

Tellus – meeting of the All-Party Parliamentary Group for Earth and Environmental Sciences on Tuesday 13 May 2014

VALUING AND REALIZING OUR NATURAL CAPITAL ASSETS – TELLUS ALL ABOUT IT

The 2011 White Paper *'The Natural Choice: Securing the Value of Nature'* commits us to be the first generation to leave the natural environment in a better state than it inherited. The Tellus projects - a series of multi-partner environmental survey and research projects carried out in the UK and Ireland - have delivered innovative data and research that have successfully shaped policy and stimulated new investments in mineral, energy and infrastructure resources. On 12 May, at a meeting of the All Party Group on Earth and Environmental Sciences chaired by Martin Caton MP, *Andy Howard*, *Mike Young* and *Marie Cowan* explained how the Tellus Projects are transcending their original goals to contribute to the wider objective of measuring and realizing the value of our natural capital assets, and to help deliver the world-leading research needed to inform decisions and measure success in meeting the White Paper objectives.

In the early 2000s the geological surveys of Britain, Northern Ireland, the Republic of Ireland, and Finland joined forces to design a Resource and Environmental Survey for Ireland (RESI). RESI's purpose was not only to provide new resource data to stimulate exploration investment and licencing in minerals and energy resources but also to inform research, regulation and management of other natural capital assets including soil, groundwater and landscape amenity. Re-branded as *'Tellus'*, the first of these projects was completed in Northern Ireland between 2005-8, with funding from the Department of Enterprise, Trade and Investment. Building on a highly positive, post project cost benefit analysis of the impacts of Tellus, €5M funding was secured from the EU INTERREG IV programme for a second project - *Tellus Border* - which ran from 2010 to late 2013 and surveyed the six border counties of the Republic of Ireland.

So what does a Tellus survey involve? Firstly, an *airborne geophysical survey* flies a specially equipped light aircraft at very low altitude over the landscape, in some places only 60m above ground. On-board sensors measure trace amounts of magnetism, radioactivity and electrical conductivity to build a 3 dimensional map of the properties of the soils, rocks, minerals and fluids below ground. At the same time, ground-based *geochemical survey* teams collect soil, stream sediment and water samples for analysis of over 50 key elements from the periodic table, representing a combination of the most essential minerals, nutrients and contaminants present in the environment. The survey results are then combined into digital datasets and maps that are delivered online, providing a *stock take* of the extent and quality of minerals, soil and water resources, a *health check* of both natural and man-made chemical and radiological contaminants in the environment, and an objective *data resource* for multidisciplinary scientific research.

From an original project cost of £5.8M, the outcome and impact of Tellus Northern Ireland has been considerable. The maps and data have led so far to estimated investment commitments of over £32 million in new minerals exploration activity, with licenced blocks increasing from 15% to 70% of Northern Ireland's land area. The data are now routinely used to inform implementation of soil, water and waste directives, and deliver new maps on diverse themes such as radon hazard, soil moisture and carbon stocks, residual Chernobyl fallout, soil erosion and landfill contamination. Data on subsurface properties of aquifers, notably on previously unresolved barriers to groundwater flow, have informed new strategies for managing Belfast's groundwater supplies. Commercialisation of

the Tellus data to provide information products and expert services to the agricultural industry on nutrient balances in soil, water and feed is proceeding with the release of the Tellus Border data. Furthermore, 20 new Tellus data-based research degrees and 16 short term grants have delivered new science on topics such as cancer epidemiology, critical metal resource potential, wetland ecosystem status and trace element toxicology.

Following the lead of the Tellus projects in Ireland, the Tellus South West project in Devon and Cornwall is the first regional scale project of this type in Great Britain. The region presents an unique combination of future mineral and geothermal resource opportunities counter-balanced by environmental constraints on development, some of which relate to the region's industrial and mining legacy and others to a changing natural environment. Funded by the Natural Environment Research Council, the project is a collaboration between 3 of the NERC's research centres, the British Geological Survey (BGS), the Centre for Ecology and Hydrology (CEH), and the British Antarctic Survey (BAS), working with the University of Exeter Camborne School of Mines to connect with local businesses and the research community. Tellus South West has augmented the original Tellus specification with surveys of the status of the landscape, flood plains and natural habitats. Sampling of organic films on the beds of streams, for example, is looking for tell-tale evidence of the impacts of industrial activity on the smallest organisms in the food chain. At the other end of the scale, an *airborne lidar survey* flown by an aircraft from the BAS fleet has used high precision laser range-finding technology to make a 3 dimensional map of the ground surface, built assets and vegetation canopy, accurate to within a few centimetres. Combining these Tellus datasets provides us with a powerful set of tools to value resources and measure environmental change at a range of scales and timespans. We can model and predict, for example, how much rainfall is absorbed into the soil, how much runs off into streams and rivers, how nutrients and man-made contaminants are mobilised and transported by this water, how much of this water is taken up by vegetation, and which areas may be at risk of flooding and landslides.

