

SPUNKIAD for

Hester, E. T. and M. N. Gooseff. 2011. Hyporheic Restoration in Streams and Rivers. Pages 167-187 Stream Restoration in Dynamic Fluvial Systems: Scientific Approaches, Analyses, and Tools. AGU, Washington, DC.

Surprising?

I found surprising that given the number of functions and services the hyporheic exchange zones provide, that restoration of these zones is just starting to be considered into the wider restoration of streams.

Puzzling?

I found puzzling – and still am puzzled by – the exact location of these hyporheic zones. Do these occur everywhere, or is there a way to know where the areas of major exchange are? Does this depend on stream order? Geology?

Useful?

I found useful the authors' emphasis in determining the bigger context – watershed dynamic and land use/cover - of where the restoration of the hyporheic zone (including site selection and restoration goals) is going to take place which will determine in many levels its degree of success.

New?

I found new the science of the hyporheic exchange zone and the benefits of its function for humans (via water quality) and organisms (via habitat and thermal buffering).

Knew it already?

I already knew the two main ways humans impact streams: via within-channel modifications (dams, levees, channelization) and from land use/cover change (conversion from agriculture/forest to impervious surface, or from forest to agriculture).

Interesting?

I found interesting the three main functions of the hyporheic zones the authors focused on: temperature moderation, nutrient processing and toxin attenuation.

Do you agree or disagree with the findings?

I agree with the findings in that they use many studies to support their arguments, while providing an in-depth analysis on when hyporheic restoration should take place and when it shouldn't – alluding to all the possible caveats of managing for restoration of these areas.

Reflection

Hester and Gooseff's (2011) book chapter as well as Hester's in-class presentation left more questions than answers. The hyporheic zone continues to be an abstract concept which has been hard to piece together into the concept of stream habitat management. Below I reflect on why this is a hard concept to grasp.

While I understand the general location of the hyporheic zone, I would imagine having a hard time going to the field and identifying with certainty an exchange zone. I would be interested in knowing if one could use high resolution satellite or radar imagery to map a hyporheic distribution through a stream network. This would get at identifying the couple of things that Hester mentioned in class – like the head drop, area/length of exchange and hydraulic conductivity.

As Hester said, it would only make sense to restore the hyporheic zone in places that have been disturbed. If they haven't been disturbed, then the hyporheic exchange zone should not be impacted. In those areas that have been disturbed, Hester talked about different ways to enhance the exchange such as putting wood structures into streams that allows the water to be held back, and then allowing for infiltration through the hyporheic zone.

Not being able to see a profile of what this area looks like, it seems like a magical place that has positive effects on both aquatic organisms and humans. The hyporheic exchange zone provides many services and is a unique habitat to aquatic organisms during different life stages. It seems that the hyporheic zone can process high levels of pollutants, through biogeochemical processes, that output cleaner water than when it came in.

Hester acknowledged the need to identify the problem at the watershed scale before addressing what the actual restoration strategies would be. This is extremely important to acknowledge because as we've read in other studies, in-stream restoration efforts that don't take into account the watershed scale processes result in ineffective actions.

Finally, there is a limited amount of things a scientist can do and a lot of uncertainty related to restoring hyporheic zones because of the difficulty in seeing or measuring changes. This becomes a great challenge when incorporating the concept of hyporheic restoration zone to stream restoration. Hester recognized that people were just starting to recognize the role of these areas both to water quality and as habitat for aquatic organisms.