Supplementary Materials

1. Trend analysis test results

1.1 Tocantins- Araguaia Watershed

Table S1. Tocantins-Araguaia Watershed parameters trend tests results. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confidence A confidence interval of 95% was considered

Tocantins-Araguaia Watershed parameters	Trend test	2000 - 2020	2000-2010	2010 - 2020
Reservoirs sum area	Mann-Kendall	tau = 0.58; p-value = 2.58E-04*	tau = 0.78, p-value = 1.08E-03*	tau = -0.09, p-value = 0.75
	WAKV test	-	-	test statistic = 0.20, moving window = 5, p-value = 0.84
Precipitation	Mann-Kendall	tau = -0.30, p-value = 0.06	tau = 0.05, p-value =0.88	tau = -0.31, p-value =0.21
	WAKV test	test statistic = 0.80, moving window = 5, p-value = 0.34	test statistic = -0.39, moving window = 5, p-value = 0.64	test statistic = 0.02, moving window = 5, p-value = 0.99
Urban area	Mann-Kendall	tau = 1, p-value =< 2.22E-16*	tau = 1, p-value =2.62E-05*	tau = 1, p-value =2.62E-05*
	WAKV test	-	-	-
Natural area	Mann-Kendall	tau = -1, p-value = 2.77E-10*	tau = -1, p-value = 2.62E-05*	tau = -1, p-value = 2.62E-05*
	WAKV test	-	-	-
Agriculture area	Mann-Kendall	tau = 0.99, p-value =< 2.22E-16*	tau = 0.96, p-value = 5.16E-05*	tau = 1, p-value = 2.62E-05*
	WAKV test	-	-	-
Pasture area	Mann-Kendall	tau = 0.71, p-value = 6.80E-06*	tau = 1, p-value =2.6226E-05*	tau = 0.09, p-value =0.76*
	WAKV test	-	-	-
Upstream reservoir discharge	Mann-Kendall	tau = -0.29, p-value =0.07	tau = -0.09, p-value = 0.75	tau = -0.34, p-value = 0.008*
	WAKV test	test statistic = 2.91, moving window = 5, p-value = 0.31	test statistic = -0.19, moving window = 5, p-value = 0.89	-
Downstream reservoir discharge	Mann-Kendall	tau = -0.35, p-value = 0.03*	tau = -0.16, p-value = 0.53	tau = -0.35, p-value = 0.16
	WAKV test	-	test statistic = -0.54, moving window = 5, p-value = 0.01*	test statistic = 1.00, moving window = 5, p-value = 0.03*
Liquid Evaporation	Mann-Kendall	tau = -0.32, p-value = 0.04*	tau = -0.24, p-value = 0.35	tau = -0.2, p-value = 0.44
	WAKV test	-	test statistic = -0.54, moving window = 5, p-value = 1	test statistic = -0.58, moving window = 5, p-value = 0.33

* Significant trend.

1.2 Reservoir Cascade System

Table S2. Reservoir parameters trend tests results for Serra da Mesa, Cana Brava, and São Salvador reservoirs from the initial monitored year of each to 2020. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confidence A confidence interval of 95% was considered

