

**SUPPORTING REPORT VI**

**POLLUTION STATUS OF THE LAKE AND  
ITS MAIN RIVERS**

Table S6.2.3 Field Observation Records on Rivers

Yuquvry River, Station Y7

Date	Transparency (cm)	Temp. (°C)	D.O. (mg/l)	D.O. (%)	pH	E.C. (µS/cm)	Color	Water Volume (m <sup>3</sup> /S)	Remarks
Feb. 24, '88	5	25.7	4.3	(54)	6.9	120	Greyish brown	-	Oil odor
Apr. 6	18	24.3	2.5	(31)	7.2	370	Brown	1.87	
Apr. 13	-	22.4	-		5.6	971	Reddish brown	36.45	Apr. 12 - Heavy rainfall
Apr. 19	-	22.0	6.6	(77)	6.8	220	"	14.06	
May 4	18	18.8	-		6.8	300	Brown	3.60	
May 19	12	20.0	3.5	(40)	7.2	353	"	4.41	
Jun. 14	30 <	16.8	4.6	(49)	6.8	400	Whitish brown	3.30	
Jun. 23	30 <	21.0	3.2	(37)	6.7	370	Brown	3.29	
Jul. 1	30 <	21.3	3.9	(45)	6.8	467	Greyish brown	2.94	
Jul. 9	30 <	13.5	6.1	(61)	6.7	359	Brown	2.36	
Aug. 18	-	-	1.3	(-)	6.5	350	"	-	
Sept. 26	27	22.6	2.8	(33)	7.0	292	"	1.55	
Oct. 24	8	24.1	1.9	(23)	6.5	280	Dark brown	1.53	
Dec. 10	13	26.1	4.2	(52)	6.6	348	Yellowish brown	1.27	
Jan. 11	19	27.3	4.7	(60)	6.8	306	Brown	1.40	
Feb. 14	16	26.9	4.3	(55)	7.1	298	Brown	1.55	
Mar. 2	13	26.6	5.0	(63)	7.2	324	Brown	1.48	

Table S6.2.4 Field Observation Records on Rivers  
Yagua Resa-u River, Station P11

Date	Transparency (cm)	Temp. (°C)	D.O. (mg/l)	(%)	pH	E.C. (µS/cm)	Color	Water Volume (m³/S)	Remarks
Feb. 24, '88	21	25.9	5.8	(73)	6.9	61	Brown	-	
Apr. 6	30 <	22.0	9.1	(107)	7.5	92	Brown	0.44	
Apr. 13	-	21.5	-	(-)	5.6	55	"	7.75	
Apr. 19	-	21.9	7.1	(83)	5.5	57	"	6.70	
May 4	29	19.1	-	(-)	6.8	51	Brown	3.70	
May 19	20	20.3	4.7	(54)	6.6	45	"	11.32	
Jun. 14	30 <	15.8	9.2	(76)	7.0	59	"	1.41	
Jul. 6	30 <	15.6	9.6	(99)	6.7	77	"	0.93	
Jul. 9	30 <	13.5	10.5	(104)	6.5	67	"	0.97	
Aug. 18	-	21.0	8.1	(93)	7.4	36	"	-	
Sept. 26	29	24.5	9.0	(110)	7.5	74	"	0.53	
Oct. 24	21	26.7	8.9	(113)	7.0	74	Light brown	0.23	
Dec. 10	18	27.5	7.4	(95)	6.9	72	Brown	0.19	
Jan. 11, '89	30	26.5	7.2	(91)	7.3	66	"	0.38	
Feb. 14	30 <	27.8	8.3	(107)	7.1	69	"	0.37	
Mar. 2	30 <	26.1	8.0	(100)	7.4	65	"	0.52	

Table S6.2.5 Field Observation Records on Rivers

Ypucu River, Station P12

Date	Transparency (cm)	Temp. (°C)	D.O. (mg/l)	D.O. (%)	pH	E.C. (µS/cm)	Color	Water Volume (m <sup>3</sup> /S)	Remarks
Feb. 24, '88	16	25.9	5.5	(69)	7.1	95	Brown	-	
Apr. 6	19	22.1	6.0	(70)	7.0	171	"	0.16	
Apr. 13	-	21.9	-	(-)	5.2	62	"	7.16	
Apr. 19	-	22.0	5.5	(65)	5.1	82	"	9.86	
May 4	19	17.8	-	(-)	6.3	99	"	0.36	
May 19	23	20.9	4.8	(55)	7.8	26	"	7.32	
Jun. 14	21	16.1	8.5	(89)	7.3	185	"	0.63	
Jul. 6	30 <	14.9	8.9	(91)	6.7	108	"	0.62	
Jul. 9	30 <	13.2	9.9	(98)	6.5	-	"	0.59	
Aug. 18	-	20.3	6.3	(72)	6.7	124	"	-	
Sept. 26	14	23.5	4.0	(48)	7.4	148	Whitish grey	0.33	
Oct. 24	11	24.9	4.9	(60)	6.4	98	Light brown	0.23	
Dec. 10	13	26.6	3.9	(49)	6.2	96	Brown	0.30	
Jan. 11, '89	12	25.1	4.2	(52)	6.7	82	"	0.35	
Feb. 14	22	26.6	5.4	(68)	7.1	69	"	0.20	
Mar. 2	25	25.8	5.4	(67)	7.3	108	Brown	0.19	

Yuquvry River, Station Y6 (Wooden Bridge)

Table S6.2.6 Analytical Results of Water Quality of Rivers

Item	Date	Jun. 23 '88	Jul. 1 '88	Jul. 9 '88	Sep. 26 '88	Oct. 24 '88	Dec. 10 '88	Jan. 11 '89	Feb. 14 '89	Mar. 2 '89
TP (µg/ℓ)		490	1,580	284	818	564	620	334	446	494
PF (µg/ℓ)		157	452	-	237	194	330	188	250	46
DOP (µg/ℓ)		84	147	-	59	59	136	83	45	52
PO <sub>4</sub> P (µg/ℓ)		249	1,128	126	522	311	154	63	151	396
TN (µg/ℓ)		-	-	3,481	5,010	2,254	-	4,463	3,764	3,026
TNK (µg/ℓ)		-	-	2,469	4,810	1,904	-	3,900	2,908	2,681
PON (µg/ℓ)		-	-	1,424	1,785	-	-	850	549	371
DON (µg/ℓ)		-	-	377	79	-	-	1,310	1,479	1,613
NH <sub>4</sub> -N (µg/ℓ)		728	974	668	2,946	1,184	2,160	1,740	880	697
NO <sub>3</sub> -N (µg/ℓ)		591	493	1,012	200	350	112	563	856	345
TCOD (mg/ℓ)		35	23	-	12	57	28	40	19	50
DCOD (mg/ℓ)		22	12	-	11	30	20	25	16	17
BOD (mg/ℓ)		-	4.1	7.3	-	7.2	5.2	6.3	6.6	-
TR (mg/ℓ)		342	359	-	-	464	-	-	410	-
IL (mg/ℓ)		91	107	-	-	246	-	-	304	-
SS (mg/ℓ)		47.0	35.7	18.0	28.0	101.0	73.5	132.0	86.5	70.0
IL (mg/ℓ)		21.5	15.4	-	-	74.0	-	-	67.0	-
Cl <sup>-</sup> (mg/ℓ)		71	80	-	-	82	92	-	76	124
TFe (mg/ℓ)		-	-	-	-	4.1	-	-	-	-
Alkalinity (mg/ℓ)		-	59	-	27	47	47	-	116	84
Fecal coliform (No/100ml)		-	-	1,415	7,956	-	-	-	23,330	-

Table S6.2.7 (1) Analytical Results of Water Quality of Rivers

Yuquvay River, Station Y7 (Concrete Bridge) (1)

Item	Date	Feb. 24 '88	Mar. 15 '88	Apr. 6 '88	Apr. 13 '88	Apr. 19 '88	May 4 '88	May 19 '88	Jun. 1 '88	Jun. 14 '88	Jun. 23 '88	Jul. 1 '88	Jul. 9 '88	Aug. 17 '88	Aug. 18 '88
TP (µg/ℓ)		489	482	266	561	245	685	630	699	1,090	506	1,028	286	612	758
PP (µg/ℓ)		177	242	-	161	-	108	166	-	164	149	-	109	225	359
DOP (µg/ℓ)		61	60	-	80	-	207	158	-	115	167	-	53	94	80
PO <sub>4</sub> P (µg/ℓ)		251	180	255	320	196	370	306	-	819	190	-	124	293	319
TN (µg/ℓ)		-	-	2,359	2,403	2,018	2,367	-	-	2,520	-	-	2,146	3,088	3,152
TNK (µg/ℓ)		-	-	1,951	1,600	1,665	2,196	-	2,069	2,064	-	-	1,626	2,890	2,852
PON (µg/ℓ)		-	-	-	375	40	131	-	722	-	-	-	108	255	916
DON (µg/ℓ)		-	-	-	1,105	1,200	1,590	-	600	-	-	-	348	-	1,179
NH <sub>4</sub> -N (µg/ℓ)		626	246	828	120	425	475	291	747	1,665	1,350	1,306	1,170	-	757
NO <sub>3</sub> -N (µg/ℓ)		-	650	408	803	353	173	-	-	456	783	316	520	198	300
TCOD (mg/ℓ)		-	28	-	41	42	-	-	-	-	36	19	-	32	45
DCOD (mg/ℓ)		-	16	-	38	29	-	-	-	-	28	8	-	27	35
BOD (mg/ℓ)		-	-	-	-	-	-	-	-	7.5	-	5.1	7.2	6.9	6.6
TR (mg/ℓ)		-	-	-	-	-	-	-	-	-	281	309	-	-	288
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	77	137	-	-	91
SS (mg/ℓ)		176.3	68.0	73.0	-	268.0	41.3	99.0	-	-	40.6	30.5	26.0	26.0	34.7
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	16.3	16.5	-	14.0	13.4
Cl <sup>-</sup> (mg/ℓ)		-	6	53	10	70	56	54	50	3	62	60	-	68	19
TFe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		-	-	-	21	22	45	-	-	51	-	53	-	55	-
Fecal coliform (Nc/100ml)		-	-	-	-	-	-	-	-	-	-	-	1,976	-	-

Table S6.2.7 (2) Analytical Results of Water Quality of Rivers

Yucuyry River, Station Y7 (Concrete Bridge) (2)

Item	Date	Sep. 26 '88	Oct. 24 '88	Dec. 10 '88	Jan. 11 '89	Feb. 14 '89	Mar. 2 '89						
TP (µg/ℓ)		632	538	703	195	449	533						
PP (µg/ℓ)		102	173	314	13	295	280						
DOP (µg/ℓ)		71	65	186	118	55	56						
PO <sub>4</sub> P (µg/ℓ)		459	300	203	64	149	197						
TN (µg/ℓ)		4,706	2,262	-	5,578	2,216	3,460						
TNK (µg/ℓ)		4,553	1,982	-	5,255	1,625	3,180						
PON (µg/ℓ)		-	-	-	2,805	137	128						
DON (µg/ℓ)		-	-	-	485	463	2,175						
NH <sub>4</sub> -N (µg/ℓ)		3,366	1,173	2,276	1,965	1,205	877						
NO <sub>3</sub> -N (µg/ℓ)		153	280	157	323	591	280						
TCOD (mg/ℓ)		11	57	25	28	22	28						
DCOD (mg/ℓ)		9	31	11	20	19	17						
BOD (mg/ℓ)		-	7.9	4.4	8.7	7.3	-						
TR (mg/ℓ)		-	408	-	-	341	-						
IL (mg/ℓ)		-	222	-	-	240	-						
SS (mg/ℓ)		37.5	62.7	105.0	108.0	71.5	75.5						
IL (mg/ℓ)		-	36.3	-	-	56.5	-						
Cl <sup>-</sup> (mg/ℓ)		17	59	59	-	82	80						
TFe (mg/ℓ)		-	5.2	-	-	-	-						
Alkalinity (mg/ℓ)		43	48	52	-	79	84						
Fecal coliform. (No/100ml)		4,896	-	-	-	45,900	-						

Table S6.2.8 (1) Analytical Results of Water Quality of Rivers Yagua Resa-u River, Station P11 (1)

Item	Date	Feb. 24 '88	Mar. 15 '88	Apr. 6 '88	Apr. 13 '88	Apr. 19 '88	May 4 '88	May 19 '88	Jun. 1 '88	Jun. 14 '88	Jul. 6 '88	Jul. 9 '88	Aug. 17 '88	Aug. 18 '88
TP (µg/ℓ)		98	114	143	250	119	-	108	87	82	62	55	90	-
PP (µg/ℓ)		36	73	-	131	-	-	29	32	26	4	11	22	-
DOP (µg/ℓ)		29	2	-	80	-	-	67	25	24	15	20	48	-
PO <sub>4</sub> P (µg/ℓ)		33	39	34	39	84	45	12	30	32	43	34	20	16
TN (µg/ℓ)		-	-	392	1,984	1,765	648	-	-	749	716	493	1,078	651
TNK (µg/ℓ)		-	-	324	1,430	1,530	619	-	724	725	629	418	853	356
PON (µg/ℓ)		-	-	207	430	435	37	-	79	80	308	347	442	-
DON (µg/ℓ)		-	-	69	802	986	468	-	565	511	253	36	411	-
NH <sub>4</sub> -N (µg/ℓ)		30	70	48	198	109	114	143	80	134	68	35	0	14
NO <sub>3</sub> -N (µg/ℓ)		-	20	68	554	235	29	-	-	24	87	75	225	295
TCOD (mg/ℓ)		-	4	-	38	28	-	-	-	-	27	-	10	15
DCOD (mg/ℓ)		-	0	-	31	20	-	-	-	-	14	-	8	6
BOD (mg/ℓ)		-	-	-	-	-	-	-	-	1.5	-	2.0	1.6	1.9
TR (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	108
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	48
SS (mg/ℓ)		74.8	13.0	16.0	-	409.0	25.5	54.0	-	-	3.6	33.5	44.0	14.5
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	2.0	-	12.0	3.3
Cl <sup>-</sup> (mg/ℓ)		-	61	7	4	19	4	5	4	4	4	-	7	15
TFe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		-	-	-	12	15	24	-	-	22	28	-	-	27
Fecal coliform (No/100ml)		-	-	-	-	-	-	-	-	-	-	172	-	-



