

# Urban Monitor™

## FINE-SCALE MONITORING OF COMPLEX ENVIRONMENTS

Remote Sensing and Image Integration Team

[www.data61.csiro.au](http://www.data61.csiro.au)



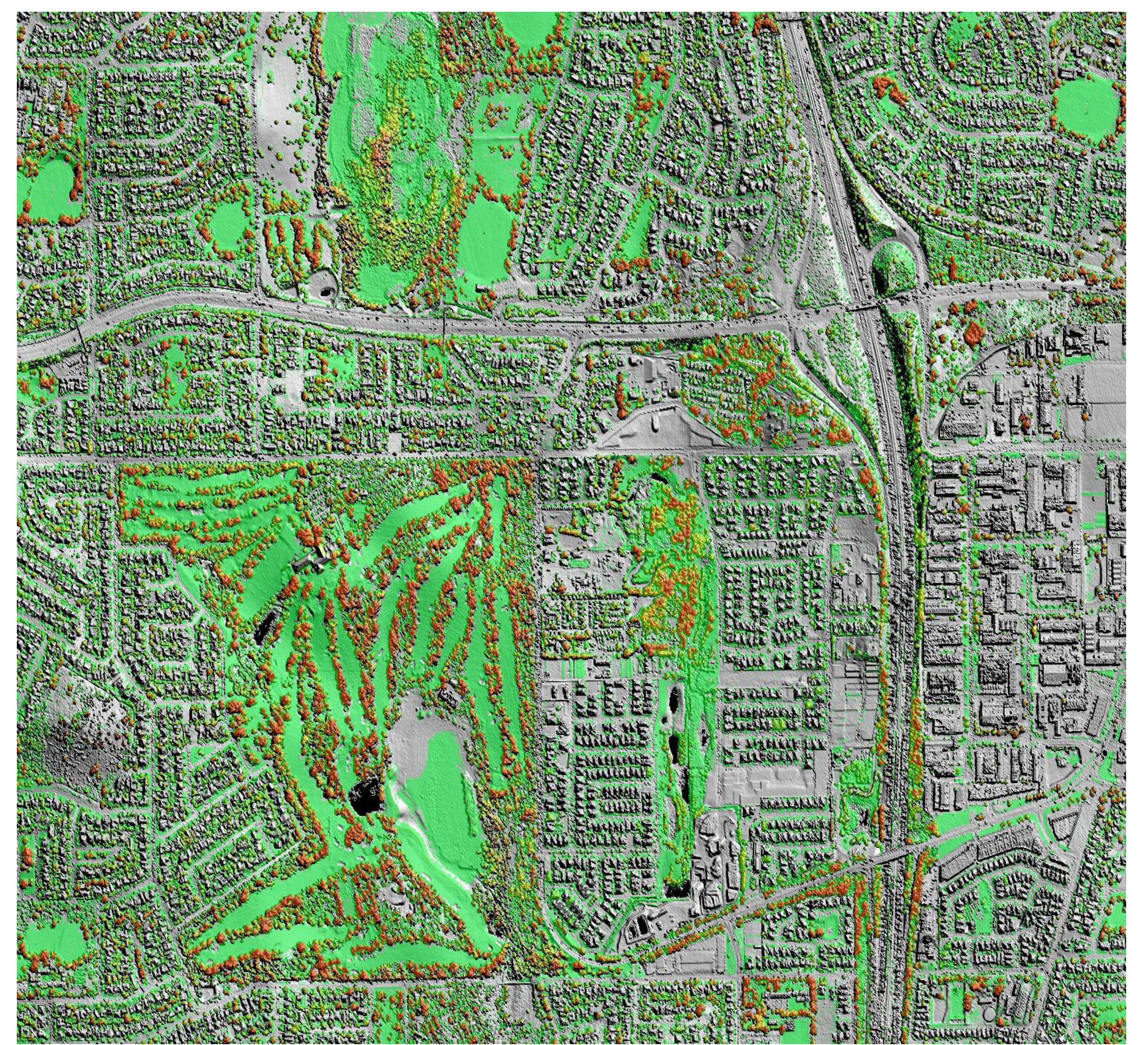
Most Australians live in urban and coastal areas which continuously change creating challenges for service provision, resource allocation, regulatory surveillance and planning. The availability of high quality digital photography allows unparalleled monitoring of environmental indicators. Urban Monitor is a monitoring system, able to track and communicate land cover and structural changes in a way that has not been previously possible.

### The Urban Monitor approach

Urban and peri-urban areas contain varied land surfaces such as roofs, irrigated and non-irrigated trees, bushes and lawns. Each surface has impacts on the hydrological and energy cycle and the impacts change in complex ways as the surfaces change over time.

Digital aerial photography can monitor changes in these surfaces at high precision (e.g. 0.1 to 0.3m) – their presence, area, condition, volume and height above the ground or above sea level. To achieve this, the data is geometrically and radiometrically calibrated making quantitative comparisons in space and time possible. For instance, land cover statistics of a local government area may be compared with previous years, and these statistics may be meaningfully compared with those of other councils.

The Urban Monitor project has solved a number of technical problems enabling digital photography to be used as an effective monitoring tool. Elevation models of the city surface and ground surface are produced along with images calibrated to surface reflectance. From these urban metrics and indicators such as presence and absence of greenspace, built objects and surface properties are derived.



**Figure 2:** Grassed areas are green, bushes and trees have hotter colours representing increasing height above ground. The elevation of built structures and impervious areas are shown in grey scale.



**Figure 1:** False colour imagery with bright red areas photosynthetically active (irrigated and healthy), dull red areas vegetated but non-irrigated and grey areas non vegetated.



**Figure 3:** The loss of urban trees is shown in red, yellow is no change and green is an increase in tree cover between 2007 and 2009. Grey areas have no vegetation

#### FOR FURTHER INFORMATION

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