GREEN PLANNING DRIVEN BY DATA

PLANNING THE CITIES OF THE FUTURE REQUIRES MORE THAN JUST DECIDING WHERE BUILDINGS AND INFRASTRUCTURE SHOULD BE BUILT – TREES WILL BE JUST AS IMPORTANT. **PETER LICALSI** REPORTS ON A TOOL THAT CAN BE USED TO HELP PLAN THE URBAN ECOSYSTEMS OF TOMORROW

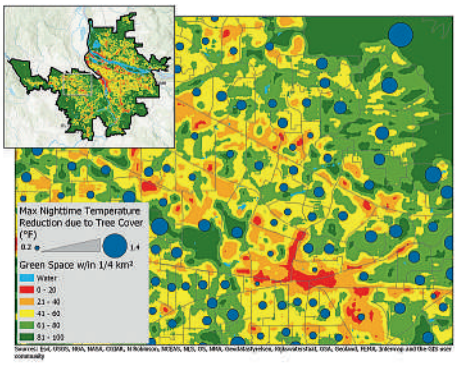
Studies have shown a link between human health and trees. Exposure to nature has a host of positive effects including relief of depression symptoms, increase in white blood cell count, and reduction of stress, heart rate and cortisol levels. Trees also naturally mitigate greenhouse gases, as they absorb carbon dioxide and convert it into oxygen. But to realise their benefits, communities need to understand the best places to plan parks and plant trees equitably and effectively.

To meet needs like this, the US Environmental Protection Agency (EPA) and its partners created EnviroAtlas. Powered by location intelligence, the online open-access tool collects and maps data about the environment, economy, and demographics. It provides planning organisations with context and a framework to make decisions related to ecosystem services. For example, planners can use EnviroAtlas to create a new park or plant trees along a pavement. It is a data-driven, strategic tool for planning green spaces that have the greatest positive impact, and communities are already putting it to use.

Urban heat islands

The East Portland neighbourhood in Portland, Oregon had a climate problem that many cities are starting to face – urban heat islands (UHI). This phenomenon occurs when urban structures and materials such as asphalt combine to absorb, reflect and radiate heat at elevated levels. A lack of trees and other vegetation for shade, water filtration, and uptake combined with a decrease in the amount of atmospheric carbon dioxide (a greenhouse gas) exacerbates the problem of UHI.

Based on the concerns of local stakeholders, the EPA used EnviroAtlas and other available data to map UHI in the city of Portland. They identified areas that might benefit from heat mitigation through additional street trees and other solutions including rooftop gardens. Using remote sensing and spatial analytics, the EPA calculated differences in land surface temperature that could be attributed to UHI effects.



Map showing the maximum night-time temperature reduction as a result of tree cover in Portland, OR

To visualise excessive heating in certain neighbourhoods, the EPA created a map of UHI for the whole metropolitan region and shared this information with local stakeholders. The map, which used thermal information from the Landsat 8 earth observation satellite, showed areas in Portland that managed to stay cool despite higher summer heat. When the city compared the UHI map to the amount of vegetation and trees, they found a close association between the two – as the amount of vegetation increased, the UHI effect decreased.

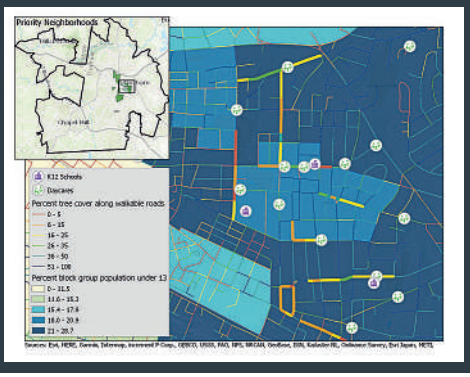
THE GREEN SPACES OF THE FUTURE WILL BE EVERYWHERE AND THEIR LOCATIONS INFORMED BY THE NEEDS OF THE COMMUNITY

To better target warmer neighbourhoods for planting additional trees, Portland also looked at the average UHI index summarised by Census block group. This is the smallest geographical unit for which the Census Bureau publishes sample data. Zooming into East Portland, the EnviroAtlas map pinpoints neighbourhoods with a high UHI index. By viewing the average summer UHI index for each block group, users could identify the

Tree buffers

The city of Durham, North Carolina recently prioritised tree planting and used data from EnviroAtlas to look at existing tree cover along walkable roadways as a starting point. As the city worked to plant thousands of trees over a period of only a couple of years, officials needed to prioritise these plantings based on the most beneficial locations. They looked specifically at benefiting underserved and vulnerable populations, including children.

EnviroAtlas staff produced a map showing the percentage of tree cover along walkable roads and the percentage of a residential population under 13 years old. Because children are most likely to be at school or a day care centre during the work week, they also mapped the locations of these facilities to target vulnerable children in unhealthy environments. Durham planners then considered all of these data layers to identify priority blocks for planting additional street trees.



number of block groups with a high UHI index. Seeing the difference among block groups, from coolest to warmest, made it easy to identify block groups that would benefit most from additional green infrastructure.

By adding one of several estimated tree cover layers from EnviroAtlas, city planners could see that Rockwood and adjacent neighbourhoods had little tree cover along major roadways. Since these locations experienced the greatest UHI effect, planting new street trees would have the greatest impact in mitigating heat for the community.

Green infrastructure

Cities are beginning to realise that nature can and must be a part of urban planning. But just as the planning of roads, bridges, and public transportation need a location-based strategy, so too does green infrastructure. Gone are the days of a massive metropolitan centre orbiting a single botanical garden or park. The green spaces of the future will be everywhere, and their locations informed by the needs of the community. Cities can now use readily available location-based data to make concrete cost-benefit analyses of how and where to build parks, tree buffer zones, green roofs, and to identify other ways to integrate nature into the fabric of the urban architecture.

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