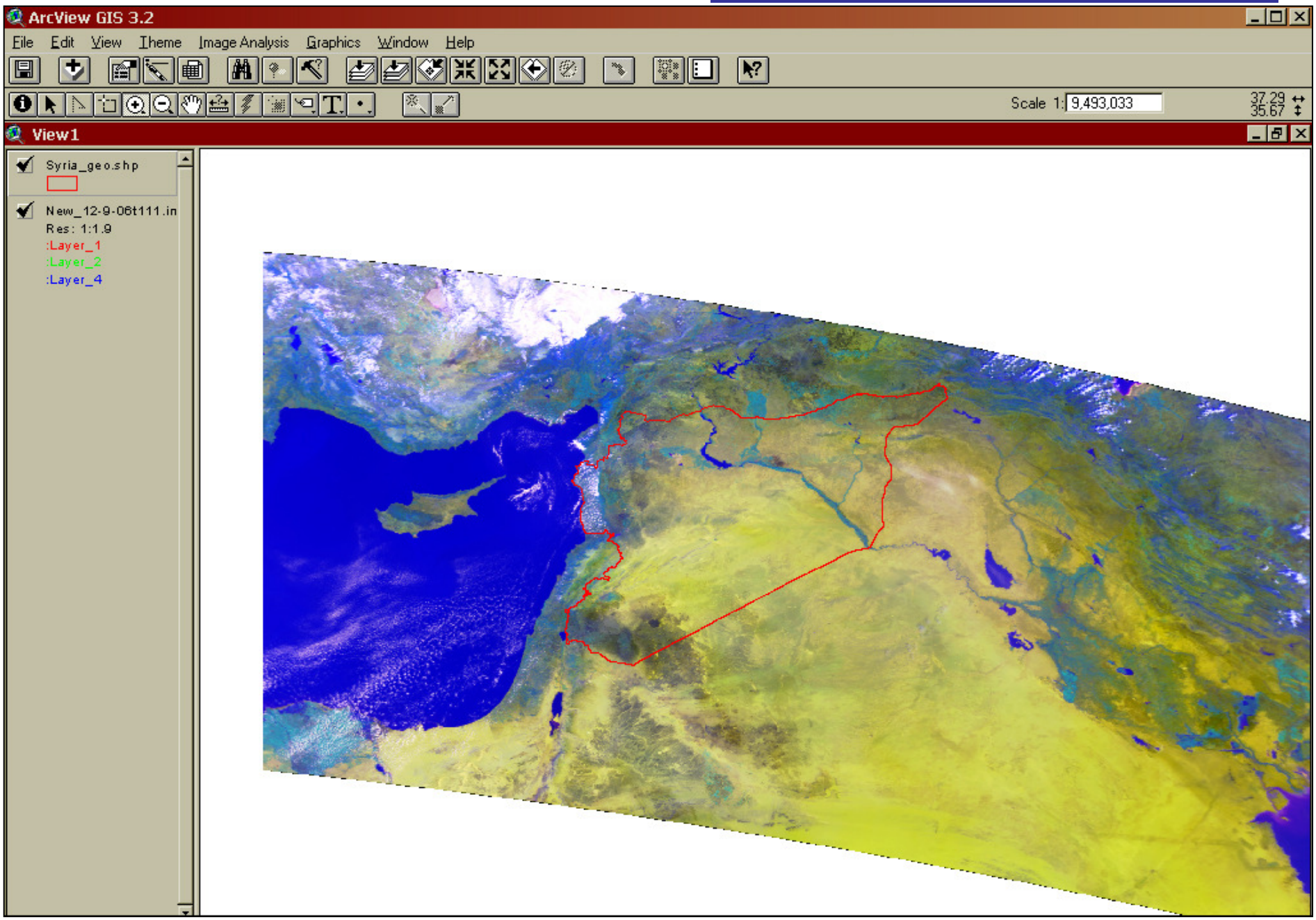
All received images have wgs72 projection but it has a distortion. taking in consideration the comparison process needs the coincidence in images so, all images georeferenced on mosaic topographic map with 1/250000 scale.

2- subset image to the Syrian border extent :

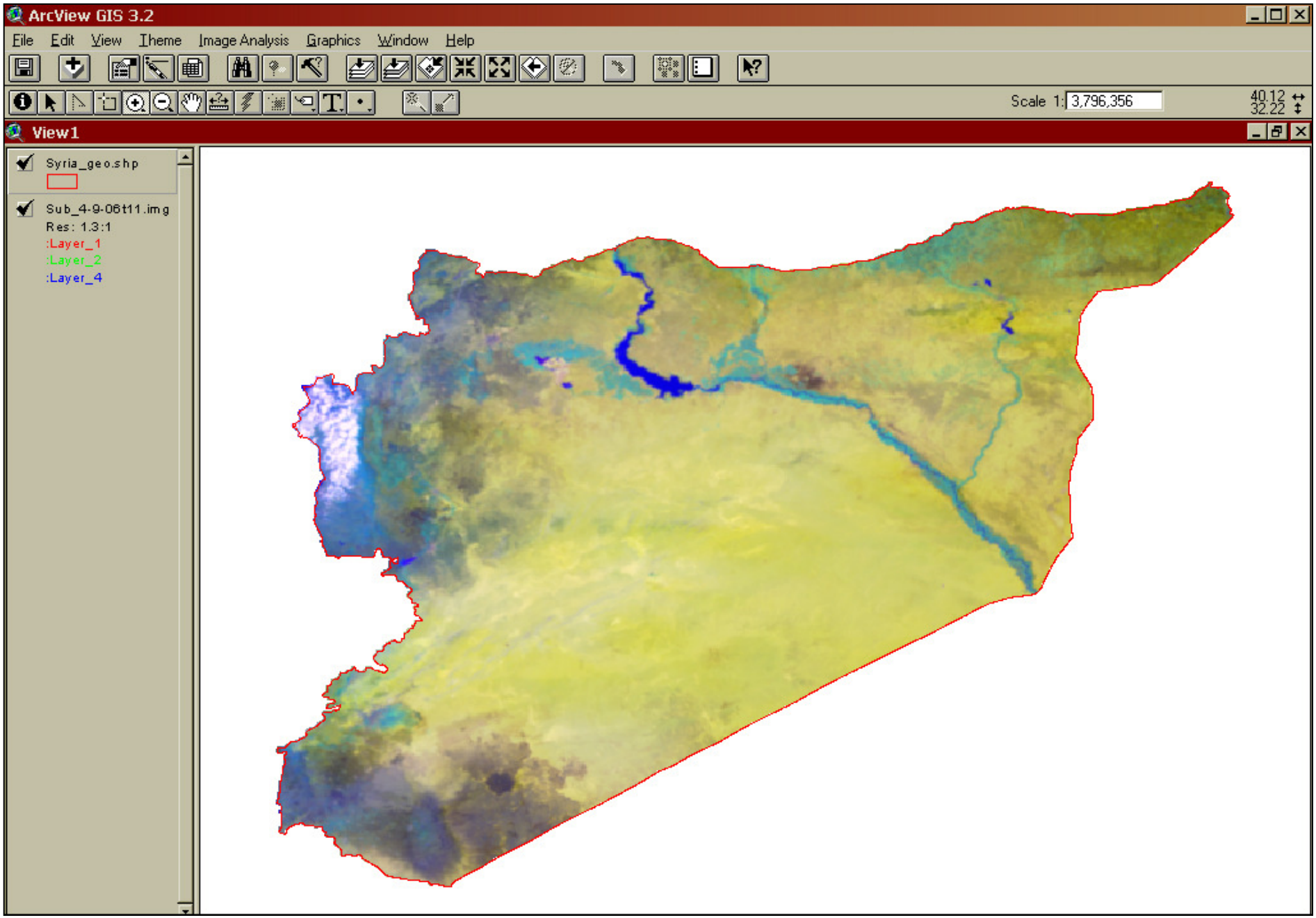
The coverage area of the images exceeds Syrian border to cover Iraq and another countries.

So, all images clipped on Syrian administrative borders. For making the calculation of areas more easier .

Scene from NOOA satellite



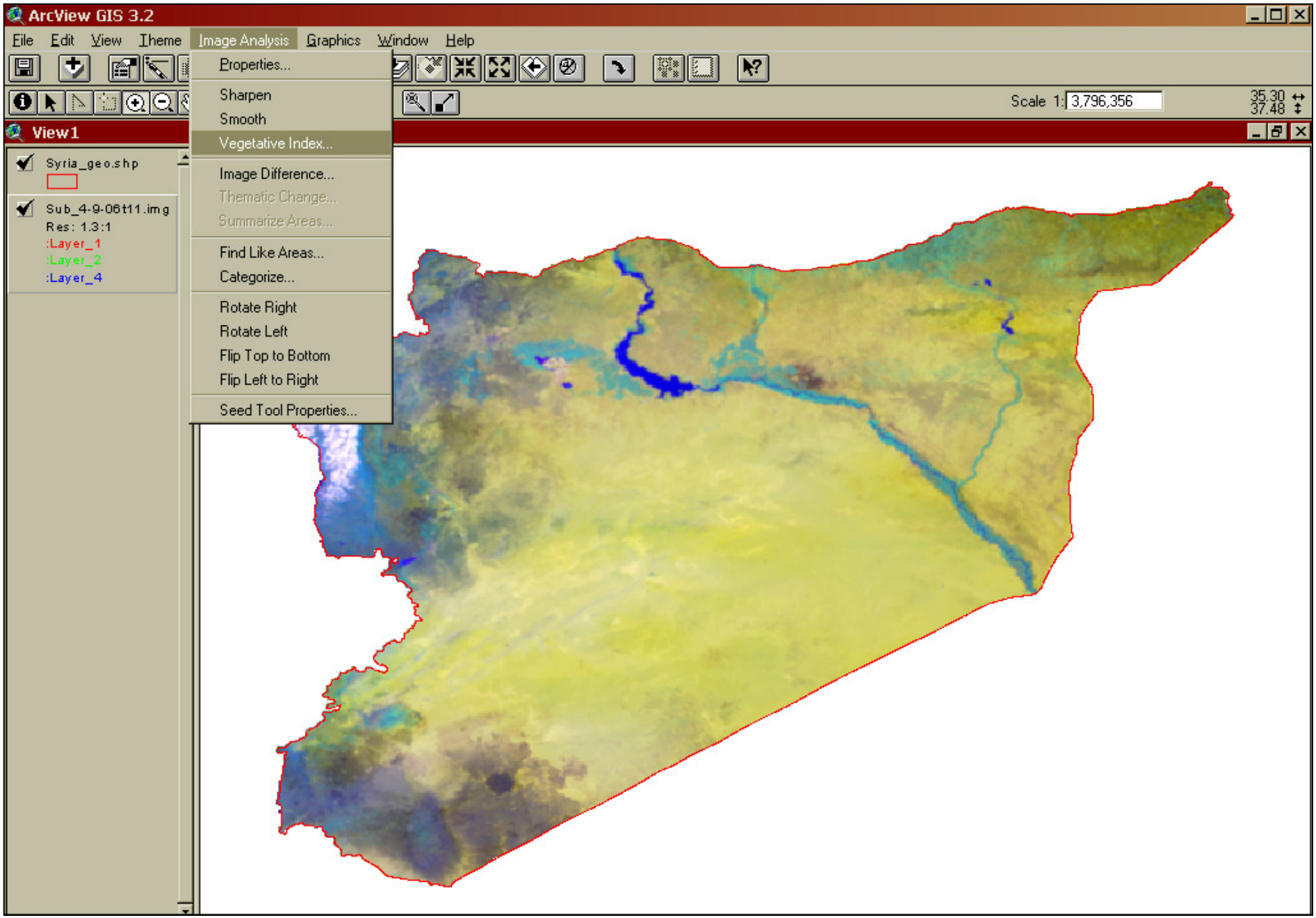
sat image after clipping with Syrian border



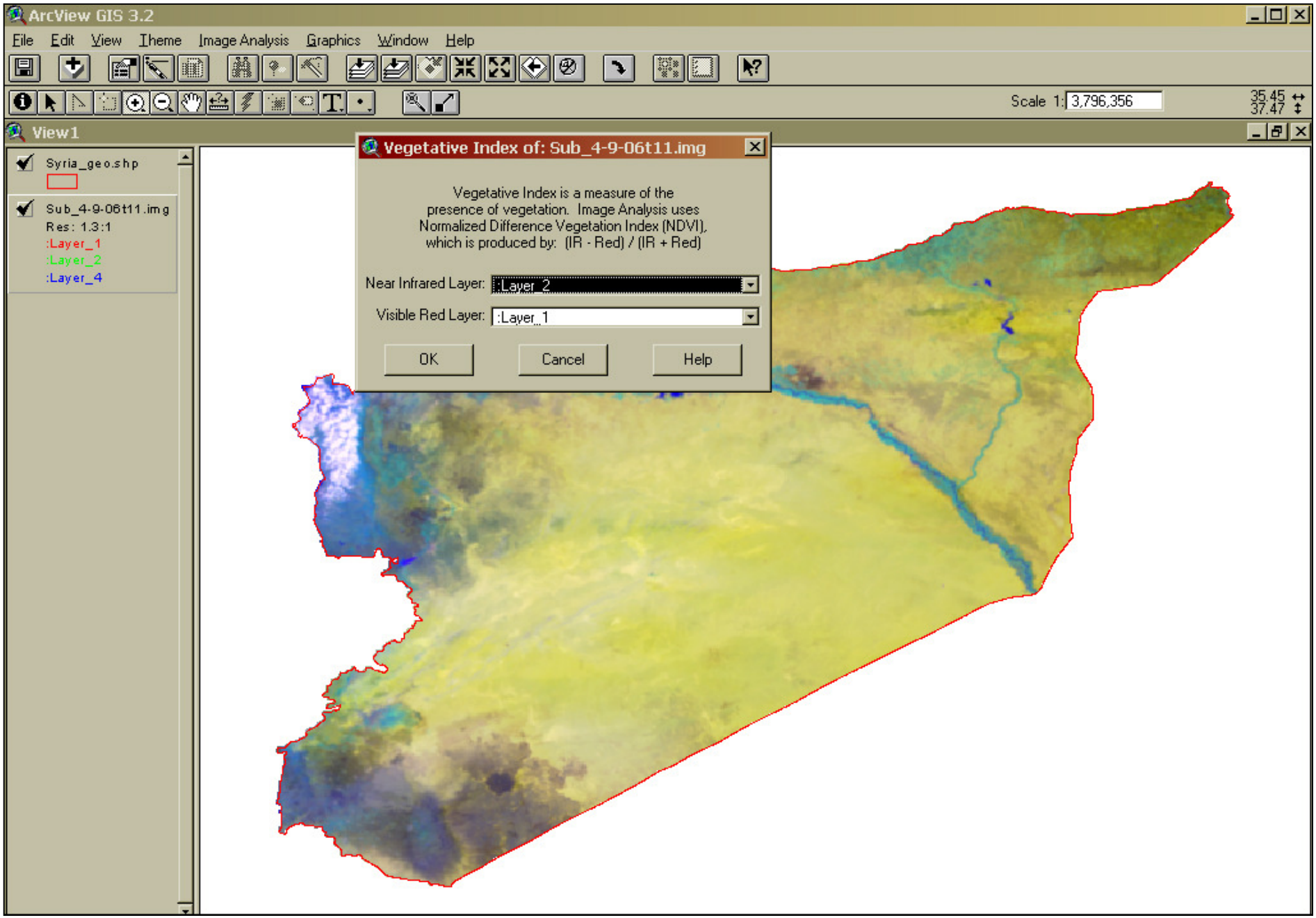
Steps of applying NDVI formula on images :

