

Using drone technology to manage natural resources

Natural Resources Wales

The Challenges

- Gather environmental evidence from large, remote areas that are hard to reach
- Collect evidence more frequently to enable better monitoring of environmental changes

The Benefits

- Well-informed decisions about managing natural resources
- Enhanced understanding of changes in the environment
- Rapid responses to environmental events
- Cost efficient monitoring of intervention programmes



Forestry and Land Scotland is using ArcGIS to survey the condition of ash trees on its land and analyse the impact of the devastating Ash Dieback disease over time. The organisation can now clearly see where it needs to take action to limit the risk of falling trees and branches, which helps it to maintain the safety of people visiting, living and working in Scotland's countryside.

The Challenge

Natural Resources Wales is responsible for ensuring that the environment and natural resources of Wales are maintained, protected and used in a sustainable way. One of the organisation's key roles is to gather and share evidence about the environment, which can then be used to inform vitally important decisions about conservation projects, land management and government policy.

Capturing this evidence is, however, not always easy. Some mountainous and coastal areas of Wales are very hard to reach, while others are so vast that they are too big to survey on the ground using traditional methods. Natural Resources Wales wanted to be able to capture evidence efficiently at these large, remote sites, as well as find a more effective way to monitor environmental changes over time.

The Solution

Fortunately for Natural Resources Wales, a cost-effective solution was at hand. The organisation already had a number of drones and Civil Aviation Authority (CAA) approved drone pilots, who previously had just taken imagery for promotional materials. It also had access to Esri's ArcGIS Drone2Map solution, through its ArcGIS Enterprise license, and over eight years' experience of using ArcGIS solutions. "It made sense to make better use of the skilled resources, equipment and software that we already had," says Adam Burke, Lead Specialist Advisor, Geospatial, at Natural Resources Wales.

Following a successful pilot at Whiteford Bay, Natural Resources Wales now makes extensive use of drones to capture evidence at coastal and upland sites right across Wales. Drone2Map enables Natural Resources Wales to stitch its drone-captured pictures together, very quickly and precisely, creating an orthomosaic image of vast landscapes. The organisation can then easily analyse the data captured in the orthomosaic image, along with base mapping and other data, using ArcGIS Pro and ArcGIS Online, to monitor change and gain fresh insight into environmental issues.

The tight integration of Drone2Map with other ArcGIS solutions also makes it very easy for Natural Resources Wales to make its newly-captured environmental evidence available both internally and externally. For example, the organisation uses ArcGIS Online to create Story Maps that embed drone-captured images, enabling it to engage with the public in a new way. It also creates ArcGIS web apps that provide employees with simple tools for analysing and exploring orthomosaic images, from their desks or on mobile devices while in the field.

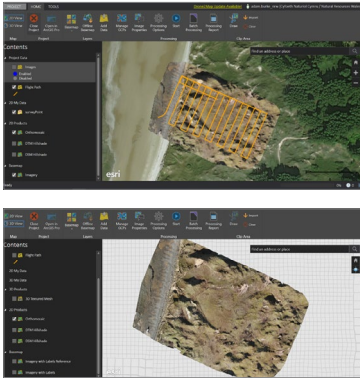
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“Drone2Map enables us to gain high quality evidence about a wide range of different environments, very quickly, which leads to better management of natural resources.”

Adam Burke, Lead Specialist Advisor, Geospatial, Natural Resources Wales



ArcGIS displays the flight path for image capture and the final processed imagery

The Benefits

Well-informed decisions about managing natural resources

Through its use of Drone2Map, Natural Resources Wales has been able to introduce a brand new method of gathering reliable evidence that can be used to inform environmental decisions. Drone2Map is, for example, now playing a key role in Wales' first national peatland action programme, where it is being used to gather data about upland peat bogs that are hard to reach on foot. New evidence about erosion and drainage is being amassed that will help to inform sustainable management and restoration plans for blanket and lowland peats. Burke says, “Drone2Map enables us to gain high quality evidence about a wide range of different environments, very quickly, which leads to better management of natural resources.”

Enhanced understanding of changes in the environment

Natural Resources Wales gains significant benefits from being able to capture drone footage of the same site at regular intervals and then analyse the data to detect and better understand changes in the environment over time. This is particularly important for the Sands of Life project, a £4 million conservation scheme to restore sand dunes that are constantly shifting due to the movement of the wind and tides. Drones can be used to survey hundreds of hectares of dunes on a regular basis, helping environmentalists to identify which dunes are retreating fastest and where best to introduce intervention measures such as fences and trenches.

Rapid responses to environmental events

If something unexpected occurs, Natural Resources Wales can now use its drones and Drone2Map to collect data about the incident very quickly, rather than having to engage an external contractor to complete a drone survey and wait weeks for the report. When storms caused unexpected erosion at Whiteford, the organisation used Drone2Map to see how much had been lost on the frontal dunes. “We could respond quickly to the storm damage, because we had rapid access to the most accurate, up-to-date imagery of the environment,” says Burke. “When the conditions are right, we can achieve near real-time data capture.”

Cost efficient monitoring of intervention programmes

Because the new method of collecting evidence is highly cost efficient, it can be used in a broad range of projects, including monitoring the success of intervention programmes. At Pontarddulais near Swansea, Drone2Map has been used to help Natural Resources Wales monitor the construction of a flood storage reservoir and the installation of new habitats, including a wetlands area, over 3000 trees and shrubs, a pond and improved grassland. The organisation will continue to use Drone2Map at this site to monitor the ongoing development of the new natural environment and measure the success of the scheme in improving biodiversity, while reducing flood risks.

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