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Records of Aquatic Macrophyte Flora and Environmental Factors from the Irrigation Ponds around Lake Shinji, Shimane, Japan

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Relationship between aquatic macrophyte composition and environmental factors were studied in 149 irrigation ponds mostly distributed in the surrounding area of Lake Shinji, Shimane Prefecture, Japan, during the summer of 1984, 1986 and 1988. During the study, a total of 38 taxa were recorded, and 17 environmental factors such as altitude, depth, transparency, pH, electric conductivity, COD, alkalinity, chlorophyll *a*, ignition loss of bottom soil, Na, K, Ca, Mg, Mn, Fe, PO_4-P and total P contents were measured. Since the results processed by statistical treatment and/or multivariate analysis have already been published, the raw data on macrophyte composition and environmental factors are presented in this paper as appendices, expecting the information to be of general use.

Introduction

There are many irrigation ponds in the surrounding area of Lake Shinji, Shimane Prefecture, Japan. However, only scattered data on aquatic macrophyte flora have been available. Therefore, the senior author conducted an extensive survey on the flora and some environmental characteristics of the irrigation ponds in the locality to document the present status of the ponds. During the July–October of 1984, 1986 and 1988, a total of 149 ponds (Fig. 1) were visited and presence or absence of all species of submerged, floating-leaved and free floating macrophytes were recorded and 17 environmental factors were measured (cf. Table 3). While these results of the survey had already been compiled and the relation between aquatic macrophyte composition and environmental factors were examined (Kunii, 1991), presence/absence records of all aquatic macrophytes and the raw data on environmental factors were not presented in the paper. This paper is thus prepared as appendices of the earlier paper. By virtue of the large number of the sites studied, it is expected that the information presented here will be of general utilization.

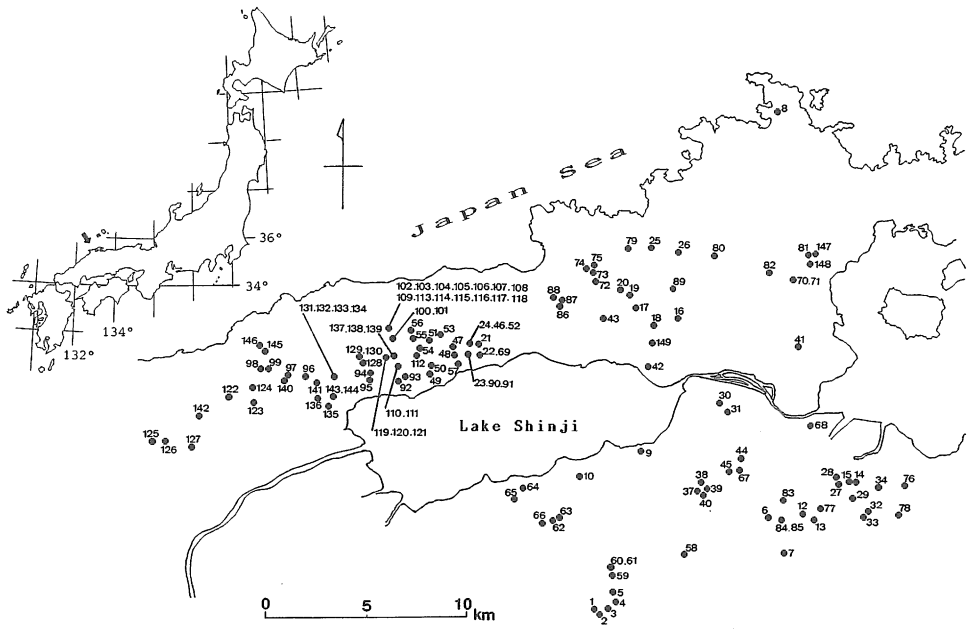

Fig. 1. Map of the surrounding area of Lake Shinji, Shimane Prefecture, showing locations of study ponds. Three ponds (nos. 11, 35 and 36) locating farther to the west of Lake Shinji are omitted from the figure. No. 11, Pond Hasu-ike in Koryo Town; No. 35, Pond Ukinuno-ike at Mt. Sambe; No. 36, Pond Himenoga-ike at Mt. Sambe. Observations were made in 1984, 1986 and 1988 for nos. 1–45, 46–91 and 92–149, respectively.

Methods

Refer Kunii (1991) for detailed description of the methods.

Results and Discussion

A total of 38 macrophyte taxa observed in the 149 study ponds are listed in Table 1, along with their taxon codes and frequency of occurrence. Table 2 shows presence/absence records of the 38 macrophyte taxa. Responsibility for the specific identifications rests with the senior author, and voucher specimens of each species have been deposited in the Laboratory of Plant Ecology of Shimane University. Data on the environmental factors are shown in Table 3.

