

Article

Socio-Environmental Vulnerability to Drought Conditions and Land Degradation: An Assessment in Two Northeastern Brazilian River Basins

Rita Marcia da Silva Pinto Vieira ^{1,*}, Javier Tomasella ¹, Ana Paula Martins do Amaral Cunha ², Alexandre Augusto Barbosa ¹, João Pompeu ¹, Yara Ferreira ¹, Fabrícia Cristina Santos ¹, Lincoln Muniz Alves ¹ and Jean Ometto ¹

¹ Instituto Nacional de Pesquisas Espaciais, São José dos Campos 12227-010, SP, Brazil
² Centro Nacional de Monitoramento de Desastres Naturais, São José dos Campos 12247-016, SP, Brazil
* Correspondence: ritamsp@gmail.com

S1. Material and Methods

S1.1. Correlation Matrix

Correlation matrix used to investigate the dependence between multiple variables. The variables considered were: V1 Population density, V2 Soil degradation/desertification, V3 Burn Frequence, V4 Drought recurrence, V5 Surface temperature, V6 Number days without rain, V7 Land use and land cover change, V8 Slope, V9 Soil type, V10 IDHM, V11 IVS, V12 Land tenure, V13 Conservation units, V14 Indigenous land.

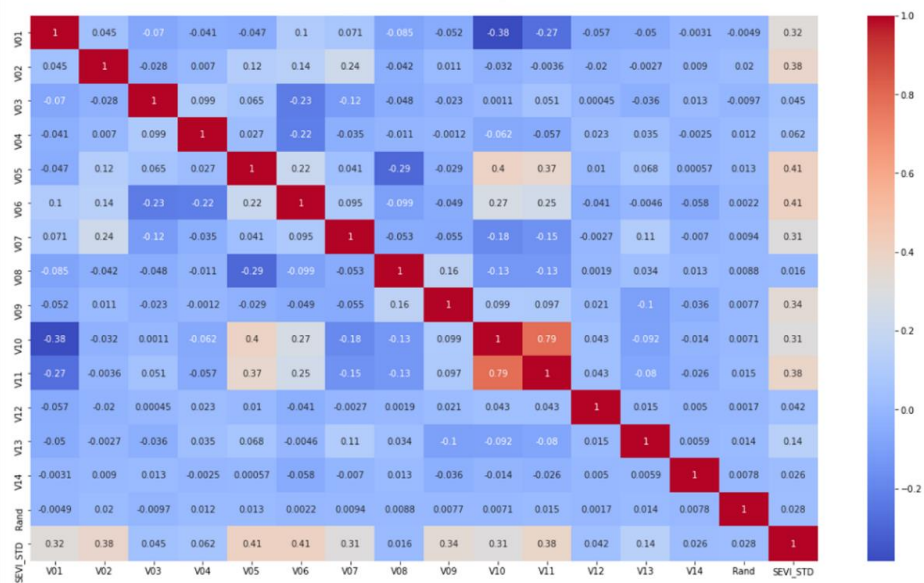


Figure S1. Variables Correlation Matrix.

S1.2. Pearson's Chi-Square Tests

Pearson’s Chi-square test was used the test to check if the variable were statistically independent. The variables V3 Burn Frequency, V4 Drought recurrence, V8 Slope, V12 Land tenure, V13 Conservation units, V14 Indigenous land were later removed because the test indicated values above 0.50.