Reservoirs parameters	Trend test	Serra da Mesa (2000 - 2020)	Cana Brava (2003 - 2020)	São Salvador (2009 - 2020)
Reservoir area	Mann-Kendall	tau = -0.19, p-value =0.24	tau = -0.37, p-value = 0.03*	tau = -0.58, p-value = 0.01*
	WAKV test	test statistic = 21.05, moving window = 5, p-value = 0.07	-	-
Reservoir discharge	Mann-Kendall	tau = -0.29, p-value =0.08	tau = -0.26, p-value =0.15	tau = -0.52, p-value = 0.02*
	WAKV test	test statistic = 2.91, moving window = 5, p-value = 0.30	test statistic = 5.33, moving window = 5, p-value = 0.13	-
Liquid Evaporation	Mann-Kendall	tau = -0.39, p-value =0.01*	tau = -0.03, p-value = 0.91	tau = -0.05, p-value = 0.89
	WAKV test	-	test statistic = -1.00, moving window = 5, p-value = 0.12	test statistic = -0.76, moving window = 5, p-value = 0.34
Precipitation	Mann-Kendall	tau = -0.12, p-value =0.47	tau = -0.16, p-value = 0.36	tau = -0.27, p-value = 0.24
	WAKV test	test statistic = 0.24, moving window = 5, p-value = 0.83	test statistic = -0.23, moving window = 5, p-value = 0.84	test statistic = -0.11, moving window = 5, p-value = 0.94
Urban area	Mann-Kendall	tau = 1, p-value =< 2.22E-16*	tau = 0.95, p-value =< 2.22E-16*	tau = 0.94, p-value = 2.87E-05*
	WAKV test	-	-	-
Natural area	Mann-Kendall	tau = -0.95, p-value =1.87E-09*	tau = -0.61, p-value = 4.93E-04*	tau = -0.91, p-value = 5.22E-05*
	WAKV test	-	-	-
Agriculture area	Mann-Kendall	tau = 0.99, p-value =< 2.22E-16*	tau = 0.09, p-value =0.65	tau = 0.97, p-value = 1.56E-05*
	WAKV test	-	test statistic = 13.11, moving window = 5, p-value = 0.01*	-
Pasture area	Mann-Kendall	tau = -0.91, p-value =8.04E-09*	tau = 0.40, p-value = 0.02*	tau = -0.52, p-value =0.02*
	WAKV test	-	-	-

* Significant trend.

Table S3. Reservoir parameters trend tests for Peixe Angical, Luís Eduardo Magalhães/Lajeado, Estreito, and Tucuruí reservoirs from the initial monitored year of each to 2020. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confidence A confidence interval of 95% was considered. For the Estreito reservoir, only Mann-Kendall tests were made due to the small sample size

Reservoirs parameters	Trend test	Peixe Angical (2006-2020)	Luís Eduardo Magalhães/Lajeado (2002-2020)	Estreito (2012 – 2020)	Tucuruí (2000 - 2020)
Reservoir area	Mann-Kendall	tau = -0.49, p-value =0.01*	tau = -0.47, p-value = 5.13E-03*	tau = -0.61, p-value = 0.03*	tau = 0.25, p-value = 0.12
	WAKV test	-	-	-	test statistic = -0.10, moving window = 5, p-value = 0.94
Reservoir discharge	Mann-Kendall	tau = -0.37, p-value = 0.06	tau = -0.44, p-value = 0.01*	tau = -0.39, p-value = 0.17	tau = -0.35, p-value = 0.03*
	WAKV test	test statistic = -1.05, moving window = 11, p-value = 0.045*	-	-	-
Liquid Evaporation	Mann-Kendall	tau = -0.25, p-value = 0.22	tau = -0.41, p-value = 0.02*	tau = 0.14, p-value = 0.67	tau = 0.20, p-value = 0.22
	WAKV test	test statistic = -0.91, moving window = 5, p-value = 0.13	-	-	test statistic = -0.56, moving window = 5, p-value = 0.57
Precipitation	Mann-Kendall	tau = -0.2, p-value =0.32	tau = -0.19, p-value = 0.26	tau = 0.22, p-value = 0.46	tau = -0.19, p-value = 0.25
	WAKV test	test statistic = 0.04, moving window = 5, p-value = 0.98	test statistic = 0.53, moving window = 5, p-value = 0.61	-	test statistic = -0.81, moving window = 5, p-value = 0.35
Urban area	Mann-Kendall	tau = 1, p-value = 2.38E-07*	tau = 1, p-value =< 2.22E-16*	tau = 1, p-value = 2.63E-04*	tau = 1, p-value =< 2.22E-16*
	WAKV test	-	-	-	-
Natural area	Mann-Kendall	tau = -0.94, p-value = 1.24E-06*	tau = -1, p-value = 2.72E-09*	tau = -1, p-value = 2.63E-04*	tau = -0.96, p-value = 1.28E-09*
	WAKV test	-	-	-	-
Agriculture area	Mann-Kendall	tau = 0.54, p-value = 5.58E-03*	tau = 0.89, p-value = 1.19E-07*	tau = 0.56, p-value =0.047*	tau = 0.64, p-value = 5.91E-05*
	WAKV test	-	-	-	-
Pasture area	Mann-Kendall	tau = 0.51, p-value = 0.01*	tau = -0.06, p-value = 0.73	tau = 0.94, p-value = 5.81E-04*	tau = 0.95, p-value =< 2.22E-16*
	WAKV test	-	test statistic = 13.39, moving window = 5, p-value < 2.2E-16*	-	-

* Significant trend.

