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Case study

Safer drinking water from smarter catchment management

Welsh Water

The Challenge

- Deliver wholesome and acceptable drinking water to over three million customers

The Benefits

- Supports environmental objectives
- Instant access to date and insights
- Enhanced health and safety
- More robust business response
- Better data management

Welsh Water's Catchment team has the huge responsibility of ensuring the water quality that reaches its water treatment works is of the best quality it can be, minimising the treatment it requires before being delivered to over three million customers. Driving an organisation-wide spatial and more collaborative approach to data helped the team developed the WaterSource Portal, an ArcGIS enterprise solution which is supporting a more proactive, preventative approach to catchment management.

The Challenge

With an operational area covering more than half of Wales and managing 136 drinking water catchments which feed 61 Water Treatment Works, Welsh Water's Catchment Spatial Risk Analysts play an important role in delivering wholesome and acceptable drinking water to over three million customers.

With limited land holding across these catchments, the not-for-profit water company has little or no control over how it is used. Agriculture, forestry, the use of chemicals including pesticides, fertilisers and nutrients, as well as human settlements and adverse weather conditions can all determine the quality of raw water that enters their water treatment works.

To help understand and monitor its catchment areas, the Catchment Risk Analysis team, who sit within the wider Water Services Science department, acquire data from a range of sources. Traditionally, it relied on huge amounts of data from raw water sampling, along with spot samples and field observations. In recent years the organisation has started to capture knowledge and intelligence through proactive stakeholder programmes with farmers and landowners, to better understand the root causes of deteriorating or changing raw water quality.

The team was keen to demonstrate how a spatial and more collaborative approach to managing data from a variety of sources could transform how it provides scientific evidence and advice to the Water Services team. By safeguarding raw water quality before it reaches the water treatment works, Welsh Water can avoid using additional chemicals and energy to turn it into perfect drinking water, while safeguarding the environment and protecting drinking water sources for generations to come.

The Solution

ArcGIS has historically been used by Welsh Water primarily to consolidate its network and asset-related data. The Catchment Spatial Risk Analysts identified that, as a system of engagement, the ArcGIS platform could be used to share and manage data both internally and externally, working more collaboratively with its stakeholders across catchment areas including farmers and landowners. The team developed the WaterSource Portal, which was initially trialled in November 2018 and quickly adopted 24/7/365 as a business-critical system, taking data out of spreadsheets and sharing it online, through web services, on maps and dashboards.

Data from multiple sources is stored in its Microsoft SQL server database acting as the data store for ArcGIS Enterprise, which collates, analyses, records and manages spatial data to identify and predict issues affecting raw water quality. Portal for ArcGIS acts as the 'one stop shop' for the team's GIS needs, enabling them to create, use and share maps and apps with colleagues and external stakeholders.

Survey123 helps the team to work off-line in often remote and isolated environments, capturing and incorporating data from the field, supporting the team's ability to identify specific areas of water deterioration. For example, areas where soil erosion has resulted in extra silt in rivers, flowing into reservoirs and requiring more treatment. Working with farmers to plant trees on the sides of valleys is reducing the erosion of soil into rivers, ensuring that water reaching the drinking water treatment works is of a more manageable and expected quality.

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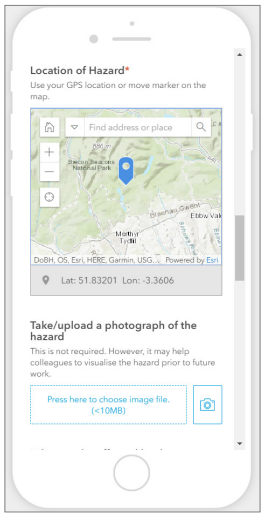
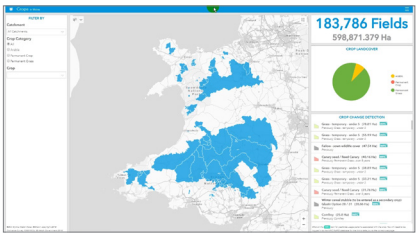
> “Water from catchment areas reaching our treatment works needs to be of manageable and expected quality. Where situations are often unpredictable, new means and ways of working with spatial data is critical for us in our work, so we can produce tailored web and mobile apps within hours.”

Shaun Lewis, Catchment Spatial Risk Analyst, Welsh Water



Forms and mobile apps allow the team to collect structured locational data quickly and easily in the field



Operational Dashboards helps the team assess pesticide risk based on agricultural data from the Rural Payments Agency

The Solution (cont.)

Data from the field is now quickly visualised and summarised using Operations Dashboards, highlighting such potential causes of water deterioration and providing business intelligence to help the Water Services Science team identify solutions for smarter catchment management. As business demands evolve and conditions change, such as the impact of adverse weather conditions, the Catchment team can quickly tailor collection and visualisation apps, thanks to configurable templates in ArcGIS Enterprise.

The team used the company’s pre-existing ArcGIS Enterprise and ArcGIS Online platforms to build the WaterSource Portal, utilising out-of-the box functionality with no additional software licensing costs. The WaterSource Portal now acts as a showcase to the wider business, demonstrating how spatial analytics can provide enhanced functionalities to different user groups by taking data out of spreadsheets and sharing it online, and supporting regulatory responsibilities.

The Benefits

Supporting business and environmental objectives

By working more collaboratively with external stakeholders and share areas of potential concern through a geographic approach, the organisation can support better land management. As the quality of water which needs treating improves, fewer chemicals are required to reduce pollutants thereby helping to reduce operating costs, while safeguarding the environment.

Shared insights

The WaterSource Portal allows instant access to data and insights, putting powerful spatial analytics into the hands of day-to-day users across the company. Vital business intelligence for the team’s regulatory responsibilities can now be summarised in a matter of seconds.

Enhanced health and safety

Task assessment forms created in Survey123 forms have led to improved health and safety. Forms now include prompts to tell people to stop working in adverse weather conditions, reminders to accurately mark hazards on a map and further prompts asking whether the user can take any steps to make the job in hand safer.

Improved enablement

ArcGIS Enterprise enables the team to work more efficiently, more accurately, more safely and more confidently with enhanced awareness of changeable environmental conditions. The business response is more robust, and a broader user group now benefits from access to powerful spatial analytics.

Better data management

Data, from multiple internal and external sources, can be managed more efficiently and productively in ArcGIS Enterprise. Information can be stored and retrieved quickly, and forms and additional documentation such as images from the field can be attached and shared with colleagues and stakeholders.

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