Supplementary Information A. Time series plot of reconstructed total carbon biomass of phytoplankton (black), total phosphorus (green), chlorophyll *a* (yellow), and chlorophyll flux (magnesium) and pair-correlations among the variables

In order to reveal the historical change of trophic status of Lake Biwa, we compiled various data sets to show the temporal trend. Albeit with significant interannual variability, different data series exhibited a similar trend (Table A1, Fig. A1); that is, the eutrophication progressed rapidly in 1960s and then declined after 1980. The phytoplankton carbon lagged total phosphorus (TP), and the chlorophyll flux data estimated from a sediment core lagged the phytoplankton carbon. While admitting uncertainty in the estimates, we use the phytoplankton carbon biomass (black line in Fig. A1) as a proxy to total phytoplankton biomass.

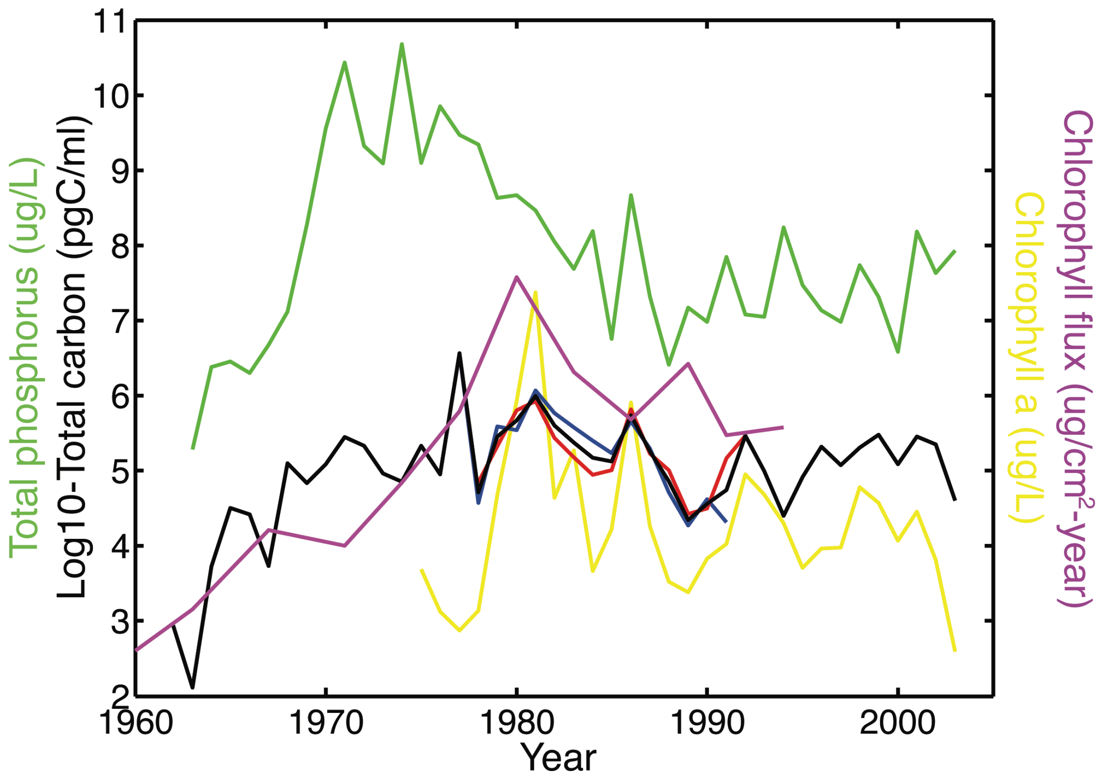

Figure A1. The blue line represents the series from 1978 to 1991 collected by SPFES, and the red line represents the estimated series from 1978 to 1991 collected by LBERI using the eqn: Y=-0.5914+1.8089*LBERI (r=0.788, p<0.001). For the overlapped period, the estimated total carbon biomass was calculated as the average of the blue and red lines. The magnesium line represents chlorophyll flux data estimated from a sediment core (extracted from Tsugeki, 2003). For the chlorophyll flux series, two data points (1997 and 2000) were not included, because these two points show anomalously high values that could be owing to errors in the upper layer of a sediment core.

