

Supplementary Materials for **The changing hydrology of a dammed Amazon**

Kelsie Timpe and David Kaplan

Published 1 November 2017, *Sci. Adv.* **3**, e1700611 (2017)

DOI: 10.1126/sciadv.1700611

This PDF file includes:

- table S1. Hydroelectric dams analyzed with supporting information.
- table S2. Streamflow stations used for IHA analysis.
- table S3. Stations used in the LOR analysis.
- table S4. Stations used in the IHA analysis of individual dams, with supporting information.
- table S5. Stations used in the IHA analysis of multiple dams in the Amazon and Paraná basins.
- table S6. Stations used in the IHA analysis of multiple dams in the Tocantins basin.
- table S7. IHA results for streamflow stations in the individual dams analysis.
- table S8. IHA results for streamflow stations in the multiple dams analysis.

table S1. Hydroelectric dams analyzed with supporting information. NA signifies data not available.

Dam Name	River	Watershed	Lat. (deg.)	Lon. (deg.)	Elevation (masl)	Production (KW)	Reservoir Size (km ²)	Construction Start Year	Reservoir Fill Start Year	Operation Date	IHA Analysis Group
Antônio Brennand	Jauru	Paraná	-15.047	-58.752	421	21960	NA	NA	NA	9/13/02	Cumulative
Aquarius	Correntes	Amazon	-17.621	-54.89	253	4200	NA	NA	NA	9/19/06	Cumulative
Balbina	Uatumã	Amazon	-1.915	-59.473	32	249750	4438	1977	1987	2/20/89	Individual
Baruíto	Sangue	Amazon	-13.318	-57.597	338	18300	1	NA	NA	4/29/03	Cumulative
Cachoeira do Lavrinha	das Almas	Tocantins/ Araguaia	-15.516	-49.485	562	3010	NA	NA	NA	4/16/04	Individual
Cana Brava	Tocantins	Tocantins/ Araguaia	-13.399	-48.143	309	450000	140	1999	NA	5/22/02	Cumulative
Coaracy Nunes	Araguari	North Atlantic Basins	0.904	-51.259	47	76952	30	1967	1975	12/30/75	Individual
Dardanelos	Aripuanã	Amazon	-10.163	-59.464	189	261000	0	2007	NA	8/9/11	Cumulative
Estreito	Tocantins	Tocantins/ Araguaia	-6.587	-47.459	165	1087000	636	2007	2010	4/29/11	Cumulative
Faxinal I	Aripuanã	Amazon	-10.165	-59.447	189	2788	NA	NA	NA	3/13/97	Cumulative
Figueirópolis	Jauru	Paraná	-15.393	-58.638	198	19410	7	NA	NA	9/28/10	Cumulative
Garganta da Jararaca	Sangue	Amazon	-13.391	-57.624	396	29300	2	NA	NA	11/28/06	Cumulative
Graça Brennand	Juba	Paraná	-14.793	-57.967	251	27400	6	NA	NA	6/28/08	Cumulative
Guaporé	Guaporé	Amazon	-15.123	-58.964	482	124200	5	2001	2002	4/8/03	Individual
Indiavaí	Jauru	Paraná	-15.255	-58.716	244	28000	0	NA	NA	8/1/03	Cumulative
Itiquira (Casas de Forças I e II)	Itiquira	Paraná	-17.09	-54.83	416	156000	4	1998	2002	11/6/02	Both
Jauru	Jauru	Paraná	-15.235	-58.727	369	121500	5	2000	2002	6/6/03	Cumulative
Juba I	Juba	Paraná	-14.748	-58.074	360	42000	1	1992	1995	11/10/95	Cumulative
Juba II	Juba	Paraná	-14.756	-58.023	288	42000	3	1993	1995	8/16/95	Cumulative
Lajeado (Luís Eduardo Magalhães)	Tocantins	Tocantins/ Araguaia	-9.757	-48.371	189	902500	630	1998	2001	12/1/01	Both
Manso	Manso	Paraná	-14.874	-55.785	268	210900	402	1988	2000	11/29/00	Individual
Ombreiras	Jauru	Paraná	-15.1	-58.733	402	26000	3	NA	NA	7/23/05	Cumulative
Pampeana	Juba	Paraná	-14.83	-57.912	213	27990	4	NA	NA	5/14/09	Cumulative
Peixe Angical	Tocantins	Tocantins/ Araguaia	-12.239	-48.382	244	498750	318	2002	2006	6/27/06	Cumulative

