Supervised Classification of the Golan Heights Region

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Introduction

The Golan Height region is a plateau located in the northeast territory of Israel and southwest territory of Syria. The area is an arid desert with the Sea of Galilee and Yarmouk River to the south, the Jordan River on the western border, and Ruqqad River on the eastern border.

The region is a conflict area due to Israel capturing, occupying, and developing the region since the 1967 Six Day War. This action is broadly declared illegal by the international community and several United Nations resolutions have called for Israel to cease settling the region and cede the territory to Syria. In this project I intend to show an increase in human development in the region contrary to UN resolutions,

Methodology

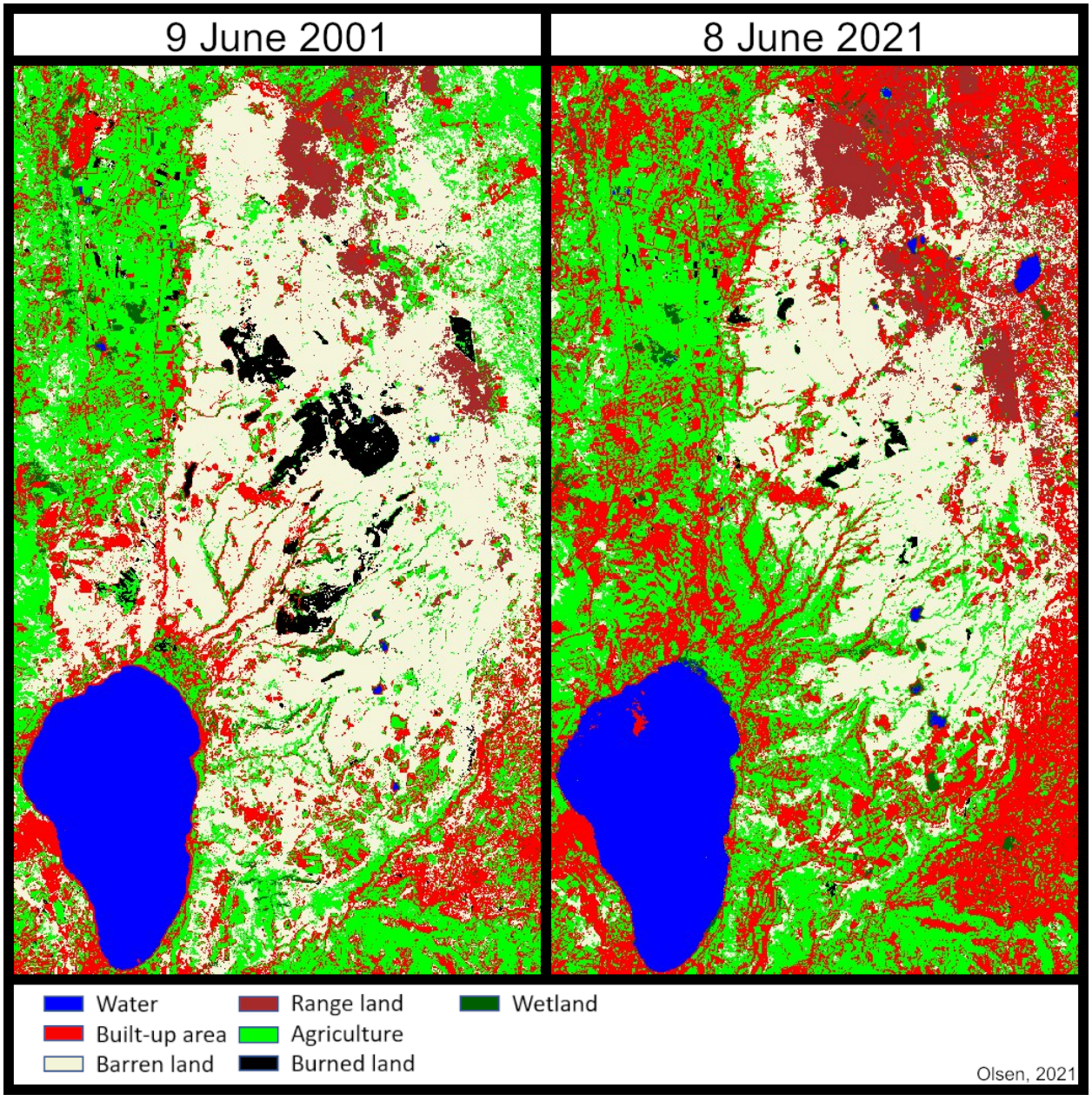
To gather the data required I used the USGS EarthExplorer. I downloaded the LandSat 7 Collection 2 Level 1 data for the flyover on 9 June 2001 (product ID: *LE07_L1TP_174037_20010609_20200917_02_T1*) and the LandSat 8 Collection 2 Level 1 data for the flyover on 8 June 2021 (product ID: *LC08_L1TP_174037_20210608_20210615_02_T1*).

I created a separate folder to keep the original files separate, and created a layer stack in ERDAS Imagine. For the LandSat 7 imagery I used bands 1,2,3,4,5,6,7,8 in order; for the LandSat 8 imagery bands 2,3,4,5,6,10,7,8 in order.

After stacking both sets of imagery, I then pansharpened each stack using band 8 (panchromatic) for each respective satellite. After pansharpening, I created a subset image to focus on the study area of each stack.

For each image stack I performed a supervised classification using a total of seven classes using the definitions in *Anderson et al. (1976)* as a basis for the classes. The classes I chose are: agriculture, barren, built-up, burned land, rangeland, water, and wetlands.

Results



Classified imagery of the Golan Heights, 9 June 2001 on left, 8 June 2021 on left. Olsen, 2021

I was unable to perform an accuracy assessment for each classification, the process would either continuously fail or give an accuracy result of <0.50%.

I performed a change assessment by summing the histogram value for each class then finding the percentage of each class, then subtracting the 9 Jun 01 from the 8 Jun 21 percentages.

Class	9 Jun 01	8 Jun 21	% Change
Built-up	15.66%	30.09%	14.43%
Agricultural	26.32%	29.56%	3.24%
Barren	42.22%	24.87%	-17.35%
Burned Land	3.01%	0.50%	-2.52%
Rangeland	3.64%	6.17%	2.52%
Wetlands	1.68%	0.98%	-0.70%
Water	7.46%	7.83%	0.37%

The change assessment shows an increase in human development of the region, this can also be seen in the supervised classification images, the changes are evident.

Conclusion

Supervised classification of a desert biome can be difficult due to collection of dust and sand on flat surfaces. The accuracy of the supervised classification is difficult due to the limit of 15 meter imagery provided by the USGS and LandSat satellites.

References

James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer, 1976. A Land Use and Land Cover Classification System for Use with Remote Sensor Data