Table A1. Results of pair-correlation among the variables

	TP	Log10-Phytoplankton carbon	Chlorophyll a	Sediment chlorophyll
TP		0.009	0.545	0.023
Log10-Phytoplankton carbon	0.401		0.012	0.043
Chlorophyll a	-0.117	0.463		0.351
Sediment chlorophyll	0.674	0.618	0.418	

The upper lower presents correlation coefficients and lower triangle presents p-values for the correlations. Except for TP versus Chlorophyll a, all pair-wise correlations are significant (α=0.05, without adjusting autocorrelation in time series).

Supplementary Information B. Aggregated phytoplankton carbon biomass according to their size, morphology or taxonomic class

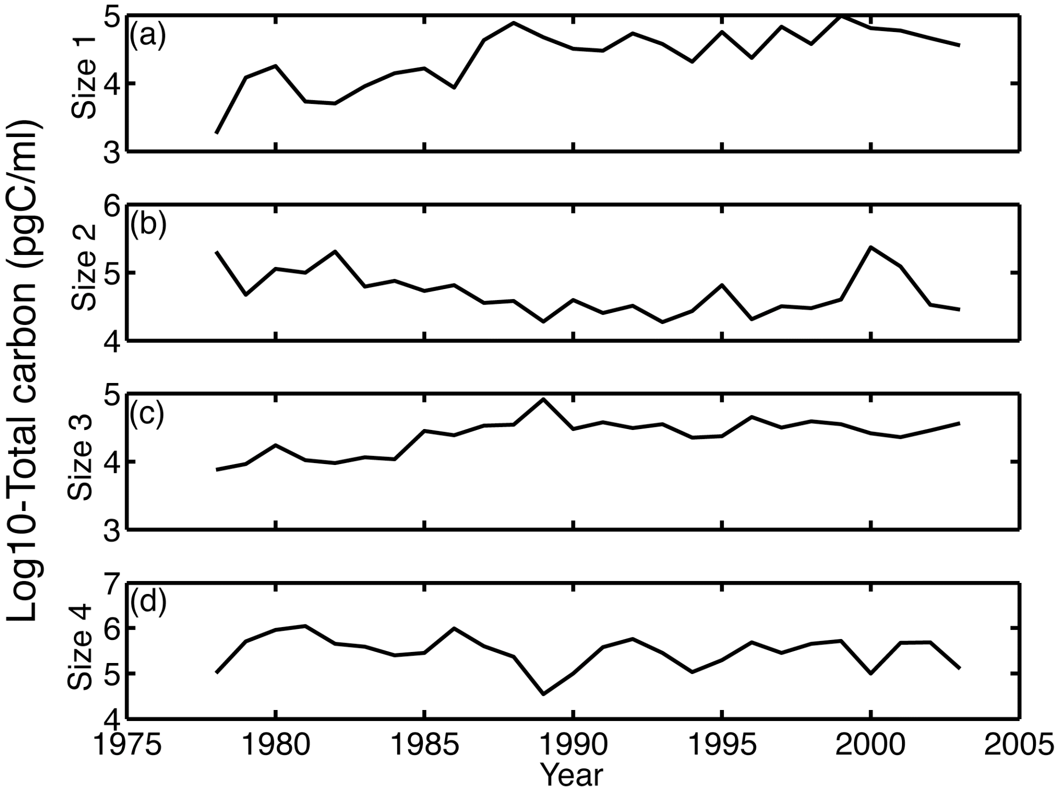

Figure B1. Phytoplankton carbon biomass time series categorized by cell size (not colony size). Size 1 ranges 0~200 um^3; size 2 ranges 200~1000 um^3; size 3 ranges 1000~8000 um^3; size 4 >8000 um^3.

