DRONE USE IN FORESTRY

FEATURE

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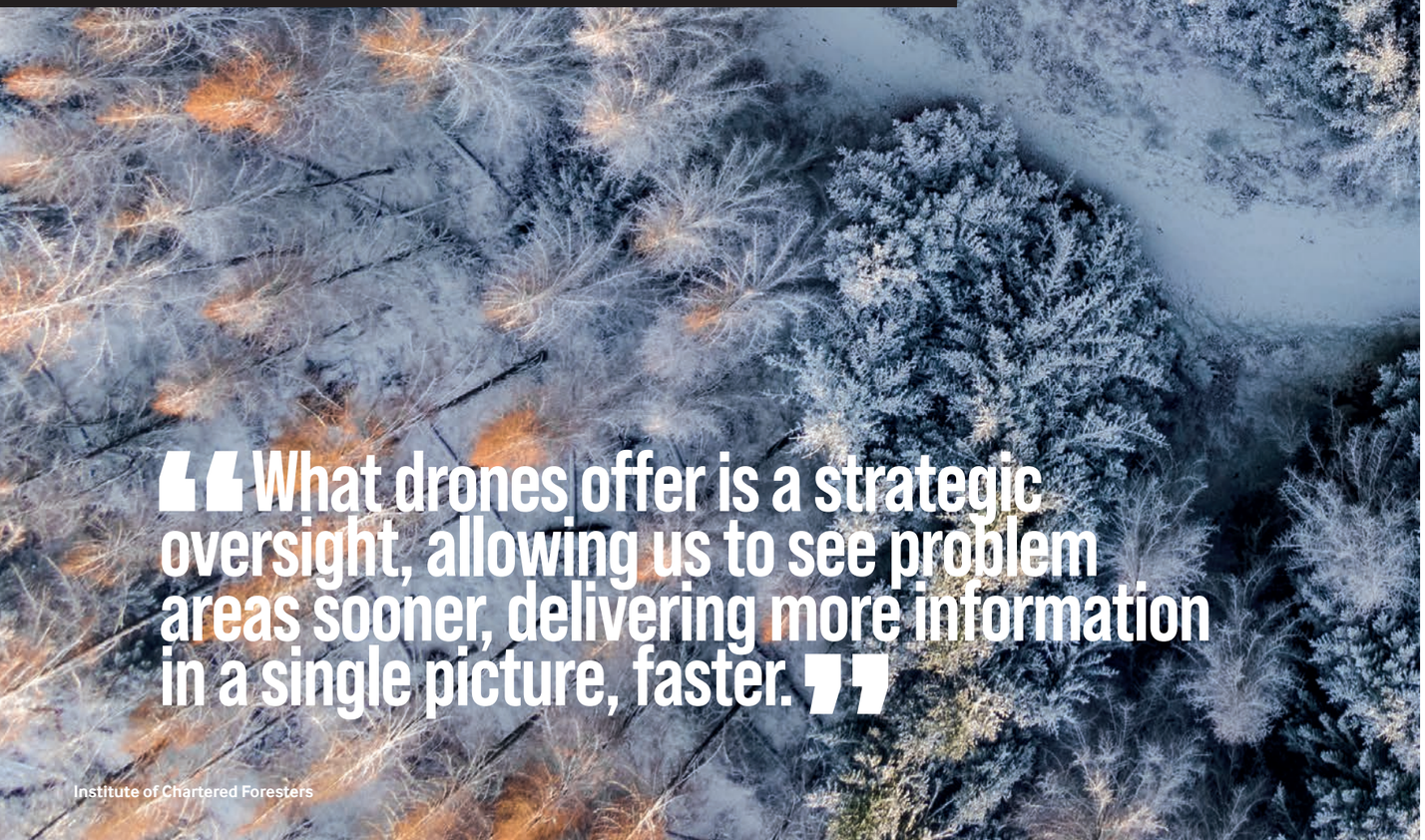
Mark Simpson outlines some of the key considerations when utilising drone technology in forestry operations.



