Fighting wildfires with drones and AI

CRJ Partner **PIX4D** describes how drones and photogrammetry help track and prevent the spread of wildfires, as well as the evacuation process and damage analysis for residents

T he northern hemisphere's summer of 2021 has witnessed multiple heatwave records. Extreme heat dries out the land, leaving it vulnerable to wildfires. Such wildfires can be good for the environment, triggering a new cycle of growth and clearing out dead material. However, with climate change, they have grown in frequency and intensity, leading to larger fires that can get out of control.

There are key actions besides extinguishing the fire that can help mitigate the effects of wildfires: Prevention; tracking; evacuation; and damage assessment.

Drones and photogrammetry software can be used in all stages of these key actions.

One way to predict the spread of a fire and how it will burn is to analyse the territories at risk. The Wildfire Aversion by Forecast and Early Response System team uses PIX4Dmapper to map areas that are vulnerable to wildfires in the US. First, it flies over the zone of concern with a drone before the data is uploaded to PIX4Dmapper. The team then creates heat maps of the land in the software to analyse where the land is most arid. The undergrowth here can then be cleared. This reduces the amount of material to burn which, in turn, cuts down on sites for fire and where it could spread.

The team then uses AI and the 3D models from PIX4Dmapper to simulate how a wildfire would behave. It can input the latest weather forecasts, considering wind which can drive or slow the fire. The simulations created are used to plan evacuations for people as well as the deployment of firefighting resources.

The drone and photogrammetry with fast-mapping software, such as PIX4Dreact, can then be used to give live updates about the fire while the pilot stays in a safe location away from the blaze. Wildfires can move quickly, so emergency responders must be wary of being surrounded unexpectedly.

When it comes to co-ordinating evacuations or assessing damage, different drone image analysis tools can help.

Dangerous substances
In the case of the 2019-2020 Australian wildfires, the New South Wales authorities involved in the clean-up after the fire used PIX4Dmapper to carry out 3D modelling so they could measure volumes. Their outputs were used to measure the size and scale of the damage, including sorting waste into categories from vegetation to infrastructure, to dangerous substances such as asbestos. This was crucial for helping people move safely back to their homes.

In the 2020 wildfire season in California, a team from GeoAcuity had to move even faster. It used PIX4Dreact to get situational awareness and scan the buildings in towns the fire had moved through. This helped create a record for the authorities to use before residents returned to the town, as well as providing material to help local people understand how their properties had been affected.

The team gathered datasets using seven pairs of pilots who flew specified areas that were processed and stuck together by a lead co-ordinator. The 2D orthomosaic of Boulder Creek in California was shared as an open resource map for residents, who could look at 'before' imagery to compare what the fire had done. This is useful not only for damage assessment, but also for predicting the future movements of fires, as well as in helping to deploy assistance to the most affected populations.

Fires can be some of the most uncontrollable and indiscriminate events that people face worldwide, so obtaining actionable data is key to fighting them effectively, whether for prediction, reconnaissance, or recovery. **C·RJ**

■ *PIX4D is a* CRJ *Key Network Partner; visit pix4d.com for more details*

Wildfires decimated California in 2020 and are a continued threat in 2021
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