

Reviewer #1 (M. McClain)

The manuscript of Lyon et al. offers an unexpected, and welcomed, opportunity to continue the discussion begun by McClain et al. in this same special issue. I appreciate the authors' efforts to add detail to the discussion and provide, as they say, a "how-you-can-do-it" example addressing both content and instructional approaches. The example they present is of a new (June 2012) three-week summer course offered to MSc-level students in a Hydrology, Hydrogeology and Water Resources program at Stockholm University. The course is entitled Ecohydrology: A Mediterranean Perspective and is divided into three main teaching and learning activities that consider the central concepts of ecohydrology and delve deeper into the process of evapotranspiration via classroom exercises and fieldwork. The course also utilizes an active learning approach, which stimulates the students to play more active roles in the learning process. The effectiveness of the approach is assessed through student evaluations of the course and the personal reflections of students and teachers. The assessment does not appear to have been designed as a formal investigation of the effectiveness of active teaching approaches but rather a basic evaluation typical of quality assurance in many educational programs.

*We start by thanking Michael McClain for the appreciation of this study and for providing a valuable review of the work. In general, we agree with the reviewer's assessment and have attempted to present this study in a clearer light throughout. We feel that addressing these comments (taken in turn in the following) in our revisions have allowed us to better tune the message of this study by highlighting its strengths and more thoroughly considering potential weaknesses.*

Evaluating the merits of this course and the lessons learned in the context of the framework presented by McClain et al. is not straight forward because the framework considers ecohydrology in a broader educational context and at the MSc level focuses on full programs rather than a single course on the subject. If the manuscript continues to feature this link, it would be helpful to describe the position and purpose of the course in the larger Hydrology, Hydrogeology and Water Resources MSc program at Stockholm University. How does this course fit into the learning objectives and design of the MSc program? Is it the only explicit consideration of ecohydrology in the program? I presume the course is elective given it is the first time it has been offered and it is taught in collaboration with another university. Are there plans for the future of the course in the program or for the future incorporation of more content in ecohydrology?

*It is agreed that there is some misalignment between the breadth of full MSc level ecohydrology program outlined in McClain et al. and the course offered up in this current study. We do feel that there is connection between the two studies such that a link between the two is valid. To help adjust for this, we have taken the reviewer's comment to provide a better context surrounding the course relative to the larger Hydrology, Hydrogeology and Water Resources MSc program at Stockholm University in the revised text.*

*As correctly pointed out by the reviewer, the course considered in this study is currently an elective that provides the main consideration of ecohydrology in that Hydrology MSc program. The course matches well with the central learning objectives of the MSc program. The Hydrology, Hydrogeology, and Water Resources Master's Program seeks to provide broad knowledge in the field of hydrology and water resources with substantially deeper knowledge and*

*insight into current research and development activities. Further, and in a more general sense, the program encourages students to critically, independently and creatively identify and formulate water issues and to plan and carry out advanced tasks within specified time limits, so to contribute to the development of knowledge around these issues.*

*Further, there are plans to increase the level of ecohydrology content directly considered in this course through course development (as addressed in response to other reviewer comments) and through cross-listing the course in the newly started Landscape Ecology MSc program at Stockholm University. We have attempted to highlight this throughout the revised manuscript as we outline how this course presents a structure that is likely relevant for ecohydrology education.*

Considering the content of the course, I was struck by the absence of any real consideration of ecology - plant ecology in particular. Students will have encountered references to ecological processes in TLA #1 "What is Ecohydrology", but there were no recommended readings on plant water use, variations among species, variations among crops and 'wild' plants, etc. Moreover, the exercises in TLA#2 and research questions in TLA#3 (Table 3) deal only with physical factors influencing evapotranspiration (i.e. temperature, humidity, vapor pressure, soil moisture, and albedo). Did students learn anything about the ecological processes that influence and sometimes control these critical physical variables? The Mediterranean focus of the course is perfect for learning about unique plant adaptations to limited water availability, and the differences in water use between native plants and irrigated crops is fundamental to understanding differences in evapotranspiration. Landscape ecology and changing land use/land cover (i.e. species composition) would seem to offer another opportunity for learning about the interaction of ecology and hydrology in the Mediterranean region. In my opinion it is this explicit incorporation of ecological as well as hydrological concepts and approaches that distinguishes ecohydrology. From a content perspective (and excluding the literature review in TLA#1), how is this course different from the standard teaching of evapotranspiration in any hydrology program?