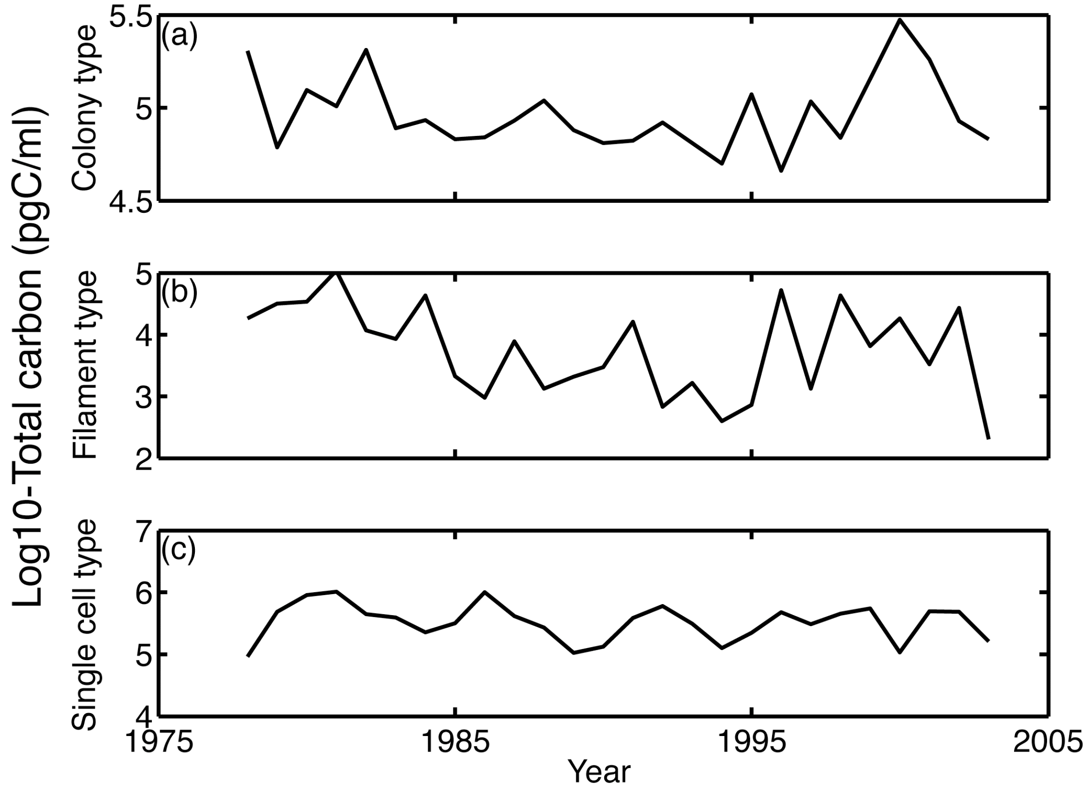

Figure B2. Phytoplankton carbon biomass time series categorized by morphology.

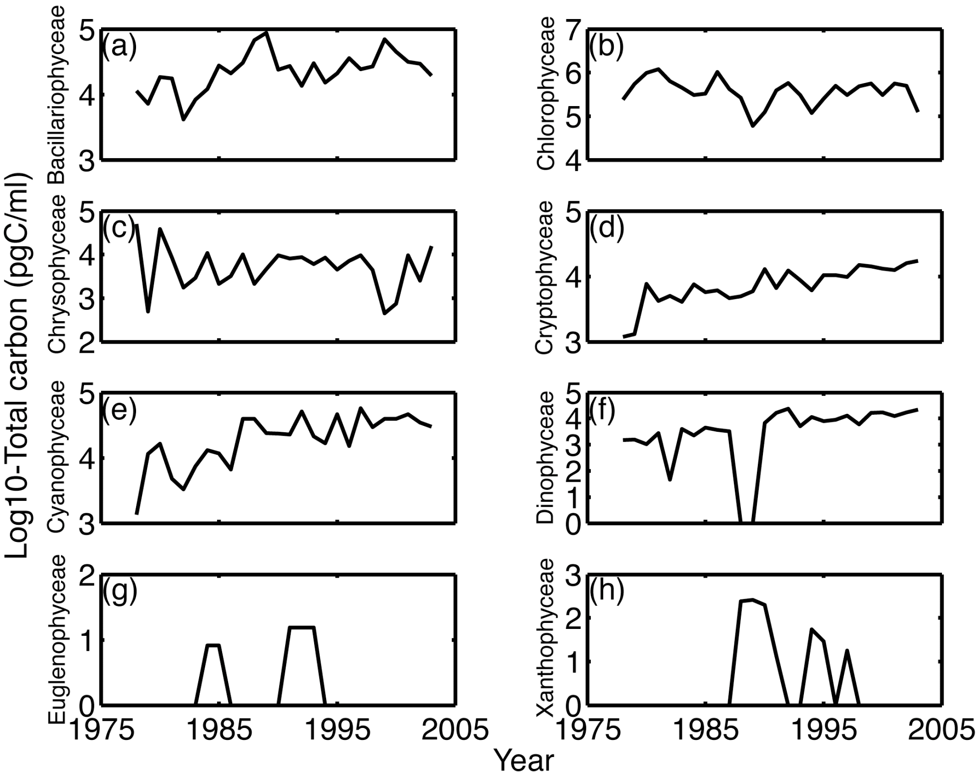

Figure B3. Phytoplankton carbon biomass time series categorized by phytoplankton class.

