



**Confidential**

**Review of USB FFPW PhD Thesis**

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<b>Title of PhD thesis:</b> Pond ecosystem dynamics in terms of production ecology	
<b>REVIEWER:</b>	
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<b>Please describe your professional relationship to the PhD student:</b> none	<b>Please describe your field of expertise:</b> Hydrobiology, aquatic ecology, aquaculture

**QUESTIONNAIRE**

***Originality, scientific importance, perspectives and impacts of results presented in the PhD thesis for basic and/or applied research***

Evaluate competitiveness of the PhD thesis in the international context and compare its level with the current state of the art in the field (**extent ¼ – ½ page**):

Ph.D. thesis focuses on the quality of water ponds with fishery management in the Czech Republic. The main task of the work is the evaluation of basic nutrients (C, P, N) cycle in the pond ecosystem and the evaluation of possible impacts on the environment. In addition to the basic evaluation of physicochemical parameters of water, the phytoplankton and zooplankton composition and methane emissions from ponds are also monitored. The conclusion focuses on the high nutrient load of ponds, low energy transformation within the food chain and the accumulation of surplus organic matter. The author recommends a revision of the current pond management regime to increase the environmental sustainability of fish farming. There are very few similar studies addressing the issue of trophic relationships of pond ecosystem, therefore this work significantly contributes to the general understanding of the functioning of these systems.



### ***Elaboration of the PhD thesis, objectives of the work and deliverables***

Evaluate the overall level of elaboration of the PhD thesis (structuring of the main text, comprehensibility, logicity of the chapters and their ordering) and the originality of the selected approaches to solve the objectives; evaluate publications and whether the results described correspond to objectives of the PhD thesis (**extent ¼ – ½ page**):

Structure of the Ph.D. thesis is common and logically arranged. The first chapter includes a general introduction to the issue of pond management in the Czech Republic, including historical development. In the following paragraphs, the factors influencing primary production, water quality at the outflow from the pond, water eutrophication and gas emissions from ponds are described. The second chapter contains an article on carbon metabolism and nutrient balance in the Dehtář pond published in Aquatic Ecosystems. The third chapter is a manuscript describing the effectiveness of nutrient retention in a hypereutrophic pond. The fourth chapter contains an article on Diffusive methane emissions from temperate nursery and major carp ponds published in Aquaculture environment interactions. The last, fifth chapter includes English and Czech summaries, acknowledgements, list of publications, training and supervision plan during the study and curriculum vitae. The individual chapters follow each other logically and bring new information on the issue. Based on the achieved results, the author draws conclusions about the influence of carp breeding on the quality of pond ecosystems.

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### **OVERALL COMMENTARY ON THE PhD THESIS**

I do not like to comment on already opposed and published articles, but because those articles are part of the submitted Ph.D. thesis I will allow myself a short comment and I would like to ask a few questions.

The nutrients input to the fishpond from inflow water is quite different and depends on the intensity of the inflow, human activities, etc. Fourteen-day (monthly) sampling is not enough (adequate) to capture individual episodes of nutrient input by the inflow. Even a single uncaught episode can significantly affect the overall balance of the monitored factor. Were different nutrient concentrations, which depend on the intensity of the flow in the individual tributaries, recorded during the monitoring of Dehtář? In my opinion, regime-dependent sampling would certainly be more suitable than periodic monitoring.

The composition of manure can also be very variable. The production of manure, the content of dry matter, organic matter and nutrients depends on the species of animals, their age, feeding, type of housing, amount and type of litter, number of housed animals and number of animals in the stable. Why wasn't the analysis of used manure in the pond done? Calculating the balances of elements from the average values of manure composition can, for example, in the case of phosphorus, cause an order of magnitude error. Due to the large scope of work performed during monitoring and the number of individual analyses, the analysis of manure nutrients and used feed would contribute to the accuracy of balance calculations.

In the manuscript "Nutrient retention efficiency in a hypereutrophic fishpond" I didn't find analyses of nutrients in the sediment of the Dehtář pond. The author states in the final summary that "Accumulation in sediments was the main fate of phosphorus". This conclusion should be supported by the analysis of phosphorus in the sediment. Were these analyses performed?



Who conducted the taxonomic analysis of phytoplankton? During the COST project, the main taxonomist was colleague Markéta Fránková. Phytoplankton analyses on the Dehtář pond are also performed by the Povodí Vltavy, State Enterprise (probably Tomáš Bešta). Given the extent of the data used, I would expect at least to state the name of the taxonomist in the acknowledgement.

The publication on methane production from ponds is very interesting, I would recommend continuing the work and clarifying the effect of fish bioturbation in connection with the oxygen content at the bottom of the pond.

Cattle are considered a major producer of methane. If we compare the production of cattle methane with the emissions from ponds, how large an area of the pond equals the production of one cow?

The Ph.D. student did a lot of work in monitoring the balance of key nutrients in ponds, changes in their concentration during the year, etc. Due to very rapid changes in the values of the monitored parameters in natural conditions of hypertrophic ponds even during the day, it is very problematic to realize these balances in natural conditions. The published results certainly contribute significantly to the knowledge of the functioning of pond ecosystems.

### **FINAL RECOMMENDATION**

- PhD Thesis can be recommended for defence**  
 **PhD Thesis can be recommended with reservations for defence**  
 **PhD Thesis can not be recommended for defence**

Brno, July 2, 2020

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Date and place

doc. Radovan Kopp

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Name and signature