Soil and Land Resources of The Bahamas

by Neil Sealey

Much of this is based on the much quoted *Land Resource Study by Little et al, 1977, Volume 27 Summary*. Unfortunately a lot of this is misunderstood and misquoted, particularly the chapter on Land Capability which classifies the land into three categories suitable for modern mechanized agriculture in decreasing quality.

In general terms the natural resources available for raising crops and livestock can be considered as the ground and the climate. This discussion only deals with the land and not the atmosphere.

Bahamian Land.
All Bahamian land is limestone, $CaCO_3$. This is a very common rock worldwide, and not noted for agriculture where it occurs. In mountainous and dry areas it is virtually unusable, and has been made worst by centuries of goat rearing in many areas, goats being the only animals capable of sustaining themselves in such a hostile environment.. In the case of The Bahamas the limestone is young and very pure, both characteristics of considerable significance to agriculture. The purity means that only calcium carbonate is available to plants from the geology (much in the way of nutrients comes from the air, and via decaying vegetation as humus).

Most other rocks are complex sets of minerals which break down to later form soils rich in nutrients, a process known as weathering. Limestone does not do this as its mineral content dissolves to leave nothing behind.

One aspect of limestone that is significant is the relative acidity/alkalinity of the weathered surface it develops. As acid conditions are generally bad for crops Bahamian land avoids this development, but high alkalinity also has its problems. Anything over Ph 7 is alkaline, and over about 8.3 is a disadvantage as it generally limits the ability of a plant to absorb water. All Bahamian protosols are alkaline, usually in the range 7.5 t0 8.5, but the red soils are less so, or neutral depending on the amount of limestone they include. Red soils are an anomaly in so far as they are not a product of the native geology, but wind-blown Sahara dust that has collected in vales between ridges, and to a lesser extent in potholes and extensive rockland.

The other feature of limestone is that it dissolves in water. This means that rather than breaking down to form a weathered residue that acts as a rooting medium it will simply wash away, leaving holes of various sizes and sharp-edged fragments between them Loose rock is common from this process. Farms that do have a suitable tilth made up of mulch and limestone pebbles and/or sand are faced with the fact that the limestone in this mix is dissolving rapidly (high surface area) in every rain storm.

The *Land Resource Study* also dealt with the various conditions under which the limestone had been formed. It is a mistake to think that because all Bahamian rock is limestone, the land surface is all the same. In fact there are many surface expressions. Seabed limestone exposed after a sea level drop is most suitable for farming, being generally flat, close to the water table, and young enough to be relatively soft and easily crushed. Perhaps even slightly better but more restricted are old beaches as they often have a higher level of organic content than the sea bed. The Seven Hills district of southern NP is in fact a sequence of shorelines left behind as sea level retreated, and the shoreline migrated

southward. The preferred farmland along Cowpen Road is on one or more of these beach strands.

Other areas are much less amenable to surface preparation, even if they are flat. Old surfaces have become increasingly hardened by the lithification process. These cannot easily be crushed and do not breakdown easily to form a loose surface. Any farming in these areas and hilly areas in general, is likely to be confined to banana holes. These have the advantage that they naturally collect both water and decayed vegetation. If big enough and accessible they can be farmed, as at Benzies Hill in Long island.

The procedure for preparing the limestone surface for mechanical farming is known as scarification, a process developed in South Florida in the early 20th Century. The process as done today is to shave the surface of the limestone with a bulldozer with a blade set to about 4” and then repeat this in another direction. This breaks up and levels the surface, does not create very large stones, and incorporates organic matter from solution holes into the mix. Following that a weighted disc plough is run across the ground several times to produce a mechanised growing medium. As long as the land is in use this should be continued annually. A suitable crop should be planted into this raw mix to help create a protosol and provide a residue that can be disced back into the ground. This is a rather expensive business.

Protosols

Apart from the problem of limestone, there has been little time for soil to develop in The Bahamas. Such “soils” as have developed are best described as “protosols” as they are not what would be considered mature. A typical soil comprises several layers known as horizons through which water rises and falls, and includes vegetable matter and insect and microscopic life all of which contribute to the maintenance of this profile and the ability of the soil to sustain plant life. Four general protosols have been recognized by the LRS, and other authors such as David Campbell (*Ephemeral Islands*), and all have their role in farming. The two most used from the earliest days are the organic soils/black land of the coppice; and the salt-and-pepper soils/white land of the sandy coast.

The **black soils** are the basis of pothole farming and at their simplest consist of pockets of humus trapped in solution holes, which of course also attract water. Simply clearing the bush by burning also adds carbon to the ground, and suitable crops can then be planted in the pockets of black soil found in the holes. This method is good for a year and then the bush needs to grow back before the process can be repeated, about 15 years in the wetter islands, 25 in the drier areas. This form of shifting cultivation has been the most widespread since the islands were settled, and is still practiced today. An advantage outside of NP is that a lot of land is available throughout the country. The disadvantages are the access and transport, as the fields are continually changing, and only track roads access most cleared sites. Production will always be low, but for an individual with access to land and a local market, the potential remains to make a living, probably part-time if necessary.

The **white soils** are basically sand dunes. Unlike the rockland this material has depth, but sand is a sediment, not a soil. As humus is added from tolerant vegetation the process of soil formation begins. The sand will be darker in colour than fresh beach sand. On close inspection it will be seen to be a mixture of white/light coloured grains of sand and black particles of humus, earning it the name ‘salt-and-pepper’ soil. Clearly this is of limited nutritional value, but because of their ready accessibility and continuous nature these soils are popular in some areas such as San Salvador.

The next well-known protosol has already been mentioned, being the **red soils**. These are unusual as they are actually a clay material blown in from North Africa and collected over the years in hollows in our limestone landscape. They are essentially a compound of minerals commonly referred to as laterite, or ‘brick earth’, in the tropics. The LRS used the term ferro-aluminous laterite due to the high concentrations of iron (which gives it its red colour) and aluminium. In fact this is very similar to the bauxite of Jamaica which is the ore of aluminium, and came from the same source. Unfortunately while this might seem like a bonus, red soils are notoriously sterile, essentially being the inert waste from chemical weathering in the tropics. Their use in The Bahamas reflects more on the poor quality of natural soil development than any intrinsic value. As they, like sand, and unlike the widespread rockland soils, have depth, this is an advantage, and they have been widely used, notably for pineapples, so much so that are often referred to as pineapple soils. The point is that pineapples require an acidic soil which clearly the Bahamas does not produce, but the red soil is not calcareous, more neutral, and with an acidic fertilizer the pineapples thrive in our climate.

These are the main ‘soils’, the rest are composites or artificial to some degree, like the Mount Thompson onion fields made up of a sandy matrix enriched with fresh-water peat from the rather rare ponds in that area.

Conclusion

Many crops that can grow in our climate under natural conditions will suffer when expanded to a large scale. An example is potatoes which grow well, but when tried in North Andros stones in the soil damaged the potato harvester, and, even more importantly, were picked up by the harvester and bruised the potatoes, causing them to be susceptible to disease and pests. Crops that can be sustained need constant fertilizing to attain good yields, and even the wetter islands need irrigation due to the inability of the protosols to retain water.

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This text was designed to be supported by a Powerpoint presentation and soil samples