

Puche, E., Rojo, C., Ramos-Jiliberto, R. and Rodrigo, M: A. 2019. Structure and vulnerability of the multi-interaction network in macrophyte-dominated lakes. – Oikos doi: 10.1111/oik.06694

Appendix 1

Table A1. Main physical and chemical variables measured in the experimental mesocosm. Mean of two months (measured weekly) and standard deviation (mean \pm SD) are shown. For photosynthetic active radiation (PAR) the average dose was calculated from measurements made at depths of 0, 10, 20 and 30 cm in the mesocosm. Abbreviations: TN total nitrogen, TP total phosphorus.

Variable	Mean \pm SD
Temperature ($^{\circ}$ C)	21.1 \pm 0.8
Conductivity (μ S cm $^{-1}$)	1575 \pm 60
pH	8.4 \pm 0.2
Nitrate (mg N-NO $_3$ l $^{-1}$)	1.3 \pm 0.8
TN (mg N l $^{-1}$)	2.9 \pm 1.1
TP (mg P l $^{-1}$)	0.2 \pm 0.05
PAR (mol photons m $^{-2}$ d $^{-1}$)	2.2
Sediment %C	10.5 \pm 3.2
Sediment %N	0.12 \pm 0.08
Sediment %P	0.02 \pm 0.00

Table A2. Complete list of the identified taxa in each compartment, noting if they are autotrophic (Aut.) or heterotrophic organisms (Het.). Order is alphabetical within each compartment.

Taxon	Compartment	Autotroph (Aut.) / Heterotroph (Het.)
<i>Achnanthydium minutissimum</i>	<i>Pelagic</i>	Aut.
Bacteria	<i>Pelagic</i>	Het.
<i>Ceriodaphnia</i>	<i>Pelagic</i>	Het.
<i>Chlamydomonas</i> sp.	<i>Pelagic</i>	Aut.
<i>Chroococcus aphanocapsoides</i>	<i>Pelagic</i>	Aut.
<i>Chydorus</i>	<i>Pelagic</i>	Het.
Ciliate sp. 1	<i>Pelagic</i>	Het.
Ciliate sp. 2	<i>Pelagic</i>	Het.
Cyclopoid copepodite	<i>Pelagic</i>	Het.
Cyclopoid copepod	<i>Pelagic</i>	Het.
<i>Cyclotella meneghiniana</i>	<i>Pelagic</i>	Aut.
<i>Lecane bulla</i>	<i>Pelagic</i>	Het.
<i>Lecane</i> cf. <i>furcata</i>	<i>Pelagic</i>	Het.
<i>Lecane</i> cf. <i>hastata</i>	<i>Pelagic</i>	Het.
<i>Lecane closterocerca</i>	<i>Pelagic</i>	Het.
<i>Lecane hamata</i>	<i>Pelagic</i>	Het.
<i>Lecane luna</i>	<i>Pelagic</i>	Het.
<i>Lepadella</i>	<i>Pelagic</i>	Het.
Nauplii	<i>Pelagic</i>	Het.
<i>Oedogonium</i> sp.	<i>Pelagic</i>	Aut.
<i>Oscillatoria</i> sp.	<i>Pelagic</i>	Aut.
<i>Pleuroxus</i>	<i>Pelagic</i>	Het.
<i>Rhopalodia gibba</i>	<i>Pelagic</i>	Aut.
<i>Scenedesmus aculeolatus</i>	<i>Pelagic</i>	Aut.
<i>Simocephalus</i>	<i>Pelagic</i>	Het.
<i>Tetraedron minimum</i>	<i>Pelagic</i>	Aut.
<i>Achnanthydium minutissimum</i>	<i>Meadow</i>	Aut.
Bacteria	<i>Meadow</i>	Het.
<i>Bdelloidea</i>	<i>Meadow</i>	Het.
<i>Carteria</i> sp.	<i>Meadow</i>	Aut.
<i>Chlorella</i> sp.	<i>Meadow</i>	Aut.
Ciliate sp. 1	<i>Meadow</i>	Het.
Ciliate sp. 2	<i>Meadow</i>	Het.
<i>Coelastrum microporum</i>	<i>Meadow</i>	Aut.
Cyclopoid copepodite	<i>Meadow</i>	Het.
Cyclopoid copepod	<i>Meadow</i>	Het.
<i>Cyclotella meneghiniana</i>	<i>Meadow</i>	Aut.
<i>Diploneis parma</i>	<i>Meadow</i>	Aut.