Using GIS software like Arcview in image analyst extension or Erdas imagein as follows:

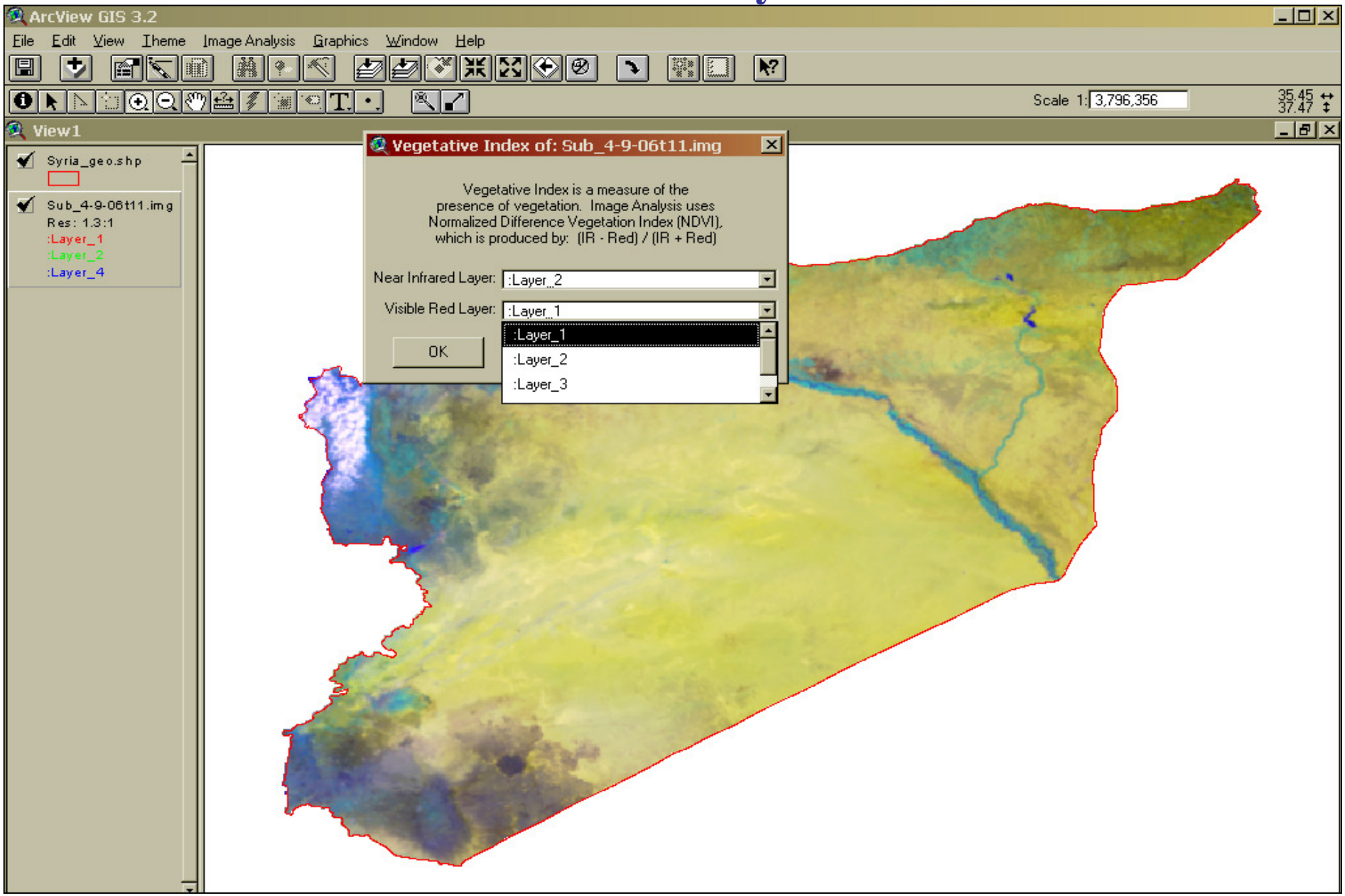
Selecting the vegetation option from image analyst menu -



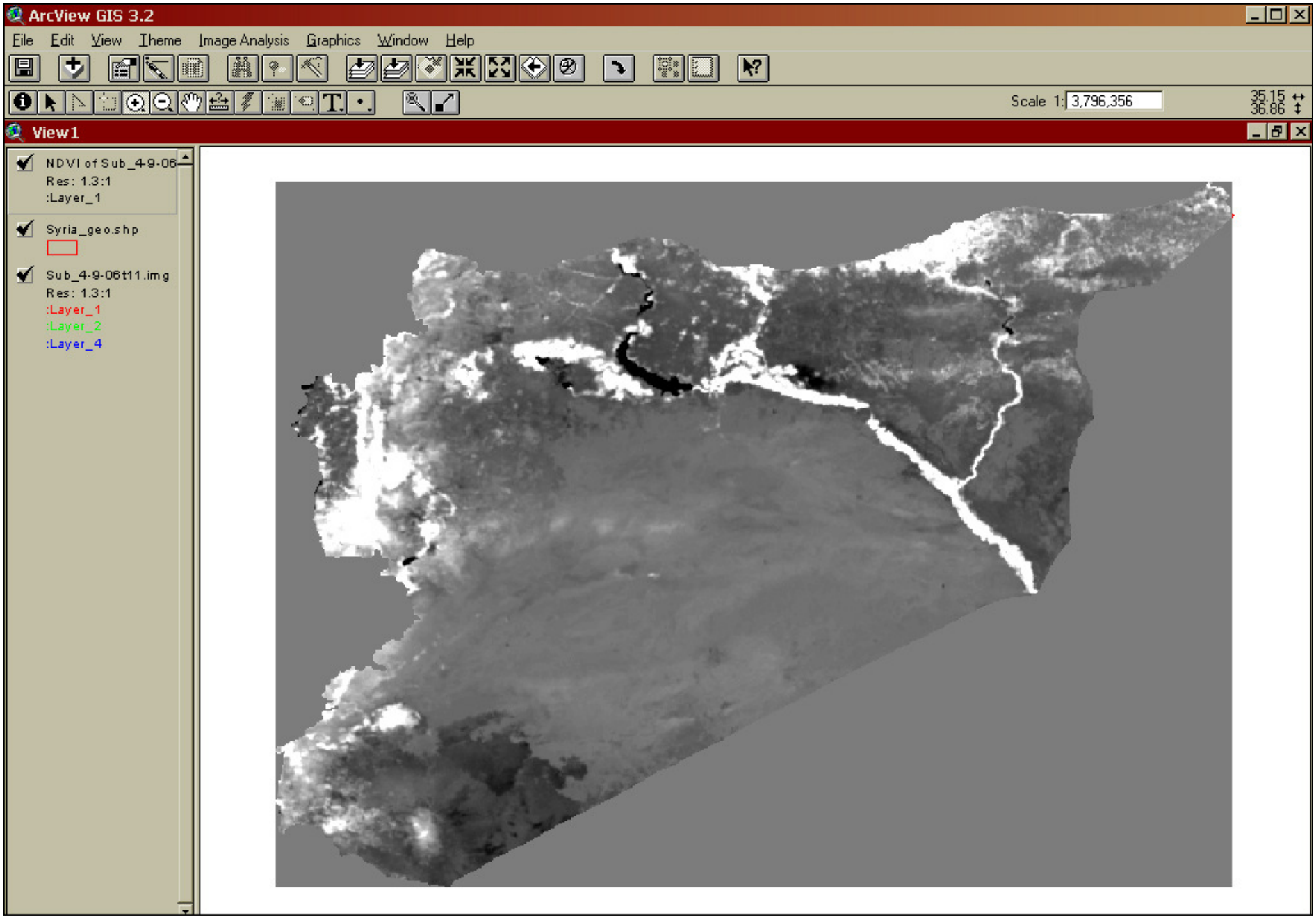
ـ في النافذة الجديدة نحدد القنوات التي تمثل النطاق تحت الأحمر والنطاق الأحمر



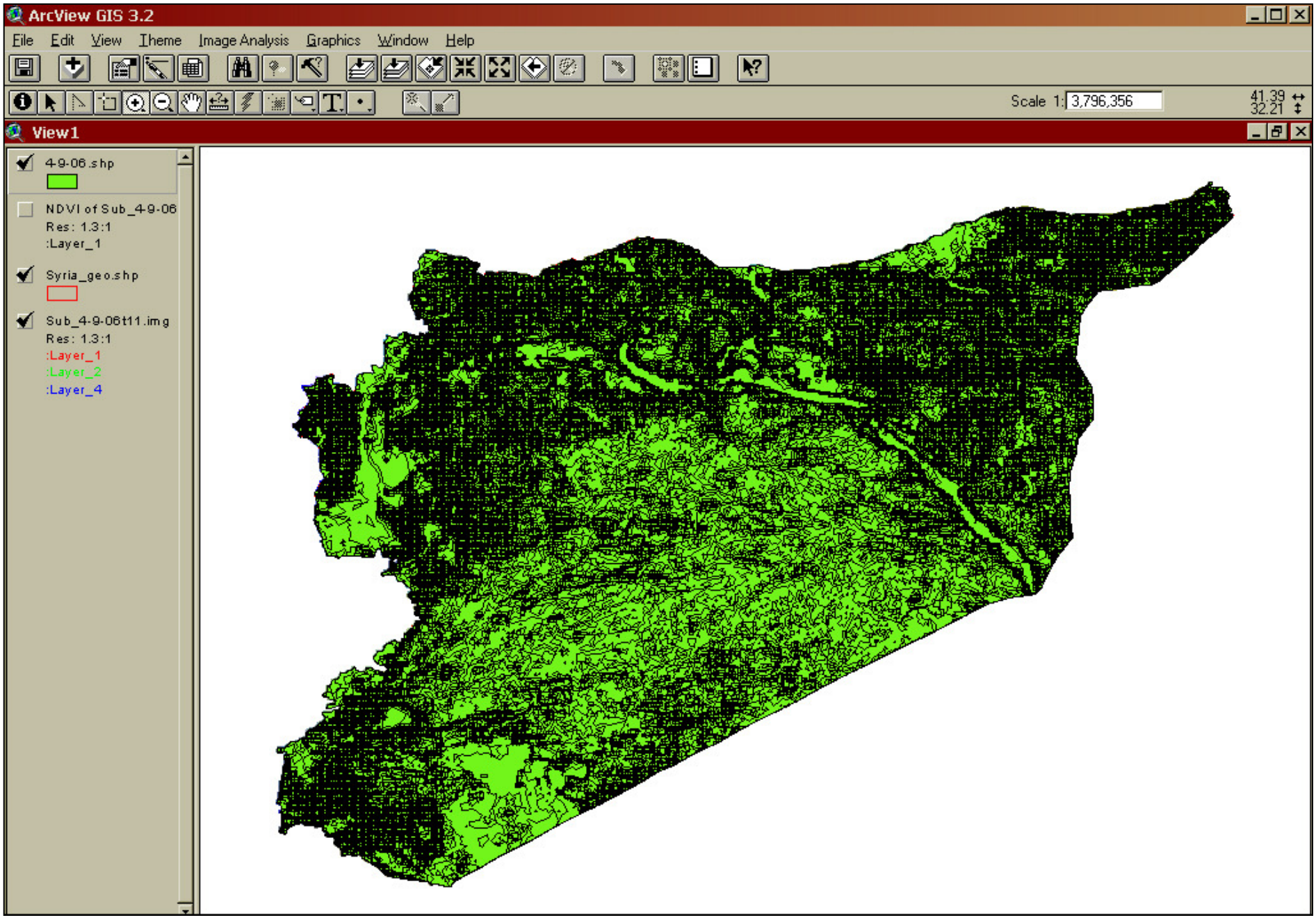
In NOOA images layer one is red channel - and layer tow is infrared channel-



