

# Environmental Management: Lithosphere practicals

## Soil Horizons

### Aim:

To understand soil structure and the separate layers that lie beneath our feet.

### Equipment needed:

- Clear drinking glass
- Oreos or other biscuits
- Chocolate Angel Delight (or other brown coloured pudding/ice cream)
- Butterscotch Angel Delight (or other pudding that is not as dark as chocolate, e.g. creme caramel or caramel ice cream)
- Chocolate chips/Reeses Pieces/Mini Smarties/M&Ms/peanuts/Rice Crispies/Cocopops or similar
- Chocolate muffins/cake
- Chocolate sprinkles/curly
- Jelly worms
- Desiccated coconut mixed in with a drop of green food colouring

Optional: another type of biscuit, chocolate sauce, maple syrup, icing flowers, coloured sprinkles

### Method:

1. **Horizon R:** Place an unbroken Oreo (or similar) at the bottom of your glass. This is your **bedrock**.
2. Optional: If you want to add 'petroleum oil' and another layer of 'bedrock', put chocolate sauce on top of the Oreo and then a different type of biscuit.
3. Optional: If you want to add an 'aquifer' (groundwater), pour on a layer of maple syrup (or similar) over the top of your bedrock biscuit.
4. **Horizon C:** Crumble some more of the top type of 'bedrock' biscuit on to your 'bedrock' (or aquifer) and add chocolate chips, smarties or whatever other little chunks you have at hand. This is your **weathered bedrock**. Add a thin layer of the caramel Angel Delights, so it goes down through the gaps between your parent rock. This layer (Angel delight and chunks together) is called the **substratum**.
5. **Horizon B:** Next is the chocolate Angel Delight. This is the **subsoil** that is full of dissolved minerals and fine clay.
6. **Horizon A:** Break up the muffins to fine breadcrumbs and put a layer on top of the subsoil. This is the **top soil**.
7. **Horizon O:** On top of this add chocolate sprinkles (the **organic debris** on the soil surface - rotting down leaves etc.) and jelly worms.
8. Finally add the grass (coconut) and other plant life (flowers, sprinkles etc.)



Plantlife and 'decomposers'



## Explanation:

Soil is divided up into layers called **horizons**. Each horizon has its own name and their own characteristics that separate it from other horizons. Not all soils have all horizons. The younger the soil, the fewer the horizons it will have.

### Horizon R

At the bottom, we have the **bedrock** - Horizon R. This is a single piece of rock, and may be igneous, metamorphic or sedimentary rock. It is also known as the **parent rock**, as when weathered, it is the source of rock that go into the layers above. This means that parent rock influence the type of minerals, nutrients, pH, and the texture of the soil above.

The soil's characteristics determine what grows on the top, and the plant life determines what animals can live there, so that bottom layer of rock is really important in shaping the landscape we see above ground.

There are often more than one bedrock layers, made of different rock. Some of this rock will be porous (liquid and air can pass through it), while some other bedrock layers are impermeable (liquid and air can't pass through).

**Petroleum oil** (<https://www.nationalgeographic.org/encyclopedia/petroleum/>) and **natural gas** (<https://www.nationalgeographic.org/encyclopedia/natural-gas/>) (<https://upstreampm.com/whats-the-difference-between-shale-crude-oil-and-natural-gas/>) can be found within the bedrock, as can **aquifers** (<https://www.nationalgeographic.org/encyclopedia/aquifers/>). Where these reserves of water or fossil fuel build up depends on how permeable or impermeable the layers of rock above and below are. Oil and gas try to move up, but get trapped, forming a kind of underground lake, by the impermeable layer above. Water, on the other hand, tends to soak down and gets prevented from moving further down by with the impermeable rock below it.

### Horizon C

Next is **horizon C**. This is the layer that is neither soil or rock, but is a bit of both. It has the **weathered rock** in it, but not enough organic material in order for anything to grow in it.

### Horizon B

The **B horizon** is the **subsoil**. As water seeps through the layers above, with the liquid, they bring down the minerals from the soil above (this is called leeching), where they build up in the subsoil (this is called accumulation). There is minimal organic matter in this layer as plant roots rarely get down this far.

### Horizon A

Sometimes there is an E horizon, but due to ploughing, this layer usually gets mixed up in with the A horizon.

The **A horizon** is the **top soil**. Particles are fine (compared to the other layers). It has many of the minerals from the parent rock, but also some of the **humus** - rotted organic bits, such as leaves - from the layer above. This is the layer that roots grow in and the worms live. It is a fairly dark layer as it has all that humus in it.