Table S6.2.8 (2) Analytical Results of Water Quality of Rivers

Yagua Resa-u River, Station P11 (2)

Item	Date	Sep. 26 '88	Oct. 24 '88	Dec. 10 '88	Jan. 11 '89	Feb. 14 '89	Mar. 2 '89							
TP (µg/ℓ)		53	60	122	79	96	79							
PP (µg/ℓ)		8	16	70	4	43	11							
DOP (µg/ℓ)		45	44	48	1	22	52							
PO <sub>4</sub> P (µg/ℓ)		0	0	4	74	31	16							
TN (µg/ℓ)		1,765	1,073	654	2,075	1,271	1,963							
TNK (µg/ℓ)		1,660	893	548	1,850	1,100	1,778							
PON (µg/ℓ)		468	-	98	600	225	481							
DON (µg/ℓ)		1,075	-	415	1,026	848	1,223							
NH <sub>4</sub> -N (µg/ℓ)		57	21	35	224	27	74							
NO <sub>3</sub> -N (µg/ℓ)		165	180	106	225	171	185							
TCOD (mg/ℓ)		2	29	5	36	22	39							
DCOD (mg/ℓ)		1	11	1	15	20	24							
BOD (mg/ℓ)		-	1.3	1.0	1.4	2.0	-							
TR (mg/ℓ)		-	156	-	-	145	-							
IL (mg/ℓ)		-	28	-	-	84	-							
SS (mg/ℓ)		38.7	32.8	30.0	14.6	14.0	15.0							
IL (mg/ℓ)		-	24.8	-	-	3.5	-							
Cl <sup>-</sup> (mg/ℓ)		83	13	3	-	5	4							
TFe (mg/ℓ)		-	-	2.3	-	-	-							
Alkalinity (mg/ℓ)		53	33	32	-	61	55							
Fecal coliform (No/100ml)		424	-	-	-	550	-							

Ypucu River, Station P12 (1)

Table S6.2.9 (1) Analytical Results of Water Quality of Rivers

Item	Date	Feb. 24 '88	Mar. 15 '88	Apr. 6 '88	Apr. 13 '88	Apr. 19 '88	May 4 '88	May 19 '88	Jun. 1 '88	Jun. 14 '88	Jul. 6 '88	Jul. 9 '88	Aug. 17 '88	Aug. 18 '88
TP (µg/ℓ)		200	232	118	319	179	199	131	111	146	118	103	242	272
PP (µg/ℓ)		81	-	-	54	-	87	11	41	6	35	45	78	197
DOP (µg/ℓ)		53	-	-	101	-	50	120	9	63	7	0	84	50
PO <sub>4</sub> P (µg/ℓ)		66	153	110	164	166	72	0	61	77	76	58	80	25
TN (µg/ℓ)		-	-	1,506	2,223	2,115	588	-	-	1,335	1,333	891	2,036	2,251
TNK (µg/ℓ)		-	-	1,071	1,800	1,838	501	-	-	1,281	871	111	1,657	1,691
PON (µg/ℓ)		-	-	604	780	798	177	-	-	251	160	-	756	909
DON (µg/ℓ)		-	-	262	909	913	229	-	-	868	590	-	765	782
NH <sub>4</sub> -N (µg/ℓ)		93	148	205	111	127	95	116	203	162	121	62	136	0
NO <sub>3</sub> -N (µg/ℓ)		-	350	435	423	277	87	-	-	54	462	780	379	560
TCOD (mg/ℓ)		-	8	-	32	32	-	-	-	-	5	-	34	24
DCOD (mg/ℓ)		-	0	-	25	29	-	-	-	-	4	-	24	18
BOD (mg/ℓ)		-	-	-	-	-	-	-	-	3.4	-	2.9	4.4	6.9
TR (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	172
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	54
SS (mg/ℓ)		52.1	301.5	42.0	-	118.5	42.5	68.0	-	-	8.8	24.0	52.0	42.0
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	4.8	-	17.5	11.2
Cl <sup>-</sup> (mg/ℓ)		-	11	51	3	12	15	5	8	3	7	-	41	20
TFe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		-	-	-	15	15	30	-	-	39	35	-	40	-
Fecal coliform (No/100ml)		-	-	-	-	-	-	-	-	-	-	950	-	-

Table S6.2.9 (2) Analytical Results of Water Quality of Rivers

Ypucu River, Station P12 (2)

Item	Date	Sep. 26 '88	Oct. 24 '88	Dec. 10 '88	Jan. 11 '89	Feb. 14 '89	Mar. 2 '89						
TP (µg/ℓ)		250	213	269	126	164	140						
PP (µg/ℓ)		91	81	127	19	67	45						
DOP (µg/ℓ)		59	10	125	13	26	28						
PO <sub>4</sub> P (µg/ℓ)		100	132	17	94	71	67						
TN (µg/ℓ)		3,916	1,497	1,338	1,957	1,930	2,185						
TNK (µg/ℓ)		3,725	1,167	975	1,600	1,522	1,865						
PON (µg/ℓ)		1,817	-	495	-	361	49						
DON (µg/ℓ)		1,361	-	317	-	1,100	1,689						
NH <sub>4</sub> -N (µg/ℓ)		547	165	163	-	61	127						
NO <sub>3</sub> -N (µg/ℓ)		191	330	363	357	408	320						
TCOD (mg/ℓ)		22	41	9	17	19	32						
DCOD (mg/ℓ)		14	17	6	7	19	14						
BOD (mg/ℓ)		-	1.0	2.0	1.6	3.5	-						
TR (mg/ℓ)		-	224	-	-	167	-						
IL (mg/ℓ)		-	28	-	-	14	-						
SS (mg/ℓ)		46.8	53.6	116.0	51.7	24.0	22.3						
IL (mg/ℓ)		-	37.6	-	-	12.5	-						
Cl <sup>-</sup> (mg/ℓ)		54	51	3	-	5	7						
TFe (mg/ℓ)		-	3.6	-	-	-	-						
Alkalinity (mg/ℓ)		59	41	37	-	74	92						
Fecal coliform (No/100ml)		6,732	-	-	-	0	-						

Table S6.2.10 Diameter of Particles in the Water of the Three rivers

Sampling date: July. 9. '88

Name of River	Max. Size (µm)	Size Ratio (%)		
		74~5µm	5~1µm	1~0.635µm > 0.635µm >
Yuguyry	10.00	5.7	21.2	9.8
Ypucu	8.00	4.7	21.9	9.6
Yagua Resa-u	5.04	0	15.7	8.9

Table S6.2.11 Field Observation Records of Rivers

Date	Jul. 1, '88	Weather	Clear
Starting time	9:05	Weather on the previous day	Clear
Finishing time	15:50	Air temp. (mean)	21.3°C

Small Rivers Flowing into the Yuquvry Water System

Sampling Station	Transpa- rency (cm)	Temp. (°C)	D.O. (mg/l)	D.O. (%)	pH	E.C. (µS/cm)	Color	Water Volume (m³/S)	Remarks
St. Y1	26	21.8	-	-	6.6	113		0.03	Light whitish brown, transparent
St. Y2	25	21.4	-	-	6.6	116		0.05	"
St. Y3	30 <	21.1	5.7	(66)	6.1	80		0.05	Domestic drainage up the river
St. Y4 <sub>1</sub>	14	21.0	6.4	(74)	4.2	830	Whitish brown	0.52	Oil factory just up the river, Asunción side
St. Y4 <sub>2</sub>	19	20.5	6.7	(77)	5.1	669	"		Oil factory just up the river, Itagua side
St. Y4 <sub>3</sub>	-	-	-	-	2.4	5,020	"	-	Water was collected from the end of drain of the factory.
St. Y5	24	20.9	4.3	(49)	6.5	170	Greyish brown	1.34	
St. Y6	26	20.8	3.4	(39)	6.9	531	"	2.72	Regular sampling station, Y6
St. Y7	30	21.3	3.9	(45)	6.8	467	"	2.94	Regular sampling station, Y7
St. Y8	30 <	20.4	1.0	(11)	6.9	333	Dark grey	1.67	

Table S6.2.12 Analytical Results of Water Quality of the Yuquyry Water System

Date: Jul. 1, '88

Item	St. Y1	St. Y2	St. Y3	St. Y4 <sub>1</sub>	St. Y4 <sub>2</sub>	St. Y4 <sub>3</sub>	St. Y5	a St. Y6	b St. Y7	St. Y8
TP (µg/ℓ)	261	-	53	3,975	2,825	14,925	2,714	1,580	-	461
PP (µg/ℓ)	86	-	31	375	175	-	2,534	305	-	-
DOP (µg/ℓ)	75	-	13	1,717	1,079	-	46	147	-	-
PO <sub>4</sub> P (µg/ℓ)	100	89	9	1,883	1,571	2,804	134	1,128	1,169	319
TN (µg/ℓ)	-	-	-	-	-	-	-	-	-	-
PON (µg/ℓ)	-	-	-	-	-	-	-	-	-	-
DON (µg/ℓ)	-	-	-	-	-	-	-	-	-	-
NH <sub>4</sub> -N (µg/ℓ)	1,602	120	60	689	501	3,598	439	974	1,306	1,529
NO <sub>3</sub> -N (µg/ℓ)	950	3,150	1,210	920	921	1,080	490	493	316	382
TCOD (mg/ℓ)	19	12	8	77	53	50	15	23	19	147
DCOD (mg/ℓ)	12	2	7	73	51	31	14	12	8	81
BOD (mg/ℓ)	4.9	0.7	-	9.4<	10.1<	8.8	3.6	4.1	5.1	5.5<
TR (mg/ℓ)	102	151	83	3,090	480	185	650	359	309	283
IL (mg/ℓ)	63	68	70	518	123	86	142	107	137	180
SS (mg/ℓ)	27.3	43.3	15.7	56.0	38.3	125.3	33.6	35.7	30.5	17.7
IL (mg/ℓ)	12.0	14.6	12.7	36.0	5.0	82.0	18.4	15.4	16.5	15.4
Cl <sup>-</sup> (mg/ℓ)	3	7	4	10	7	219	20	80	60	24
Alkalinity	32	20	23	0	12	0	37	59	53	99
Fecal coliform (No/100ml)	-	-	-	-	-	-	-	-	-	-

a. Regular sampling station at the Yuquyry River, Y6

b. Regular sampling station at the Yuquyry River, Y7

Table S6.2.13 (1) Field Observation Records of Rivers

Date	Jul. 5, '86	Weather	Cloudy and little rainfall
Starting time	10:20	Weather on the previous day	Clear
Finishing time	16:20	Air temp. (time)	13.6 °C (15:30)

Small Rivers Flowing into the Pirayu Water System

Sampling Station	transpar ency (cm)	Temp. (°C)	D.O. (mg/l)	pH	E.C. (µS/cm)	Color	Water Volume (m <sup>3</sup> /S)	Remarks
St. P1	5	16.9	1.6	6.6	152	Whitish brown	0.10	Stock farm, water moved very little.
St. P2 Pirayu River	28	17.3	7.3	7.0	73	Brown	0.98	
St. P3	27	14.5	9.8	7.1	73		0.17	Transparent water, sandy bottom
St. P4 Zanja Moroti	25	14.3	3.8	5.6	178	Black, odor	0.01	Two alcohol factories up the river.
St. P5 Mbatovi River	30 <	14.4	9.4	6.6	31	Little whitish	0.11	Transparent water, sandy bottom
St. P6 Cardena River	30 <	15.2	9.4	6.1	31		0.03	
St. P7 Paso Vera River	30 <	15.7	10.3	6.1	36		0.05	

Table S6.2.13 (2) Field Observation Records of Rivers

Date	Jul. 6, '88	Weather.	Cloudy and little rainfall
Starting time	10:45	Weather on the previous day	Cloudy
Finishing time	14:15	Air temp. (time)	15.4 °C (10:45)

Small Rivers Flowing into the Pirayu Water System

Sampling Station	Transpa rency (cm)	Temp. (°C)	D.O. (mg/l)	pH	E.C. (µs/cm)	Color	Water Volume (m <sup>3</sup> /s)	Remarks
St. P8	30 <	15.4	6.8	6.5	47	-	-	Meeting point of Yagua Resa-u and Ypucu Rivers
St. P9	30 <	15.9	5.1	6.0	98	-	-	St. 0 in the Lake
St. P10	30 <	16.5	5.4	6.1	95	-	-	Near St. 2 in the Lake
St. P11 Yagua Resa-u River	30 <	15.6	9.6	6.7	77	0.93	0.93	Regular sampling station
St. P12 Ypucu River	30 <	14.9	8.9	6.7	108	0.62	0.62	Regular sampling station