Ponte de Pedra	Correntes	Paraná	-17.61	-54.827	396	176100	16	2001	2004	7/19/05	Cumulative
Rio Branco	Branco	Amazon	-11.906	-62.181	209	7140	NA	NA	NA	12/31/04	Individual
Salto	Jauru	Paraná	-15.288	-58.711	219	19000	1	NA	NA	12/29/07	Cumulative
Santa Gabriela	Correntes	Paraná	-17.538	-54.433	466	24000	1	NA	NA	9/18/09	Cumulative
Santa Lúcia II	Juruena	Amazon	-13.552	-59.037	475	7600	NA	NA	NA	4/14/03	Individual
São Domingos	São Domingos	Tocantins/ Araguaia	-13.407	-46.344	640	14336	NA	NA	NA	1/1/91	Individual
São Salvador	Tocantins	Tocantins/ Araguaia	-12.81	-48.239	264	243200	100	2006	2008	8/6/09	Cumulative
Serra da Mesa	Tocantins	Tocantins/ Araguaia	-13.835	-48.301	451	1275000	1254	1986	1996	4/30/98	Both
Tucuruí	Tocantins	Tocantins/ Araguaia	-3.832	-49.652	55	8535000	3513	1975	1984	12/30/84	Both

table S2. Streamflow stations used for IHA analysis.

Station Name	River	Watershed	Lat. (deg.)	Lon. (deg.)	Mean Flow (m ³ /s)	Region	Data Span	Data Gaps (if any)
Água Suja	Jauru	Paraná	-15.5	-58.6	93	Southwest Cerrado	1980-2015	1988-1993
AHE São Félix - Mira B/S. Félix	Tocantins	Tocantins/ Araguaia	-13.53	-48.14	793	Central Cerrado	1975-2006	1996
Araguatins	Araguaia	Tocantins/ Araguaia	-5.63	-48.13	6399	Northern Cerrado	1975-2015	none
Cáceres (DNPVN)	Paraguai	Paraná	-16.1	-57.7	587	Pantanal	1966-2015	none
Cachoeira Do Cachimbo	Branco	Amazon	-11.93	-62.15	37	Southwestern Lowlands	1993-2014	1996, 2011
Cachoeira Morena	Uatuma	Amazon	-2.11	-59.34	688	Northern Lowlands	1973-2011	1987-1990,20 08, 2009
Carolina	Tocantins	Tocantins/ Araguaia	-7.34	-47.47	3799	Central Cerrado	1962-2011	none
Ceres	das Almas	Tocantins/ Araguaia	-15.28	-49.55	166	South Central Cerrado	1965-2015	1990
Descarreto	Tocantins	Tocantins/ Araguaia	-5.79	-47.47	4495	Northern Cerrado	1955-2015	1956-1958, 1964
Estrada BR-163	Correntes	Paraná	-17.6	-54.8	62	Southwest Cerrado	1970-2015	1981-1984, 1987- 1994
Fazenda Angical	Tocantins	Tocantins/ Araguaia	-12.25	-48.35	1668	Central Cerrado	1975-2005	none
Fazenda Lobeira	Manuel Alves	Tocantins/ Araguaia	-11.53	-48.29	187	Central Cerrado	1970-2015	1988, 2006, 2007
Fazenda Raizama (Coimbra) - F6	Manso	Paraná	-14.9	-55.9	186	Southwest Cerrado	1982-2015	1990-1993, 1999, 2000, 2005-2007
Fazenda Tombador	do Sangue	Amazon	-11.72	-58.05	521	Southern Highlands	1985-2014	1997, 1998, 2007
Fazenda Tucunaré	Juruena	Amazon	-13.46	-59	143	Southern Highlands	1995-2014	none
Fazenda Veneza	São Domingos	Tocantins/ Araguaia	-13.5	-46.78	44	Central Cerrado	1976-2014	1989-1991, 2006, 2007
Humboldt	Aripuanã	Amazon	-10.17	-59.47	339	Southern Highlands	1983-2014	1989-1991, 1993, 1994
Itiquira	Itiquira	Paraná	-17.2	-54.2	63	Southwest Cerrado	1971-2015	none
Itupiranga	Tocantins	Tocantins/ Araguaia	-5.13	-49.32	10877	Northern Cerrado	1970-2015	none
Jacinto	Santa Tereza	Tocantins/ Araguaia	-11.98	-48.66	159	Central Cerrado	1972-2015	1986-1994, 2006, 2007
Jaraguá	Das Almas	Tocantins/ Araguaia	-15.72	-49.33	33	Central Cerrado	1965-2015	1995, 1996, 2013
Leônidas (Bambu)	Araguari	North Atlantic Basins	0.79	-51.61	505	East Lowlands	1952-2014	1957-1972
Marabá	Tocantins	Tocantins/ Araguaia	-5.34	-49.12	10695	Northern Cerrado	1972-2015	2006, 2007
Mato Grosso	Guaporé	Amazon	-15.01	-59.96	131	Southern Highlands	1977-2014	1992, 2002