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Drones are daunting to anyone just starting out. What are the laws? What are the limitations? What are the potential applications? Should I use a fixed-wing or quadcopter? What data becomes available? This is an overview guide to drone operations viewed through the filter of forestry.

Laws

Any operator undertaking flight missions to inspect their forest assets will require a permit from the Civil Aviation Authority (CAA) to do so. Unless already in possession of a Permission for Commercial Operations (PfCO), as of the 31st of December 2020 any drone under 2kg requires an A2 Certificate of Competence (A2 CofC) to fly commercially. A drone under 2kg is all a forester really needs. The A2 CofC course is designed to walk the pilot through how to use a drone safely and legally, covering all angles of commercial use with extensive explanations.

Mission Restrictions and the Area of Operations

The drone Area of Operations (AO) is limited to a height of 120m, a radius of 500m and must always stay in Visual Line of Site (VLOS) of the operator. For reference, this works out at to an area of 0.79km2, or 79 hectares (ha) of total coverage. Furthermore, the AO isn’t tethered to the launch site, the AO is tethered to you. If you move, so does the AO. It’s not unheard of for some operators to chase their drone across a site in order to maximise flight time.

Applications

The benefits of even a cheap drone on operational efficiency are staggering. Undiscovered pockets of windblow and significant growth variance are now visible. Blocked drains won’t stay hidden for long. Walking over a waterlogged fell site for routine inspections just became easier. Worried about downstream siltation? Now you can see it in a matter of seconds. Does the site need weeding? Send the drone up. You don’t even need advanced equipment like First Person View Goggles and the latest high-speed laptop - most drones come with a remote controller that plugs directly into your smartphone.

Fixed-Wing or Quadcopter?

Fixed-wing drones are for mapping huge swathes of land - a fixed-wing drone can map the AO in approximately 14 minutes. On a large restock site or new woodland creation you will have unparalleled mapping ability for ground preparation, weeding issues and (if equipped with a multispectral camera) accurate crop health data. Most commercially available fixed-wing drones have a flight time of 90 minutes per battery. At a resolution of 3cm/pixel, they can map at a rate of 5.5 ha per minute. The caveat to a fixed-wing drone is finding a clear area to launch, land and maintain VLOS - an extremely difficult task if you are in the depths of a forest.

Quadcopters are flying periscopes capable of reaching 120m into the air and 500m away from you. A quadcopter can map the AO in approximately 42 minutes. Most commercially available quadcopter drones have a flight time of 20 minutes per battery. At a resolution of 3cm/pixel they can map at a rate of 1.85 ha per minute, making them perfect for small area data capture and precision observation. They are much smaller than a fixed-wing, can take-off and land vertically and will stay in one position for as long as you need.

Data Analysis – Beyond Data Capture

In addition to basic photography and video capture, drones also open sites to more advanced data analysis techniques.

Advanced data analysis starts with the orthomosaic – a single picture created by stitching several photographs together. These photographs are commonly used for roofing and building façade inspections. A map much like google maps can be created when the camera is faced straight down - all GIS software accepts orthomosaics for analysis, allowing you to drag and drop data directly onto the workspace. Several services offer the capability to create and analyse orthomosaics – the most popular being Pix4D & DroneDeploy. When enough pictures of a site have been collected, a fairly accurate point-cloud dataset can be created. Point-cloud datasets allow users to build a 3D model of the site. 3D models offer foresters another new tool – volumetrics. If you map a site before works commence, you now have a way to determine borrow pit volumes and see the visual impact all at the same time.

In Closing

The need for boots on the ground doesn’t vanish with introduction of drones - they simply remove the limitations of terrestrial anchoring. Ground proofing can’t be beaten and will always be a necessity. No technology can mensurate a forest from the air (not even LiDAR, but that is a technology for another article). What drones offer is a strategic oversight, allowing us to see problem areas sooner, delivering more information in a single picture, faster. We can download and send pictures and videos while the drone is still airborne – in some cases even stream the flight in real-time. Drones give us new ways to communicate to our clients, co-workers and the public. We can captivate audiences with the stories of our industry from the scale of the landscape itself, delivering a fascinating new perspective from ground preparation through to harvesting.

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