SIAT - LAND EVALUATION SYSTEM

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ABSTRACT - The purpose of this work was to adapt the MicroLEIS - Land Evaluation Information System developed in Spain (Project Leader: Diego de la Rosa, CSIC - Instituto de Recursos Naturales y Agrobiologia - Sevilla) to the brazilian conditions. There are 12 variables: A - Relief Factor: 1) Slope; B - Soil Factor: 2) Effective Depth, 3) Texture, 4) Stoniness, 5) Drainage, 6) Salinity; C - Erosion Factor: 7) Erodibility, 8) Slope, 9) Vegetation Density, 10) Rainfall Erosivity; D - Bioclimatic Deficiency Factor: 11) Frost, 12) Available Water. For each of them, the control parameters where changed, according the conditions of the soil of the State of São Paulo. In this case, Salinity was changed by the pH. As second step the SIAT was interfaced with a GIS - Geographic Information System named GEO-INF+MAP, to facilitate the data input, processing and spacialization of the results. The program structure was changed from Basic to C, and a data bank (Clipper) and routines to become the system more friendey, were also included. The modified system was tested in the LEME - SP region showing good results. However was clear that it is much more helpful at scales near 1:250.000, tham 1:100.000 as initially proposed.

1. INTRODUCTION

Brazil has continental dimensions and there are great differences in terms of environmental problems between regions. In the southeast region the main problem is the soil erosion and a system wich evaluates the land use suitability is basic in a regional environmental planning. In the middle of the 40's [3] the subject was reviwed and the studies already done were gathered in the USA and the methodology was finally adapted when the USDA - United States Department of Agriculture offered the USDA system [5]. The modified system has been used in Brazil as related by several authors [12], [8], [6], [7].

Since the very begnning is possible to detect the trials to process the data digitally ([2], [10], [4], [1], [9] - MicroLEIS). The MicroLEIS was designed and developed in Spain and has enough flexibility to be adapted for another conditions (Fig. 1). The Stage 1 (CERVANA) regarded with the general land capability, was the module inicially modified by the brazilian researches.

2. MATHERIAL AND METHODS

A test site in the state of São Paulo was selected due to the variability of soils, relief and land use. An integrated analysis was performed and the data where prepared to be used in the system. However several modifications were necessary considering limits, contents and even the change of variables, as follows:

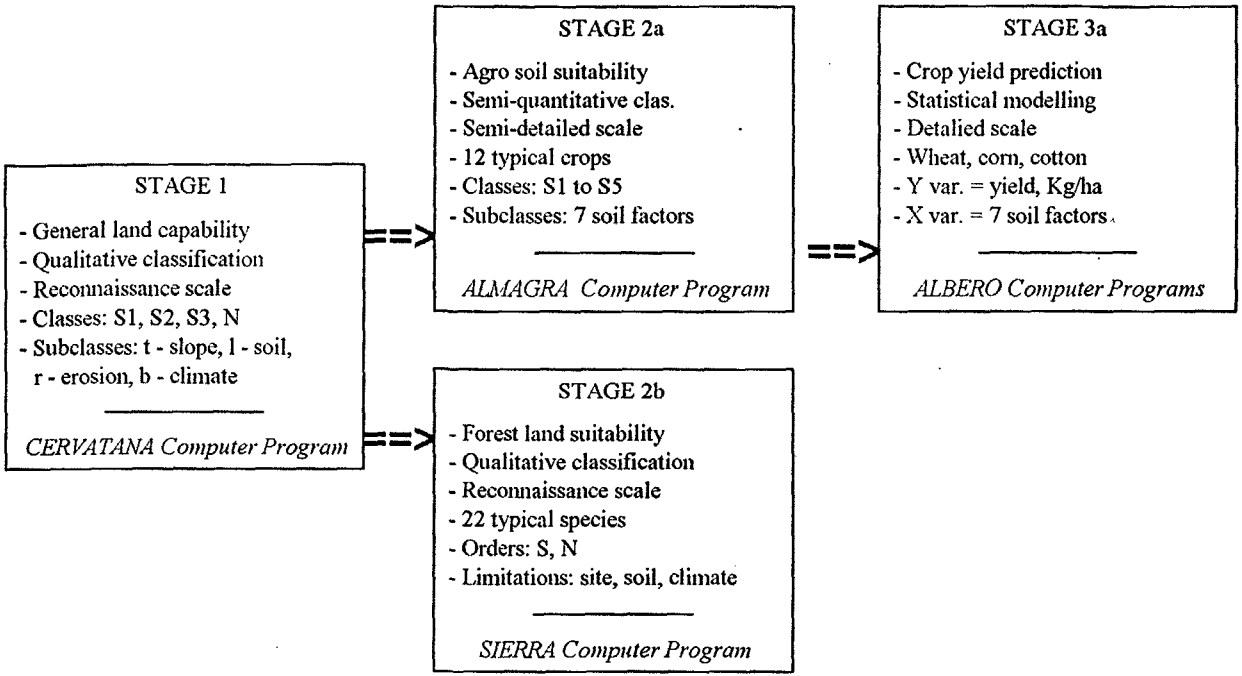

Figure 1. General outline of the land evaluation system MicroLEIS

VARIABLES/CERVATANA

Relief factor - Slope

Range	Code
< 7%	1
7-15%	2
15-30%	3
> 30%	4

VARIABLES/CERVATANA

Soil factor - Effective Depth

Range	Code
> 75 cm	1
50-75 cm	2
25-50 cm	3
< 25 cm	4

VARIABLES/CERVATANA

Soil factor - Texture

Level	Code
Balanced	1
Light or Heavy	2

VARIABLES/CERVATANA

Soil factor - Stoniness

Range	Code
< 15%	1
15-40%	2
> 40	3

VARIABLES/CERVATANA

Soil factor - Drainage

Level	Code
Good	1
Moderate	2
Excessive or Deficient	3

VARIABLES/CERVATANA

Soil factor - Salinity

Range	Code
< 4 mmhos/cm	1
4-8 mmhos/cm	2
8-12 mmhos/cm	3
> 12 mmhos/cm	4

VARIABLES/CERVATANA

Erosion factor - Erodibility

Level	Code
Light	1
Moderate	2
Hight	3

VARIABLES/SIAT

Relief factor - Slope

Range	Code
< 5%	1
5-10%	2
10-20%	3
< 20%	4

VARIABLES/SIAT

Soil factor - Effective Depth

Range	Code
> 200 cm	1
200-80 cm	2
80-40 cm	3
< 40 cm	4

VARIABLES/SIAT

Soil factor - Texture

Level	Code
Balanced	1
Clay	2
Sand	3

VARIABLES/SIAT

Soil factor - Stoniness

Range	Code
< 10%	1
10-20%	2
> 20%	3

VARIABLES/SIAT

Soil factor - Drainage

Level	Code
Good	1
Moderate	2
Excessive or Deficient	3

VARIABLES/SIAT

Soil factor - Acidity (pH)

Range	Code
7.0-6.0	1
6.0-5.0	2
5.0-4.0	3
< 4.0	4

VARIABLES/SIAT

Erosion factor - Erodibility

Level	Code
Light	1
Moderate	2
Hight	3

VARIABLES/CERVATANA

Erosion factor - Slope

Range	Code
< 15%	1
15-30%	2
> 30%	3

VARIABLES/SIAT

Erosion factor - Slope

Range	Code
< 10%	1
10-20%	2
> 20%	3

VARIABLES/CERVATANA

Erosion factor - Vegetation Density

Level	Code
High	1
Moderate	2
Null	3

VARIABLES/SIAT

Erosion factor - Vegetation Density

Range	Code
> 80%	1
80-40%	2
< 40%	3

VARIABLES/CERVATANA

Erosion factor - Erosivity of rain

Range	Code
< 150	1
150-200	2
200-300	3
> 300	4

VARIABLES/SIAT

Erosion factor - Erosivity of rain

Range	Code
< 700	1
700-725	2
725-750	3
> 750	4

VARIABLES/CERVATANA

Bioclimatic Deficiency factor - Frost

Range	Code
< 2	1
2-5	2
> 5	3

VARIABLES/SIAT

Bioclimatic Deficiency factor - Frost

Range	Code
< 2	1
2-4	2
> 4	3

VARIABLES/CERVATANA

Bioclimatic Deficiency factor Available Water (Ih = P/ETP)

Range	Code
> 1	1
1-1/2	2
1/2-1/3	3
< 1/3	4

VARIABLES/SIAT

Bioclimatic Deficiency factor Available Water (AD = P-ETP)

Range	Code
> 1500 mm	1
1500-350 mm	2
350-200 mm	3
< 200 mm	4

The language of programminy was changed from Basic to C and a data bank (Clipper) and routines to become the system more friendly, were also included. An interface with the GIS GEO-INF+MAP [11] was developed to facilitate the input, processing and retrieval of data.

A map of Land Suitability prepared by IAC - Instituto Agronômico do Estado de São Paulo [7] was used as reference to evaluate the SIAT. Figure 2 shows the final classification of the study area, wich matches 100% with the reference map. However is necessary to explain that the IAC system wchich is analogic, has seven final classes and the SIAT has 4 final classes.

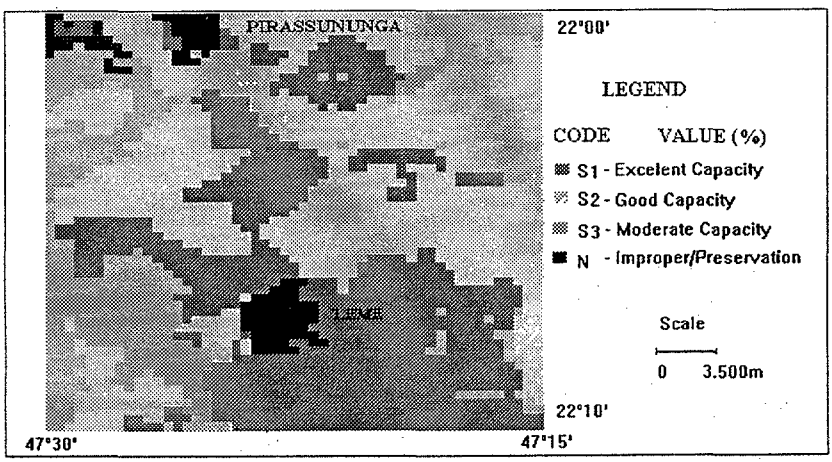

Figure 2. Final Classification

3. CONCLUSIONS

The results indicate that was possible to modify the system improving it for local necessities. The study has shown that since the system classify the landscape in four final classes it could be more helpfull at scales near 1:250.000.

The results also suggest that due to the flexibility of the system it can be used in another parts of the country changing when necessary, the ranges and limits of the edaphic climatic parameters, as well the parameters itselves.

4. REFERENCES

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