Miracema do Tocantins	Tocantins	Tocantins/ Araguaia	-9.57	-48.38	2300	Central Cerrado	1970-2015	none
Peixe	Tocantins	Tocantins/ Araguaia	-12.02	-48.53	1681	Central Cerrado	1971-2015	2006, 2007
Pontes e Lacerda	Guaporé	Amazon	-15.22	-59.35	57	Southern Highlands	1971-2014	1987, 1991, 1992
Porto Esperidião	Jauru	Paraná	-15.9	-58.5	108	Southwest Cerrado	1966-2015	1991, 1992
Porto Nacional	Tocantins	Tocantins/ Araguaia	-10.7	-48.42	2172	Central Cerrado	1931-2007	1935, 1937-1948, 1995, 1996
Porto Platon	Araguari	North Atlantic Basins	0.71	-51.44	959	East Lowlands	1952-2014	1957-1972
Rosário Oeste	Cuiabá	Paraná	-14.8	-56.4	302	Southwest Cerrado	1966-2013	1992-1994, 2008-2010
São Jerônimo	Piquiri	Paraná	-17.2	-56	255	Southwest Cerrado	1968-2015	1987- 1992
São José do Piquiri	Piquiri	Paraná	-17.3	-56.4	296	Pantanal	1969-2014	1987- 1992
São José do Sepotuba	Sepotuba	Paraná	-15.1	-57.7	239	Southwest Cerrado	1970-2015	1988-1993
Serra do Navio	Amapari	North Atlantic Basins	0.9	-52	352	East Lowlands	1952-2015	1957-1972
Tocantinópolis	Tocantins	Tocantins/ Araguaia	-6.29	-47.39	4079	Northern Cerrado	1955-2015	1956-1958, 1964
Tucuruí	Tocantins	Tocantins/ Araguaia	-3.76	-49.65	10752	East Lowlands	1970-2015	none
Tupiratins	Tocantins	Tocantins/ Araguaia	-8.39	-48.11	3335	Northern Cerrado	1970-2015	none
UHE Peixe Angical Fazenda Barreiro	Tocantins	Tocantins/ Araguaia	-12.79	-48.24	922	Central Cerrado	1975-2006	none
Xambioá	Araguaia	Tocantins/ Araguaia	-6.41	-48.54	5747	Northern Cerrado	1970-2015	none

table S3. Stations used in the LOR analysis. LOR results are presented as the number of years of flow data required to be within 5 or 10% of the long-term annual maximum flow mean with varying levels of confidence from 80 to 95%. For example, 5/95 refers to the number of years of data required to be within 5% of the long-term mean with 95% confidence.