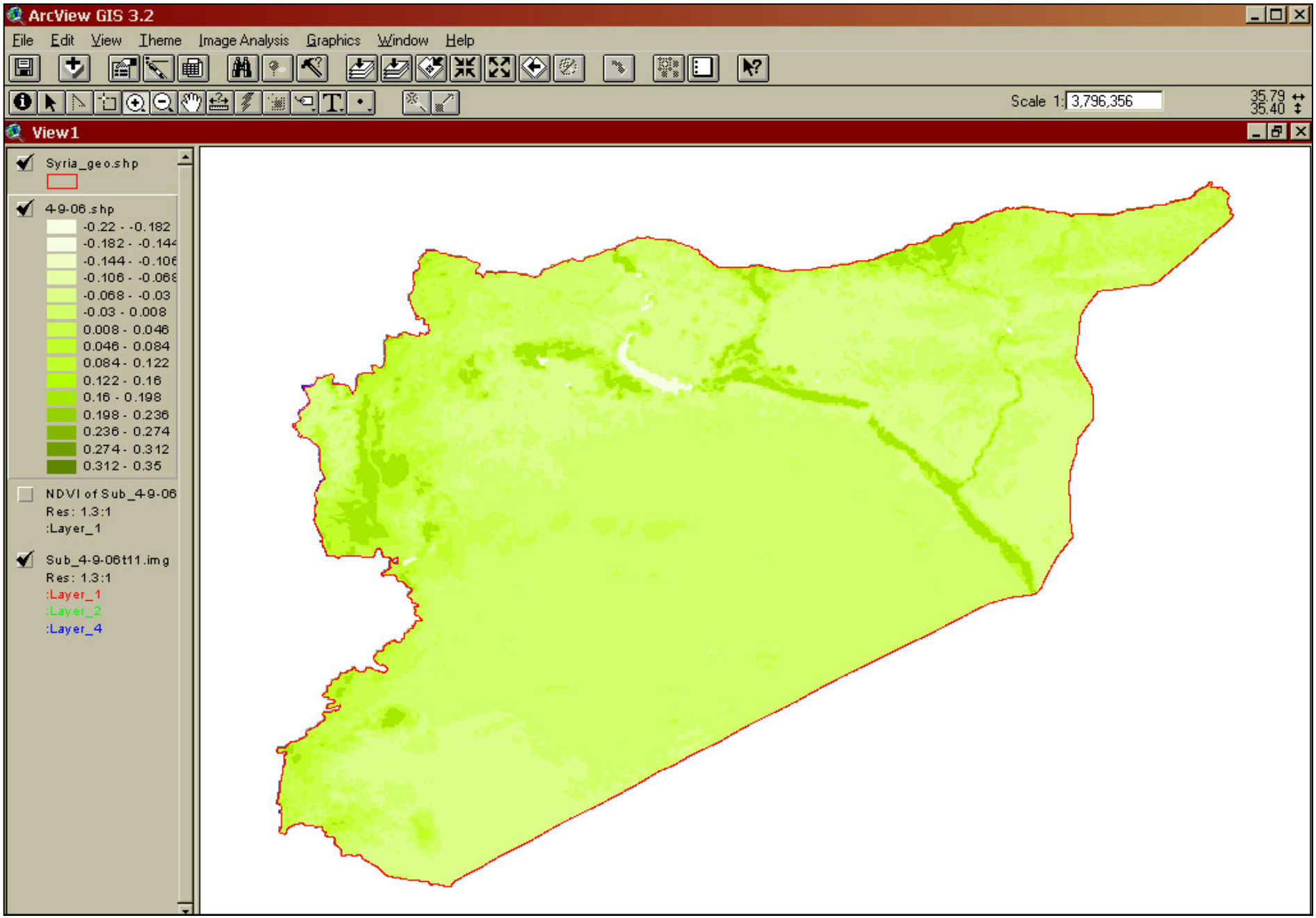
NDVI map in raster format -



NDVI map after changing it to vector format -



final NDVI map -



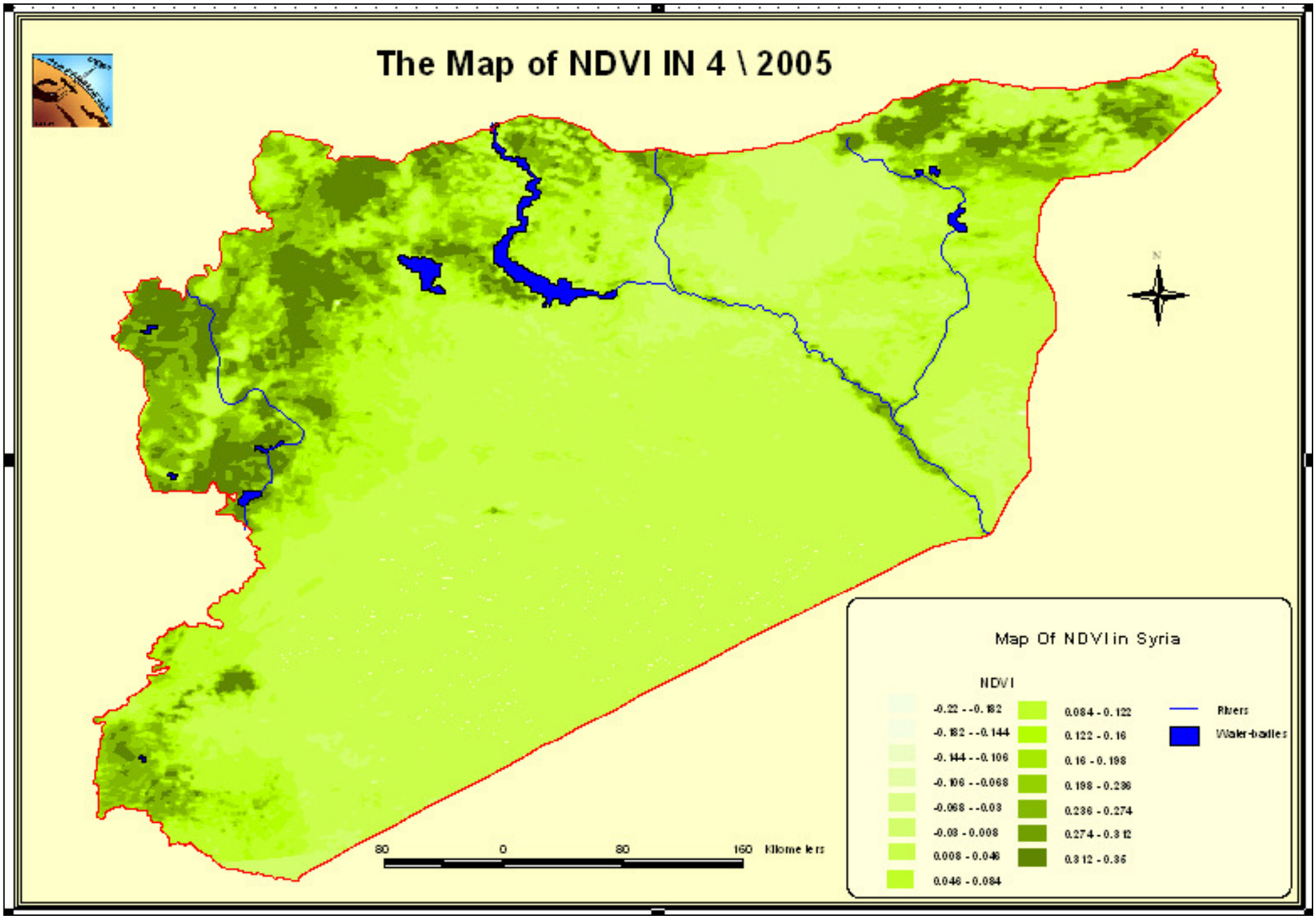
Syrian NDVI maps (monthly-yearly) :

Based on NDVI formula all monthly NDVI maps prepared using GORS meteorological receiving station.

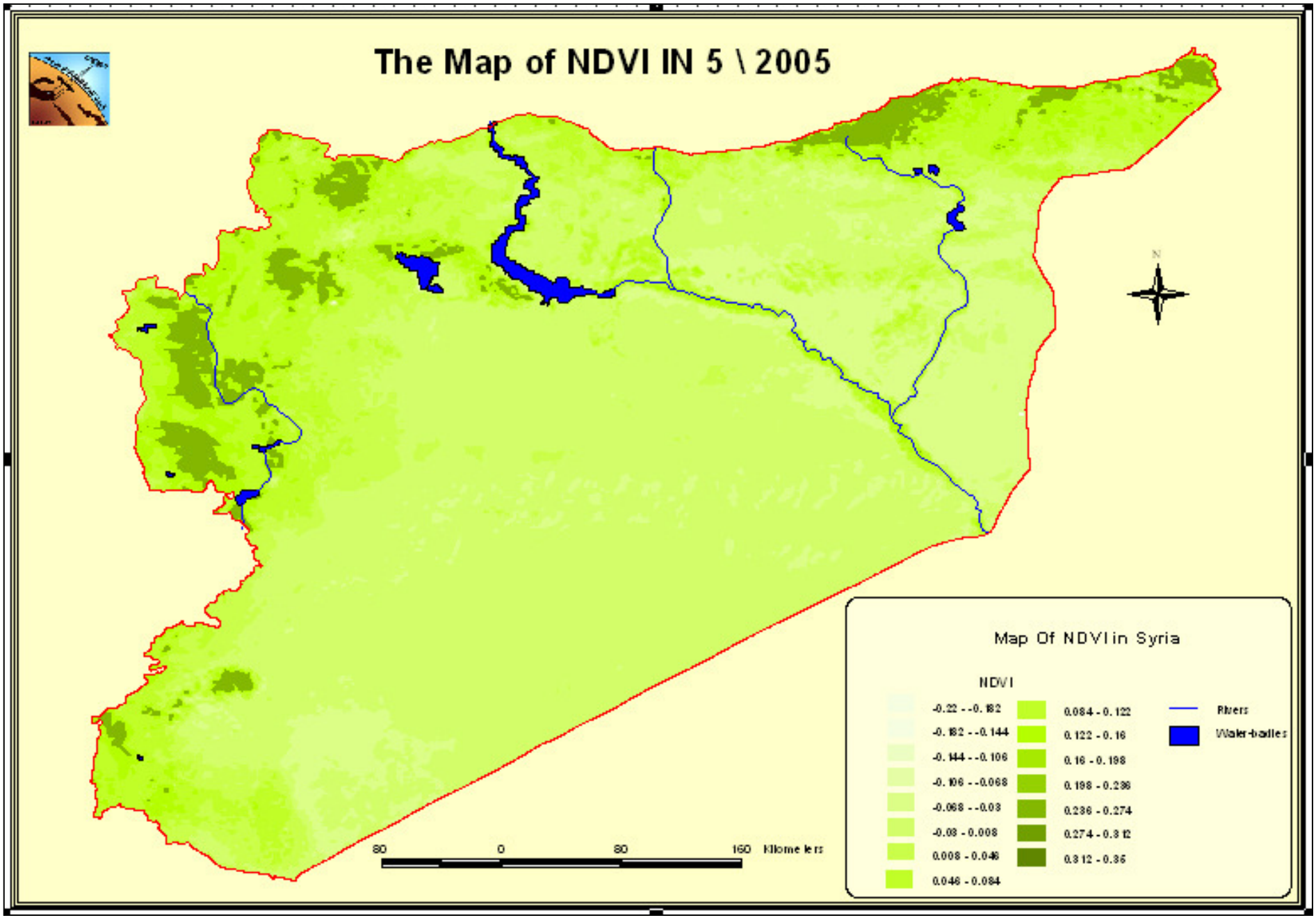
By using these maps we can monitor changes in vegetation cover monthly or yearly.