Table S6.2.14

## Analytical Results of Water Quality of the Pirayu Water System

## Small Rivers Flowing into the Pirayu Water System

Jul. 5, 6, '88

Item	St.	St. P1	St. P2	St. P3	St. P4	St. P5	St. P6	St. P7	St. P11	St. P12	St. P8	St. P9	St. P10
TP (µg/ℓ)		385	104	58	979	80	54	63	62	118	75	82	61
PP (µg/ℓ)		341	42	12	260	22	7	22	4	35	19	19	3
DOP (µg/ℓ)		6	11	0	160	7	6	2	15	7	7	18	13
PO <sub>4</sub> P (µg/ℓ)		38	51	46	559	51	41	49	43	76	49	45	45
TN (µg/ℓ)		1,564	865	1,653	2,670	829	717	895	716	1,333	1,157	1,201	1,271
FON (µg/ℓ)		1,061	99	235	1,052	233	270	171	308	160	187	591	711
DON (µg/ℓ)		323	571	69	1,332	264	220	286	253	590	563	422	427
NH <sub>4</sub> -N (µg/ℓ)		70	41	19	31	22	17	23	68	121	122	86	79
NO <sub>3</sub> -N (µg/ℓ)		110	155	1,330	255	310	210	355	87	462	285	102	54
TCOD (mg/ℓ)		25	20	10	397	11	30	12	27	5	14	14	18
DCOD (mg/ℓ)		18	10	9	343	8	25	10	14	4	13	13	14
TR (mg/ℓ)		217	80	123	251	95	83	105	-	-	-	-	-
IL (mg/ℓ)		180	67	52	200	47	37	42	-	-	-	-	-
SS (mg/ℓ)		141.8	12.8	14.0	18.0	6.4	3.6	24.8	3.6	8.8	3.6	2.4	5.2
IL (mg/ℓ)		36.5	9.6	12.8	17.0	1.2	2.0	17.2	2.0	4.8	0.4	0.4	1.6
Cl <sup>-</sup> (mg/ℓ)		10	3	4	5	3	3	3	4	7	6	7	7
Alkalinity (mg/ℓ)		56	27	12	59	9	9	8	28	35	32	49	24

Table S6.2.15 Analytical Results of Water Quality of Yuquvy River on the day after Rainfall

Oct. 31, 10:30 start

Item	1	3	4	5	7	8	10	11	Nov. 2	Y. Bocca.	R. Negro
	0 <sup>h</sup>	5-30	8-20	11-20	20-20	26-10	44-20	55-20		12:00	14:00
TP (µg/ℓ)	301	390	486	469	451	175	383	291		124	78
PP (µg/ℓ)	151	-	309	256	296	63	165	-		62	44
DOP (µg/ℓ)	87	-	53	121	44	0	114	-		57	0
PO <sub>4</sub> P (µg/ℓ)	63	156	124	92	111	112	104	136		5	34
TN (µg/ℓ)	1,269	2,343	2,958	2,286	1,834	1,285	935	863		659	559
PON (µg/ℓ)	288	-	-	-	444	116	175	252		224	157
DON (µg/ℓ)	145	-	-	-	297	475	2	89		407	381
NH <sub>4</sub> -N (µg/ℓ)	822	1,096	1,282	1,045	451	340	685	473		28	21
NO <sub>3</sub> -N (µg/ℓ)	14	1,247	1,542	1,241	642	354	73	49		0	0
TCOD (mg/ℓ)	43	60	47	46	69	56	55	44		29	33
DCOD (mg/ℓ)	16	21	21	21	19	17	14	18		21	16
PCOD (mg/ℓ)	27	39	26	25	50	39	41	36		8	17
SS (mg/ℓ)	167	187	221	201	224	200	182	133		53	71
Cl <sup>-</sup> (mg/ℓ)	118	78	47	48	43	38	71	39		43	81
Turbidity (NTU)	8	10	20	2.4	16	6	1.4	10		14	1.4
EC (µS/cm)	429	325	251	251	220	204	324	222		212	357
Water volume (m <sup>3</sup> /S)	6.20	9.67	16.49	18.94	18.81	13.03	10.02	4.09		2.27	2.08

Table S6.2.16 Analytical Results of Water Quality of Yagua Resa-u River on the Day after Rainfall

Oct. 31, 11:35 start

Item	1	2	4	6	7	8	9	10	11	Nov. 2	St. 0	St. 4
	0 <sup>a</sup>	3-10	9-00	18-00	24-00	30-00	42-00	45-10	67-00	15:30	15:45	
TP (µg/ℓ)	167	273	277	324	-	211	169	149	114		143	128
PP (µg/ℓ)	124	221	129	285	-	161	114	96	81		106	91
DOP (µg/ℓ)	10	14	112	6	-	11	30	27	16		13	15
PO <sub>4</sub> P (µg/ℓ)	33	38	36	33	39	39	25	27	17		24	22
TN (µg/ℓ)	3,397	3,116	3,064	2,314	2,444	2,723	1,205	1,020	792		1,014	957
PON (µg/ℓ)	479	18	224	62	89	212	239	74	299		140	66
DON (µg/ℓ)	287	531	313	378	365	272	364	412	357		376	561
NH <sub>4</sub> -N (µg/ℓ)	210	240	261	199	228	210	116	106	45		47	15
NO <sub>3</sub> -N (µg/ℓ)	2,421	2,327	2,266	1,675	1,762	2,029	486	428	91		451	315
TCOD (mg/ℓ)	32	34	42	36	34	35	36	31	68		33	70
DCOD (mg/ℓ)	16	13	34	33	31	25	23	26	25		22	31
PCOD (mg/ℓ)	16	21	8	3	3	10	13	5	43		11	39
SS (mg/ℓ)	342.0	359.0	114.5	176.0	206.5	311.5	152.5	140.5	123.0		91.3	98.0
Cl <sup>-</sup> (mg/ℓ)	5	7	5	5	5	5	6	6	6		6	25
Turbidity (NTU)	34	18	10	6	8	10	20	22	12		4	2.6
EC (µS/cm)	79	95	83	80	81	83	75	75	74		76	106
Water volume (m <sup>3</sup> /S)	3.39	4.62	5.05	4.50	5.38	7.05	10.74	11.62	-		-	-

**Table S6.2.17 Analytical Results of Water Quality of Ypucu River on the Day after Rainfall**

Oct. 31, 12:00 start

Item	1	2	3	4	5	8	9	10
	0 <sup>a</sup>	3-10	6-00	9-00	12-00	29-50	41-50	76-45
TP (µg/ℓ)	663	577	450	339	225	220	405	203
PP (µg/ℓ)	11	156	158	101	90	107	218	122
DOP (µg/ℓ)	543	354	250	233	109	76	157	60
PO <sub>4</sub> P (µg/ℓ)	109	67	42	5	26	37	30	21
TN (µg/ℓ)	1,209	1,305	1,592	1,890	1,774	1,101	774	813
PON (µg/ℓ)	80	57	177	248	41	247	69	167
DON (µg/ℓ)	410	425	110	322	586	334	499	449
NH <sub>4</sub> -N (µg/ℓ)	175	112	158	159	150	87	58	51
NO <sub>3</sub> -N (µg/ℓ)	544	711	1,147	1,161	997	433	148	146
TCOD (mg/ℓ)	40	41	40	36	40	38	34	32
DCOD (mg/ℓ)	22	15	16	18	17	22	33	24
PCOD (mg/ℓ)	18	26	24	18	23	16	1	8
SS (mg/ℓ)	282.0	128.0	282.0	120.0	122.0	90.7	112.7	94.0
Cl <sup>-</sup> (mg/ℓ)	7	5	5	6	5	6	7	6
Turbidity (NTU)	18	24	14	12	8	4	8	4
EC (µS/cm)	81	73	75	80	80	82	88	73
Water volume (m <sup>3</sup> /S)	4.82	3.48	5.93	5.38	4.60	1.31	5.22	-



Table S6.4.4(1) Field Observation Records of Lake Ypacarai

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto.* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
				Date		Feb. 16, '88		Weather		Clear		Wind force		Weak
				Starting time		9:45		Weather on the previous day		Clear		Wind direction		South
				Finishing time		16:00		Air temp. (Time)						
2	1.4	65	30<	29.5	27.1	9.5 (123)	8.0 (102)	7.2	-	109	-	whitish green, brown	○	-
3	2.3	90	30<	30.5	26.8	10.0 (134)	8.8 (87)	8.5	-	110	-	light green	○	transparent
4	2.0	80	30<	30.4	26.0	9.0 (120)	8.4 (80)	7.5	-	107	-	greenish brown	○	little whitish
18	2.8	80	30<	31.2	27.1	10.7 (145)	-	8.7	-	112	-		○	
25	2.9	80	30<	29.9	27.0	11.0 (140)	-	9.1	-	108	-		⊙	large particles were found
27	2.8	70	30<	32.0	26.7	-	-	8.0	-	105	-	light green	○	small particles were found
30	2.7	50	30<	31.0	27.2	14.8 (189)	7.8 (99)	9.6	-	120	-	brown	⊙	
32	2.9	85	30<	30.1	27.2	11.0 (146)	7.9 (101)	8.9	-	110	-	greenish brown	⊙	large particles were found
47	-	90	-	-	-	-	-	8.0	-	-	-	light green	○	highly transparent
49	2.8	60	30<	28.6	27.8	9.8 (128)	8.5 (84)	9.0	-	113	-	greenish yellow	○	
51	2.5	45	27	30.7	27.2	-	-	9.2	-	112	-	light greenish brown	○	
52	0.8	28	20	28.0	27.8	10.7 (138)	8.1 (104)	9.3	-	117	-	green	⊙	-
53	1.9	45	30<	28.0	27.8	9.4 (121)	-	9.2	-	121	-	greenish brown	⊙	weak odor
54	2.8	65	30<	28.0	27.9	8.6 (111)	8.2 (106)	8.9	-	115	-	"	○	
55	2.0	40	25	28.4	27.5	8.0 (104)	8.1 (104)	9.2	-	113	-	"	⊙	weak odor
56	1.8	22	13	28.4	28.2	9.0 (117)	8.0 (104)	8.8	-	103	-	green	⊙	
57	2.3	38	20	28.3	28.4	8.8 (112)	8.4 (83)	9.4	-	109	-	green	⊙	weak odor
58	1.8	20	18	28.3	28.1	7.5 (97)	7.4 (96)	9.0	-	108	-	greenish brown	⊙	

\* : ○ highly observed    ⊙ observed    ● not observed

Table S6.4.4 (2) Field Observation Records of Lake Ypacarai

Date		Mar. 2, '88		Weather		Clear		Wind force		Weak				
Starting time		11:00		Weather on the previous day		Clear		Wind direction		SW				
Finishing time		17:00		Air temp. (Time)		26.9								
Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O. (mg/l) (%)		pH		E.C. (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
4	2.0	90	30 <	31.9	28.6	10.0 (136)	5.0 (85)	9.0	-	152	-	greenish brown	○	
6	-	75	-	-	-	-	-	-	-	-	-	-	-	
25	3.0	90	-	34.0	29.0	11.4 (160)	8.1 (80)	9.1	8.8	163	-	brown, transparent	○	
26	3.1	65	-	35.0	29.2	-	-	-	-	167	-	-	○	
27	3.0	70	-	30.7	-	12.5 (168)	-	9.5	-	183	-	-	○	
28	1.8	80	-	32.6	-	11.6 (160)	-	-	-	167	-	-	-	
30	2.8	60	30 <	30.9	29.2	12.3 (166)	8.2 (81)	9.9	9.1	179	-	green	○	transparent
34	-	80	-	-	-	-	-	-	-	-	-	-	○	
35	3.0	80	30 <	31.9	28.6	10.0 (136)	5.0 (85)	9.0	-	152	-	-	○	
36	2.8	85	30 <	29.0	-	9.9 (130)	-	9.7	-	166	-	green	○	
40	3.0	70	-	-	-	-	-	-	-	-	-	-	○	
42	2.6	90	-	-	-	-	-	-	-	-	-	-	-	
45	2.0	70	-	-	-	-	-	-	-	-	-	-	○	
49	2.8	60	30 <	31.1	28.9	8.4 (118)	8.1 (80)	9.7	9.2	168	-	greenish brown	○	
52	1.9	60	30 <	31.3	29.4	9.3 (129)	6.5 (88)	9.5	9.2	170	-	-	-	weak odor
57	3.1	60	30 <	30.6	29.0	9.0 (121)	8.1 (80)	9.5	9.0	166	-	greenish brown	⊙	

\* : ⊙ highly observed ○ observed ● not observed

Table S6.4.4 (3) Field Observation Records of Lake Ypacarai

Date	Mar. 22, '88	Weather	Clear, hot	Wind force	Strong
Starting time	9:00	Weather on the previous day	Clear, hot	Wind direction	North
Finishing time	15:30	Air temp. (Time)	30.6		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O. (mg/l) (%)		pH		E.C. (µS/cm)		Color	Phyto- <sup>*</sup> plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	1.0	45	30 <	27.8	27.5	7.7 (89)	7.5 (96)	7.0	-	115	-	yellowish brown	●	particles visible
4	2.0	60	24	28.0	28.0	11.3 (146)	11.4 (147)	9.6	-	159	-	brown, transparent	○	
25	2.7	55	30	27.6	27.5	10.8 (139)	11.1 (142)	9.9	-	172	-	greenish brown	◎	
30	2.5	80	30	27.5	27.4	10.5 (134)	10.6 (135)	9.8	-	168	-	greenish brown	◎	high waves, strong wind
35	2.6	80	30 <	27.6	27.2	11.9 (153)	10.5 (134)	9.9	-	170	-	greenish brown	○	
49	2.6	70	29	27.6	27.6	9.1 (117)	9.6 (123)	9.6	-	164	-	green	◎	high waves, strong wind
52	1.8	45	26	27.6	27.6	8.5 (109)	9.2 (118)	9.2	-	187	-	greenish brown	◎	transparent
57	2.4	60	25	27.2	27.2	7.3 (89)	7.4 (94)	9.1	-	150	-	yellowish brown	●	
Yuquyry Boca	1.0	100	30 <	23.0	23.2	0.9 (1)	0.9 (1)	6.6	-	495	-	brown	●	particles visible
Boca Salado	1.3	20	7	26.0	26.0	6.3 (79)	6.4 (80)	8.1	-	144	-	grayish brown	●	particles visible, strong wind

