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Monitoring Soil Organic Carbon and other soil variables in Otjozondjupa. A Case Study of the SteamBioAfrica project.

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ESA Symposium on Earth Observation for Soil Protection and Restoration

Project objective

Innovative Large-Scale Production of Affordable Clean Burning Solid Biofuel and Water in Southern Africa: transforming bush encroachment from a problem into a secure and sustainable energy source (SteamBioAfrica: GA: 101036401)

Develop a commercially viable technology solution that will stimulate the harvesting of invasive woody biomass

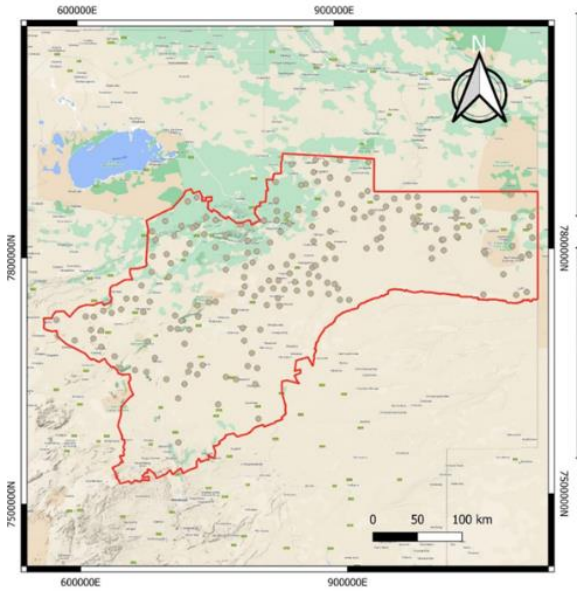
15 partners in 8 countries

Environmental objectives

1) Compiling, harmonizing and standardizing data related to Ecosystem Services (including C sequestration)
2) Establishing a ES baseline and impacts' prediction on future scenarios (LULC and CC)
3) Developing a monitoring approach

Methodology

One large area in Otjozondjupa (Namibia) and validation area (Cheetah Conservation Fund)
Soil dataset: SOC, pH, Clay, BD (0-30cm)→ 2016 VS validation datasets (2020)
Satellite dataset: Sentinel 2 (Level 1-C)



INPUT

- **Land use changes rasters (2010-2016)**
- **SoilGrid/ ISDA SOC map**
- **Landscape units shapefile** (soil type and landform)

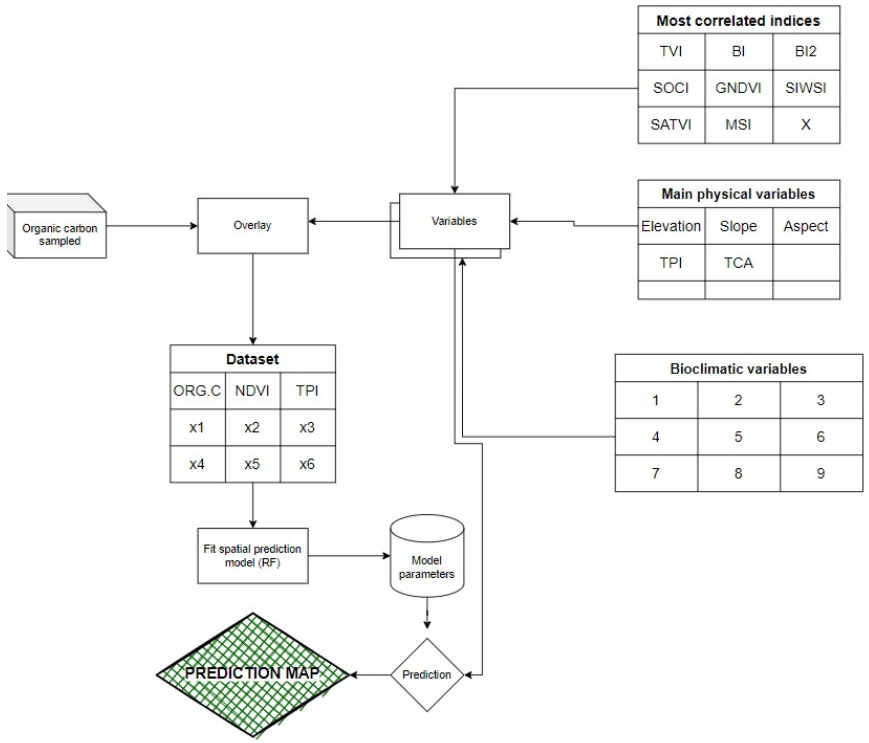
→ **Data processing and integration** → **Statistical analysis** →