Monitoring monthly changes

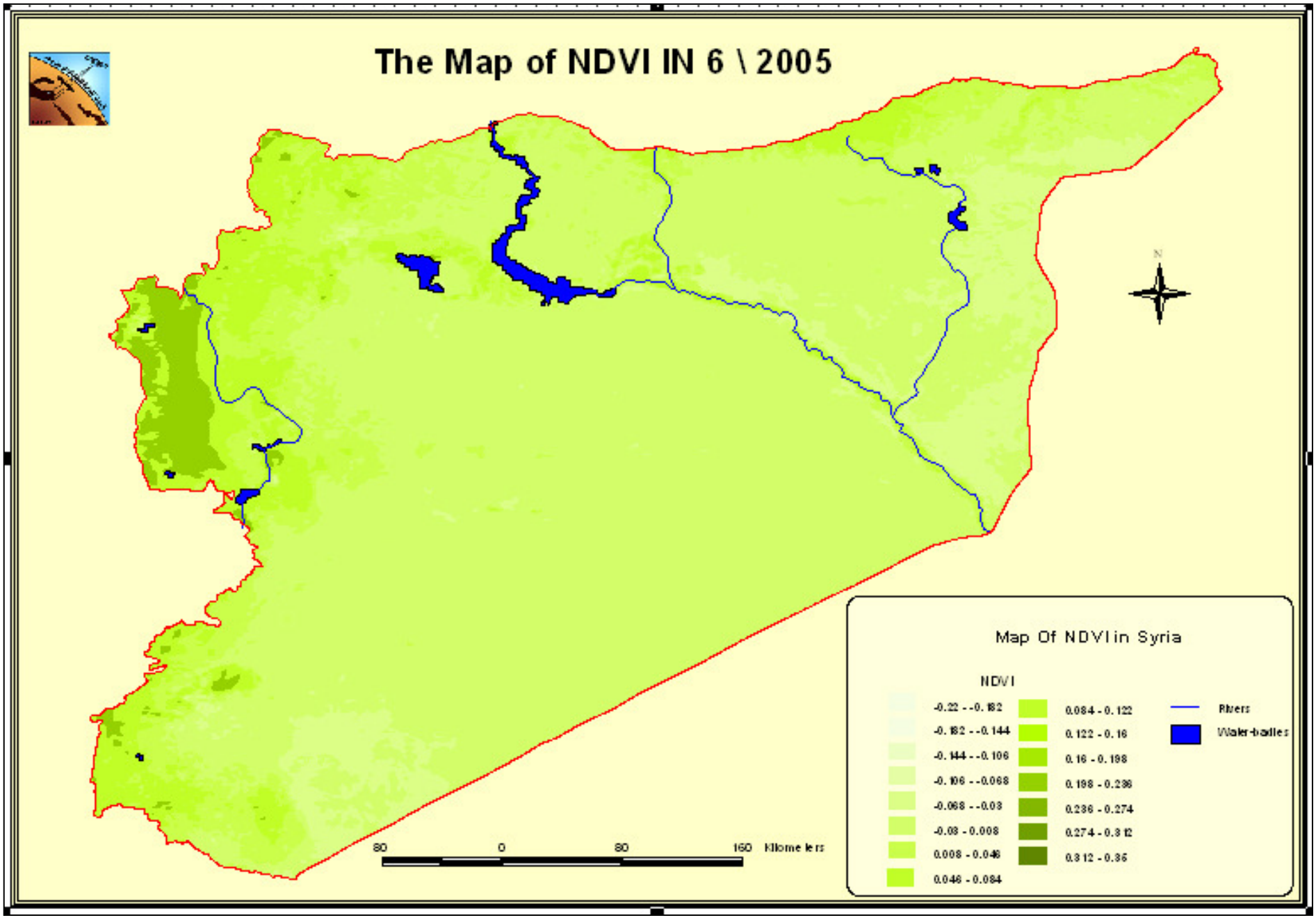
NDVI map for April 2005 -



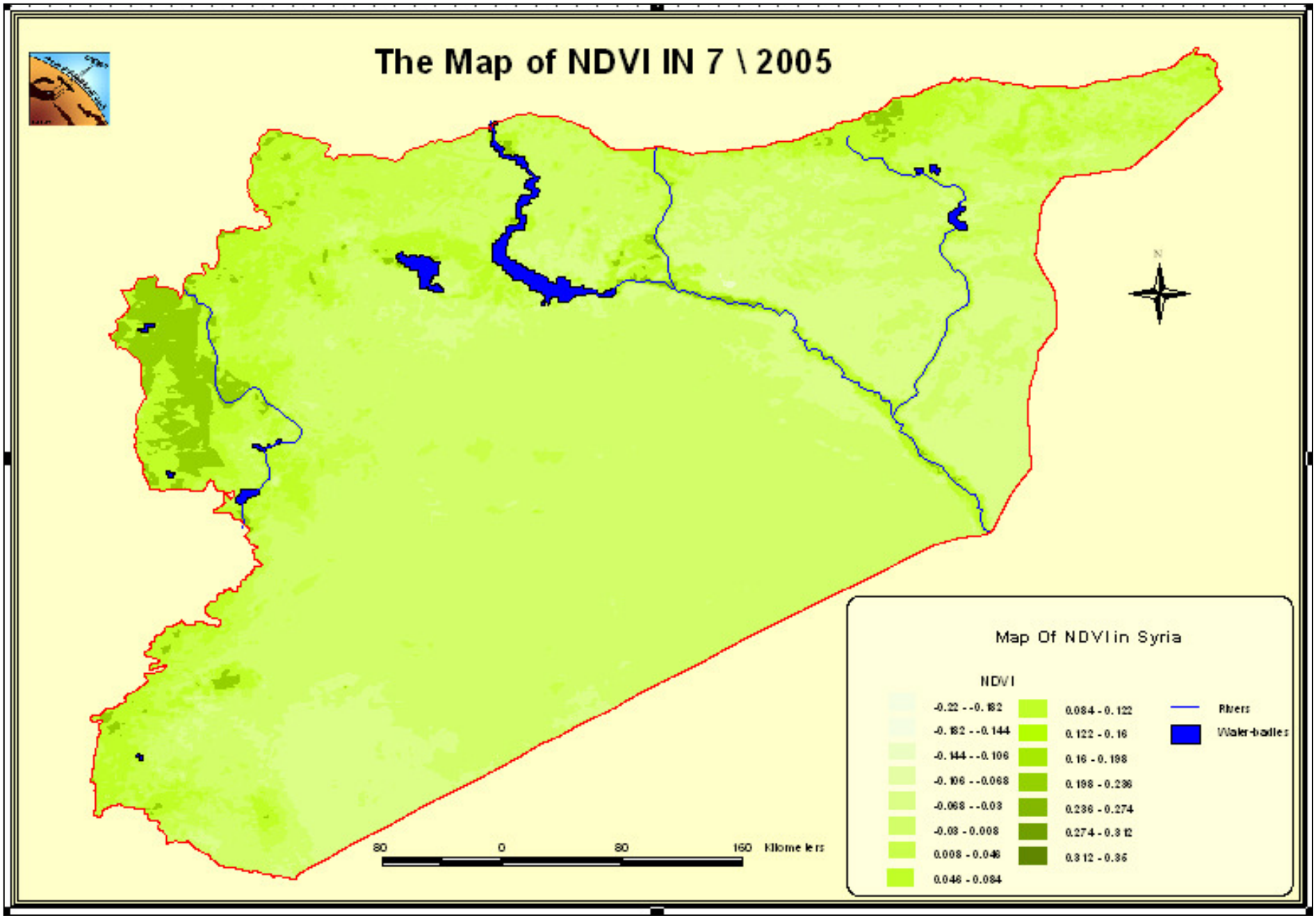
NDVI map for May 2005 -



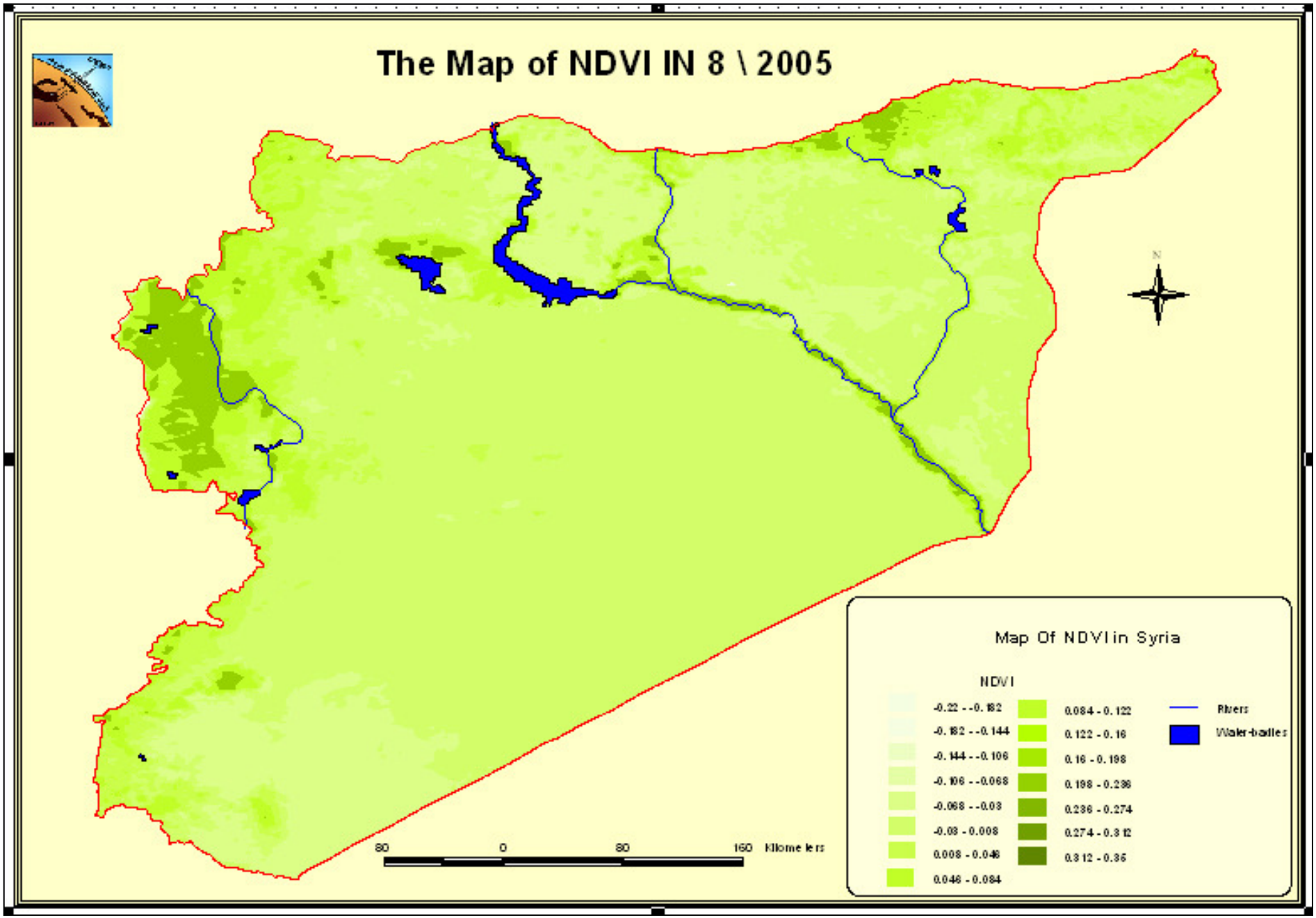
NDVI map for June 2005 -



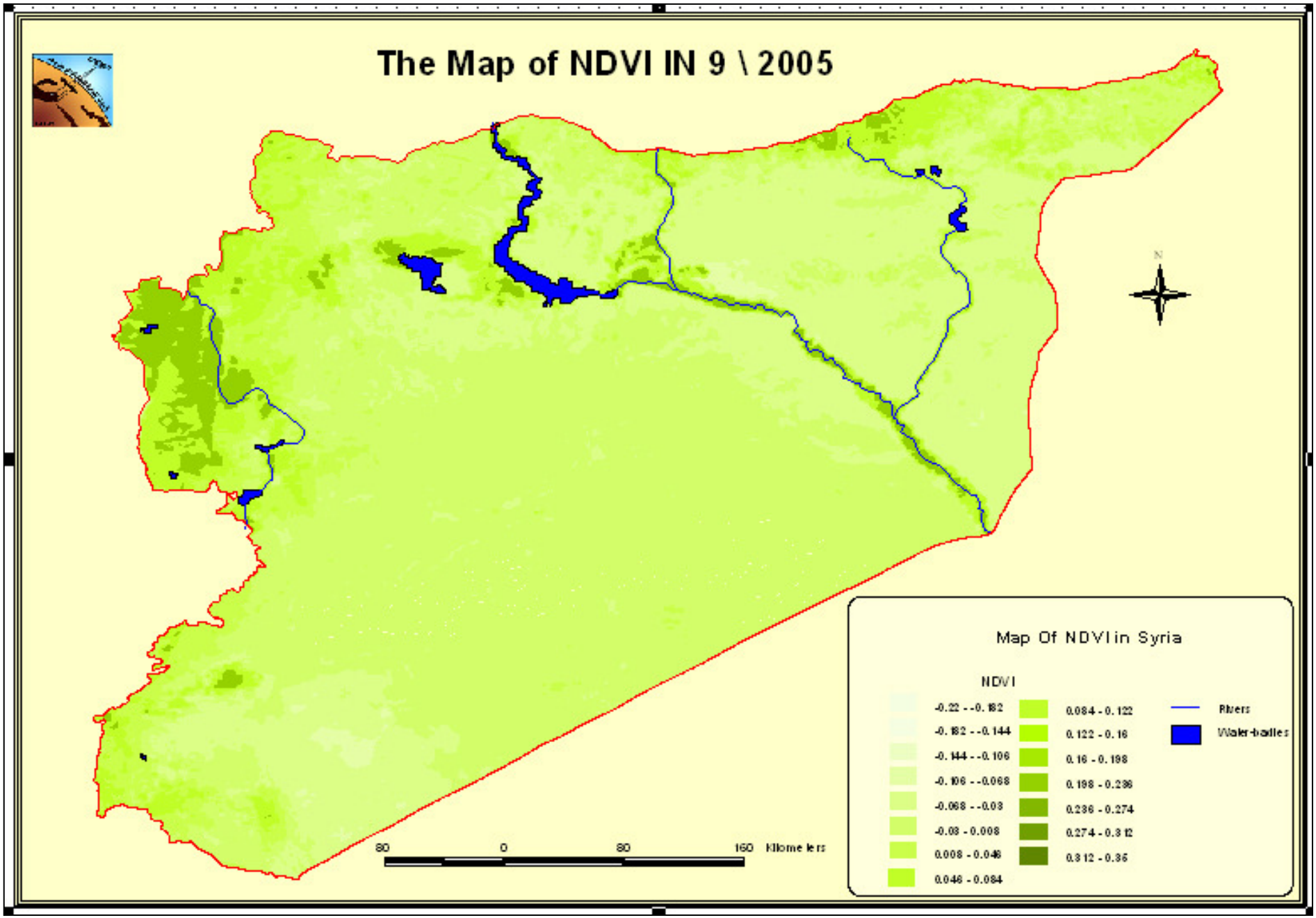
NDVI map for July 2005 -



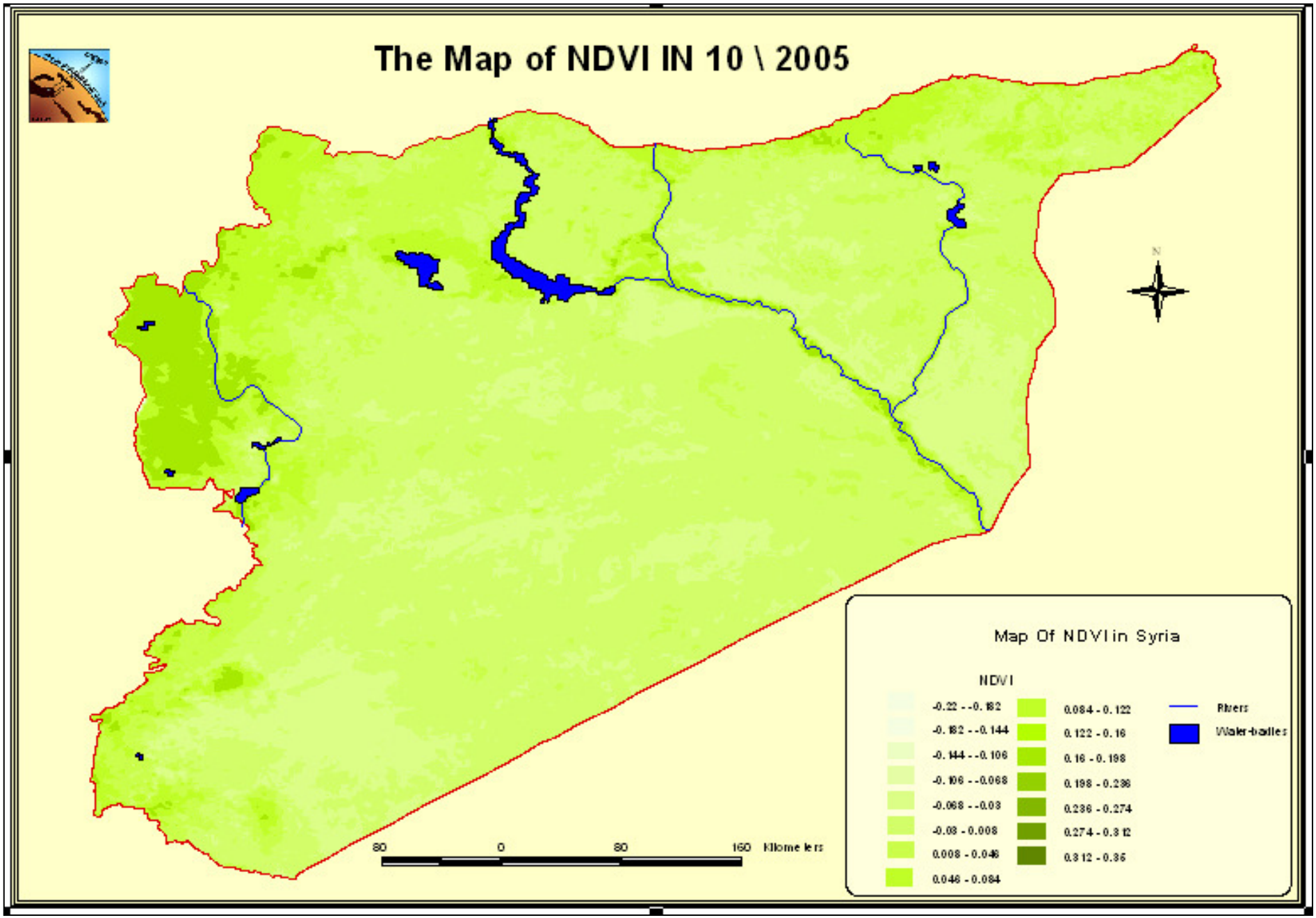
NDVI map for august 2005 -



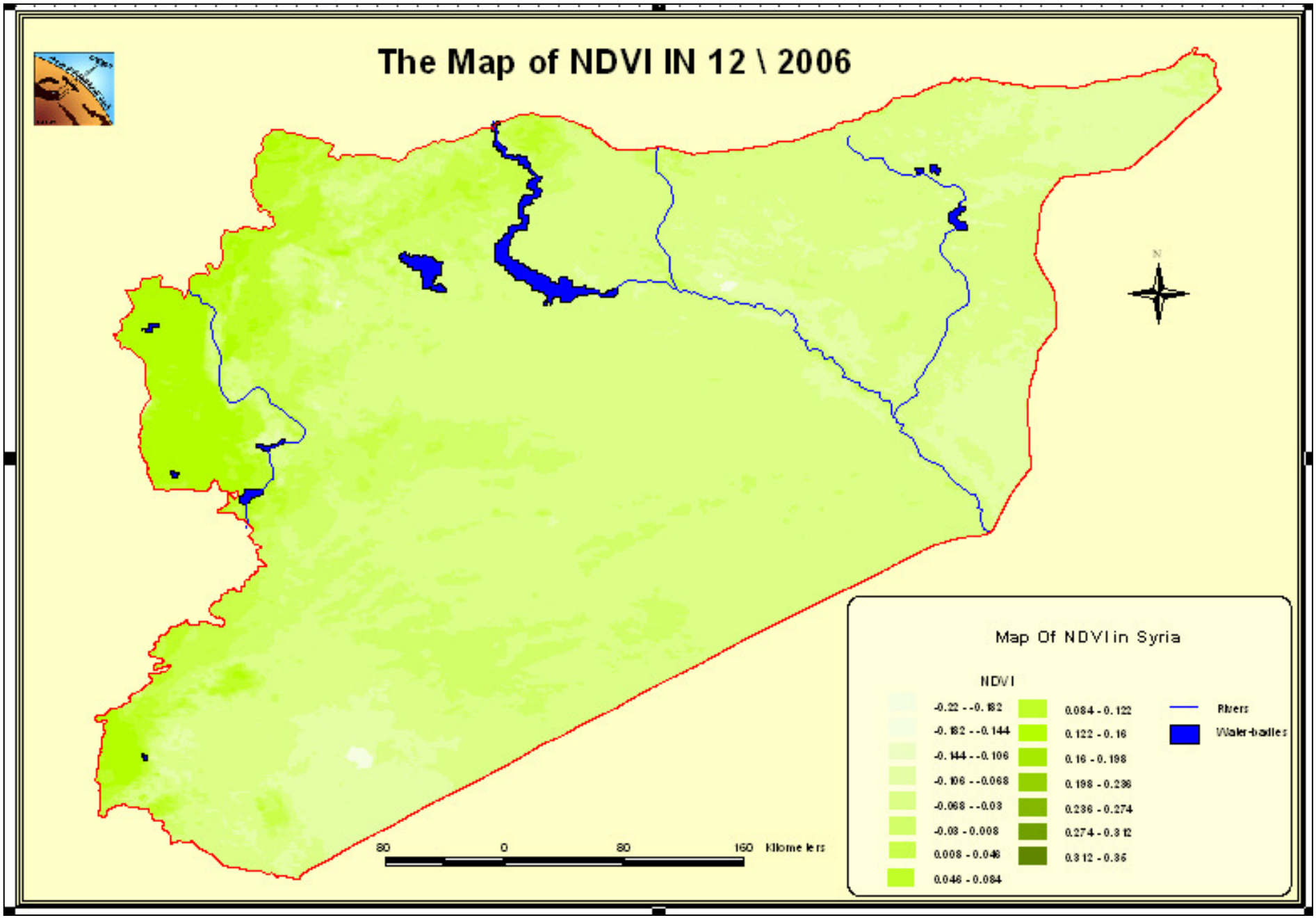
