Geo Data-Based Policymaking: National Tree Canopy Cover Example

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SUMMARY

In the era of global challenges, such as climate change and more frequent extreme weather events, geospatial data plays a crucial role in providing policymakers as well as stakeholders with geo data-based insights. Geographic Information Systems (GIS) data facilitate informed decision making processes and the establishment of long-term strategies.

Israel has high predisposition to be adversely affected by the anticipated climate changes, such as: rising temperatures, heat waves, heavy precipitation and flooding, while the urban areas are the most vulnerable ones. Since the vast majority of the Israeli population is concentrated in cities, mitigation and adaption measures are to be taken to ensure healthy and sustainable living environment in the long run.

Trees contribute greatly to creating a habitability of cities by removing carbon dioxide, reducing air pollution, absorbing surface runoff and producing oxygen. Moreover, urban forest is instrumental in climate change combat by providing shade, cooling of the air and buildings and promoting energy conservation. As a result, trees were recognized by an interdepartmental designated team in the Israeli government as a critical resource and infrastructure to be preserved and expanded, with special attention to urban forestry and shade-providing street trees.

This paper demonstrates the importance of spatial data in creation of people-centered solutions via the example of National Tree Canopy map database. The project was carried out by the Survey of Israel in collaboration with the Technion, actualizing the Governmental Decision 1022 by the Israeli Government: Shading and Cooling of the Urban Space by means of Urban Forestry as an Adaptation Step toward Climate Change.

First, AI techniques were employed on high-resolution orthophotos for efficiently extracting raw, vector-based mapping of tree canopies across the metropolitan centers in Israel. The algorithm utilizes a Machine Learning Mask-R Convolution Neural Network model.

Based on the raw mapping data, it was then possible to calculate Tree Canopy Cover values for cities, neighborhoods, public spaces and individual street segments. Furthermore, Summer Shade Index values maps were generated per street segments as well as entire neighborhoods, thus creating maps that expose the hierarchies of shade tree allocation across urban areas.

High-resolution tree canopy cover mapping can serve local authorities in adopting informed and evidence-based policies regarding urban forests and pursue efficient monitoring and management of their stocks of shade-providing trees. By applying tree canopy cover mapping on a national scale, it would be also possible to expose inherent and systematic deficiencies in tree shade provision between urban settlements resulting from past national and local planning policies, to allocate resources for intensified urban tree planting in locations of high vulnerability to heat, and to effectively follow positive or negative changes in tree canopy cover and their relation to public investment.