

TODAS AS ÁGUAS SÃO EMENDADAS

**IMPACTOS ANTRÓPICOS NOS CICLOS BIOGEOQUÍMICOS DO MERCÚRIO E
METAIS TÓXICOS NOS ECOSSISTEMAS AQUÁTICOS E TERRESTRES DA
ESTAÇÃO ECOLÓGICA DE ÁGUAS EMENDADAS**

**Discentes: Lucas Cabrera Monteiro, Ygor Oliveira,
Rebekah Pedrosa, Iara Fernandes**

Prof. Dr. Ludgero Galli, Prof. DR. Jurandir Souza

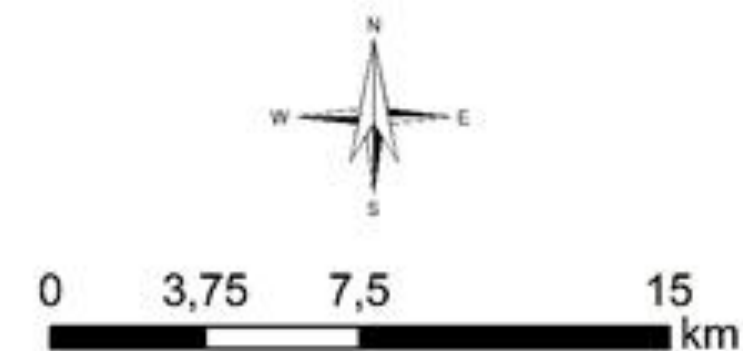
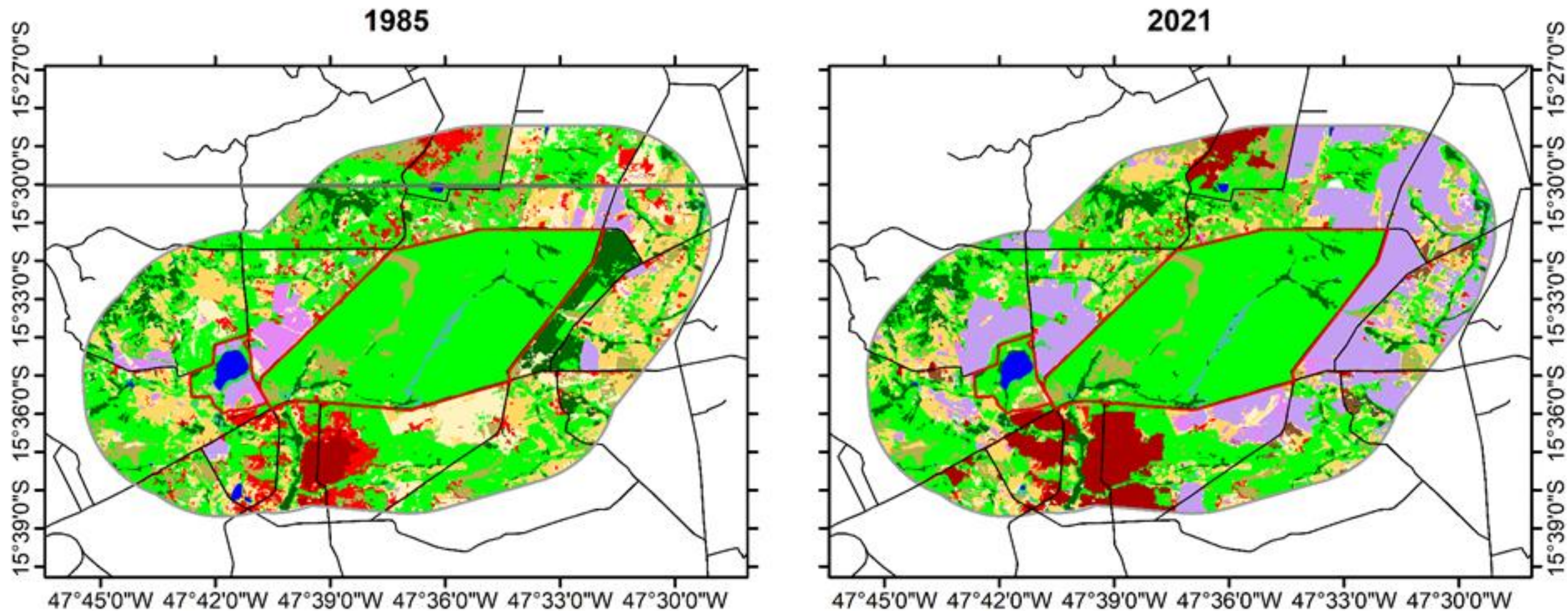
Coordenador: Prof. Dr. José Vicente Elias Bernardi

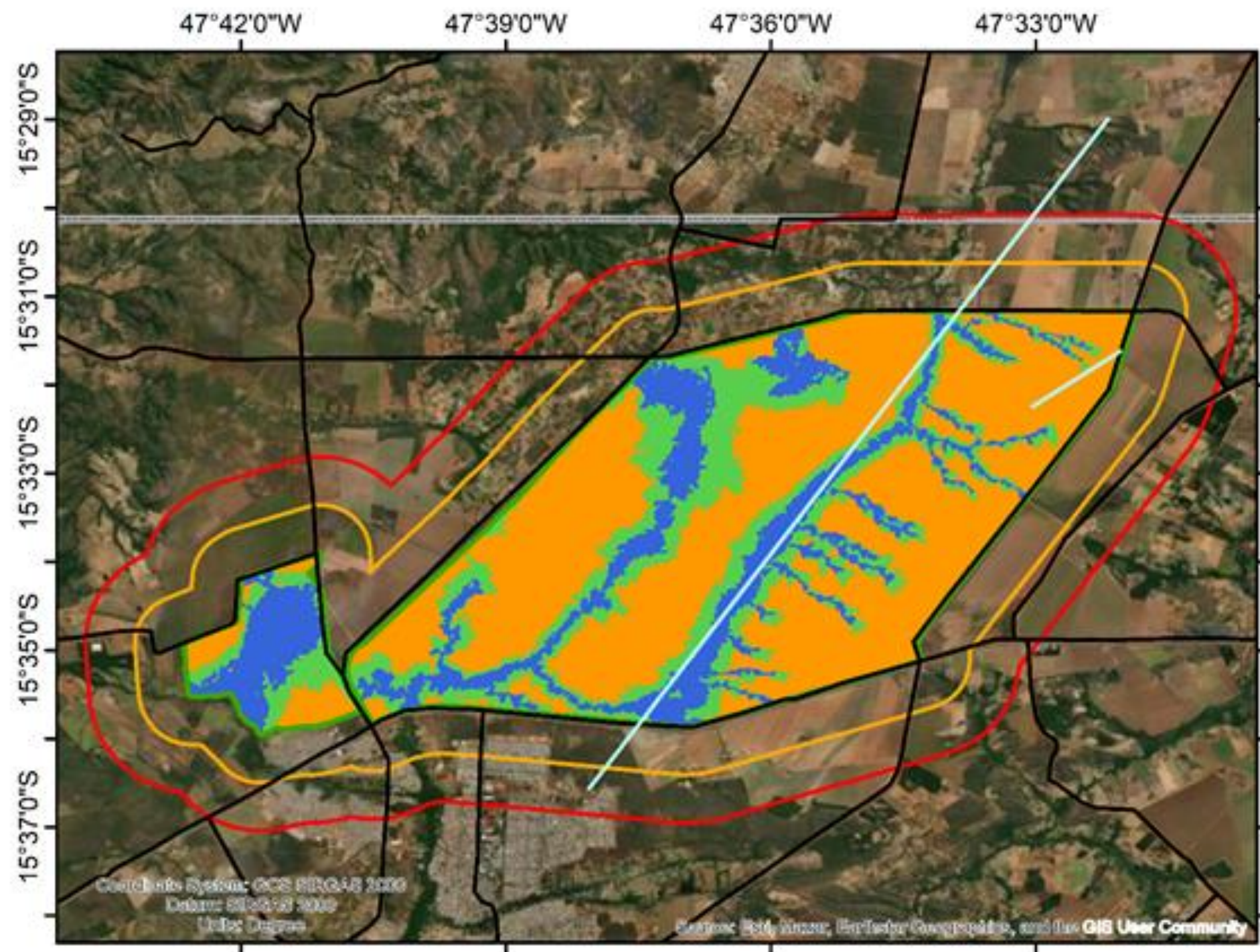
2024



Laboratório de Geoquímica Ambiental

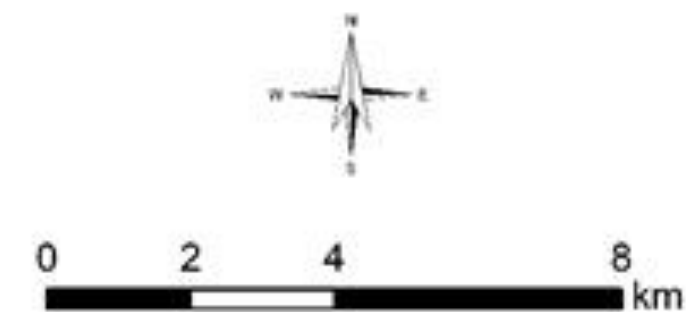




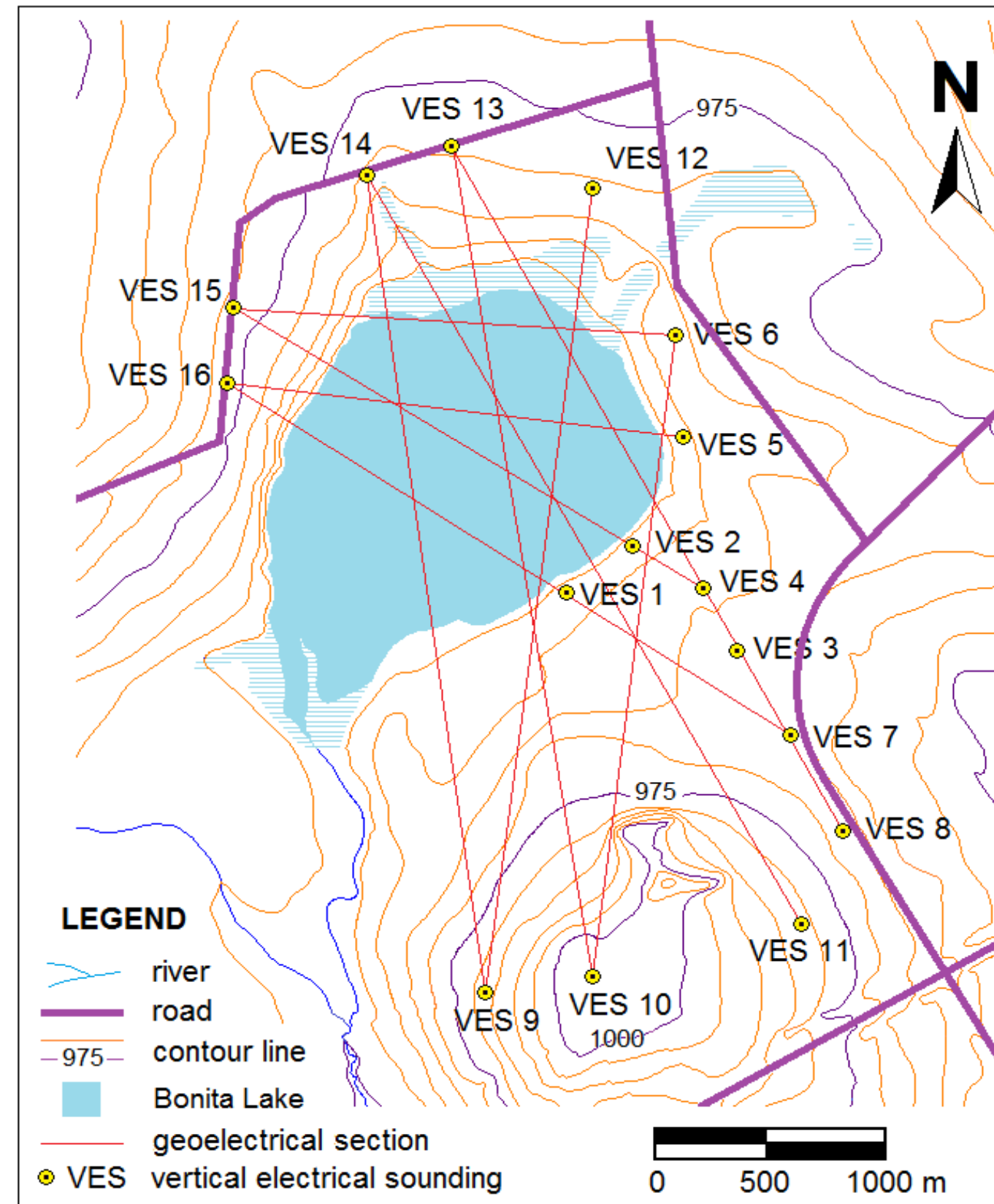


Legenda

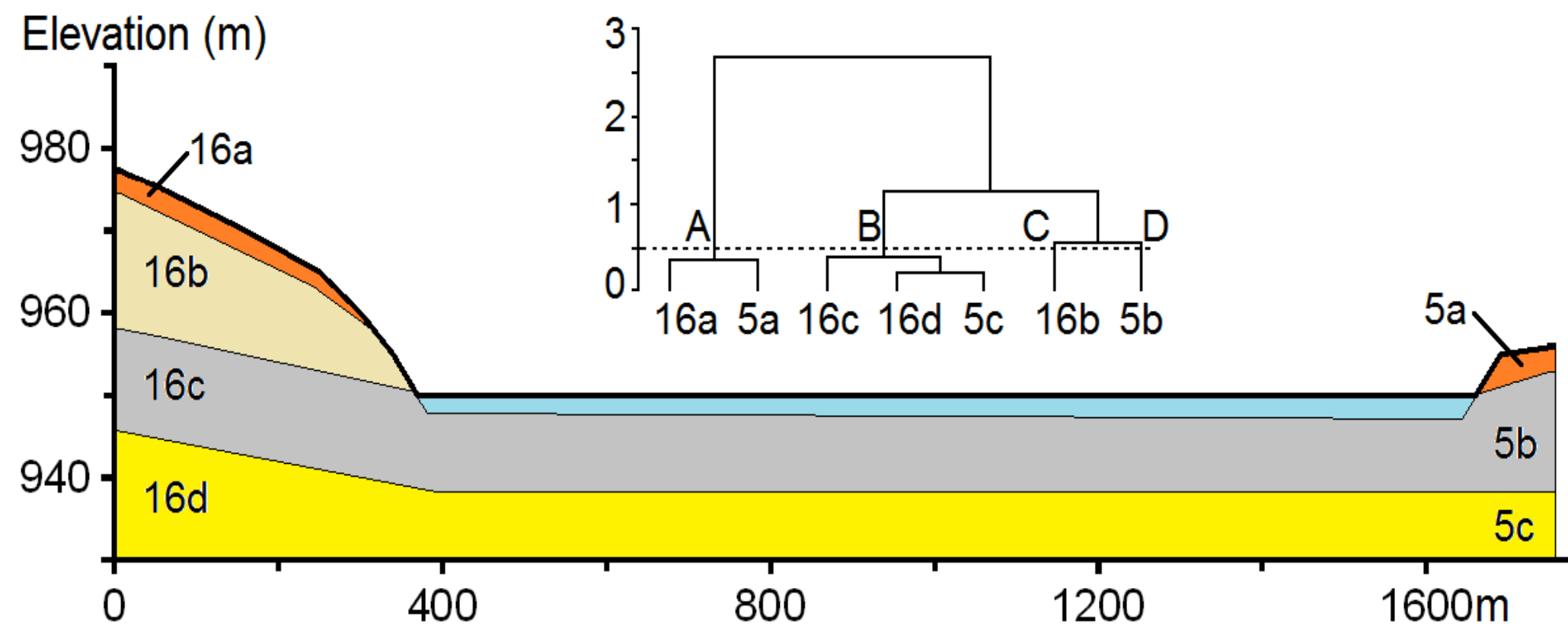
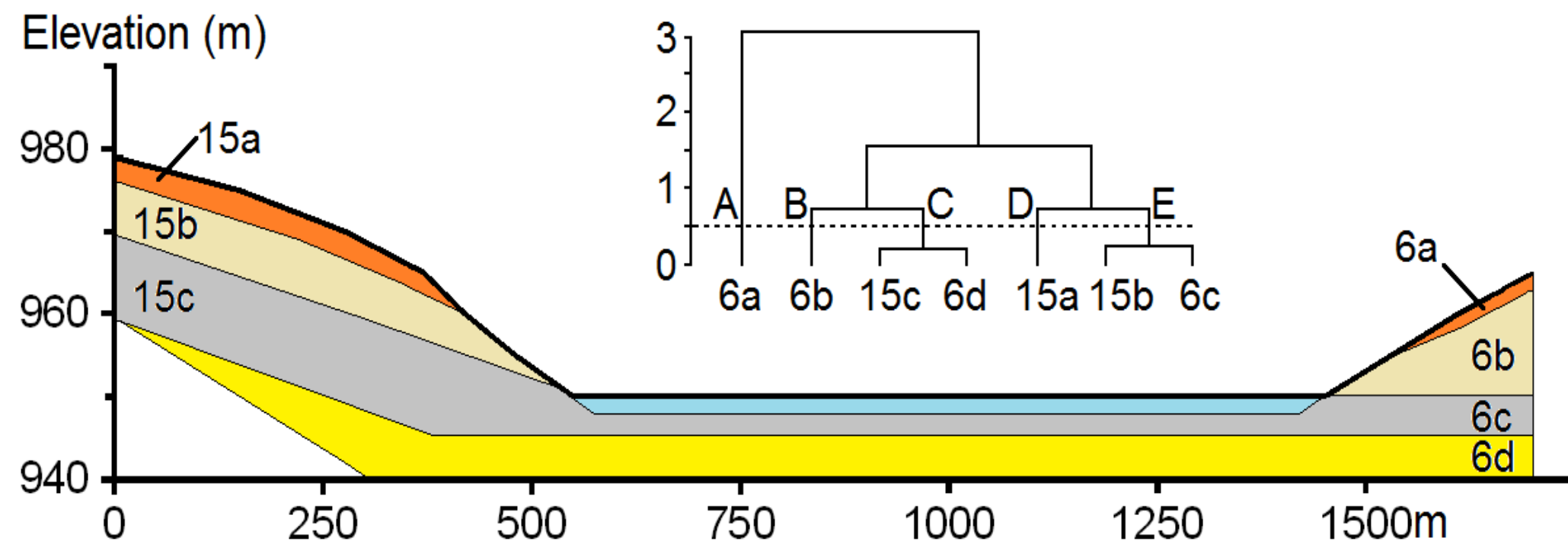
- | | | |
|--------------------|-----------------|---|
| Falhas Estruturais | Alcance de 1 km | Lençol freático (<5 m) |
| Trecho rodoviário | ESECAE | Lençol freático pouco profundo (> 5 < 15 m) |
| Alcance de 2 km | Limites do DF | Lençol freático profundo (> 15 m) |