NDVI map for September 2005-



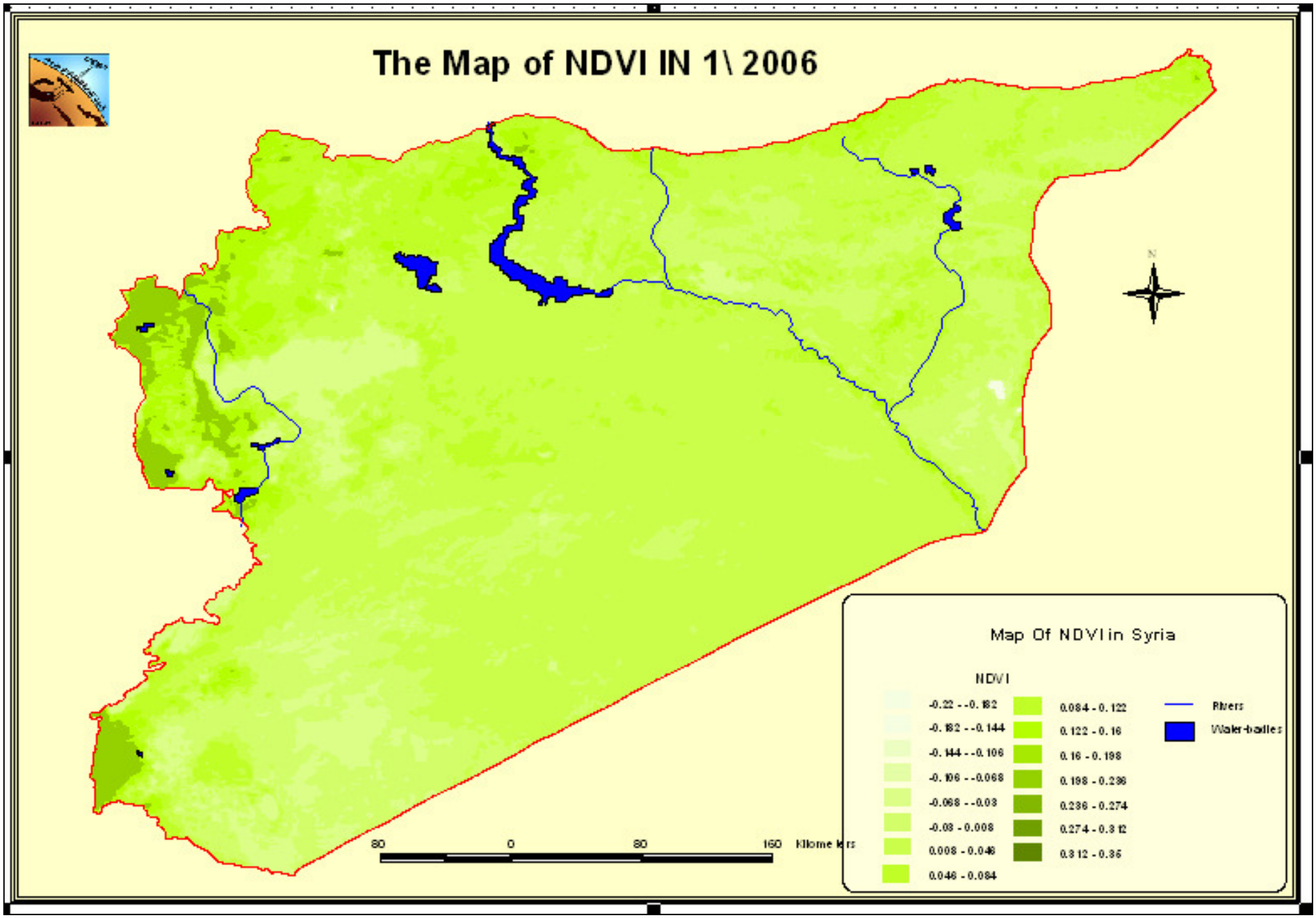
NDVI map for October 2005 -



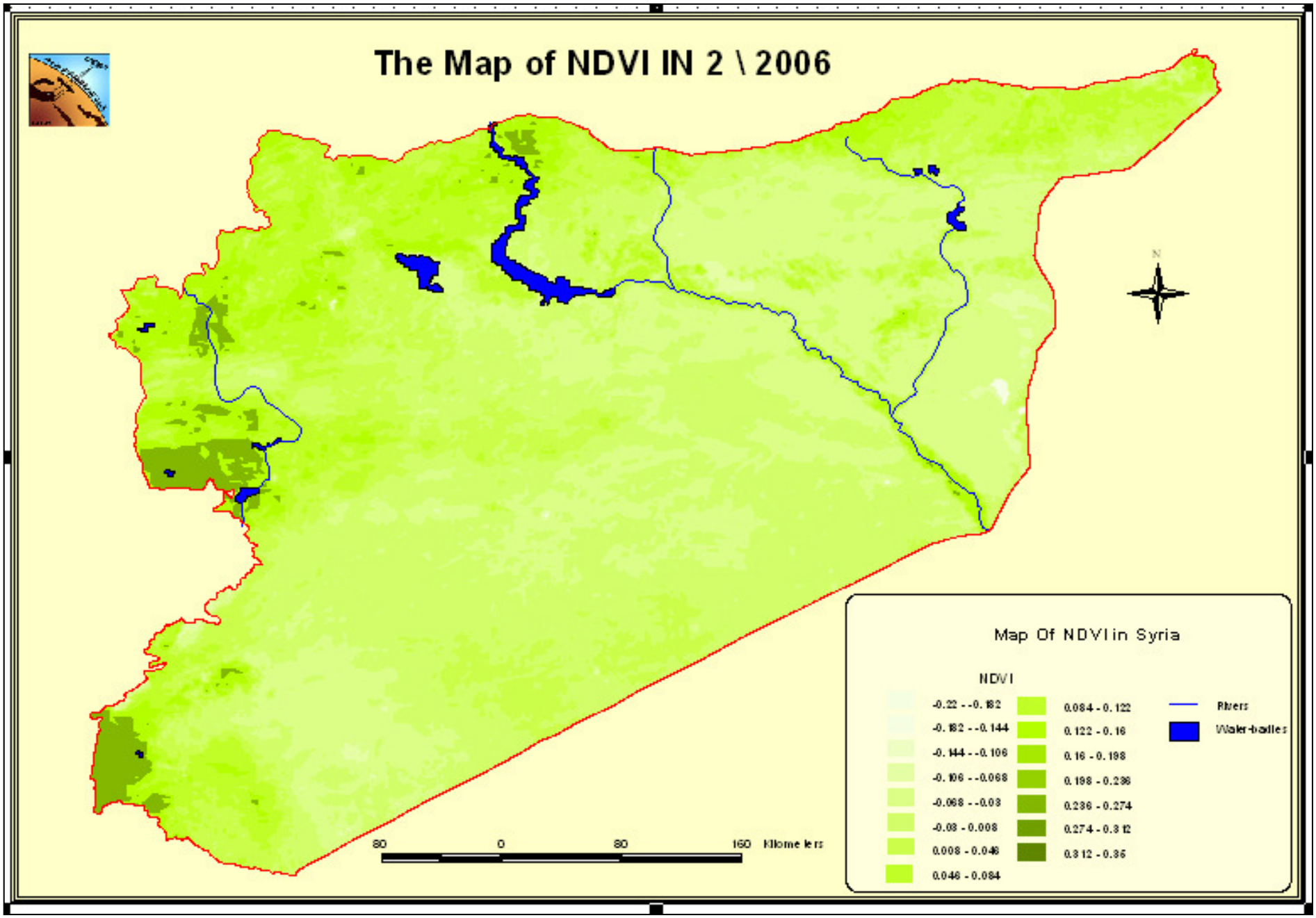
NDVI map for December 2005-



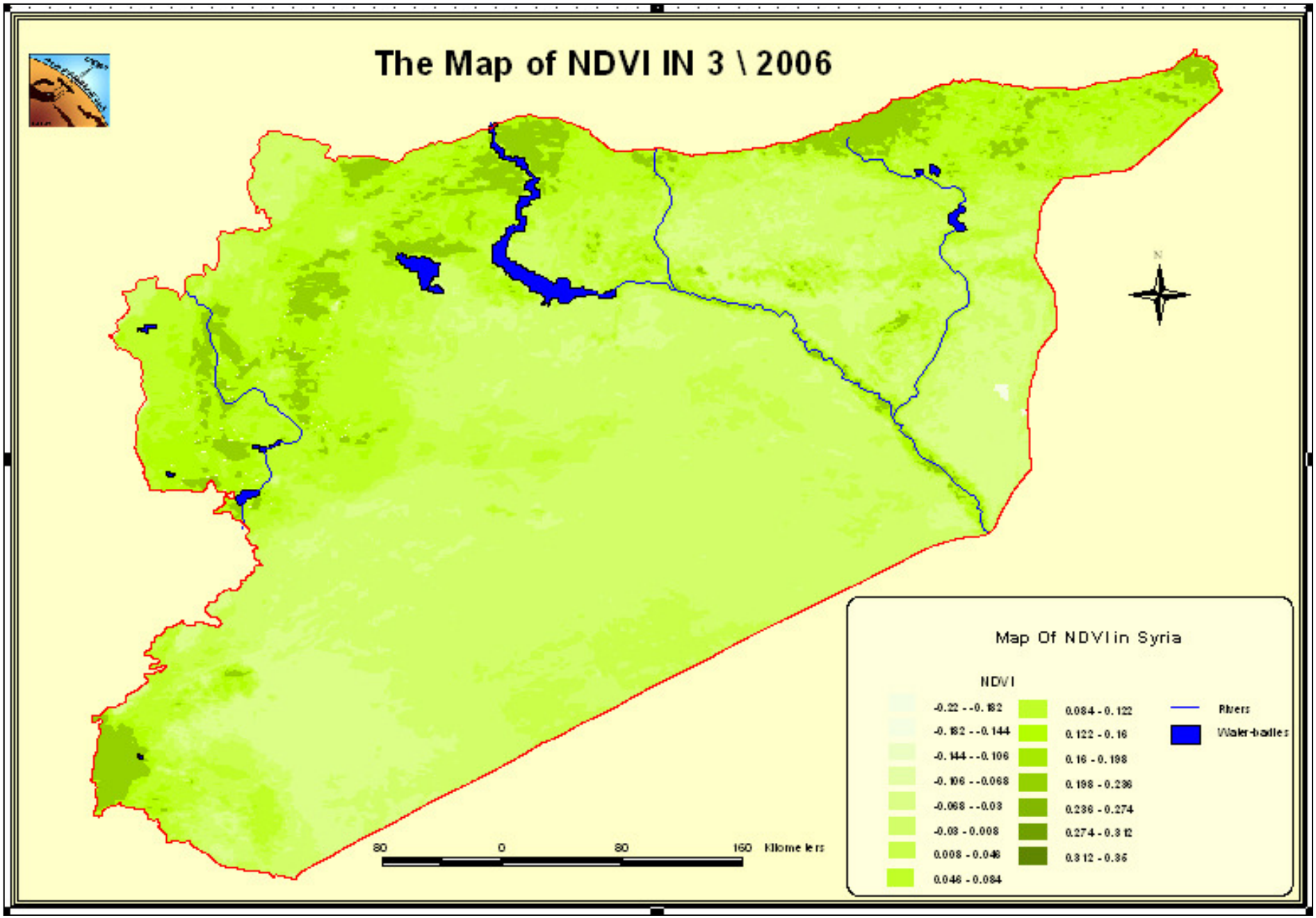
NDVI map for January 2006-



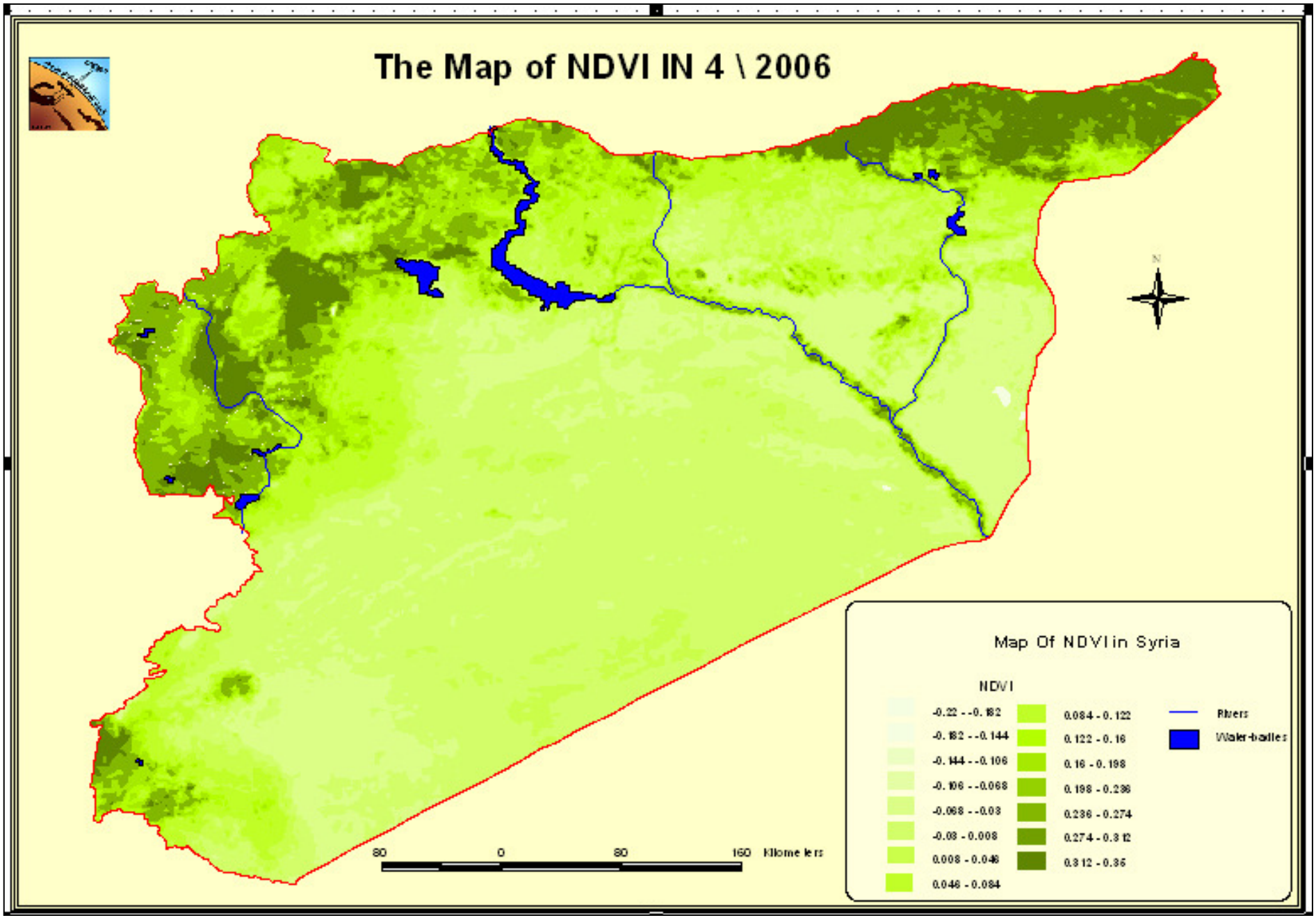
NDVI map for February 2006 -



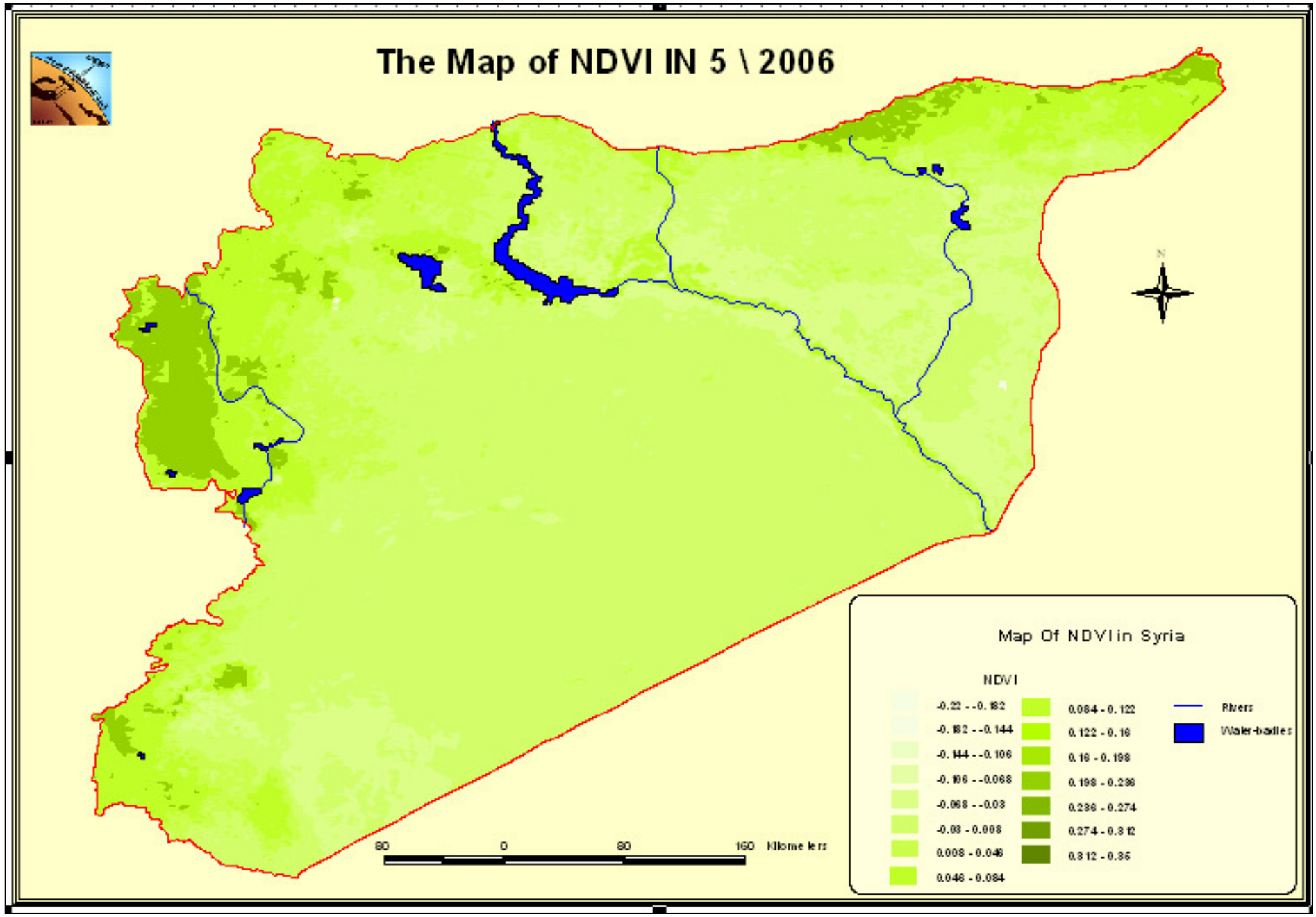
NDVI map for March 2006 -



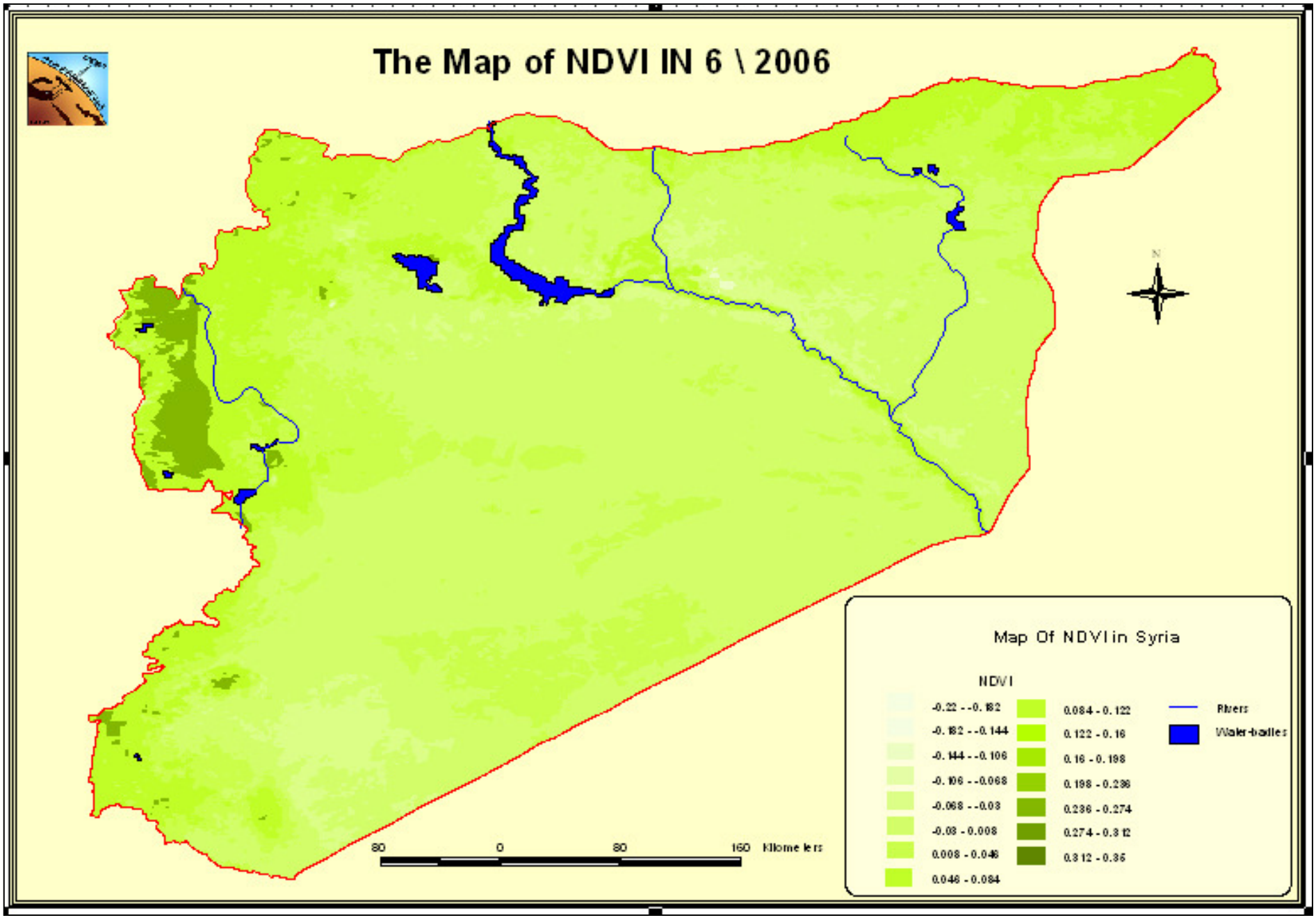