Station Name	River	Lat. (deg.)	Lon. (deg.)	Mean Flow (m ³ /s)	Region	Record Length (yrs)	5/95	5/90	5/85	5/80	10/95	10/90	10/85	10/80
Acanaui	Rio Caquetá/ Japurá	-1.82	-66.6	14002	Northwestern Lowlands	33	8	6	4	4	2	1	1	1
Altamira	Rio Xingu	-3.21	-52.21	8006	East Lowlands	35	22	20	17	15	10	8	7	5
Aruanã	Rio Araguaia	-14.91	-51.08	1146	South Central Cerrado	41	33	30	27	25	18	15	12	10
Bandeirantes	Rio Araguaia	-13.69	-50.8	1429	Central Cerrado	32	22	19	17	15	11	9	7	6
Barão de Melgaço	Rio Cuiabá	-16.2	-56	383	Pantanal	39	22	19	17	15	10	8	7	5
Barra do Bugres	Rio Paraguai	-15.1	-57.2	156	Southwest Cerrado	45	37	34	32	29	23	19	16	14
Boca do Guariba	Rio Aripuanã	-7.71	-60.59	1440	West Central Lowlands	28	13	11	9	8	4	3	2	2
Canutama	Rio Purus	-6.54	-64.39	6418	West Central Lowlands	36	2	1	1	1	1	1	1	1
Conceição do Araguaia	Rio Araguaia	-8.27	-49.26	5054	Northern Cerrado	42	35	32	29	27	20	16	14	12
Curicuriari	Rio Negro	-0.2	-66.8	12536	Northern Lowlands	29	10	8	6	5	3	2	1	1
Estirão da Angelica	Rio Mapuera (Rio Urucurina)	-1.1	-57.06	679	Northern Lowlands	23	21	21	20	19	16	15	13	12
Estirão do Repouso	Rio Javari	-4.34	-70.91	2548	Northwestern Lowlands	29	8	6	5	4	3	2	1	1
Fazenda Rio Branco	Rio Branco	-9.89	-62.98	26	Southwestern Lowlands	26	21	19	17	16	12	10	8	7
Guajará-Mirim	Rio Mamoré	-10.79	-65.35	7997	Southwestern Lowlands	34	20	17	14	13	8	6	5	4
Itapéua	Rio Solimões/ Amazonas	-4.06	-63.03	86516	Central Lowlands	37	7	5	4	3	2	1	1	1
Ivolândia	Rio Claro	-16.51	-51	35	South Central Cerrado	36	36	36	34	33	31	28	26	24
Jatuarana	Rio Solimões/ Amazonas	-3.06	-59.65	123816	Central Lowlands	30	11	9	7	6	4	3	2	2
Lábrea	Rio Purus	-7.26	-64.8	5689	West Central Lowlands	41	3	2	1	1	1	1	1	1
Lavandeira	Rio Mosquito	-12.79	-46.51	37	Central Cerrado	29	29	28	27	26	25	23	21	20
Luiz Alves	Rio Araguaia	-13.21	-50.59	1660	Central Cerrado	33	14	11	10	8	5	4	3	2

Manacapuru	Rio Solimões/ Amazonas	-3.31	-60.61	101221	Central Lowlands	35	7	5	4	3	2	1	1	1
Manicoré	Rio Madeira	-5.82	-61.3	24860	West Central Lowlands	39	14	12	9	8	5	3	3	2
Mineração Ponte Massangana Óbidos	Rio Massangana	-9.76	-63.29	25	Southwestern Lowlands	24	18	17	15	14	10	9	7	6
Pedras Negras	Rio Solimões/ Amazonas	-1.92	-55.51	172653	East Lowlands	39	10	7	6	5	3	2	1	1
	Rio Guaporé	-12.85	-62.9	864	Southwestern Lowlands	24	12	10	8	7	4	3	2	2
Porto Dos Gaúchos	Rio Arinos	-11.54	-57.42	733	Southern Highlands	33	18	15	13	11	6	5	4	3
Porto Roncador	Rio Teles Pires (Rio São Manuel)	-13.56	-55.33	272	Southern Highlands	34	28	25	23	21	16	13	11	9
Santo Antônio do Leverger	Rio Das Mortes	-12.29	-50.96	891	Central Cerrado	42	30	27	24	22	16	12	10	9
São Félix do Araguaia	Rio Araguaia	-11.62	-50.66	2748	Central Cerrado	33	23	20	18	17	12	10	8	6
São Francisco	Rio Jari	-0.57	-52.57	1055	East Lowlands	37	27	24	22	20	14	11	9	8
São Paulo de Oliveira	Rio Solimões/ Amazonas	-3.44	-68.76	45953	Northwestern Lowlands	36	7	6	4	3	2	1	1	1
Seringal da Caridade	Rio Purus	-9.04	-68.58	1352	Southwestern Lowlands	39	20	16	14	12	7	5	4	3
Seringal Fortaleza	Rio Purus	-7.72	-66.99	3861	West Central Lowlands	41	9	7	5	4	2	2	1	1
Serrinha	Rio Negro	-0.48	-64.83	17305	Northern Lowlands	29	11	9	7	6	4	3	2	2

