Mapping Canberra's Tree Canopy with Airborne Lidar

Transport Canberra and City Services (TCCS) recently engaged 1Spatial, a leading company in managing geospatial data, to analyse and extract aerial laser scanning data. The project was aimed at accelerating the establishment of baseline data for the urban tree canopy coverage of Canberra, the capital of Australia.

The relationships between climate change challenges, sustainability goals and community expectations are key drivers in TCCS's development of an urban tree planting programme. Informative and current data sets are being used to inform management strategies by overlaying age, density and condition data and proposing future canopy density targets.

Current baseline data

The establishment of current baseline data for Canberra's urban tree canopy coverage was essential to the programme. In this respect, two data sets were available: a 2010 ground-based audit of trees in streets, verge areas, open spaces and parks; and new aerial laser scanning Lidar (Light Detection And Ranging) data for the majority of urban areas across Canberra.

With a tight timeframe of four weeks to complete the project, TCCS needed to quickly analyse and extract the Lidar data relating to trees and combine it with the ground-based audit data. After evaluating different tools and methods, TCCS chose Safe Software's FME application and engaged 1Spatial, for their expertise in analysing and extracting Lidar data to accelerate the process.

TCCS was keen to use FME because they have an existing skills base, said Daniel Goodwin, acting manager, asset & data integration for TCCS. FME is more user friendly than other approaches which require more specialised expertise. It also provides full transparency into the process which makes it very good for iterative development. With other tools, the TCCS team was not sure they could get the outcome wanted in the available timeframe.

Mapping tools

A 1Spatial consultant was contracted for two weeks to identify tree-related data points in the Lidar dataset and generalise them to create smooth representations of the tree canopy. Within a week, 1Spatial had a good product output, and then we ran some refinements over the next week, said Goodwin. They used out-of-the-box smoothing algorithms in FME to generate very compelling data for their analysis.

As 1Spatial was able to deliver ahead of schedule, the Directorate could save time and use its own FME skills more productively. This included verifying the tree canopy data, integrating it with other datasets and creating mapping tools for strategic tree planting and management.

Lidar data

When the final tree canopy data was displayed in TCCS's Geographical Information System (GIS), with canopy coverage calculated as a percentage, the value of the Lidar data was immediately obvious.

The Lidar data was crucial in determining the canopy cover, said Goodwin. Publicly available Web mapping tools tend to merge urban and non-urban areas and overestimate urban tree cover. When the team focussed on the urban areas we have control over, they could see which suburbs and streets have less canopy cover than others and better target the tree management strategy.

TCCS can also use the new data to facilitate implementation of the urban tree planting programme and communicate with key stakeholders. An interactive Web mapping tool is currently being developed to be used by urban tree planners, designers and contractors.

FME is a great tool for handling large volumes of aerial Lidar data and integrating it with other geospatial datasets, said Natalie Cooney, general manager, 1Spatial Australia. Although aerial laser scanning is now becoming common, relatively few people have the skills to manipulate Lidar data, and 1Spatial was delighted to be able to assist TCCS."

To read the full case study visit: www.1spatial.com/transport-canberra-city-services