Glossary – Soils: the world beneath our feet

**Air pollution** - Air pollution is the introduction of harmful materials into the earth’s atmosphere.

**Aluminium** – Aluminium (Al) is a metallic element. When there is a lot of aluminium in a soil it can be toxic to plants and animals.

**Aggregate** – Within soil an aggregate is basically a clump of soil particles. It is particles that bind to each other more than they do surrounding particles. They are held together by various mechanisms including moist clay, plant roots, fungal hyphae and organic compounds excreted by bacteria and fungi.

**Arable** – Arable land is land that has been ploughed for crops.

**Bacteria** - Bacteria are single celled microorganisms. They are common in all types of habitat, not just the soil. We are most likely to know of the ones that cause disease but there are many types found in soils providing a wide range of functions.

**Biota** - Animals and plants in an area at a particular time.

**Biodiversity** – Biodiversity is the variety of life, it includes all forms and variation in life from diversity of animals plants and microbes to variation at a genetic level.

**Bioturbation** - the mixing of soil or sediment by living organisms.

**Bioremediation** - Biological remediation or bioremediation uses a biological process to break down, transform or remove contaminants.

**Boulder clay** – Boulder clay is formed from the deposits of glaciers. It is often full of boulders hence the name.

**Calcium** – Calcium (Ca) is a metallic element found in soil. High concentrations of calcium are related to soil with a high pH.

**Carbon** - Carbon (C) is a non-metallic element but importantly it forms the basis for organic materials.

**Carbon dioxide** – Carbon dioxide (CO₂) is a gas that occurs naturally in the atmosphere but it is also a greenhouse gas.

**Casts** – Casts are the mass of soil left after passing through a worms body.

**Chemical weathering** - Weathering is the process by which rocks are worn down and broken up. Chemical weathering is when this process is caused by chemicals in the environment for example chemicals excreted by plants or pollution such as acid rain.

**Chlorofluorocarbons** - Chlorofluorocarbons (CFCs) are chemicals that contain the elements carbon, hydrogen, chlorine and fluorine. In many regions of the world their use is being phased out but they were previously commonly used as refrigerants and propellants (e.g. in areosols). They are harmful to the ozone layer because of the chemical reactions they produce in the atmosphere.

**Clay** – Clays are the smallest size fraction in soil, they have already undergone chemical weathering changing their physical and chemical composition and so are known as secondary materials. Clays are less than 0.002 mm in size.
Collembola – These soil organisms live in the soil environment where they play an important role in breaking up organic matter. They look a little like insects but are not closely related to them.

Compaction – Compaction is the process by which applying pressure to the soil surface compresses it making it denser.

Glossary

Decomposition – Decomposition is the process or rotting or decay that organic matter undergoes. Decomposition breaks down the complex organic material into simpler substances or basic elements. Bacteria and fungi play an important role in decomposition.

Deforestation – The removal of forest.

Dung beetles - Dung beetles are beetles that feed on dung, it can be their entire food source or part of their diet. There are thousands of dung beetle species and they are found in many different types of habitat.

Ecosystem – The grouping of all of the living organisms in an area and the physical environment that they live in.

Ecosystem engineers - This group, which includes earthworms, build and modify the soil environment, creating habitat for the smaller groups of organisms.

Ecosystem services - The services that the environment provides for human beings, either by making human life possible or by enhancing it. Examples include providing clean drinking water, providing food to eat and providing an environment in which to enjoy leisure activities.

Element – an element is a substance that cannot be broken down into a simpler substance.

Enzyme – Enzymes are chemical produced by living organisms to help bring about or speed up chemical reactions. For example, a fungi might produce an enzyme to speed up the conversion of one form of phosphorus to another in the soil.

Erosion – The removal of soil by external factors such as water or wind.

Eutrophication – Eutrophication occurs when nutrients flow into a water body leading to an accumulation of excess nutrients. This can promote rapid growth of plants or algae leading to the organisms in the water having to compete for other resources.

Excretion – Excretion is when a living organisms expels waste.

Fauna – Fauna means animal life.

Fungal hyphae – Hyphae are the long tubular structures that make up many fungi.

Fungi - Fungi are single celled or multicellular organisms that produce spores to reproduce. They decompose the organic matter in which they live.