The authors hope that the information will provide additional insight into the relationship between distribution of aquatic macrophytes and environmental factors. The data presented here will also be available to monitor the progressive environmental changes of the irrigation ponds in the locality.

Table 1. Macrophyte taxa observed in 149 study ponds, their code names and frequency of occurrence*

Taxon	Code	Frequency (%)
Trapa spp.	Tsp	84 (56.4)
Utricularia spp.	Usp	60 (40.3)
Nymphaea tetragona Georgi	Nte	56 (37.6)
Potamogeton octandrus Poir.	Poc	55 (36.9)
Myriophyllum oguraense Miki	Mog	48 (32.2)
Ceratophyllum demersum Linn.	Cde	33 (22.1)
Hydrilla verticillata (Linn. fil.) Casp.	Hve	30 (20.1)
Brasenia schreberi J. F. Gmel.	Bsc	30 (20.1)
Najas minor All.**	Nmi	29 (19.5)
Potamogeton fryeri A. Benn.	Pfr	25 (16.8)
Nitella spp.	Nsp	17 (11.4)
Blyxa echinosperma (C. B. Clarke) Hook fil.	Bec	13 (8.7)
Myriophyllum ussuriense (Regel) Maxim.	Mus	12 (8.1)
Potamogeton oxyphyllus Miq.	Pox	12 (8.1)
Spirodela polyrhiza (Linn.) Schleid.	Spo	9 (6.0)
Limnophila sessiliflora Blume	Lse	8 (5.4)
Lemna paucicostata Hegelm.	Lpa	8 (5.4)
Ottelia alismoides (Linn.) Pers.	Oal	8 (5.4)
Eleocharis spp.	Esp	8 (5.4)
Potamogeton distinctus A. Benn.	Pdi	7 (4.7)
Nymphoides indica (Linn.) O. Kuntze	Nin	6 (4.0)
Nelumbo nucifera Gaertn.	Nnu	6 (4.0)
Najas graminea Del.	Ngr	6 (4.0)
Sparganium fallax Graebn.	Sfa	6 (4.0)
Nuphar japonicum DC.	Nja	5 (3.4)
Potamogeton crispus Linn.	Pcr	5 (3.4)
Nymphaea cv.	Ncv	4 (2.7)
Chara spp.	Csp	4 (2.7)
Najas japonica Nakai	Naj	3 (2.0)
Blyxa japonica (Miq.) Maxim.	Bja	2 (1.3)
Egeria densa (Planch.) Casp.	Ede	2 (1.3)
Isoetes japonica A. Br.	Ija	2 (1.3)
Vallisneria asiatica Miki	Vas	1 (0.7)
Ricciocarpus natans (Linn.) Corda	Rna	1 (0.7)
Myriophyllum spicatum Linn.	Msp	1 (0.7)
Hydrocharis dubia (Blume) Backer	Hdu	1 (0.7)
Eichhornia crassipes (Mart.) Solms	Ecr	1 (0.7)
Euryale ferox Salisb.	Efe	1 (0.7)
Total number of ponds studied		149 (100)

*; nomenclature of taxa follows mainly Ohwi (1972).

**; including *N. oguraensis* Miki.

Table 2. Records of 38 macrophyte taxa from 149 ponds. See Table 1 for taxon name. 1 and 0 indicate presence and absence of each taxon, respectively.

Pond number	Tsp	Usp	Nte	Poc	Mog	Cde	Hve	Bsc	Nmi	Pfr	Nsp	Bec	Mus	Pox	Spo	Lse	Lpa	Oal	Esp	Pdi	Nin	Nnu	Ngr	Sfa	Nja	Pcr	Ncv	Csp	Naj	Bja	Ede	Ija	Vas	Rna	Msp	Hdu	Ecr	Efe	Total
1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	6
6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3
7	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	4
9	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	1	1	0	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
12	0	1	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
13	0	1	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
14	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
15	0	0	1	1	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
21	1	1	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	9
22	1	1	1	1	0	1	1	1	1	0	1	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	14
23	1	1	1	1	1	0	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
24	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
25	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
27	1	0	0	1	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
28	1	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6
29	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
31	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
32	1	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
33	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
34	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
35	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
36	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
37	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
38	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	5
39	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
40	0	1	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	8

41	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
42	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
43	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
44	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
45	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	6
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48	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
49	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
50	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
51	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
52	1	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
53	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
54	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
55	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
56	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3
57	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
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59	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
60	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
61	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
62	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
63	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
64	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
65	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
66	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
67	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5
68	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
69	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
70	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
71	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
72	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
73	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
74	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
75	1	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	7
76	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
77	0	1	1	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
78	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
79	1	1	0	1	1	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3

Table 2. Continued.

