SUPPLEMENT FOR

Wang, C., V. B-Béres, C. Stenger-Kovács, X. Li & A. Abonyi, 2018. Enhanced ecological indication based on combined planktic and benthic functional approaches in large river phytoplankton ecology. Hydrobiologia 818(1):163–175 doi:10.1007/s10750-018-3604-1.

Supplementary Table S.1 The variance explained in the phytoplankton community structure based on the taxonomic and different functional approaches by local environmental variables using different number of Self Organizing Map (SOM) clusters. For more details on the functional approaches, please see the text of the original article.

Number of SOM clusters	Taxonomic composition	Functional groups (FGs) (Reynolds et al. 2002, Borics et al. 2007, Padisák et al. 2009)	Combined FG and size classes (Reynolds et al. 2002, Berthon et al. 2011)	Combined FG and diatom ecological guilds (Reynolds et al. 2002, Passy 2007, Rimet and Bouchez 2012)	Combined FG and eco-morphological groups based on size and ecological guilds (Reynolds et al. 2002, B-Béres et al., 2016)
3	62.0%	70.3%	80.0%	82.7%	76.0%
4	64.2%	71.6%	80.2%	81.5%	76.5%
5	60.1%	71.0%	79.0%	69.1%	71.6%
6	58.6%	69.1%	71.6%	63.0%	65.4%

Supplementary Table S.2 Sample composition of each cluster in the Self Organizing Map (SOM) approach based on the taxonomic, the functional group (FG) and the three different combined functional approaches: FG and diatom size, FG and diatom ecological guilds, as well as FG and diatom eco-morphological groups. For more details on the functional approaches, please see the text of the original article.

SOM clusters	Taxonomic composition				Functional groups (FGs) (Reynolds et al. 2002, Borics et al. 2007, Padisák et al. 2009)				Combined FG and size classes (Reynolds et al. 2002, Berthon et al. 2011)				Combined FG and diatom ecological guilds (Reynolds et al. 2002, Passy 2007, Rimet and Bouchez 2012)			Combined FG and eco-morphological groups based on size and ecological guilds (Reynolds et al. 2002, B-Béres et al., 2016)			
	C1	C2	C3	C4	F1	F2	F3	F4	S1	S2	S3	S4	G1	G2	G3	T1	T2	T3	T4
Sample composition	25-Apr, 30-Apr, 10-May, 20-May, 25-May, 30-May, 10-Jul, 10-Aug, 15-Sep	1-Jun, 10-Jun, 15-Jun, 20-Jun, 5-Jul, 15-Jul, 20-Jul, 25-Jul, 30-Jul, 5-Aug	1-Jan, 5-Jan, 10-Jan, 15-Jan, 20-Jan, 25-Jan, 30-Jan, 1-Feb, 5-Feb, 10-Feb	20-Aug, 25-Aug, 30-Aug, 1-Sep	1-Jan, 10-Jan, 20-Jan, 25-Jan, 30-Jan, 1-Feb, 5-Feb, 10-Feb, 25-Feb, 1-Mar	15-Jan, 15-Apr, 20-Apr, 25-Apr, 30-Apr, 1-May, 25-May, 10-Jun, 15-Jun	20-Aug, 25-Aug, 30-Aug, 1-Sep	5-Jan, 25-Mar, 1-Apr, 20-Apr, 20-May, 30-May, 1-Jun, 20-Jun, 30-Jun, 10-Jul, 15-Jul	1-Jan, 5-Jan, 10-Jan, 15-Jan, 20-Jan, 25-Jan, 30-Jan, 1-Feb, 5-Feb, 10-Feb	20-Aug, 25-Aug, 30-Aug, 1-Sep	25-May, 10-Jun, 15-Jun, 1-Jul, 20-Jul, 30-Jul, 15-Aug	20-Apr, 25-Apr, 30-Apr, 30-May, 25-Jun, 5-Jul, 15-Jul, 25-Jul, 1-Aug, 5-Aug	1-Jan, 5-Jan, 10-Jan, 20-Jan, 25-Jan, 30-Jan, 1-Feb, 5-Feb, 10-Feb, 25-Feb	15-Jan, 20-Apr, 25-Apr, 30-Apr, 1-May, 25-May, 30-May, 10-Jun, 15-Jun	20-Aug, 25-Aug, 30-Aug, 1-Sep	1-Jan, 5-Jan, 10-Jan, 15-Jan, 20-Jan, 30-Jan, 1-Feb, 5-Feb, 10-Feb, 25-Feb	20-Aug, 25-Aug, 30-Aug, 1-Sep	20-Jan, 25-Mar, 1-Apr, 10-May, 25-May, 30-May, 1-Jun, 15-Jun, 25-Jun, 5-Jul, 15-Jul	25-Mar, 1-Apr, 20-May, 10-Jul, 1-Aug, 15-Sep, 15-Nov

