Rhosneigr 2 soil RIGS

GeoMôn Global Geopark original webpage

RIGS Statement of Interest:

Site description: Soil Type Location Rhosneigr, Anglesey. Park at [SH330716] off the A4080 south of Rhosneigr among the sand dunes. Examine the soil in the small channel through the centre of the car park Parent material wind-blown sand Topography Altitude 2m; slope 0° ; Climate rainfall 885mm, FCD 186, AT0 1467, MDw 91mm MDp 79mm land use vegetation, grass and herbs

Profile description:

0-40cm A dark greyish-brown sand, abundant fine fibrous roots (grass) and common coarse fibrous roots (marram). Repeated layering of darker organic-stained sand and paler yellowish sand. Gradual boundary

40-60cm B brown sand, merging boundary

60-100cm C yellowish sand

Geological setting/context: Soil is formed by the interaction of five factors: parent material, position in the landscape, climate, natural vegetation and time. Soil formation is a very slow process of physical, chemical and biological alteration of geological material — called parent material by soil scientists — including both hard rocks and the range of superficial deposits such as glacial debris, alluvium or wind-blown sand. The wide variety of such materials [detailed in other RIGS sites] contributes to the variation in soil types throughout the region. In some cases, restricted occurrence of some rock or sediment types means that some soils are particularly scarce in this area.

Position within the Landscape interacts with climate and vegetation, and helps control water relationships. Higher altitude often causes colder and wetter conditions than lowland sites. Steeper slopes cause more water to run off the surface increasing erosion and reducing leaching. The wide variety of landscape elements, high mountains, upland plateau, rolling hills, coastal locations, lowlands and valleys create an enormous diversity of situations where soils may form differently. Changes in landscape development also lead to changes in existing soils — e.g. the changes in sea level dominate the morphology and deposits of coastal areas creating new processes or directions of soil formation.

Climate, largely affected by position in the landscape is a key factor controlling rates of physical and chemical weathering, biological activity and the composition of the plant community, thereby adding to the diversity of soil formation. Variations [daily or seasonal] in temperature and rainfall regimes have a marked effect also.

Natural Vegetation plays an important part in soil development due to the extraction of water and nutrients from deep in the soil and the return of organic debris to the surface: different plant communities have varying effects, e.g. deciduous trees have deep root systems drawing nutrients from depth and their leaves decompose readily to recycle nutrients and add humus to the soil whereas coniferous trees lead to acidification, partly by locking up nutrients and partly due to the organic acids that cause podsolisation. There is also considerable difference in soil biodiversity under different plant communities and land uses. These three environmental factors interactively generate changes in the parent material that take time to develop fully. The complex changes in climate and consequently in vegetation communities during and after the last glacial episode have driven soil forming processes in an erratic fashion, causing most to be in the early stages of development, and others to record multiple soil formation. Soils take considerable time to reach maturity, and almost certainly most of the soils we see are still adjusting to changes. Deglaciation, about 14 000–10 000 years ago is recent in soil forming terms, whilst most saltmarsh areas have only formed in the last few hundred years. Welsh soils are young by world-wide standards and these early stages of soil formation are vitally important for understanding the genesis of soil.

Human influences have taken over from natural factors in the last few hundred years: most of Wales is farmland, much of it rough grazing for sheep or beef cattle in the uplands but with considerable agricultural management in the lowlands, and even in the hill areas of Mid-Wales where vast areas have been 'improved' with lime and fertilisers and now form rich sheep grazing pastures. These agricultural practices, together with forestry, create entirely new environments and soil formation slowly begins to respond, destroying the natural soils and impacting on biodiversity and even landscape.

RIGS soil sites are chosen to represent characteristic soils in natural or semi-natural condition as an important educational resource for schools and universities, but equally for farmers, land owners and even policy makers to appreciate their natural value to the landscape and character of the region, and also to conservation of biodiversity. The following table sets out the 10 major soil groups and their indicative distribution in Wales together with a brief description of the dominant characteristic. Many of these major groups are subdivided into groups and subgroups which reflect variants on the basic definition and add detail such as texture or parentage. Each subgroup is further divided into soil series, defined as 'similar profiles…under similar conditions .. on one parent material' which usually have a geographical name suggesting where they were first mapped but, sadly, many of the original (Welsh) series names have been lost due to rationalisation.

Network context of the site: This site is part of a network of sites representing the soil types present in North Wales, using the classification system devised by the then Soil Survey of England and Wales [Avery, 1980]. It is important that a complete network of major soil groups is preserved to illustrate the diversity of soils that underpins the species biodiversity and habitat diversity throughout North Wales.

Major soil group (% of Wales land area)

1. Terrestrial raw soils <0.01% in recently formed well-drained material with little or no soil formation
2. Raw Gley soils 0.21% in recently formed waterlogged material with little or no soil formation
3. Lithomorphic soils 2.21% in very shallow (<30cm) soils over rock, rubble or little-altered sediment
4. Pelosols 0.10% deeply cracking clay soils
5. Brown soils 30.22% deep, well-drained fertile soils
6. Podsolic soils 32.30% with a peaty surface layer and humus and / or iron-enriched subsoils.
7. Stagnogley soils 24.63% slowly permeable, seasonally waterlogged soils
8. Groundwater Gley soils 3.26% permeable, seasonally waterlogged soils affected by the groundwater table
9. Man-made soils 0.43% disturbed, restored or man-made soils
10. Peat soils 3.28% more than 40cm of organic material that has remained wet to the surface (upland bogs)

This site is a classic example of a terrestrial raw soil, also demonstrating both the fragile nature of such soils and the uncertain path of soil development with repeated erosion and depositional phases.

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Site geometry: Site boundary