\* : ◎ highly observed ○ observed ● not observed



Table S6.4.4 (4) Field Observation Records of Lake Ypacarai

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	0.9	35	17	24.5	-	4.2 (51)	-	6.9	-	54	-	brown	●	Medium
4	2.8	50	30<	24.4	22.2	11.7 (143)	5.0 (58)	9.1	-	141	88	green	◎	North
6	2.8	45	30	23.9	22.8	12.2 (148)	6.0 (71)	9.4	-	130	111	greenish brown	○	
13	3.2	50	30<	24.9	22.4	11.6 (145)	4.9 (58)	9.1	-	147	147	brown	○	
16	2.9	35	23	24.3	23.8	9.3 (118)	7.7 (98)	9.9	-	145	147	dark green	◎	
20	3.1	30	25	23.5	22.3	11.0 (132)	7.4 (87)	6.6	-	162	144	brown		
25	3.1	30	30<	23.4	22.9	12.5 (150)	8.3 (99)	9.3	-	148	145	dark green	○	
30	2.8	30	17	24.1	23.6	8.5 (105)	5.7 (69)	9.7	-	151	156	dark green	◎	
35	3.1	60	28	23.4	22.5	8.3 (99)	9.3 (74)	7.6	-	150	144		○	
37	2.8	35	27	24.8	23.9	12.4 (152)	8.6 (104)	9.4	-	170	169	green	◎	
49	2.6	30	23	23.3	23.1	8.9 (85)	6.8 (81)	7.0	-	159	162	transparent brown	●	
52	1.8	35	22	24.5	23.8	7.7 (94)	8.8 (82)	7.4	-	172	263	green	○	
57	2.7	35	20	22.9	22.8	6.7 (80)	6.8 (81)	6.9	-	157	160	brown	●	
Yaguiry Boca	1.9	130	30<	21.8	21.8	4.3 (50)	4.7 (55)	6.6	-	312	-	transparent brown	●	
Boca Salado	2.0	25	15	22.4	22.4	5.2 (61)	5.2 (61)	6.7	-	150	192	brown	●	

\* : ◎ highly observed ○ observed ● not observed

Table S6.4.4 (5) Field Observation Records of Lake Ypacarai

Date	May 31, '88	Weather	Fair	Wind force	Weak
Starting time	9:50	Weather on the previous day	Fair	Wind direction	SW
Finishing time	16:15	Air temp. (Time)	5.7		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l)		pH		E.C (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
4	2.2	70	30 <	15.5	15.5	11.8 (122)	11.4 (118)	9.3	9.3	145	140	light brown	●	
6	2.2	70	30 <	-	15.7	11.7 (121)	11.4 (119)	9.3	9.3	154	156	"	●	
20	3.1	50	30 <	15.3	15.3	11.5 (119)	11.3 (116)	9.2	9.3	129	131	"	●	
25	3.3	70	30 <	15.5	15.3	12.4 (128)	7.6 (78)	9.3	7.1	150	156	"	●	
30	2.8	70	30 <	15.3	15.1	12.0 (124)	10.7 (110)	9.3	6.8	149	158	"	●	
35	3.2	70	30 <	15.6	14.8	12.0 (124)	9.8 (100)	9.4	8.4	130	140	"	●	
40	3.2	55	30 <	15.4	15.0	12.0 (124)	7.9 (81)	9.0	7.4	137	155	"	●	
49	3.0	38	26	15.4	14.7	11.0 (114)	9.5 (97)	8.7	7.7	159	158	"	●	
52	2.0	40	23	15.3	14.9	11.9 (123)	11.2 (15)	8.8	8.6	149	154	greenish brown	○	
57	2.1	25	16	14.6	14.0	10.7 (109)	8.5 (97)	8.4	7.8	145	145	brown	●	
Yaguayy Boca	1.7	170 <	30 <	11.4	11.4	7.2 (88)	7.5 (71)	7.0	-	407	-	light brown	●	
Boca Salado	2.6	20	9	14.1	14.0	8.9 (89)	8.9 (89)	7.6	-	154	163	dark brown	●	

\* : ◎ highly observed

○ observed

● not observed

Table S6.4.4 (6) Field Observation Records of Lake Ypacarai

Date	Jun. 21, '88	Weather	Cloudy,	Wind force	Weak
Starting time	9:35	Weather on the previous day	later clear	Wind direction	SW
Finishing time	17:300	Air temp. (Time)	Clear		
			18.7 (10:35)		
			22.1 (15:50)		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
4	2.7	50	30 <	17.8	16.2	7.4 (80)	6.5 (88)	6.6	7.0	123	154	brown		
6	2.9	80	30 <	19.9	16.8	8.5 (86)	7.9 (94)	9.0	7.2	151	167	"		
20	3.0	90	30 <	16.4	15.8	8.6 (81)	7.8 (81)	7.4	7.4	154	-	light brown	○	transparent, very much zooplankton - ⊙
25	3.0	90	30 <	20.0	16.1	10.4 (118)	7.5 (79)	8.6	7.9	156	152	"		
30	2.5	70	30 <	20.2	17.7	10.8 (120)	7.9 (85)	8.8	7.3	158	172	"		
35	3.1	100	30 <	18.4	16.0	9.2 (101)	7.7 (81)	7.6	7.1	150	153	dark brown		
40	3.0	90	30 <	20.0	16.2	8.9 (101)	7.4 (78)	8.6	7.3	152	152	brown		
49	3.1	80	30 <	18.3	16.1	9.2 (97)	7.4 (78)	8.6	7.3	154	194	"	○	
52	2.1	65	30 <	19.5	18.0	10.4 (116)	8.5 (71)	8.8	6.9	164	324	"		
57	1.6	90	30 <	18.7	18.4	8.9 (109)	8.9 (88)	7.7	7.5	162	-	"	○	
Yaguzy Boca	1.7	60	30 <	17.3	17.4	6.3 (88)	6.1 (86)	6.7	6.7	381	377	reddish brown	●	odor of sample was fishy
Boca Salado	2.7	55	30 <	18.8	18.6	9.9 (110)	9.8 (108)	7.9	8.0	156	-	green	○	

\* : ○ highly observed    ● not observed

Table S6.4.4 (7) Field Observation Records of Lake Ypacarai

Date	Jul. 8, '88	Weather	Clear	Wind force	Weak
Starting time	9:25	Weather on the previous day	Clear, cold	Wind direction	SW
Finishing time	16:30	Air temp. (Time)	12.2°C (9:30)		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O. (mg/l) (%)		pH		E.C. (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	1.0	65	30 <	15.0	13.9	8.8 (91)	8.1 (81)	6.3	-	92	-	dark brown		zooplankton - ○
4	1.9	70	30 <	16.4	14.8	11.0 (116)	9.9 (101)	7.9	7.7	154	159			
20	2.8	65	30 <	16.2	15.4	10.3 (108)	9.6 (99)	7.9	7.7	154	155			
21	-	65	-	-	-	-	-	-	-	-	-		●	transparent
25	3.0	88	30 <	15.7	15.6	10.2 (108)	9.8 (102)	7.7	7.6	157	160	green	◎	zooplankton - ◎
30	2.4	80	17	15.5	15.1	11.0 (114)	9.8 (101)	7.5	7.7	165	165	brown		
35	3.0	55	30	15.0	14.7	9.2 (94)	8.0 (82)	7.5	7.3	146	152	"	◎	zooplankton
49	2.9	45	28	15.4	15.0	11.3 (117)	10.3 (106)	7.4	7.4	164	168	grayish brown	○	zooplankton - ◎
Yuquyry Boca	1.7	170 <	30 <	11.3	11.3	8.8 (83)	8.4 (79)	3.3	3.5	474	474	"	●	
Boca R.N	1.4	140 <	30 <	11.4	11.3	7.4 (70)	7.2 (68)	3.6	-	475	475	"	●	
Boca Salado	1.8	20	14	15.6	15.5	9.1 (94)	9.0 (93)	6.9	7.0	179	183	blackish	●	

\* : ◎ highly observed    ○ observed    ● not observed

Table S6.4.4 (8) Field Observation Records of Lake Ypacarai

Date	Aug. 18, '88	Weather	Clear	Wind force	Strong
Starting time	10:10	Weather on the previous day	Clear.	Wind direction	SW
Finishing time	17:30	Air temp. (Time)	20.2		

Sta. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
4	2.6	80	-	19.5	19.4	9.8 (101)	10.5 (117)	8.3	8.1	157	-	greenish brown	●	strong wind
25	2.7	70	-	19.4	18.9	9.0 (101)	9.3 (103)	8.2	7.8	155	-	"	●	"
30	2.1	45	-	19.6	19.4	8.5 (95)	8.9 (100)	7.8	7.2	159	-	brown	●	"
35	2.8	70	-	19.8	19.4	8.8 (98)	9.2 (103)	7.6	7.7	156	-	"	●	"
49	2.7	70	-	19.1	19.0	9.0 (100)	9.0 (100)	7.8	7.6	158	-	greenish brown	●	"
52	1.7	45	-	19.4	19.0	8.7 (97)	7.4 (82)	7.5	7.0	197	-	"	●	"
57	2.1	50	-	19.4	18.5	9.2 (103)	8.2 (90)	7.9	7.1	154	-	"	●	"
Yaguiry Boca	1.6	160 <	-	17.9	-	5.5 (60)	-	7.0	-	468	-	"	●	transparent
Boca Salado	1.6	30	-	16.8	18.3	7.9 (84)	8.9 (76)	6.9	6.9	152	-	brown	●	"

\* : ● highly observed ○ observed ● not observed

Table S6.4.4 (9) Field Observation Records of Lake Ypacarai

Date	Sep. 27, '88	Weather	Cloudy	Wind force	Strong
Starting time	9:30	Weather on the previous day	Fine	Wind direction	South
Finishing time	15:30	Air temp. (Time)	27.8°C (10:25)		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
Riacho Negro	-	-	30 <	19.7	-	3.4 (88)	-	6.9	-	426	-			very rough waves, all day long
Yaguiry Eoca	1.1	160 <	30 <	18.9	18.7	3.3 (87)	3.5 (89)	6.9	-	422	420			"
0	0.5	-	28	21.2	21.7	9.5 (110)	8.8 (108)	8.0	-	159	-			"
4	1.6	70	24	22.1	22.1	10.8 (127)	9.8 (115)	8.5	8.4	179	179			"
25	2.7	60	27	21.7	22.0	9.2 (107)	7.3 (86)	8.1	8.3	182	181			"
30	2.0	75	-	21.7	21.7	9.3 (108)	9.2 (107)	8.2	8.0	167	168			"
35	2.7	50	26	21.9	21.9	8.6 (101)	8.3 (87)	7.6	-	177	176			"
49	2.5	50	18	21.6	21.7	9.6 (110)	9.0 (105)	8.1	7.6	172	172			"
52	1.5	40	20	21.2	21.2	9.1 (105)	-	8.0	8.0	171	171			"

\* : © highly observed    ○ observed    ● not observed

Table S6.4.4 (10) Field Observation Records of Lake Ypacarai

Date	Oct. 27, '88	Weather	Clear, not hot	Wind force	Medium
Starting time	12:30	Weather of the previous day	Clear, strong wind	Wind direction	South
Finishing time		Air temp. (Time)	23.5°C (13:00)		

Stan. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto.* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	1.4	14	7	23.0	-	7.5 (89)	-	6.4	-	86	-	greenish brown		very rough waves,
4	1.6	25	14	23.7	22.1	11.0 (133)	7.5 (88)	8.8	-	182	186	transparent		"
20	2.7	15	8	23.1	-	8.2 (110)	-	8.1	-	174	-	"		"
25	2.7	20	10	24.0	23.0	9.2 (112)	7.4 (88)	8.0	7.1	175	181	"		"
30	2.3	15	8	23.5	-	8.8 (106)	-	6.9	-	185	-	"		"
49	2.5	15	7	23.3	23.1	8.1 (97)	7.9 (94)	7.7	7.4	188	192	"		"
Yaguayry Boca	1.4	1.4<	-	22.8	-	4.1 (49)	4.2 (-)	6.8	6.8	469	-			
Riacho Negro	1.4	1.4<	-	22.9	-	6.6 (79)	2.9 (-)	6.5	6.6	450	-			
Boca Salado	1.9	4	3	23.2	23.1	7.7 (92)	7.2 (88)	7.1	7.1	198	199			
50m from S.B.	1.2	5	4	23.6	22.9	6.0 (72)	7.6 (90)	7.2	6.9	195	208			

\* : © highly observed ○ observed ● not observed

Table S6.4.4 (11) Field Observation Records of Lake Ypacarai

Date	Dec. 6, '88	Weather	Clear, dry	Wind force	Weak
Starting time	10:30	Weather on the previous day	Clear	Wind direction	NE
Finishing time	18:15	Air temp. (Time)			

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C. (µS/cm)		Color	Phyto.* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	-	90	30 <	29.4	-	3.8 (50)	1.9 (-)	6.5	-	159	-	brown	●	transparent
4	1.2	60	30 <	31.3	29.6	7.3 (92)	5.3 (70)	6.6	6.4	184	-	"	●	transparent
25	2.2	60	25	32.2	29.2	10.2 (140)	5.7 (75)	6.3	6.2	196	-	greenish brown	○	
30	1.8	45	21	31.5	-	13.9 (188)	-	7.7	-	216	-	"	○	
35	1.8	50	23	32.2	-	9.8 (134)	-	6.5	-	202	-	"	○	
49	2.5	45	24	30.5	28.6	10.2 (137)	5.5 (72)	7.2	7.1	209	-	"	○	
57	0.9	35	20	31.5	-	9.4 (128)	-	7.2	-	208	-	"	○	
Yuquyry Boca	0.5	40	23	29.0	-	1.0 (13)	-	7.1	-	569	-	"	○	
R. Negro	0.3	30	30 <	26.9	-	0.6 (8)	-	7.2	-	560	-	brown	●	
Boca Salado	1.1	30	25	31.5	-	7.9 (107)	-	6.7	-	206	-	greenish brown	○	

