innogistic

Case Study: The Impact of GIS on Biodiversity Monitoring at Yorkshire Water

www.innogistic.co.uk

Case Study : Biodiversity Monitoring

The Impact of GIS on Biodiversity Monitoring at Yorkshire Water

Utility companies, especially in the Water Industry have never been more aware of their environmental responsibilities. They are also realising that GIS can play an important part in helping them to manage and monitor environmental impact within their business activities. Ensuring that its operational activities are sensitive to the rich variety of wildlife in the county, Yorkshire Water's Biodiversity Action Plan is a keystone of its environmental policy. John Richardson from Innogistic looks at how Yorkshire Water has applied GIS to help them protect Biodiversity.

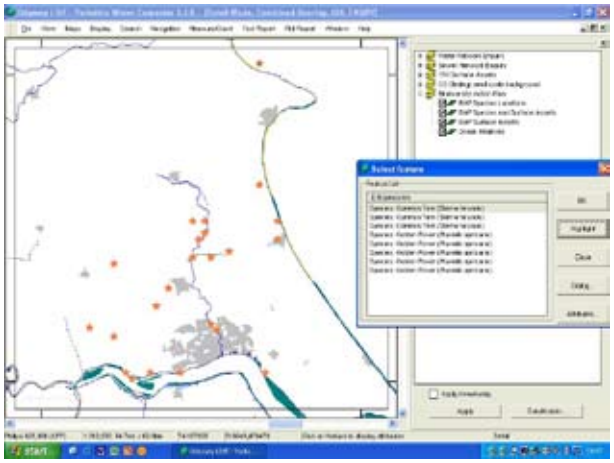
Yorkshire is an area of England famed for its natural beauty and its diversity of habitats. The famous old county is criss-crossed by a number of famous rivers, which rush down from the upland areas of the Pennines and the Yorkshire Moors. As the region's water utility, Yorkshire Water Services has recognized for many years that it has a role to play in the protection of this beautiful environment and the wildlife that calls it home. The company is itself a major regional landowner with holdings that include many important habitats such as reservoirs and catchments. However, with the increase of environmental awareness has come Government intervention and legislation, which now requires all utility companies to monitor and minimize any environmental impact that may come as a result of its operational activities.

The Influence of Environment

Biological diversity - or biodiversity – can simply be defined as the 'variety of life'. In June 1992, the Convention of Biological Diversity was signed by 160 national governments, including the UK, at the Rio de Janeiro Earth Summit. It entered into force on 29 December 1993 and was the first international treaty to provide a legal framework for biodiversity conservation. In response to the Rio Convention, the UK government launched its own 'UK Biodiversity Action Plan' which outlined how the UK would achieve the requirements of the Convention. In this document, the UK Government made it clear that, in their view, all organisations, including private companies such as Yorkshire Water, have a part to play in protecting biodiversity and in delivering the UK Biodiversity Action Plan.

In addition, the European Union's Water Framework Directive 2000 required all member states to achieve stringent water quality standards, by 2012, based on the ecology, as well as chemical pollutants, of rivers, estuaries and coastal waters. Guidance at the time from DEFRA, confirmed that the Water Framework Directive would be the single largest environmental quality driver for the UK Water Industry for the next 15 years, with total cost estimates up to or exceeding £16 billion.

With such large costs at stake as well as the ever increasing prominence of environmental issues, Yorkshire Water realized that, even though it already had an environmental policy in place, it needed to increase the profile of environmental management within its operations. As part of this re-alignment, the company created its own Biodiversity Action Plan (BAP) within which it made provision for the fulfillment of its statutory obligations as well as for its own, self instigated, environmental vision. Yorkshire Water's BAP is essentially a publicly reported strategy which sets out the company's commitment towards biodiversity and environmental improvements, including the development of measures to monitor biodiversity and report on progress.



The Appliance of GIS

Yorkshire Water manages the collection, treatment and distribution/disposal of clean and waste water for around 4.7 million domestic customers and 150,000 industrial customers. With over 60,000 km of mains and sewers, 83 water treatment plants and over 600 waste water works, the management and operation of its assets alone is a considerable task. The company is widely regarded as one of the most technologically advanced water utilities and like many other utility companies, it has invested considerably in GIS technology, in particular for the management of its below ground asset records. However, unlike other water utilities, the use of GIS has proliferated across many aspects of the organization, breaking out of the engineering/works management 'silo' and into new domains, including customer relationship management, non-regulated commercial activities and of course environmental management.

Yorkshire Water's corporate GIS, known internally as 'Odyssey', is a specialist GIS solution based on OpenWings, a highly flexible GIS package created and supplied by Innogistic. The Bristol based independent software developer is well known for its innovative business solutions which it supplies to a number of market sectors, including Central & Local Government, Emergency Services, Utilities, and other private / public sector organisations. The company also has a special projects team dedicated to the development of bespoke GIS embedded software applications. Odyssey is highly regarded and well utilised throughout Yorkshire Water and is accessible as both an office based and mobile application on over 3500 PC's and laptops and 1000 mobile ToughBooks. Mike Turner, Head of Asset Records at Yorkshire Water explains "In practice every member of staff is able to access and make use of the Odyssey GIS if it is applicable to their day-to-day job. We recently found out that Odyssey is the second most used software application at Yorkshire Water, after e-mail!"

With the unveiling of the company's Biodiversity action plan, the GIS team at Yorkshire Water asked Innogistic to create bespoke elements within Odyssey to help with the implementation and monitoring of the plan. Kevin North, Innogistic's Utilities Business Manager explains.

