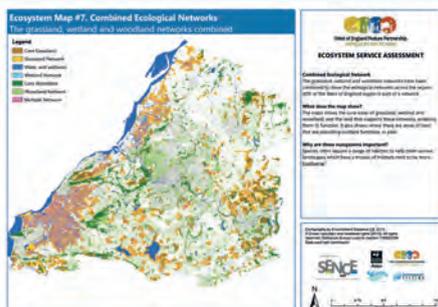


Welcome

In this issue of Sphere we focus on a major 'State of the Environment' report for the West of England Nature Partnership, a project to restore moorland in the Peak District, the UK's most popular National Park, and a natural resource management approach to flood risk in Pembrokeshire. There's also news of a project focused on agriculture in Australia and a habitat mapping project on the island of St. Helena in the South Atlantic. editor@envsys.co.uk

State of the Environment Assessment



Combined ecological networks map

The West of England Nature Partnership (WENP) is a response to a 2011 Government White Paper which highlighted the need for local areas to work in a more joined up and strategic way. This is reflected in the partnership's vision to create and coordinate a plan for the restoration of the natural environment within the West of England region and integrate that plan into strategies for spatial planning, economic development and public health.

This project focused on taking an 'Ecosystem Approach,' using existing data and evidence to assess the current provision of ecosystems across the West of England. The 'Ecosystem Approach' seeks to understand the services that the natural environment is providing and advocates an integrated approach to the way the land and living resources are managed and enhanced.

Environment Systems used its SENCE (Spatial Evidence for Natural Capital Evaluation) tool and expertise to create 14 ecosystem services and opportunities maps. The maps visualise the ecosystem

services and networks within the region and can be used at a strategic level, to identify cross-boundary, large-scale ecological networks and right down to a field scale. They not only provide a snapshot of the state of existing natural assets, but also indicate where enhancements are required and inform decision making for future development and its likely impact on the environment.

At the launch in June 2016 WENP produced 3 main recommendations:

- That the data was made available to all in order to make evidence based decisions about the environment
- That the safeguarding of ecosystem services be factored into strategic planning and growth
- That strategic planning and growth result in a net gain in natural capital across the region

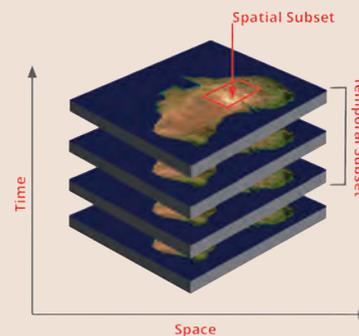
A project report was published with an explanation of the available maps and short case studies. The maps themselves are all available via the WENP website in a number of different formats including downloadable pdfs, as shape files for use in a GIS and via an online mapping portal. WENP and Environment Systems have also published a technical report explaining how the maps were created, the data used to create the maps, and how they can be used.

To view the reports and get access to the maps please visit the WENP website: <http://www.wenp.org.uk/ecosystems/>

Investigating 'data cubes' for Australian agriculture

Environment Systems has recently acted as a consultant on this project funded under the UK Space Agency's International Partnership Space Programme (IPSP). The project investigated the feasibility of Earth Observation derived services/products available through a specific geospatial data infrastructure (data cube) focused on the Australian agricultural monitoring market. A data cube consists of a consistent architecture that indexes data spatially (X/Y) and temporally (Z), and supports rapid access and retrieval of data across these axes on request.

A number of agricultural demonstrators also took place as part of the IPSP collaboration. These included the integration of satellite SAR (Synthetic Aperture Radar) imagery into the data cube which involved developing an automated processing system for Sentinel 1 data and generating analysis ready data. Other demonstrators focused on using Sentinel data and optical imagery to predict yields for sugar cane and wheat.



A data cube indexes data spatially (X/Y) and temporally (Z)

Environment Systems ran two government stakeholder engagement workshops to investigate the proposed value of services and the role of organisations within the satellite product delivery chain.

The data cube concept presents a huge opportunity for delivering services into agricultural markets. The agricultural demonstrator projects show that the availability of SAR data will be a key enabler for this, and together with optical satellite data, can answer the needs of a diverse range of agricultural customers.

Ecosystem Services: Making the Environment work for you

In April Environment Systems hosted a very successful SENCE event in Harwell focused on Ecosystem Services which was attended by over 40 delegates. The day featured presentations from leading academics and exponents of the Ecosystem Approach and included Dr Lucy Rogers from the Avon Wildlife Trust, one of the WENP partners, describing the project, what had been learnt and the importance of future monitoring.