Pond number	Tsp	Usp	Nte	Poc	Mog	Cde	Hve	Bsc	Nmi	Pfr	Nsp	Bec	Mus	Pox	Spo	Lse	Lpa	Oal	Esp	Pdi	Nin	Nnu	Ngr	Sfa	Nja	Pcr	Ncv	Csp	Naj	Bja	Ede	Ija	Vas	Rna	Msp	Hdu	Ecr	Efe	Total
81	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5
82	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
83	0	1	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
84	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
85	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
86	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
87	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
88	1	1	1	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7
89	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
90	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
91	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
92	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
93	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
94	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
95	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
96	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
97	1	1	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
98	1	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
99	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
100	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	7
101	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
102	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
103	1	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
104	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
105	1	1	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
106	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
107	0	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
108	0	0	1	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
109	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
110	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
111	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
112	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
113	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
114	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
115	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
116	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
117	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
118	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
119	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
120	0	1	1	1	1	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8

121	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
122	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
123	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
124	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
125	1	1	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
126	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
127	1	1	0	1	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
128	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
129	0	1	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6
130	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
131	1	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
132	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
133	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
134	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
135	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
136	1	1	0	0	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
137	0	1	1	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
138	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
139	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
140	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
141	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
142	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
143	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
144	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
145	1	1	1	0	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10
146	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
147	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
148	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
149	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9
Total	84	60	56	55	48	33	30	30	29	25	17	13	12	12	9	8	8	8	8	7	6	6	6	6	5	5	4	4	3	2	2	2	1	1	1	1	1	

Table 3. Data of 17 environmental factors measured.

Pond number	Alt. (m)	Dep. (m)	Tr. (m)	pH	Cond. (μS/cm)	COD (mg/l)	PO_4-P (μg/l)	Alk. (meq/l)	Chl. *a* (μg/l)	V.S. (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	Mn (mg/l)	Fe (mg/l)	Total P (μg/l)
1	350.00	0.80	0.80	6.80	75.10	14.85	9.50	0.52	1.68	10.80	8.15	2.12	4.28	2.09	0.80	0.36	—
2	330.00	0.70	0.42	6.60	42.10	16.43	3.00	0.18	9.13	17.60	2.53	1.16	1.97	1.24	0.22	0.28	—
3	380.00	1.00	0.92	6.50	67.00	5.44	0.00	0.42	11.73	2.88	6.66	1.80	3.40	2.20	0.16	0.19	—
4	390.00	1.50	1.15	6.90	57.00	3.16	3.00	0.36	3.75	3.04	3.96	1.73	2.75	1.82	0.07	0.14	—
5	370.00	0.95	0.95	6.60	48.00	7.27	0.00	0.17	5.69	3.13	2.52	1.61	1.45	1.37	0.20	0.30	—

Table 3. Continued.