LOCALIZAÇÃO DAS SONDAGENS ELÉTRICAS VERTICAIS (VES)

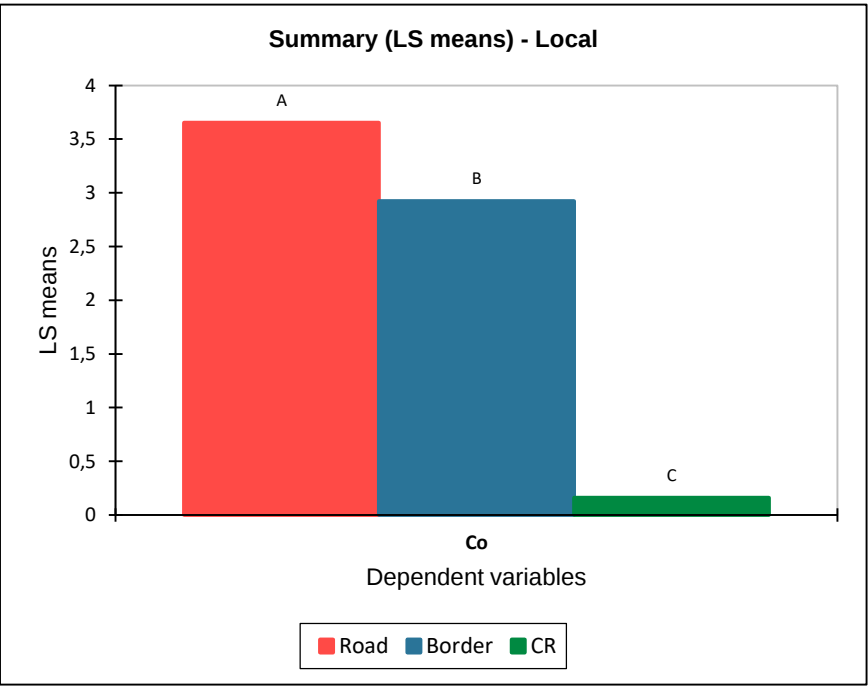
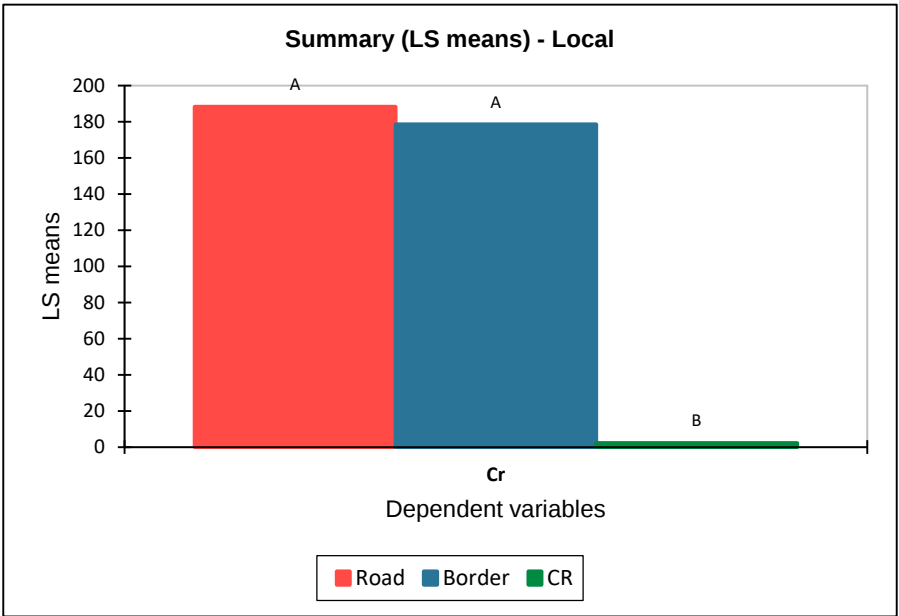
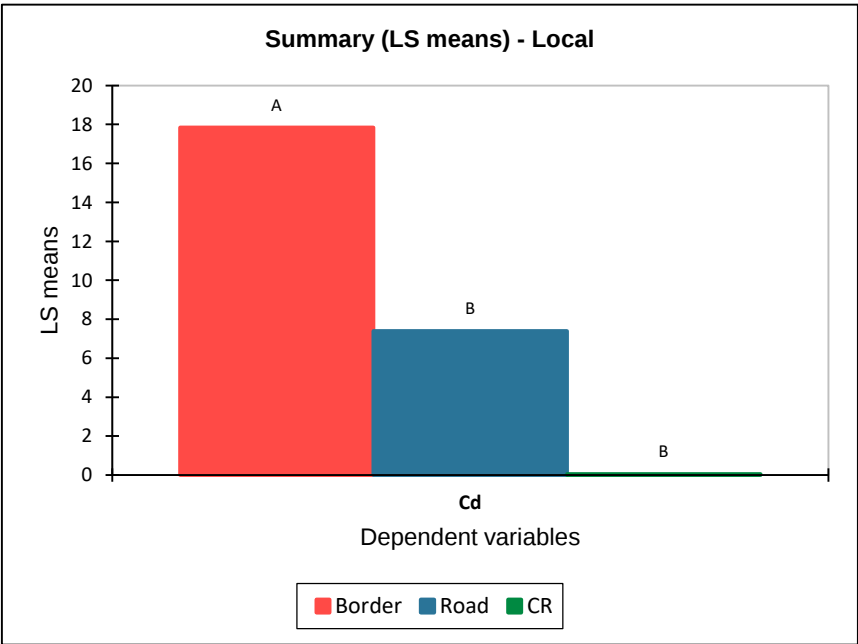
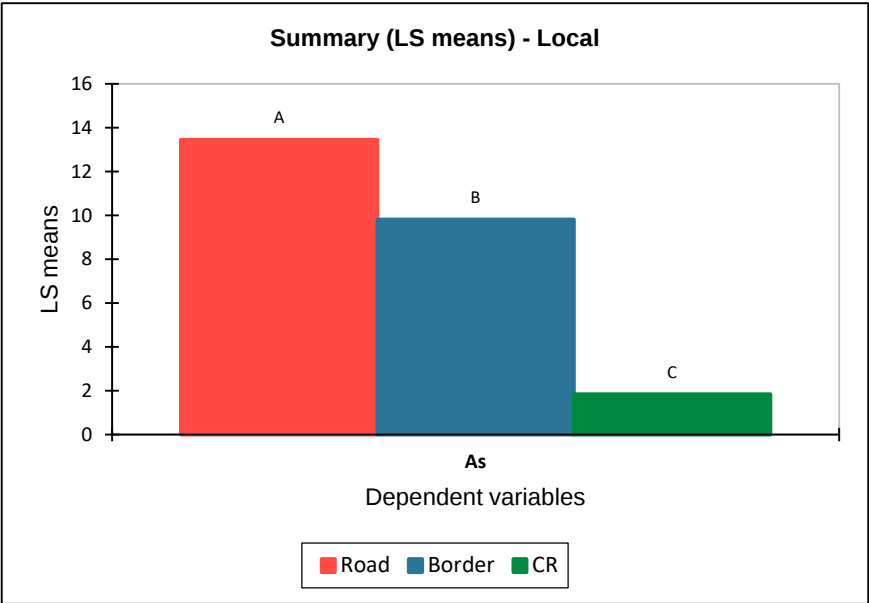
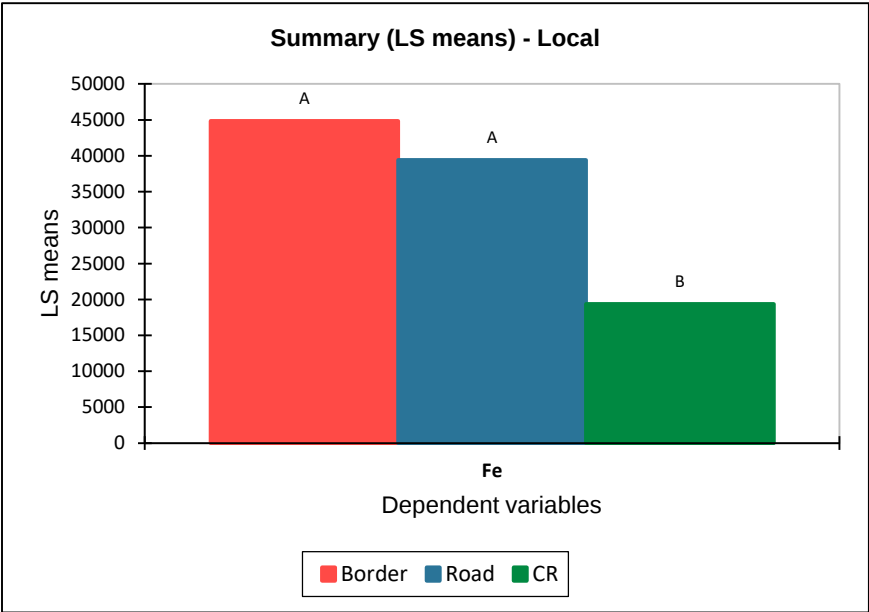
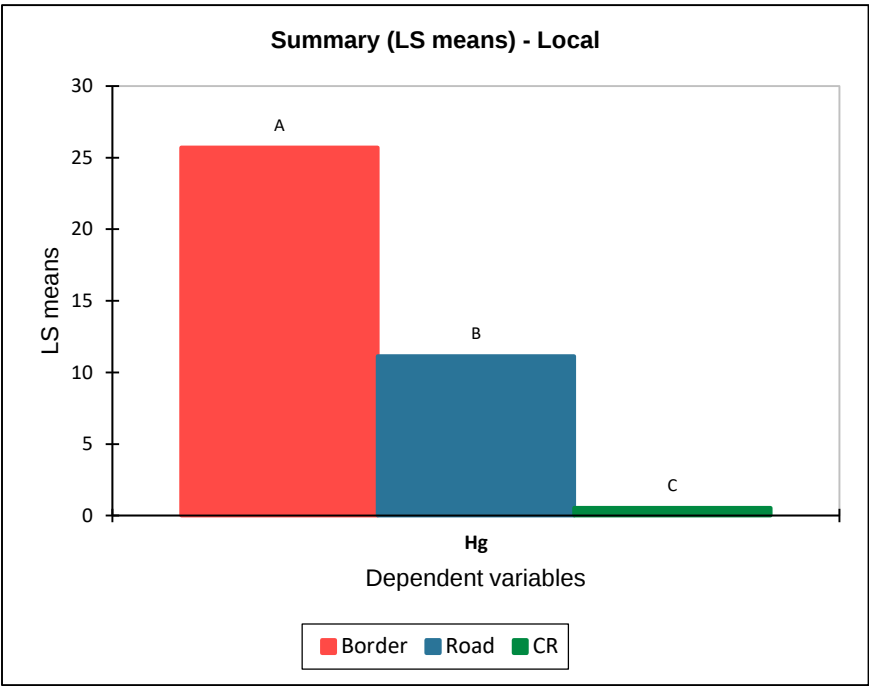
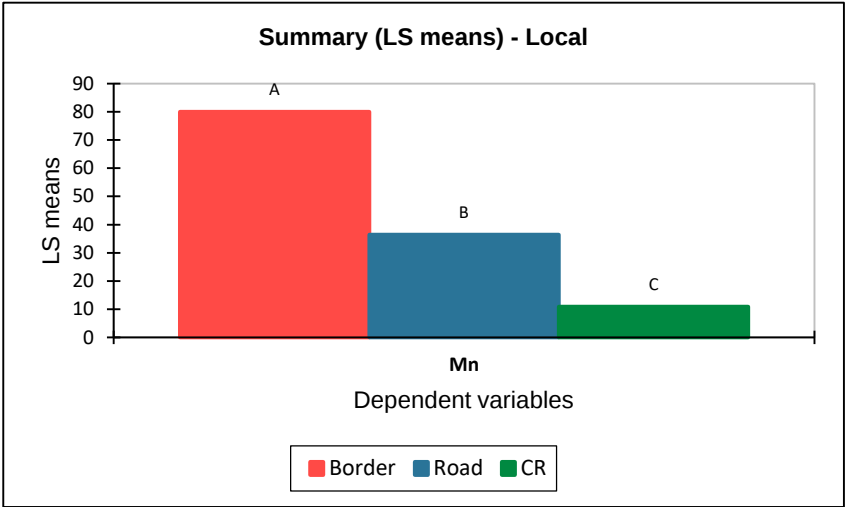
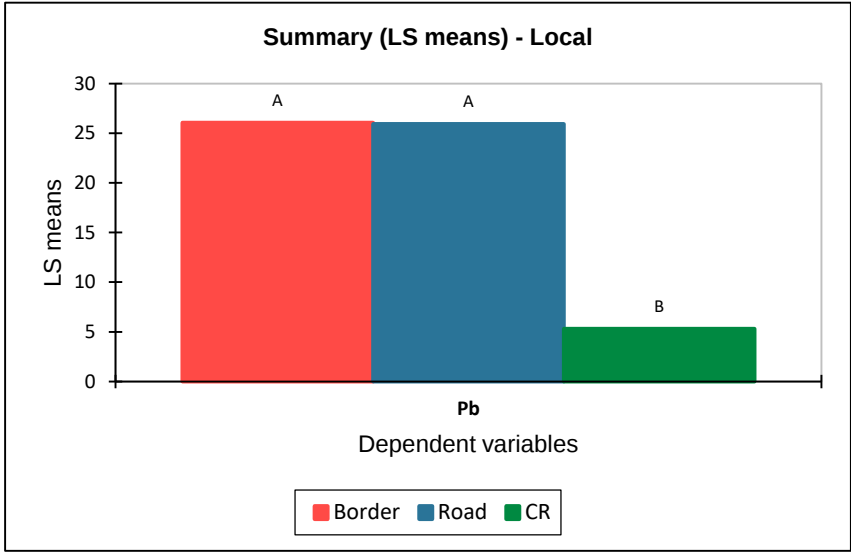


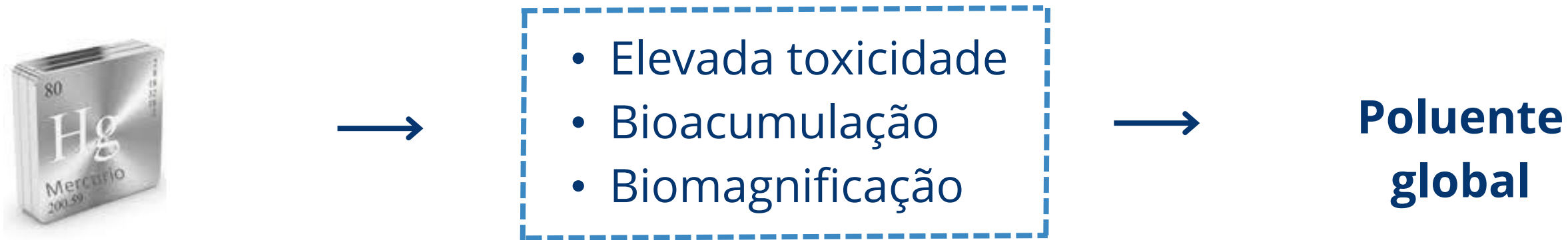
SEÇÕES GEOELÉTRICAS COMPOSTAS PELAS SEVS 15-6 (ACIMA) E 16-5 (ABAIXO).



