Interactive comment on "The inbuilt long-term unfeasibility of environmental flows when disregarding riparian vegetation requirements" *by* R. Rivaes et al.

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This study addresses the important topic of considering inter-annual flow requirements of riparian vegetation in the determination of environmental flow regimes in rivers. This is especially important in river reaches downstream of large dams capable of capturing and holding large flood pulses. In systems with less storage capacity, large floods are will propagate through the system at near natural levels, or even increased levels if upstream river sections include flood defenses. Thus the paper refers to a particular situation in the recommendation of environmental flow levels, but it is certainly a common situation.

The authors suggest that current environmental flow science and practice devote too little attention to riparian vegetation and inter-annual flow levels, but this too is a particular situation that may be common in Europe where environmental flow methodologies are dominated by hydraulics-based analyses of habitat suitability. Other parts of the world, where more holistic methods like the Building Block Methodology, Savannah Method, and hydrologic indicator site method (e.g. Murray Darling Basin) are applied, devote substantial attention to riparian vegetation and its inter-annual needs. Moreover, hydrologic index approaches like the Range of Variability routinely consider and recommend floods of magnitudes that occur at recurrence intervals of 5 to 10 years or more.

For these reasons I do not fully agree with the authors' assertion in the discussion (page 10715) that the capability demonstrated in their study "revolutionizes the actual paradigm in environmental flow science". I do, though, think it is an interesting effort to link instream and riparian processes and demonstrate the feedbacks between them.

That said, I have the following questions and remarks, which address aspects of the manuscript and analysis that I believe require clarity or more attention.

1. What are the discharge data used in the study? Where is the gauging station relative to the study site? What is the length of record, time step, and degree of completeness? I refer to the data used in the production of the monthly flow levels shown in Figure 1 and the source of the annual high flows used in the riparian vegetation modeling.

2. How is the riparian vegetation model calibrated? The authors refer to other papers for the explanation of calibration. I checked one and did not find a sufficient explanation there either. Does the calibration/validation include, as one would expect, comparison of the model outputs with measured data from other years and time periods? If so what are these data? Are they aerial photos from previous years or something equivalent? More details are needed here to demonstrate the model's performance.

3. More explanation is also needed about the model output shown in Figure 3. Are

these maps of vegetation on a particular year of the simulation or some sort of long-term mean configuration? The paper refers to vegetation being modeled in a 10-year period, but what does that mean exactly. I noted in the environmental flow regime in Figure 2 that there is a large flood in year 9. Are the figures for year 10 immediately after that big flood? The fact that the Eflow panel in Figure 2 shows most of the area in the early succession woodland phase suggests that only 10 years has passed. Given that scenario includes no floods I assume the entire flood plain will eventually move into the forest phases.

4. I was surprised that the influence of riparian vegetation on fish habitat was only considered in its influence on channel roughness. Riparian vegetation serves so many other important functions, including cover, substrate and shelter for eggs and fry/juveniles, food sources, etc. Why only roughness, and why was 'cover' not included in the habitat suitability index (equation 1) as it usually is?

5. Related to the point above, I found the effects of roughness on depth and velocity (page 10714 lines 1-6) to be incredibly small. While the differences may be statistically significant given the consistency of output data, the real significance is questionable. Depth varied by no more than 3-5 mm and velocity varied by no more than 0.007-0.008 m/s between the simulations. What evidence would support that these small differences have a significant impact on ecological status and function?

6. Again related to point #4, how was the effect of roughness exactly considered in the habitat modeling? Most of the riparian vegetation is clearly outside the wetted channel and would rarely (if ever in Eflows scenario) be wetted. Was only vegetation positioned in the wetted channel considered to affect flow?

7. Given these questions I do not believe that assertions in the discussion, such as "The habitat decrease of barbel and nase juvenile during autumn and winter months jeopardizes those species survival" are convincingly supported by the modeling results. The criteria for habitat suitability appear very sensitive while the real uncertainty in the

influence of the changes is large in my estimation. The results are of course also distributed such that 'more', as well as 'less' habitat is created by altered flow regimes. The authors argue that any change from their simulated ideal is negative, and this too is subject to considerable uncertainty.

8. Finally, how was the considered environmental flow regime "adapted" (page 107009 line 18) from the environmental flow regime proposal for the future Alvito dam? What did the adaptation consist of? Why no citation of the work for Alvito dam?