

LANDSCAPE SYSTEM MAPPING OF THE HUMID BATURITÉ MASSIF AND ITS SEMI-ARID PIEDMONT (NORTHEASTERN BRAZIL): A MULTILAYER INTEGRATION OF ENVIRONMENTAL PARAMETERS

BÉTARD F.¹

¹Laboratoire de géographie physique, CNRS UMR 8591, Université Paris-Sorbonne, Paris, F-75005 France.

PEULVAST J-P.¹

¹Laboratoire de géographie physique, CNRS UMR 8591, Université Paris-Sorbonne, Paris, F-75005 France. e-mail: jean-pierre.peulvast@wanadoo.fr;

BOURGEON G.²

²CIRAD, UPR Recyclage et Risque, Montpellier, F-34000 France.

GUNNELL Y.³

³Laboratoire de géographie physique, CNRS UMR 8591, Université Paris 7, Paris, F-75005 France.

CLAUDINO SALES V.⁴

⁴Universidade Federal do Ceará, Campus do Pici, Fortaleza, CE-60451-170 Brazil.

CANER L.⁵

⁵HydrASA, CNRS UMR 6532, Université de Poitiers, Poitiers, F-86000 France.

ABSTRACT

The Baturité massif is the erosional remnant of an Early Cretaceous rift shoulder. Humid bioclimatic conditions on this upstanding residual landform contrast with the semi-arid conditions of the surrounding plain ('Sertão'). Located ~100 km south of Fortaleza (Ceará, NE Brazil), the study area exhibits a characteristic vegetation continuum between evergreen forest, or 'mata atlântica', of the humid zone and deciduous 'caatinga' of the semi-arid piedmont via a semi-deciduous forest belt in the transition zone. Systematic soil successions and landform variations were also identified through this topo-climatic framework. The objective of this work was to develop a method of landscape system mapping that accounts adequately for the new pedogeomorphological observations made in the field. The survey was performed using GIS techniques by overlaying a digital elevation model, topographic maps at 1:100,000, digital geological data, Landsat imagery, and available soil maps. The GIS survey also allowed to take into consideration other fundamental environmental parameters such as rainfall distribution and water balance calculations that are useful to understanding soil distribution and mesoscale topographic patterns. The resulting soil-landform map captures the key features of the regional pedogeomorphic landscapes: (1) the humid Baturité massif is characterised by a summit surface (800–900 m a.s.l.) exhibiting *meia laranja* topography with monosiallitic weathering and associated low-activity-clay Acrisols; (2) a highly dissected sub-humid peripheral area (200–800 m) with more shallow weathering and soil profiles (Lixisols); (3) in the semi-arid plain (0–200 m), the 'Sertão' is a dissected pediplain with shallow bisiallitic grus associated with red Luvisols and brown Cambisols. Neogene clastic sediments on the piedmont are capped by plinthitic paleosols (Lixisols) whereas Pleistocene aeolian sands are highlighted by Arenosols.

Keywords: Pedogeomorphology, tropical soils, weathering patterns, Northeastern Brazil.