table S4. Stations used in the IHA analysis of individual dams, with supporting information.

Dam Name	Station Name	Distance from dam (km)	Location	Years Pre-Impact	Years Post-Impact	Corresponding LOR Station	Significance Level based on LOR
Balbina	Cachoeira Morena	33	downstream	14 (1973-1987)	18 (1991-2011)	Estirão da Angelica	85% CI within 10% of mean
Cachoeira do Lavrinha	Ceres	57	downstream	37 (1965-2003)	11 (2004-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Cachoeira do Lavrinha	Jaraguá	54	upstream	36 (1965-2003)	10 (2004-2015)	Ivolândia	Below 80% CI within 10% of mean
Coaracy Nunes	Leônidas (Bambu)	112	upstream	7 (1952-1975)	38 (1976-2014)	Estirão da Angelica	Below 80% CI within 10% of mean
Coaracy Nunes	Porto Platon	34	upstream	7 (1952-1975)	38 (1976-2014)	São Francisco	80% CI within 10% of mean
Coaracy Nunes	Serra do Navio	155	upstream	7 (1952-1975)	39 (1976-2015)	Estirão da Angelica	Below 80% CI within 10% of mean
Guaporé	Mato Grosso	210	downstream	24 (1977-2002)	11 (2003-2014)	Barra do Bugres	Below 80% CI within 10% of mean
Guaporé	Pontes e Lacerda	92	downstream	27 (1972-2002)	11 (2003-2014)	Barra do Bugres	Below 80% CI within 10% of mean
Itiquira	Itiquira	144	upstream	30 (1972-2002)	12 (2003-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Lajeado	Fazenda Lobeira	225	upstream	30 (1970-2001)	11 (2002-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Lajeado	Jacinto	300	upstream	20 (1972-2001)	11 (2002-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Manso	Fazenda Raizama (Coimbra) - F6	7	downstream	13 (1982-1999)	11 (2001-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Manso	Rosário Oeste	128	downstream	31 (1966-2000)	9 (2001-2013)	Barão de Melgaço	90% CI within 10% of mean
Rio Branco	Cachoeira do Cachimbo	5	upstream	10 (1993-2004)	8 (2005-2014)	Mineração Ponte Massangana	85% CI within 10% of mean
Santa Lúcia II	Fazenda Tucunaré	20	downstream	7 (1995-2002)	11 (2003-2014)	Porto Roncador	Below 80% CI within 10% of mean
São Domingos	Fazenda Veneza	75	downstream	13 (1976-1989)	20 (1992-2014)	Lavandeira	Below 80% CI within 10% of mean
Serra da Mesa	AHE São Félix - Mira B / S. Félix	60	downstream	21 (1975-1996)	9 (1997-2006)	Santo Antônio do Leverger	80% CI within 10% of mean
Serra da Mesa	Fazenda Angical	255	downstream	21 (1975-1996)	8 (1997-2005)	Luiz Alves	95% CI within 10% of mean