Pond number	Alt. (m)	Dep. (m)	Tr. (m)	pH	Cond. (μS/cm)	COD (mg/l)	PO_4-P (μg/l)	Alk. (meq/l)	Chl. *a* (μg/l)	V.S. (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	Mn (mg/l)	Fe (mg/l)	Total P (μg/l)
6	30.00	—	—	6.50	109.00	16.75	80.20	0.55	8.91	3.39	13.57	3.16	7.96	3.46	1.16	0.25	—
7	80.00	2.20	1.60	7.00	78.00	10.11	0.00	0.44	7.53	3.44	2.54	1.59	4.68	2.49	0.07	0.20	—
8	10.00	1.40	0.85	8.00	329.00	16.75	3.00	2.19	4.54	3.43	20.80	4.36	30.09	14.15	0.19	0.19	—
9	10.00	1.40	0.65	6.50	67.00	12.46	1.50	0.11	18.65	2.54	4.06	1.44	1.12	1.72	0.08	0.24	—
10	10.00	1.20	1.20	7.50	91.00	10.90	3.00	0.44	10.24	3.30	13.16	1.56	5.66	2.92	0.07	0.19	—
11	30.00	6.00	3.00	7.20	110.00	9.48	1.50	0.20	5.07	2.87	13.18	2.12	4.09	5.20	0.07	0.14	—
12	60.00	0.80	0.80	6.40	61.00	16.75	0.00	0.20	26.49	2.26	6.62	1.36	1.39	2.68	0.10	0.35	—
13	30.00	2.20	1.00	7.00	69.00	19.28	0.00	0.35	17.02	2.89	7.19	1.15	1.76	3.62	0.19	0.43	—
14	5.00	1.65	1.65	5.60	52.00	12.32	0.00	0.05	6.77	2.82	5.83	1.09	0.68	0.95	0.12	0.29	—
15	5.00	1.00	0.65	6.70	68.00	12.96	1.50	0.04	38.80	2.55	10.44	2.03	1.35	1.64	0.09	0.27	—
16	10.00	1.90	0.90	7.10	136.00	19.43	1.50	0.69	24.63	2.30	10.66	3.18	9.22	6.35	0.06	0.19	—
17	5.00	1.00	1.00	6.90	195.00	19.59	1.50	0.44	8.33	2.37	25.46	5.26	11.94	7.86	0.08	0.18	—
18	5.00	2.25	1.85	6.80	123.00	19.91	0.00	0.69	3.13	2.89	19.79	1.90	7.47	5.71	0.12	0.20	—
19	10.00	2.15	0.70	6.90	93.00	10.43	0.00	0.45	26.14	2.32	7.06	2.46	4.14	3.29	0.06	0.15	—
20	10.00	1.20	0.85	6.60	117.00	12.48	0.00	0.70	6.60	2.51	10.00	3.02	5.46	4.18	0.10	0.25	—
21	10.00	1.50	0.95	6.50	132.00	14.06	0.00	0.78	4.83	3.36	15.11	1.70	8.39	5.76	0.06	0.06	—
22	10.00	1.75	1.00	6.40	78.00	10.27	0.00	0.14	5.87	3.37	11.02	1.77	1.66	2.04	0.07	0.11	—
23	10.00	2.10	0.95	6.40	73.00	13.27	0.00	0.20	23.71	1.99	10.31	1.51	1.09	2.22	0.09	0.35	—
24	20.00	0.85	0.60	6.30	106.00	19.61	4.50	0.43	5.67	10.00	11.56	1.89	4.86	4.11	0.08	0.14	—
25	20.00	2.90	1.80	6.20	78.00	5.69	0.00	0.18	3.42	11.50	12.42	1.24	2.38	2.23	0.10	0.14	—
26	60.00	1.35	0.65	8.00	153.00	10.27	0.00	0.90	33.81	10.90	14.62	2.72	9.56	5.38	0.07	0.18	—
27	10.00	2.20	1.35	6.10	58.00	9.48	0.00	0.81	7.65	17.80	6.18	1.86	1.08	1.25	0.07	0.25	—
28	10.00	1.15	0.90	6.80	60.00	8.37	1.50	0.13	5.88	13.40	5.66	1.53	1.41	1.25	0.06	0.18	—
29	20.00	1.90	1.15	6.70	97.00	15.17	0.00	0.63	26.79	14.40	12.59	1.75	3.51	5.46	0.13	0.27	—
30	20.00	1.10	0.40	7.50	127.00	19.91	4.50	0.86	61.00	16.40	24.06	5.70	7.15	3.28	0.08	0.09	—
31	10.00	2.30	1.90	7.10	108.00	13.11	0.00	0.86	6.02	14.60	11.74	1.53	5.22	3.86	0.08	0.09	—
32	30.00	2.35	1.20	6.60	102.00	7.43	0.00	0.75	5.58	9.20	12.08	2.54	5.07	3.54	0.09	0.03	—
33	50.00	0.40	0.40	6.40	66.00	13.59	0.00	0.44	21.59	25.90	7.99	1.85	1.74	2.36	0.10	0.11	—
34	30.00	—	—	6.90	56.00	4.42	0.00	0.22	2.73	—	4.05	2.02	1.39	1.12	0.04	0.09	—
35	270.00	2.50	0.30	9.10	71.00	6.95	1.50	0.41	163.07	—	9.20	2.31	2.17	1.08	0.06	0.42	—
36	570.00	0.50	0.50	5.70	15.00	22.12	1.50	0.04	4.97	50.90	0.00	0.29	0.29	0.15	0.06	0.04	—
37	140.00	1.95	1.00	6.90	64.00	5.06	1.50	0.24	8.02	11.81	6.24	1.18	1.73	1.66	0.05	0.03	—
38	140.00	0.30	0.30	5.20	57.00	9.48	0.00	0.06	5.24	17.92	3.20	0.46	1.64	1.95	0.52	0.08	—
39	150.00	1.70	1.70	4.50	112.00	6.00	0.00	0.00	4.45	16.95	2.00	0.58	5.12	4.20	0.71	0.00	—
40	160.00	1.75	—	5.50	44.00	6.00	0.00	0.05	21.74	7.54	3.71	0.23	0.49	0.87	0.06	0.05	—

