

Online Resource 1

Delineating the influence of water conditions and landscape on plant communities in eutrophic ditch networks

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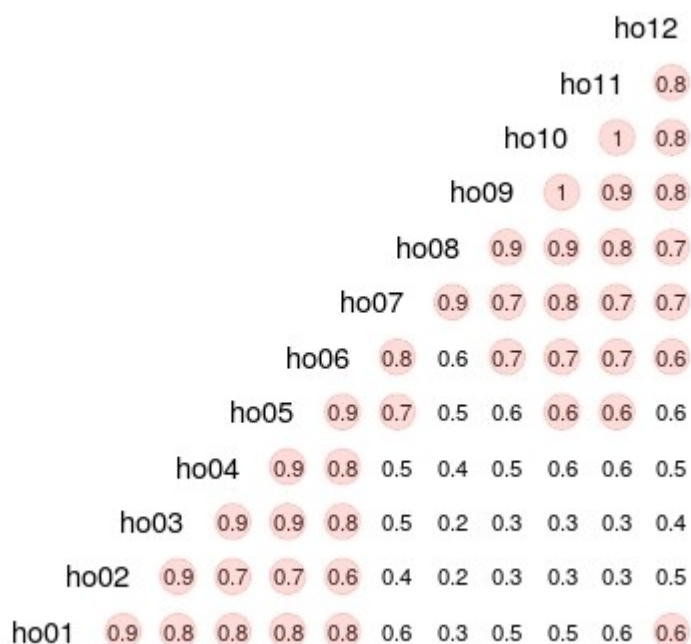
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A and **B**, correlation matrices for environmental variables. Four-year (2015-2018) data and 11 sites as used in the models. Circles indicate absolute r values > 0.6 which may lead to elimination by the VIF procedure. **A** all monthly water levels and **B** all variables with only a sample of water levels anterior to the sampling date.

C, fluctuations in water levels during the four-year study in the 11 sites.

A



This matrix underlines the strong correlations between monthly water levels with two groups, January to June on one hand, and June to December on the other hand. These correlations justify using only one level in the analyses (we used June) considering that it is correlated to all other months for interpretation, and that a high water level in June means an overall high water level.

B

	Algal.cover	Crayfish.abundance	Mud.depth	Ditch.density	Hedge.cover.index	Crops	Meadows	Woodlands	Drying.event.duration	Water.level.CV.spring	Water.level.CV.winter	Water.level.June	Water.level.March	Water.level.January	Water.conductivity	Saturation.O2	Orthophosphates	Chlorophyll.a	Organic.C	N.Kjeldahl	NH4	NO3	NO2	pH
Algal.cover	0																							
Crayfish.abundance	0																							
Mud.depth	-0.3	0.2																						
Ditch.density	0.2	-0.3	0																					
Hedge.cover.index	0.2	-0.6	0.2	-0.1																				
Crops	0.2	-0.6	-0.4	0.5	0.3																			
Meadows	-0.8	-0.6	0.1	0.5	-0.3	-0.4																		
Woodlands	-0.3	-0.3	0.7	0.7	-0.1	-0.2	0.1																	
Drying.event.duration	-0.1	-0.2	0.3	0.3	-0.2	-0.4	0.7	-0.2																
Water.level.CV.spring	0.4	-0.3	-0.2	0.4	0.2	-0.4	-0.3	0.3	-0.3															
Water.level.CV.winter	0.7	0.5	-0.2	-0.2	0.3	0.2	-0.4	-0.3	0.3	-0.2														
Water.level.June	0.2	0.1	-0.2	-0.1	0.3	-0.2	-0.1	-0.4	0	-0.4	-0.1													
Water.level.March	0.8	0.5	0.5	0.2	-0.3	0.2	0	0	-0.5	-0.2	0	-0.2												
Water.level.January	0.8	0.8	0.6	0.4	0.1	-0.1	0	0	0.2	-0.4	-0.2	-0.2	-0.2											
Water.conductivity	-0.5	-0.3	-0.4	-0.2	-0.2	0.1	-0.5	0.4	-0.1	-0.6	-0.2	0.3	0.2	-0.1										
Saturation.O2	0.1	-0.2	-0.1	0	-0.3	0	-0.2	-0.2	0.2	-0.2	-0.4	0.1	0.3	-0.2	0.1									
Orthophosphates	-0.1	0.3	-0.3	-0.3	-0.4	0	0	0.1	-0.2	-0.3	0.5	-0.2	0	0.1	0.3	0.6								
Chlorophyll.a	0.8	0.3	0.4	-0.4	-0.3	-0.4	-0.1	-0.1	0.1	-0.2	-0.3	0.4	-0.3	-0.1	0.1	0.4	0.5							
Organic.C	0.8	0.6	0.4	0.6	-0.5	-0.4	-0.4	-0.2	0	0	-0.5	0	0.3	-0.6	-0.1	0.4	0.2	0.2						
N.Kjeldahl	0.9	1	0.8	0.3	0.5	-0.4	-0.4	-0.4	-0.2	-0.1	0.1	-0.3	-0.2	0.3	-0.5	-0.1	0.2	0.4	0.4					
NH4	0.4	0.5	0.4	0.6	-0.2	0.1	-0.2	-0.3	-0.4	0	-0.2	0	-0.1	-0.3	0.4	-0.1	0	0.1	0.1	0.4				
NO3	-0.2	-0.5	-0.6	-0.3	-0.2	-0.2	-0.5	0.6	0.4	0.4	0.5	0.2	0.2	0.4	-0.4	0.1	0.6	-0.1	-0.5	-0.1	0.1			
NO2	0.7	-0.2	-0.4	-0.5	-0.3	-0.3	-0.4	0.4	0.4	0.4	0.2	-0.1	0.1	0.3	-0.3	0	0.5	-0.1	-0.4	0	0.1			
pH	-0.6	-0.7	0	0.5	0.6	0.3	0.2	0.6	0.6	-0.3	-0.3	-0.2	-0.2	0	-0.1	-0.5	0.6	-0.3	-0.8	0	0.6	0	-0.1	

This matrix shows groups of highly correlated variables. Only one variable was retained for analyses within each group.

