

## DOWN TO EARTH CPRW BRECON & RADNOR SEMINAR 3/11/2018 – SUMMARY



*Chair, Dr John Scullion, Aberystwyth University, taking audience questions*

An appreciative audience joined the Brecon & Radnor branch of CPRW at the Town Hall in Talgarth for a fascinating day listening to our expert speakers discuss different aspects of soil health and approaches to soil conservation. A short summary can't do justice to the presentations but we hope this will give a flavour of the day. This seminar was the third in our series of day seminars on environmental issues. Sadly, once again, no County Councillor or officer from Powys County Council took up the invitation to attend.

### **Dr John Scullion, Reader in Soil Science in the Institute of Biological, Environmental and Rural Sciences (IBERS), University of Aberystwyth:**

From having been in the past treated simply as a plant food source, we are coming to have a greater appreciation and understanding of soil's complexity, variability and vulnerability, its central role in the provision of ecosystems services, and the crucial importance of good soil management to preserve effective soil function.

Key threats to soil health include pollution, changing climate, deforestation, and loss of carbon. Earthworms and fungi, both in parasitic form and as secondary root systems, are crucial to soil condition and hydrology and the support of habitats. Soil acidification releases aluminium and is harmful to earthworms, which require organic matter and hate pesticides. Excess phosphate interferes with mycorrhizal fungi, which are less effective in intensively farmed soils than those farmed organically. Deforestation and loss of soil carbon impact on CO<sub>2</sub> levels. Drier summers may see a move from grassland to cropping, with consequent soil carbon loss.

There are very big decisions to be made about how soils, many of which now have impaired function, are used.

### **Dr Alan Feest, Senior Research Fellow in Civil Engineering, Bristol University:**

Dr Feest introduced the audience to the many soil organisms found in healthy soils, organisms which form their own complex ecosystem and underground food chain. He suggested that in terms of the types of organisms found, soil can be thought of as very concentrated water. He outlined the roles of fungi and bacteria in decomposition, and the

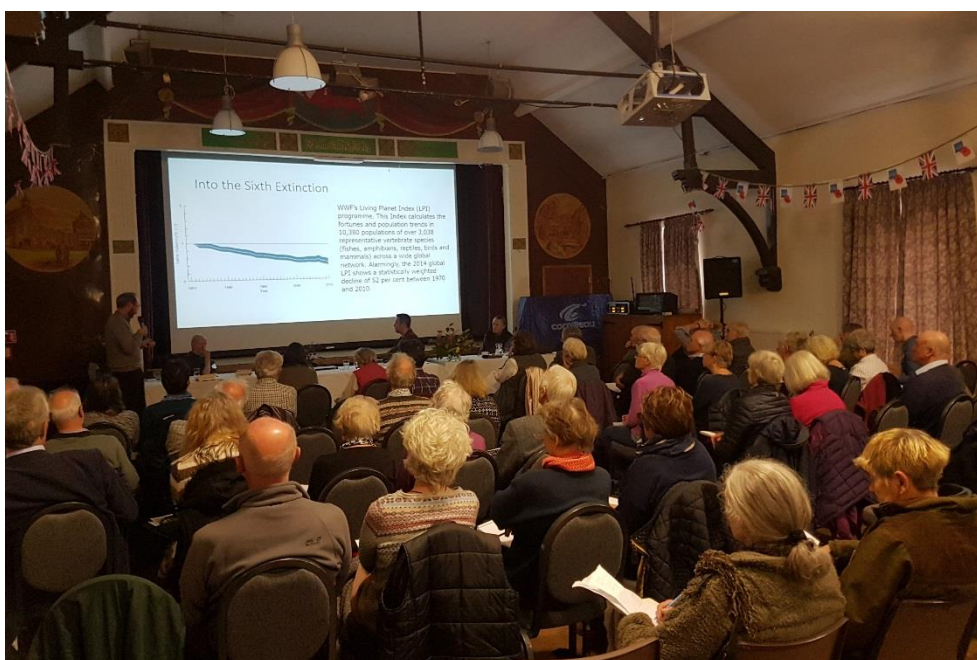
importance of protozoa to the nitrogen cycle, and held the audience spellbound with accounts of encounters with slime moulds, single celled organisms, of surprising size.

**Ian Rappel, Chief Executive, Gwent Wildlife Trust:**

Conservation is about the interface between humans and biodiversity. Soil is a non-renewable resource, and is washing away. There has been huge biodiversity loss since the 1970s, we are on the brink of the 6th great extinction, and all human interventions are impacting on soils. While until the mid-19th century, agriculture recycled nutrients, industrial agriculture has now replaced the natural ecology of soils with the artificial ecology of agribusiness, whereby damage to soils through poor management is 'rectified' with chemicals. This breakdown is driving the biodiversity crisis.

Conservationists can be seen as the 'union reps' for wildlife and are at the interface between scientists and politicians. For example, the opposition to the Welsh Government's preferred route for the M4 extension is a struggle for ecological sanity. While the history of humans has in the main been good for biodiversity, we now need balance not intensification, and a return to less intensive practice.

Soil is the most fundamental ecological system. To attempt to halt extinctions we have to attend to soil, and we have to ask how we should feed ourselves, how we should measure progress and what in fact progress is.



*Ian Rappel, CE, Gwent Wildlife Trust*

**Rory Francis, PR & Campaigning Manager, Woodland Trust:**

The Woodland Trust is campaigning for agroforestry – more trees on farms – to address soil loss, which has accelerated since 1945 with the intensification of agriculture. New agricultural support payments could encourage tree and hedge planting to protect and enhance soils and enable agriculture to be more sustainable and resilient.