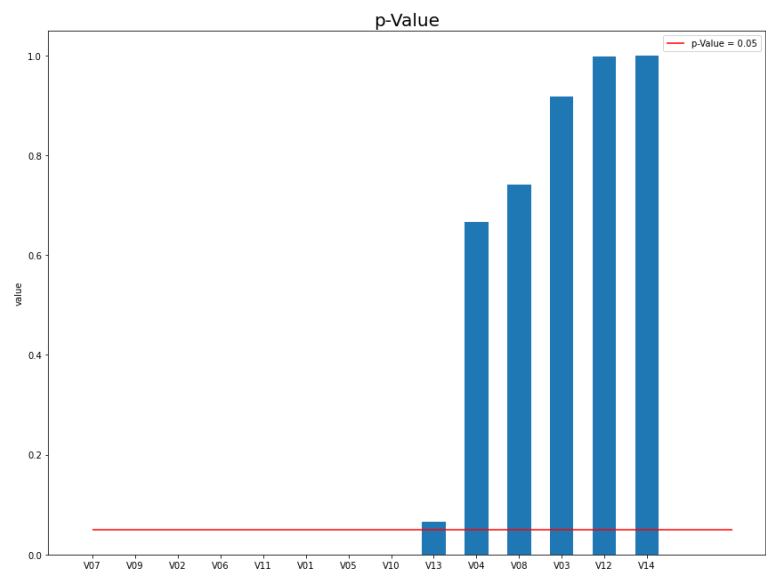
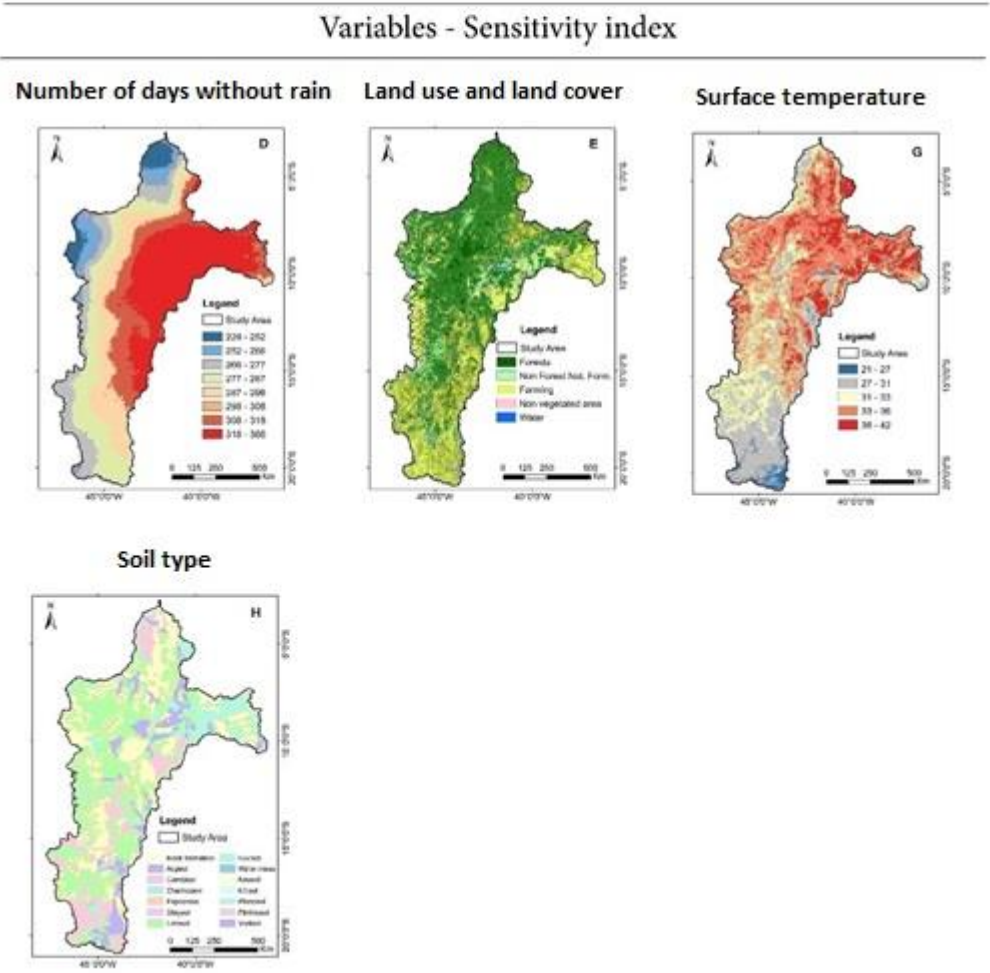
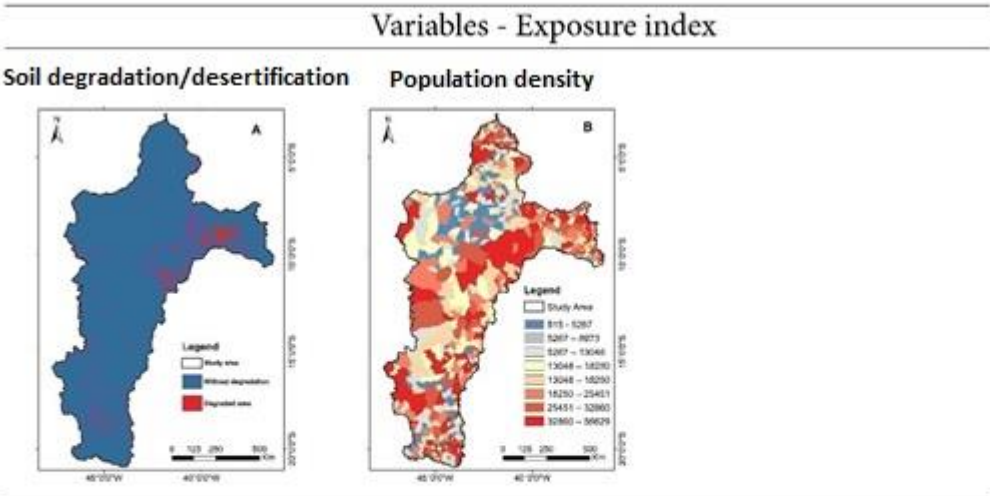