41	70.00	0.55	0.55	6.40	85.00	16.91	0.00	0.54	4.59	9.54	12.86	1.62	5.12	2.83	0.08	0.30	—
42	10.00	0.70	0.70	6.60	113.00	15.80	0.00	0.24	14.50	18.25	23.51	3.40	4.98	2.70	0.07	0.11	—
43	5.00	1.30	0.60	6.30	80.00	14.38	3.00	0.24	4.11	9.58	11.71	1.76	1.47	2.37	0.09	0.24	—
44	20.00	1.40	0.85	6.50	69.00	8.22	6.00	0.35	27.64	14.13	8.19	2.03	3.08	2.05	0.07	0.07	—
45	30.00	2.70	2.40	6.80	77.00	7.74	6.00	0.31	4.57	11.05	7.66	2.07	2.67	2.20	0.12	0.06	—
46	20.00	2.30	1.65	6.90	111.40	13.60	0.00	0.40	—	—	11.68	1.15	6.15	—	0.07	0.55	12.00
47	10.00	2.10	1.05	6.90	170.00	12.80	5.00	0.39	—	—	14.80	2.48	9.42	6.57	0.01	0.58	6.00
48	5.00	2.20	1.25	6.40	79.30	10.90	5.00	0.16	—	—	10.32	1.09	2.38	1.78	0.01	0.42	13.00
49	10.00	3.65	1.30	6.50	67.40	8.09	0.00	0.14	—	—	10.28	1.33	2.09	1.82	0.12	1.35	11.50
50	10.00	2.30	1.25	6.20	94.60	6.51	1.60	0.14	—	—	9.65	0.76	1.89	1.41	0.16	0.61	11.50
51	30.00	3.20	2.10	6.50	253.90	8.06	0.80	0.34	6.10	—	17.17	3.03	13.55	12.30	0.58	0.62	15.50
52	30.00	1.84	0.90	6.80	275.10	7.58	0.80	0.21	3.13	—	15.52	2.03	12.91	10.90	0.21	0.57	10.00
53	30.00	3.20	2.20	6.50	116.30	7.11	0.00	0.24	2.17	—	12.45	1.09	4.64	2.42	0.16	0.61	8.00
54	40.00	2.50	1.15	6.80	200.30	11.20	0.00	0.46	3.25	—	17.01	3.94	7.81	5.94	0.08	0.49	18.50
55	100.00	1.90	1.10	6.30	112.60	10.11	0.00	0.10	4.70	—	16.07	1.12	1.50	1.95	0.12	0.44	9.00
56	100.00	—	—	6.80	199.30	10.10	7.00	0.35	41.50	—	19.74	2.10	5.99	6.05	0.19	0.61	17.50
57	10.00	—	—	6.60	132.50	20.70	1.60	0.48	5.55	—	16.95	2.03	1.94	4.52	0.17	1.68	22.50
58	200.00	2.40	1.80	7.10	90.60	12.90	—	0.42	—	—	9.03	1.54	5.53	1.67	0.14	0.69	19.50
59	400.00	—	—	6.20	64.30	—	—	—	0.58	—	7.78	1.45	2.54	1.16	0.21	0.75	13.50
60	390.00	—	—	6.00	77.40	15.70	—	0.23	5.38	—	8.16	1.18	2.66	1.96	0.18	0.99	19.50
