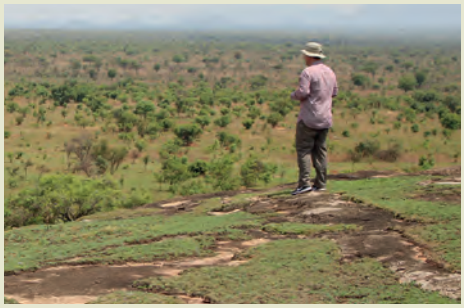
Sphere
Environmment Systems Newsletter
Summer 2018

Field Trip – Karamoja Region, Uganda



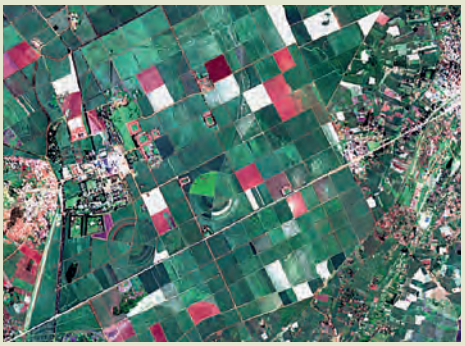
Karamoja is a region of varied landscapes

In May a team from Environment Systems visited the Karamoja region of Uganda as part of its work on the Drought and Flood Mitigation Service (DFMS) project (Sphere, Spring 2017).

DFMS will provide timely and improved meteorological, hydrological, and Earth Observation (EO) satellite information in the form of current observations, forecasts and historical archives. A cloud-based platform will host hydrological and meteorological models and other algorithms which transform the EO satellite and in-situ data inputs into valuable information. The resulting data products, including land cover information, vegetation indices, soil moisture and weather forecasts, will be provided as an online service.

This 'early warning system' relies in part on a hydrological model, which in turn relies on accurate input data. Environment Systems is providing a land cover classification, derived from Sentinel-1 and 2 imagery, as one of the model inputs. Information on land cover helps in the understanding of how water flows through the environment. However, ground based data are required to ensure that the land cover classification is accurate and this was the primary reason for our field trip. Field surveys ensure that the land cover map we are creating relates to what we see on the ground.

Karamoja is a semi-arid region where many crop varieties are grown. These include sorghum, cassava and maize. Livestock farming is also common, although, in some cases, a competing activity. Persistent poor harvests, the result of flash floods and prolonged dry seasons in addition to climate cycle variability, contribute to the acute food security and livelihood challenges faced by the people of the region.



Kakira a major sugar growing estate

The DFMS project involves close collaboration with the Government of Uganda, local NGOs and commercial organisations. It is funded under the UK Space Agency's International Partnerships Programme, a £150M multi-year programme which exploits space-based knowledge, expertise and capability to provide a sustainable, economic or societal benefit to developing economies in the 'Majority World.'

Natural Capital Accounting for Area Statements

In the last issue of Sphere we talked about SoNaRR (State of Natural Resources Report), and mapping opportunity space for Area Statements which provide information and discussion documents to help implementation of the Welsh Natural Resource Policy. SoNaRR reported that the full value of natural resources and ecosystems were not fully considered in decision making and also concluded that new tools and techniques would be required to understand the contribution that ecosystems make, sometimes referred to as natural capital accounting. By providing valuations of natural capital, decision makers can take better account of the environment in their plans to allocate resources, to develop and promote well being and the growth of the economy. Natural capital accounts present the value of the environment in an accounting format that is familiar to business and policy leaders enabling environmental issues to be considered alongside economic effects when gauging the feasibility of actions.

Earlier this year NRW (Natural Resources Wales) commissioned a feasibility study from Vivid Economics with Environment Systems as a partner. The objective of this study was to develop strategic thinking, a framework and options for progressing natural capital approaches, especially natural capital accounting, including the identification of appropriate data sets and methods. There was a particular emphasis on understanding the requirements of users and the future uses of accounts in the context of local scale that the Area Statements work within.

The table shown here summarises the features of some selected natural resource accounting tools. The tools were appraised for their potential added value beyond the features of the existing programme of NRW natural capital work, especially NRW's SoNaRR stock and opportunity mapping.

SoNaRR Stock and Opportunity Mapping	Maps which indicate the existing stock of ecosystem services together with the greatest priority, suitability and/or opportunity that exist for the enhancement of each service now being developed further as part of GIS for Area Statements.
ONS Natural Capital Accounts at Area Statement level	Information relating to the stocks of natural capital and flows of services. Accounts are of two kinds: physical accounts which classify and record measures of extent, condition and annual service flow plus monetary accounts which assign a monetary value to selected services.
ONS Natural Capital Accounts at sub-area level	ONS recognises that accounts for sub-national areas such as countries, regions, county councils, river basin districts, catchment areas and national parks will be useful for policy purposes. A similar structure could be used for the stocks of natural capital and flows of services.
Corporate Natural Capital Accounting	A set of reporting statements for organisations to measure the value of the natural capital they own or manage. It includes a natural capital balance sheet and a statement of changes in natural assets between accounting periods.
Asset register	An asset register is an inventory of the natural assets in an area, and their condition.
Natural Capital risk register	The risk register assesses current and future risks to natural capital in terms of changes in delivery of benefits, thereby helping to prioritise particular risks and assets.
DPSIR framework (Drivers, pressures, state, impacts, responses)	The framework is also useful for interpreting natural capital accounts, for example, showing how soil degradation affects service flows and associated benefits.

Trees Outside Woodland - Scotland

Sometimes we get involved in projects with a large research element. Current work for the Scottish Government and Forestry Commission Scotland is an example. It focuses on determining how the Scottish Government can use remote sensing technology to assess the amount, location and distribution of trees outside areas classified as Scottish woodlands.