Concentração média de Metais Tóxicos nos solos ESECAE

Concentração de Prevenção CONAMA: Hg (0,5); As (15); Cd (1,3); Co (25); Pb (75) mg/Kg (ppm) Solos





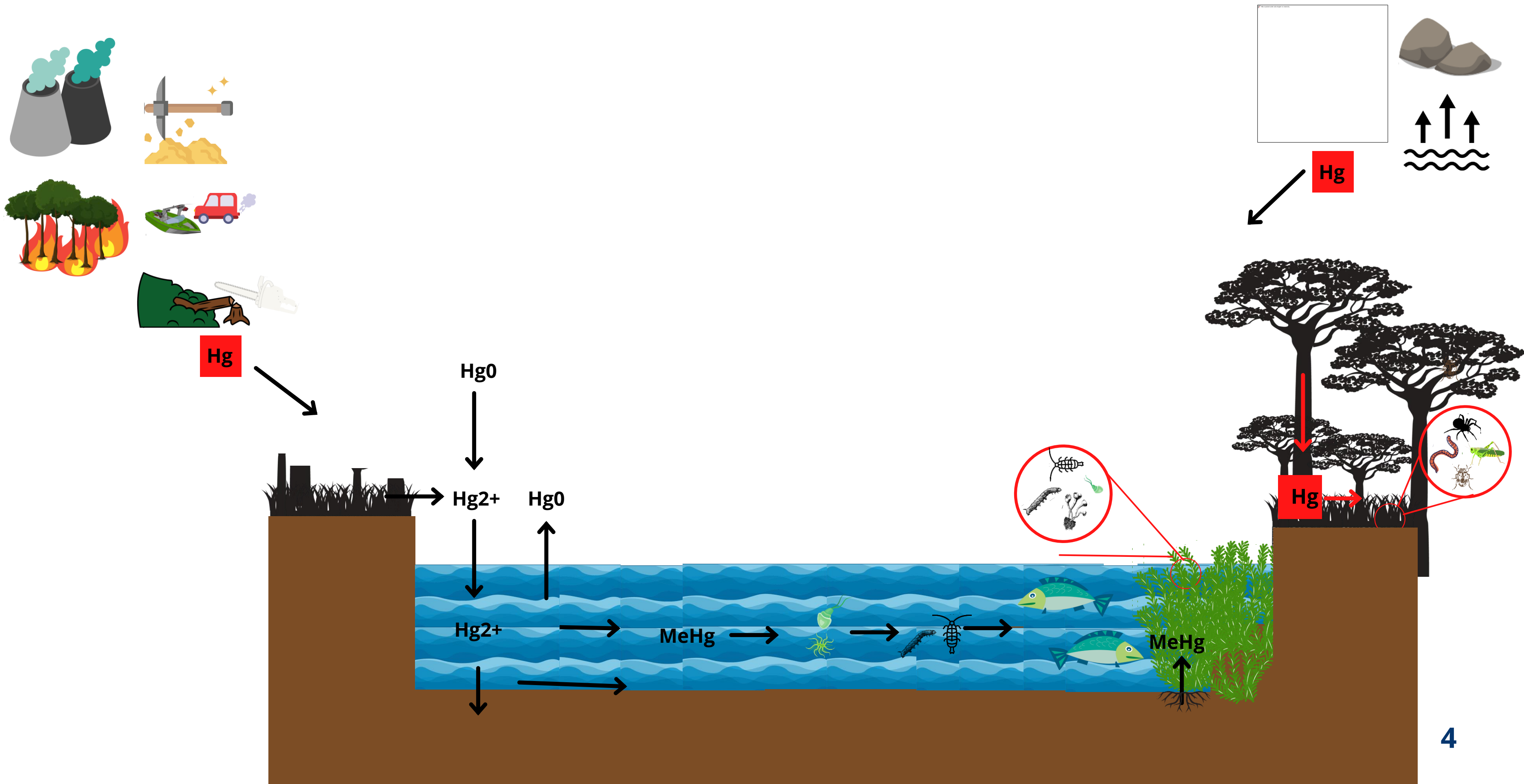
Convenção de Minamata - Decreto N° 9.470/2018

Objetivo:

- Proteger a saúde humana e o meio ambiente das emissões antropogênicas de mercúrio e de compostos de mercúrio.

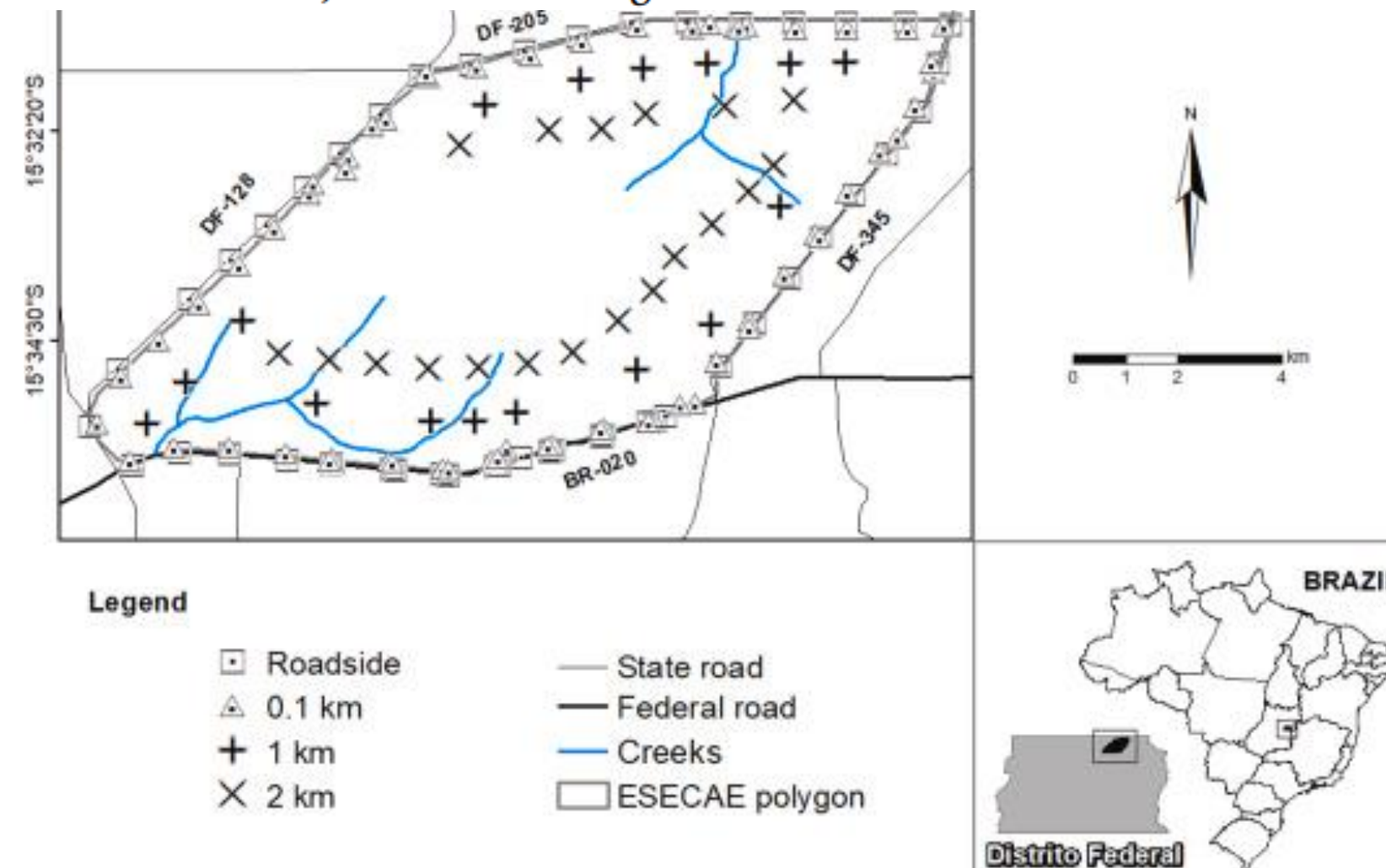
Artigo 19:

- Inventários de emissões antrópicas e mobilização para os ecossistemas aquáticos e terrestres.
- Monitoramento das concentrações de mercúrio em regiões geograficamente representativas.

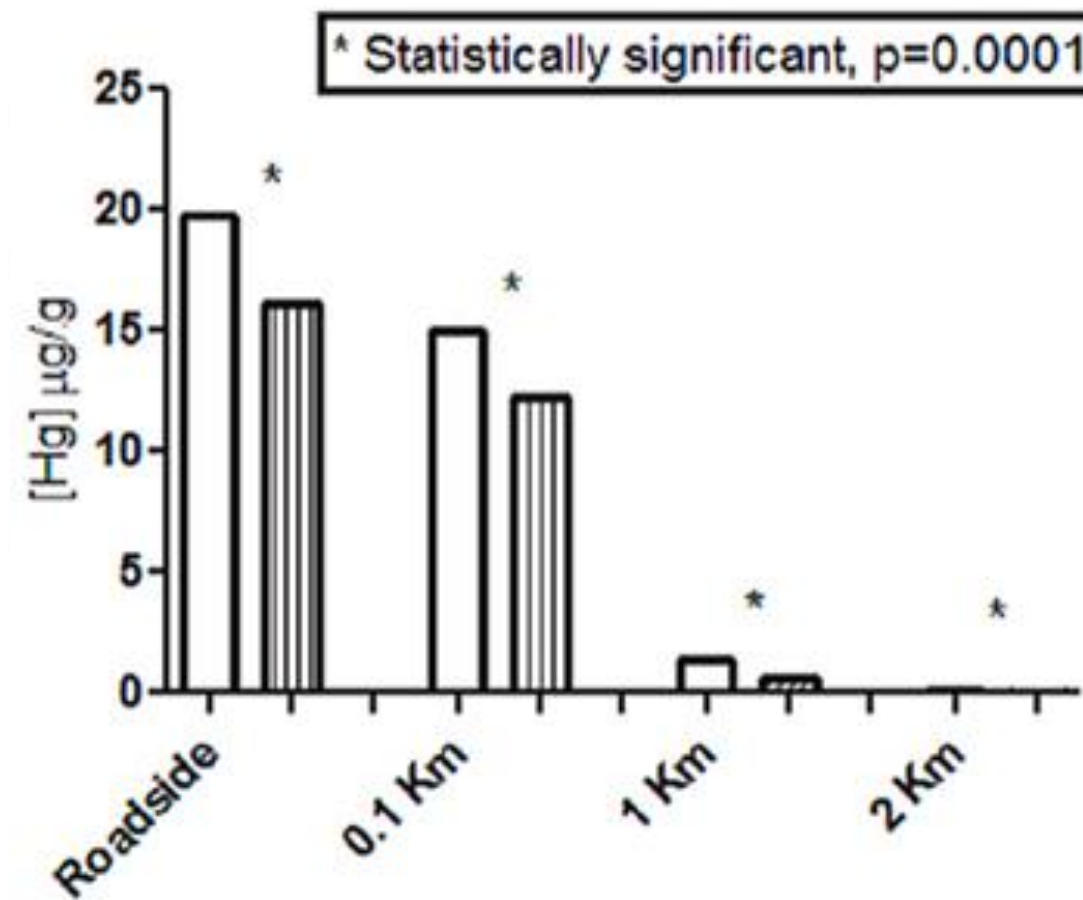


Mercury spatiality and mobilization in roadside soils adjacent to a savannah ecological reserve

Ygor O.S. Rodrigues^a, José G. Dórea^b, P.M.B. Landim^c, José Vicente Elias Bernardi^{a,*}, Lucas Cabrera Monteiro^d, João Pedro Rudrigues de Souza^e, Lilian de Castro Moraes Pinto^f, Iara Oliveira Fernandes^f, João Victor Villela de Souza^a, Antônia Roberto Sousa^a, Juruna de Paula Sousa^a, Bruno Leandro Oliveira Maciel^a, Francisco Marcos dos Santos Delvico^g, Jurandir Rodrigues de Souza^e



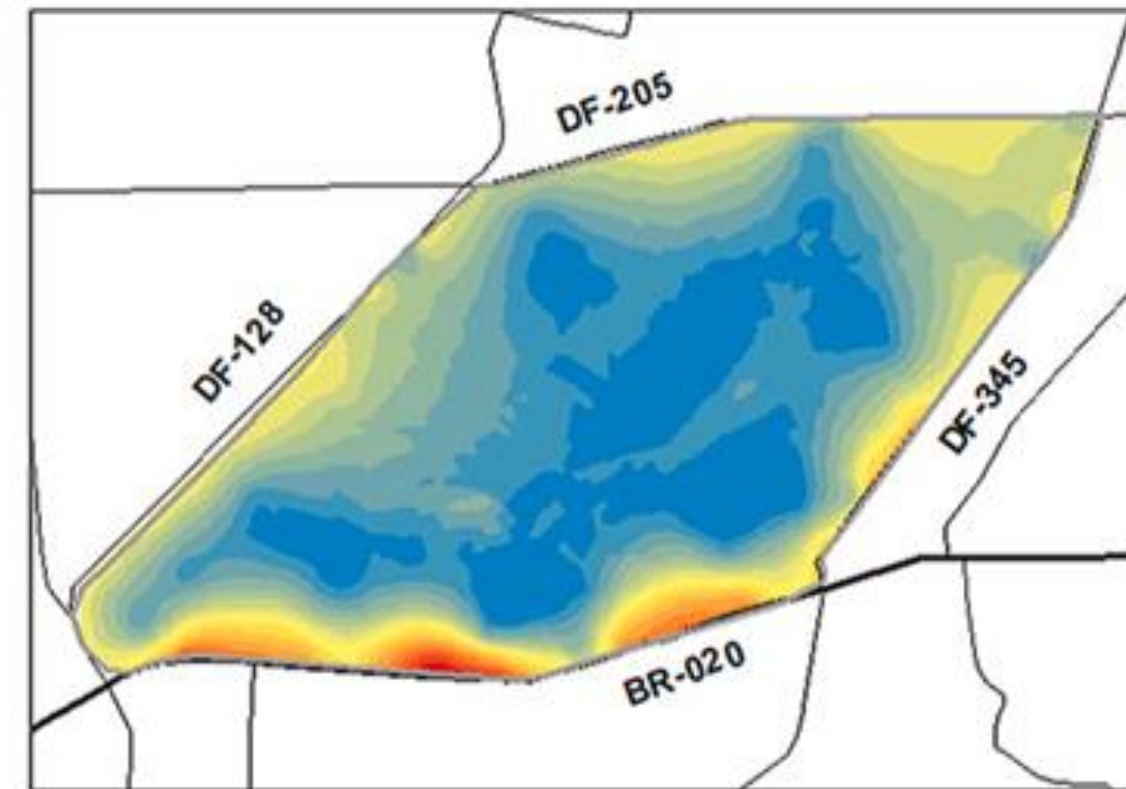
Statistical analysis



Distance from roadside (undisturbed soil)

□ Sampling depth, 20cm
▨ Sampling depth, 100cm

Co-kriging method



Mercury concentration index (µg/g)

0.06 - 0.68	3.9 - 5.7	9.2 - 11	16 - 16.5	21 - 23
0.69 - 2.1	5.8 - 7.6	12 - 13	17 - 18	24 - 25
2.2 - 3.8	7.7 - 9.1	14 - 15	19 - 20	26 - 29