Mapping St Helena's Biodiversity and Natural Environment



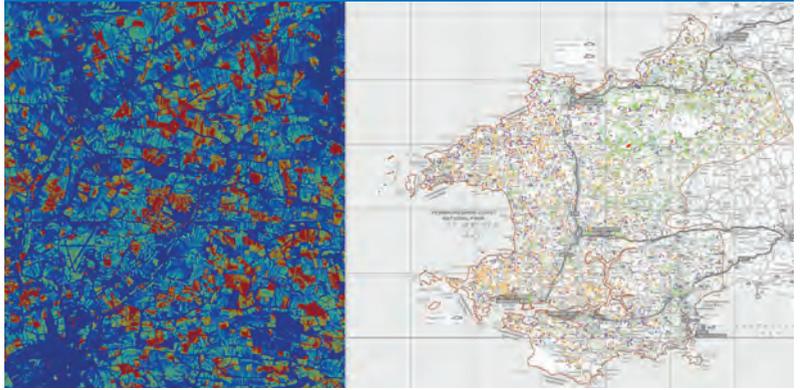
Sandy Bay district of St Helena viewed from central peaks

St Helena is a volcanic island in the South Atlantic, 4,000 km east of Rio de Janeiro and 1,950 km west of south western Africa. St Helena's vegetation consists of a lush green interior, surrounded by agricultural land, scrub and dry barren areas near the coast. Since it was first visited in 1502, the island's sensitive ecosystems have been modified and exploited resulting in the loss of endemic species and fragmentation of habitats. It is increasingly threatened by the effects of climate change, tourism, development pressures and invasive species. The Island aims to become more self-sufficient which will require careful land management, the restoration of habitats and the protection of rare species.

Environment Systems is part of a team that will produce comprehensive environment maps showing the functioning of habitats and soils and creating an accessible digital system which will utilise remote sensing and field based surveying for present and future ecosystem services monitoring. An important part of the project will be focused on the acquisition and analysis of multi-spectral (8-band) satellite imagery to provide the initial land cover, vegetation and soil classifications. Environment Systems will lead the image analysis.

Training workshops also form a significant part of the project to help the Island's Government with future mapping and modelling. The workshops will also help in the development of management tools for the control of invasive species, water retention in vegetation and soils, soil quality and to identify the potential for habitat restoration and conservation.

A Natural Resource approach to flood risk in Pembrokeshire



Detail of the soil erosion map and the natural flood management opportunities map

Environment Systems was recently commissioned by Pembrokeshire County Council to undertake and assess the current ecosystem service regulating capacity across the county. The work is the first step towards developing a catchment-based approach to help reduce flooding in towns across the county.

On this project we used our SENCE tool to model the existing ability of the land across Pembrokeshire to prevent flooding. We analysed dataset attributes for habitat type (including habitat condition), soils, geology, management practice and steepness of slope. Each attribute was entered into a rule base where it was scored in a range from high to low significance. The rule base was then joined with GIS data and the SENCE tool used to create

an Ecosystem Service stock map for flooding. A soil erosion model identified areas at greater risk of flooding. Using these in combination with further binary analysis we were able to identify further opportunities.

The resulting Opportunity Map shows locations where undertaking natural flood management measures would be preferential. These include planting wet woodland and shelter belts across slopes, the promotion of mob-grazing, contour ploughing and 'swale' creation.

By establishing a robust workflow comprising remote sensing software, accurate rule sets and enhanced ecological knowledge, the maps can be easily updated with satellite imagery enabling quick and cost effective monitoring over time.

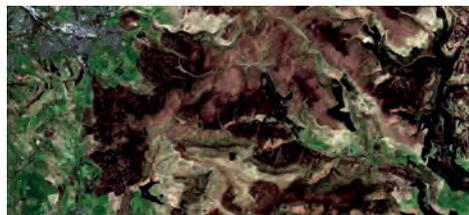
Preserving the South Pennine Moors

MoorLIFE 2020 is a project which aims to conserve and protect Active Blanket Bog (ABB) within the South Pennine Moors Special Area of Conservation (SAC) and the ecosystem services it provides. The project is run by the Moors for the Future Partnership acting through the Peak District National Park Authority with funding from the EU LIFE fund, which supports environmental, nature conservation and climate action projects across Europe.

Environment Systems has been contracted to deliver:

- A series of land cover maps for moorlands
- Land management issues maps for land located within the SAC's water catchments
- Land cover maps for land located within the SAC's water catchments

The maps will be generated from multiple datasets including a mix of 6.5m Rapid Eye and 10m Sentinel satellite data and aerial photography. The finer resolution imagery is

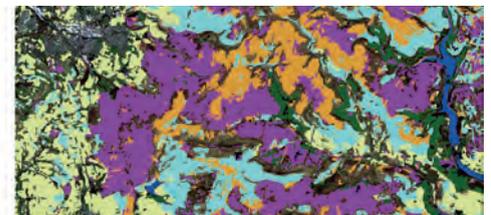


Copernicus Sentinel data, 2016, on the left with draft classification on the right

used for the segmentation of areas of interest with the coarser resolution satellite imagery to identify what the land cover is within those segmented areas.

The maps will be used to inform the planning of the land management capital works and serve as a baseline for monitoring the impact or the outcomes of the project. Typically these works might include:

- Stopping the erosion of the peat body by re-vegetating bare peat
- Raising water tables by blocking grips and erosion gullies



- Reducing wildfire risk and increasing habitat resilience by diversifying homogenous vegetation
- Improving the hydrological integrity of the blanket bog by delivering and further developing Sphagnum (peat moss) reintroduction
- Increasing the resilience of ABB by increasing the diversity of specific plant species
- Engaging with landowners, managers and local communities and visitors through a programme of events to promote appropriate land management