Forestry Commission Scotland monitors woodland and produces statistics and information on woodlands over 0.5 hectares and an annual map is publically available. This information is used to inform management and investment within the forest sector that contributes £1bn to the Scottish economy, and also informs a number of other environmental projects. However there is only limited information available on smaller areas of trees, not found in classified woodland areas and are less than 0.5 hectare, such as lone trees and hedgerows. This leaves a significant evidence gap, weakening Scotland's capacity to account for its carbon stocks accurately, plan and control plant health outbreaks, to plan for urban trees impact on air quality and to plan effectively for new woodland creation and woodland expansion.

The availability of new remote sensing technologies offers the prospect of being able to quantify and map these tree features and to fill the evidence gap. In our research we are investigating a suite of datasets representing different sensors (e.g. radar vs optical) and resolutions, examining their ability to detect lone trees and small stands of woodlands not included in the National Forest Inventory.

Trees are a valuable Scottish resource, mapping their location outside woodlands is a challenge

Within the project we are developing a test methodology for determining the best mix of remote sensing technologies, their practical accuracy and cost effectiveness plus recommendations for the way forward.

MAPPING FOR EVIDENCE BASED POLICY, RECOVERY AND ENVIRONMENTAL RESILIENCE

Darwin Plus, sometimes referred to as the Overseas Territories Environment and Climate Fund, is open to any organisations that wish to embark on a project which will benefit one or more of the British Overseas Territories by protecting and enhancing their biodiversity or addressing wider environment or climate-related issues.

This project is the result of a joint bid by Environment Systems, the Government of the Turks and Caicos Islands (TCI), National Parks Trust of the British Virgin Islands (BVI) and the Joint Nature Conservation Committee (JNCC).

The project will provide evidence to develop policy to aid post-hurricane environmental recovery and enhance future resilience to natural disasters. It will use satellite data to map and model the marine and terrestrial environment in the TCI and BVI, both before and after hurricanes Maria and Irma which caused so much devastation in 2017.

The project will share experience and learning to develop both island groups' expertise in relevant techniques and be integrated closely with other UK Government supported projects in the BVI and TCI.

The Turks & Caicos - the low mainly flat limestone island group has extensive marshes & mangrove swamps and over 128 square miles of beach front

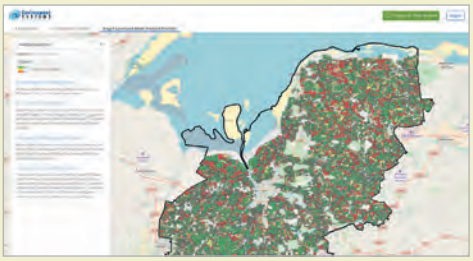
Ecosystem goods and services, derived from biodiversity, are crucial to the islands' economies, supporting tourism, food provision and providing protection against the effects of extreme weather events. The natural environment is susceptible to damage from both human activities and natural disasters such as hurricane-generated storm surges and flooding. The importance of protecting these natural assets has been brought into sharp focus by the recent hurricane damage and the impact on the islands' economies.

DARWIN INITIATIVE

A major part of this project will focus on building resilience. This will be achieved by building the capacity of the island governments to use remote sensing outputs to undertake detailed mapping of terrestrial and marine environments themselves, both to evaluate hurricane impacts and highlight opportunities for habitat restoration. Three workshops will be held in the islands, with a further workshop programmed to take place in our head office. The project will run until early 2020.

Data Services Demonstrator

Our Data Services offering has been under continuous development since its launch last year, offering access to Sentinel 1 & 2 satellite data, under an open licence, plus a range of specialist pre-processed data products. Our platform takes care of all the data handling and data processing enabling users to login, define an area of interest, select a product, download, and then drag and drop into their GIS.



Our Demonstrator is the perfect place to discover how our Data Services can be put to work

To demonstrate how it is possible to map, model and monitor a variety of indicators using our Data Services, we have introduced our Demonstrator, a site where it will be possible to view and interact with examples of what can be achieved. We have chosen two areas within the UK which offer diverse environments and land-management activities. The initial maps you can see on this site have been created by combining our Data Services products with other freely available open data, using open source GIS software. All the maps shown here are free to download under an open licence, once you have registered for a free Data Services account. The two areas are described below.

Dyfi Biosphere Reserve

The Dyfi Biosphere Reserve, in Wales, is part of the Man and the Biosphere Programme (MAB) and its World Network of Biosphere Reserves. Biosphere reserves inspire communities to work together, connecting people with nature and cultural heritage, while strengthening local economy. They are sites recognised under MAB as promoting innovative approaches to sustainable development and cross-discipline scientific research. The DBR measures 840 km^2, of which 90% is land and 9% is sea. It is home to over 26,000 people and includes part of Snowdonia National Park.

For this area the demonstrator currently includes two layers. A productivity (NDVI) layer and a layer displaying recently felled woodland.

King's Lynn and West Norfolk District

King's Lynn and West Norfolk is a local government district and borough in Norfolk, England, with a population of approximately 147,000 people. The majority of the area lies within the lower catchment reach of the River Great Ouse. This river has been important both for drainage and navigation for centuries. The area includes some of the Norfolk Coast - Area of Outstanding Natural Beauty, which is home to distinctive geological and geophysical features, rare wildlife and habitats. Agriculture is a major industry, and the climate, landscape and soils are ideally suited for growing wheat, barley and other similar crops.

For this area the demonstrator currently includes two layers. A productivity layer (NDVI) and a bare soil layer.

The best way to find out more about our Data Services Demonstrator is to try it for yourself here: https://data.envsys.co.uk/demonstrator/

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