

# Soil is a Habitat in its Own Right

Eight Things We Learnt at the Devon Local Nature Recovery Strategy Conference

ELLEN FAY, APRIL 2025

## Introduction

I was delighted to be invited by Sarah Jennings of Devon County Council to the Devon Local Nature Partnership's Conference on 25th March, where a key aim for the day was to set out and discuss Devon's emerging Local Nature Recovery Strategy (LNRS). The conference was introduced by Marian Spain, Chief Executive of Natural England, who gave a brilliant overview of the role of LNRS in delivering national biodiversity targets and joining up efforts across the country to a packed auditorium of the experts and practitioners who will be responsible for implementation on the ground. She explained that LNRSs are based on a collaborative and strategic approach to nature recovery led by Local Authorities under the direction of Natural England. Central to LNRS is the need to not only prevent species extinction but to ensure abundance, by making nature conservation efforts more effective, integrated, and strategic.

The Devon Strategy is led with extraordinary focus and energy by Sarah Jennings, who explained all we need to know about the initiative more broadly (Annex 1). At the heart of it is a mapping process which identifies high opportunity areas where conservation actions should be prioritised. These areas are divided into five categories:

1. **Managing Existing Habitats:** Using the best available data, including watercourses and hedges, to enhance connectivity.
2. **Protecting and Expanding Habitats:** A proposed 100-metre buffer around priority habitats to shield them from urban and agricultural impacts, expand them or create other habitats.
3. **Creating new habitats (focus Landscapes):** Specific areas identified for habitat creation, using soil, landscape character data, species etc.
4. **Species-Specific Strategies:** Mapping areas where species conservation efforts should be targeted.
5. **Avoiding "White Space":** Ensuring all areas are considered for conservation efforts, not just the prioritised 'High Opportunity Areas'.

Sarah and her team's goal is to produce a clear, practical mapping tool, linked to a website with details on actions (and why the actions are needed) that helps farmers, land managers, policymakers, funders, conservationists, and communities make informed decisions. This tool will be interactive, allowing users to click anywhere on the map to see what they can do for wildlife in that area.

To my delight, we learned that under Sarah's leadership Devon's strategy will put soil at its heart, using soil maps, data and knowledge to underpin habitat recovery and also a bespoke plan for soil habitats. This has been designed by Dr Richard Smith, a Devon-based soil scientist and practitioner who works for the Environment Agency. Though it is currently unique across the country, it would be fascinating to see Richard's approach built out to other region's strategies. Here are eight key things we learnt from Richard's presentation.

## 1. Soil is a habitat in its own right

Healthy soils both underpin every aspect of landscape and habitat recovery and are fundamental ecological habitats in their own right. Soil is a unique habitat and is full of life that underpins all terrestrial ecosystems. A

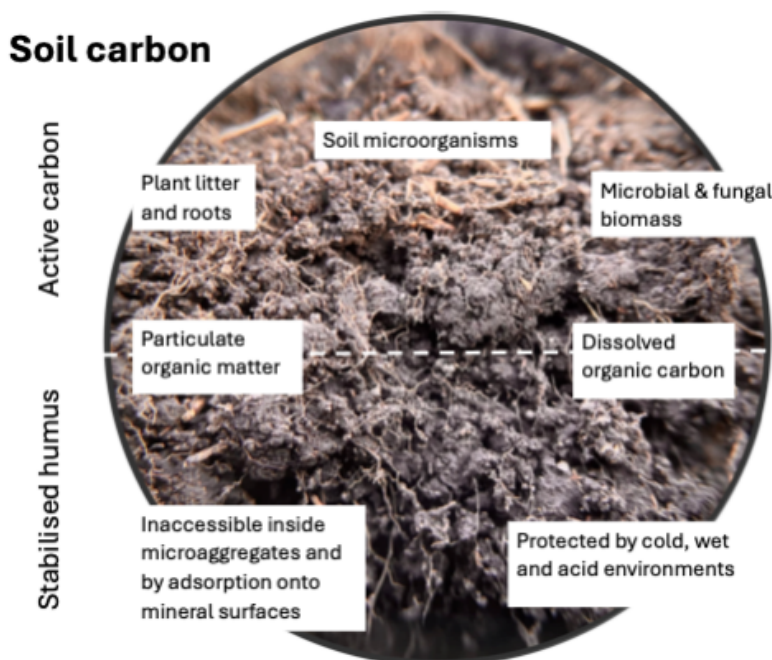
quarter of all known species live in the soil where they are invisible and unnoticed to most people. While soil is often discussed in relation to ecosystem services such as water management, its function as a habitat and symbiosis with overlying habitats remains overlooked. To that end, Richard has helped to design a central place for it in the Devon LNRS.