— State road — Federal road
□ ESECAE polygon

CONAMA - Resolução N° 420/2009

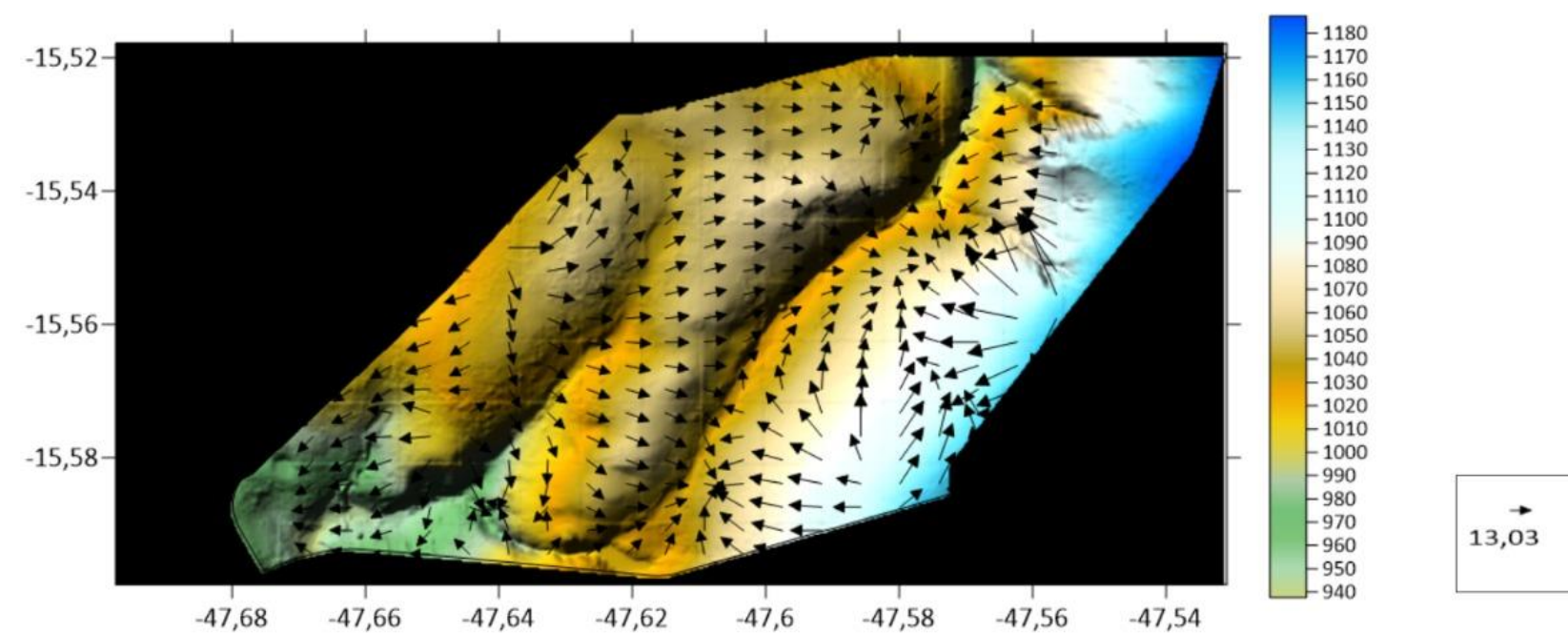


Limite de prevenção: 0,5 mg/kg

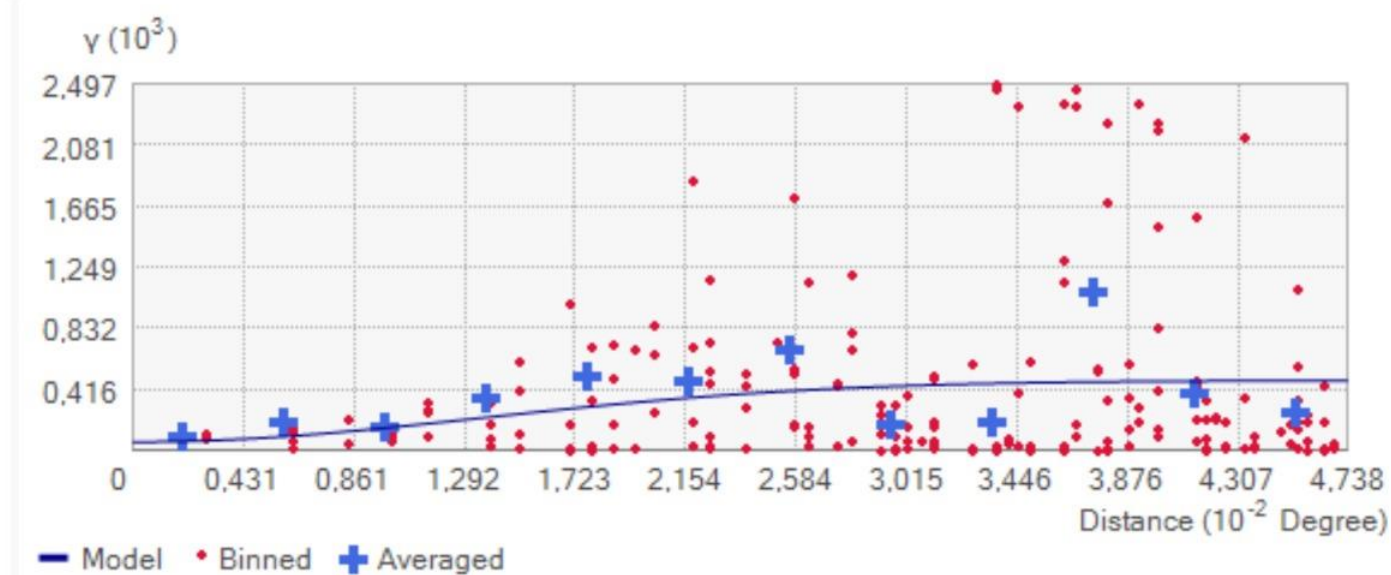
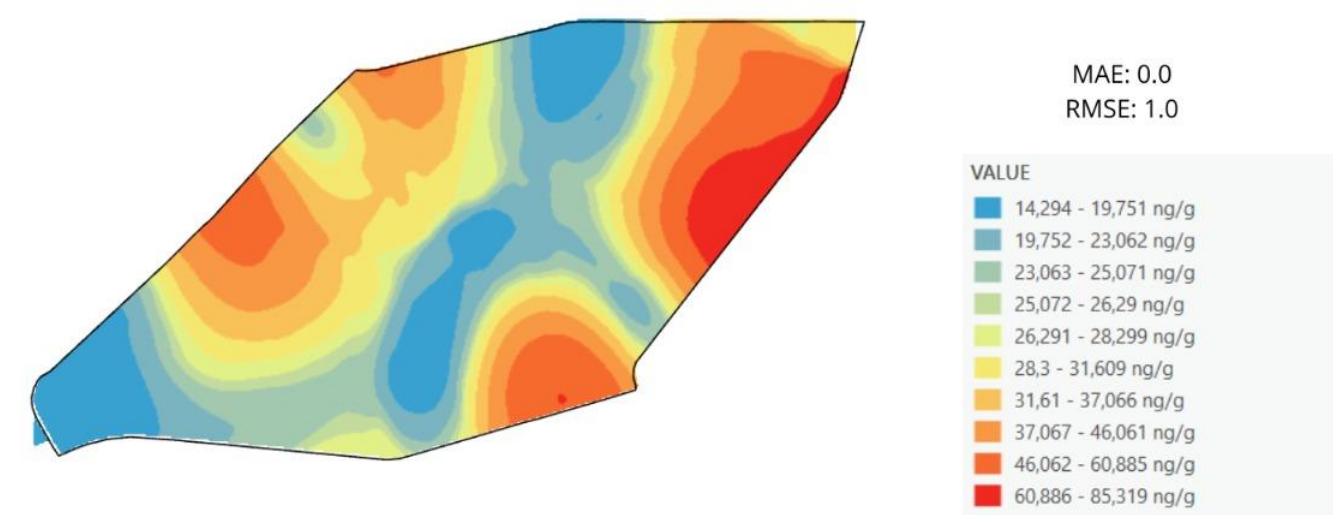
Countries	Soil samples	Distance from the road (m)	Mean THg concentrations ($\mu\text{g g}^{-1}$)	Reference
Brazil ^a	144	<30	19.8	This study
Canada	50	<15	0.25	Rasmussen et al. (2001)
China	127	30	0.21	Chen et al. (2010)
Greece	96	3	0.1	Christoforidis et al. (2009)
Japan	22	<1 ^a	0.9	Ozaki et al. (2008)
New Zealand	60	300	0.11	Curran-Cournane et al. (2015)
Pakistan	9	3	90.6	Khan et al. (2011)

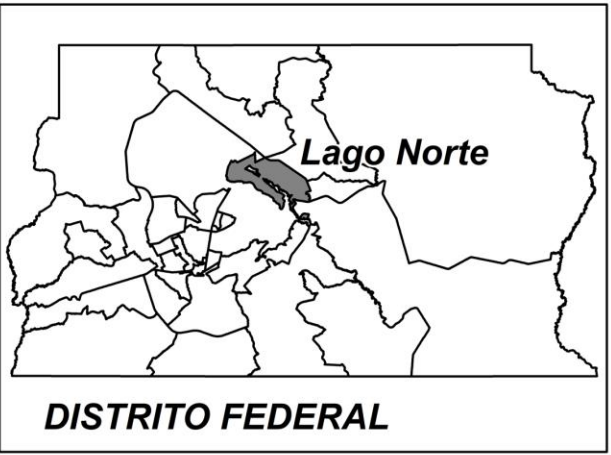
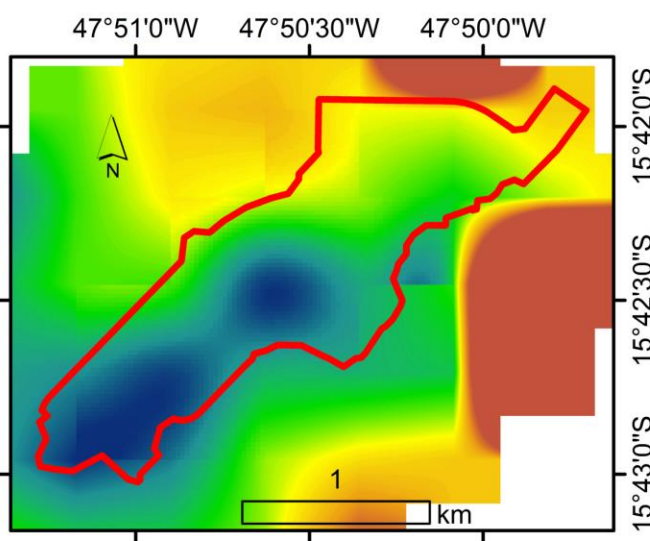
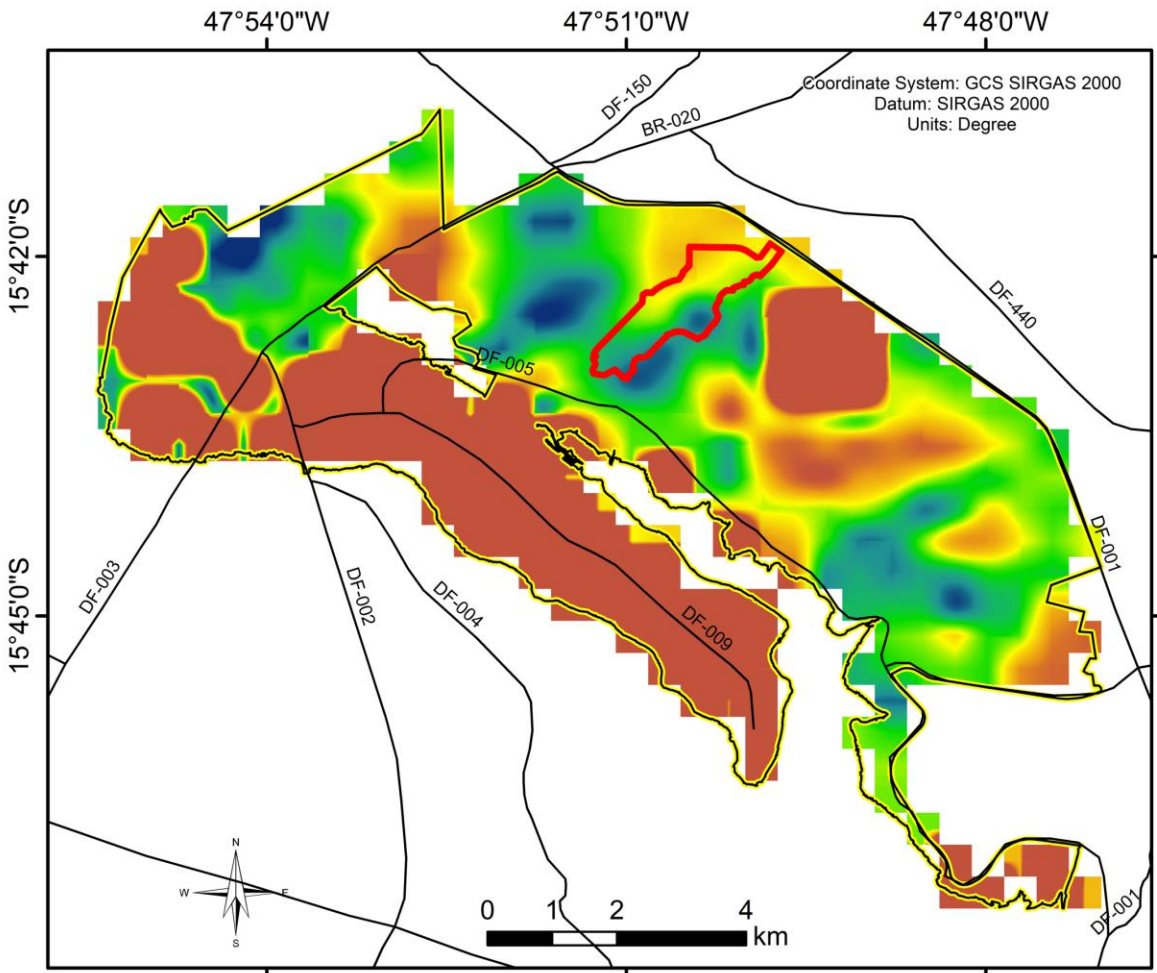
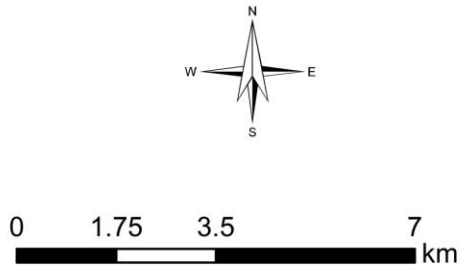
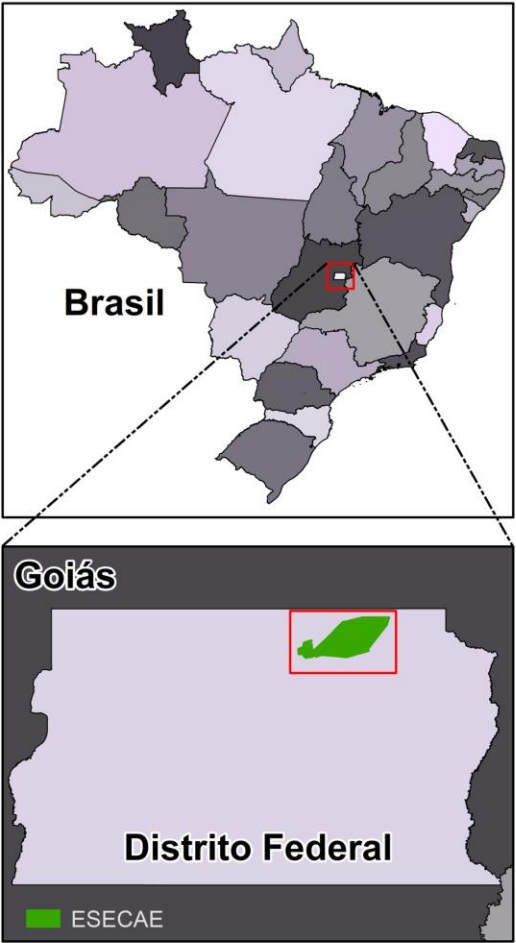
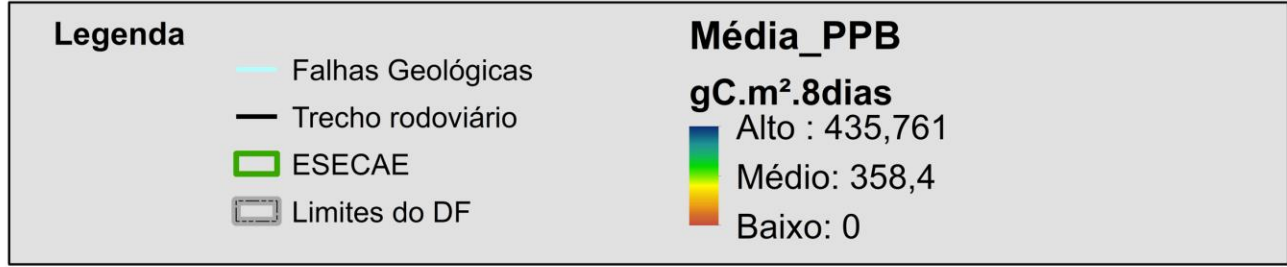
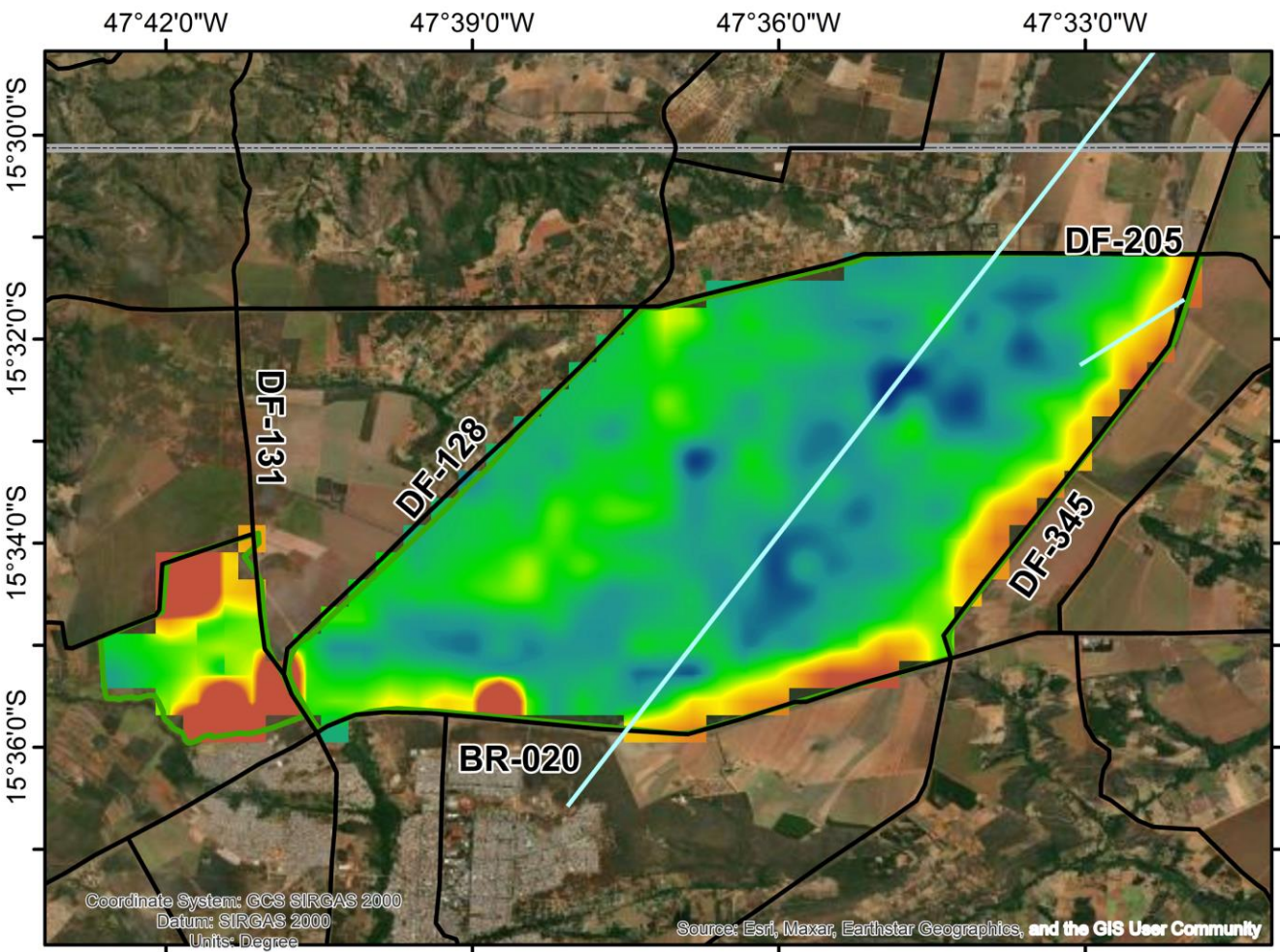
Mecúrio na Vegetação