25-Sep	15-Aug	25-Feb	5-Mar	25-Jun	20-Oct	25-Feb	10-Aug	1-Mar	25-Jun	1-Mar	20-Jul
30-Sep	5-Sep	1-Mar	10-Mar	1-Jul	10-Nov	1-Mar	20-Sep	5-Mar	1-Jul	5-Mar	25-Jul
1-Oct	10-Sep	5-Mar	15-Mar	5-Jul		5-Mar	5-Dec	10-Mar	5-Jul	10-Mar	20-Sep
20-Oct		10-Mar	20-Mar	20-Jul		10-Mar		15-Mar	20-Jul	15-Mar	30-Sep
30-Oct		15-Mar	30-Mar	25-Jul		15-Mar		20-Mar	25-Jul	20-Mar	20-Oct
1-Nov		20-Mar	5-Apr	30-Jul		20-Mar		25-Mar	30-Jul	30-Mar	1-Dec
1-Dec		25-Mar	10-Apr	5-Aug		25-Mar		30-Mar	5-Aug	5-Apr	5-Dec
5-Dec		30-Mar	5-May	10-Aug		30-Mar		1-Apr	10-Aug	10-Apr	10-Dec
10-Dec		1-Apr	10-May	15-Aug		1-Apr		5-Apr	15-Aug	15-Apr	15-Dec
20-Dec		5-Apr	15-May	5-Dec		5-Apr		10-Apr	20-Sep	20-Apr	
25-Dec		10-Apr	5-Jun			10-Apr		15-Apr	5-Dec	30-Apr	
30-Dec		15-Apr	1-Aug			15-Apr		5-May		1-May	
		20-Apr	5-Sep			1-May		10-May		5-May	
		1-May	10-Sep			5-May		15-May		15-May	
		5-May	15-Sep			10-May		20-May		5-Jun	
		15-May	20-Sep			15-May		1-Jun		10-Jun	
		5-Jun	25-Sep			20-May		5-Jun		20-Jun	
		25-Jun	30-Sep			1-Jun		20-Jun		30-Jun	
			1-Oct			5-Jun		30-Jun		1-Jul	

			30-Jun		5-Oct				20-Jun				10-Jul			30-Jul		
			1-Jul		10-Oct				30-Jun				15-Jul			5-Aug		
			1-Aug		15-Oct				10-Jul				1-Aug			10-Aug		
			20-Sep		25-Oct				5-Sep				5-Sep			15-Aug		
			25-Sep		30-Oct				10-Sep				10-Sep			5-Sep		
			15-Dec		1-Nov				15-Sep				15-Sep			10-Sep		
					5-Nov				25-Sep				25-Sep			25-Sep		
					15-Nov				30-Sep				30-Sep			1-Oct		
					20-Nov				1-Oct				1-Oct			5-Oct		
					25-Nov				5-Oct				5-Oct			10-Oct		
					30-Nov				10-Oct				10-Oct			15-Oct		
					1-Dec				15-Oct				15-Oct			25-Oct		
					10-Dec				20-Oct				20-Oct			30-Oct		
					15-Dec				25-Oct				25-Oct			1-Nov		
					20-Dec				30-Oct				30-Oct			5-Nov		
					25-Dec				1-Nov				1-Nov			10-Nov		
					30-Dec				5-Nov				5-Nov			20-Nov		
									10-Nov				10-Nov			25-Nov		
									15-Nov				15-Nov			30-Nov		