\* : ○ highly observed    ○ observed    ● not observed



Table S6.4.4 (12) Field Observation Records of Lake Ypacarai

Date	Jan. 10, '89	Weather	Clear, warm	Wind force	weak
Starting time	10:30	Weather on the previous day	Clear	Wind direction	SSW
Finishing time	12:05	Air temp. (Time)			

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-* plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	2	60	30 <	27.2	-	1.8 (23)	-	6.4	-	92	-	dark brown	●	
4	1.6	90	30 <	28.4	28.4	5.2 (67)	4.5 (58)	7.1	7.0	150	-	light brown	●	
25	2.9	50	27	29.0	28.4	8.5 (111)	5.9 (77)	8.6	7.8	180	-	greenish brown	○	
30	2.4	50	24	30.3	-	10.2 (136)	-	8.8	-	177	-	"	⊙	
35	2.6	40	20	29.5	28.5	5.0 (70)	-	6.9	-	174	-	blackish green	○	
49	2.8	40	14	29.3	28.0	8.7 (115)	5.2 (67)	8.5	7.5	187	-	greenish black	○	
57	1.4	5	5	29.4	-	8.0 (79)	-	7.2	-	188	-	dark grey	●	
Yuquyry Boca	0.6	60	-	28.2	-	0.5 (7)	-	6.6	-	443	-	brown	●	
Riacho Negro	0.7	70	-	26.4	-	0.5 (6)	-	6.5	-	406	-	brown	●	

\* : ⊙ highly observed

○ observed

● not observed

Table S6.4.4 (13) Field Observation Records of Lake Ypacarai

Date	Feb. 15, '89	Weather	Slightly cloudy	Wind force	Weak
Starting time	11:20	Weather on the previous day	Clear	Wind direction	WSW
Finishing time	17:30	Air temp. (Time)	29.4°C (11:10)		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O. (mg/l) (%)		pH		E.C. (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
30	2.3	25	16	29.8	29.6	8.5 (86)	8.1 (80)	6.9	6.9	176	178	grey	○	
35	3.0	20	22	30.4	29.9	7.1 (85)	5.5 (73)	7.1	7.1	170	171	"	○	
39	2.9	20	23	29.8	29.7	7.0 (92)	6.9 (91)	7.1	7.1	173	173	"	○	
47	2.7	15	26	30.8	29.9	7.4 (100)	6.8 (80)	7.1	7.1	175	174	"	○	
49	2.9	35	20	30.6	29.6	8.8 (91)	8.3 (85)	7.1	7.1	177	178	"	○	
52	1.0	20	22	30.6	30.6	7.3 (85)	7.0 (94)	7.0	6.6	179	182	"	○	
56	1.7	17	17	31.0	30.1	7.5 (101)	6.5 (88)	7.2	7.1	175	177	"	○	
57	2.3	23	23	30.7	30.0	8.5 (87)	5.8 (77)	7.1	6.9	177	177	"	○	
Yacuyry Boca	1.0	40	23	25.1	25.1	0.4 (5)	0.2 (3)	6.5	6.5	413	-		●	
Riacho Negro	1.3	50	7	26.4	26.4	0.01 (0.1)	0.01 (0.1)	6.5	6.5	405	406		●	

\* : ◎ highly observed ○ observed ● not observed

Table S6.4.4 (14) Field Observation Records of Lake Ypacarai

Date	Feb. 16, '89	Weather	Slightly cloudy	Wind force	No wind
Starting time	9:30	Weather on the previous day	Slightly cloudy	Wind direction	SW
Finishing time	12:00	Air temp. (Time)	25.7°C (9:30)		

Stn. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	1.0	-	-	28.6	27.9	10.6 (138)	3.8 (49)	6.7	6.1	115	104	grey	☉	
3/4	2.4	-	17	29.2	28.7	8.9 (117)	5.7 (74)	7.6	6.9	166	172	"	☉	blooming
4	2.4	-	22	29.4	29.0	7.8 (100)	8.6 (86)	7.0	6.9	165	164	"	☉	
6	2.2	30	21	29.0	28.3	6.2 (81)	8.0 (78)	6.9	6.9	174	174	"	☉	green belts
13	3.0	30	22	29.3	28.9	6.7 (88)	8.0 (78)	7.0	6.9	169	169	"	○	
☆15	1.3	25	13	30.6	29.7	5.8 (78)	5.4 (71)	6.9	6.8	169	167	"	○	
20	2.5	30	-	30.2	29.9	8.4 (88)	5.5 (72)	7.0	6.9	170	168	"	○	
25	2.6	30	22	29.3	29.0	8.6 (87)	6.3 (83)	6.8	6.7	168	170	"	☉	

\* : ☉ highly observed

○ observed

● not observed

☆: Sampled on Feb. 15, '89

Table S6.4.4 (15) Field Observation Records of Lake Ypacarai

Date	Mar. 3, '89	Weather	Clear	Wind force	Weak
Starting time	10:10	Weather on the previous day	Clear	Wind direction	
Finishing time	14:30	Air temp. (Time)	27.0°C (10:30)		

Sta. No.	Depth (m)	Secchi disk (cm)	Transparency (cm)	Temperature (°C)		D.O (mg/l) (%)		pH		E.C (µS/cm)		Color	Phyto-plankton	Remarks
				Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom			
0	1.1	35	26	27.6	26.7	1.9 (13)	1.0 (13)	6.3	6.3	102	102	greyish brown	●	
4	2.2	25	12	28.6	28.2	6.3 (82)	6.0 (78)	7.1	7.1	167	170	"	●	
6	1.8	25	19	28.9	28.6	6.2 (80)	6.1 (79)	7.3	7.2	170	173	"	●	
20	3.0	26	17	28.7	28.3	5.6 (79)	5.2 (67)	7.0	6.9	157	161	"	●	
25	3.1	26	16	27.9	27.8	6.1 (79)	6.0 (77)	7.2	7.0	166	167	"	●	
30	2.2	25	14	29.4	29.0	6.7 (94)	5.7 (75)	7.4	7.1	171	174	"	●	
35	3.0	25	12	28.9	27.6	6.3 (82)	5.5 (71)	7.3	7.0	162	163	"	●	
49	2.6	20	12	27.8	27.3	6.3 (81)	6.1 (78)	7.4	7.3	176	176	brown	●	
57	2.2	13	7	28.1	27.4	6.6 (94)	6.2 (79)	7.3	7.2	175	175	blackish brown	●	
Yuquary Boca	1.7	25	-	27.4	24.9	2.6 (33)	0.3 (4)	6.7	6.1	340	355		●	
R. Negro	70	70<	30<	25.3	25.2	1.3 (16)	0.8 (1)	6.6	-	329	-		●	
Boca Salado	2.3	13	8	27.2	26.9	5.9 (75)	5.7 (72)	7.1	7.0	175	174	greyish dark brown	●	

\* : © highly observed ○ observed ● not observed ☆ sampled on 15, Feb.

Table S6.4.5 (1) Maximum, Minimum and Mean Values of Chemical Elements in the Surface Layer of the Lake (1)

Item	Date	Feb.16, '88	Mar.2, '88	Mar.22, '88	Apr.20, '88	May31, '88	Jun.21, '88	Jul.8, '88	Aug.18, '88	Sep.27, '88	Oct.27, '88	Dec.6, '88	Jan.10, '89	Feb.15, '89	Mar.3, '89
		TP (µg/l)	250	162	106	310	163	96	84	103	99	198	92	226	292
	84	83	71	139	45	55	64	72	62	116	52	101	171	205	
	147	115	99	166	80	68	73	86	79	159	73	164	203	228	
PP (µg/l)	188	97	93	223	142	41	45	65	73	162	79	92	143	91	
	22	29	24	27	15	12	25	36	31	89	47	31	22	31	
	84	55	49	85	53	29	38	46	55	127	63	56	47	64	
DOP (µg/l)	44	77	47	54	45	60	24	47	31	36	16	78	56	65	
	27	31	27	9	5	28	13	29	18	19	5	37	20	13	
	32	51	33	33	17	40	21	34	24	25	10	58	39	31	
PO <sub>4</sub> -P (µg/l)	33	17	105	97	19	0	24	29	0	18	0	70	129	144	
	17	0	0	19	7	0	9	0	0	0	0	19	93	128	
	28	9	36	56	10	0	15	6	0	8	0	50	116	134	
TN (µg/l)	-	-	2,871	1,860	-	1,765	1,364	2,671	5,581	3,405	1,100	2,015	2,576	4,945	
	-	-	1,111	629	-	1,039	865	861	1,860	1,076	372	1,528	1,605	2,272	
	-	-	2,419	1,125	-	1,441	1,054	1,787	3,338	2,049	715	1,712	2,054	3,280	
TNK (µg/l)	-	-	3,347	1,152	1,413	1,549	1,102	2,388	5,497	3,345	1,100	2,250	2,065	4,495	
	-	-	671	523	799	803	653	841	1,753	1,026	372	1,450	1,100	1,902	
	-	-	2,260	766	1,122	1,213	837	1,762	3,164	1,972	671	1,865	1,461	2,899	
PON (µg/l)	-	-	2,372	-	650	794	628	2,002	4,308	2,276	720	1,000	922	2,885	
	-	-	89	-	144	20	240	180	693	249	28	225	17	293	
	-	-	1,460	-	444	431	371	1,188	2,012	1,270	244	681	331	1,121	
DON (µg/l)	-	-	1,141	-	915	1,011	564	989	1,480	1,309	644	1,206	1,381	2,050	
	-	-	639	-	278	397	273	153	792	724	274	747	702	1,470	
	-	-	996	-	559	749	431	558	1,102	889	410	996	1,025	1,646	

Table S6.4.5 (2) Maximum, Minimum and Mean Values of Chemical Elements in the Surface Layer of the Lake (2)

Item	Date	Feb. 16,	Mar. 2,	Mar. 22,	Apr. 20,	May 31,	Jun. 21,	Jul. 8,	Aug. 18,	Sep. 27,	Oct. 27,	Dec. 6,	Jan. 10,	Feb. 15,	Mar. 3,
		'88	'88	'88	'88	'88	'88	'88	'88	'88	'88	'88	'88	'89	'89
NH <sub>4</sub> -N (µg/l)	Max.	67	97	104	137	72	43	47	0	39	68	80	503	166	142
	Min.	41	30	47	58	45	21	29	0	32	32	58	128	81	120
	Mean	51	56	66	77	55	34	36	0	36	44	68	317	109	132
NO <sub>3</sub> -N (µg/l)	Max.	726	1,502	440	890	252	262	50	359	100	0	229	835	450	
	Min.	272	1,272	260	7	212	193	12	84	50	0	78	418	350	
	Mean	374	1,412	410	338	228	218	25	174	73	0	126	594	381	
TCOD (mg/l)	Max.	76	78	48	33	34	24	26	24	46	41	34	37		
	Min.	-	19	33	18	20	10	18	21	35	13	19	20		
	Mean	50	48	25	24	25	21	24	24	40	19	26	25		
DCOD (mg/l)	Max.	39	39	14	23	16	22	31	17	19	28	25			
	Min.	28	10	10	13	10	5	24	11	12	18	19			
	Mean	32	21	13	18	13	9	29	14	15	22	22			
Chl-a (µg/l)	Max.	177	86	260	268	219	55	40	41	62	96	66	91	153	55
	Min.	7	14	100	16	38	14	28	36	31	61	34	19	10	14
	Mean	73	32	102	90	71	28	32	38	39	79	55	55	34	32
SS (mg/l)	Max.	50.4	55.0	29.0	35.6	12.3	19.3	31.5	44.0	84.0	60.9	37.0	33.0	71.0	
	Min.	0.2	2.0	13.0	8.6	0.8	0.7	14.0	15.9	35.0	7.5	12.8	11.6	20.5	
	Mean	9.2	21.5	20.0	18.5	6.5	12.1	21.9	30.0	59.6	20.4	21.4	23.7	37.0	
Cl <sup>-</sup> (mg/l)	Max.	23	38	23	18	33	32	50	41	43	41				
	Min.	20	24	16	1	24	29	34	34	35	38				
	Mean	21	29	20	8	26	31	40	38	41	39				
Alkalinity (mg/l)	Max.	17	21	33	39	16	32	33	36	41	61	57			
	Min.	14	18	16	30	0	29	31	34	36	47	41			
	Mean	15	20	24	35	5	30	33	35	39	53	48			

Table S6.4.6(1) Analytical Results of Water Quality of Lake Ypacarai

Date: Feb. 16, '88

Item	St. 4	St. 25	St. 27	St. 30	St. 49	St. 52	St. 56	St. 57	Yaguayry Boca
TP (µg/l)	84	-	-	132	109	162	250	-	219
PP (µg/l)	22	-	-	61	49	101	188	-	147
DOP (µg/l)	29	38	-	38	27	44	29	24	12
PO <sub>4</sub> P (µg/l)	33	29	-	23	33	17	33	30	60
TN (µg/l)	-	-	-	-	-	-	-	-	-
TNK (µg/l)	-	-	-	-	-	-	-	-	-
PON (µg/l)	-	-	-	-	-	-	-	-	-
DON (µg/l)	-	-	-	-	-	-	-	-	-
NH <sub>4</sub> -N (µg/l)	45	-	-	53	67	41	45	57	40
NO <sub>3</sub> -N (µg/l)	290	-	-	330	726	272	290	333	230
TCOD (mg/l)	-	-	-	-	-	-	-	-	-
DCOD (mg/l)	-	-	-	-	-	-	-	-	-
BOD (mg/l)	-	-	-	-	-	-	-	-	-
TR (mg/l)	-	-	-	-	-	-	-	-	-
IL (mg/l)	-	-	-	-	-	-	-	-	-
SS (mg/l)	0.2	-	-	-	6.7	22.2	50.4	16.7	-
IL (mg/l)	-	-	-	-	-	-	-	-	-
Chl. a (µg/l)	7	37	17	24	71	174	177	135	19
Cl <sup>-</sup> (mg/l)	-	-	-	-	-	-	-	-	-
TFe (mg/l)	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)	17	15	-	14	17	14	15	16	-
Fecal coliform (No/100ml)	-	-	-	-	-	-	-	-	-