61	400.00	—	—	6.00	37.40	8.78	—	0.07	5.69	—	5.69	0.29	1.14	0.53	0.15	0.59	10.00
62	—	0.90	0.55	6.70	91.20	6.64	3.00	0.18	11.47	—	9.71	2.11	3.23	1.67	0.23	0.62	18.50
63	—	1.35	0.65	6.40	92.80	6.54	1.60	0.28	7.39	—	8.89	1.47	3.86	2.20	0.62	0.86	9.30
64	0.00	3.30	2.15	6.90	158.10	8.12	0.00	0.27	5.43	—	11.73	1.04	8.86	4.71	0.17	0.75	12.80
65	10.00	1.70	1.00	6.40	137.90	15.80	0.80	0.60	14.60	—	15.76	0.93	7.31	2.66	0.17	0.92	28.00
66	—	—	—	6.90	99.80	12.50	12.00	0.31	7.81	—	8.37	3.13	4.66	2.04	0.21	0.82	17.50
67	20.00	2.25	1.18	7.20	91.60	4.90	0.00	0.32	7.94	—	8.99	1.57	3.83	1.96	0.13	0.78	11.80
68	30.00	—	—	6.40	110.40	12.00	0.00	0.56	9.27	—	7.52	3.51	7.49	2.40	0.58	0.92	30.50
69	10.00	1.22	0.60	—	101.60	12.10	3.00	0.09	3.67	—	14.23	1.67	3.66	3.29	0.35	1.72	9.30
70	20.00	3.30	1.60	7.10	98.10	6.87	0.00	0.29	3.91	—	9.44	1.28	4.07	2.24	0.15	0.92	8.00
71	20.00	2.40	1.50	6.80	94.70	6.26	0.00	0.27	3.97	—	9.41	1.25	3.70	2.21	0.16	0.95	11.80
72	5.00	—	—	7.10	115.40	13.70	8.00	0.24	20.80	—	12.43	1.97	3.74	2.33	0.15	0.85	24.00
73	5.00	2.33	1.05	6.80	113.00	14.30	0.80	0.34	30.21	—	12.37	1.13	3.06	2.96	0.14	1.14	17.50
74	10.00	—	—	6.60	103.60	12.30	1.60	0.48	11.75	—	8.80	0.32	5.41	3.25	0.17	1.11	21.80
75	5.00	1.20	0.65	7.40	242.40	12.20	3.00	1.15	23.54	—	20.13	4.97	12.42	6.57	0.30	0.93	30.80
76	30.00	1.70	0.60	6.90	96.20	11.10	3.00	0.27	86.90	—	9.72	1.71	3.63	2.56	0.09	0.44	18.50
77	20.00	2.00	1.30	6.60	74.30	8.97	5.00	0.27	2.08	—	8.94	0.74	1.71	2.45	0.36	0.42	8.00
78	60.00	4.75	2.90	6.60	137.60	12.00	—	0.38	3.26	—	13.64	2.88	3.41	4.40	0.21	0.48	—
79	10.00	1.70	0.40	6.50	153.80	8.37	5.00	0.43	19.67	—	14.84	1.68	4.61	3.94	0.28	0.45	14.50
80	130.00	2.50	1.15	7.20	145.50	6.64	5.00	0.65	6.45	—	14.26	1.36	6.98	3.73	0.09	0.40	18.50