Glacial deposits – As a glacier melts all of the material that is carried within it is deposited. This will typically consist of sediments (fine particles) and rocks. This deposited material is known as glacial till or outwash.

Habitat – A habitat is the environment in which an organisms lives.
Gleying - Gleying occurs in waterlogged soils where the majority of the pores are filled with water rather than air. This leads to oxygen being removed from iron compounds either throughout the soil or confining it to small patches. This leaves the soil looking very grey sometimes with orange patches where the oxidised iron remains.

Greenhouse gasses – Greenhouse gasses are those which contribute to the greenhouse effect by absorbing radiation and preventing it escaping from the earths atmosphere. Carbon dioxide (CO₂) and methane (CH₄) are examples of greenhouse gasses.

Groundwater - Water held below ground, this could be in soil pores or in the bedrock itself.

Humus – Highly decomposed organic matter within soil.

Impervious materials – Materials which fluid cannot pass through.

Invasive species – Invasive species are species which occur outside their natural range and cause damage to the environment or economy.

Invertebrates – Invertebrates are animals that lack a backbone. In the soil this includes many different types of insects, spiders and worms.

Iron – Iron (Fe) is a metallic element. In soils it can exist in both oxidised form and non-oxidised forms. When there is a large quantity of oxidised iron it makes the soil a rusty orange colour.

Irrigation – Irrigation is the addition of water to promote plant growth. It is commonly used for crop growth in many regions of the world when there is insufficient rainfall.

Illuviation – Otherwise known as podsolization. The process by which things transported in water are deposited within the soil. For example, organic matter leached from the upper soil profiles may be deposited in lower profiles via this process.

Laser diffraction – Laser diffraction is a commonly used technique for measuring the size of small particles. A laser beam is passed through a solution in which the particles are floating and the amount that the laser beam is scattered is used to assess particle size.

Leaching – Leaching is the process by which dissolved chemicals are transported downwards through the soil profile by water.

Limestone - Limestone is a rock formed from the skeletal fragments of sea organisms such as corals. It is mostly made up of different forms of calcium carbonate.

Litter – Materials from plants in the early stage of decomposition, litter is still easily recognisable as plant material such as dead leaves on the ground.

Litter transformers - These organisms, such as mites and collembola, can be up to 5mm long and play an important role by eating plant litter and then excreting it. This provides nutrient rich material which promotes the growth of bacteria and fungi.

Macrofauna – Macrofauna refers to animals living in the soil that are greater than 2 mm in size.

Magnesium – Magnesium (Mg) is a metallic element which can be found in the soil.

Micro food web – In the functional classification of life in the soil the micro food web consists of the smallest organisms. The micro-food web includes bacteria and fungi.
**Microbe or Microorganism** – A living organism that is microscopic or smaller in size. Bacteria and fungi are examples of microorganisms found in the soil.

**Microbial community** – A group of microbes of different species that live in the same environment.

**Mites** – Mites are tiny spider like creatures. There are a wide variety of mites found in the soil including those that eat plants and fungi as well as those that prey on other soil organisms.

**Molecular analysis techniques** – Molecular analysis is used to examine microbial communities. There are a range of different techniques available to help characterise the microbial community in different ways. They are based around extracting DNA, RNA, proteins or lipids.

**Mutualistic relationship** – an interaction between two species in which both of the species get benefits.

**Mycorrhizal fungi** - Mycorrhizal fungi form mutualistic relationships with plant roots, that is a relationship where both partners benefit.

**Nematodes** – Nematodes are a group of worms that includes roundworms and threadworms. There are many different species found in the soil, most of which eat bacteria.

**Nitrogen** – Nitrogen (N) is a very abundant non-metallic element. It is an important constituent of the atmosphere but is also an important plant nutrient. It can also become a pollutant.

**Nitrate** - Nitrate (NO₃) is a form of oxidised nitrogen, it is a form of nitrogen that plants can use easily and it does not bind to soil easily so it can move through soil in water.

**Nutrient cycles** – A nutrient cycle is the transfer of nutrients from one place to another and back again. Cycles can be observed for all nutrients but are most commonly described for common nutrients such as nitrogen. For example, in the nitrogen cycle we can see nitrogen being converted from atmospheric nitrogen gas to nitrogen forms that plants can use by lightning strikes and nitrogen fixing plant species. The nitrogen enters the soil and is used by other plants. These might be eaten by grazing animals who return it to the soil or used by microorganisms who return it to the atmosphere. You can find out more about the nitrogen cycle here: [http://extension.missouri.edu/p/WQ252](http://extension.missouri.edu/p/WQ252)

**Organic matter** – Organic matter comes from organisms that once lived in and on the soil. When they die they decompose and are incorporated into the soil.