Figure S2. Pearson’s Chi-square tests.

S1.3. Spatial Distribution of the Variables Used to Compose the Sub-Indices



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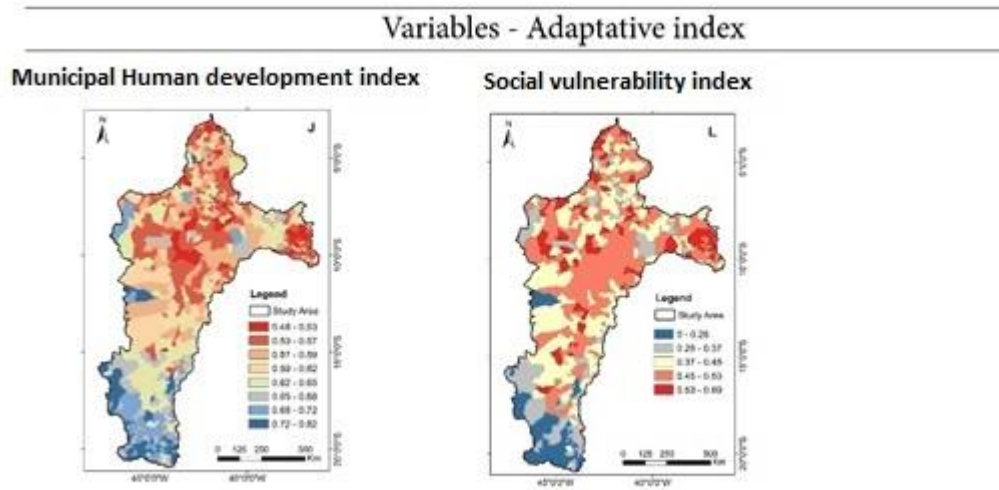


Figure S3. Spatial distribution of the set of variables used to compose the sub-indices.

Table S1. Weight table.

Slope (%)	Susceptibility weight
>75	2.00
45 - 75	1.80
20 - 45	1.60
8 - 20	1.40
3 - 8	1.20
0 - 3	1.00
Soil Type (EMBRAPA, 1999)	Susceptibility weight
Latosols, organic soils, hydromorphic soils, humic soils	1.00
Podzolic soils, brunizem, planosol, brunizem, structured dusky, red earth	1.33
Cambisol, Non-cohesive soils, immature soils	1.66
Laterites, rocky outcrop	2.00
Degradation map	Susceptibility weight
Low degradation	1.00
Moderate degradation	1.50
High and Very high degradation	2.00
Conservation units	Susceptibility weight
Integral protection	1.00
Sustainable use	1.50
Non conservation unit	2.00
Indigenous land	Susceptibility

	weight
With indigenous land	1.00
Non indigenous land	2.00
Human development index	Susceptibility weight
0.48 – 0.53	2.00
0.53 – 0.57	1.84
0.57 – 0.59	1.70
0.59 – 0.62	1.56
0.62 – 0.65	1.42
0.65 – 0.68	1.28
0.68 – 0.72	1.14
0.72 – 0.82	1.00
Population density	Susceptibility weight
815 – 5.267	1.00
5.267 – 8.973	1.14
5.267 – 13.048	1.28
13.048 – 18.250	1.42
18.250 – 25.451	1.56
25.451 – 32.860	1.70
32.860 – 56.629	1.84
>56.629	2.00
Land use and land cover change	Susceptibility weight
Forest natural formation	1.00
Beach and Dune	1.00
Urban infrastructure	1.00
Water	1.00
Grassland	1.20
Soy bean	1.20
Sugar cane	1.30
Perennial crop and Forest plantation	1.40
Wetland	1.50
Temporary crop and Other temporary crops	1.70
Salt flat	1.80
Other non forest formations	1.80
Agriculture	1.80
Pasture	1.90
Farming (Mosaic of agriculture and pasture)	1.90
Rocky outcrop	2.00
Mining	2.00
Other non vegetated areas	2.00
Non observed	1.00
Aquaculture	1.80
Temperature superficie	Susceptibility weight
21 – 27	1.00
27 – 31	1.25