### Horizon O

The top layer is the **O horizon**. It is all **humus**, full of animal bits (poo, dead insects) and plant matter (leaves, twigs etc.). Everything is at different stages of decomposition and this is the darkest horizon.

On top of all this is the bit of the plants you can see growing.

Slide show:

Weathering and soil formation - <https://slideplayer.com/slide/14610519/>

Pictures:

<http://geologylearn.blogspot.com/2015/11/soil.html>

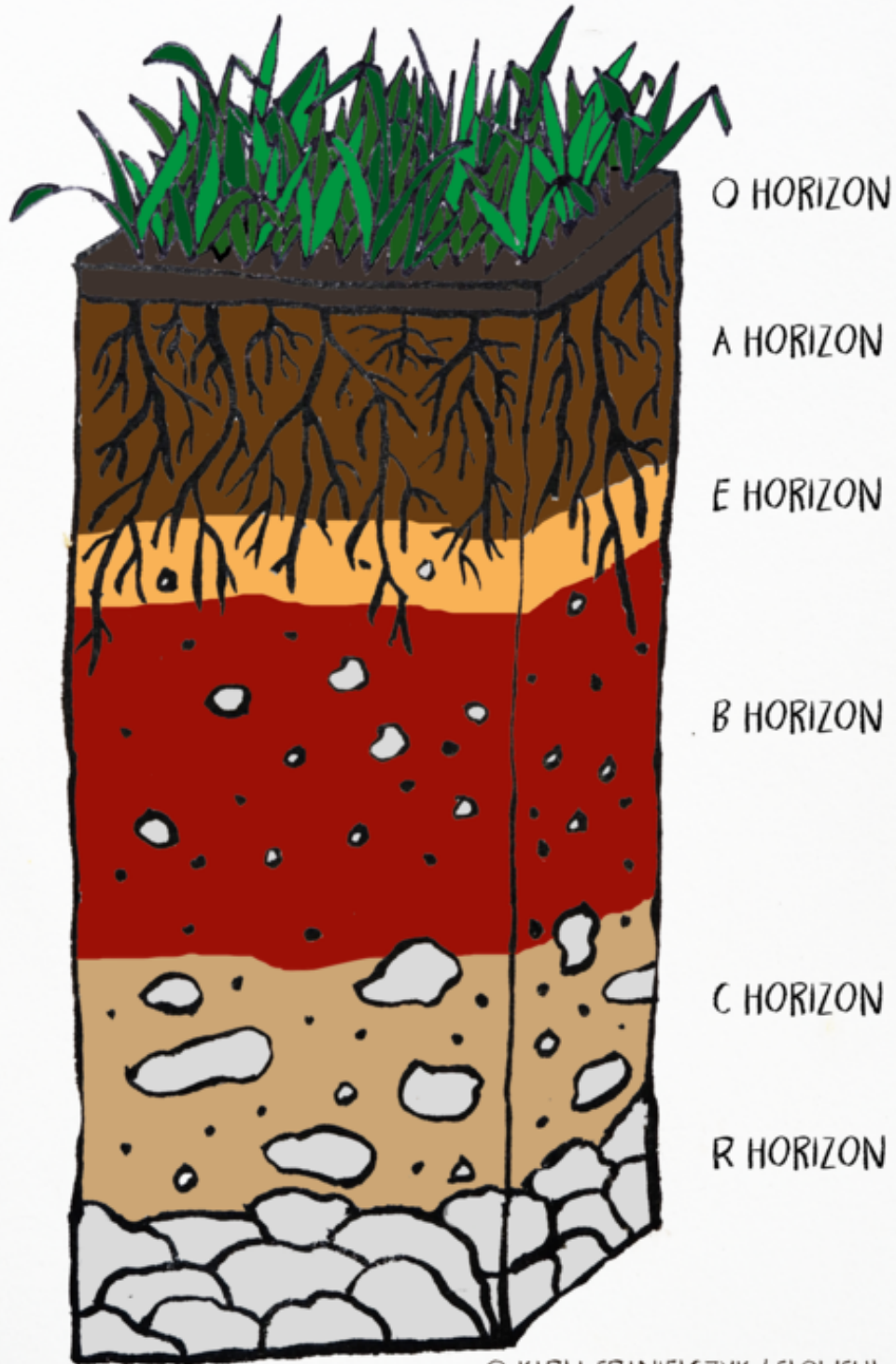
<https://www.flowful.org/permaculture-community-resilience-course/s6-soil-basics>

Further info:

[https://www.nationalgeographic.org/education/resource-library/?q=soil&page=1&per\\_page=25](https://www.nationalgeographic.org/education/resource-library/?q=soil&page=1&per_page=25)



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