Case Study : Biodiversity Monitoring

"Initially Yorkshire Water asked us to create elements within Odyssey which could act as a reporting system on Biodiversity as well as a simple tool to help assess the impact of any planned work or incidents. However, since commencing this project it has expanded to the point where Odyssey now includes many more interesting BAP features."

Biodiversity Monitoring in Odyssey

Alex Curtis, Lead Adviser on Environmental Strategy for Yorkshire Water takes up the story. "As a result of the requirements from our BAP, we needed to look at what functionality would be required within Odyssey, but equally important, we also needed to look at the data that would be required in order to make this functionality produce meaningful results. So one of the most important elements of our BAP GIS solution is a database in which we hold a large amount of information from both the Environment Agency and from our own data gathering procedures, on the variety and number of specific animal, fish and plant species which are native to our region. We also need to store information on their habitats, food sources, associated legal protection designation and a large amount of other information on their welfare and protection. All of this, of course, is geo-referenced to their most likely habitat so that we can run location queries using the GIS functionality."

Once the biodiversity data was in place, the next important element of the BAP GIS solution is being able to look at the company's planned work, operational activity and any accidents or unplanned incidents in terms of their environmental impact. To do this, Innogistic built 'wizard' driven processes into Odyssey that guide the user through a sequence of steps to help them specify the activity for modelling these environmental impacts. These include:

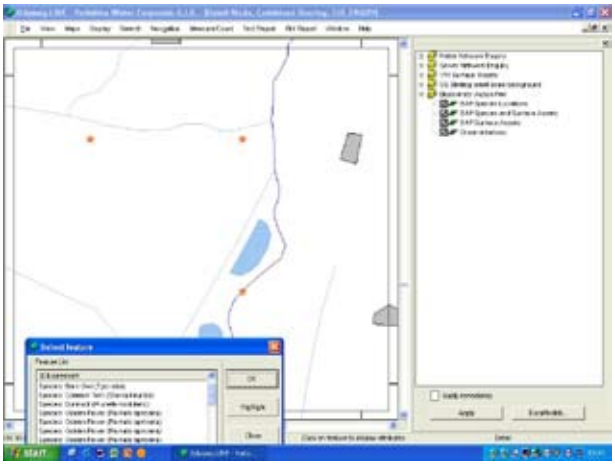
- Specifying details of any planned work or an incident by factors such as location, incident type, activity start and end dates, nearest watercourse etc.
- Select a river reach and then trace downstream from this reach (this includes the ability to specify the distance over which the trace should run).

The system then finds all relevant species, habitats and protected areas (e.g. SSSI's) that may be affected by the planned work or incident or those that are near to the traced river reaches. For planned work, the system then gives a recommendation to the user advising if they should proceed, proceed with caution, or should not proceed with the work, based on the information it finds from the geo-referenced BAP database. The instruction can be overridden, but a reason for this override is required from the user which is then stored for future reporting.

Depending on the activity or incident, and the species that may be affected by it, the system also gives advice and recommendations about how the impact on biodiversity can be kept to a minimum. The user can then decide on a course of action and specify the advice they are going to follow. This is then also output to a file for reporting and monitoring purposes.

Alex Curtis talks about the river trace tools. "Traced river reaches and the species, habitats and protected areas are all highlighted on the map and this information can be printed out as a text report or as a map view. Recent upgrades in the system have also given us information about how certain species behave, for example it can show how far upstream from a certain point a particular migratory fish may swim or what is the area in which a territorial Otter may hunt. It is really fascinating stuff when you look into it."

Possibly the most important functionality in the BAP solution, is the Incident Management Tool. This evaluates the environmental impact of asset failures including identification of incident type, tracing the impact of the incident including any assets affected, identify any river reaches affected, particularly environmentally sensitive areas and of course identify all species, habitats or sites intersecting the area affected by the incident. The tool will also identify any commercial ponds or fisheries intersecting with, or that are contiguous to, the incident area. These features are unlikely to be formally connected to the river network, but may take their water feed from the effected river. As a result, any incident could cause significant damage to fish or plant stocks.



Modelling the Impact of Biodiversity on Business Performance

The items outlined above all relate to the impact that work or incidents will have on the environment. However, any business must continue to make a profit and the other side of the coin in this case is to look at how the requirements of environmental legislation are impacting on the company's business performance. Within the BAP solution is a risk modelling function which provides a set of geographically-based tools that allow the company to understand the impacts and implications of the Water Framework Directive and the company's BAP as a whole on its capital and operational activities. Added to this is an Investment Planning (scoring) tool which uses a more complex scoring algorithm to determine which environmentally important sites would most benefit from investment.

Conclusion

A responsible Environmental policy is a reality for every company today. With this reality in mind Yorkshire Water has taken steps to ensure that this reality is given the prominence it needs but also help ensure that its impact on the business is managed and minimised. The introduction of the BAP reporting system into Odyssey indicates how Yorkshire Water is integrating its own environmental considerations and vision into its business operations so as to conserve, protect and enhance biological diversity within its region.

The BAP solution delivers a number of benefits to Yorkshire Water, including allowing them to assess and manage the impact of day to day operations on the most sensitive environments in the Yorkshire region as well as monitor the impact that legislation and its own BAP is having on its business activity. The system also assists Yorkshire Water's contract partners in planning and managing capital schemes more effectively whilst considering their impact on biodiversity and allows for the prioritization of pollution abatement activities to minimise the effects of incidents on the environment.

Case Study : Biodiversity Monitoring