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								20-Nov 25-Nov 30-Nov 1-Dec 10-Dec 15-Dec 20-Dec 25-Dec 30-Dec				20-Nov 25-Nov 30-Nov 1-Dec 10-Dec 15-Dec 20-Dec 25-Dec 30-Dec			20-Dec 25-Dec 30-Dec			

Supplementary Table S.3 Characteristics of SOM clusters defined using the Self Organizing Map approach based on the combination of the phytoplankton functional group concept *sensu* Reynolds (Reynolds et al. 2002) and size classes of benthic diatom taxa (Berthon et al. 2011) in the Pearl River phytoplankton, 2009.

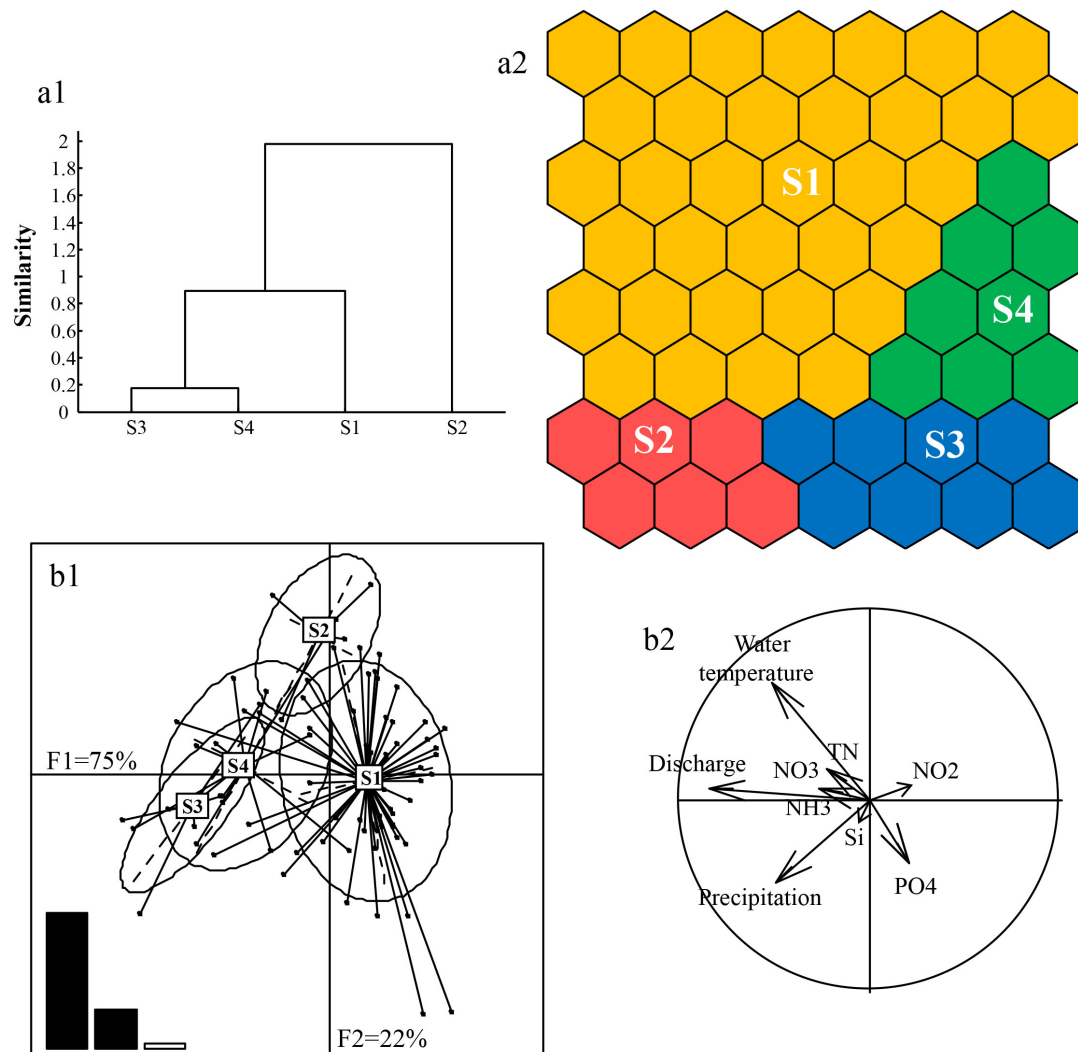| SOM clusters	S1	S2	S3	S4
Number of samples	57	4	7	13
Overlapping periods	All except August	Aug - Sep	May - Aug	Apr - Dec
Dominant seasons	Autumn & Winter	Summer	Summer	Summer
Dominant species	*Aulacoseira granulata*; *Melosira varians*	*A. granulata*	*A. granulata*	*A. granulata*
Dominant coda	P; TB	P	P	P
Dominant benthic diatoms	*M. varians*	*M. varians*; *Surirella minuta*; *Surirella robusta*;	*M. varians*; *Pleurosigma sp.*; *Navicula sp.*; *Cymbella affinis*; *Amphora ovalis*;	*M. varians*; *Cymbella sp.*
Size classes of dominant benthic diatoms	S5	S5; S4; S5	S5; S5; S3; S3; S5	S5; S3