NDVI map for April 2006-



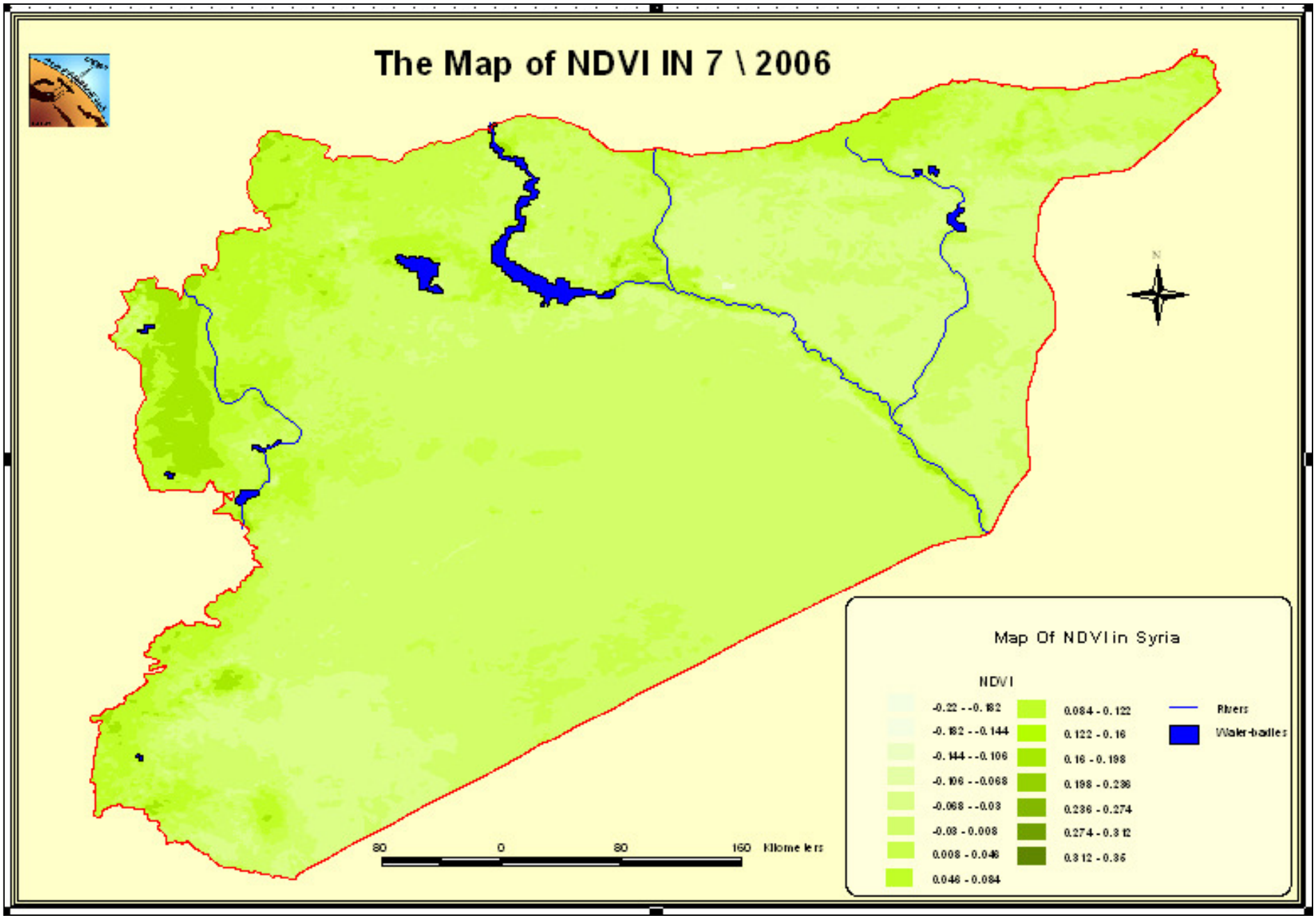
NDVI map for May 2006 -



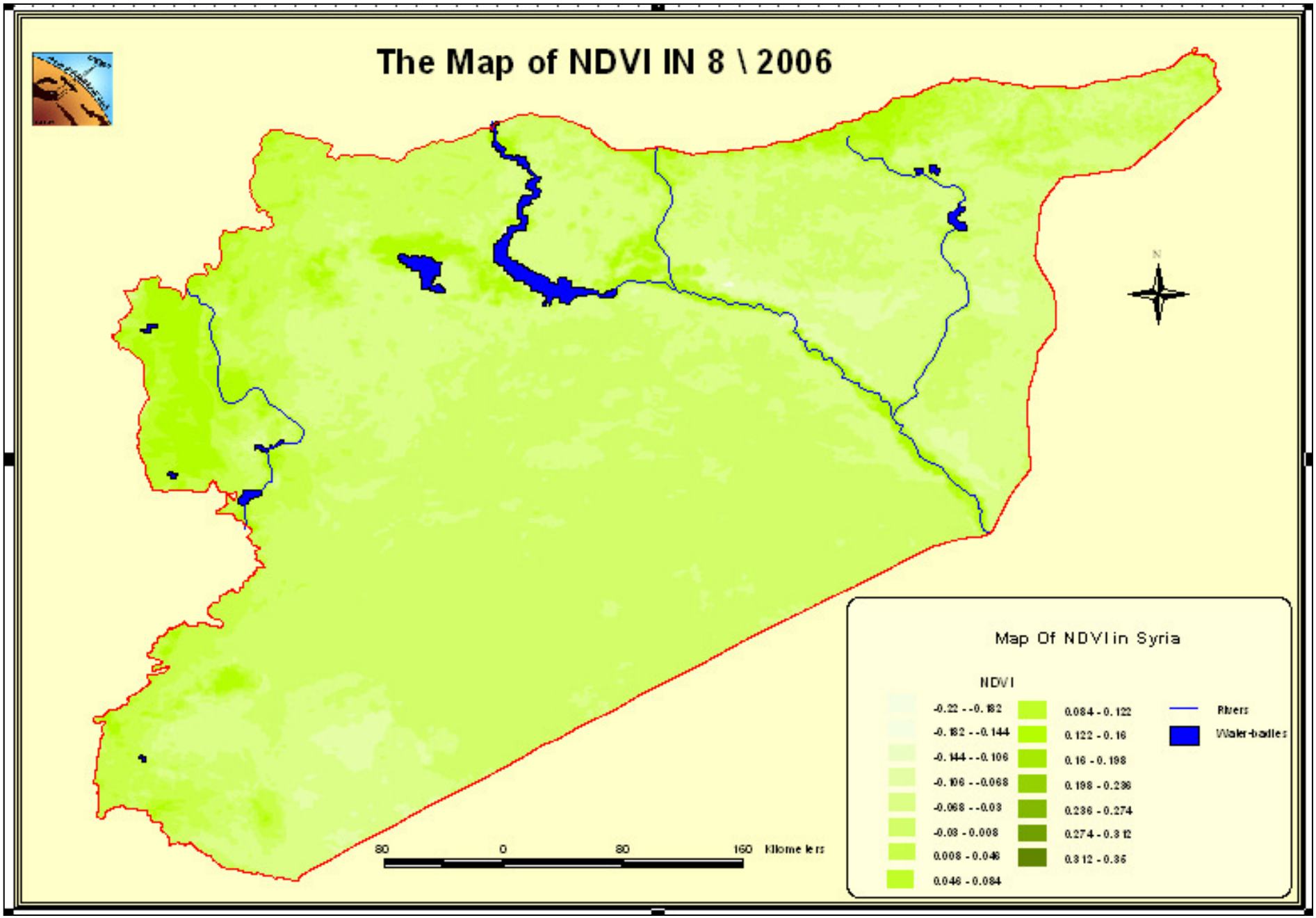
NDVI map for June 2006 -



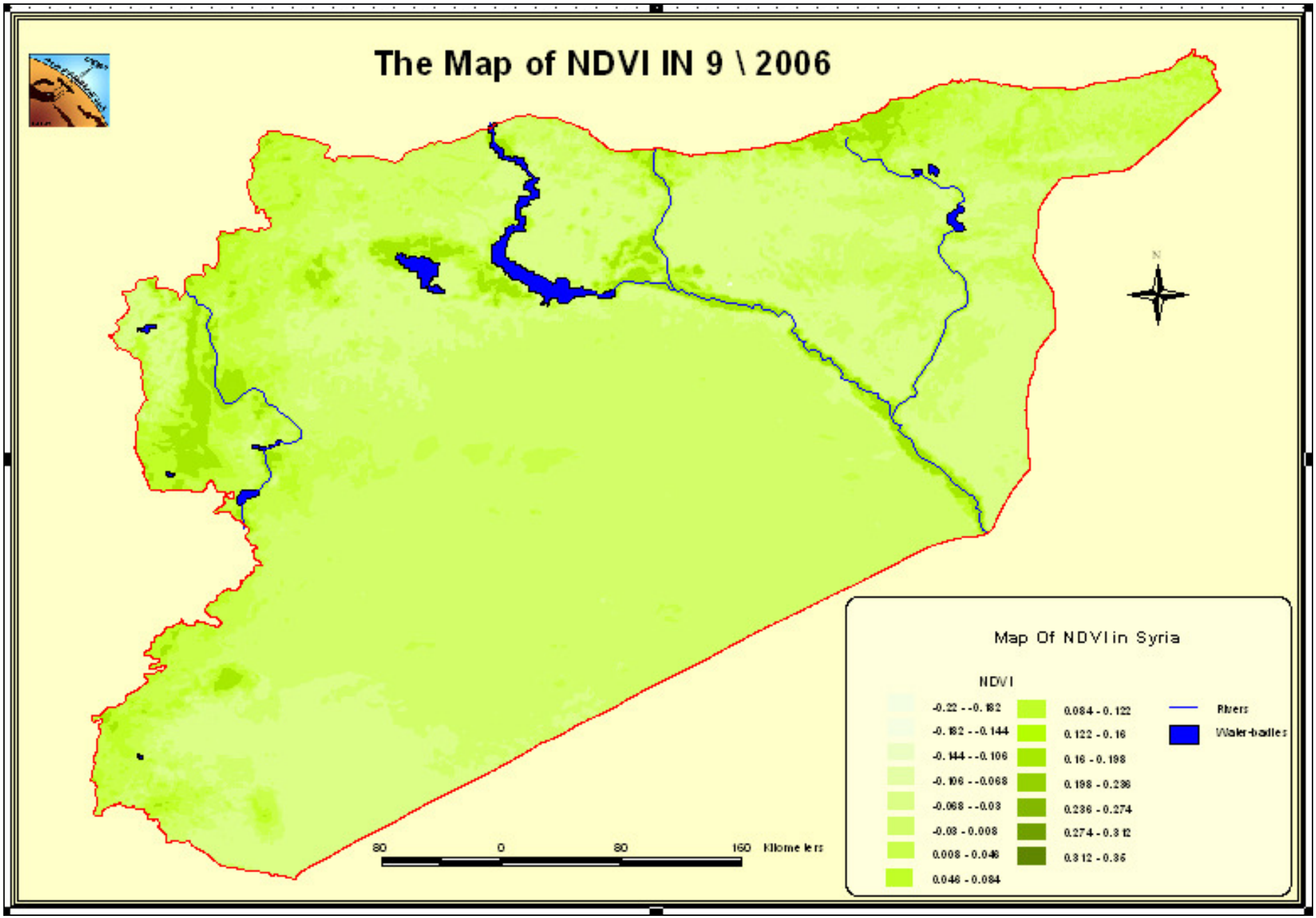
NDVI map for July 2006-



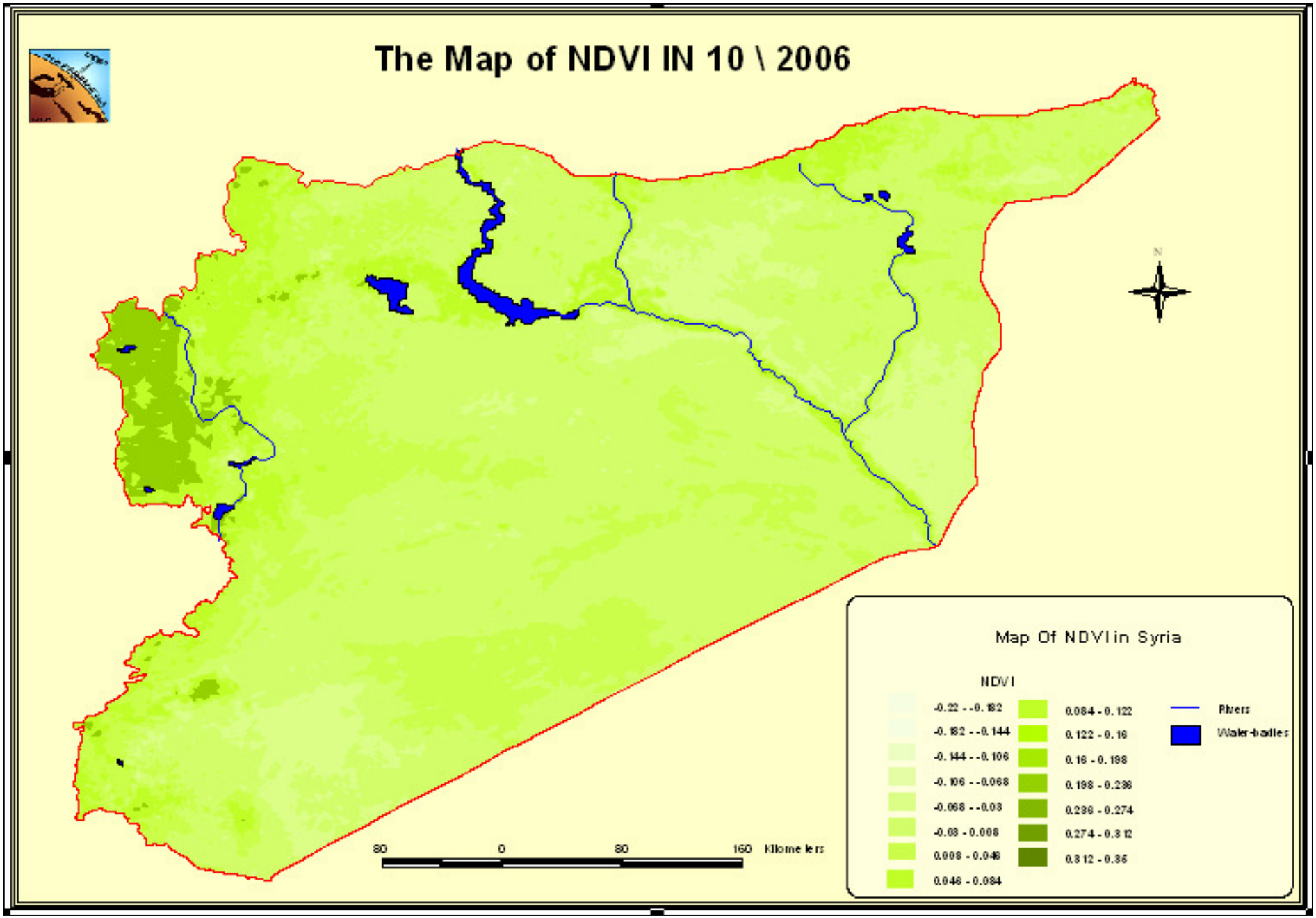
NDVI map for August 2006 -



NDVI map for September 2006

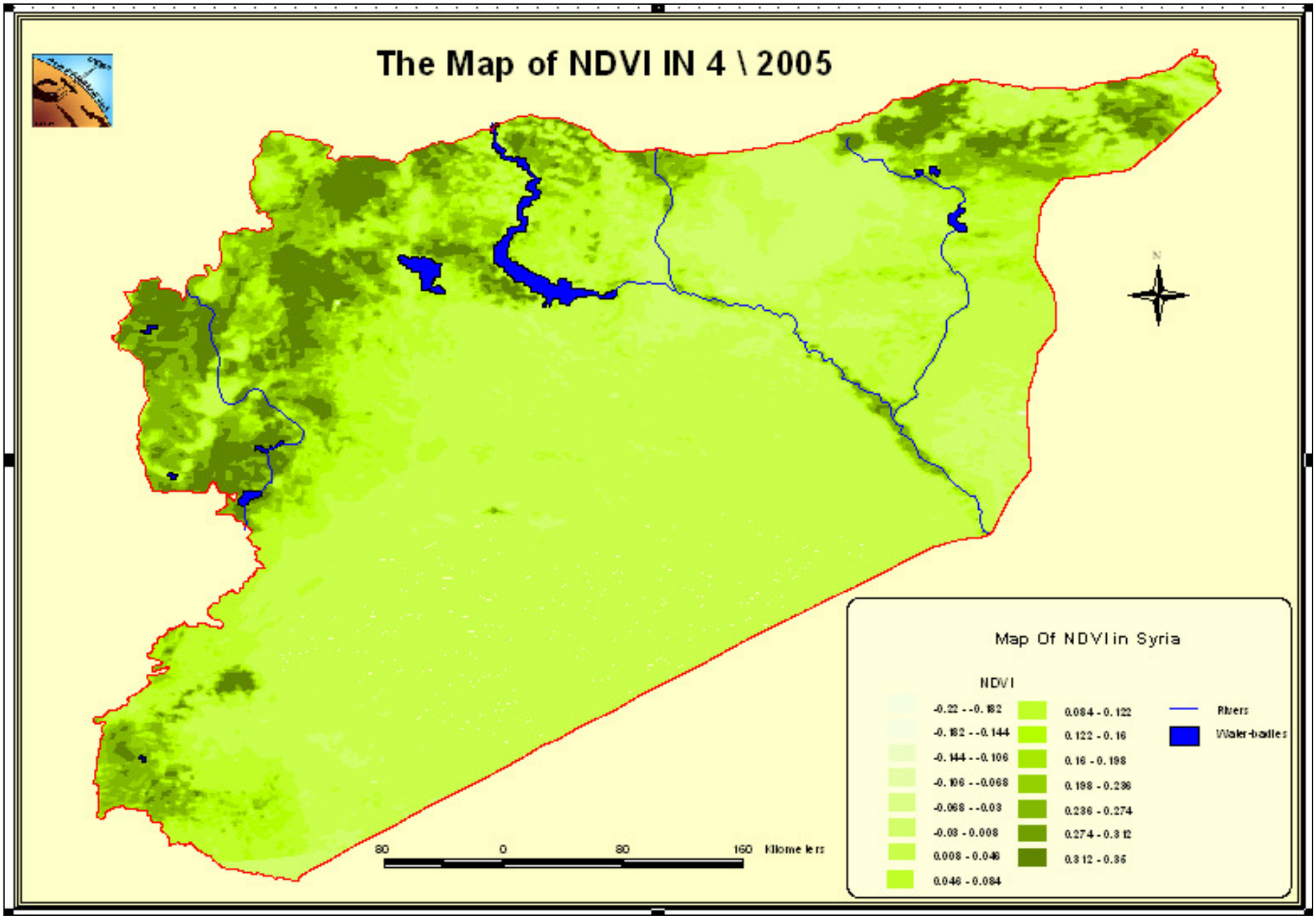


NDVI map for October 2006 -