Serra da Mesa	Peixe	290	downstream	25 (1971-1996)	16 (1997-2015)	Luiz Alves	95% CI within 10% of mean
Serra da Mesa	UHE Peixe Angical Fazenda Barreiro	155	downstream	21 (1975-1996)	9 (1997-2006)	Luiz Alves	95% CI within 10% of mean
Tucuruí	Araguatins	460	upstream	9 (1975-1984)	30 (1985-2015)	Altamira	90% CI within 10% of mean
Tucuruí	Descarreto	430	upstream	25 (1955-1984)	11 (1985-1996)	Conceição do Araguaia	80% CI within 10% of mean
Tucuruí	Itupiranga	150	upstream	14 (1970-1984)	11 (1985-1996)	Altamira	95% CI within 10% of mean
Tucuruí	Marabá	190	upstream	12 (1972-1984)	11 (1985-1996)	Altamira	95% CI within 10% of mean
Tucuruí	Tocantinópolis	490	upstream	25 (1955-1984)	11 (1985-1996)	Conceição do Araguaia	80% CI within 10% of mean
Tucuruí	Tucuruí	9	downstream	14 (1970-1984)	11 (1985-1996)	Altamira	95% CI within 10% of mean
Tucuruí	Xambioá	600	upstream	14 (1970-1984)	30 (1985-2015)	Conceição do Araguaia	85% CI within 10% of mean

table S5. Stations used in the IHA analysis of multiple dams in the Amazon and Paraná basins.

Dams	River	Station Name	IHA Run # (Match with # in Table S9)	Years Pre-Impact	Years Post-Impact	Corresponding LOR Station	Significance Level based on LOR
Amazon Basin							
Dardanelos, Faxinal I	Aripuanã	Humboldt	1	8 (1983-1996)	17 (1997-2014)	Porto Roncador	80% CI within 10% of mean
Baurito, Garganta da Jararaca	Sangue	Fazenda Tombador	2	15 (1985-2002)	10 (2003-2014)	Porto dos Gaúchos	90% CI within 10% of mean
	Sangue	Fazenda Tombador	3	15 (1985-2002)	6 (2008-2014)	Porto dos Gaúchos	90% CI within 10% of mean
Paraná Basin							
Ponte de Pedra, Aquarus, Santa Gabriela	Correntes	Estrada BR-163	4	23 (1970-2005)	9 (2006-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Antônio Brennand, Jauru, Indiavaí, Ombreiras, Salto, Figueirópolis	Jauru	Água Suja	5	17 (1980-2002)	12 (2003-2015)	Barra do Bugres	Below 80% CI within 10% of mean
	Jauru	Porto Esperidião	6	34 (1966-2002)	12 (2003-2015)	Barra do Bugres	Below 80% CI within 10% of mean
Itiquira, Ponte de Pedra, Aquarius, Santa Gabriela	Piquiri	São Jerônimo	7	28 (1986-2002)	12 (2003-2015)	Barão de Melgaço	90% CI within 10% of mean
	Piquiri	São Jerônimo	8	28 (1986-2002)	10 (2005-2015)	Barão de Melgaço	90% CI within 10% of mean
	Piquiri	São José do Piquiri	9	27 (1969-2002)	12 (2002-2014)	Barão de Melgaço	90% CI within 10% of mean
	Piquiri	São José do Piquiri	10	27 (1969-2002)	9 (2005-2014)	Barão de Melgaço	90% CI within 10% of mean
Juba I, Juba II, Graça Brennand, Pampeana	Sepotuba	Cáceres	11	29 (1966-1995)	19 (1996-2015)	Porto Roncador	95% CI within 10% of mean
	Sepotuba River	São José do Sepotuba	12	19 (1970-1995)	19 (1996-2015)	Barão de Melgaço	85% CI within 5% of mean

table S6. Stations used in the IHA analysis of multiple dams in the Tocantins basin.