Table S6.4.6 (2) Analytical Results of Water Quality of Lake Ypacarai

Date: Mar. 2, 88

Item	St.	St. 25		St. 30		St. 35	St. 49		St. 52		St. 57	
		surface	bottom	surface	bottom		surface	bottom	surface	bottom	surface	bottom
TP (µg/ℓ)	126	112	-	137	134	96	83	83	87	125	162	148
PP (µg/ℓ)	49	58	-	97	67	34	29	42	45	69	75	118
DOP (µg/ℓ)	77	43	42	31	37	62	39	34	32	50	70	30
PO <sub>4</sub> P (µg/ℓ)	0	11	31	9	30	0	15	7	10	6	17	0
TN (µg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
TNK (µg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
PON (µg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
DON (µg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
NH <sub>4</sub> N (µg/ℓ)	37	80	75	31	-	30	77	40	97	60	36	73
NO <sub>3</sub> N (µg/ℓ)	1,502	1,417	1,394	1,485	-	1,497	1,363	1,464	1,272	1,334	1,346	1,489
TCOD (mg/ℓ)	19	76	-	67	-	57	57	-	48	-	29	-
DCOD (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
BOD (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
TR (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
IL (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
SS (mg/ℓ)	2.0	5.0	30.0	55.0	7.0	4.5	32.0	11.0	7.0	11.0	45.0	17.0
IL (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
Chl - a (µg/ℓ)	18	16	24	50	24	15	17	38	25	46	86	16
Cl <sup>-</sup> (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
T Fe (mg/ℓ)	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)	20	21	-	18	-	-	19	-	19	-	20	-
Fecal coliform (No/100ml)	-	-	-	-	-	-	-	-	-	-	-	-



Table S6.4.6 (3) Analytical Results of Water Quality of Lake Ypacarai

Date: Apr. 13, 89

Item	St.	Yuquyry			Yuquyry			Yuquyry		
		Boca I	Boca II	Boca III	Boca I	Boca II	Boca III	Boca I	Boca II	Boca III
TP (µg/ℓ)		163	237	136						
PP (µg/ℓ)		33	25	4						
DOP (µg/ℓ)		46	107	90						
PO <sub>4</sub> P (µg/ℓ)		84	105	42						
TN (µg/ℓ)		-	867	920						
TNK (µg/ℓ)		-	793	893						
PON (µg/ℓ)		-	113	18						
DON (µg/ℓ)		-	633	845						
NH <sub>4</sub> -N (µg/ℓ)		12	47	30						
NO <sub>3</sub> -N (µg/ℓ)		14	74	27						
TCOD (mg/ℓ)		29	29	31						
DCOD (mg/ℓ)		22	20	22						
BOD (mg/ℓ)		-	-	-						
TR (mg/ℓ)		-	--	-						
IL (mg/ℓ)		-	-	-						
SS (mg/ℓ)		-	-	-						
IL (mg/ℓ)		-	-	-						
Chl. - a (µg/ℓ)		-	-	-						
Cl <sup>-</sup> (mg/ℓ)		75	74	74						
T Fe (mg/ℓ)		-	-	-						
Alkalinity (mg/ℓ)		35	36	34						
Fecal coliform (No/100ml)		-	-	-						



Table S6.4.6 (5) Analytical Results of Water Quality of Lake Ypacarai

Date: Mar. 22, '88

Item	St.	St. 0	St. 4	St. 25		St. 30		St. 35	St. 49	St. 52		St. 57	Yuquyry Boca	Salado Boca
				surface	bottom	surface	bottom			surface	bottom			
TP (µg/ℓ)		90	71		103	105		75	138		84	106	-	177
PP (µg/ℓ)		45	24		47	44		33	93		47	-	-	129
DOP (µg/ℓ)		18	47		29	-		31	-		27	-	-	40
PO <sub>4</sub> P (µg/ℓ)		27	0		27	-	105	11	-		5	66	214	8
TN (µg/ℓ)		1,903	2,830		1,111	-	2,871	2,680	1,211		-	2,653	1,752	4,933
TNK (µg/ℓ)		1,493	2,420		671	1,060	2,420	2,420	779		3,347	2,271	1,386	4,247
PON (µg/ℓ)		500	1,046		-	647	-	1,641	89		2,372	782	877	3,690
DON (µg/ℓ)		949	1,337		-	358	-	675	639		923	1,411	445	730
NH <sub>4</sub> -N (µg/ℓ)		44	47		59	55	55	104	51		52	78	64	227
NO <sub>3</sub> -N (µg/ℓ)		410	410		440	-	436	260	432		-	382	366	286
TCOD (mg/ℓ)		61	35		43	43	33	43	51		52	78	53	55
DCOD (mg/ℓ)		16	28		36	8	28	30	34		39	31	47	39
BOD (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
TR (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
IL (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
SS (mg/ℓ)		15.5	16.0		20.0	20.0	13.0	15.0	29.0		27.0	20.0	-	88.0
IL (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
Chl. a (µg/ℓ)		24	100		125	135	108	260	114		109	73	13	59
Cl <sup>-</sup> (mg/ℓ)		10	20		23	22	22	20	-		-	22	100	22
T Fe (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
Alkalinity (mg/ℓ)		-	-		-	-	-	-	-		-	-	-	-
Fecal coliform (No/100ml)		-	-		-	-	-	-	-		-	-	-	-

Table S6.4.6 (6) Analytical Results of Water Quality of Lake Ypacarai

Date: Apr. 20, '88 (1)

Item	St. 0	St. 4		St. 6		St. 20		St. 30		St. 35		St. 37		St. 49	
		surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
TP (µg/l)	224	141	253	141	146	186	157	166	186	153	179	310	283	139	166
PP (µg/l)	58	56	179	98	94	116	43	87	105	56	71	223	223	27	58
DOP (µg/l)	56	-	-	24	38	9	43	29	47	44	30	54	30	39	18
PO <sub>4</sub> P (µg/l)	110	-	-	19	14	61	71	50	34	53	78	33	30	73	90
TN (µg/l)	86	652	1,179	749	624	1,267	1,051	363	-	1,108	1,166	629	1,193	1,338	1,010
TNK (µg/l)	86	600	1,090	742	592	1,011	849	-	912	1,108	1,166	588	1,182	542	216
PON (µg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DON (µg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NH <sub>4</sub> -N (µg/l)	61	116	114	71	88	136	94	137	134	101	127	59	52	58	134
NO <sub>3</sub> -N (µg/l)	0	52	89	7	32	256	202	164	-	585	413	41	11	796	794
TCOD (mg/l)	31	26	27	-	-	22	21	18	40	23	58	45	45	20	30
DCOD (mg/l)	25	18	19	25	30	19	16	16	21	16	16	27	23	10	23
BOD (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IL (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS (mg/l)	19.3	8.6	15.6	14.6	12.0	15.5	12.0	35.6	11.3	13.0	25.5	28.6	26.0	13.3	16.0
IL (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chl.-a (µg/l)	22	52	34	102	76	70	47	96	77	48	44	268	238	23	23
Cl <sup>-</sup> (mg/l)	16	27	13	24	24	24	36	29	27	31	29	35	35	24	34
T Fe (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)	18	21	19	16	22	22	30	16	24	26	26	33	27	26	28
Feces coliform (No/100ml)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table S6.4.6 (7) Analytical Results of Water Quality of Lake Ypacarai

Item	St.	St. 52		St. 57		Yuquy Boca		Salado Boca	
		surface	bottom	surface	bottom	Boca		surface	bottom
TP (µg/ℓ)		216	197	161	204	132		152	179
PP (µg/ℓ)		122	121	33	74	38		46	62
DOP (µg/ℓ)		31	29	31	46	31		18	37
PO <sub>4</sub> P (µg/ℓ)		63	47	97	84	66		88	80
TN (µg/ℓ)		1,404	742	1,860	1,870	390		1,852	1,427
TNK (µg/ℓ)		1,152	540	970	971	367		735	1,608
PON (µg/ℓ)		-	-	-	-	-		-	-
DON (µg/ℓ)		-	-	-	-	-		-	-
NH <sub>4</sub> -N (µg/ℓ)		104	82	92	89	52		65	102
NO <sub>3</sub> -N (µg/ℓ)		252	202	890	899	23		1,117	819
TCOD (mg/ℓ)		48	49	23	28	31		27	31
DCOD (mg/ℓ)		39	27	21	27	20		20	30
BOD (mg/ℓ)		-	-	-	-	-		-	-
TR (mg/ℓ)		-	-	-	-	-		-	-
IL (mg/ℓ)		-	-	-	-	-		-	-
SS (mg/ℓ)		27.3	20.0	22.0	18.6	-		27.3	27.3
IL (mg/ℓ)		-	-	-	-	-		-	-
Chl- <i>a</i> (µg/ℓ)		133	99	16	15	11		15	13
Cl <sup>-</sup> (mg/ℓ)		38	44	33	33	71		30	30
T Fe (mg/ℓ)		-	-	-	-	-		-	-
Alkalinity (mg/ℓ)		29	28	26	26	31		23	33
Fecal coliform (No/100ml)		-	-	-	-	-		-	-

Table S6.4.6 (8) Analytical Results of Water Quality of Lake Ypacarai

Date: May. 31. '88

Item	St.	St. 4	St. 6	St. 20		St. 25	St. 30		St. 35	St. 40		St. 49		St. 52	St. 57	Yuquvy Boca
				surface	bottom		surface	bottom		surface	bottom	surface	bottom			
TP (µg/ℓ)		67	76	70	64	57	57	57	128	45	72	111	105	84	163	50
PP (µg/ℓ)		52	24	-	45	33	33	31	101	15	56	78	78	48	142	8
DOP (µg/ℓ)		8	45	-	9	16	16	18	11	18	5	14	12	17	11	1
PO <sub>4</sub> P (µg/ℓ)		7	7	9	10	8	8	8	16	12	11	19	15	19	10	41
TN (µg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TNK (µg/ℓ)		1,261	1,413	1,261	1,043	864	864	1,114	1,992	799	1,072	818	1,293	1,260	887	649
PON (µg/ℓ)		315	640	495	405	536	536	154	1,323	144	611	88	650	622	274	102
DON (µg/ℓ)		896	736	701	589	278	278	915	585	599	406	-	571	583	561	499
NH <sub>4</sub> -N (µg/ℓ)		50	47	65	49	50	50	45	75	56	55	-	72	55	52	58
NO <sub>3</sub> -N (µg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TCOD (mg/ℓ)		-	-	-	-	-	-	22	43	24	22	-	22	20	33	26
DCOD (mg/ℓ)		-	-	-	-	-	-	12	14	12	10	-	14	12	14	22
BOD (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chl. <sub>a</sub> (µg/ℓ)		69	68	39	83	79	79	219	150	90	89	-	88	81	38	10
Cl <sup>-</sup> (mg/ℓ)		16	23	16	17	20	20	20	20	17	17	-	21	22	21	76
TFe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fecal coliform (No/100ml)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table S6.4.6(9) Analytical Results of Water Quality of Lake Ypacarai

Date: Jun. 21, '88

Item	St. 4	St. 6	St. 20	St. 25		St. 30	St. 35		St. 40	St. 49		St. 52	St. 57	Yuquyry Boca	Salado Boca
				surface	bottom		surface	bottom		surface	bottom				
TP (µg/l)	96	57	55	64	55	86	56	176	59	64	90	76	70	185	85
PP (µg/l)	36	29	12	24	23	41	23	147	29	33	51	27	32	72	11
DOP (µg/l)	60	28	43	40	32	45	32	29	37	31	39	49	38	94	74
PO <sub>4</sub> P (µg/l)	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
TN (µg/l)	1,152	1,039	1,747	1,565	1,416	1,220	1,362	1,563	1,765	1,586	2,096	1,702	1,272	1,372	1,780
TNK (µg/l)	900	803	1,513	1,350	1,181	1,991	1,140	1,342	1,549	1,365	2,872	1,490	1,031	1,079	1,540
PON (µg/l)	20	97	590	625	488	553	470	789	794	416	914	447	296	298	795
DON (µg/l)	837	676	890	704	663	397	640	508	715	913	926	1,011	704	734	715
NH <sub>4</sub> -N (µg/l)	43	30	33	21	30	41	30	45	40	36	32	32	31	47	30
NO <sub>3</sub> -N (µg/l)	252	236	234	215	235	229	222	221	216	221	224	212	241	293	240
TCOD (mg/l)	-	19	25	18	21	31	34	34	33	28	12	10	26	-	-
DCOD (mg/l)	-	13	21	16	18	21	17	18	18	23	5	9	21	-	-
BOD (mg/l)	1.3	2.6	1.8	2.1	1.6	3.9	1.8	2.8	2.7	1.7	1.5	4.0	3.2	2.1	2.9
TR (mg/l)	115	98	97	114	105	118	109	243	102	-	130	105	103	257	257
IL (mg/l)	45	58	53	85	90	74	68	155	59	-	68	56	158	115	238
SS (mg/l)	12.3	5.7	4.7	5.7	7.0	10.0	5.0	118.0	6.3	5.3	34.3	0.8	9.3	13.0	15.7
IL (mg/l)	10.6	3.7	1.4	4.0	6.0	7.3	1.7	38.0	2.3	2.0	16.7	0.2	5.3	12.4	12.7
Chl - a (µg/l)	14	24	25	19	35	55	20	89	24	27	53	41	30	12	40
Cl <sup>-</sup> (mg/l)	1	2	2	2	2	12	60	62	16	17	12	15	18	64	12
T Fe (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)	30	36	39	35	35	35	36	35	35	35	35	32	35	76	34
Fecal coliform (No/100ml)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table S6.4.6(10) Analytical Results of Water Quality of Lake Ypacarai