Vector map (vegetation)

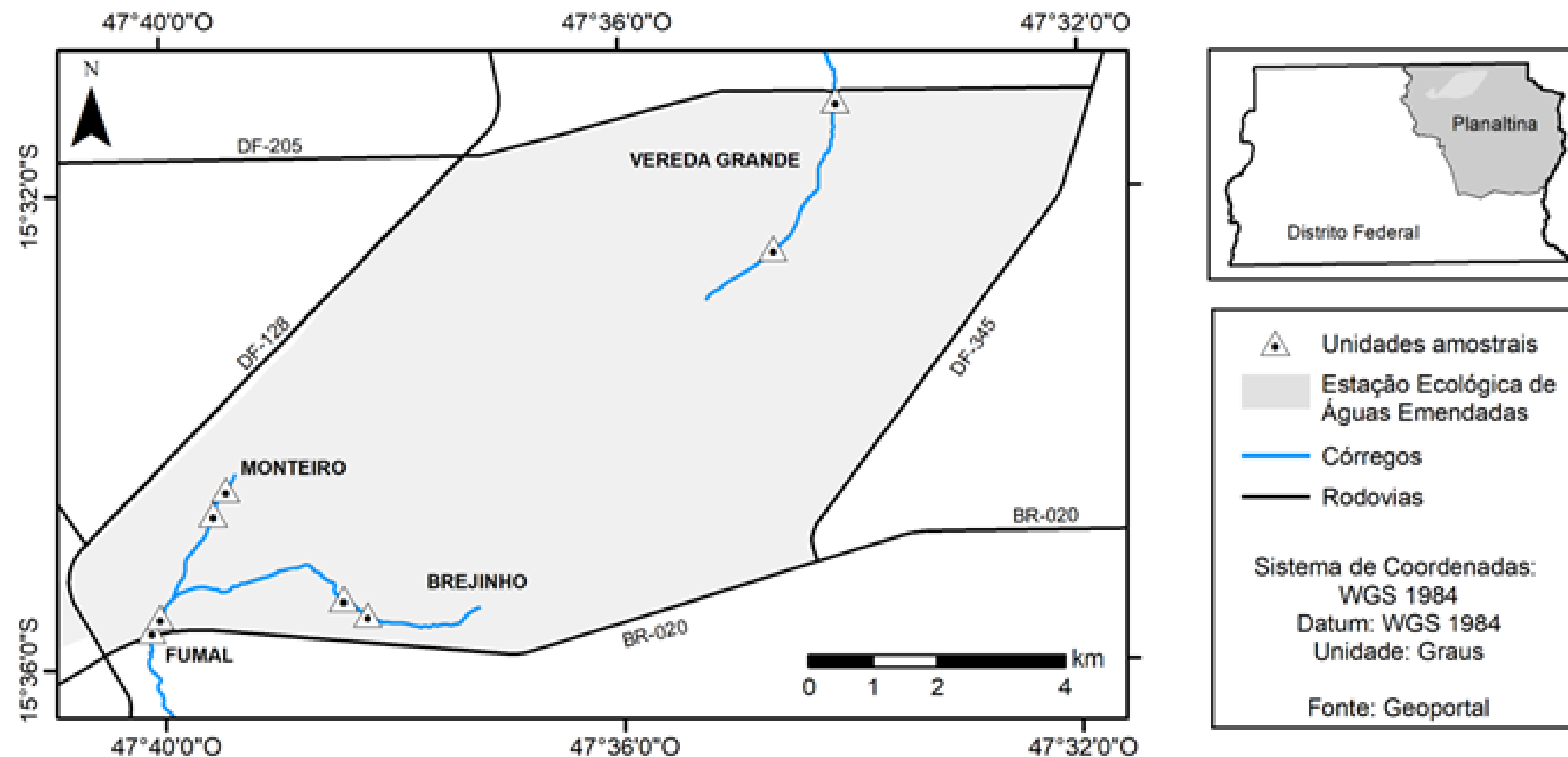


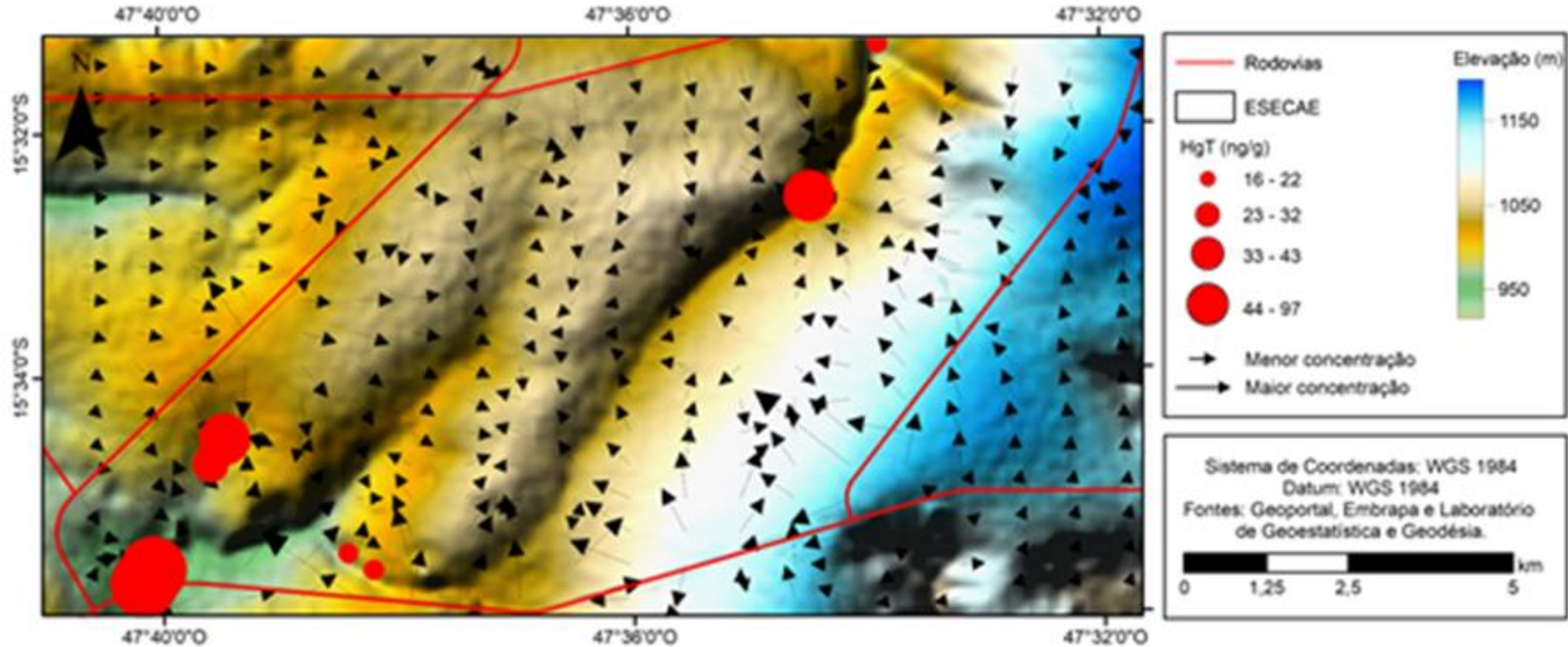
Ordinary kriging (vegetation)





Mercúrio nos sedimentos aquáticos e sua distribuição espacial em solos superficiais no bioma Cerrado: estudo de caso no Distrito Federal, Brasil

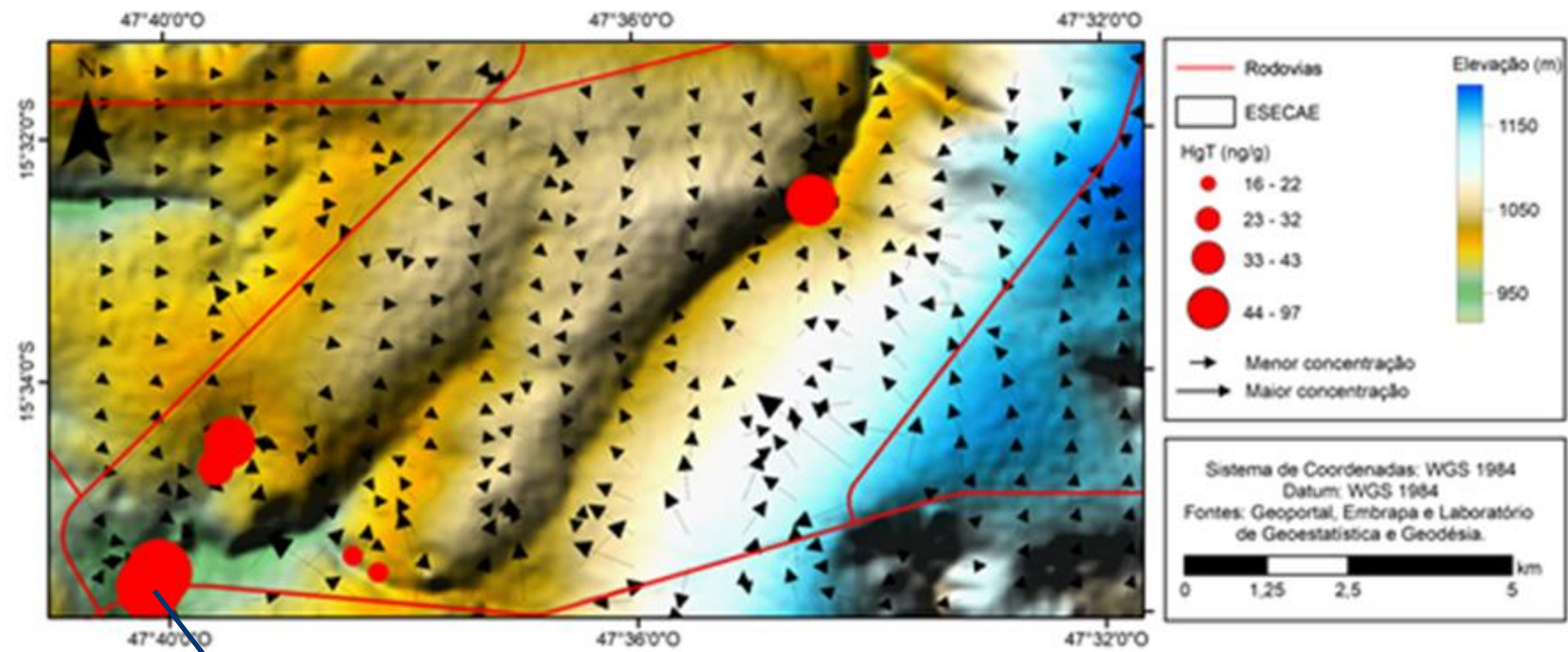




CONAMA - Resolução N° 454/2012



Nível 1: 170 ng/g
 Nível 2: 486 ng/g





Contents lists available at [ScienceDirect](#)

Environmental Pollution

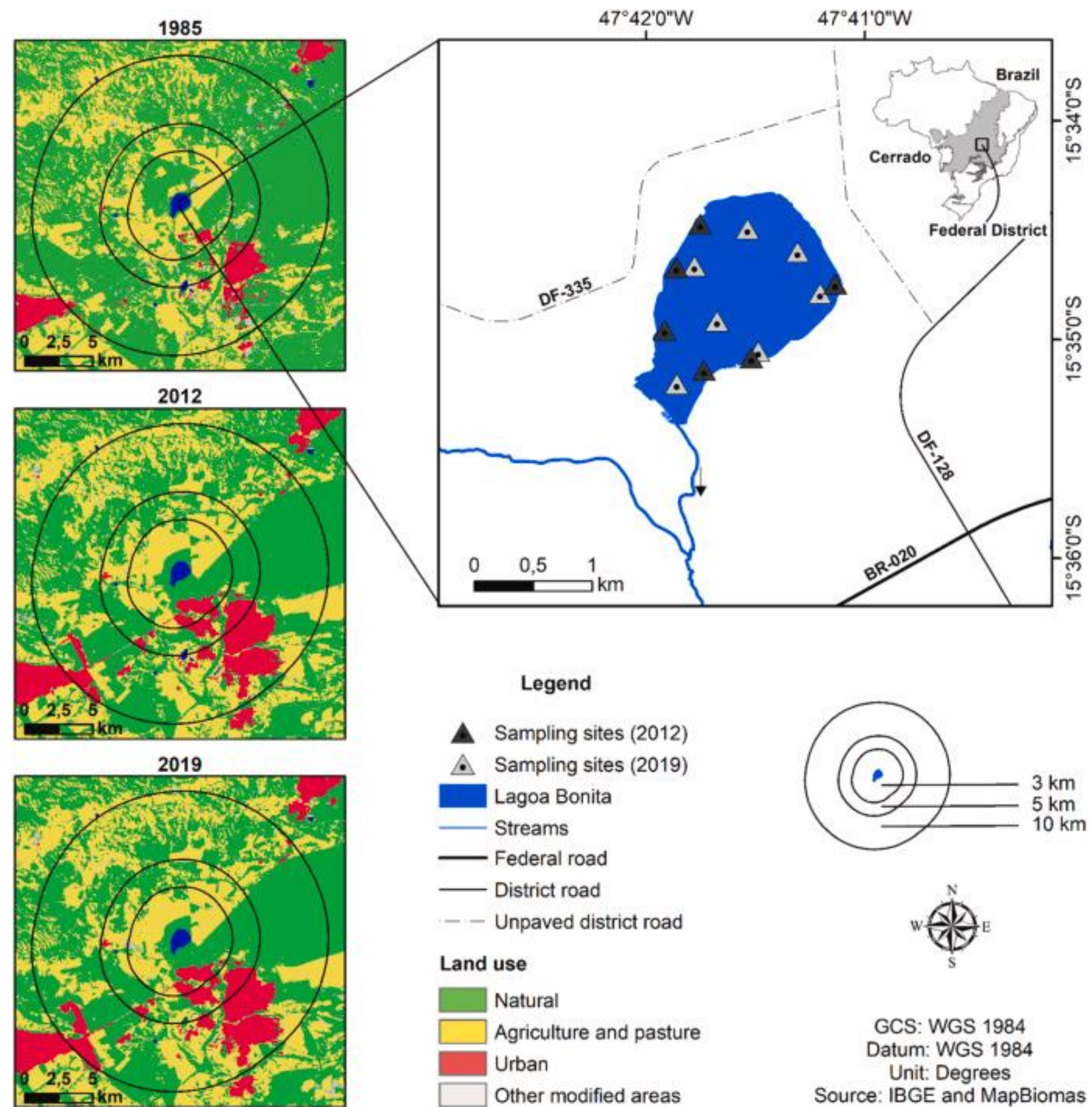
journal homepage: www.elsevier.com/locate/envpol