How can trees benefit soil? Trees and hedges increase water filtration, and so slow the progress of water across land; trees are hugely valuable in reducing/capturing ammonia emissions; trees increase biodiversity in rivers and streams by increasing infiltration rates, reducing flood events in both number and severity and so reducing soil erosion and run off.

Challenges to the take up of agroforestry include the initial costs, competition for land use with cropping, difficulties with ever larger farm machinery, skills shortages, lack of historical support and development of markets, and the long timespan of agroforestry projects as compared with farm tenancies.

The Woodland Trust is calling on the Government of Wales, one of the most nature depleted nations in the world, to promote and subsidise agroforestry.

**James Cooke, Welsh Government, Agricultural Land Use Policy Manager:**

Conservation and protection of the most valuable soils has been in planning policy for 40 years. The Welsh Government soils team is involved in planning policy, also restoration of industrial sites, research and development. Much of the work is hands on, and the team is trying to make sure that the evidence feeds into post CAP farm support discussions. £1m is now going into a 3 year work plan. James outlined the coverage of soils in State of Natural Resources, the production of Area Statements, and the Climate Change Committee Action Plan, which includes actions on soils.

In the 1930s, the geographer Dudley Stamp initiated the study of land use and soils. However war introduced a crisis of food production. In the past 5 years there has been more interest in soils than in the whole period since the 1950s. Soil is a resource of special importance and once it's gone it's gone.

New soil mapping is based on smaller grid sizes to give finer grained analysis. Should soil protection always be based on best agricultural soils? New mapping looks at stoniness, exposure etc. and predictive maps can look at crop suitability, water uptake, erosion etc.

**Dr William Stiles, Agri-environment Lecturer and KE Group Leader IBERS, Aberystwyth University:**

Farming Connect brings science into practice and IBERS have a huge database of research articles.

Soil health, i.e. a healthy balance of minerals, water, air and soil organic matter (living, dead, and very dead organic matter) supports all plants and life, and is impacted by land management intensity, compaction, disturbance, erosion, loss of soil, contamination, and salinity. These impacts may be a consequence of agriculture but may arise in other ways.

Plant diversity is a function of the diversity of soil organisms. The soil can be compared to a rainforest in the complexity of the ecosystem.

Only 2% of natural grassland, which supports high levels of biodiversity, and is believed by some to be nutritionally preferable with medicinal impacts on livestock, remains. Intensive management of grassland using high levels of nutrients reduces organic matter and biodiversity. Lower nitrogen levels can yield the same output while supporting greater biodiversity. Higher nitrogen leads to higher aspiration, at the same time a lack of nitrogen is also not ideal. There is an optimum nitrogen level at which microbial activity and plant growth are stimulated. Studies have shown this optimum to be below recommended regulatory levels.

Recovery of degraded soils is not easy. Civilisations have failed when they have degraded their soils.



*Dr William Stiles, IBERS, Aberystwyth University*

**Richard Tudor, Farmer and Nuffield Farm Scholar:**

Soil is often looked at from an arable perspective, while in fact grassland is 70% of farmed land. The uplands are vital for livestock production. Most grassland, even in uplands, has been through a process of reseeding and improvement, i.e. the application of fertilisers to increase grass yield, but the benefits plateau. Grass quality is as important as quantity and lambs can lose weight on a field full of grass if it is deficient in essential nutrients.

Before you can be a sheep farmer, you need to be a grass farmer, in fact a soil farmer. Soil is a living medium, a material pulsating with life, inadequately protected in the UK. For example, in the Netherlands there is a quota on phosphate from cows. For every animal you need a proportional area of land to feed it and to absorb manures. UK soil testing looks at nitrogen, phosphorus and potassium, i.e. chemistry, alone and is much criticised overseas for its crudity and failure to reflect a broader range of parameters.

The practice of liming, which raises PH, has decreased and should be encouraged. Compaction and erosion are problems. There are huge benefits to plant root systems where plants are allowed recovery time when grazed.

Farmers need to consider the resources they have. Soil health leads to animal health which leads to human health.

**Geraint Powell, Farmer and Nuffield Farm Scholar:**

Geraint described the landscape around his Cotswold farm as very pretty and also entirely man made. Predominantly sheep farming land, it is still developing and can't be held in arrested state. Mixed farming can deliver a balance of economy and ecology but the public demands one thing but buys another.

Geraint became interested in regenerative farming, a system that improves biodiversity, soil structure and ecosystems service. In the US he spoke to Gabe Brown, who prior to adopting regenerative farming practices had lost 3 harvests to drought and was facing bankruptcy. With no cash Gabe couldn't afford inputs. His farm is profit orientated, rather than having a focus on yield and his farming is based on the relationship of sun, soil, plants and animals. His improvements in the soil health on his farm are key to his success. Resilience is built into the system which treats the causes of any problems and not just the symptoms.

The soil food web can be thought of as a party – it needs the right place, food and drink.

You don't create the environment for the livestock, they are part of the ecosystem which needs to work as a whole. You can't deliver ecosystem services without understanding ecosystem functions. Get the ecosystem functions right and there will be more biodiversity.

The supermarket till is the most powerful driver of change.

**Questions from the audience** reflected a wide range of experience and interests. Concerns were expressed over the proposed Black Route for the M4 extension and the importance of this case as a test of Welsh Government's environmental legislation. Concerns were also raised about the need for a holistic vision for the Welsh environment, rather than pockets of protected landscapes within a larger devastated area. Reaching a balance between biodiversity and productivity would need a landscape scale vision and effective dialogue between scientists and government, where currently there is a mismatch between research and action. The audience debated the growth of the vegan movement and the impacts of a reduction of meat eating on Welsh uplands. The panel felt that the environmental impacts of food production depended much more on *how* food is produced than *what* food is produced.