

Chapter 3. The used data

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This chapter presents in detail the data that are taken as examples in the use of multivariate analyses.

The site

The site described is located in Rwanda, in eastern Central Africa. The relevés were placed in a transect 2400 meters long by 200 wide, located between Lake Ihéma and Kionja Hill in the south-east of Akagera Park.

The vegetation is very diverse, from grassy to wooded savannas and closed formations called xerophilous thickets. The main results were published in BOUXIN (1974, 1975a and b, 1983).

Sampling frame

Eighty relevés were described during the year 1970, from January to June (beginning of the dry season). These were located in a 2400 x 200 m transect between Lake Ihéma and Kionja Hill, facing east-west direction. Each relevé measures 25 meters long and 10 meters wide. The relevés were placed in the following manner: 40 crossheads of 200 m length were drawn at an equal distance from one another (60 m) and in each crossing two relevés were drawn among eight possible places.

Vegetation description

The vegetation was described as follows:

- for trees and shrubs large enough (more than 1.5 m high), trunk circumferences were measured at breast height and then transformed into basal area; the abundance of a species in a relevé is given by the sum of the basal areas of measurable individuals in a relevé;
- for smaller trees and shrubs, the number of individuals of each species was counted;
- for herbaceous species and small shrubs, abundance was measured by the number of times that the vertical projection of its aerial part meets one of the 125 sampling points. This technique was possible thanks to the tuft shape of many species. In each relevé, the 125 sampling points were distributed evenly along five lines parallel to the short side of the rectangle, placed at equal distances. For each species, the number of presences on the points is transformed into relative frequency (coded from 1 to 10 thereafter). The herbaceous species observed in a relevé, outside the sampling points, are noted simply present.

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Environment description

The environment of each relevé was described using 25 parameters. We were confronted with a set of very different parameters: some qualitative with two values (0-1), others quantitative. We have adopted the following presentation:

- soil slope (ranging from 2 and 50%)
- flat ground (1 if not 0),
- southern exposure (1 if not 0),
- east exposure (1 if not 0),
- north exposure (1 if not 0),
- altitude (varying between 1300 and 1458 m),
- the flat topography (1 if not 0),
- the concave topography (1 if not 0),
- the convex topography (1 if not 0),
- the open character of the vegetation (1 if not 0),
- the moderately closed character of the vegetation (1 if not 0),
- the closed character of the vegetation (1 if not 0),
- the abundance of trees with light cover (of the *Acacia* type, leaving a lot of light, regardless of species, total land area in dm²),
- the abundance of dense canopy trees (creating dense shade, irrespective of species, total land area in dm²),
- lithosol (1 if not 0),
- shallow soil (1 if not 0),
- deep soil (1 if not 0),
- recent tropical soil (1 if not 0),
- ferralsol (1 if not 0),
- humiferous ferrisol (1 if not 0),
- presence of rock (number of contacts with the rock, among the 125 points),
- thickness of the horizon A1 of the soil, in cm);
- absence of structure in A1 and in the underlying horizon (1 if not 0),
- fine, little developed structure in A1 and in the underlying horizon (1 if not 0),
- fine grumelous structure well developed in A1 and in the underlying horizon (1 if not 0),
- fine and medium grumelous structure, developed, moderately stable at A1 and in the underlying horizon (1 if not 0),
- fine and medium gumelous structure, developed, stable at A1 and in the underlying horizon (1 if not 0),
- grumelous structure to fine subangular polyhedral, poorly developed, not very stable at A1 and in the underlying horizon (1 if not 0),
- grumelous structure to medium subangular polyhedral, not well developed, not stable in A1 and in the underlying horizon (1 if not 0),
- subangular polyhedral structure not stable in A1 and in the underlying horizon (1 if not 0),

- thin and medium subangular polyhedral structure, developed and stable at A1 and in the underlying horizon (1 if not 0),
- medium subangular polyhedral structure, well developed, not very stable at A1 and in the underlying horizon (1 if not 0),
- medium subangular polyhedral structure with a massive tendency, stable at A1 and in the underlying horizon (1 if not 0),
- the absence of texture of the horizon A1 and of the underlying horizon (1 if not 0),
- the sandy texture of the horizon A1 and the underlying horizon (1 if not 0),
- the sandy-clayey texture of the horizon A1 and the underlying horizon (1 if not 0),
- the sandy-clay texture of the horizon A1 and the underlying horizon (1 if not 0),
- the clay-sandy texture of the horizon A1 and the underlying horizon (1 if not 0),
- the clay texture of the horizon A1 and the underlying horizon (1 if not 0),
- the field capacity (or water retention after 24 hours of a soil saturated with water) of the two upper horizons (from 17 to 46%),
- the pH in the two horizons (varying from 4.9 to 7.5),
- the sum of the exchangeable cations in the two horizons (ranging from 3.9 to 21.5 meq /100 g),
- the base saturation degree in the two horizons (ranging from 25 to 87%),
- loss by ignition in the A1 horizon (varying between 3.9 and 13.6% of the air-dried mass),
- the denuded soil (estimated from the same 125 sampling points as for the herbaceous stratum).

Botanical nomenclature

The nomenclature follows the following works:

- for the flora of Rwanda: FISHER & KILLMANN (2008), FISHER *et al.* (2010), TROUPIN (1978, 1983, 1985, 1988).

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