Combination of Dams	Station Name	IHA Run # (Match with # in Table S9)	Years Pre-Impact	Years Post-Impact	Corresponding LOR Station	Significance Level based on LOR
1. Serra da Mesa, Cana Brava	Ahe São Félix - Mira B/S. Félix	13	21 (1975-1996)	9 (1997-2006)	Santo Antônio do Leverger	80% CI within 10% of mean
	Fazenda Angical	14	21 (1975-1996)	8 (1997-2005)	Luiz Alves	95% CI within 10% of mean
	Fazenda Angical	15	21 (1975-1996)	4 (2002-2006)	Luiz Alves	95% CI within 10% of mean
	Uhe Peixe Angical	16	21 (1975-1996)	9 (1997-2006)	Luiz Alves	95% CI within 10% of mean
	Fazenda Barreiro	17	21 (1975-1996)	4 (2002-2006)	Luiz Alves	95% CI within 10% of mean
	Uhe Peixe Angical					
	Fazenda Barreiro	18	25 (1971-1996)	9 (1997-2006)	Luiz Alves	95% CI within 10% of mean
	Peixe					
2. Serra da Mesa, Cana Brava, Lajeado	Porto Nacional	19	52 (1931-1995)	10 (1997-2007)	São Félix do Araguaia	90% CI within 10% of mean
3. Serra da Mesa, Cana Brava, Lajeado, Peixe Angical, São Salvador	Peixe	20	25 (1971-1996)	15 (1997-2014)	Luiz Alves	95% CI within 10% of mean
	Peixe	21	25 (1971-1996)	6 (2009-2015)	Luiz Alves	95% CI within 10% of mean
4. Serra da Mesa, Cana Brava, Lajeado, Peixe Angical, São Salvador, Estreito	Carolina	22	34 (1962-1996)	14 (1997-2011)	São Félix do Araguaia	90% CI within 10% of mean
	Carolina	23	34 (1962-1996)	9 (2002-2011)	São Félix do Araguaia	90% CI within 10% of mean
	Descarreto	24	37 (1955-1996)	18 (1997-2015)	São Félix do Araguaia	90% CI within 10% of mean
	Descarreto	25	37 (1955-1996)	13 (2002-2015)	São Félix do Araguaia	90% CI within 10% of mean
	Miracema Do Tocantins	26	26 (1970-1996)	18 (1997-2015)	São Félix do Araguaia	90% CI within 10% of mean
	Miracema Do Tocantins	27	26 (1970-1996)	13 (2002-2015)	São Félix do Araguaia	90% CI within 10% of mean
	Tocantinópolis	28	37 (1955-1996)	18 (1997-2015)	Conceição do Araguaia	95% CI within 10% of mean
	Tocantinópolis	29	37 (1955-1996)	13 (2002-2015)	Conceição do Araguaia	95% CI within 10% of mean

	Tupiratins	30	26 (1970-1996)	18 (1997-2015)	Conceição do Araguaia	95% CI within 10% of mean
	Tupiratins	31	26 (1970-1996)	13 (2002-2015)	Conceição do Araguaia	95% CI within 10% of mean
5. Tucuruí, Serra da Mesa, Cana Brava, Lajeado, Peixe Angical, São Salvador, Estreito	Descarreto	32	25 (1955-1984)	30 (1985-2015)	Altamira	95% CI within 10% of mean
	Descarreto	33	25 (1955-1984)	17 (1985-2002)	Altamira	95% CI within 10% of mean
	Descarreto	34	25 (1955-1984)	13 (2002-2015)	Altamira	95% CI within 10% of mean
	Itupiranga	35	14 (1970-1984)	30 (1985-2015)	Altamira	95% CI within 10% of mean
	Itupiranga	36	14 (1970-1984)	16 (1985-2001)	Altamira	95% CI within 10% of mean
	Itupiranga	37	14 (1970-1984)	13 (2002-2015)	Altamira	95% CI within 10% of mean
	Marabá	38	12 (1972-1984)	28 (1985-2015)	Altamira	95% CI within 10% of mean
	Marabá	39	12 (1972-1984)	16 (1985-2001)	Altamira	95% CI within 10% of mean
	Marabá	40	12 (1972-1984)	11 (2002-2015)	Altamira	95% CI within 10% of mean
	Tocantinópolis	41	25 (1955-1984)	30 (1985-2015)	Conceição do Araguaia	95% CI within 10% of mean
	Tocantinópolis	42	25 (1955-1984)	16 (1985-2001)	Conceição do Araguaia	95% CI within 10% of mean
	Tocantinópolis	43	25 (1955-1984)	13 (2002-2015)	Conceição do Araguaia	80% CI within 10% of mean
	Tucuruí	44	14 (1970-1984)	30 (1985-2015)	Conceição do Araguaia	95% CI within 10% of mean
	Tucuruí	45	14 (1970-1984)	16 (1985-2001)	Conceição do Araguaia	95% CI within 10% of mean
	Tucuruí	46	14 (1970-1984)	13 (2002-2015)	Conceição do Araguaia	80% CI within 10% of mean

table S7. IHA results for streamflow stations in the individual dams analysis.