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## 2. Soil structure and soil carbon are central to the soil habitat

Biological activity in the soil is fundamental in forming soil structure. This is where clumps of soil particles are held together by chemical, physical and biological processes creating the soil habitat. Aggregation of soil forms living space and controls the balance of air and water available for organisms.

The soil habitat is a large carbon store and the science about soil carbon is evolving rapidly. Traditional thinking regarded humus as organic matter that could not be broken down, thus accumulating slowly over time. However, modern science has shifted this perspective, suggesting that all organic matter can be decomposed but becomes inaccessible because it is protected either by wetness, coldness and acidity or due to physical protection within soil aggregates.



## 3. Understanding different soil layers or horizons as well as topsoil is critical

There is a common tendency to focus solely on topsoil (also known as the A horizon). Deeper soil layers however significantly influence surface conditions. Water movement, acidity, and nutrient availability are all governed by these deeper layers due to their inherent texture, porosity and the type of bedrock, which in turn determine the types of plants and habitats that can thrive.

Focussing on topsoil and not considering the deeper layers and varying soil types is akin to discussing birds without considering their individual species and ecological requirements. By failing to acknowledge soil diversity, conservation and restoration efforts risk oversimplification – and ultimately failure

## The soil profile



**A horizon**

**B horizon**

**C horizon**

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### 4. Different soil types play different critical roles in habitat recovery

Richard introduced the Devon LNRS alongside the Devon soil map. He explained that the Soilscales map published by Cranfield University is based on the National Soils Map and can be used to categorise soils based on their ecological potential and characteristics for habitat recovery. Richard identified four broad soil types found in Devon which are critical to nature recovery in this region:

- **Brown Earths:** These soils are freely draining and very common in Devon, typically associated with woodland habitats and slightly acidic grasslands. Calcareous brown earths also occur over chalk and limestone in Devon.
- **Gley Soils:** These have naturally poor drainage and so support wet woodlands and other wetland habitats with seasonally waterlogged soils. These are common in North Devon with purple moor grass and rush pastures.
- **Podzolic Soils:** These are found in areas like the Pebble Bed Heaths and Dartmoor, they are acidic soils and support heathland ecosystems.

- **Peat Soils:** These are found on moors such as the Dartmoor blanket bog. They are permanently wet soils that support unique ecological communities.

Other broad soil groups being considered with different habitats are the shallow soils and man-made soils.

## Broad soil groups



**Brown earth soil**  
- Woodland



**Gley soil**  
- Wetland



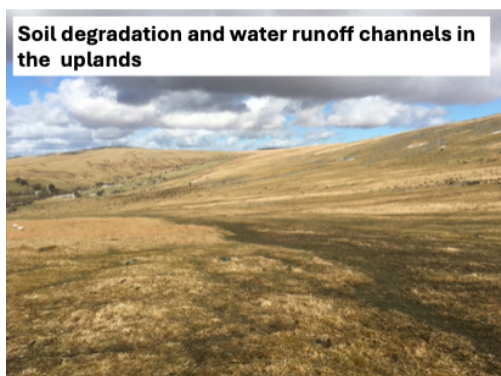
**Podzolic soil**  
- Heathland



**Peat soil**  
- Bogs and mires

### 5. Soil compaction is rife not only on agricultural soils but also in semi- natural habitats

One of the key issues Richard addressed was the widespread problem of soil compaction and poor soil structure in Devon across all habitats. Dealing with soil compaction is central to strategy for improving soil and habitats. He noted widespread legacy compaction on Dartmoor, particularly on podzolic soils. This not only causes unnatural runoff, but also could be limiting the potential for recovery of heathland habitats and accumulation of carbon. He attributed this to mainly to historical management, particularly winter grazing, people and vehicles squeezing wet soil, and typically with very slow recovery of these acid soils.