Supplementary Information C. Aggregated zooplankton abundance according to their taxonomic class and feeding type.

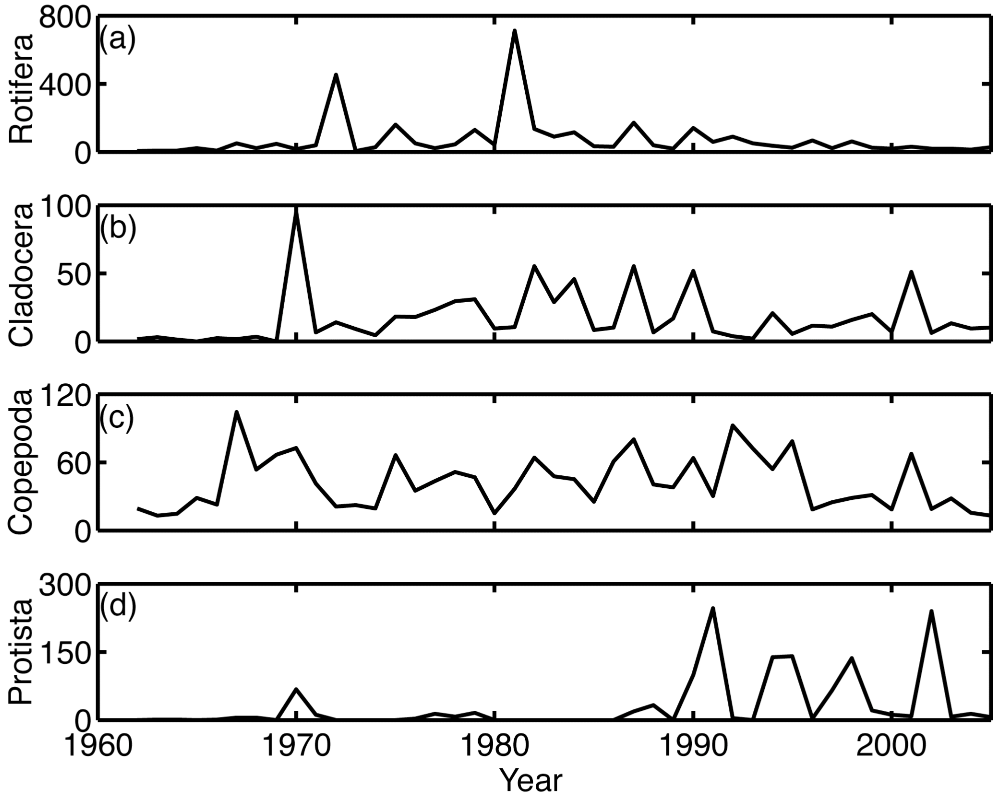

Figure C1. Total zooplankton abundance (10^4ind./m^2) time series categorized by taxonomic groups.