Table S4. Reservoir parameters trend tests results from 2000 to 2010 for the only two reservoirs that were flooded during this entire period, Serra da Mesa and Tucuruí reservoirs. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confidence A confidence interval of 95% was considered.

Reservoirs parameters	Trend test	Serra da Mesa (2000-2010)	Tucuruí (2000-2010)
Reservoir area	Mann-Kendall	tau = 0.53, p-value =0.03*	tau = 0.81, p-value = 0.81
	WAKV test	-	test statistic = -0.27, moving window = 8, p-value = < 2.2e-16*
Reservoir discharge	Mann-Kendall	tau = -0.09, p-value = 0.75	tau = -0.16, p-value = 0.53
	WAKV test	test statistic = -0.18, moving window = 5, p-value = 0.86	test statistic = -0.54, moving window = 5, p-value = 0.009*
Liquid Evaporation	Mann-Kendall	tau = -0.05, p-value = 0.88	tau = 0.16, p-value = 0.53
	WAKV test	test statistic = -0.73, moving window = 5, p-value = 0.17	test statistic = -0.70, moving window = 5, p-value = 0.95
Precipitation	Mann-Kendall	tau = 0.31, p-value = 0.21	tau = 0.02, p-value = 1
	WAKV test	test statistic = -0.46, moving window = 5, p-value = 0.58	test statistic = -0.37, moving window = 5, p-value = 0.71
Urban area	Mann-Kendall	tau = 1, p-value = 2.62E-05*	tau = 1, p-value = 2.62E-05*
	WAKV test	-	-
Natural area	Mann-Kendall	tau = -0.85, p-value = 3.42E-04*	tau = -1, p-value = 2.62E-05*
	WAKV test	-	-
Agriculture area	Mann-Kendall	tau = 0.96, p-value = 5.16E-05*	tau = 0.75, p-value = 0.002*
	WAKV test	-	-
Pasture area	Mann-Kendall	tau = 0.78, p-value = 0.001*	tau = 1, p-value = 2.62E-05*
	WAKV test	-	-

* Significant trend.

Table S5. Reservoir parameters trend tests results for Serra da Mesa, Cana Brava, and São Salvador reservoirs from 2010 to 2020. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confidence A confidence interval of 95% was considered

Reservoirs parameters	Trend test	Serra da Mesa (2010 - 2020)	Cana Brava (2010 - 2020)	São Salvador (2010 - 2020)
Reservoir area	Mann-Kendall	tau = -0.6, p-value =0.01*	tau = -0.53, p-value = 0.03*	tau = -0.89, p-value = 1.86E-04*
	WAKV test	-	-	-
Reservoir discharge	Mann-Kendall	tau = -0.64, p-value = 0.008*	tau = 0.71, p-value = 0.003*	tau = -0.71, p-value = 0.003*
	WAKV test	-	-	-
Liquid Evaporation	Mann-Kendall	tau = -0.67, p-value = 0.005*	tau = 0.16, p-value = 0.53	tau = -0.22, p-value = 0.39
	WAKV test	-	test statistic = -0.58, moving window = 5, p-value = 0.37	test statistic = -0.76, moving window = 5, p-value = 0.13
Precipitation	Mann-Kendall	tau = -0.31, p-value = 0.21	tau = 0.05, p-value = 0.88	tau = -0.12, p-value = 0.64
	WAKV test	test statistic = 0.22, moving window = 5, p-value = 0.85	test statistic = -0.44, moving window = 5, p-value = 0.62	test statistic = -0.34, moving window = 5, p-value = 0.69
Urban area	Mann-Kendall	tau = 1, p-value =< 2.62E-16*	tau 0.89, p-value = 1.86E-04*	tau = 0.93, p-value = 9.92E-05*
	WAKV test	-	-	-
Natural area	Mann-Kendall	tau = -0.96, p-value = 5.16E-05*	tau = -0.89, p-value = 1.86E-04*	tau = -0.89, p-value = 1.86E-04*
	WAKV test	-	-	-
Agriculture area	Mann-Kendall	tau = 1, p-value =< 2.62E-05*	tau = 0.53, p-value =0.03*	tau = 1, p-value = 2.62E-05*
	WAKV test	-	-	-
Pasture area	Mann-Kendall	tau = -0.89, p-value = 1.86E-04*	tau = 0.31, p-value = 0.21	tau = -0.64, p-value = 0.008*
	WAKV test	-	test statistic = 2.65, moving window = 5, p-value < 2.2E-16*	-