<i>Encyonopsis microcephala</i>	Meadow	Aut.
<i>Geitlerinema amphibium</i>	Meadow	Aut.
<i>Gomphosphaeria aponina</i>	Meadow	Aut.
<i>Lecane bulla</i>	Meadow	Het.
<i>Lecane cf. pyriformis</i>	Meadow	Het.
<i>Lecane closterocerca</i>	Meadow	Het.
<i>Lecane hamata</i>	Meadow	Het.
<i>Lecane luna</i>	Meadow	Het.
<i>Lepadella</i>	Meadow	Het.
<i>Lophocanis</i>	Meadow	Het.
Nauplii	Meadow	Het.
<i>Navicula</i> sp.	Meadow	Aut.
<i>Oedogonium</i> sp.	Meadow	Aut.
<i>Oscillatoria</i> sp.	Meadow	Aut.
<i>Phormidium</i> sp.	Meadow	Aut.
<i>Pleuroxus</i>	Meadow	Het.
<i>Scenedesmus aculeolatus</i>	Meadow	Aut.
<i>Scenedesmus acutus</i>	Meadow	Aut.
<i>Scenedesmus</i> sp.	Meadow	Aut.
<i>Simocephalus</i>	Meadow	Het.
<i>Tetraedron minimum</i>	Meadow	Aut.
<i>Ulnaria ulna</i> var. <i>acus</i>	Meadow	Aut.
<hr/>		
<i>Achnantheidium minutissimum</i>	Periphyton	Aut.
<i>Aphanocapsa elachista</i>	Periphyton	Aut.
<i>Aphanothece stagnina</i>	Periphyton	Aut.
Bacteria	Periphyton	Het.
<i>Bdelloidea</i>	Periphyton	Het.
<i>Ceriodaphnia</i>	Periphyton	Het.
<i>Chara hispida</i>	Periphyton	Aut.
<i>Chlorella</i> sp.	Periphyton	Aut.
<i>Chroococcus aphanocapsoides</i>	Periphyton	Aut.
<i>Chroococcus obliteratus</i>	Periphyton	Aut.
<i>Chroococcus</i> sp.	Periphyton	Aut.
<i>Chroococcus turgidus</i>	Periphyton	Aut.
<i>Chydorus</i>	Periphyton	Het.
<i>Coelastrum microporum</i>	Periphyton	Het.
<i>Colurella</i>	Periphyton	Het.
Copepodite	Periphyton	Het.
Copepod	Periphyton	Het.
<i>Cyclotella meneghiniana</i>	Periphyton	Aut.
<i>Cymbella</i> sp.	Periphyton	Aut.
<i>Diploneis parma</i>	Periphyton	Aut.
<i>Encyonopsis microcephala</i>	Periphyton	Aut.
<i>Fragilaria biceps</i>	Periphyton	Aut.