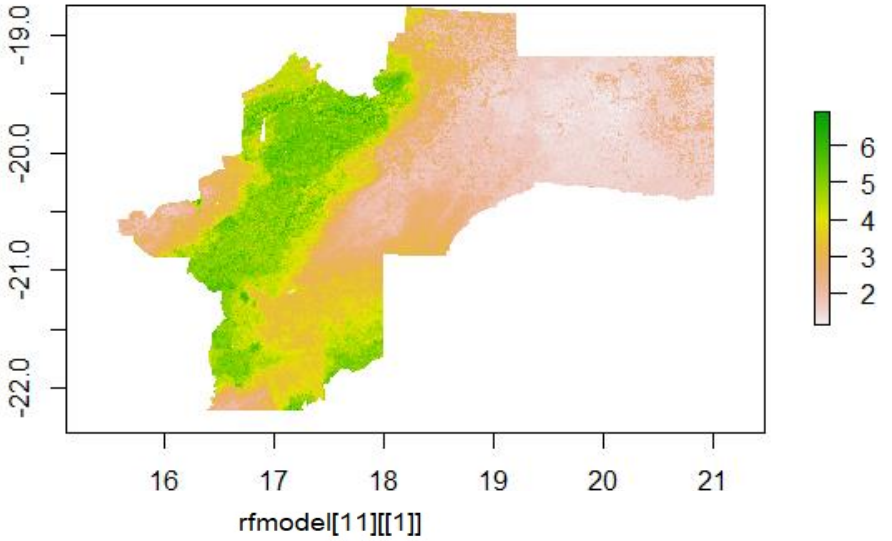
Results
-Land uses that maximize the c.sequestration
-CSR of each land use change (2010-2016)
-Land use behavior and its carbon impact

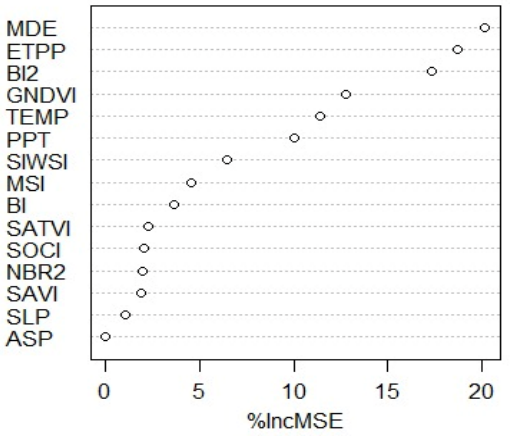
OUTPUT

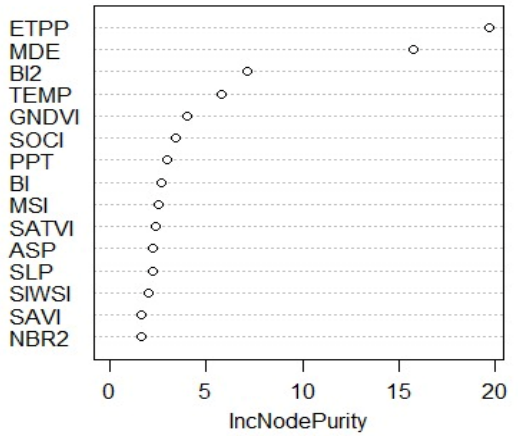
Preliminary results

SOC maps developed considering soil types, land use and other soil parameters









Future scenarios

Land use Change scenarios + Distribution suitability maps

To develop sustainable business models potentially to relate with carbon farming practices