P and TB mean functional groups according to Reynolds et al. 2002 and Borics et al. 2007. S3-S5 mean size classes of benthic diatoms according to Berthon et al. (2011).

Supplementary Table S.4 Characteristics of SOM clusters defined using the Self Organizing Map approach based on the combination of the phytoplankton functional group concept *sensu* Reynolds (Reynolds et al. 2002) and combined eco-morphological functional groups of benthic diatom taxa (B-Béres et al. 2016) in the Pearl River phytoplankton, 2009.
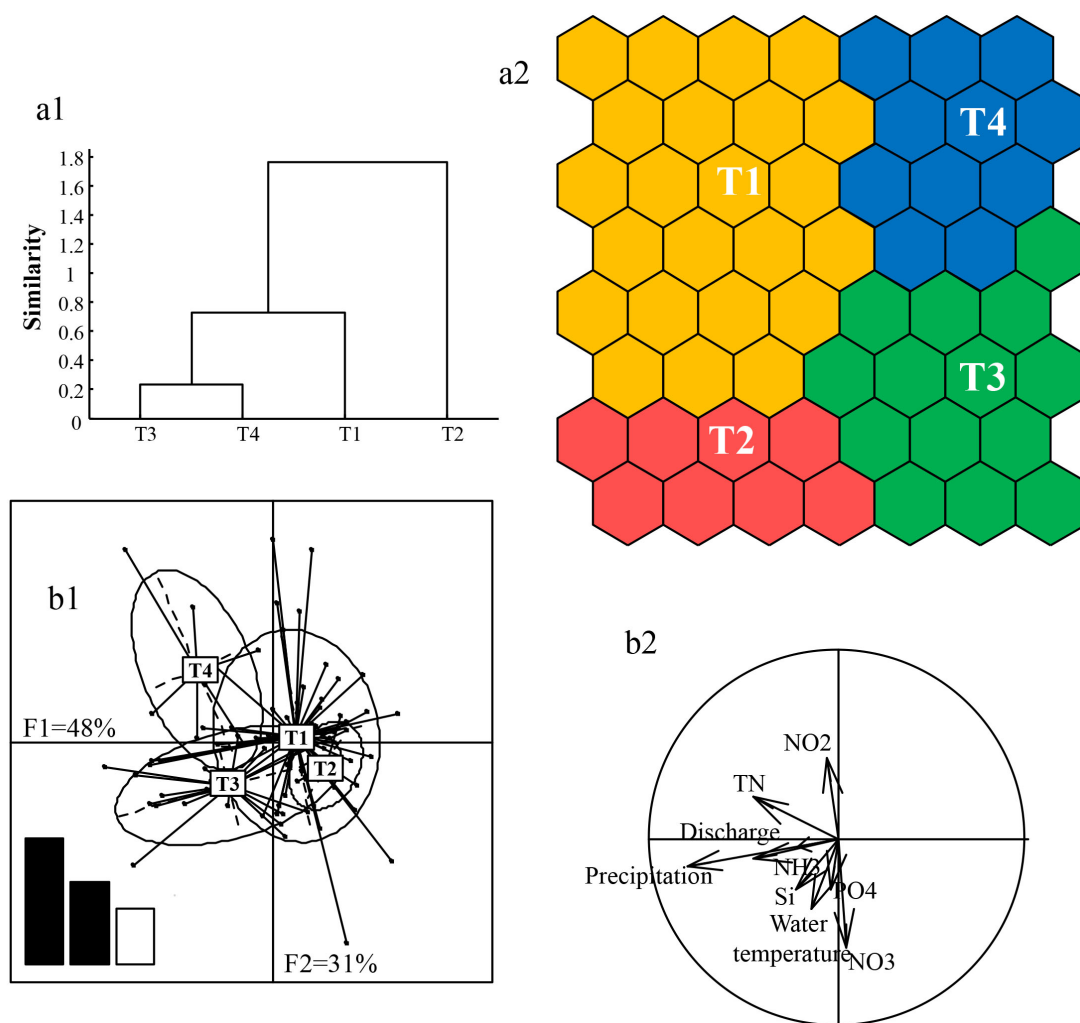
SOM clusters	T1	T2	T3	T4
No.	51	4	19	7
Period	All months	Aug - Sep	Jan - Dec	Mar - Nov
Dominant seasons	Autumn & Winter	Summer	Summer	Spring
Dominant species	*Aulacoseira granulata*; *Melosira varians*	*A. granulata*	*A. granulata*	*A. granulata*; *M. varians*
Dominant coda	P; TB	P	P	P; TB
Dominant benthic diatoms	*M. varians*	*M. varians*; *Surirella minuta*; *Surirella robusta*;	*M. varians*; *Cymbella sp.*	*M. varians*
CEMFGs of dominant benthic diatoms	HS5	HS5, MS4, MS5	HS5, LS3	HS5

P and TB mean functional groups according to Reynolds et al. 2002 and Borics et al. 2007. Names of CEMFG groups are according to B-Béres et al. 2016.

Supplementary Figure S.1 Self Organizing Map (SOM) clusters of phytoplankton in the Pearl River based on the combination of the FG approach *sensu* Reynolds (Reynolds et al. 2002) and size classes of benthic diatom taxa according to Berthon et al. (2011). (a1) Similarity levels between the four SOM clusters identified; (a2) The distribution of clusters on SOM; (b1) The distribution and overlap of SOM clusters; (b2) The correlation of SOM clusters with main environmental predictors using Linear Discriminant Analysis.

Supplementary Figure S.2 Self Organizing Map (SOM) clusters of phytoplankton in the Pearl River based on the combination of the FG approach *sensu* Reynolds (Reynolds et al. 2002) and detailed benthic diatom composition using combined eco-morphological functional groups according to B-Béres et al. (2016). (a1) Similarity levels between the four SOM clusters identified; (a2) The distribution of clusters on SOM; (b1) The distribution and overlap of SOM clusters; (b2) The correlation of SOM clusters with main environmental predictors using Linear Discriminant Analysis.

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