In a striking example we saw a side-by-side comparison of soil inside and outside a fenced area. Within the fenced area, where grazing was excluded, the soil had recovered dramatically, becoming more porous, biologically active and in turn supporting wider habitat recovery. While reducing grazing pressure can aid recovery, in some cases, complete exclusion including people pressure is necessary for the soil to fully regenerate and for it to support nature recovery for that local area.

**Habitat recovery in the uplands**



**Good soil structure**



## 6. Nature recovery practices can harm soil habitats, or even destroy ancient soils

Richard highlighted an example from the East Devon Pebble Bed Heaths, a Special Area of Conservation (SAC), where soils are severely degraded in some areas due to the pressure of people. He also mentioned that conservation practices may unwittingly ignore the value of rare fragile soils. An example of this that has been drawn to our attention at the SSA is the deliberate removal of ancient topsoil on podzols to create habitat for specific species like the silver-studded blue butterfly and insects. Through a soils lens, this is akin to cutting down an ancient tree – once these ancient soils are lost, they cannot be regenerated within a human lifespan or even potentially over centuries.

Similarly, an area that needs addressing is the management of naturally wet soils in semi-natural habitats when the very management may cause soil compaction, and how to prevent and deal with it when works are carried out. Richard offered the perspective that this is an area where more discussion is needed to find a compromise and working together so that outcomes that may seem to be in competition with each other become complementary.

## 7. Land management practices have unique impacts on soil health

Richard discussed specific impacts on soil health of different land management techniques and practice:

- **Tree Planting:** There are multiple benefits of tree planting but the process must consider soil conditions. Allowing natural regeneration often yields better results, as this enables pioneering vigorous plant

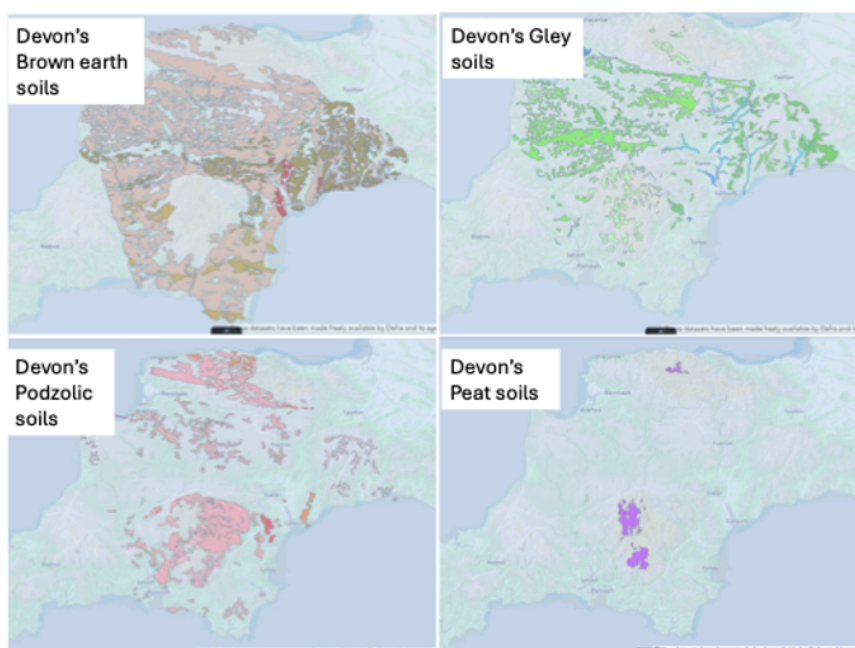
roots that can naturally break up compacted soil over time. When planting trees, it is critical that the soil itself is first in good health – and not damaged in the planting process itself. There are too many examples of trees planted that do not survive.