<i>Geitlerinema amphibium</i>	<i>Periphyton</i>	Aut.
<i>Komvophoron</i> sp.	<i>Periphyton</i>	Aut.
<i>Lecane bulla</i>	<i>Periphyton</i>	Het.
<i>Lecane</i> cf. <i>furcata</i>	<i>Periphyton</i>	Het.
<i>Lecane</i> cf. <i>hastata</i>	<i>Periphyton</i>	Het.
<i>Lecane</i> cf. <i>pyriformis</i>	<i>Periphyton</i>	Het.
<i>Lecane clostercerca</i>	<i>Periphyton</i>	Het.
<i>Lecane hamata</i>	<i>Periphyton</i>	Het.
<i>Lecane luna</i>	<i>Periphyton</i>	Het.
<i>Lecane</i> sp. 2	<i>Periphyton</i>	Het.
<i>Lepadella</i>	<i>Periphyton</i>	Het.
<i>Merismopedia</i> sp.	<i>Periphyton</i>	Aut.
Nauplii	<i>Periphyton</i>	Het.
<i>Navicula</i> sp.1	<i>Periphyton</i>	Aut.
<i>Navicula</i> sp.2	<i>Periphyton</i>	Aut.
<i>Navicymbulla pusilla</i>	<i>Periphyton</i>	Aut.
<i>Nitzschia</i> sp.1	<i>Periphyton</i>	Aut.
<i>Oedogonium</i> sp	<i>Periphyton</i>	Aut.
<i>Oscillatoria curviceps</i>	<i>Periphyton</i>	Aut.
Ostracod	<i>Periphyton</i>	Het.
<i>Phormidium</i> cf. <i>formosum</i>	<i>Periphyton</i>	Aut.
<i>Phormidium</i> sp.	<i>Periphyton</i>	Aut.
<i>Physella acuta</i>	<i>Periphyton</i>	Het.
<i>Pleuroxus</i>	<i>Periphyton</i>	Het.
<i>Pseudanabaena biceps</i>	<i>Periphyton</i>	Aut.
<i>Pseudanabaena</i> sp.	<i>Periphyton</i>	Aut.
<i>Simocephalus</i>	<i>Periphyton</i>	Het.
<i>Snowella lacustris</i>	<i>Periphyton</i>	Aut.
<i>Spirulina</i> sp.	<i>Periphyton</i>	Aut.
<i>Ulnaria ulna</i> var. <i>acus</i>	<i>Periphyton</i>	Aut.
<i>Ulothrix</i> sp.	<i>Periphyton</i>	Aut.

Table A3. Degree, closeness and betweenness centrality measures (C_D , C_C and C_B , respectively) for each node in the network.

ID	Compartment	Node	C_D	C_C	C_B
1		Nutrients	0.537	0.661	0.000
2	<i>Pelagic</i>	Bacteria	0.195	0.494	0.008
3	<i>Pelagic</i>	Unicellular chlorophytes	0.220	0.513	0.005
4	<i>Pelagic</i>	Colonial chlorophytes	0.171	0.488	0.003
5	<i>Pelagic</i>	Filamentous chlorophytes	0.073	0.441	0.000
6	<i>Pelagic</i>	Small diatoms	0.220	0.513	0.005
7	<i>Pelagic</i>	Big diatoms	0.171	0.488	0.003
8	<i>Pelagic</i>	Colonial cyanobacteria	0.268	0.539	0.001
9	<i>Pelagic</i>	Filamentous cyanobacteria	0.171	0.482	0.000
10	<i>Pelagic</i>	Ciliates	0.098	0.402	0.000
11	<i>Pelagic</i>	Rotifers	0.195	0.456	0.002
12	<i>Pelagic</i>	Cladocerans	0.341	0.526	0.005
13	<i>Pelagic</i>	Copepodites	0.244	0.471	0.000
14	<i>Pelagic</i>	Copepods	0.146	0.456	0.000
15	<i>Meadow</i>	Bacteria	0.268	0.539	0.020
16	<i>Meadow</i>	Unicellular chlorophytes	0.341	0.586	0.014
17	<i>Meadow</i>	Colonial chlorophytes	0.268	0.554	0.006
18	<i>Meadow</i>	Filamentous chlorophytes	0.122	0.500	0.000
19	<i>Meadow</i>	Small diatoms	0.341	0.586	0.014
20	<i>Meadow</i>	Big diatoms	0.268	0.554	0.006
21	<i>Meadow</i>	Colonial cyanobacteria	0.366	0.603	0.022
22	<i>Meadow</i>	Filamentous cyanobacteria	0.220	0.539	0.017
23	<i>Meadow</i>	Ciliates	0.195	0.506	0.013
24	<i>Meadow</i>	Rotifers	0.341	0.569	0.029
25	<i>Meadow</i>	Cladocerans	0.561	0.683	0.062
26	<i>Meadow</i>	Copepodites	0.415	0.603	0.036
27	<i>Meadow</i>	Copepods	0.244	0.547	0.000
28	<i>Periphyton</i>	Bacteria	0.244	0.526	0.002
29	<i>Periphyton</i>	Unicellular chlorophytes	0.293	0.547	0.002
30	<i>Periphyton</i>	Colonial chlorophytes	0.244	0.532	0.001
31	<i>Periphyton</i>	Filamentous chlorophytes	0.146	0.488	0.000
32	<i>Periphyton</i>	Small diatoms	0.293	0.547	0.002
33	<i>Periphyton</i>	Big diatoms	0.244	0.532	0.001
34	<i>Periphyton</i>	Colonial cyanobacteria	0.341	0.562	0.000
35	<i>Periphyton</i>	Filamentous cyanobacteria	0.244	0.513	0.000
36	<i>Periphyton</i>	Ciliates	0.146	0.471	0.005
37	<i>Periphyton</i>	Rotifers	0.268	0.506	0.006
38	<i>Periphyton</i>	Cladocerans	0.390	0.539	0.008
39	<i>Periphyton</i>	Copepodites	0.268	0.500	0.000
40	<i>Periphyton</i>	Copepods	0.171	0.506	0.000
41	<i>Periphyton</i>	Charophyceae	1.195	0.745	0.447
42	<i>Periphyton</i>	Gastropoda	0.220	0.471	0.000

