BUSINESS AREA: SPATIAL SERVICES

Case Study

Cooling the City

With the frequency of extreme heat events increasing in urban areas, heat stress is becoming a major health concern for pedestrians as they navigate their way across the urban landscape.

To explore this issue and map out routes through a heating city, the Urban Sustainability Branch within the City of Melbourne required a pilot project to analyse and map the thermal comfort for pedestrian routes. While trees and shade can offer some reduction of ambient temperate, additional cooling potential depends on the nature of the surrounding urban environment, such as surface materials, geometry, building height and density.

To improve liveability and pedestrian wellbeing, the City of Melbourne is implementing a Digital Urban Infrastructure program that encompasses three pilot projects to test the performance of digital infrastructure such as sensors within the urban environment. The city is interested in further understanding the benefits, impacts, challenges and opportunities for expanding digital urban infrastructure within the municipality. Cooling the City forms one of the selected projects and involves analysing and mapping the thermal comfort for pedestrian routes.

"Spatial Vision played an integral role in this project, including designing a theoretical model to map thermal comfort using CoM data. The 'cool routes' tool will enable city users to move around the city comfortably and also provide us with an opportunity to communicate the importance of looking after your health during heat events and demonstrate the benefits of greening to cool the city."

Candace Jordan
Sustainability Officer - Climate Resilience
Urban Sustainability Branch, City of Melbourne

Customer Profile
www.melbourne.vic.gov.au

Company
City of Melbourne - Urban Sustainability Branch, Climate Resilience

Location
Melbourne, VIC

Industry
Local Government

Products
Data Analysis & Data Layers

Solution
Using a variety of key spatial datasets, including tree canopy cover, shadow cover at time of day and footpath surface material, held by the City of Melbourne, Spatial Vision produced a thermal comfort model that highlighted the cooler routes for pedestrians.

Benefits
- Creation of dataset within the existing pedestrian network that would detail the most thermally optimal route between two points at three times of the day, as well as the shortest.
- The underlying thermal comfort raster mosaic indicated hotter regions indicating areas of opportunity and development for future city planning.

The Issue

Finding a route though a city block, at times can be more than just finding the quickest route. Often on a hot day, using a shadier or cooler route can be desirable. The Cool Routes project for the City of Melbourne had an objective to map out these thermally optimal routes in the city through the creation of a thermal comfort mosaic, which then would be embedded within a pedestrian network to create a network dataset that would be navigable in a web-enabled platform.

Using a variety of key spatial datasets held by the City of Melbourne, as well as other data sources, a thermal comfort model was designed to emphasise the cooler routes for pedestrians as well as indicate areas of opportunity for future city planning.

The Solution

Focusing on Melbourne's Innovation District as the study area, a spatial model was built identifying the most thermally comfortable route to planned destinations on pedestrian networks using a combination of spatial and network analysis toolkits.

Using a modular approach, key data layers were gathered from the City of Melbourne and organised into key themes relating to thermal comfort.

Key themes for thermal comfort include:

- **Vegetation canopy cover and type**
- **Surface material**
- **Water sources**
- **Water sensitive urban design**
- **Building footprints**

These were assembled into four main modules; surface type, natural environment, built environment and adjoining infrastructure.

Relative thermal ratings were determined for each feature, both at an immediate feature point and up to a distance of five metres from the object, before being converted into the raster mosaics. Ratings were then appropriately adjusted over this five-metre distance using a filtering focal statistical approach.

The mosaics are then weighted against one another using a pairwise comparison to determine relative weights and a raster overlay with these weights. As an output, each grid cell contained a unique thermal comfort index rating. In the final process, the mosaics were embedded within the pedestrian network, which determines the ideal navigation and route planning for optimal shade and thermal comfort across the study area.

The Benefits

- The model was built in a modular format. This enabled customisation of inputs, creating a unique localised thermal comfort index catering for different themes and constraints. This also allowed updating on a module rather than the whole model.
- Outcomes demonstrated a multimodal navigation environment involving thermal metrics, pedestrian networks, green-space and tree shade. The thermal comfort model highlighted cooler routes for pedestrians and areas of opportunity for future city planning.
- Focusing on Melbourne's Innovation District in the CBD North, Carlton and Parkville, the council displayed and promoted the thermal comfort map as part of Melbourne Knowledge Week in May 2019.

Our Cool Routes project assists in improving pedestrian wellbeing, highlighting opportunities for future city planning.

If you'd like to know more, please get in touch.

spatialvision.com.au

Level 8, 575 Bourke Street
Melbourne 3000 Australia

info@spatialvision.com.au
+61 03 9691 3000

Spatial Vision