

Land Suitability Assessment in Continental Grits of Northwestern Nigeria for Rainfed Crop Production

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Abstract

The suitability of soils on continental-grits in northwestern part of Nigeria was assessed for selected land use types (LUTs), using a qualitative physical land evaluation methodology. The results indicated that the soils of the landscape were currently not suitable (N1, 10-18) for cereals but marginally suitable (S3, 47-56) for grain legumes. Potentially, all the evaluating units were moderately suitable (S2, 61-69) for cereals. Soils on upland and valley bottom were moderately suitable (S2, 66-76), while those on plain were highly suitable (S1, 82-88) for grain legumes. Soils on plains were potentially more suitable for the crop considered than the soils on the upland and valley bottom. The major limitations were nutrient availability (f) which cut across the landscape, erosion (inter-rill) hazard (e) at the upland and oxygen availability (o) at the plains and valley bottom. However, nutrient availability was more important consideration because land users (farmers) who crop the land manage the soils with little or no soil fertility management system despite the very low nutrient status of the soils. The landscape will only be suitable for both cereals and grain legumes with the use of high fertility management practices. Subsequent comprehensive quantitative evaluation methods using computer models to simulate soil-water flow and crop growth can then be focused on potentially suited land.

Introduction

Land evaluation is the processes of assessing the possible uses of land for agriculture, engineering, forestry, recreation, industry and conservation. In the agricultural context, it is the assessment for a specific kind of land utilization, e.g. extensive grazing, rainfed farming, irrigation and agriculture. Land evaluation methods aim at assessing land qualities or suitability for specific land-use, as conditioned by biophysical parameters (Beek, 1978; Smit *et al.*, 1984). The physical resources remain reasonably stable, unlike the socio-economic resources that are affected by social, economic and political setting (Dent & Young, 1981). Van Ranst *et al.* (1996) suggested that derivation of physical land suitability is a prime requisite for land-use planning and development, since it guides decisions on land utilization type

(LUT) for optimal use of the land resources.

There are several approaches to land evaluation for which Van Lanen (1991) identified three general types. The first one is qualitative evaluation based mainly on expert judgement, where physical suitability is obtained by qualitative procedure. This approach gives useful result that generalizes the constraint of an area for specified kind of land use type. The FAO (1976) is an example. The approach is presented in discretely ranked classes (e.g. S1, S2, S3, N1 and N2). The FAO concept is mostly commonly applied, and, although it is a qualitative approach, it can be complemented and enhanced by more quantitative methods (Yizengaw & Veheye, 1995).

The second type includes a qualitative evaluation based on parametric methods that assess the suitability of land on a