- **Lime Application:** liming can help recover some degraded agricultural soils improving soil structure, including enclosed farmland near Dartmoor. However, it may not be suitable for recovery of naturally acidic grasslands.
- **Subsoiling:** While useful to remedy compaction deep in the soil on agricultural land, subsoiling must be done with an understanding of the soil type. Some soils naturally restructure through cracking, while others require periodic intervention.
- **Direct Drilling:** Direct drilling of crops and no tillage is frequently promoted as a soil conservation technique to grow soil carbon and soil health. However, it can in fact cause or exacerbate soil compaction problems if not managed and applied with sensitivity. This is a common problem in Devon on sandy soils that readily pack down, thus reducing soil porosity. The Environment Agency deal with many runoff problems in Devon associated with shallow tillage and poor soil structure.

## 8. Soil maps and data are critical to overcoming barriers to healthy soils

The group discussion following Richard's presentation highlighted that improving soil management is challenging due to economic barriers and policy constraints. Though farmers have the advantage over policy makers of direct experience about soil conditions, there is a continuing lack of awareness and skills which is a key barrier to better soil management across all habitats.

Richard's contribution to Devon's LNRS makes great use of the existing open access Soilscape data and it was fascinating to see these applied and the broad soil groups occur in Devon (see maps below). However, I noted the project illustrates both the recurring opportunities and barriers faced by soils through the lack of publicly accessible soil data and associated soil maps – and guidance on their interpretation. The [National Soil Map](#), though created by public funds, has for decades been costly and cumbersome to access because licences are required. We at the SSA are watching keenly to see whether efforts to make this data freely available will succeed, allowing land managers and their advisers to make more informed decisions with soil at their heart, and Devon's LNRS is a great example of the innovative and practical approaches freely available national soil data and maps would unlock.



## Conclusion and Summary

Richard concluded with the promising message, that soil recovery is possible but requires time, patience, awareness, expertise and proper management. Soils recover by natural biological processes, build-up of soil carbon and also by good husbandry involving management to prevent compaction and soil loosening where needed. He shared an example of a field that had recovered significantly over 20 years after being taken out of maize production, subsoiling and then converted to permanent pasture. Understanding and raising awareness of soil diversity is crucial—there is no one-size-fits-all solution, and different soils require tailored management approaches.

### Restoration of soil



2001 – Arable rotation



2021 – Permanent grassland (20 yrs)

My overarching takeaway from this inspiring presentation was clear: soil is an overlooked but a vital habitat in its own right – and all other habitats are dependent upon it being in good health. Whether restoring woodlands, wetlands, or heathlands, understanding both soil type and soil condition is fundamental to successful landscape and nature recovery. If you're reading this with an interest or role in nature recovery, what are the dominant soil types in your area? What aspects of nature restoration are they best suited to? What condition are they in? How are they being managed? Where do they lie across the land? LNRSs around the country – as well as land managers, conservationists and policy makers – might to look to Devon's leadership in putting soil knowledge and soil health at the heart of their strategy and adopting evidence-based management practices.

### Key takeaways:

- The soil tends to be an overlooked habitat in its own right and in supporting overlying habitats
- Soil habitats are diverse
- Soil habitats are degraded in all land uses, including 'semi natural habitats'
- Soil compaction is a problem in Devon
- More awareness is needed about soil type and how to diagnose the state of soils
- There is a huge opportunity to restore soils
- Restoring soils will enable much better and faster nature restoration

*All images in this blog are courtesy of Dr Richard Smith.*



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## Annex 1 – Background to Local Nature Recovery Strategies

### 1. Policy context for LNRS

Data is key to Local Nature Recovery Strategy thinking, because it allows for cost effective and (ideally) robust targeting of prioritisation and actions. LNRS aim to identify priority areas for restoring nature over the next 10 years.