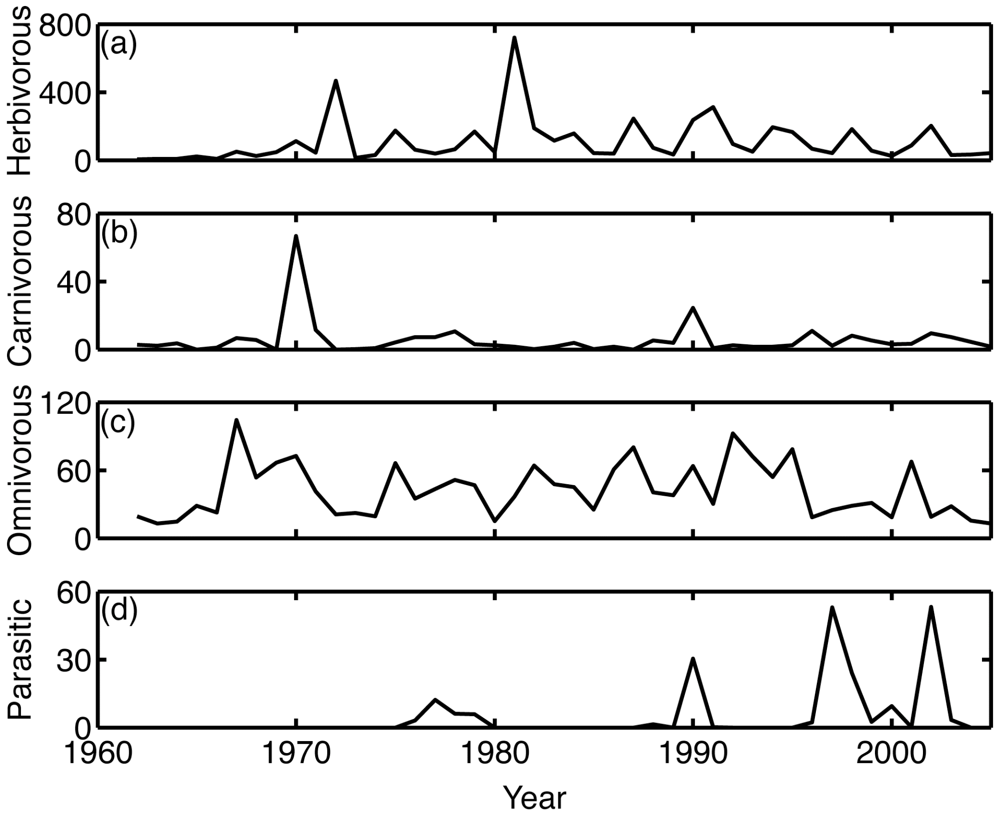

Figure C2. Total zooplankton abundance (10^4ind./m^2) time series categorized by feeding types.

Supplementary Information D. Life history characteristics of zooplankton taxa

Species	Taxonomy	Size (um)	Feeding	Feeding type	Remark	Reference
Asplanchna spp	Rotifera	420-1500	Carnivorous		Feeding on small rotifers and cladocerans	Williamson and Gilbert (1980)
Bosmina longirostris	Cladocera	250-700	Herbivorous	Suspension feeder, specialist**	Discriminating prey via prey odor	DeMott (1982;1986)
Brachionus spp	Rotifera	180-570	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton and bacterioplankton	Ruttner-Kolisko (1974), DeMott (1986)
Conochilus spp	Rotifera	250-300	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton	Gilbert and Bogdan (1984)
Cyclops spp	Copepoda	900-1700	Omnivorous	Raptorial feeder	A selective feeder	Yoshida et al (2001)
Daphnia spp	Cladocera	800-2500	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton, non-selective	DeMott (1982;1986), Kawabata (1988)
Diaphanosoma brachyurum	Cladocera	700-900	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton, non-selective	DeMott (1986)
Difflugia spp	Protista	65-400	Carnivorous			Han et al (2008)
Eodiaptomus japonicus	Copepoda	800-1200	Omnivorous	Suspension feeder, specialist**	A selective feeder	Kawabata (1988), Yoshida et al (2001)
Epistylis spp	Protista	30-350	Herbivorous	Suspension feeder	Feeding on phytoplankton and bacterioplankton	Patterson (1996)
Filinia spp	Rotifera	180-250	Herbivorous	Suspension feeder, specialist**	Discriminating prey via prey odor	DeMott (1986)
Kellicottia longispina	Rotifera	400-800	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton and bacterioplankton	Gilbert and Bogdan (1984)
Keratella spp	Rotifera	310-350	Herbivorous	Suspension feeder, generalist*	Feeding on phytoplankton	Gilbert and Bogdan (1984)
Leptodora kindtii	Cladocera	10000	Carnivorous	Raptorial feeder		Browman (1989)

Mesocyclops leuckarti	Copepoda	900-1700	Omnivorous	Raptorial feeder	A selective feeder	Yoshida et al (2001)
Ploesoma spp	Rotifera	150-600	Carnivorous			Ruttner-Kolisko (1974)
Polyarthra spp	Rotifera	80-220	Herbivorous	Suspension feeder, specialist**	Feeding on phytoplankton	Ruttner-Kolisko (1974)
Synchaeta spp	Rotifera	200-400	Herbivorous	Suspension feeder, specialist**	Feeding on phytoplankton	Ruttner-Kolisko (1974)
Trichocerca spp	Rotifera	200-600	Herbivorous	Suspension feeder	Feeding on phytoplankton	Ruttner-Kolisko (1974)
Trichodina spp	Protista	40-80	Parasitic		Parasitic for aquatic animals	Green and Shiel (2000)

*Organisms ingest various particle sizes.
**Organisms select food particles via its prey size or taste.

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