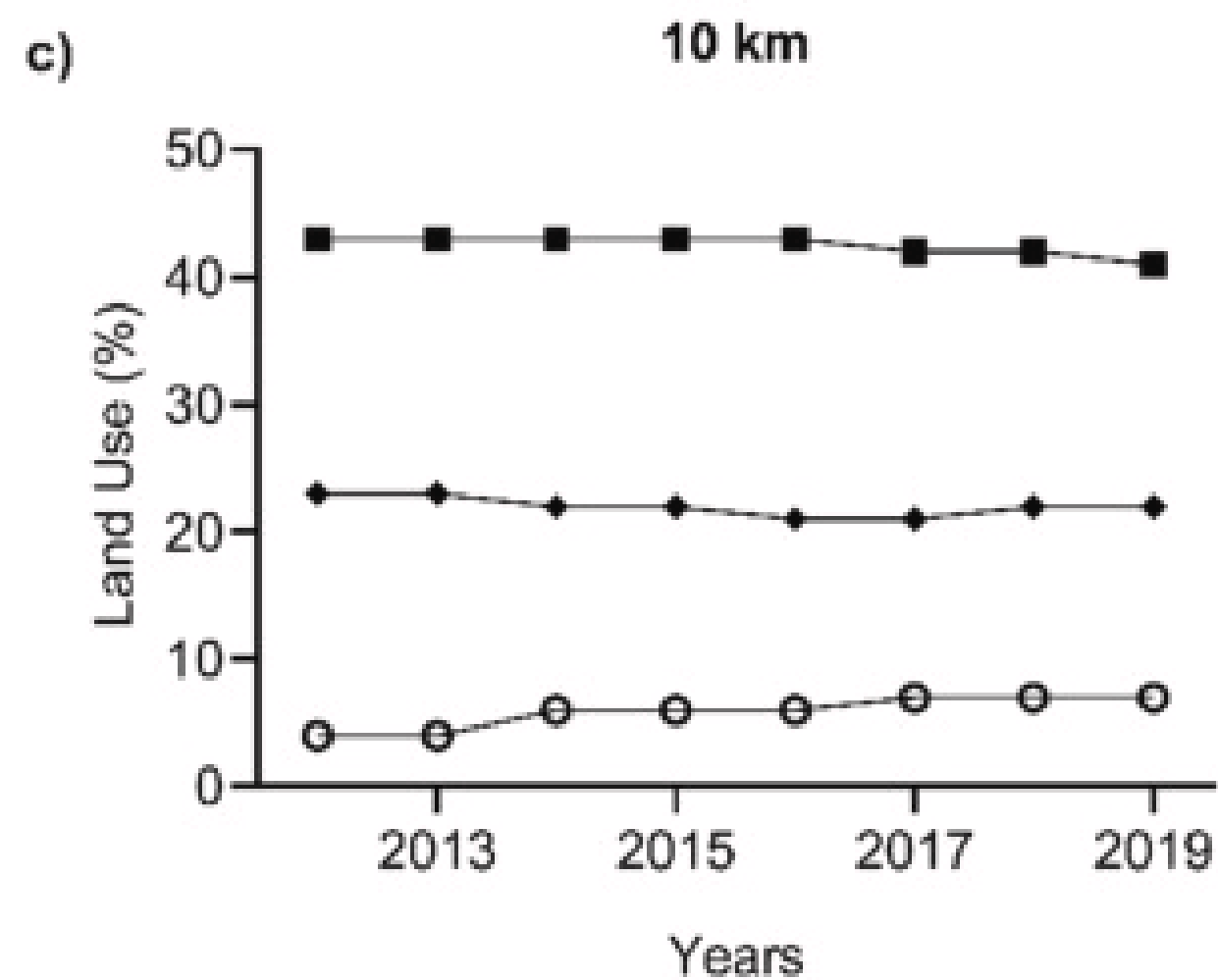
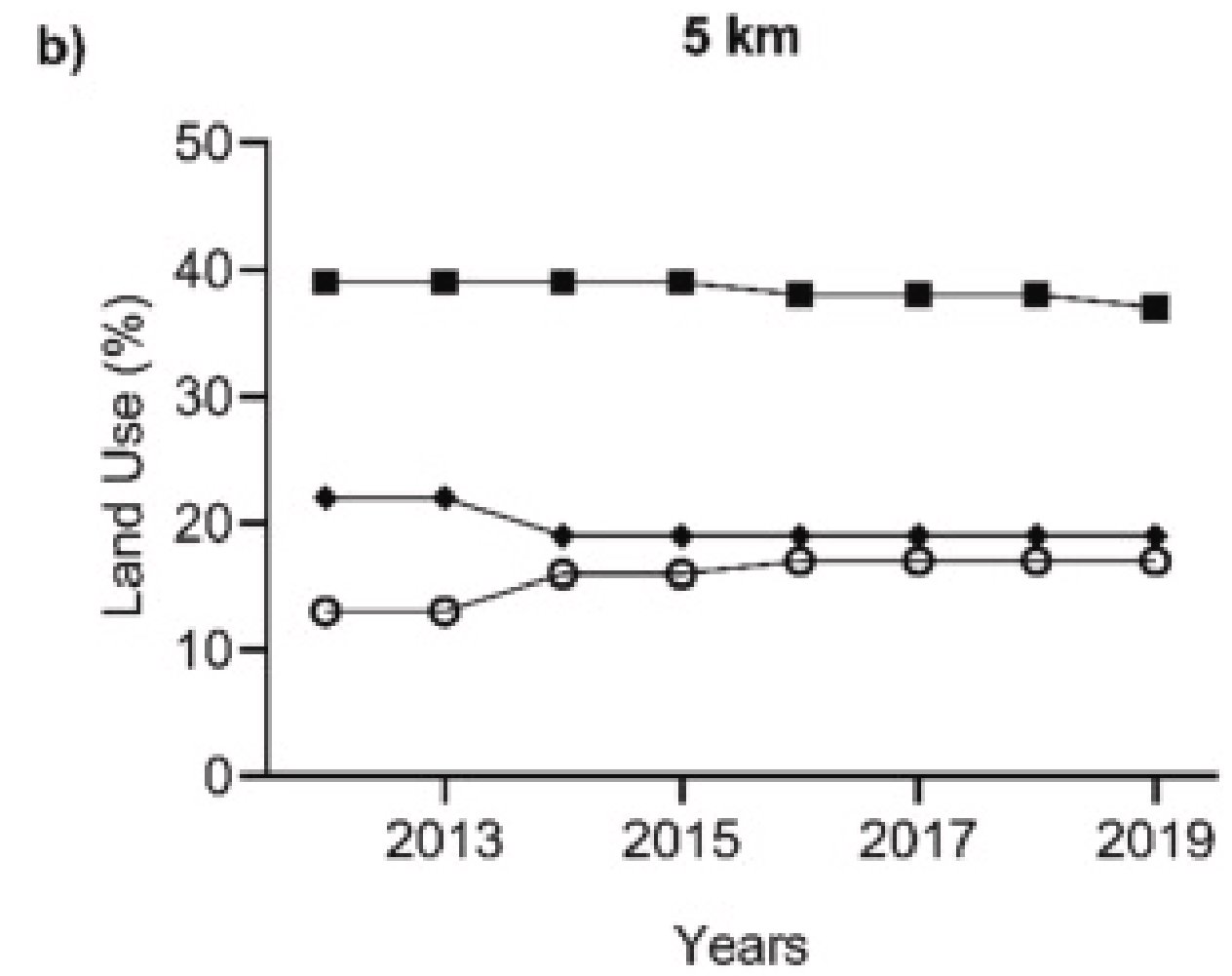
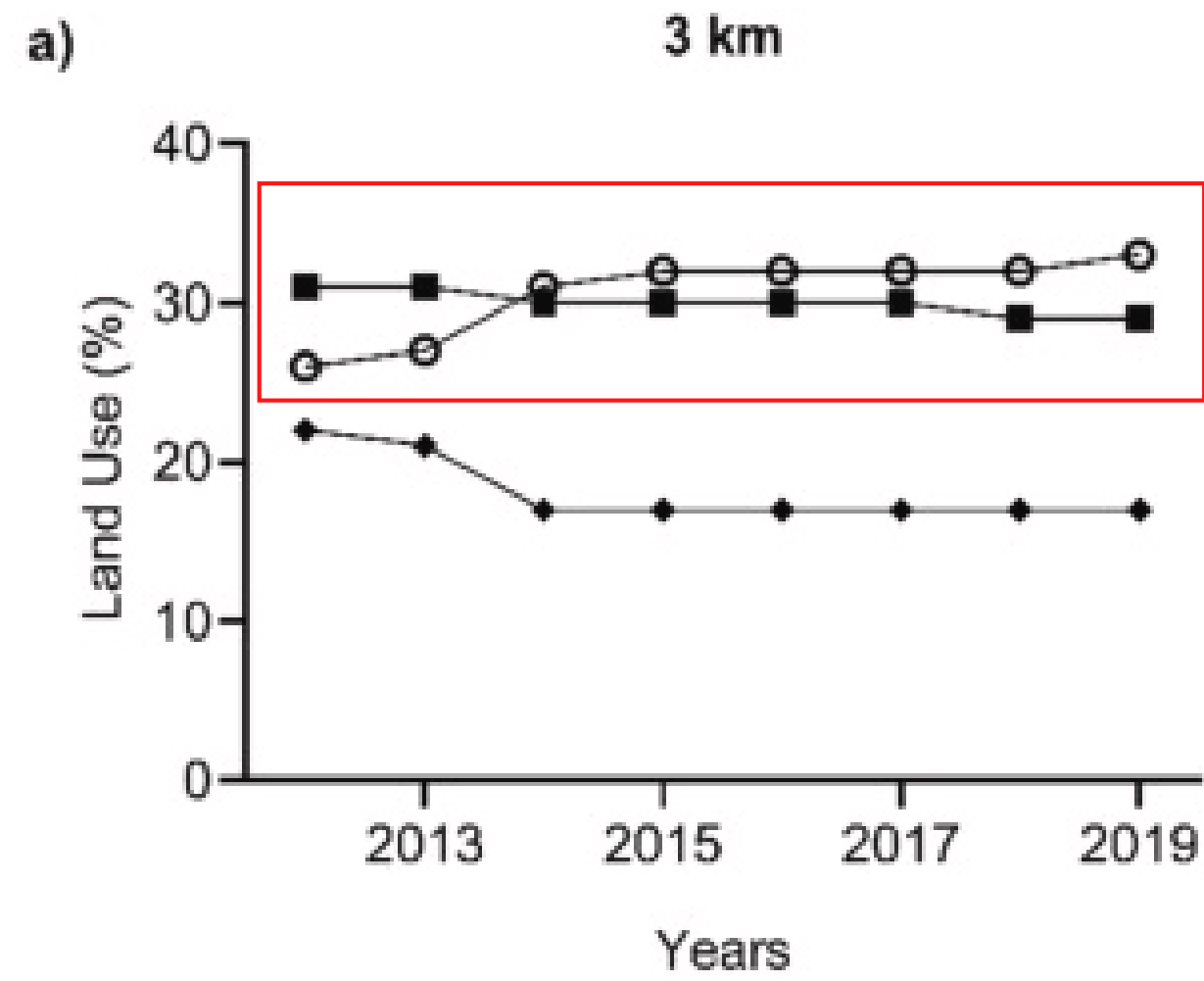


Land use impact on mercury in sediments and macrophytes from a natural lake in the Brazilian savanna[☆]

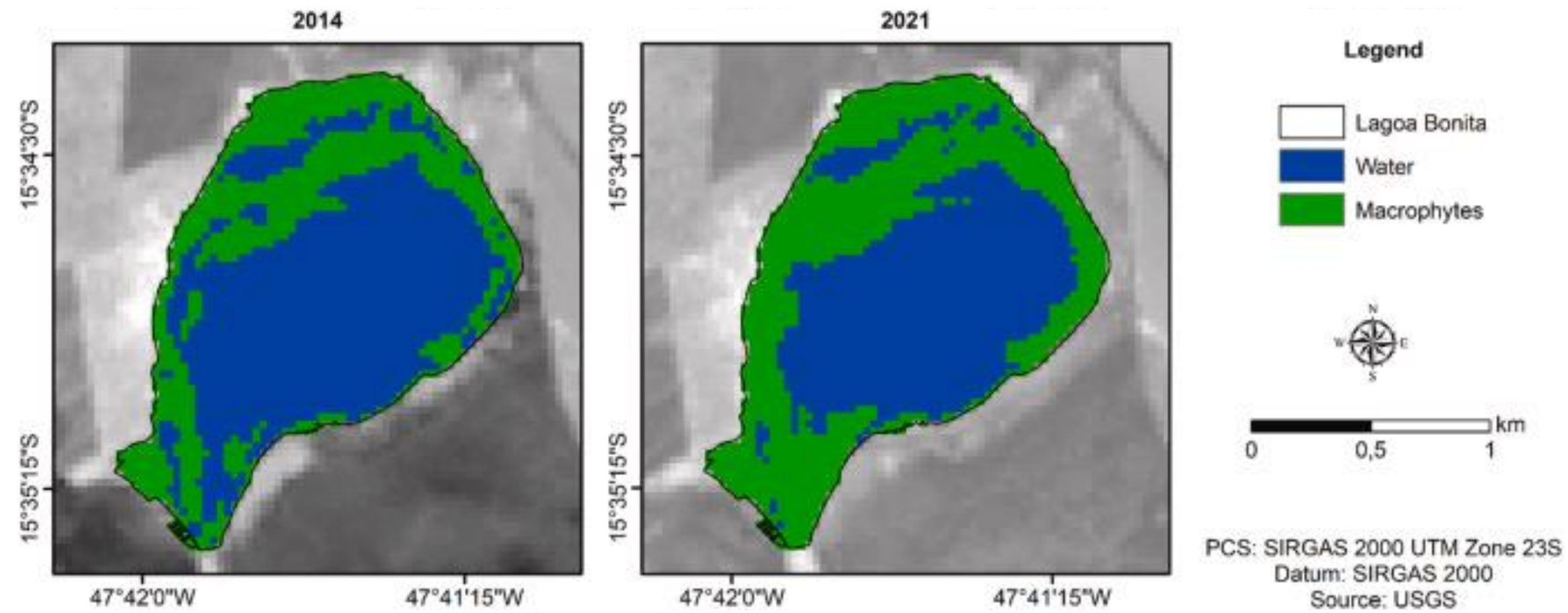
José G. Dórea^{a,1}, Lucas Cabrera Monteiro^{b,c,f,1}, José Vicente Elias Bernardi^{c,2,*},
Iara Oliveira Fernandes^{c,d}, Sandy Flora Barbosa Oliveira^d, João Pedro Rodrigues de Souza^e,
Ygor Oliveira Sarmiento Rodrigues^{c,d}, Ludgero Cardoso Galli Vieira^f,
Jurandir Rodrigues de Souza^e







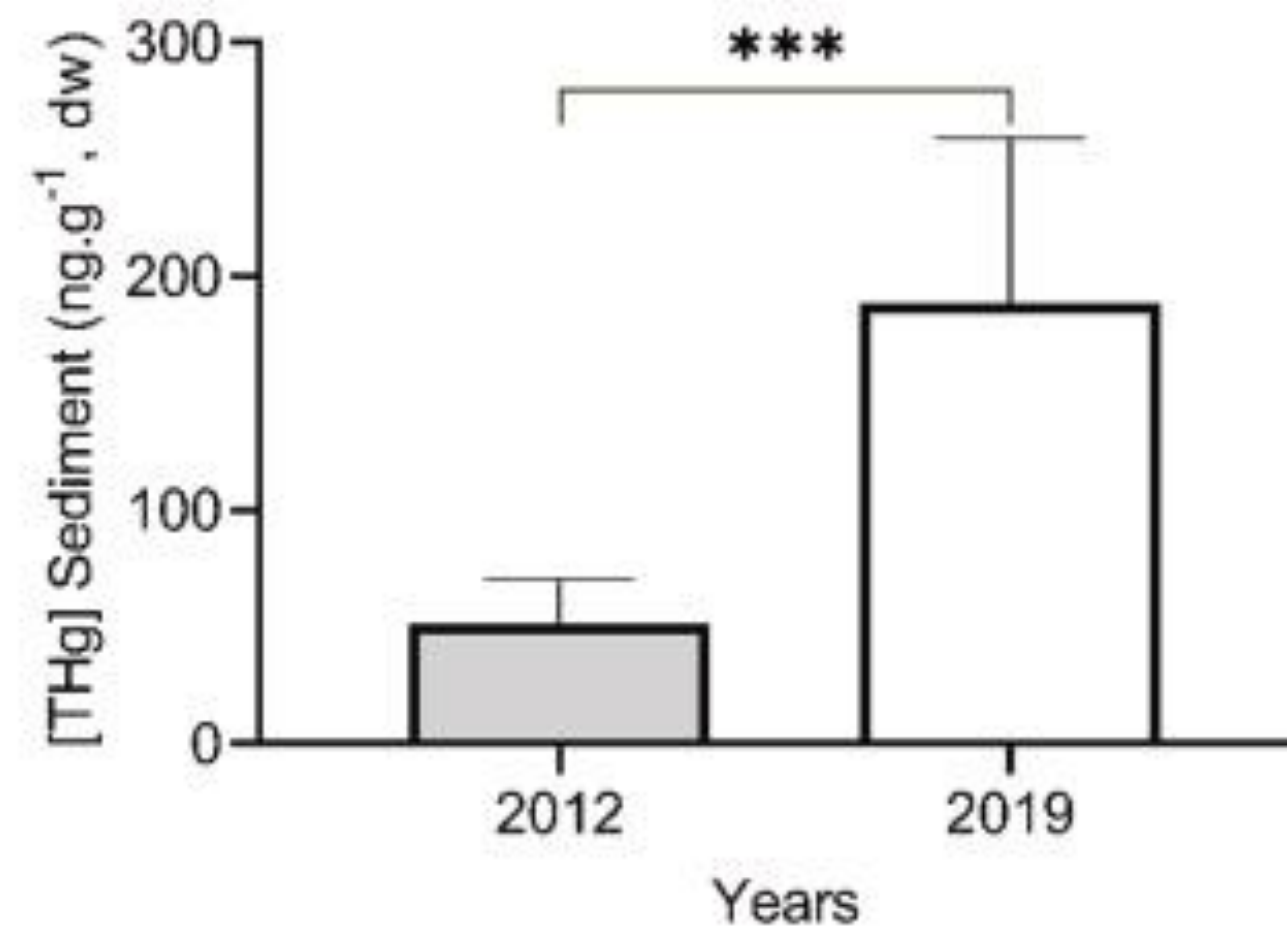
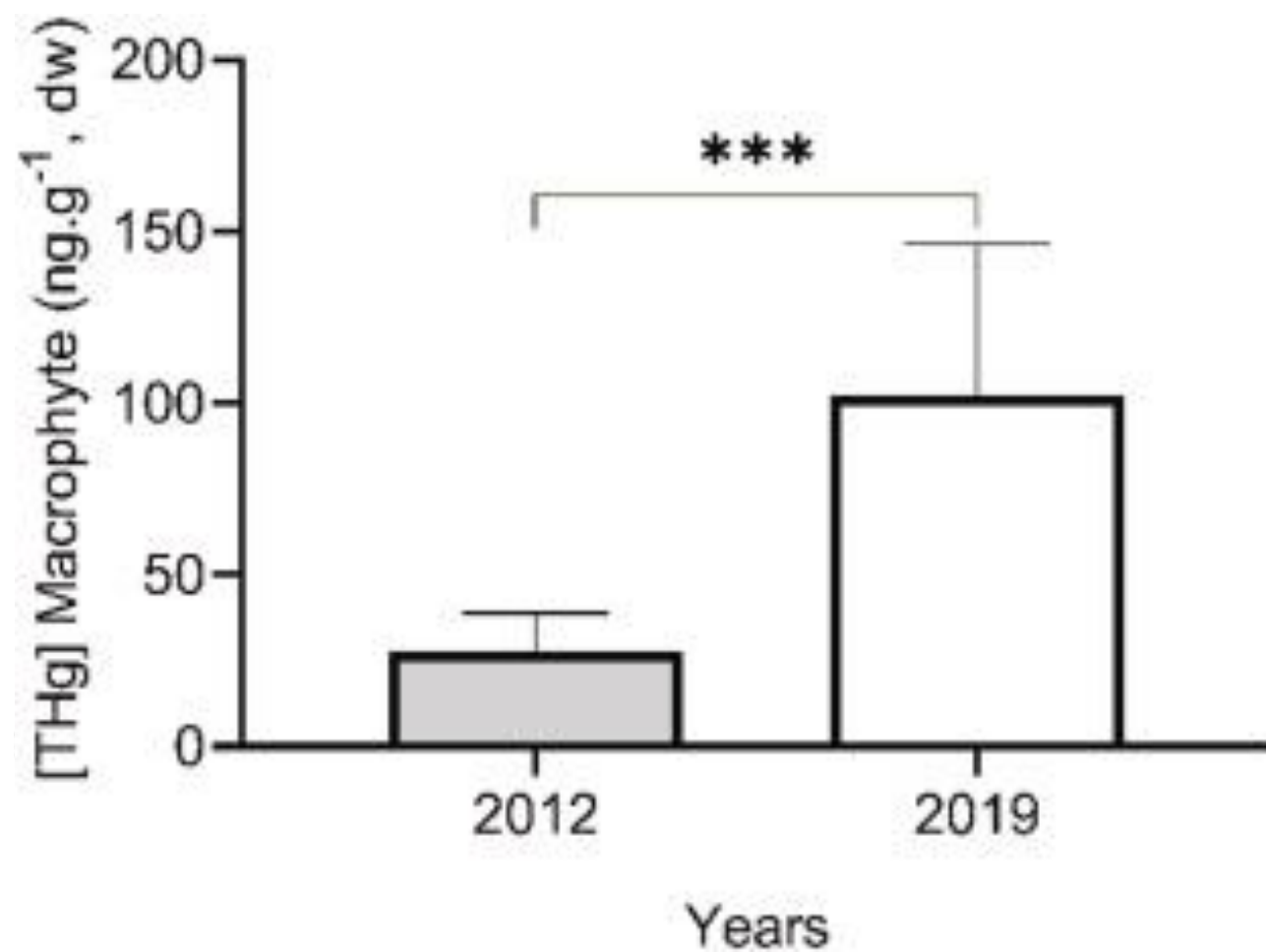
■ Savannah
◆ Pasture
○ Agriculture