31 – 33	1.50
33 – 36	1.75
36 – 42	2.00
Drought recurrence	Susceptibility weight
0.52 – 1.04	1.00
1.04 – 1.35	1.14
1.35 – 1.60	1.28
1.60 – 1.81	1.42
1.81 – 2.00	1.56
2.00 – 2.21	1.70
2.21 – 2.44	1.82
2.44 – 3.29	2.00
Burn frequency	Susceptibility weight
0	1.00
1	1.17
2	1.34
3	1.50
4	1.67
5	1.83
6	2.00
Social vulnerability index	Susceptibility weight
0.00 – 0.28	1.00
0.28 – 0.37	1.25
0.37 – 0.45	1.50
0.45 – 0.53	1.75
0.53 – 0.69	2.00
Number days whitout rain	Susceptibility weight
229-252	1.00
252-266	1.14
266-277	1.28
277-287	1.42
287-298	1.56
298-308	1.70
308-318	1.84
318-366	2.00
Land tenure	Susceptibility weight
Owner	1.00
Tenants	1.25
Settlers	1.50
Borrower	1.75
Occupiers	2.00

S2. Results

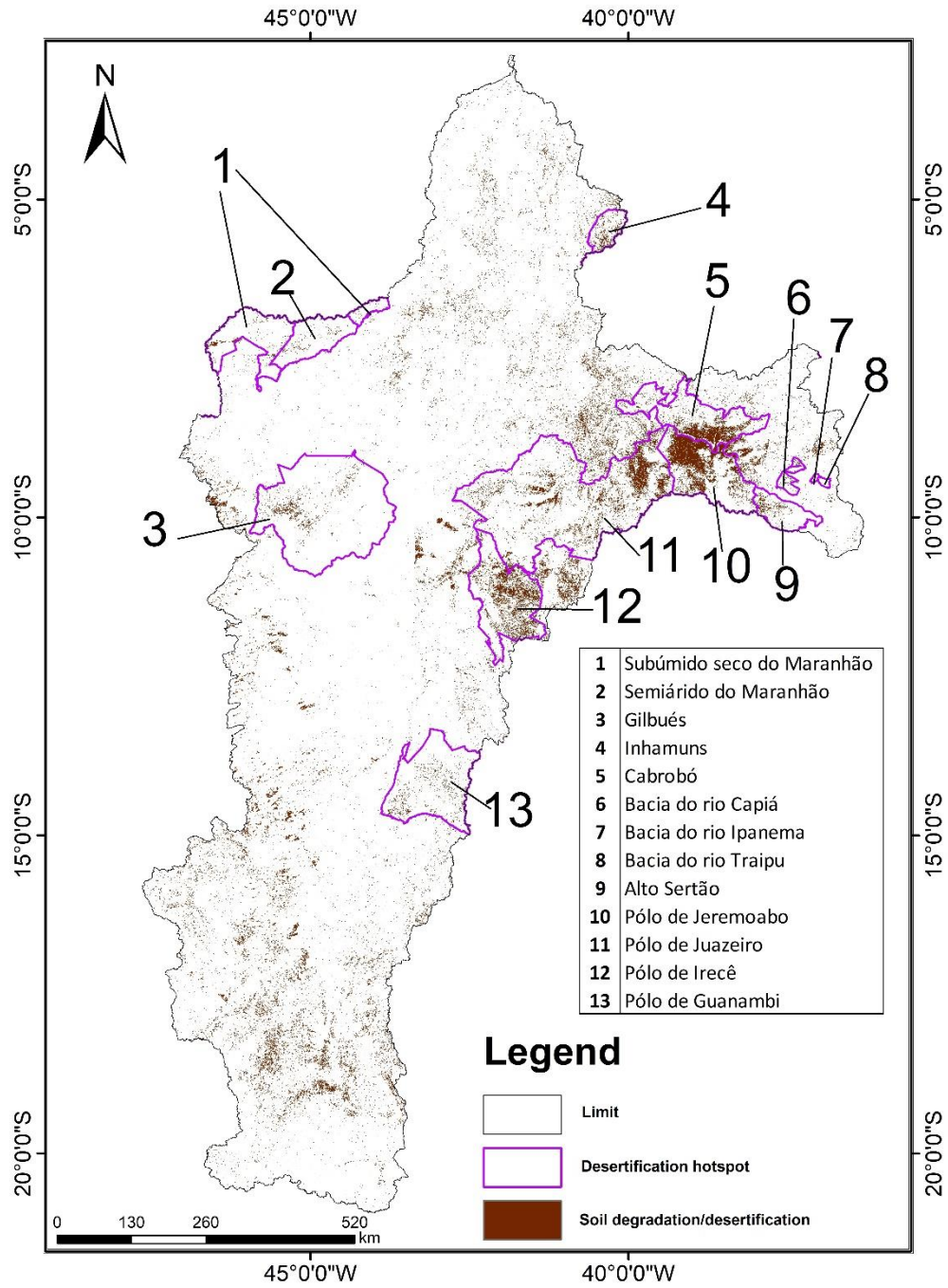


Figure S4. Desertification areas mapped. The areas delineated in purple indicate desertification hotspots recognized by the Brazilian environment ministry.

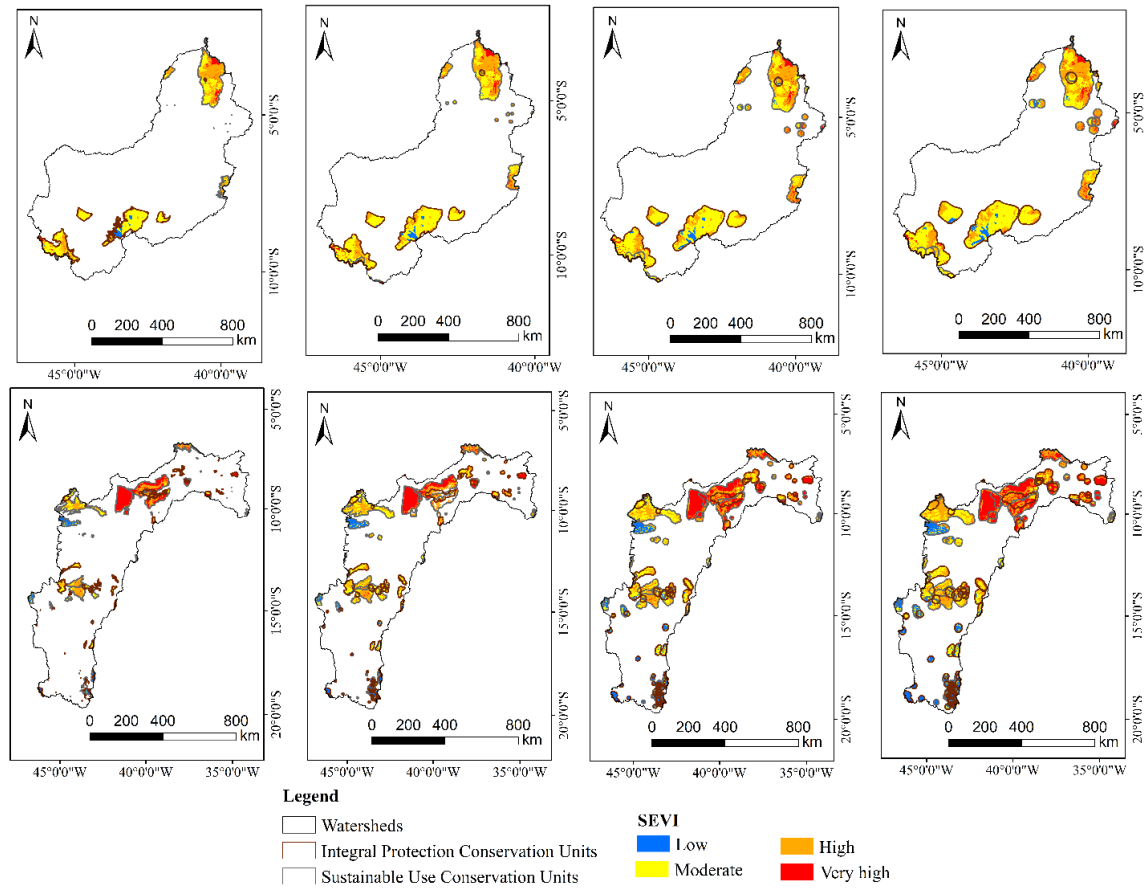


Figure S5. Conservation units colored according to their degree of socio environmental vulnerability within the (A) Parnaíba basin and the (B) São Francisco basin.