i-tree academy 2020

Using i-tree canopy to monitor *Prosopis juliflora* invasion of Swiemeh village-Jordan Valley

Final project

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Summary:

i-tree canopy tool was used to assess *Prosopis juliflora* invasion in Swiemeh village in the Jordan Valley from 2004-2020. 300 randomly generated points was surveyed based on 2020 and 2004 google imagery, respectively. Areas occupied by *P. juliflora* almost tripled in the investigation period, while urbanization related impervious surfaces increased by around 5% as well. The findings suggest that i-tree canopy can be a very useful and practical tool to study land cover and monitor land cover changes.

Introduction:

Prosopis juliflora was introduced to Jordan in the 80's of the past century. This wonder plant was proposed to tolerate drought and endure grazing pressure, while providing many important benefits. Thus, it was selected to be planted at the roadsides of the Jordan Valley (JV), which is a very vulnerable area receiving around 50-100 mm of rainfall annually. The area is heavily degraded and subjected to intense land use change. Indeed *P. juliflora* thrived in the area, but with time and assisted by vectors such as grazing animals, the species spread from its original introduction locations at road sides and invade farms and natural habitats causing huge environmental, economic and social impacts. Management options including eradication of *P. juliflora* showed limited success.

The purpose of this project is to assess *P. juliflora* invasion in time and space in a selected location near to Swiemeh village in the JV. The obtained results can be used to facilitate informed decision-making process and support biological invasion monitoring efforts.

Methodology:

i-tree canopy v7.0 was used to assess randomly delineated area with 5.28 km^2 representing Swiemeh village and surroundings (figure 1). In April 2020, 300 points was randomly generated by i-tree canopy and classified to one of pre-assigned land types; Grass/herbaceous, impervious buildings, impervious other, impervious road, soil/bare ground, tree/shrub and water. These points were exported to google earth pro and re-assessed using historic imagery from the year 2004 and according to previously assigned land

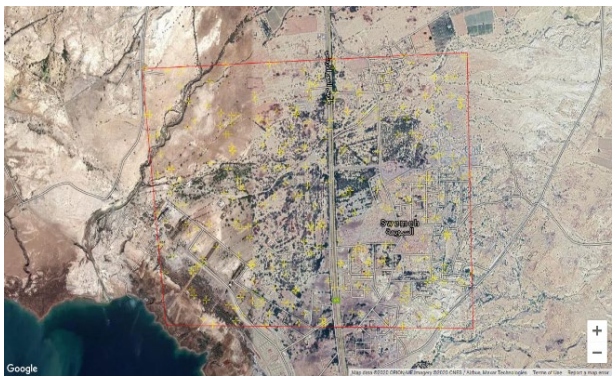

Figure 1: Study area representing Swiemeh village and surrounding.

cover classes. i-tree canopy surveys of 2020 and 2004 was used to assess land cover change and are attached as annex 1 and annex 2, respectively. In both assessments the standard error was controlled below 5% to data quality assurance.

Results:

i-tree canopy surveys of 2020 and 2004 are presented in the table 1 below.

Table 1: Land cover classes assessed in 2020 and 2004, respectively.

Land cover class	2020		2004		% Change
	% cover	SE	% cover	SE	
Grass/ herbaceous	0.00	± 0.00	0.00	± 0.00	0.00
Impervious buildings	1.66	± 0.74	0.66	± 0.00	+1.00
Impervious other	2.33	± 0.88	1.99	± 0.81	+0.34
Impervious road	7.97	± 1.56	4.30	± 1.17	+3.67
Soil/bare ground	58.47	± 2.84	81.46	± 2.24	-22.99
Tree/shrub	29.57	± 2.63	11.59	± 1.84	+17.98
Water	0.00	± 0.00	0.00	± 0.00	0.00

The surveys show that tree/shrub cover has increased by about 18% within 15 years. Furthermore, urbanization impact is quite obvious with around 5% change in roads, buildings and other impervious surfaces. Together, these changes resulted in around 23% reduction of the area covered by soil / bare ground. Results regarding benefits will not be presented neither discussed as they might be highly argued in this context using this methodology, but can be viewed in attached annexes 1&2.

Discussion:

i-tree canopy was used to assess *P. juliflora* invasion of Swiemeh village in the JV. Obtained results showed that shrub/ tree cover has tripled between 2004 and 2020. This is due to plant invasion of other locations and crown size development. Urbanization effect on land use is evident as well. Despite the fact that *P. juliflora* is not the only plant species in the area, it is surely dominating the study area, making most of identified shrubs/ trees. Furthermore, 2004 image quality caused some issues in identifying land cover classes, but the huge change in plant cover unequivocally indicate the huge invasion impact of *P. juliflora* in the area.

The approach used includes the village and nearby landscapes. Thus, help in understanding the multifaceted environmental, economic, and social impacts on invaded areas. Selecting various small parcels of known *P. juliflora* invasion locations within the area can generate evidence to clarify the invasion dynamics and impact even more.

Conclusion:

i-tree canopy can be a very useful tool to assess land cover change. In this study, it shows that it can be used to assess land cover changes occurring in time and space, such as those found in the case of invasion events. i-tree canopy can assist in developing a system to monitor invasion development and to inform decision makers about this issue. Furthermore, this tool can be used to assess other complicated issues as areas evolution and changes in land-use through time. Nevertheless, good study design and quality imagery are pre-quest for sound results.