OUR GREEN AND PLEASANT LAND

TREES AND HEDGEROWS FORM AN ESSENTIAL PART OF THE UK'S HISTORIC RURAL AND URBAN LANDSCAPE CONTRIBUTING NOT ONLY AESTHETICALLY BUT ALSO ENVIRONMENTALLY AND EVEN ECONOMICALLY. HOWEVER THE MANAGEMENT OF THESE VALUABLE RESOURCES CAN PRESENT A HEADACHE WITH FINANCIAL CONSIDERATION OFTEN OUT WEIGHING MORE THE POSITIVE CONTRIBUTIONS OFFERED. JAMES EDDY, TECHNICAL DIRECTOR AND CO FOUNDER OF AERIAL SURVEYING COMPANY BLUESKY EXAMINES HOW AERIAL PHOTOGRAPHY COULD LEND A HELPING HAND.

Hedgerows are a highly valued resource, for many reasons, and are protected by local planning law, biodiversity planning and the EU Habitats Directives. Hedgerows are a respected part of our cultural heritage and historic record as they were considered essential for marking ownership boundaries and controlling the movement of livestock; however with the easy availability of accurate maps, GPS and wire fencing these reasons are less valid. In today's world hedgerows are becoming increasingly valued for their great value to wildlife and the natural landscape and the role they play in preventing soil loss and reducing pollution, and for their potential to regulate water supply and reduce flooding.

Currently hedgerow mapping is a largely manual process, either from field survey, field sampling or air photo interpretation. These traditional approaches can provide high quality, detailed maps but can be expensive and or time consuming. In a recent research project Environment Systems has developed a unique methodology to automatically extract hedgerow features dramatically reducing the time and cost of more traditional field mapping exercises.

Using high-resolution aerial photography and colour infrared imagery supplied by Bluesky, Environment Systems has developed a semi-automated methodology for hedgerow mapping. The red, green, blue and colour infrared spectral bans of the imagery are optimised (however other combinations or other spectral information can be used) and automated digitising techniques are used to extract hedgerow features. The output from this process is a geographic information system (GIS) ready polygon hedgerow dataset complete with length, areas and condition indicator attributes.

"The key driver for this research has been to develop a rapid, low cost approach, requiring little operator interaction, to produce a hedgerow baseline that identifies the presence and extent of a hedgerow over large

The ProximiTREE 3D digital map layer

Valuable visual information is conveyed by ProximiTREE's overhead view

areas," commented Steve Keyworth, Director of Aberystwyth based Environment Systems Ltd. "The key input is high resolution, four band, digital aerial imagery either from the Vexcel or ADS40 camera."

The urban environment

While we all admire majestic tree lined streets and urban green spaces dotted with ancient oaks it would appear that it is all too easy to find a reason to remove them. In Whitehall, street trees were removed as part of the war on terror while in Islington 'killer pear trees' were destroyed. It has also been known for trees to be removed as they 'got in the way' of police surveillance cameras. In general there are three main reasons to remove a tree; the tree itself is considered dangerous, worries over subsidence and development or redevelopment projects.

Each year, about three people in the UK are killed by falling trees in public places - roughly equivalent to a risk of one in 20 million. Then bear in mind the UK's Heath and Safety Executive considers a one-in-a-million risk as very low and the threshold for what is considered acceptable; contrast this with the risk of one-in-16,800 for an average Briton being killed in a car accident in any one year.

However, subsidence of houses is estimate to cost the insurance industry in excess of £500 million pounds after each dry year, and is usually the second most expensive insured peril, after fire. In the majority of cases, particularly on clay soils, trees are the main cause of subsidence. Concern about the location of trees is a major worry to house owners, not only when trees cause damage through subsidence but also because the proximity of trees can jeopardise house purchases, mortgage loans and even cause disputes between neighbours.

There also exists a British Standard (BS5837), which provides guidance in respect of development sites for a balanced approach on deciding which trees are appropriate for retention, on the effect of trees on design consideration and on the means of protecting trees during development. Local Authorities may well, therefore, require a Tree Report as part of a planning application.

While the above describes some of the negatives associated with urban trees it is only in the past decade or so that their benefits have been documented. For example we all know that trees can reduce urban temperatures by up to 4C (7F) therefore more urban canopy may prove essential as global warming takes effect. Urban trees, as does the rural hedgerow, also absorb floodwater, slow run off and absorb different kinds of pollution including particulate, chemical and noise.

With both sides of the argument considered Bluesky looked to develop a solution to help those charged with managing our tree assets. ProximiTREE is a brand new digital map layer accurately modelling the location and extent of trees and their proximity to buildings. Designed as a tool to aid insurance assessors, property developers and Local Authority Planners, ProximiTREE details the exact spatial location and height of individual trees together with the circumference of its canopy; from this information a determination can be made of the root extent and the potential impact on either existing or proposed properties.

ProximiTREE is an accurate map representation and database of tree heights and their canopy widths derived from aerial photography. A team of editors, trained in accurate photo-interpretation, examines aerial photos to identify the height of all crown and canopies visible within each photo. Once the highest point of each tree's crown has been measured, actual tree heights are determined using an existing Digital Terrain Model (digital representation of ground surface topography or terrain).

Available in formats suitable for use in desktop Geographical Information Systems (GIS), web mapping applications and Computer Aided Design (CAD) packages ProximiTREE comprises of both 2D location and 3D height measurements so it can be viewed and interrogated in both 2D and 3D.

The final dataset enables the end user to analyse the spatial location, size and height of trees against existing vector mapping sources, address database information and orthorectified aerial photography to make informed decisions about the volume, proximity and potential risk of trees at a local level. Early trials of ProximiTREE data by UK local authorities have shown the data reduces the time (and therefore costs) taken to complete tree audits and reduced the need for costly site visits when issuing or enforcing Tree Preservation Orders (TPOs). Trials have also highlighted applications of the data within the planning process, highways maintenance and new planting and landscaping schemes.

Outside the Local Authority arena it is thought ProximiTREE may provide benefit to Utility companies where cable avoidance, either above or below ground, is critical to the maintenance and installation of electricity, water, gas and communications infrastructure. The Emergency Services may also benefit from prior knowledge about the location and extent of trees when considering access and route planning for major incidents or deploying equipment to the scene of an accident.

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