Conservation LiDAR gains momentum

Light-detection-and-ranging (LiDAR) campaigns were rare and expensive just a few years ago, but this laser-based mapping technology has now turned into the second cheapest and second most widespread airborne data source available after aerial photography. More and more countries and regions are investing in full scans of their territory, and access to such data is no more the privilege of Europe and North America: diverse and remote landscapes in South America, Africa, South-East Asia and Australasia are being scanned with increased frequency and spatial coverage. In order to address the growing availability of LIDAR data for conservation together with the need for biologists to understand the processing of 3D point clouds, a two-day pre-conference training course was delivered by Dr. András Zlinszky (Vienna University of Technology) and Dr. Shaun Levick (Max Planck Institute for Biogeochemistry) at ICCB 2015.

At ICCB 2015, a line-up of talks illustrating the use of airborne LIDAR in conservation have been presented, strikingly demonstrating the capabilities of 3-dimensional, high-resolution datasets compared to the lower resolution, 2-dimensional images that are more routinely used in conservation mapping.

Jolene Fisher of The University of the Witwatersrand used a time series of Carnegie Airborne Observatory (CAO) LIDAR scans to show regeneration of savannah woodlands near Kruger National Park. Jolene showed the usefulness of a 3D versus a 2D classification of vegetation structure especially in a structurally heterogenous environment. Penelope Mograbi, also of the University of the Witwatersrand, in collaboration with the CAO, showed that woody biomass in African communal rangelands is increasing despite extensive fuelwood harvesting and predictions of woodland loss, but that these increases are only occurring in the low vegetation classes (shrub layer).

LIDAR also proved to be a game-changer in the calculation of urban biological carbon storage. National-scale estimates usually assume that land in towns and cities has a carbon density of zero, based on land-cover from low-resolution satellite images. Zoe Davies from the University of Kent used LIDAR data collected by the city of Leicester to measure tree and shrub cover and height in extremely high resolution. The study proved that vegetation in towns and cities can make a significant contribution to carbon storage and could lock away even more carbon if local authorities and gardeners planted and maintained more trees. The work also demonstrated how low spatial resolution datasets substantially underestimate vegetation cover of urban areas.

Finally, Dr. András Zlinszky from the Vienna University of Technology presented the application of full-waveform airborne LiDAR for Natura 2000 conservation status monitoring of alkali grasslands, developed within the Changehabitats2 project. Natura 2000 monitoring protocols usually involve a series of measurements to be carried out in the field and summed for calculation of final conservation status. This study aimed at mapping all of these prescribed parameters directly from LiDAR, exploiting not only height measurements but also waveform, texture and radiometry. The final product was a sub-meter resolution map of the status of the grassland, together with the individual variables that are the reason for favourable or unfavourable state of the habitat.

LIDAR is about more than height models: it offers high-resolution structural and radiometric data at landscape to regional scales with ever-increasing coverage and availability. Many of the current issues of conservation, such as biodiversity quantification, ecosystem services mapping, and validation of conservation effectiveness can benefit greatly from the use of LIDAR.

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