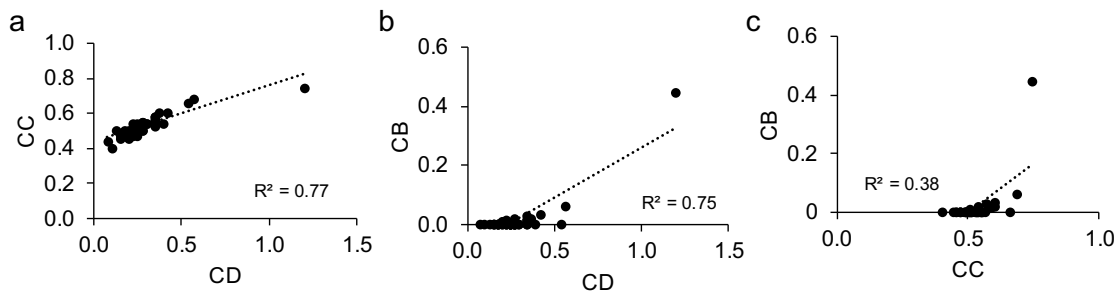


Figure A1. Significant linear correlations ($p < 0.05$) between a) degree centrality (C_D) and closeness centrality (C_C), b) C_D and betweenness centrality (C_B) and c) C_C and C_B . Pearson's R coefficient is indicated on each graph.

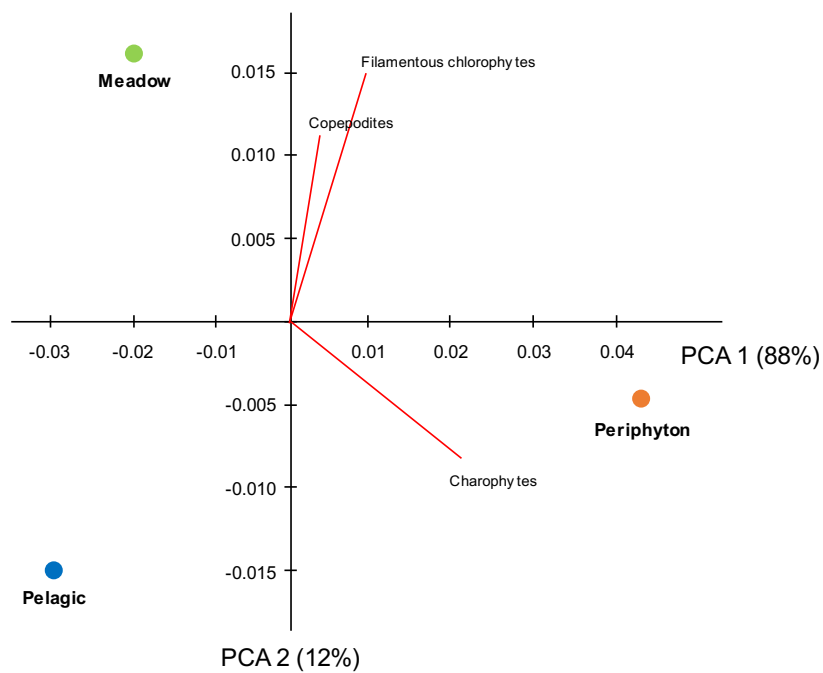


Figure A2. Biplot of the two first principal components generated by the principal components analysis (PCA) considering the nodes of the network for the three compartments (pelagic, meadow and periphyton). Lines in red show the variables (nodes) with the highest principal component coefficients.