The most important outcome of these projects is the 'Tellus Effect', the ability of these projects to encourage knowledge exchange and collaboration between specialists in businesses, research and government with a common interest in the data. Launches of the Tellus Border data in October 2013 and the Tellus South West data in May 2014 brought together data users from the minerals, energy, agricultural and water industries, from local government and environmental regulators, from heritage and conservation bodies, and from researchers in geoscience, ecology, hydrology, agricultural science and environmental health. Most importantly, the data from both projects is available free of charge both to view and download from easily accessible web portals. This catalyses the further sharing of environmental data among these groups, and the development of new partnerships to deliver value and innovation from new cross-disciplinary combinations of research capability. Momentum is building from one Tellus project to the next, with new surveys and new partners contributing to more diversity of data and joined-up research. With a hopefully successful bid to for INTERREG V funding, we hope to expand Tellus into the marine environment, joining the Irish Sea, western Wales and eastern Ireland, and partners are currently being sought for other projects in the so-called Energy Coast of north west England and in the major regeneration areas of the central belt of Scotland.

So what of Natural Capital, and the White Paper commitment? The Tellus Effect helps to pull together the partnerships of businesses, decision makers and researchers that need to work in

concert to value, manage and sustain our natural capital. The projects provide an 'instrument panel' of indicators and 'big data' to observe and learn lessons from past and present human impacts on our environment, and measure our future progress towards a 'better state' for future generations. Working together, we hope that these projects, and others like them, can help us get to grips with understanding the business of the environment, and ensure that economic growth and a sustainable natural environment are mutually compatible objectives.

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Tellus Partners:

Geological Survey of Northern Ireland <http://www.bgs.ac.uk/gsni/>

Geological Survey of Ireland <http://www.gsi.ie/>

Natural Environment Research Council <http://www.nerc.ac.uk/>

British Geological Survey <http://www.bgs.ac.uk/>

British Antarctic Survey <http://www.bas.ac.uk/>

Centre for Ecology and Hydrology <http://www.ceh.ac.uk/>

University of Exeter Camborne School of Mines <http://emps.exeter.ac.uk/csm/>

Tellus websites:

Tellus <http://www.bgs.ac.uk/gsni/Tellus/>

Tellus Border <http://www.tellusborder.eu/>

Tellus South West <http://www.tellusgb.ac.uk/>

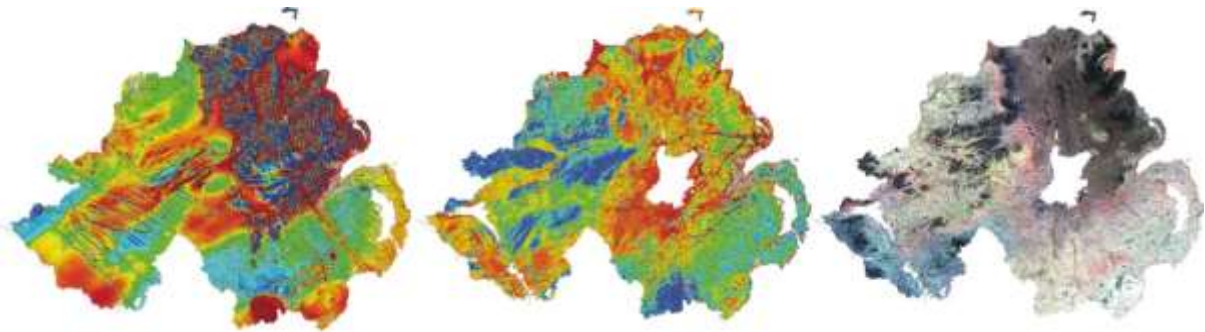


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Airborne geophysical surveys require low altitude flying to acquire high resolution data on the subsurface. Image courtesy Tellus Border project, supported by the EU INTERREG IVA Cross-Border programme.



Magnetic (left), conductivity (centre) and radiometric (right) airborne geophysical survey maps, Northern Ireland. Coastline © **Crown Copyright DMOU205**



Presenters at the Tellus South West project launch, Eden Project Cornwall, October 2013