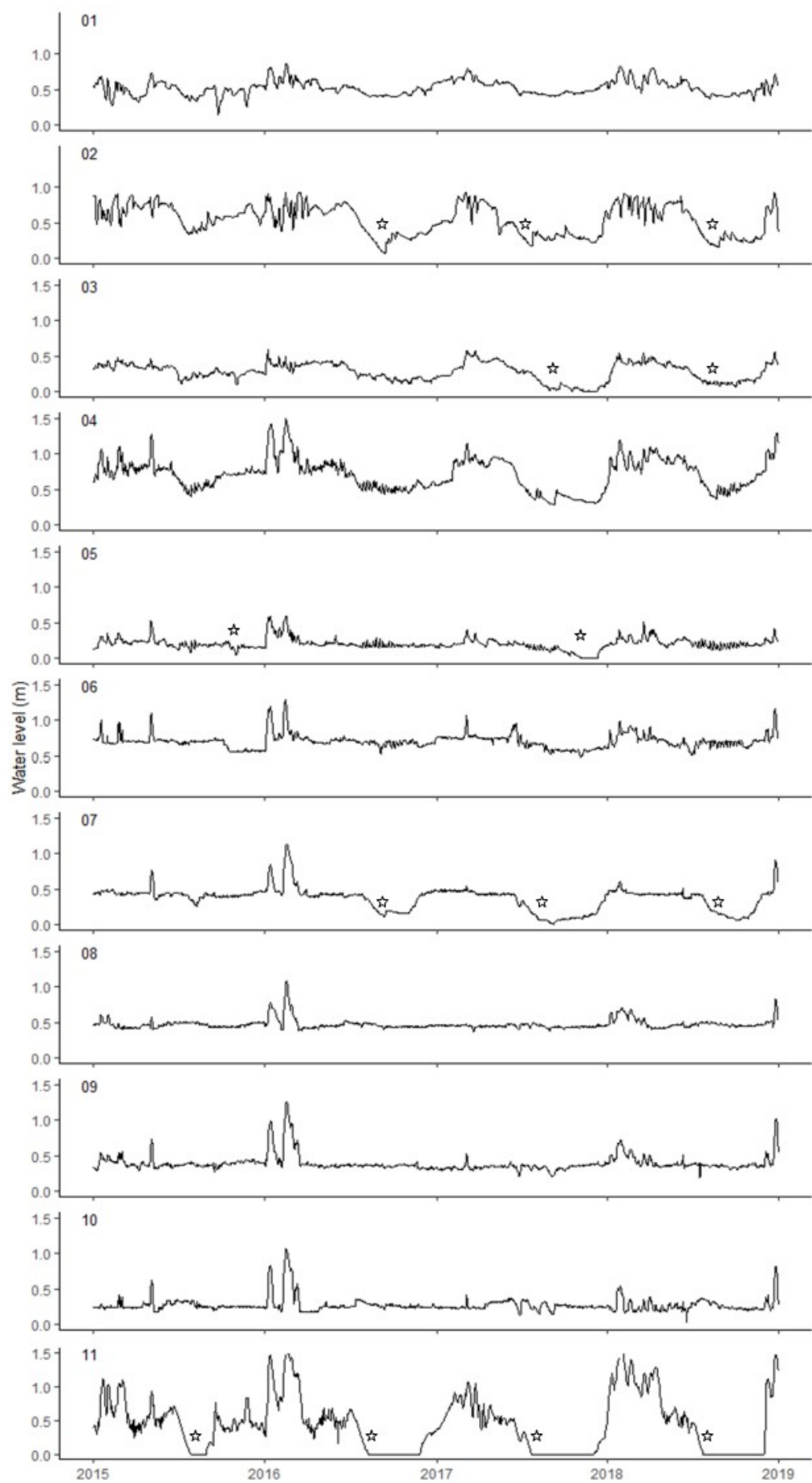
For water quality variables, orthophosphates, chlorophyll a, organic carbon and total N (Kjeldahl) were correlated and only organic C was used. NO₂, pH, the % of oxygen saturation and water conductivity were much more independent and were all retained.

The correlations among water levels were as observed in the previous matrix; as the two coefficients of variation were highly correlated, only one was used. Finally, the duration of drying out events was independent from all other descriptors of the water regime.

For landscape variables, the proportions of crops were clearly opposite to those of meadows ($r = -0.8$), but the proportions of woodlands were not related. Ditch density was independent from all other variables.

The biotic variables (algal cover and crayfish abundance) were not correlated to other variables except a link between crayfish abundance and the duration of drying out events.

C



These 11 graphs depict the variation in water level in the sites under study during the 4-year period from 2015 to 2019 (date is given for the 1st of January each year). Curves are averages of levels in the 10 ditches per site.

They illustrate the large differences in the capacity to regulate water levels resulting in different impact of floods and differences in water level fluctuations among sites.

Stars indicate the major drying out periods, when at least three out ten stations dried out on a given site. Some sites never dried (1 and 6), others experienced yearly very short drying out periods (a few days up to 6 per year, as sites 8 to 10), whereas drying out lasted more than 150 days on site 11.