2014
38%



2021
49%



CONAMA - Resolução N° 454/2012

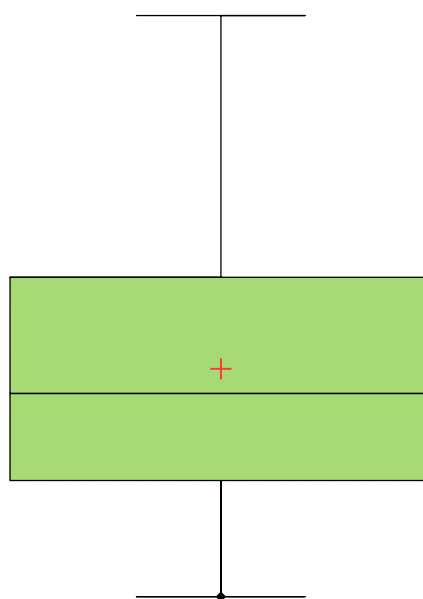


Nível 1: 170 ng/g
Nível 2: 486 ng/g

Hg água ng/l Dissolvido

Hg (ng/l)

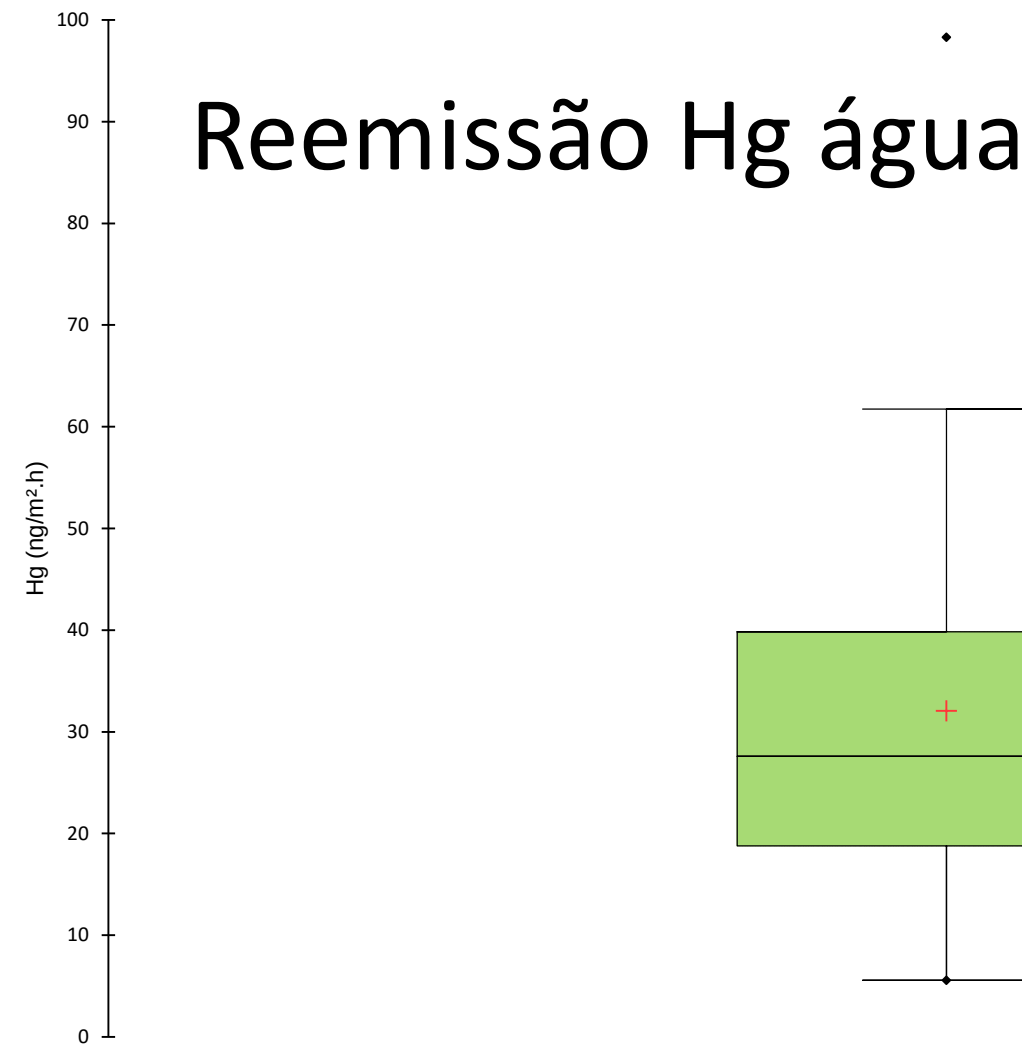
Box plot (Hg (ng/l))



Reemissão Hg água

Hg (ng/m².h)

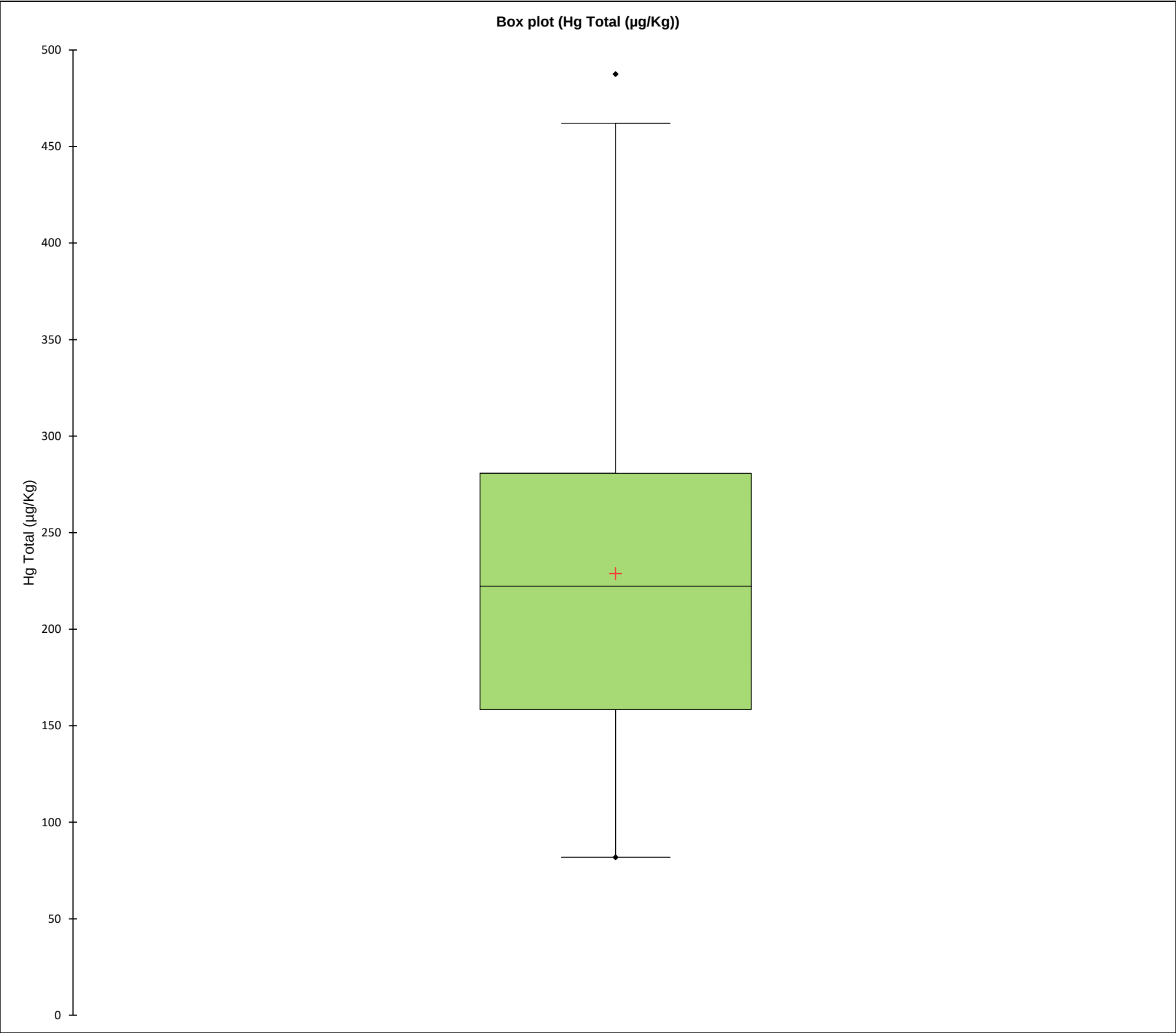
Box plot (Hg (ng/m².h))



Descriptive statistics (Quantitative data):

Statistic	Hg (ng/l)	Hg (ng/m².h)
Nbr. of observations	97	97
Minimum	2,000	5,564
Maximum	33,000	98,300
Range	31,000	92,736
Median	9,000	27,593
Mean	9,845	32,059
Variance (n-1)	25,945	307,861