Dam Name	Station Name	Overall HA	Group 1	Group 2	Group 3	Group 4	Group 5
Balbina	Cachoeira Morena	108	96	96	41	133	211
Cachoeira do Lavrinha	Ceres	17	12	17	1	36	19
Cachoeira do Lavrinha	Jaraguá	19	8	11	2	85	19
Coaracy Nunes	Leônidas (Bambu)	33	32	52	3	15	12
Coaracy Nunes	Porto Platon	17	18	21	2	22	10
Coaracy Nunes	Serra do Navio	17	12	22	4	24	22
Guaporé	Mato Grosso	40	79	7	49	24	25
Guaporé	Pontes e Lacerda	24	25	7	34	69	11
Itiquira	Itiquira	15	7	10	9	48	24
Lajeado	Fazenda Lobeira	30	24	26	6	80	20
Lajeado	Jacinto	40	38	48	8	60	14
Manso	Fazenda Raizama (Coimbra) - F6	62	46	59	52	131	49
Manso	Rosário Oeste	34	28	41	1	52	26
Rio Branco	Cachoeira do Cachimbo	17	24	13	7	14	13
Santa Lúcia II	Fazenda Tucunaré	16	10	8	4	55	30
São Domingos	Fazenda Veneza	27	13	20	13	78	50
Serra da Mesa	AHE São Félix - Mira B/S. Félix	48	55	42	16	50	67
Serra da Mesa	Fazenda Angical	37	28	30	7	72	75
Serra da Mesa	Peixe	48	31	35	12	129	82
Serra da Mesa	UHE Peixe Angical Fazenda Barreiro	45	49	41	16	47	55
Tucuruí	Araguatins	13	13	12	2	15	20
Tucuruí	Descarreto	9	8	10	1	10	16
Tucuruí	Itupiranga	25	31	24	9	30	13
Tucuruí	Marabá	10	10	11	4	5	14
Tucuruí	Tocantinópolis	10	8	10	1	21	6
Tucuruí	Tucuruí	39	16	44	3	84	76
Tucuruí	Xambioá	9	7	11	1	10	11

table S8. IHA results for streamflow stations in the multiple dams analysis.

IHA Run # (match with # in Tables S5 and S6)	Overall HA	Group 1	Group 2	Group 3	Group 4	Group 5
1	13	9	6	4	49	8
2	9	5	7	11	34	5
3	11	5	7	11	40	10
4	108	82	69	13	369	70
5	29	13	18	4	69	90
6	30	4	11	16	122	92
7	12	8	6	1	36	21
8	19	10	6	5	82	24
9	18	18	9	7	43	25
10	20	21	10	7	45	26
11	19	21	13	2	49	3
12	21	7	6	9	115	16
13	48	55	42	16	50	67
14	44	34	40	8	85	63
15	46	36	46	9	94	49
16	45	49	41	16	47	55
17	48	52	44	11	64	57
18	37	30	32	4	69	69
19	41	30	41	28	30	108
20	48	31	35	12	129	82
21	62	36	39	16	185	117
22	34	13	24	13	113	66
23	51	15	25	12	223	87
24	36	13	17	5	153	61
25	40	13	19	3	179	69
26	44	23	25	16	122	110
27	48	24	26	16	140	123
28	41	14	22	7	159	81
29	46	15	24	7	174	104
30	36	17	29	5	86	91
31	46	17	31	4	151	110
32	23	8	15	2	85	41
33	10	8	12	2	8	18
34	43	12	21	3	180	87
35	15	26	9	8	8	7
36	20	28	18	9	17	10
37	17	28	9	8	10	18
38	8	9	10	5	2	10
39	11	10	12	3	16	11
40	12	13	9	5	6	32

41	23	8	21	2	76	35
42	10	6	12	2	20	9
43	48	13	28	7	183	107
44	50	30	58	4	65	109
45	44	21	54	6	74	89
46	60	42	61	7	44	186