* Significant trend.

Table S6. Reservoir parameters trend tests results in Peixe Angical, Luís Eduardo Magalhães/Lajeado, and Tucuruí from 2010 to 2020. When the Mann-Kendall test had significant results, the WAKV test was not performed. Confi-dence A confidence interval of 95% was considered. Estreito reservoir was not included since it was only built after the start of the considered period, and its information can be found in Table S3

Reservoirs parameters	Trend test	Peixe Angical (2010-2020)	Luís Eduardo Magalhães/Lajeado (2010-2020)	Tucuruí (2010 - 2020)
Reservoir area	Mann-Kendall	tau = -0.2, p-value = 0.44	tau = -0.42, p-value = 0.09	tau = 0.49, p-value = 0.04*
	WAKV test	test statistic = -0.86, moving window = 7, p-value = 0.02*	test statistic = -0.19, moving window = 9, p-value = < 2.2E-16*	-
Reservoir discharge	Mann-Kendall	tau = -0.6, p-value = 0.01*	tau = -0.53, p-value = 0.03*	tau = -0.35, p-value = 0.16
	WAKV test	-	-	test statistic = 1.59, moving window = 4, p-value = 0.02*
Liquid Evaporation	Mann-Kendall	tau = -0.15, p-value = 0.58	tau = -0.04, p-value = 0.94	tau = 0.13, p-value = 0.64
	WAKV test	test statistic = -0.96, moving window = 5, p-value = 0.07	test statistic = -0.57, moving window = 5, p-value = 0.48	test statistic = -0.31, moving window = 5, p-value = 0.73
Precipitation	Mann-Kendall	tau = -0.12, p-value = 0.64	tau = -0.27, p-value = 0.28	tau = 0.02, p-value = 1
	WAKV test	test statistic = -0.20, moving window = 5, p-value = 0.88	test statistic = -0.01, moving window = 5, p-value = 0.99	test statistic = 0.68, moving window = 5, p-value = 0.22
Urban area	Mann-Kendall	tau = 1, p-value = 2.62E-05*	tau = 1, p-value = 2.62E-16*	tau = 1, p-value = 2.62E-05*
	WAKV test	-	-	-
Natural area	Mann-Kendall	tau = -0.89, p-value = 1.86E-04*	tau = -1, p-value = 2.62E-09*	tau = -0.86, p-value = 3.42E-04*
	WAKV test	-	-	-
Agriculture area	Mann-Kendall	tau = 0.27, p-value = 0.28	tau = 1, p-value = 2.62*	tau = -0.16, p-value = 0.87
	WAKV test	test statistic = 1.04, moving window = 5, p-value = 0.49	-	test statistic = -1.64, moving window = 7, p-value = 0.02*
Pasture area	Mann-Kendall	tau = 0.35, p-value = 0.16	tau = -0.89, p-value = 1.86E-04*	tau = 0.8, p-value = 6.14E-04*
	WAKV test	test statistic = 4.67, moving window = 5, p-value =< 2.2E-16*	-	-

* Significant trend.

2. Correlation tables

2.1 Tocantins-Araguaia Watershed

Table S7. Correlation of Tocantins-Araguaia Watershed parameters to the sum of reservoirs area. When the distribution of the data was normal, the test applied was the Pearson normality test, and when they were not normal, the Spearman normality test was used. Confidence The confidence interval of 95% was considered.