Cichla temensis



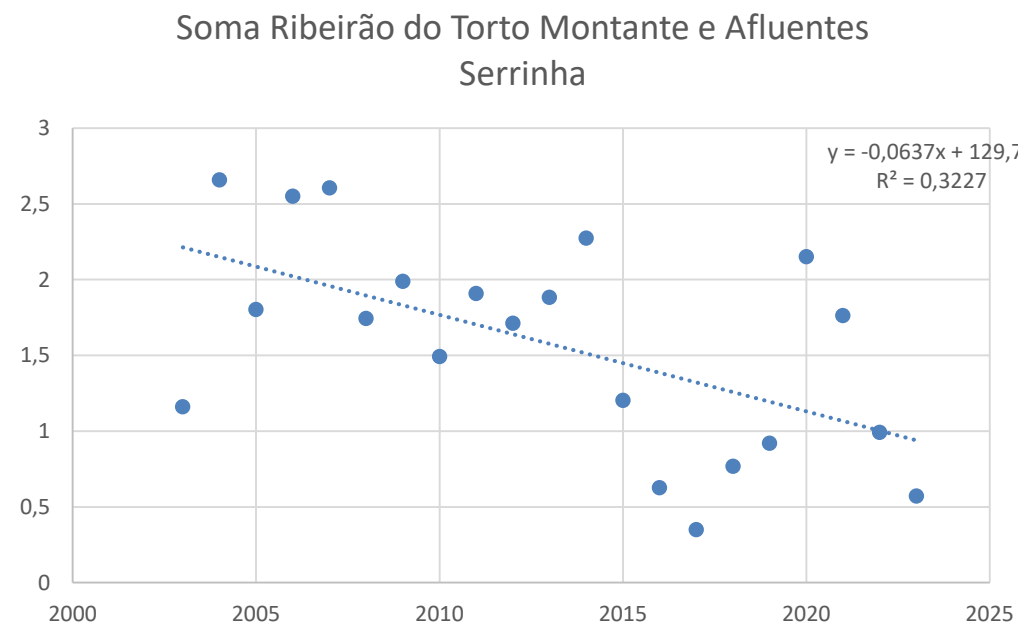
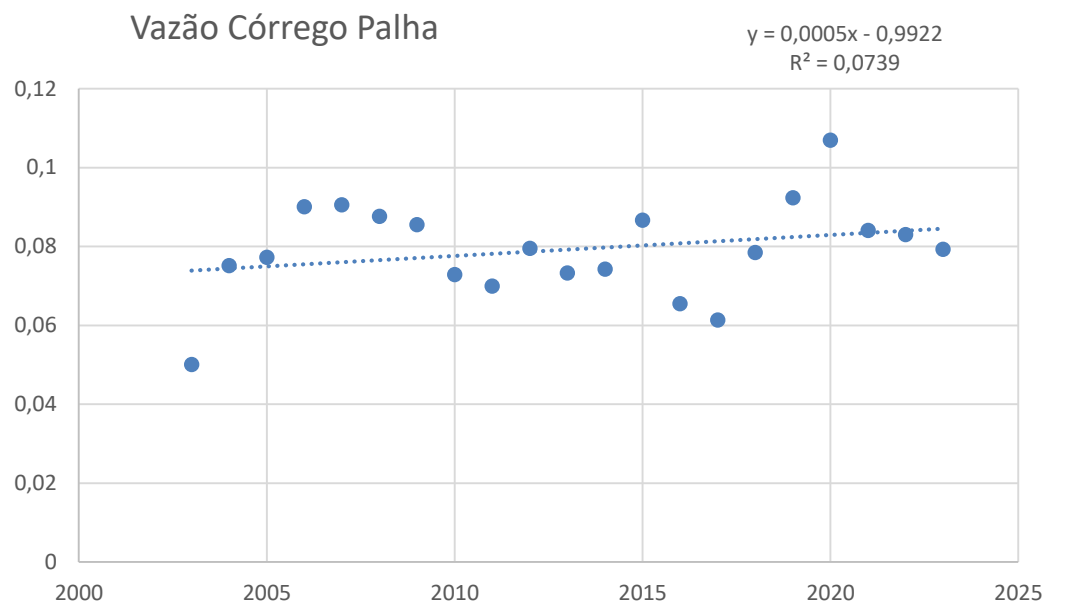
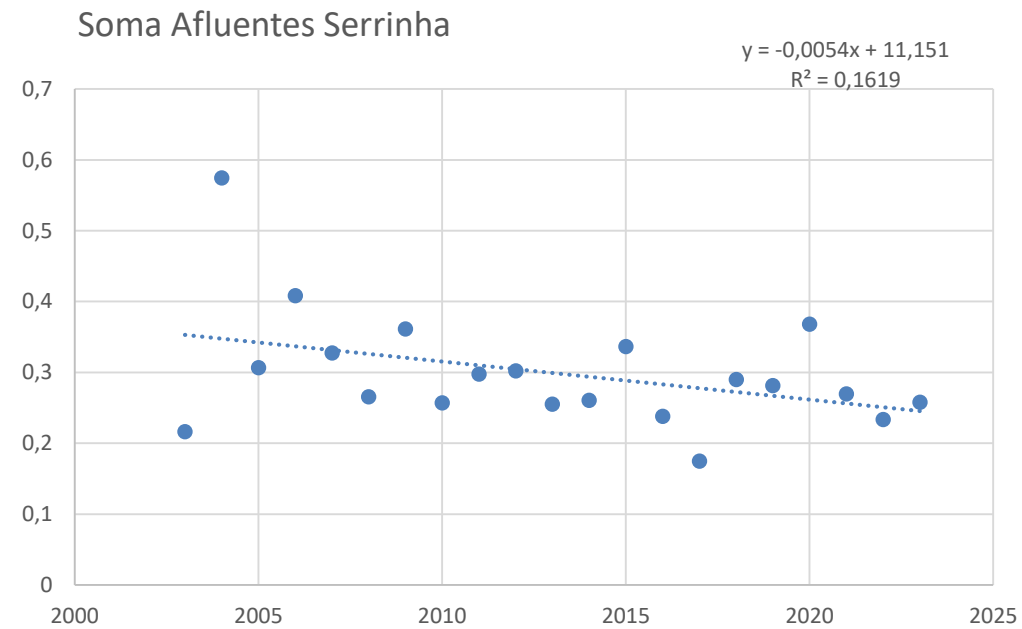
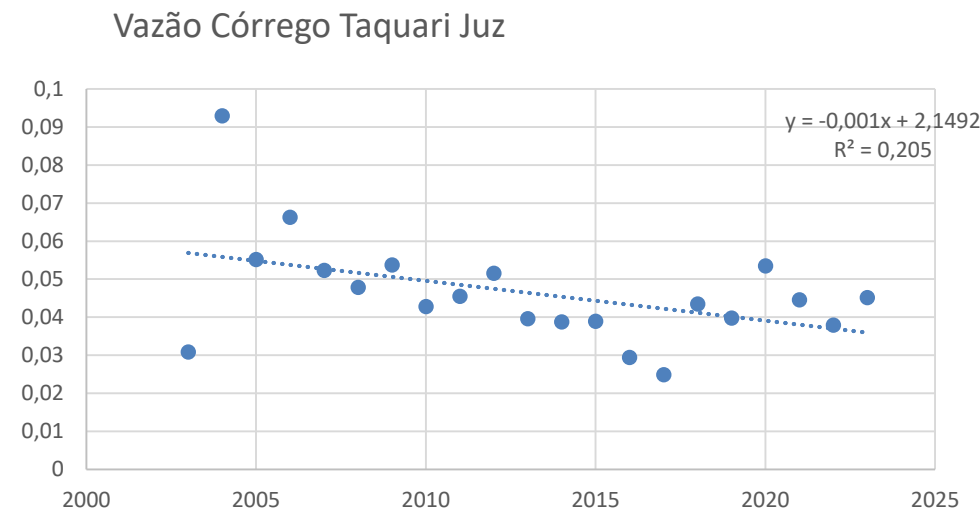
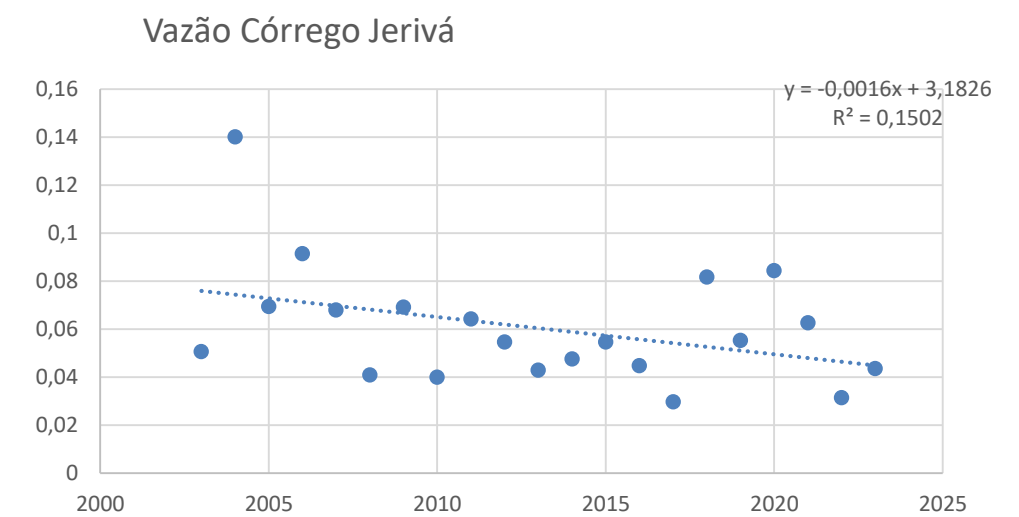
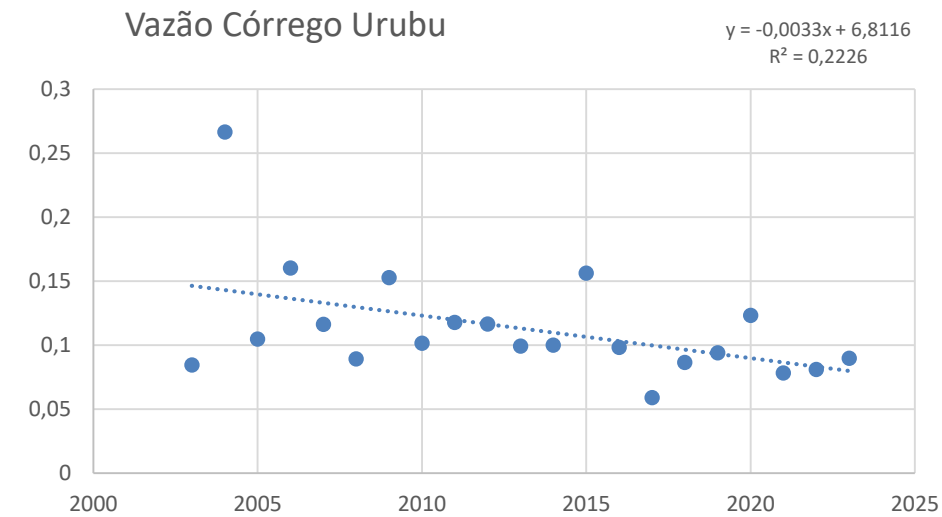
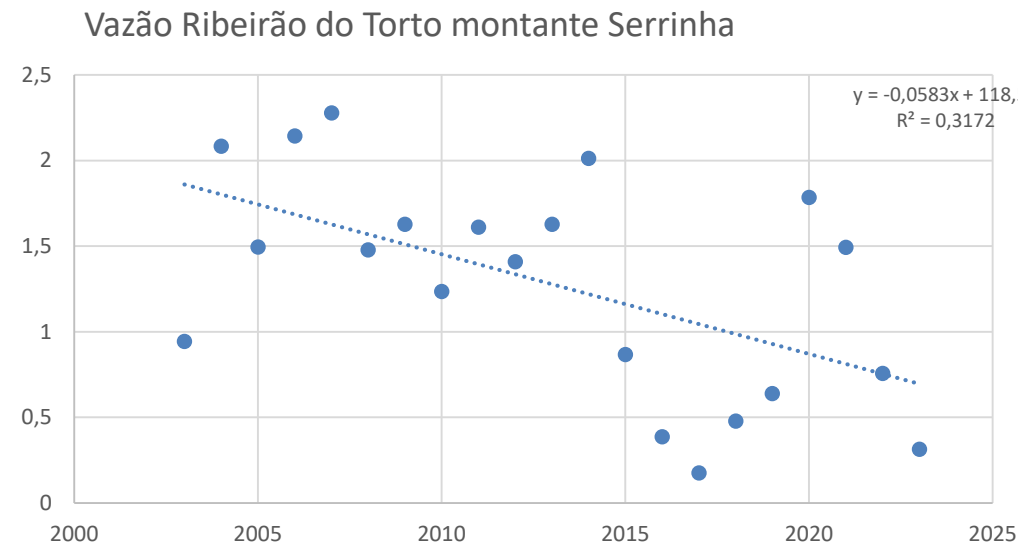
Descriptive statistics (Quantitative data):

Statistic	Hg Total (µg/Kg)	
Nbr. of observation	47	
Minimum	81,843	
Maximum	487,518	
Range	405,675	
Median	222,309	
Mean	228,793	
Variance (n-1)	8622,372	

Tabela 1. Médias totais das vazões dos corpos de água da Serrinha no período de 20 anos

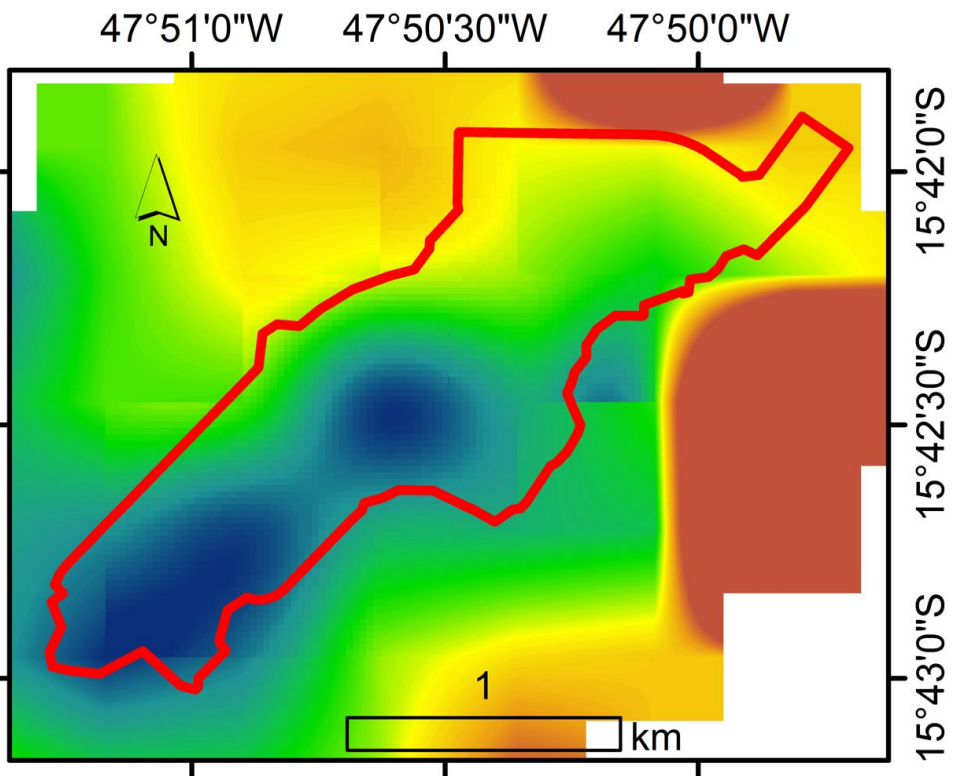
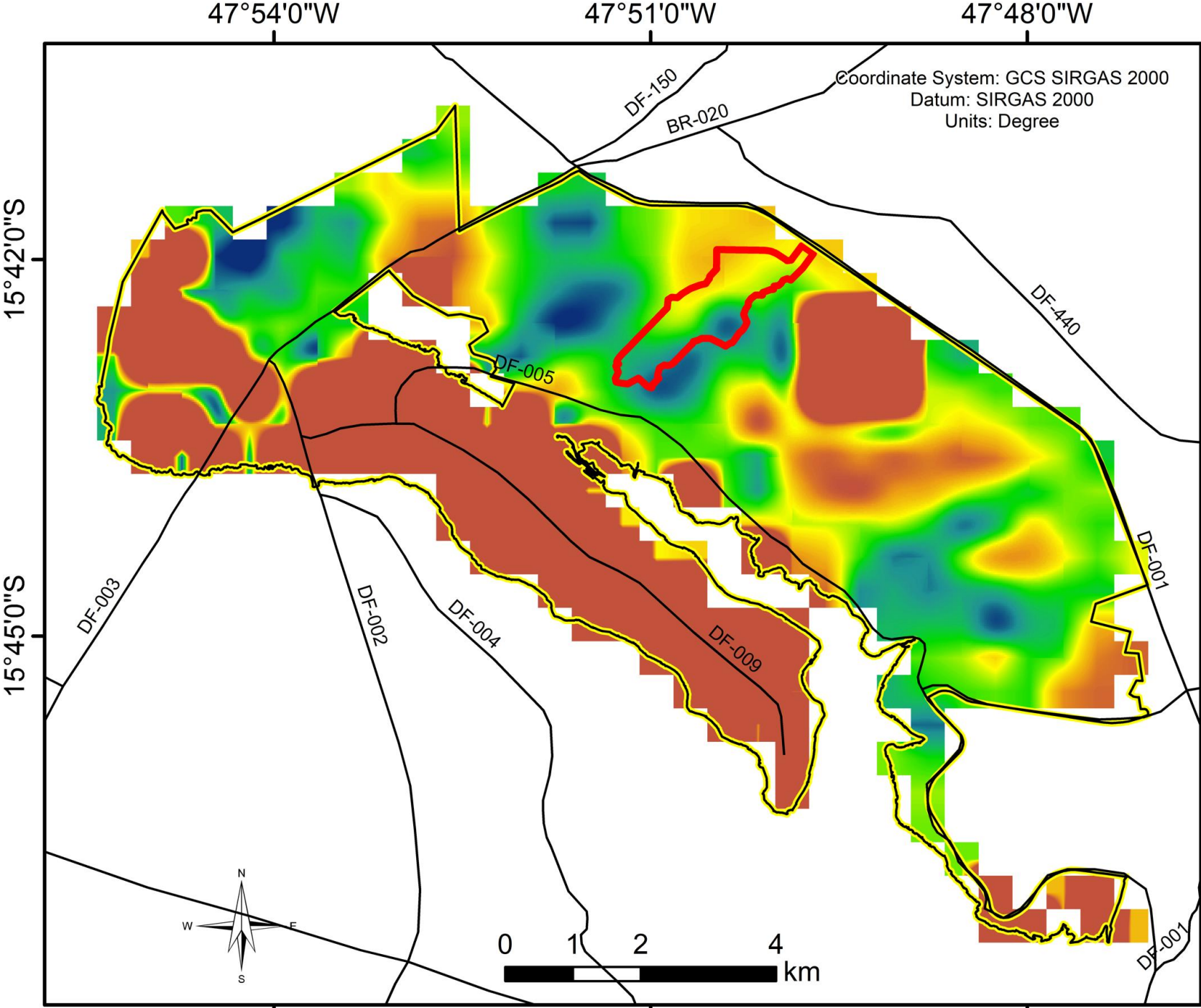
	Média Vazão m3/s
Ribeirão do Torto Montante Serrinha	1,277
Córrego Taquari Juzante	0,046
Córrego Taquari Capitação	0,161
Córrego Urubu	0,113
Córrego Jerivá	0,06
Córrego Palha	0,079
Soma média dos Afluentes	0,464
Contribuição dos Afluentes (%)	0,363

Regressão linear das vazões médias por ano (2003 a 2023)



Fonte de dados das vazões:
(<https://atlas.caesb.df.gov.br/hidrometeorologia/>)

Produção Primária Bruta g C/m²/8dias



PPB - Taquari 2

gC.m².8 dias

Alto : 368,362

Baixo: 274,248

Legenda

PPB - Lago Norte

gC.m².8 dias

Alto: 397.8

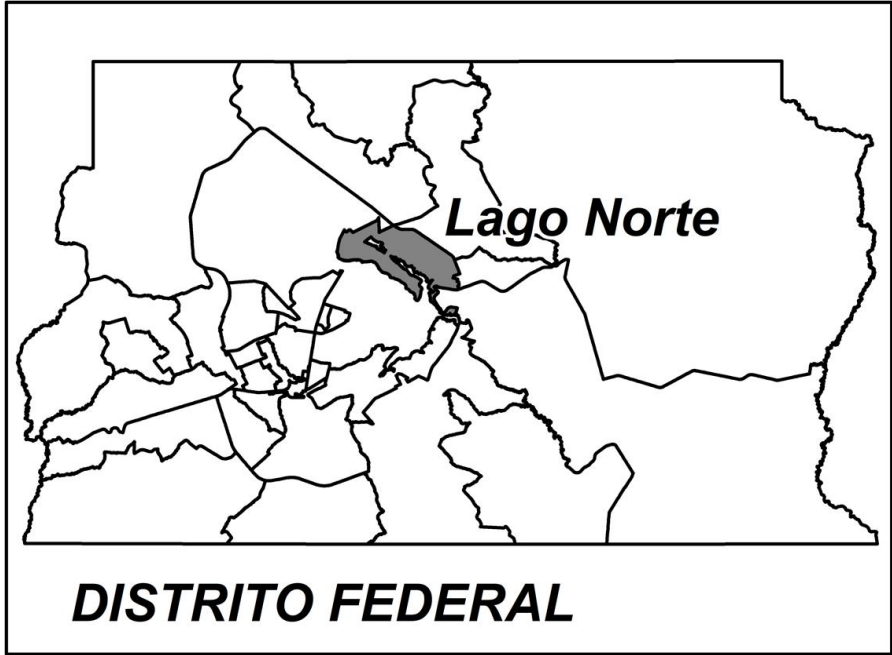
Médio: 237.3

Baixo: 0.0

— Trecho rodoviário

□ Lago Norte

□ Projeto Taquari 2



Obrigado!



bernardi@unb.br