**Organisms** – An organism is an individual form of life. This covers all forms of life including animals and plants.

**Oxidation** - Oxidation is the chemical process of adding oxygen.

**Ozone layer** – This is a layer of the earth's atmosphere which occurs about 10km above sea level. It contains high levels of ozone (O₃) and filters out the sun's ultraviolet radiation.

**Parasite** – An organisms which lives on or in another organisms obtaining nutrients from the host and benefitting at the hosts expense.

**Parent material** – The rock weathered to form mineral particles in the soil.

**Permafrost** – Permafrost is a soil layer that stays frozen year round.

**Photosynthesis** – The process by which green plants convert water and carbon dioxide into energy to fuel growth.

**Phytoremediation** - Using plants to break down, transform or remove contaminants in soil.

**Plant pathogens** – a bacteria, virus or fungi that causes disease in plants.
**Pore space and pores** – Pores or pore space are the gaps between soil particles. These can be filled with air or water. Pores can vary greatly in size and can be created by physical or biological processes in the soil.

**Potassium** – Potassium (K) is a metallic element which can be found in the soil.

**Prairie grasslands** – These are temperate, natural grasslands typical of North America.

**Protozoa** – Protozoa are single celled microscopic organisms. Protozoa eat bacteria and fungi.

**Quartz** – quartz is a hard rock mineral consisting mainly of silica. It is typically white or colourless.

**Respiration** – Breathing, taking up oxygen and breathing out carbon dioxide.

**Salinization** - Salinization is the build-up of salts in the soil. Salts can reach concentrations where they are toxic to plants. It tends to be a problem in hot regions of the world such as Africa and the Middle East.

**Silicon** – Silicon (Si) is a non-metallic element that occurs in rocks and minerals.

**Sand** - The sand size fraction has particles that range in size from 0.02 to 2 mm. Sand is mostly composed of quartz grains that are resistant to weathering. They are largely unaltered chemically, compared to the parent material.

**Saturated** – When something is saturated it means it is holding as much water as it possibly can. In soil this means that all of the available pore spaces are filled with water. You can tell if a soil is saturated by putting pressure on it and seeing if water pools on the surface around the point pressure is applied.

**Sediment** – Fine material carried in suspension in running water that is deposited.

**Silt** - Silts are largely unaltered compared to parent material. They are in the size range 0.02 to 0.002 mm. Both sand and silt are considered primary materials.

**Soil core** – Soil samples collected using a device called a corer that gives intact cylinders of soil.

**Soil horizon** - Soil horizons are layers in the soil approximately parallel to the surface. The horizons vary with depth and the influence of different soil forming factors.

**Soil security** - Soil security is about protecting our soils to ensure they are there for the future to perform all of the functions we ask of them.

**Soil texture** - Soil texture is determined by the sizes of the mineral particles that make up the soil.

**Substrate** – The material on which an organism lives or gets its food from.

**Surface sealing** – Soil surface sealing is covering of the soil surface with impervious materials that prevent soil from being able to absorb water. This mainly occurs as a result of urban development.

**Supersaturated** – Supersaturation is when there is more water in the soil that is needed for saturation. This is why you can see water pouring out of the soil.

**Ultraviolet light** – Ultraviolet light is light that has a shorter wavelength than visible light. It is invisible to the human eye. The different wavelengths of light in the UV spectrum are call UVA and UVB. Overexpose to ultraviolet light is what causes sunburn.

**Urbanisation** – an increase in the amount of people living in urban areas and urban development.
Weathered rock fragments – Weathering is the process by which rocks are worn down and broken up, rocks can be weathered by a wide range of biological, physical and chemical processes. The fragments of broken down rocks the result from this process is what are being referred to here.

Weathering/Chemical weathering - Weathering is the process by which rocks are worn down and broken up by physical or chemical processes. Chemical weathering is when this process is caused by chemicals in the environment for example chemicals excreted by plants or pollution such as acid rain.