

Plant Communities, Part 2: Soils

In Plant Communities, Part 1, I introduced the idea that looking at and learning about plant communities can sharpen your powers of observation, develop an increased understanding of the bush and help you appreciate the part that native plants play in the complex web of life.

There are several crucial aspects to the structure of plant communities. This month I'd like to tell you about just a few of the ways that SOILS play their part.

Soils are composed of 5 main components, and a variation in any of these components can have quite an impact on the plants that the soil can support. Think of the implications of changing any or all of the following: –

- **mineral particles** which are derived mainly from the weathering of the bedrock
- **organic materials** from decaying plants and animals
- **water**, containing dissolved nutrients;
- **air**
- **living organisms**, ranging in size from small animals to microscopic viruses.

In Australia the various combinations of these factors have produced nearly 50 types of soil.

The bedrock determines the mineral content of soil, but it also determines the **type** of soil, and very broadly and simplistically, there are 2 main rock masses that are relevant to the Parramatta/Hills area.

Shale bedrock produces a red-brown clayey soil that is deep and fertile and supports forests such as the Sydney turpentine Ironbark Forests (STIF) of Castle Hill-Dural. Many of the plant communities on these soils have been cleared - first for agriculture, and then for housing, (which is why the ecological community itself is endangered, and why it contains so many threatened and uncommon plants), and once cleared the fine soils can be highly vulnerable to erosion by wind and rain. Elsewhere the shale rocks of the Cumberland Plain have produced heavy clay soils that are often poorly drained and aerated, commonly forming swampy depressions.

Sandstone/conglomerate bedrock and some granites form sandy soils. These acid soils are generally found within 160km of Australia's coast and are pale yellowish, generally infertile, and support much of Australia's sclerophyll woodlands and heaths (eg Kenthurst).

A soil profile that is relevant to sandstone heath communities is the shallow, 'skeletal' soil consisting of one layer only and found in small depressions in sandstone rocks. It is always fascinating when on a bushwalk to look out for these rocky outcrops, fairly common on ridgetops. Look closely at what is growing there, and what it is growing in. Skeletal soils are the first step in the evolution of heath communities. As bare rock weathers, it may be colonised by mosses and lichens, which trap tiny amounts of water, slowing down evaporation. Perhaps the seeds of nearby *Darwinia fascicularis* or *Baeckea imbricata* have fallen into this moister environment and have grown into low shrubs, their tiny roots spreading into the rock, breaking it up and increasing the amount of soil. As the years pass, more plants will have more access to increased

amounts of soil, nutrients and moisture and will be able to grow taller. A **succession** from bare rock to an open heath community will have occurred. Over a period of 15-20 years, and particularly after a fire, conditions may allow this open heath to progress to a closed shrub community.

It is well worth looking at the **colour of soil**. It tells you how well drained it is and its humus content and so tells you a lot about the needs or adaptations of the plants that grow there. Pale/whitish colours indicate a lack of organic matter, long periods of leaching and nutrient poor soils. Red, yellow and brown soils are caused by the combinations of various iron oxides, and are acidic and well drained. In general these are sandy soils and support heath/shrubby plants. Grey, green-blue colours in subsoils indicate waterlogged conditions. These are clayey soils and in general support grassy/herbal plants.

The effect of **soil depth** can be seen in the shape and height of the vegetation. How many times have you looked in awe at the stunted growth of an *Angophora costata*, clinging to life on a rock platform, wondering how it could possibly survive? The seed has found just enough soil to germinate; the roots have found just enough space to squeeze down to form an anchor. But just across the slope, where the soil has reached a goodly depth, the same species grows straight and tall with its magnificent canopy of contorted branches spreading above.

Well this has been the barest glimpse at soils in the context of plant communities, but hopefully you now have a bit of an insight into some of the variables involved so that next time you are out in the bush, you can check out some of these principles, and broaden your knowledge of our wonderful and diverse bushland.

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