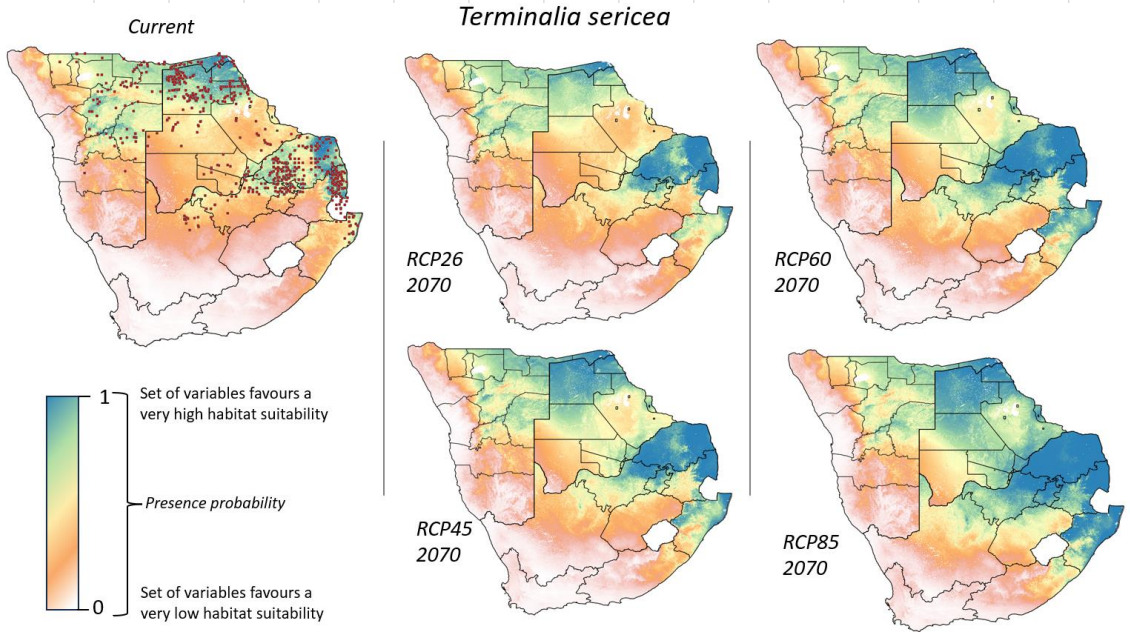
Upscaling process to evaluate opportunities in médium and long-term of carbon farming practices based on monitoring and clean technologies

	Carbon sequestration rate (t ha-1 yr-1)						
	Arenosols	Calcisols	Cambisols	Gypsisols	Leptosols	ROCK	Regosols
Shrubland land a bare areas	0.595792	0.179223	-0.64262	-0.07557	-0.34288	-0.98121	-0.35116
Shrubland land a built up areas	-2.46956	0.47781	-0.80975	-0.12879	0.687743	-0.85658	
Shrubland land a cropland	-2.46956		0.392497		0.697267	-3.95487	
Shrubland land a forest land	-0.18598	0.016895	0.17085		-0.15554	-0.14943	0.944208
Shrubland land a grassland	0.171801	0.110196	-0.46048	-0.18603	0.087431	-0.08331	-0.13558
Shrubland land a sparse vegetation	0.706908	0.731247	-0.63038	-0.24602	-0.11584	-0.39302	-0.67701
Shrubland land a wetland	-2.46956	0.455587	0.70392		0.971711	1.352037	0.65051

	Carbon sequestration rate (t ha-1 yr-1)						
	Arenosols	Calcisols	Cambisols	Gypsisols	Leptosols	ROCK	Regosols
Bare areas a shrubland	0.185272	0.408399	0.117189	0.072506	0.248784	0.351146	0.220624
Cropland a shrubland			0.148706		-0.04787		
Forest land a shrubland		-0.52298	-0.02767		-1.07343	-0.62702	-1.54873
Grassland a shrubland	-0.13884	-0.04159	-0.22138	0.163072	0.448884	0.250437	0.043023
Sparse vegetation a shrubland	0.173881	0.237667	0.283878	-0.09552	0.131958	0.097514	0.280923

	Carbon sequestration rate (t ha-1 yr-1)						
	Arenosols	Calcisols	Cambisols	Gypsisols	Leptosols	ROCK	R
Bare areas a built	1.19856	0.794257	0.161924	0.630414	1.375072	0.532079	
Bare areas a fore	-0.257	0.747725	0.372899		0.81414	1.259188	1
Bare areas a gras	0.374389	0.3906	0.25759	0.032823	0.330867	0.39109	0
Bare areas a oper	1.483745	0.142526	1.566502	0.205094	1.288419	0.405112	0
Bare areas a shru	0.185272	0.408399	0.117189	0.072506	0.248784	0.351146	0
Bare areas a sparse v	0.077565	0.237284	0.024088	0.039024	0.149864	0.157747	

	Carbon sequestration rate (t ha-1 yr-1)						
	Arenosols	Calcisols	Cambisols	Gypsisols	Leptosols	ROCK	R
Cropland a bare areas			-0.65908		-1.2761		
Forest land a bare areas		-1.54902	-0.96835		-1.99853	-1.37103	
Grassland a bare	0.297374	-0.1556	-0.33658	0.108201	-0.02073	-0.37019	
Shrubland land a ba	0.595792	0.179223	-0.64262	-0.07557	-0.34288	-0.98121	
Sparse vegetation a	-0.13601	-0.22552	0.117359	-0.12677	0.045524	-0.14573	0



Thank you for your attention

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Acknowledging our partners

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