LNRS was conceived during the period in which the concept of public money for public good dominated environmental policy development (2016 to 2023 approximately). Many Environment and even Prime Ministers have come and gone since, and the current policy driver is now growth, alongside energy and health. Making sure nature is not crowded out of the policy landscape is a challenge, and one the LNRS mandate is ideally suited to rise to, because growing nature for the economy, health, security and climate change resilience must be part of a robust growth agenda.

LNRS sees any land use change is an opportunity to put nature back, and this must be part of the thinking and action in the push to build houses and increase energy and transport links.

To this end, LNRS will:

- Have universal coverage across England developed with people, who will both deliver and benefit.
- Inform an upcoming Nature Recovery Fund in the planning, and a review, of environmental regulations so these can be applied in a more user-friendly way such as through a lead regulator, rather through different points of contact.
- Form the bedrock upon which Natural England will build its environmental delivery plans and provide the framework to give confidence to anyone who wants to spend money on nature recovery.
- Be a powerful part of the evolving Environmental Land Management (ELM) scheme, the Future Farming Roadmap and farmer payment schemes.
- Be critical for the new Land Use Framework for England, forming the local-level manifestation of how regions can fulfil their 30 by 30 and Green in 15 obligations.
- Within the Planning and Infrastructure Bill, it will stack with development and catchment plans – providing a framework for understanding where nature and water matter and must be accounted for.
- There is a statutory requirement for LNRSs to be used to target Biodiversity Net Gain.

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### 2. LNRS is based on an holistic approach to conservation

Conservation should not only be about rare species but about overall biodiversity. The "Lawton principles" of making nature conservation better, bigger, and more joined up guide the approach. Actions should consider broader benefits, including carbon sequestration, flood control, water quality, and human well-being.

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### 3. Mapping and data collection are at the heart of LNRS

Mapping is a critical part of the LNRS, to support decision making and identify priority areas for conservation and inform funding allocation. Maps are powerful visual tools for informing and engaging the public and a simplified approach has been developed to ensure usability for all – from community groups to farmers. Species and habitat data are integral, though some datasets (especially for habitats) have flaws. Because it is underpinning and static and integral to successful habitat creation, soil data could be a key foundation for mapping nature recovery efforts.

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### 4. Data availability

Unfortunately, many (if not the majority) of LNRSs have been unable to use data from their Local Records Centres. This is for a variety of reasons: because Defra (Natural England / Forestry Commission) does not have a national or local agreement to use LRC data, the data is not in the public domain, and commerciality rules prevent it being placed in the public domain even if purchased for the LNRS. The lack of a joined-up approach to wildlife and nature-related data and the inconsistent approach taken to the Historic Environment Record - which Local Authorities have a statutory duty to maintain - is a significant issue nationally.

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### 5. Strategic Integration with other environmental strategies is baked in

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### 6. A framework based on high opportunity areas – please note that this is the approach that Devon is currently taking. Each LNRS is required to map where action is most needed but how they are doing this is slightly different.

The mapping process identifies *high opportunity areas* where conservation actions should be prioritised. These areas are divided into categories:

- **Managing Existing Habitats:** Using the best available data, including watercourses and hedges, to enhance connectivity.
- **Protecting and Expanding Habitats:** A proposed 100-metre buffer around priority habitats to shield them from urban and agricultural impacts.
- **Focus Landscapes:** Specific areas identified for habitat creation, using soil and landscape character data.
- **Species-Specific Strategies:** Mapping areas where species conservation efforts should be targeted.

- **Avoiding "White Space":** The strategy ensures that all areas are considered for conservation efforts, not just the designated opportunity zones.

The goal is to produce a clear, practical tool that helps policymakers, conservationists, and communities make informed decisions. This tool will be interactive, allowing users to click anywhere on the map to see what they can do for wildlife in that area.

**Ends.**