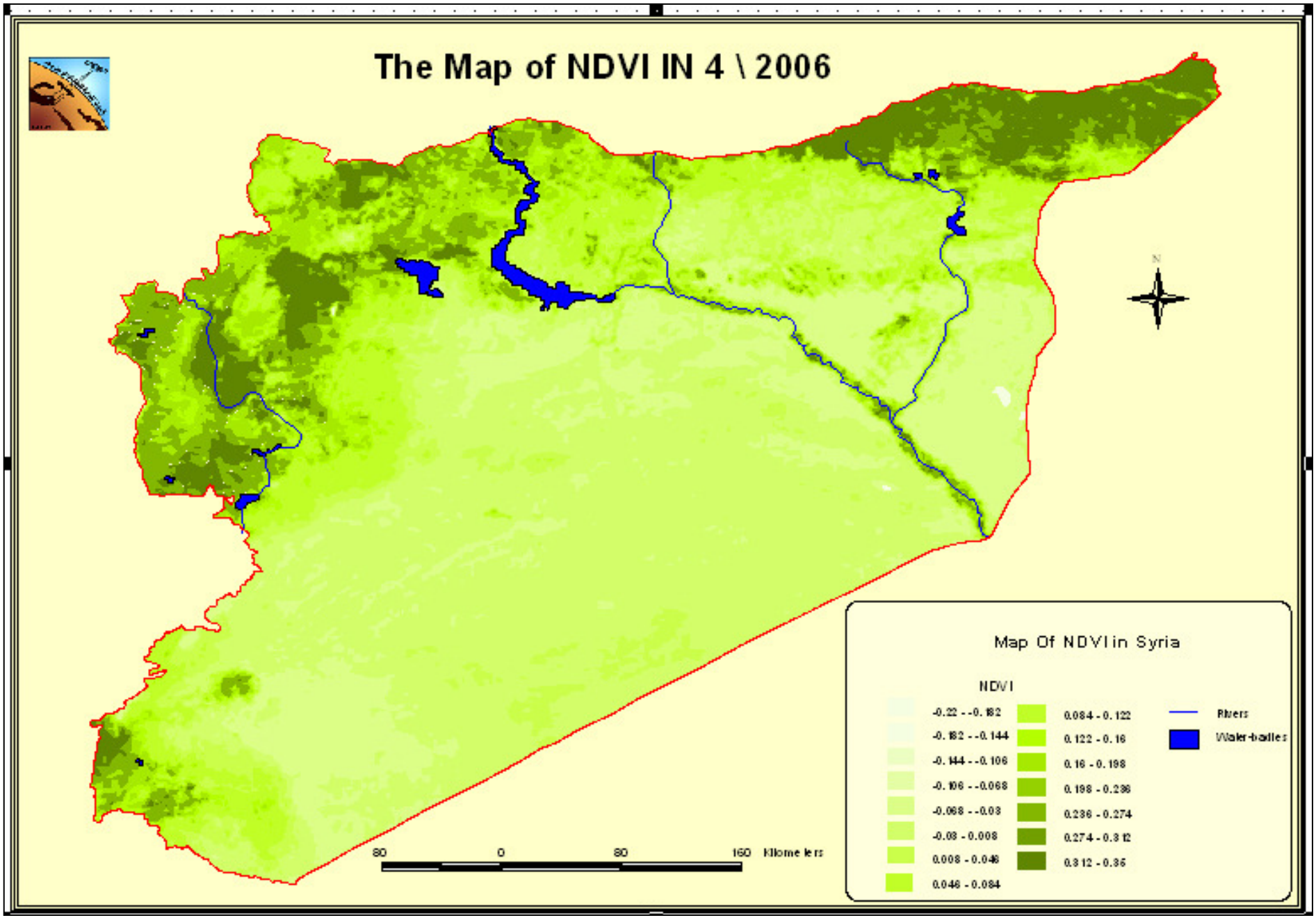


Monitoring yearly changes in Syria

NDVI map for April 2005 -



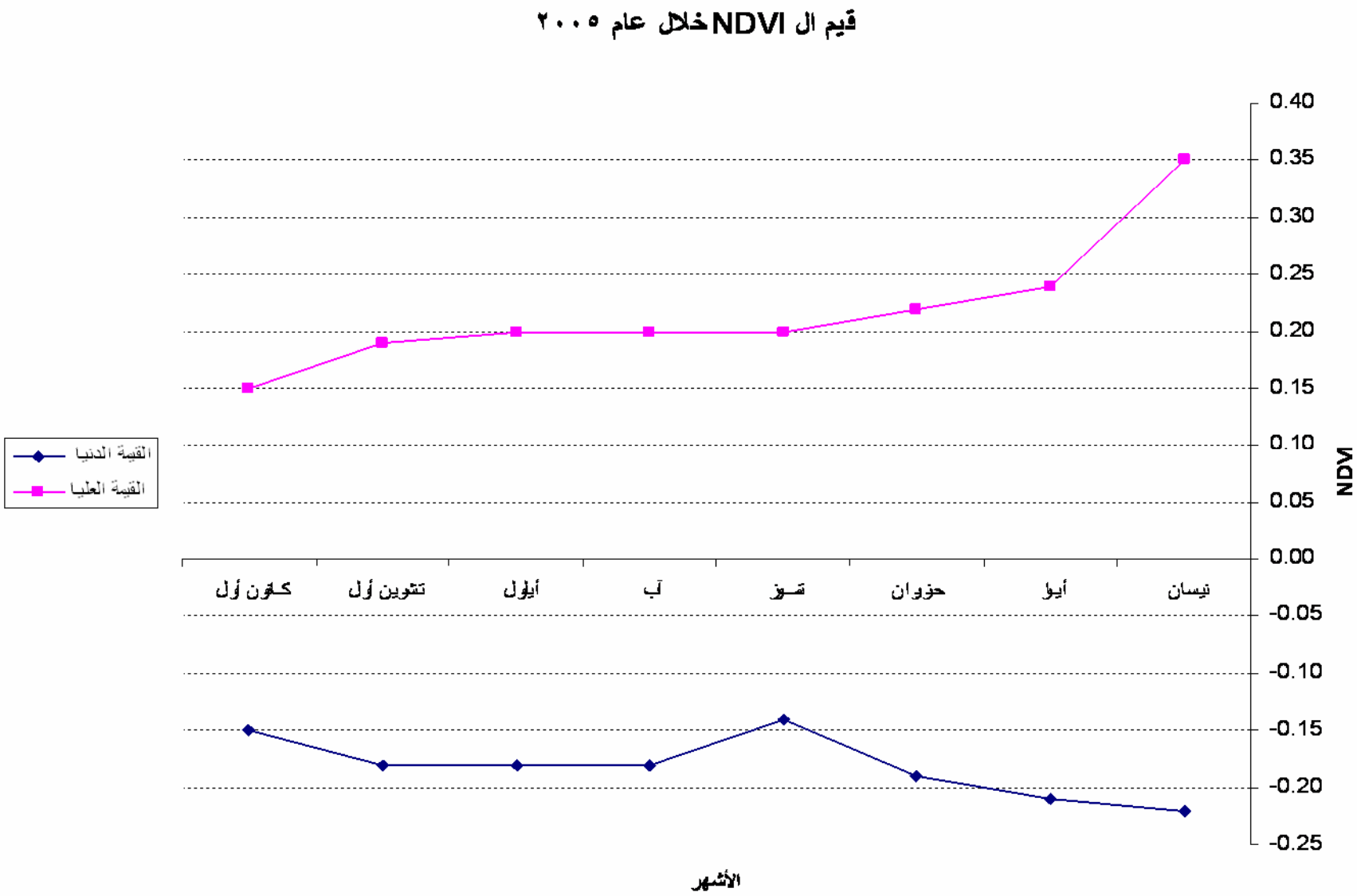
NDVI map for April 2006 -



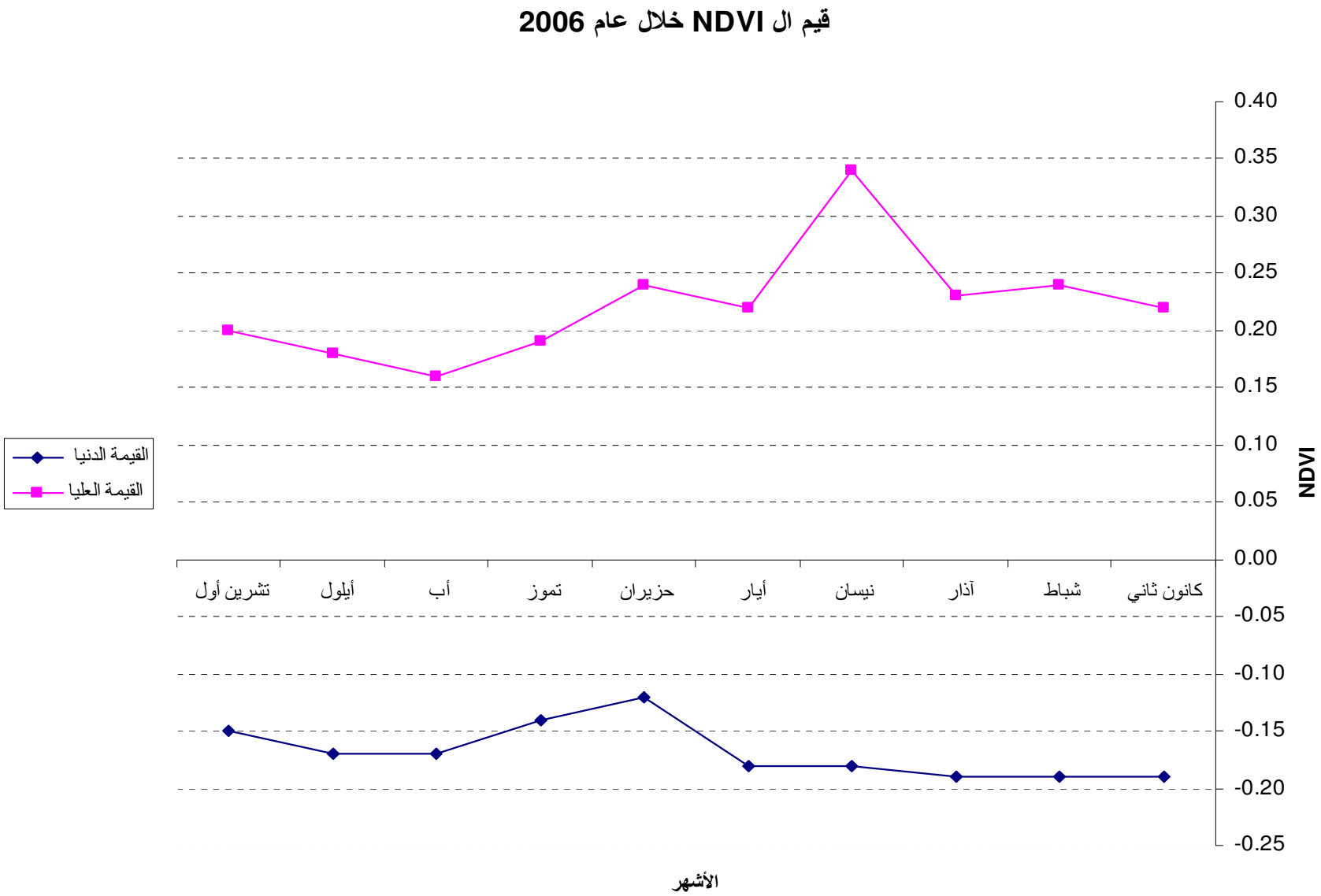
Maximum and Minimum NDVI -

range	Maximum NDVI	Minimum NDVI	month	serial
0.57	0.35	-0.22	April	2005
0.45	0.24	-0.21	May	
0.41	0.22	-0.19	June	
0.34	0.20	-0.14	July	
0.38	0.20	-0.18	August	
0.38	0.20	-0.18	September	
0.37	0.19	-0.18	October	
0.30	0.15	-0.15	December	
0.41	0.22	-0.19	January	2006
0.43	0.24	-0.19	February	
0.42	0.23	-0.19	March	
0.42	0.34	-0.18	April	
0.40	0.22	-0.18	May	
0.36	0.24	-0.12	June	
0.33	0.19	-0.14	July	
0.33	0.16	-0.17	August	
0.35	0.18	-0.17	September	
0.35	0.20	-0.15	October	

maximum and minimum NDVI chart for the year 2005



maximum and minimum NDVI chart for 2006 -



Thanking you