

The Soils of Serranía de los Churumbelos

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Sumario

Nota: para el propósito de esta evaluación del suelo, SS4a se refiere a la meseta de Villa Iguana, y SS4b se refiere a la meseta de Alto Cagadero.

Las espectaculares formaciones geológicas, combinadas con la compleja topografía de las Serranía de los Churumbelos, producen condiciones ideales para una alta variedad espacial de las propiedades del suelo lo que puede explicar la extensa regionalización de los ecosistemas (ver “Aves” en páginas anteriores). Se hizo un análisis básico del suelo para todos los sitios, con el cual se midió la textura y el pH a 0 cm, 25 cm y 50 cm de profundidad. Se encontró que la textura era muy variable. Aunque todos los sitios se clasifican, por el sistema de clasificación de la USDA, como de suelos arcillosos, se encontró una clara tendencia a suelos arenosos en los sitios bajos y un aumento progresivo hacia un alto de contenido de cieno a SS4a y SS4b. Igualmente, se encontró que el pH es también altamente variable. SS1, SS2 y SS3 se caracterizan por un pH moderado, típico de los suelos tropicales mientras que SS4a y SS4b se caracterizan por una roca subyacente alcalina y un pH más alto. Este análisis del suelo corresponde, por lo general, a una capacidad de carga potencialmente más alta y a una degradación del suelo en condiciones de deforestación. El suelo varía altamente entre los sitios lo que podría explicar la regionalización de los ecosistemas.

Los factores edáficos son importantes a la hora de explicar las características vegetativas de los bosques tropicales y pueden proveer información útil para explicar el tipo de bosque. La alta regionalización de los ecosistemas puede deberse a variaciones en el tipo de suelo. Debido a las espectaculares formaciones geológicas y a las diferencias en la capa de roca subyacente se espera una significativa variabilidad localizada. Además, la extrema topografía de las vertientes más altas crea una variabilidad en la profundidad de los horizontes de suelo, con claras zonas de acumulación. La topografía también causa un gran deslizamiento de tierras en la región y las características del suelo pueden ser importantes para producir una potencial erosión del mismo y un movimiento de la masa como resultado de la deforestación.

Note: for the purposes of this soil assessment, SS4a refers to the Villa Iguana plateau, and SS4b refers to the Alto Cagadero meseta landform.

Summary

The spectacular geological formations combined with complex topography in Serranía de los Churumbelos produce ideal conditions for high spatial variability of soil properties, which may explain the extensive regionalisation of ecosystems (see e.g. “Birds” above). A basic soil analysis was made for all sites with texture and pH being measured at 0cm, 25cm and 50cm depth. The texture was found to be highly variable. Though all sites are classified as clay soils by the USDA classification system, there was a clear trend from sandy soils in the lower sites, with a progression towards high silt content at SS4a and SS4b. The pH was also found to be highly variable. SS1, SS2 and SS3 were characterised by a moderate pH typical of tropical soils, whilst SS4a and SS4b were characterised by an underlying alkaline bedrock and higher pH. This soil analysis typically corresponds to a high potential for water logging and soil degradation under deforestation. The soil was highly variable between sites, which may further explain the regionalisation of ecosystems.

Edaphic factors are important in vegetative characteristics in tropical forests, and can provide useful information in explaining forest type. The high regionalisation of ecosystems could potentially be due to variations in soil type. Significant localised variability is expected due to the spectacular geological formations and differences in underlying bedrock. Additionally, the extreme topography of the higher slopes creates variability in soil depth and soil horizons, with clear zones of accumulation. The topography has also caused a large amount of landsliding in the region, and the soil characteristics will be important in determining potential soil erosion and mass movement as a result of deforestation.

Methodology

For each site a 1kg soil sample was taken at 0cm, 25cm and 50cm depth. This was analysed in the laboratory for soil texture and pH.

Results

Table 2 shows the results of the laboratory analysis.

Table 2: Results of soil analysis

Study Site	% Sand	% Silt	% Clay	USDA Classification	Soil pH
SS1	0cm	47	15	Sandy Clay	5.8
	25cm	54	12		5.8
	50cm	55	11		5.7
SS2	0cm	44	13	Sandy Clay	6.3
	25cm	48	16		6.5
	50cm	46	15		6.3
SS3	0cm	33	25	Clay	6.6
	25cm	31	23		6.5
	50cm	30	26		6.5
SS4a	0cm	40	32	Clay Loam	6.9
	25cm	42	31		6.8
	50cm	41	33		6.9
SS4b	0cm	18	53	Silty Clay Loam	7.0
	25cm	15	51		7.2
	50cm	16	50		7.2

Discussion and Conclusion

In general the soils for the area are predominantly clay, but there is significant variability in exact texture between sites. The lower sites of SS1 and SS2 are predominantly sandy, with increasing levels of silt with altitude. The pH also increases with altitude from 5.8 at SS1 to 7.2 at SS4b. The moderate acidity at SS1, SS2 and SS3 is typical of tropical clay soils, formed through high levels of leaching. At SS4a and SS4b the pH increases. This may be due to the effect of underlying bedrock, with the alkaline bedrock balancing the acidification from leaching. SS4b is predominantly silt, and very different in texture to all other sites. Though no measure of nutrient content was made, it is likely that the soil at SS4b is highly fertile based on the texture.

The regionalisation of ecosystems may well be due to soil characteristics. The analysis of soil samples from each site has shown distinct differences in soil texture and pH, with increasing silt content and increasing pH with increasing altitude. The alkaline underlying geology at SS3, SS4a and SS4b is represented in an increasing pH from the lowland sites. For landsliding, the increasing silt content with altitude means that the soil is more stable, but the steep topography far outweighs this making the mountainous areas highly landslide prone. Water-logging under deforestation could be of concern, with soils throughout the region having a very low saturated conductivity (i.e. low infiltration rates). The potential downstream effects of deforestation could increase the hazard of floods due to reduced infiltration and greater overland flow, with greater levels of runoff increasing soil erosion.