

# USING GEOSPATIAL DATA ANALYTICS TO PROVIDE FORESTED ASSET DECISION SUPPORT

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## THE PROBLEM

In the forestry sector, private woodland owners, management companies, investment managers, sawmill forestry owners and larger public and private estates require current information about woodlands to provide effective management, insurance services and valuations.

Forest surveys are typically conducted on a five-year cycle and can be costly due to the diverse and widely dispersed woodlands in the UK, which can sometimes be difficult to access. Tree health issues, windblow damage, species distribution and mensuration could potentially be missed or inaccurate due to the long update cycles.

Working in conjunction with John Clegg and with the analysis of two forested assets in Scotland, Rezatec have demonstrated how the cost-effectiveness and accuracy of Earth Observation (EO) technologies to support woodland inventory and plant health assessments are pioneering an innovative new approach to forest management.



**Rezatec**

**John Clegg & Co**

CHARTERED SURVEYORS



## THE SOLUTION

For the two forested assets in Scotland, Rezatec mapped out species distribution, stand mensuration, windblow damage and associated health issues. Rezatec's web-based portal allowed John Clegg to view these products and download the data in tabular format on a more frequent basis than the regularly scheduled surveys. Managers and owners can view the data in a geospatial context that they haven't been able to previously do.

Rezatec utilises EO optical and radar data in proprietary machine learning algorithms to output data products that are scalable and easier to update on a more frequent basis than traditional field surveys. For the European Space Agency and John Clegg, Rezatec analysed optical and radar data to derive the following products with current information about woodlands in Scotland:

### + Species distribution mapping

This product is based on analysis of EO optical and radar data in order to model the spatial distribution and proportions of discrete tree species within the study area.

According to existing data each compartment contained only one or two species with no spatial distribution information. Rezatec's analysis proved there were more than one or two species within the compartments and also provided the missing spatial distribution. As a result, the valuation of the stand is more accurate.



Geospatial visualisations of tree species distribution

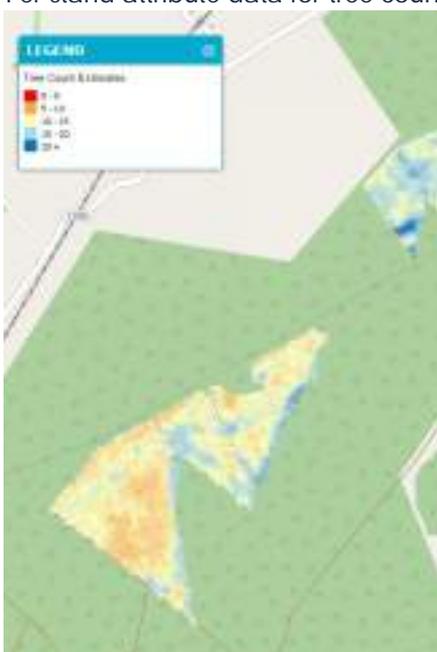


## + Stand mensuration mapping

This product is made up of three separate components (count, height, volume) which allow for the quantification of the timber within the study area, essential for understanding the true value of the stock. The species distribution information is combined with EO-derived optical and radar data and environmental layers to model the number of trees, mean height and total volume within each stand. The results can be viewed as geospatial visualisations or in tabular format.

Stand No.	Area (Ha)	Planting Year	Total Est. Count	Trees / Ha	Total Est. Vol. (m <sup>3</sup> )	Est. Volume / Ha	Tree Height (m)	Species	Species % Est.	Total Est. Species Vol. (m3)	Total Est. Species Vol. / Ha
2	27.94	1972	23,546	843	6,487.63	232.2	18.09	SP	100	6,356.39	227.5
3	20.93	1975	25,031	1,196	4,058.03	193.89	17.64	SS SP LP	20 64 16	377.73 3,214.72 287.46	18.05 153.59 13.73

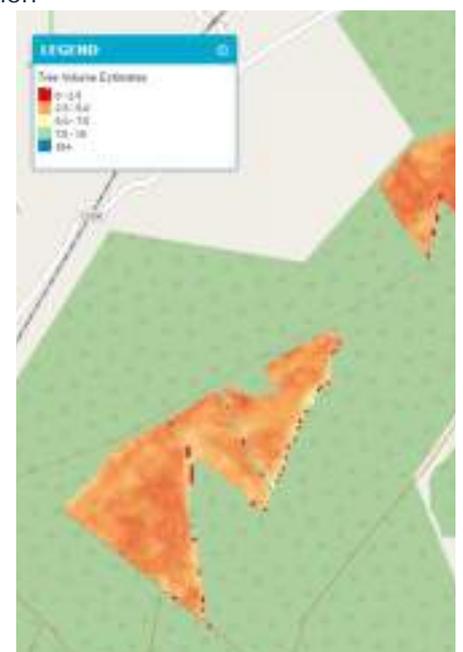
Per stand attribute data for tree count, volume and height and species distribution



Geospatial visualisations for tree count



Geospatial visualisations for tree height



Geospatial visualisations for tree volume

# FORESTRY CASE STUDY



## + Windblow damage mapping

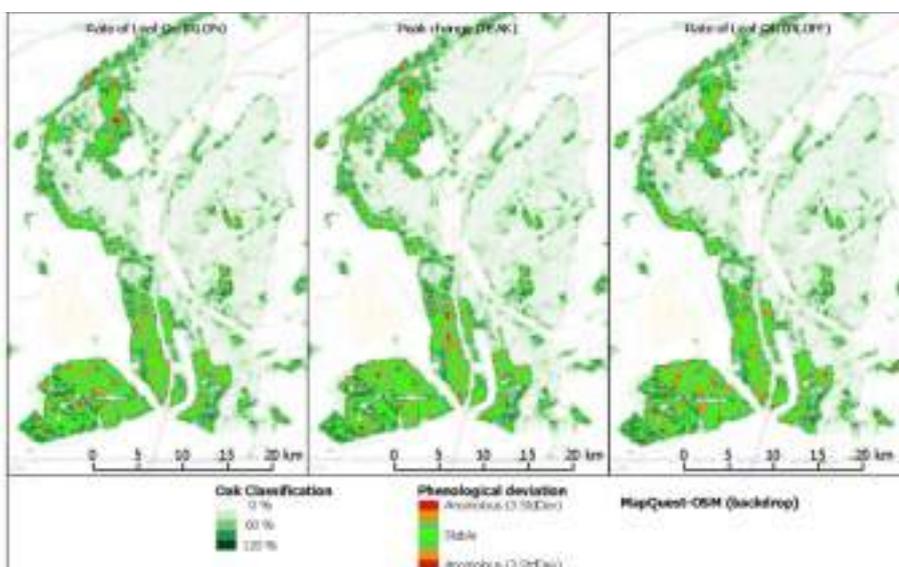
This product uses a time-series of Earth Observation (EO) data in order to monitor the changing state of the forested asset over time and identify any rapid changes associated with wind damage. These areas are then identified spatially and the user can take mitigating actions. Rezatec's analysis resulted in automatic detection of recent windblow damage. When combined with the species distribution & mensuration data, asset owners/managers are able to get a quantification of what was lost or what can be recovered from windblow damage.



Before 21st July 2015



After 5th June 2016



Tree health: Phenology for Tree Stress Monitoring – Oak (2015)

## + Health monitoring

This product is the output of analysis of a time-series of Earth Observation (EO) data in order to monitor the changing state of the forested asset. It also identifies any changes away from an established baseline that are indicative of potential stress or disease. This then allows the user to identify specific localised areas which may require further assessment to direct remediation activities.