Date: Jul. 8, '88

Item	St.	St. 0	St. 4	St. 20	St. 25		St. 30	St. 35	St. 49	Yuquyry Boca	Riacho Negro	Salado Boca
					surface	bottom						
TP (µg/ℓ)		67	64	71	73	77	72	84	76	59	36	114
PP (µg/ℓ)		5	25	38	42	49	35	45	41	9	1	74
DOP (µg/ℓ)		30	29	24	14	15	13	24	22	7	6	21
PO <sub>4</sub> P (µg/ℓ)		32	10	9	17	13	24	15	13	43	29	19
TN (µg/ℓ)		801	865	962	1,155	1,218	1,364	913	1,073	545	731	1,422
TNK (µg/ℓ)		541	653	769	935	1,001	1,102	698	866	356	526	1,197
PON (µg/ℓ)		157	352	240	339	472	628	286	382	47	203	743
DON (µg/ℓ)		354	273	500	564	503	427	382	438	284	303	404
NH <sub>4</sub> -N (µg/ℓ)		30	29	29	32	26	47	30	46	25	20	52
NO <sub>3</sub> -N (µg/ℓ)		260	212	193	220	217	262	215	207	189	205	223
TCOD (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
DCOD (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
BOD (mg/ℓ)		1.1	2.8	2.5	2.4	2.8	1.9	2.9	2.6	1.8	2.1	2.2
TR (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
SS (mg/ℓ)		15.0	17.1	2.5	17.0	13.0	0.7	16.0	19.3	1.7	10.6	53.0
IL (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
Chl - a (µg/ℓ)		14	28	28	40	32	29	33	31	7	2	36
Cl <sup>-</sup> (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
T Fe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-
Fecal coliform (No/100ml)		75	2	10	0	-	2	16	2	68	60	4



Table S6.4.6 (11) Analytical Results of Water Quality of Lake Ypacarai

Date: Aug.18 '88

Item	St.	St. 4		St. 25		St. 30	St. 35		St. 49	St. 52	St. 57	Yuquyry Boca	Salado Boca
		surface	bottom	surface	bottom		surface	bottom					
TP (µg/l)		90		81	91	103	86	79	84	84	72	116	126
PP (µg/l)		36		53	63	65	43	38	37	47	40	30	89
DOP (µg/l)		25		26	28	37	43	5	47	30	28	36	32
PO <sub>4</sub> P (µg/l)		29		2	0	1	0	36	0	7	4	50	5
TN (µg/l)		861		1,558	1,575	1,244	2,671	857	1,561	2,438	2,173	2,018	2,657
TNK (µg/l)		849		1,546	1,565	1,226	2,621	841	1,546	2,388	2,155	2,000	2,625
PON (µg/l)		180		1,225	1,143	713	1,668	97	557	1,968	2,002	1,709	2,510
DON (µg/l)		-		321	422	513	953	744	989	420	153	291	115
NH <sub>4</sub> -N (µg/l)		-		0	0	0	0	0	0	0	0	0	0
NO <sub>3</sub> -N (µg/l)		12		12	10	18	50	16	15	50	18	18	32
TCOD (mg/l)		21		20	20	21	18	19	21	24	22	16	21
DCOD (mg/l)		10		13	14	12	10	11	13	16	15	15	17
BOD (mg/l)		-		-	-	-	-	-	-	-	-	-	-
TSR (mg/l)		127		-	124	146	127	119	138	144	138	294	-
IL (mg/l)		100		-	44	51	46	54	57	132	67	79	-
SS (mg/l)		15.7		15.2	19.3	31.5	14.0	7.5	23.0	27.5	26.5	1.7	29.5
IL (mg/l)		11.0		10.0	11.0	16.0	8.4	2.5	12.0	14.0	14.5	0.4	14.5
chl - g (µg/l)		38		41	38	38	36	36	37	36	37	-	26
Cl <sup>-</sup> (mg/l)		24		25	26	26	25	30	25	33	27	103	26
T Fe (mg/l)		-		-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)		29		29	30	30	30	29	29	32	29	51	29
Fecal coliform (No/100ml)		-		-	-	-	-	-	-	-	-	-	-

Table S6.4.6 (12) Analytical Results of Water Quality of Lake Ypacarai

Date: Sept. 27, '88

Item	St.	St. 0	St. 4	St. 25		St. 30	St. 35	St. 49	St. 52	Yuquyry Boca	Riacho Negro
				surface	bottom						
TP (µg/l)		72	65	62	63	69	84	99	93	118	79
PP (µg/l)		49	44	31	43	51	58	73	72	28	6
DOP (µg/l)		23	21	31	20	18	26	26	21	17	28
PO <sub>4</sub> P (µg/l)		0	0	0	0	0	0	0	0	87	45
TN (µg/l)		1,550	1,860	2,012	2,563	3,364	5,581	1,964	5,245	4,410	4,121
TNK (µg/l)		1,501	1,753	1,767	2,317	3,005	5,497	1,824	5,136	4,018	4,023
PON (µg/l)		321	697	939	1,142	1,809	4,308	693	3,626	3,037	2,723
DON (µg/l)		1,148	1,017	792	1,131	1,163	1,154	1,005	1,480	948	1,270
NH <sub>4</sub> -N (µg/l)		32	39	38	44	33	35	36	32	33	30
NO <sub>3</sub> -N (µg/l)		49	107	245	246	359	84	140	107	392	98
TCOD (mg/l)		39	21	25	21	26	21	26	23	19	14
DCOD (mg/l)		7	6	7	18	9	5	22	6	7	8
BOD (mg/l)		-	-	-	-	-	-	-	-	-	-
TR (mg/l)		-	-	-	-	-	-	-	-	-	-
IL (mg/l)		-	-	-	-	-	-	-	-	-	-
SS (mg/l)		16.7	17.2	15.9	14.6	27.3	34.0	44.0	41.4	3.8	2.0
IL (mg/l)		-	-	-	-	-	-	-	-	-	-
Chl-a (µg/l)		30	33	38	33	39	62	34	31	11	12
Cl <sup>-</sup> (mg/l)		27	31	31	28	31	29	31	32	101	97
T Fe (mg/l)		-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)		33	33	323	33	33	31	33	33	75	83
Fecal coliform (No/100ml)		40	-	2	-	-	5	5	-	42	60

Table S6.4.6 (13) Analytical Results of Water Quality of Lake Ypacarai

Date: Oct. 27, 88

Item	St.	St. 0	St. 4	St. 20	St. 25		St. 30	St. 49		Yuquyry Boca	Riacho Negro	Salado Boca	Salado (50m)
					surface	bottom		surface	bottom				
TP (µg/ℓ)		56	116	165	136	166	198	178	210	101	80	264	287
PP (µg/ℓ)		14	89	130	109	137	162	147	176	19	28	222	248
DOP (µg/ℓ)		35	19	27	21	29	36	23	26	27	15	35	32
PO <sub>4</sub> P (µg/ℓ)		7	18	8	6	0	0	8	8	55	37	7	4
TN (µg/ℓ)		828	1,076	1,425	3,405	1,071	1,188	3,150	2,234	710	833	2,572	1,298
TNK (µg/ℓ)		748	1,026	1,370	3,345	996	1,088	3,030	2,134	654	781	2,402	1,156
PON (µg/ℓ)		84	249	554	2,004	378	-	2,276	1,566	36	91	1,624	500
DON (µg/ℓ)		638	744	779	1,309	580	-	724	613	591	663	681	579
NH <sub>4</sub> -N (µg/ℓ)		26	33	37	32	38	68	50	55	27	27	97	77
NO <sub>3</sub> -N (µg/ℓ)		80	50	55	60	75	100	100	100	65	52	170	142
TCOD (mg/ℓ)		34	37	35	39	38	42	46	62	21	23	78	82
DCOD (mg/ℓ)		22	31	30	24	25	31	31	25	18	20	35	26
BOD (mg/ℓ)		1.9	4.3	4.3	4.3	4.0	4.1	3.8	4.3	1.7	1.8	4.3	4.5
TR (mg/ℓ)		71	150	171	124	175	199	212	250	270	235	-	359
IL (mg/ℓ)		51	64	58	86	53	70	69	53	67	78	-	148
SS (mg/ℓ)		8.5	35.0	47.0	54.0	56.0	78.0	84.0	112.0	2.5	7.0	185.0	190.0
IL (mg/ℓ)		3.5	9.0	21.0	28.0	30.0	36.0	40.0	56.0	0.5	0.5	110.0	116.0
Chl. <sub>a</sub> (µg/ℓ)		14	88	96	80	83	61	70	94	9	11	82	82
Cl <sup>-</sup> (mg/ℓ)		13	37	37	34	37	50	40	40	115	103	57	56
T Fe (mg/ℓ)		-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/ℓ)		28	34	35	34	32	36	34	37	66	65	38	37
Fecal Soliform (No/100ml)		-	-	-	-	-	-	-	-	-	-	-	-

Table S6.4.6 (14) Analytical Results of Water Quality of Lake Ypacarai

Date: Dec. 6, '88

Item	St.	St. 0		St. 4		St. 25		St. 30	St. 35	St. 49		St. 57	Yaquyry Boca	Riacho Negro	Salado Boca
		surface	bottom	surface	bottom	surface	bottom			surface	bottom				
TP (µg/l)	51	52	72	92	113	65	85	75	82	165	283	91			
PP (µg/l)	41	47	68	79	99	53	77	63	73	149	133	73			
DOP (µg/l)	10	55	4	13	14	12	8	12	9	16	16	18			
PO <sub>4</sub> P (µg/l)	0	0	0	0	0	0	0	0	0	0	129	0			
TN (µg/l)	598	463	1,220	1,130	705	808	608	379	519	636	582	847			
TNK (µg/l)	598	453	1,170	1,100	655	808	608	372	519	626	532	827			
PON (µg/l)	55	-	605	720	107	84	163	28	111	158	222	134			
DON (µg/l)	475	440	506	322	482	644	385	274	341	405	226	622			
NH <sub>4</sub> -N (µg/l)	68	69	59	58	66	80	60	71	67	63	84	71			
NO <sub>3</sub> -N (µg/l)	0	10	50	30	50	0	0	7	0	10	50	20			
TCOD (mg/l)	18	13	17	24	20	22	21	18	14	16	20	20			
DCOD (mg/l)	13	11	13	13	15	17	13	17	14	15	16	15			
BOD (mg/l)	2.7	4.0	4.7	4.9	3.0	5.0	5.3	3.5	5.1	3.3	1.2	2.2			
TR (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-			
IL (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-			
SS (mg/l)	6.8	10.7	76.0	60.9	11.7	10.3	7.5	-	13.4	7.3	13.6	30.4			
IL (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-			
Chl - a (µg/l)	21	34	40	57	75	66	58	56	78	48	12	60			
Cl <sup>-</sup> (mg/l)	26	34	31	39	37	40	34	39	36	94	144	39			
T.Fe (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-			
Alkalinity (mg/l)	35	36	41	38	38	40	40	37	40	64	64	37			
Fecal coliform (No/100ml)	-	-	-	-	-	-	-	-	-	-	-	-			

Table S6.4.6 (15) Analytical Results of Water Quality of Lake Ypacarai

Date: Jan. 10, '89

Item	St.	St. 0	St. 4		St. 25		St. 30	St. 35	St. 49		St. 57	Yuquvy Boca	Riacho Negro
			surface	bottom	surface	bottom			surface	bottom			
TP (µg/l)		82	102	101	147	156	169	158	174	184	226	265	258
PP (µg/l)		37	34	31	53	51	57	40	67	79	92	148	99
DOP (µg/l)		42	52	51	38	78	45	60	37	35	75	-	112
PO <sub>4</sub> P (µg/l)		3	16	19	56	27	67	58	70	70	59	-	47
TN (µg/l)		1,188	1,630	1,313	-	1,860	-	1,979	1,528	1,164	-	1,370	1,199
TNK (µg/l)		1,100	1,496	1,225	2,000	1,750	2,250	1,750	1,450	1,150	2,250	1,275	1,100
PON (µg/l)		350	225	175	750	400	750	-	-	1,150	1,000	125	200
DON (µg/l)		397	747	940	907	1,158	1,206	-	-	693	1,122	891	520
NH <sub>4</sub> -N (µg/l)		353	503	160	343	192	294	-	-	457	128	259	380
NO <sub>3</sub> -N (µg/l)		88	155	88	-	110	-	229	78	14	-	95	99
TCOD (mg/l)		23	22	20	23	19	25	24	27	62	41	19	15
DCOD (mg/l)		22	13	16	20	19	15	12	13	19	14	15	15
BOD (mg/l)		2.3	1.8	1.9	5.1	3.8	6.4	3.4	5.8	4.6	1.5	1.9	1.1
TR (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
IL (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
SS (mg/l)		10.0	18.7	13.9	13.7	12.8	13.3	37.0	30.0	35.5	146.7	21.3	23.7
IL (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
Chl. a (µg/l)		12	15	19	65	61	85	42	91	83	34	11	12
Cl <sup>-</sup> (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
T Fe (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-
Fecal coliform (No/100ml)		-	-	-	-	-	-	-	-	-	-	-	-

Table S6.4.6 (16) Analytical Results of Water Quality of Lake Ypacarai

Date: Feb. 15.16.'89 (1)