Table 3. Continued.

Pond number	Alt. (m)	Dep. (m)	Tr. (m)	pH	Cond. (μS/cm)	COD (mg/l)	PO_4-P (μg/l)	Alk. (meq/l)	Chl. *a* (μg/l)	V.S. (%)	Na (mg/l)	K (mg/l)	Ca (mg/l)	Mg (mg/l)	Mn (mg/l)	Fe (mg/l)	Total P (μg/l)
81	40.00	2.90	2.00	7.10	146.10	5.75	1.60	0.67	5.00	—	14.23	0.76	6.73	3.77	0.09	0.41	9.50
82	40.00	2.10	0.80	7.10	155.40	9.45	1.60	0.75	26.50	—	13.56	2.42	8.22	4.02	0.15	0.80	13.50
83	40.00	2.20	1.10	6.00	64.20	6.23	1.60	0.06	18.70	—	8.03	1.51	0.89	1.06	0.12	0.40	9.50
84	40.00	1.10	0.80	6.20	68.80	8.85	1.60	0.11	5.85	—	8.72	1.70	0.55	1.40	0.12	0.40	7.00
85	50.00	—	—	6.90	—	5.37	1.60	0.20	—	—	11.21	1.69	1.05	1.72	0.14	0.42	14.50
86	40.00	1.60	1.60	6.40	129.20	7.77	6.50	0.42	16.40	—	14.34	1.76	3.64	3.37	0.17	0.89	7.00
87	40.00	2.05	0.90	6.70	125.80	5.37	5.80	0.34	8.19	—	15.41	1.35	2.73	3.16	0.11	0.43	7.00
88	50.00	2.86	1.35	7.00	193.60	9.64	3.30	0.77	15.90	—	18.31	1.24	7.96	5.60	0.11	0.42	22.00
89	50.00	3.00	1.65	7.50	135.30	4.14	0.00	0.52	15.40	—	14.44	1.31	5.63	2.64	0.18	0.83	17.50
90	10.00	—	—	6.30	105.80	13.40	0.00	0.14	5.52	—	14.17	4.00	0.92	1.98	0.11	0.59	16.50
91	10.00	—	—	6.50	89.70	11.50	0.80	0.09	9.53	—	13.69	1.48	0.93	1.89	0.10	0.54	16.50
92	20.00	1.97	1.00	6.30	227.50	—	3.30	0.29	62.15	16.87	13.40	2.50	13.31	11.32	0.64	1.91	88.50
93	20.00	3.83	2.10	5.90	86.40	—	80.00	0.09	19.91	8.58	10.35	1.46	0.31	2.48	0.04	0.03	4.70
94	20.00	2.36	1.85	6.90	119.00	—	3.30	0.17	8.02	12.17	10.05	1.38	0.84	4.79	0.01	0.21	6.60
95	20.00	2.35	1.05	7.10	245.30	—	3.30	0.09	8.52	10.83	14.64	0.63	7.50	12.26	0.75	0.00	8.50
96	30.00	2.55	1.38	6.50	106.80	—	8.30	0.16	8.92	11.30	10.06	0.93	2.45	3.25	0.01	0.10	16.10
97	30.00	4.50	2.25	6.40	180.10	—	0.00	0.09	7.65	8.44	15.81	2.23	2.41	8.11	0.15	0.03	2.80
98	30.00	1.40	0.70	7.30	145.60	—	1.70	0.62	14.71	15.07	18.43	1.00	1.22	4.76	0.02	2.46	6.60
99	20.00	2.93	1.07	6.90	117.40	—	0.00	0.23	3.20	9.47	12.36	0.68	2.98	3.22	0.02	0.40	14.20
100	50.00	2.25	1.10	8.20	128.80	—	3.30	0.50	16.16	8.86	9.68	1.36	8.42	4.24	0.01	0.08	19.90
101	60.00	—	—	6.60	140.60	—	1.70	0.54	37.98	—	11.26	1.60	1.53	4.20	0.12	1.02	10.40
102	100.00	5.20	2.05	7.00	92.30	—	5.00	0.14	3.41	7.79	8.38	2.49	2.37	2.68	0.01	0.00	14.20
103	100.00	1.00	0.65	6.50	45.50	—	0.00	0.20	23.19	12.74	2.81	0.88	1.22	1.09	0.00	1.39	10.40
104	100.00	—	—	6.40	42.60	—	3.30	0.22	23.35	—	3.22	1.45	1.45	0.99	0.00	0.60	10.40
105	100.00	—	—	7.20	63.40	—	5.00	0.40	28.11	—	5.16	1.35	5.59	2.13	0.02	2.35	25.70
106	90.00	—	—	6.60	131.90	—	0.00	0.31	28.85	—	10.85	1.04	3.44	6.38	0.06	0.81	37.10
107	100.00	—	—	7.60	140.00	—	1.70	0.31	14.41	—	14.34	3.20	2.45	5.26	0.01	0.30	10.40
108	110.00	—	—	6.70	70.40	—	5.00	0.09	23.79	—	7.24	2.19	1.30	1.68	0.02	0.90	6.60
109	120.00	—	—	6.90	38.50	—	1.70	0.07	5.91	—	3.69	0.83	0.62	1.31	0.03	0.78	10.40
110	50.00	1.85	1.20	6.30	110.00	—	0.00	0.19	22.39	8.53	12.09	0.85	2.90	2.98	0.04	1.47	20.00
111	50.00	1.70	1.30	7.40	149.30	—	0.00	0.30	15.38	9.60	13.60	1.40	1.38	4.48	0.03	0.21	6.60
112	40.00	2.10	2.10	5.60	113.30	—	—	0.08	10.91	11.42	13.03	0.64	1.38	2.78	0.03	0.10	12.30
113	110.00	—	—	5.80	26.20	—	5.00	0.02	27.30	—	3.82	1.08	0.15	0.39	0.00	0.08	10.40
114	110.00	—	—	7.20	133.70	—	0.00	0.44	135.97	—	8.21	2.19	2.75	3.95	0.16	0.10	23.80
115	110.00	—	—	6.40	66.60	—	3.30	0.32	94.50	—	5.13	1.80	1.38	2.33	0.36	0.41	23.80