Tocantins-Araguaia Watershed parameters		**2000 - 2020**	**2000-2010**	**2010 - 2020**
Number of reservoirs	correlation	0.77*	0.90*	-0.07
	p-value	4,08E-02*	1.0E-4*	0.83
	method	Spearman	Spearman	Spearman
Upstream reservoir discharge	correlation	-0.04	-0.23	0.46
	p-value	0.88	0.50	0.15
	method	Spearman	Spearman	Pearson
Downstream reservoir discharge	correlation	-0.19	-0.19	0.58
	p-value	0.42	0.58	0.06
	method	Spearman	Spearman	Pearson
Liquid Evaporation	correlation	-0.40	-0.46	-0.02
	p-value	0.07	0.15	0.96
	method	Spearman	Spearman	Pearson
Precipitation	correlation	-0.13	0.16	0.35
	p-value	0.56	0.63	0.30
	method	Spearman	Spearman	Pearson
Urban area	correlation	0.74*	0.93*	-0.32
	p-value	1.0E-4*	2.2E-16*	0.34
	method	Spearman	Spearman	Pearson
Natural area	correlation	-0.74*	-0.93*	0.31
	p-value	1.0E-4*	2.2E-16*	0.35
	method	Spearman	Spearman	Pearson
Agriculture area	correlation	0.74*	0.93*	-0.19
	p-value	1.0E-4*	2.2E-16*	0.58
	method	Spearman	Spearman	Pearson
Pasture area	correlation	0.60*	0.93*	-0.60*
	p-value	4.0E-3*	2.2E-16*	0,05*
	method	Spearman	Spearman	Pearson

* Significant correlation

2.2 Reservoir Cascade System

Table S8. Correlation of reservoir parameters to the reservoir area. When the distribution of the data was normal, the test applied was the Pearson normality test, and when they were not normal, the Spearman normality test was used. Confidence A confidence interval of 95% was considered..

Reservoir parameters		Serra da Mesa	Cana Brava	São Salvador	Peixe Angical	Luís Eduardo Magalhães/Lajeado	Estreito	Tucuruí
Reservoir discharge	correlation	0.59*	0.63*	0.91*	0.30	0.52*	0.27	-0.42
	p-value	4.99E-03*	0.01*	4.34E-05*	0.28	0.02*	0.49	0.06
	method	Pearson	Pearson	Pearson	Pearson	Spearman	Spearman	Pearson
Liquid Evaporation	correlation	0.52*	0.18	0.41	0.44	0.16	-0.01	0.09
	p-value	0.02*	0.48	0.19	0.10	0.51	0.98	0.68
	method	Pearson	Pearson	Pearson	Pearson	Spearman	Spearman	Pearson
Precipitation	correlation	0.41	0.14	-0.16	0.11	0.28	-0.63	-0.09
	p-value	0.07	0.59	0.62	0.70	0.25	0.08	0.70
	method	Pearson	Pearson	Pearson	Pearson	Spearman	Spearman	Pearson
Urban area	correlation	-0.39	-0.54*	-0.68*	-0.74*	-0.72*	-0.80*	0.42
	p-value	0.08	0.02*	0.02*	1.80E-03*	6.88E-04*	0.01*	0.06
	method	Pearson	Pearson	Pearson	Pearson	Spearman	Spearman	Pearson
Natural area	correlation	0.33	0.58*	0.54	0.68*	0.72*	0.80*	-0.38
	p-value	0.14	0.01*	0.07	4.85E-03*	6.88E-04*	0.01*	0.09
	method	Pearson	Pearson	Pearson	Pearson	Spearman	Spearman	Spearman
Agriculture area	correlation	-0.31	-0.14	-0.67*	-0.26	-0.70*	-0.83*	0.11
	p-value	0.17	0.57	0.02*	0.35	1.09E-03*	0.01*	0.64
	method	Pearson	Pearson	Pearson	Spearman	Spearman	Pearson	Spearman
Pasture area	correlation	0.22	-0.50*	0.76*	-0.75*	0.21	-0.78*	0.37
	p-value	0.34	0.04*	4.52E-03*	1.91E-03*	0.38	0.02*	0.10
	method	Pearson	Spearman	Pearson	Spearman	Spearman	Spearman	Spearman

* Significant correlation