BRIEFING NOTE
No. 1

Geological Survey Ireland

Soil and Subsoil

Geoscience information on soil and subsoil

This Briefing Note highlights some geological attributes of soil and subsoil beyond their well-documented role in agriculture and food production. The Briefing Note also identifies information and analysis that Geological Survey Ireland provides to support policy making and regulation in the increasingly multidisciplinary and cross-agency topic of soil and subsoil.

Soil and subsoil form a continuous interconnected natural system (Fig. 1). Soil is the uppermost layer of the ground surface that is capable of supporting plant life; it is usually less than a metre thick. Subsoil is the material between soil and bedrock. Subsoil is very extensive in Ireland where a complex layer of unconsolidated, mainly glacial, sediments underlies some 85 percent of the country's soil[1].

Soil is fundamental to agriculture, biodiversity and ecosystem services. Subsoil that underlies it provides many additional functions beyond the biological realm, including providing raw materials (aggregates), a substrate for construction, space for landfill, carbon storage, water infiltration, a source of groundwater supply and geothermal energy. Soil functions are under threat on a global level, with soil at risk from degradation associated with erosion, compaction, contamination, sealing, carbon loss, nutrient loss, salinization and desertification.

The Government is committed to developing a national Soil Strategy and to undertaking a national Land Use Review as part of the Programme for Government[2]. At the European Union level, soil is an intrinsic component of the European Green Deal and soil is attracting increased attention both in terms of policy, with a scheduled revision of the current soil strategy in 2021, and in terms of research funding through a specific mission area in Horizon Europe. Soil and subsoil require an integrated, multidisciplinary scientific and policy approach including geoscientists.

Figure 1. Soil and subsoil form a continuous interconnected and often complex system.

Soil	Subsoil	Transition Zone	Bedrock
A mix of weathered minerals, organic matter, organisms, air, and water; most soils support plant growth. In urban areas, soil is known as Made Ground if it has been reworked or created by human activities.	Mineral soil (sand, gravel, clay) with lower organic content and biological activity than soil. In Ireland, much of this material was deposited during the Quaternary Ice Ages.	Broken and partially weathered bedrock	Solid rock

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Information on soil and subsoil for policy making from Geological Survey Ireland

Soil and subsoil vary widely across the EU, due to differences in climate and underlying geology and it will be important to tailor specific policies to reflect the specific nature of soil and subsoil. Comprehensive and accurate information on Irish soil and subsoil will be an essential element in crafting a wide range of policies. Figure 2 highlights soil and subsoil information provided by Geological Survey Ireland, emphasising major applications beyond the agricultural and food-production sectors.

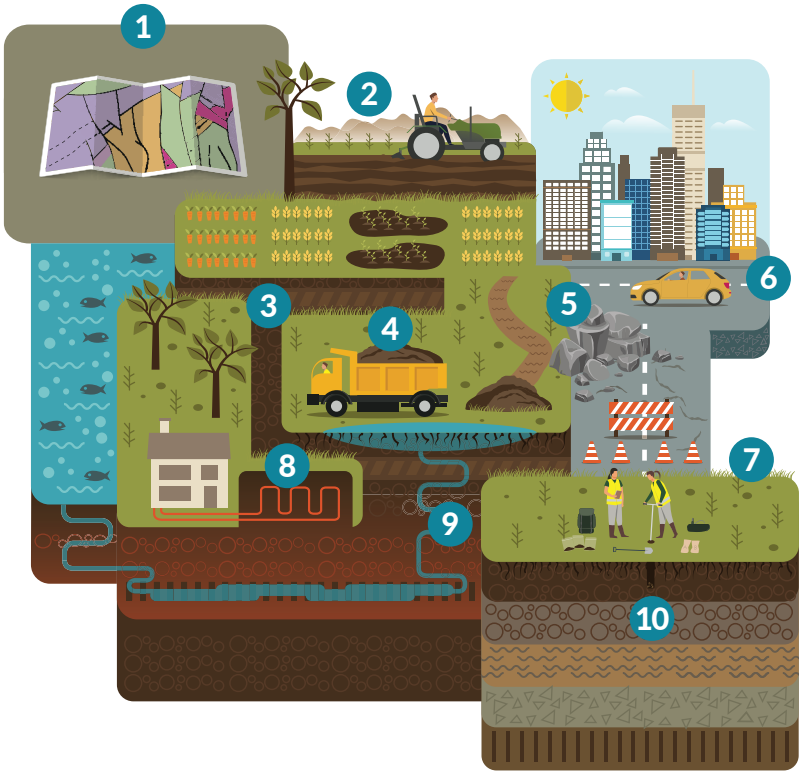

Figure 2. Soil and subsoil information at Geological Survey Ireland.

1 Geological Survey Ireland data and analysis

Geological Survey Ireland provides a range of information on Irish soil and subsoil including data, maps and models.

2 Agriculture

Geological Survey Ireland is working with Teagasc on the Terra Soil project to provide soil information to optimise agricultural productivity while supporting environmental protection.

3 Carbon Sequestration and Climate

Geological Survey Ireland's Tellus programme maps organic matter content in soil, increasing our understanding of soil carbon in mitigating climate change.

4 Circular Economy

Waste soil and stone should be should be appropriately reused to support resource efficiency. Geological Survey Ireland has assisted the Environmental Protection Agency to set acceptance criteria for Soil Recovery Facilities.

5 Geohazards

Geological Survey Ireland studies soil-related geohazards including coastal erosion, ground motion and landslides to safeguard the public and increase resilience to climate change.

6 Urban Development

Geological Survey Ireland provides data on ground conditions supporting policy on compact urban development. Products include 3D models of subsurface Dublin and Cork and a National Geotechnical Borehole Database.

7 Soil Quality

The Tellus Geochemical Survey is establishing baseline geochemical data for the country, including consideration of contaminants in urban areas.

8 Renewable Energy

Heat stored in soil and subsoil can be captured by shallow geothermal systems. Geological Survey Ireland produces guidelines and advises on this renewable energy.

9 Water

Geological Survey Ireland is the primary source for information on groundwater resources and vulnerability. Sand and gravel aquifers in the subsoil are important regional water sources.

10 Aggregates

Aggregate Potential Mapping of sand and and gravel deposits aids long term strategic planning and use of construction raw materials.

References

[1] Sullivan, L., McConnell, B., Scanlon, R., Walsh, S., and Creamer, R. (2018) Soil Formation, p. 11- 37 in Creamer, R. and O'Sullivan, L. (Eds.) (2018). The Soils of Ireland. Springer World Soils Book Series. Springer. 300p.

[2] Government of Ireland (2020) Programme for Government. Our Shared Future. https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/

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