116	100.00	—	—	6.80	101.90	—	5.00	0.45	27.87	—	7.24	4.21	2,83	2.81	0.23	1.43	14.20
117	100.00	—	—	6.60	78.20	—	0.00	0.38	129.86	—	7.30	—	2.14	1.84	0.03	3.43	10.40
118	110.00	—	—	6.00	87.20	—	1.70	0.17	7.89	—	8.71	2.21	1.07	3.07	0.11	1.17	4.70
119	50.00	1.45	1.35	6.20	110.20	—	6.70	0.14	13.45	8.82	12.33	0.63	1.53	3.59	0.02	0.14	12.30
120	40.00	1.15	1.15	7.40	117.20	—	1.70	0.38	9.90	5.91	13.80	0.50	2.98	2.71	0.02	0.11	227.00
121	30.00	—	—	5.90	139.80	—	5.00	0.06	93.55	—	13.30	1.86	5.20	5.01	0.13	0.12	19.90
122	10.00	3.05	1.30	6.70	118.90	—	5.00	0.28	11.02	10.30	11.49	1.15	3.98	4.09	0.04	0.12	19.90
123	10.00	2.60	1.10	6.80	119.90	—	1.70	0.31	8.32	9.49	14.07	0.80	3.98	4.82	0.04	1.04	37.10
124	20.00	2.60	1.40	6.70	161.50	—	1.70	0.47	20.39	8.29	12.90	1.03	9.95	7.94	0.01	0.00	18.00
125	20.00	2.80	1.15	6.80	119.30	—	1.70	0.47	13.04	11.27	9.62	0.40	6.66	6.73	0.00	0.19	14.20
126	20.00	2.40	0.90	7.40	135.30	—	1.70	0.66	23.18	7.54	10.69	1.30	9.03	3.38	0.00	0.14	10.40
127	10.00	2.55	1.08	6.40	100.40	—	11.70	0.40	10.61	13.03	10.12	0.86	3.67	4.20	0.04	0.44	10.40
128	20.00	3.70	1.70	7.20	124.30	—	0.00	0.30	16.17	8.74	11.59	1.26	3.67	2.40	0.00	0.16	14.20
129	70.00	—	—	6.70	163.60	—	0.00	0.51	6.94	—	12.80	2.49	1.99	4.91	0.10	2.08	6.60
130	50.00	—	—	5.40	131.70	—	3.30	0.04	21.33	—	11.39	1.73	2.37	3.07	0.03	0.18	14.20
131	40.00	2.80	1.35	6.80	168.60	—	1.70	0.58	51.64	9.79	13.07	0.59	9.64	5.33	0.11	0.34	18.00
132	40.00	—	—	6.50	136.30	—	3.30	0.29	62.15	—	13.67	2.00	0.46	3.52	0.02	0.07	8.50
133	50.00	—	—	6.00	138.60	—	10.00	0.15	12.36	—	13.47	0.80	0.92	5.03	0.02	0.29	8.50
134	50.00	—	—	6.00	113.20	—	6.70	0.14	14.64	—	12.56	0.56	2.30	3.53	0.00	0.30	16.10
135	20.00	1.90	0.68	6.00	116.10	—	0.00	0.22	38.82	11.25	11.49	1.35	3.37	3.45	0.02	0.70	56.10
136	20.00	1.75	0.40	6.40	116.60	—	—	0.34	35.45	12.76	13.23	1.83	0.31	2.17	0.18	2.62	10.40
137	40.00	2.55	1.20	6.00	85.10	—	10.00	0.10	12.56	10.83	9.85	1.10	1.38	1.91	0.06	0.26	14.20
138	40.00	—	—	6.00	91.20	—	0.00	0.24	11.79	—	10.15	0.86	2.14	2.71	0.01	0.45	6.60
139	50.00	—	—	5.50	108.30	—	3.30	0.16	12.12	—	10.65	1.30	1.07	2.33	0.11	1.73	6.60
140	50.00	—	—	6.90	—	—	6.70	0.43	9.98	—	33.50	6.50	—	—	0.00	0.22	31.40
141	30.00	3.55	1.15	7.10	221.60	—	1.70	0.36	48.30	10.06	13.07	2.24	10.79	9.85	0.00	0.08	35.20
142	20.00	2.56	0.70	6.70	103.60	—	3.30	0.14	5.65	8.42	10.79	1.04	1.15	1.37	0.00	0.10	16.10
143	40.00	—	—	6.60	74.30	—	3.30	0.21	5.88	—	4.32	0.85	4.21	4.91	0.00	0.08	10.40
144	40.00	—	—	6.40	59.70	—	50.00	0.24	35.17	—	4.19	2.78	1.76	2.46	0.04	0.60	240.80
145	150.00	2.70	1.90	6.20	117.80	—	5.00	0.21	8.46	9.63	12.03	0.90	2.07	2.45	0.11	0.16	35.20
146	150.00	2.90	2.05	6.40	120.00	—	11.70	0.21	6.39	10.05	11.93	0.83	1.45	1.14	0.05	0.03	4.70
147	50.00	2.20	0.57	6.00	93.60	—	16.70	0.22	10.59	7.13	10.45	0.61	1.53	3.45	0.05	0.57	35.20
148	30.00	3.65	1.75	8.10	104.00	—	6.70	0.34	15.50	9.62	9.87	1.10	3.83	3.82	0.01	0.06	35.20
149	0.00	1.70	0.78	6.20	78.30	—	3.30	0.30	130.09	16.87	7.24	0.96	3.21	2.50	0.03	0.57	40.90

Alt. = Altitude, Dep. = Water depth at the middle of the pond, Tr. = Secchi disc depth, pH = pH by colorimetric method, Cond. = Conductivity (YSI conductivity meter model 33), COD = Chemical oxygen demand determined by the alkaline oxidation method (Saijo, 1957), PO_4-P = molybdenum blue phosphorus, Alk. = Alkalinity by titrating to pH 4.8 with 0.01 N H_2SO_4, Chl. *a* = Chlorophyll *a* (UNESCO, 1966), V.S. = Ignition loss of bottom soil, Total P = Soluble reactive P after a persulfate oxidation. Cation concentrations were determined with a Hitachi 170–40 atomic absorption spectrophotometer. See Kunii (1991) for further description of the methods.

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