Rezatec

ASSESSING WILDFIRE DAMAGE FROM SPACE

FORESTRY GUIDE

SATELLITE DATA ANALYTICS SUPPORTS FORESTERS IN MAKING INFORMED SALVAGE DECISIONS.

No day goes by without a wildfire burning in some part of the world. Fires are spreading across larger areas and burning more severely than ever before in modern times. To manage this increasing threat to our natural landscape effectively and salvage any remaining commercially viable timber after a fire, foresters need all the data they can get their hands on as quickly as possible. In this article we reveal why geospatial data analytics is the ideal technology for this purpose.

DECISION-MAKING IN THE AFTERMATH

Earth observation satellite technology offers huge quantities of geospatial information, which when combined with advanced analytics delivers rapid insights into forest ecosystems. Nowhere are these insights more vital than in commercial forestry decision-making in the aftermath of a wildfire.

For millions of years, natural cycles of rainfall, drought and lightning have been the main culprits of recurring wildfires. This continues today with naturally occurring summer fires common, for example, in Canada's boreal forests. Even though wildfires clear dead and dying underbrush, helping restore forest ecosystems to good health in the long run, they also threaten lives and property, and leave many dying trees in their wake that act as kindling for yet more fires in the future.

Regardless of how they are started, wildfires have very damaging consequences. In addition, they char and degrade harvestable timber supplies – though not all will be dead and still fewer will be worthless.

FACTORS IN SALVAGE OPERATIONS

Immediate timber damage depends on the severity of the fire, ranging from abrupt death to minimal charring, shakes and checks. Except for all but the most severe fires, most trees retain a lot of their value directly afterwards. A study found that between just 2 and 16 percent of all boards sawn from fire-affected oak butt logs showed any related defects.

However, for the trees that survive, the resulting stress weakens them and makes them more vulnerable to bark beetle, disease, rot and moisture loss. These secondary effects are eventually lethal and damage the timber further – meaning salvage is a time-sensitive operation.

Figuring out which trees can and should be salvaged to recover economic value after a wildfire is a tough task. Foresters need to look at the forest's health and function in terms of salvage logging's ecological impacts, such as potential erosion, animal species diversity, and future wildfire and insect pest risk. And they must also assess the economic costs and benefits of salvage logging, weighing up factors like location, topography, road infrastructure and timber damage.

GROUND AND AERIAL SURVEY LIMITATIONS

To make informed and rapid decisions after a wildfire, foresters need as much large-scale data and analysis as possible. The only technology that can deliver these insights is satellite data analytics. Today, the forestry sector relies heavily on traditional methods of data collection.

The most precise and accurate method to assess tree damage is a ground survey, but ground teams cannot cover vast forest areas without a huge financial impact. Therefore, data is primarily collected from aerial surveys. These surveys take photos of the forest and piece them together to produce a digital forest map.

However, as with all other methodologies apart from satellites, aerial surveys need to be repeated every time they are required, for example, after a fire. Consequently, foresters can wait, in some cases, for many months after a wildfire until a viable decision on a salvage operation can be made which, in turn means that the logistical challenges and timber damage can escalate.

DEEPER DATA INSIGHTS

Earth observation satellites can be employed to provide rapid and accurate data and analysis on a large scale, meeting the needs of foresters after a wildfire. Satellite-derived visual data identifies damage to tree canopies and low-level vegetation. When combined with multi-spectral data, deeper insights are gleaned, such as green vegetation loss and decreased moisture content. This knowledge can, for example, be used to plan new access routes to hard-to-reach salvageable trees, enabling the recovery of burnt timber while also creating the road infrastructure for future harvesting.

Insights from satellite observations are further enhanced by targeted ground surveys. Combining ground team data with known damage thresholds and fire severity classes, Earth observation datasets are calibrated to produce rich layers of data. This data exposes the extent and severity of damage of a given wildfire in fine detail.

With a complete and accurate picture of damage in hand soon after a fire, foresters are better prepared to make informed decisions on all timber salvage operations. In turn, once those decisions have been made, fire-affected timber can be retrieved earlier which can result in a higher commercial return on salvage than would have otherwise been the case.

FIND OUT MORE

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WILDFIRES GETTING WORSE

In 2018, the effects of wildfires have been strongly felt around the world. In British Columbia, Canada, at the time of writing, wildfires have devastated over 3.2m acres which is now the worst fire season on record.

With similar stories of wildfire devastation around the world, every indication suggests that, through a combination of factors mainly linked to climate change, wildfires are getting worse, and more costly, year on year.