Item	St.	St. 0		St. 3/4		St. 4		St. 6	St. 13	St. 15	St. 20		St. 25		St. 30	
		surface	bottom	surface	bottom	surface	bottom				surface	bottom	surface	bottom	surface	bottom
TP (µg/l)		339		304	297	292	192	241	193	224	193	558	205	210	210	188
PP (µg/l)		260		161	150	143	47	76	22	67	44	439	47	50	38	62
DOP (µg/l)		36		54	34	56	60	58	54	37	31	18	54	47	52	5
PO <sub>4</sub> P (µg/l)		43		88	114	93	85	107	117	120	121	101	103	113	120	121
TN (µg/l)		3,059		2,416	1,888	1,868	2,388	1,969	2,430	2,131	2,087	2,804	1,850	2,096	1,605	2,032
TNK (µg/l)		2,854		2,065	1,484	1,450	1,844	1,505	1,849	1,517	1,495	2,182	1,275	1,495	1,115	1,458
PON (µg/l)		1,742		415	367	463	600	111	574	358	52	877	232	827	83	386
DON (µg/l)		1,068		1,568	1,046	906	1,137	1,280	1,169	1,050	1,331	1,194	921	556	865	948
NH <sub>4</sub> -N (µg/l)		44		82	71	81	107	114	106	109	112	111	122	112	166	124
NO <sub>3</sub> -N (µg/l)		205		351	404	418	494	464	551	614	592	622	575	601	490	574
TCOD (mg/l)		29		35	34	32	22	30	22	27	25	38	34	31	23	24
DCOD (mg/l)		25		34	31	28	24	24	22	26	24	18	18	31	22	19
BOD (mg/l)		-		-	-	4.0	1.7	2.8	-	-	1.2	1.7	1.5	1.3	-	-
TR (mg/l)		217		233	384	235	217	208	254	242	220	550	203	233	214	262
IL (mg/l)		98		157	244	122	125	52	158	154	87	349	36	133	34	109
SS (mg/l)		46.4		-	165.3	32.5	18.9	24.4	54.0	32.2	33.0	314.0	18.4	32.9	31.7	31.2
IL (mg/l)		-		-	-	-	-	-	-	-	-	-	-	-	-	-
chl. a (µg/l)		311		222	71	153	20	88	14	27	10	41	17	9	15	10
Cl <sup>-</sup> (mg/l)		21		39	39	39	38	42	39	40	35	37	42	37	42	41
TFe (mg/l)		3.0		1.8	3.2	2.1	2.0	1.9	1.7	2.7	2.5	5.2	1.9	1.8	2.6	2.1
Alkalinity (mg/l)		58		51	49	47	49	50	61	47	47	47	47	47	47	50
Fecal coliform (No/100ml)		-		-	-	12	4	-	20	-	52	24	12	16	-	-

Table S6.4.6 (17) Analytical Results of Water Quality of Lake Ypacarai

Date: Feb. 15. 16. '89 (2)

Item	St.	St. 35		St. 39	St. 47		St. 49		St. 52	St. 56	St. 57		Riacho Negro	Yuquyy Boca
		surface	bottom		surface	bottom	surface	bottom			surface	bottom		
TP (µg/l)		174	171	189	206	202	184	182	183	167	171	177	272	495
PP (µg/l)		25	26	40	54	47	28	35	26	28	26	19	153	381
DOP (µg/l)		25	20	27	35	29	26	22	49	20	20	31	19	16
PO <sub>4</sub> P (µg/l)		124	125	122	117	125	129	124	109	119	124	127	99	98
TN (µg/l)		2,509	2,197	2,576	1,698	2,560	1,792	1,686	2,412	1,679	2,136	1,979	2,072	1,130
TNK (µg/l)		1,855	1,694	1,967	1,104	1,962	1,100	1,042	1,773	1,112	1,301	1,410	1,957	972
PON (µg/l)		865	256	922	139	1,120	300	79	498	22	17	558	863	161
DON (µg/l)		875	1,294	947	763	643	702	861	1,176	985	1,381	722	1,066	594
NH <sub>4</sub> -N (µg/l)		114	144	98	102	99	96	102	99	105	103	130	28	217
NO <sub>3</sub> -N (µg/l)		654	503	609	594	598	692	644	639	560	853	569	115	158
TCOD (mg/l)		23	25	23	22	41	24	22	20	25	25	36	26	27
DCOD (mg/l)		18	-	19	-	21	-	17	20	20	25	19	21	23
BOD (mg/l)		3.0	-	-	-	-	3.3	-	-	-	1.9	-	-	-
TR (mg/l)		201	203	240	212	253	238	240	211	220	217	229	278	348
IL (mg/l)		49	65	98	74	108	151	84	111	131	67	31	138	198
SS (mg/l)		14.5	14.2	11.6	13.5	46.8	17.6	20.0	9.9	18.7	20.0	21.4	10.8	27.7
IL (mg/l)		-	-	-	-	-	-	-	-	-	-	-	-	-
Chl - a (µg/l)		11	8	76	19	10	10	7	7	18	11	6	7	9
Cl <sup>-</sup> (mg/l)		40	40	40	40	40	41	42	42	42	43	42	117	117
T Fe (mg/l)		1.9	2.3	1.8	1.8	2.7	1.8	1.8	1.8	1.8	0.2	1.9	3.0	4.3
Alkalinity (mg/l)		49	49	91	50	51	49	53	53	50	51	50	92	109
Fecal Coliform (No/100ml)		-	-	-	-	-	-	-	8	-	-	-	-	164

Table S6.4.6 (18) Analytical Results of Water Quality of Lake Ypacarai

Date: Mar. 3 '89

Item	St.	St. 0		St. 4		St. 6	St. 20	St. 25		St. 30	St. 35	St. 49		St. 57		Yuquyry		Riacho Negro	Salado Boca
		surface	bottom	surface	bottom			surface	bottom			surface	bottom	surface	bottom	surface	bottom		
TP (µg/l)	170	225	194	217	223	241	223	241	223	205	229	245	247	236	239	235	235	183	364
PP (µg/l)	84	31	41	65	46	68	47	68	47	64	55	91	79	76	84	106	106	70	217
DOP (µg/l)	37	65	23	22	37	29	34	29	34	13	35	22	23	28	15	24	24	20	15
PO <sub>4</sub> P (µg/l)	49	129	130	130	140	144	142	144	142	128	139	132	145	132	140	105	105	93	132
TN (µg/l)	4,575	2,475	2,334	3,352	4,269	2,272	2,271	2,272	2,271	2,639	3,702	4,945	4,740	2,587	3,254	5,197	5,197	5,007	2,370
TNK (µg/l)	4,375	2,110	2,014	2,932	3,919	1,902	1,736	1,902	1,736	2,319	3,322	4,495	4,210	2,192	2,754	4,957	4,957	4,837	1,980
PON (µg/l)	1,901	432	230	768	2,106	293	47	293	47	606	1,367	2,885	2,380	509	811	3,114	3,114	3,247	377
DON (µg/l)	2,353	1,537	1,647	2,050	1,671	1,470	1,559	1,470	1,559	1,581	1,820	1,479	1,693	1,563	1,795	1,758	1,758	1,505	1,426
NH <sub>4</sub> -N (µg/l)	121	141	137	114	142	138	130	138	130	132	135	131	137	120	148	85	85	85	177
NO <sub>3</sub> -N (µg/l)	200	315	320	420	350	370	535	370	535	320	380	450	530	395	500	240	240	170	390
TCOD (mg/l)	26	27	27	28	22	25	23	25	23	24	23	27	31	37	32	25	25	24	39
DCOD (mg/l)	21	25	20	21	20	20	18	20	18	23	19	25	24	22	20	21	21	19	30
BOD (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TR (mg/l)	170	234	229	221	247	230	217	230	217	232	266	244	274	288	259	287	287	269	348
IL (mg/l)	61	69	149	141	131	171	38	171	38	119	144	162	181	177	168	203	203	208	246
SS (mg/l)	23.5	35.0	27.0	24.0	20.5	22.0	22.5	22.0	22.5	26.0	36.0	47.3	52.0	71.0	54.0	10.0	10.0	2.5	139.0
IL (mg/l)	9.0	21.0	16.0	10.5	10.0	13.5	12.0	13.5	12.0	14.5	24.0	31.3	30.0	47.0	32.0	0.5	0.5	0.5	100.0
Chl- <i>a</i> (µg/l)	52	55	25	50	22	21	14	21	14	32	14	25	20	18	22	15	15	13	33
Cl <sup>-</sup> (mg/l)	26	39	38	41	38	38	36	38	36	41	38	40	41	40	40	91	91	89	26
T Fe (mg/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (mg/l)	63	49	54	47	41	41	49	41	49	57	46	54	55	49	47	103	103	81	43
Fecal coliform (No/100ml)	-	-	-	0	6	6	-	6	-	10	0	0	-	10	-	74	74	84	0



Table S6.5.2 Vertical Profiles of Organic Carbon and Nitrogen, and Water Content of Sediment

Feb. 17, '88

St. Depth (cm)	E-a			E-b			E-c					
	C (mg / g-dw)	N (mg / g-dw)	C/N	Water Content (%)	C (mg / g-dw)	N (mg / g-dw)	C/N	Water Content (%)	C (mg / g-dw)	N (mg / g-dw)	C/N	Water Content (%)
0~2.5cm	38.52	2.37	16.3	97.3	61.78	5.57	11.1	177.4	77.58	4.99	15.5	195.9
2.5~5.0	7.95	0.58	13.7	42.6	-	-	-	163.2	88.79	5.31	16.7	190.
5.0~10.0	5.01	0.44	11.4	35.1	-	-	-	114.2	103.48	6.46	16.0	146.9
15.0~20.0	2.80	0.37	7.6	31.7	-	-	-	43.8	3.41	0.67	5.1	50.3
25.0~30.0	1.74	.27	6.4	17.2	-	-	-	41.3	1.36	0.42	3.2	46.4
35.0~40.0	-	-	-	-	-	-	-	38.0	1.39	0.42	3.3	42.9

St. Depth	E-d			E-e				
	C (mg / g-dw)	N (mg / g-dw)	C/N	Water Content (%)	C (mg / g-dw)	N (mg / g-dw)	C/N	Water Content (%)
0~2.5cm	79.97	5.5	15.5	183.4	70.96	4.70	15.1	186.5
2.5~5.0	-	-	-	185.9	81.62	5.07	16.1	178.6
5.0~10.0	-	-	-	185.0	81.75	6.37	12.8	172.3
15.0~20.0	-	-	-	67.0	100.72	7.14	14.1	173.9
25.0~30.0	-	-	-	-	105.18	7.56	13.9	161.6
35.0~40.0	-	-	-	-	-	-	-	-

Table S6.5.3 Vertical Profiles of Physical and Chemical Characteristics of Sediment at St. 25 in the Lake

July, 9'88

Depth (cm)	Density (g/cm <sup>3</sup> )	Water Content (%)	Ignition Loss (%)	N(mg/g-dw)	C(mg/g-dw)	C/N
0-2.5	-	175.0	17.5	4.64	73.04	15.7
2.5-5.0	-	192.4	-	-	-	-
5.0-7.5	-	171.4	20.2	6.01	84.87	14.1
7.5-10.0	1.03	193.8	20.2	-	-	-
10.0-12.5	1.27	143.9	19.1	5.41	65.38	12.1
12.5-15.0	1.35	166.3	20.3	-	-	-
15.0-17.5	1.85	92.2	11.9	2.36	23.55	10.0
17.5-20.0	2.03	50.8	14.3	-	-	-

Table S6.5.4 Grain Diameter of Sediment in the Lake

Sampling date: July. 9, '88

St.	Max. Size ( $\mu\text{m}$ )	Size of				Size Ratio (%)			
		60%( $\mu\text{m}$ )	30%( $\mu\text{m}$ )	10%( $\mu\text{m}$ )	2,000~420 $\mu\text{m}$	420~74 $\mu\text{m}$	74~5 $\mu\text{m}$	5~1 $\mu\text{m}$	1 $\mu\text{m}$ >
4	840	45.2	7.58	1.05	1.5	31.5	42.2	15.1	9.7
25	105	3.85	0.793	-	0.0	1.8	33.5	30.9	33.8
49	105	5.79	1.13	-	0.0	3.8	39.8	28.4	28.0

**Table S6.A.1 Particulate Organic Nitrogen and Carbon Content of the Lake Water**

July 8, '88

St.	Organic N (µg/l)	Organic C (µg/l)	C/N by wt.
0	65	560	8.6
4	210	1,715	8.2
20	290	2,200	7.6
25	315	1,945	6.2
30	275	1,795	6.5
35	380	2,450	6.4
49	285	2,155	7.6
Yuquyry Boca	50	633	12.7
Boca Salado	629	6,557	10.4

Table S6.A.2 Primary Production in the Lake

Feb. 27, '89

St.	St. 25	St. 49
Temp (°C)	28.3	29.1
D.O (mg/l) (%)	7.1 (92)	7.1 (93)
Chl-a (mg/l)	307.3	34.7
SS (mg/l)	72.0	18.3
Photosynthetic Activity (0m) (mgC/m <sup>3</sup> -h)	373	101
Photosynthetic (mgC/m <sup>2</sup> -day)	774	226
Photosynthetic Efficiency (0m)	1.2	1.0
Respiration (mgC/m <sup>3</sup> -day)	639	218

Table S6.A.3 Quality of Rainwater

Oct. 26, '88

TP	POP	DOP	PO <sub>4</sub> -P	TN	NH <sub>4</sub> -N	NO <sub>3</sub> -N	Cl-	Alkalinity
	(µg/l)				(mg/l)		(mg/l)	(mg/l)
10	2	8	0	1.26	0.36	0.21	3	2

Table S6.A.4 Water Quality in Lake Ipoá

Oct. 15, '88

TP	POP	DOP	PO <sub>4</sub> -P	TNK	NH <sub>4</sub> -N	TCOD	DCOD	Chl-a	Cl-	TFe	Alkalinity
	(µg/l)				(µg/l)		(mg/l)	(µg/l)			(mg/l)
141	63	78	0	1,129	66	31	23	31	6	3.7	19

**Table S6.A.5 Particulate Organic Nitrogen and Carbon Content in the river Water**

July 9, '88

River	Organic N ( $\mu\text{g}/\ell$ )	Organic C ( $\mu\text{g}/\ell$ )	C/N by wt.
Yuquyry (Y - 7)	270	1,690	6.3
Yuquyry (Y - 6)	200	1,315	6.6
Yagua Resa-u (P11)	50	505	10.1
Ypucu (P12)	130	1,010	7.8





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