*We appreciate this comment and take the message to heart as it echoes across other reviewer comments. Clearly, this course is in its infancy and needs further development to achieve the status of what would be considered a fully-vetted ecohydrology course. The reviewer highlights several key factors that could be considered in this future development. Further, the reviewer hones in on exactly what we feel is a central message of this study: How do we get to an effective ecohydrology course?*

*We have, thus, restructured the manuscript to highlight this aspect of the study and softened claims that our course offering was a full-blown ecohydrology course. Namely, we have more explicitly stated that this course is an example of a potentially effective structure that can evolve towards a more rich and focused ecohydrology content course (even if it is not 100% there yet). This evolution towards an elusive, optimal ecohydrology course (i.e., one that encompasses all the aspects highlighted across all the reviewers) is then taken up in a more explicit discussion around our recommendations regarding the 'road forward'. This involves, for example, cross listing the course a landscape ecology MSc program (see above) to better mix student perspectives. It also involves bringing in local and site specific expertise from the region more familiar with local vegetation and ecology to address potential recent shifts regional and their connection with hydrology. In future offerings of the course, the plan is to include more*

*“physiological” ecohydrology aspects into the course such as consideration of rooting depth into model development or stomata response on controlling transpiration.*

*Lastly, the level of “ecohydrology” realized in this course is partly linked to the active learning environment itself. Allowing, for example, students to design their own experiments precludes instructors from pushing a clear agenda throughout. Students, thus, selected to design an experiment that centered on the more physical side of ecohydrology (of course, the course design of TLA#1 and TLA#2 helped guide them). During the course, instructors also identified that the course was getting away from ecohydrology. To offset this to some extent and help distinguish this course from standard teaching of evapotranspiration offered in any hydrology program, the instructors put together a demonstration aimed at drawing students' attention to the impact of biological adaptation to evaporation while at the Navarino Environmental Observatory. This activity (a description of which has now been included in the discussion text) consisted of a small experiment carried out by the teachers to demonstrate the impact of plant type (broadleaf vs. needle leaf) on evaporation. We highlight this as a potential shortcoming or limitation of an active learning environment in the revised text whereby some control on what the students actually do may be sacrificed. As such, there might not be the opportunity to explore in detail all the aspects of a given subject (particularly one as broad as ecohydrology).*

Turning to the assessment of instructional approaches used and the effectiveness of active learning approaches, the reviewers of the McClain et al manuscript emphasized that novel instructional techniques and attention to personal competencies are not unique to training in ecohydrology. I agree and am confident that Lyon et al acknowledge this as well. That said I found the results of the authors' assessment to be quite interesting. One must be cautious, however, to not over interpret or draw too-firm of conclusions from the feedback of such a small number of students in one course. I think Lyons et al present a fairly balanced analysis and discussion in this respect, although the statement in the Concluding Remarks that learning "can never be active enough" may cross the line.

*We thank the reviewer for confirming our intentions to present a balanced interpretation of the results of this study. And we agree that the statement that learning “can never be active enough” is an overstatement and it has been removed.*

The authors note that 5 of the 6 students were female which warrants a bit more attention given possible (or perceived) gender-based differences in learning styles. Another factor which was not mentioned in sufficient detail is the background of the students. On page 9347 it says the students have a "homogeneous prior educational background that likely typifies non-engineering hydrology Master's students most teachers would come across in an ecohydrology course." Academic culture varies considerably between countries and continents and the response of students to active learning approaches may be influenced by this background. Were the students all Swedish (with undergraduate degrees from Swedish universities) or did they come from a diversity of cultural and educational backgrounds? If there is a lack of cultural diversity I recommend toning down the use of "typifies" and "most teachers" because the results may only apply to a narrow portion of the cultural academic spectrum. Time will tell.

*Yes, the academic cultures do vary around the World and we appreciate the intent of this comment. To clarify, the mix of backgrounds (cultural and educational) was fairly spread from*

*our perspective (students came from and had been previously educated in Sweden, Denmark, France, Germany, and Iran while the instructors came from Sweden and the US). We have explicitly mentioned this in the revision to justify our assumption that this mix could be considered to typify classrooms at many universities.*

Minor point: There are minor grammatical and typographical errors throughout the manuscript. The language is also at times too informal and imprecise (e.g "can never be active enough" comment). A careful revision and tightening up is needed.

*Agreed and we have attempted to tighten up language and correct all minor grammatical errors in our revision.*