Tiz Mogollón December 10, 2012

Stream Habitat Management Specialist Interview

Interview with Dr. Tess Thompson, Associate Professor of Biological Systems Engineering Department

Dr. Thompson is an Associate Professor in the Biological Systems Engineering Department at Virginia Tech. She did her PhD at Virginia Tech in the same department. The following is an excerpt from her research interests and projects:

"My research program focuses on the protection and restoration of stream and wetland systems. A major goal of my research program is to investigate the interactions between stream-side vegetation and stream channel stability, including quantifying how vegetation reinforces streambanks and changes flow energy during storm events. I am also interested in improving testing procedures and models of cohesive streambank erosion. I am also collaborating with Lee Daniels (CSES) and Richard Whittecar at Old Dominion University to develop an improved wetland design model. My role in the project has been to improve current surface water hydrology calculations used in common design models. Another objective of my research program is to minimize the impacts of urban development on streams. Using a grant from the VA Water Quality Improvement Fund, my research team designed, constructed, and monitored two innovative best management practices (BMPs; a bioretention area and a structural soil infiltration trench). Based on these results, we developed BMP design and maintenance recommendations to increase the adoption and success of such BMPs. The next step is to identify the physical, chemical, and microbial processes in forest soils that can be restored in urban environments. I am collaborating with Leigh-Anne Krometis (BSE), David Sample (BSE) and Brian Strahm (Forestry) to explore these processes. Lastly, to advance the understanding of linkages between management actions and ecosystem response, I am working with faculty across campus to develop and maintain the StREAM Lab, a large scale stream laboratory."

From: http://www.bse.vt.edu/people/tenure-track/thompson-theresa.html

Interview Questions

1. **What is the appropriate scale to do stream restoration? Without constraints (budget, etc.)? With constraints?**

On a theoretical basis, she said it made sense to work at the watershed scale – although then again it really depends on the problem or goal of the project. For example, if it is acid rain work, a more regional approach is warranted. Working at a watershed scale is definitely a more systems approach to stream management.

However, for the day to day work, working at the watershed scale is harder and more complicated. Working at the reach, being a more Band-Aid approach, allows for stream restoration to occur at a reach scale. This is the role of the engineer – looking at very small spatial scales. While most of Tess' work is at the reach scale, she has participated in watershed scale management plan and in her work always acknowledges the entire context.

2. **What are the main causes of flooding today? Can people intervene on a local scale?**

She sees no problem in flooding, and feels very strongly about people not inhabiting the floodplain. She argues that people that live or construct in the floodplain have a very limited view on flooding, and that

it will occur again. The management approach in some instances has been in a spiral– construction occurs in the floodplain, then it floods, then levees are built, then it floods again, and so on. She argues that of logic and economics, people should really be taken out of the floodplain. People can definitely intervene at a local scale – land use is a huge way people can alter floods.

3. **What are your views on structural versus non-structural flood control management approaches?**

Tess completely disagrees with structural responses to flood control. She argues that they cause more damage and flooding. However, she does not represent the views of most engineers. Besides from the ecological consequences of dams to streams, she says they disrupt the sediment supply and destabilize banks (channel incision) downstream. They are expensive and high maintenance. Engineers design dams for a certain period of time, and thus they become unsustainable in the long term. Dredging is not a common response to dam management because it is too expensive.

She also disagrees with retention and detention ponds because they alter the hydrologic cycle, and disturb the natural flow, which has wide repercussions for stream ecosystems.

Tess believes in non-structural approaches to flood control, but the effectiveness of them is hard to measure, although it really depends on the type of watershed (steep slope, versus flat, high versus low water table). She believes in reforestation, removing levees and dams, and creating bioretention mechanisms that increase infiltration (e.g. sand pit).

4. **Doyle (2012) argues that river management in the US has been greatly successful because it is built on a political system that is adjustable and flexible, allows for multiple agencies to check and balance each other (invites redundancy and competition), and has nested scales to carry out projects (Federal Government – State – County - Local). However, he says that flood control and non-point source pollution have been two things that haven't been solved. Why do you think this is? Is this a science or a policy issue?**

Flood control has failed because it is a knowledge problem. Humans see floods as bad; while they are naturally occurring and very important for the ecosystem. Flooding has its purpose and its place, but people just need to get out of the way and stop viewing flooding as a problem.

With non-point source pollution instead, she thinks it has not been a failure, but that human perception if limited in respect to time. And in part, enough hasn't been done. She thinks it is a policy failure that agriculture is not regulated in relation to streams in the sense that cattle can still wade through streams.

5. **What do you think are the differences between restoration versus rehabilitation? And which one do you use as your guiding principle?**

Restoration is the most common and colloquial term to use, but she just works in rehabilitation, and think restoration is silly and unrealistic. Instead, rehabilitation goals are set to restore a particular function of the stream, and not to bring it back in time.

6. **What does a successful stream restoration project look to you? (restoring the biological side? Or just the sediment ratios, etc.)**

   Her perspective is completely physical, and more to restore process (rather than form). Process includes channel migration pace, gravel bed in river, bar formations, maintaining a channel so that it doesn't degrade or aggrade. Restring the form of a stream is concentrated on the shape of the channel and sinuosity.

She sees the hierarchical way of stream ecosystems very applied here – so the hydrology has to be right, in order for the hydraulics to work, and then the geomorphology and so on. For example, when wanting to restore a species, the hydraulics needs to be understood before proceeding with population dynamics.

7. **Monitoring seems to be something that everybody says it should be done, but it is never done. What are you views on it?**
   She argues that we need to monitor, because otherwise we are never going to learn how to do a better job. However, monitoring and the project goals have to be realistic. You have to know that you are controlling what you are monitoring for. For example, many reach-scale stream projects use macroinvertebrates as an indicator of project success; however, it is not realistic to expect a change if the upstream impacts are not being taken into account. In her work, a typical goal is to control erosion by stabilizing banks, and thus measuring the erosion rates is a feasible and doable monitoring objective.
8. **How do you see stream habitat management today? (In terms of science, policy, management, leadership, etc.)**
   She argues that there is too much focus on the reach scale and on species specific studies in policy and stream management; when these should actually be at larger spatial scales. These need to focus on process and overall ecosystem functioning. She sees Dave Rosgen's natural channel design as an approach completely driven by form, and the dangers this has. She argues that Rosgen has convinced people that they can be stream restoration specialists after 4 courses. However, Tess is weary about this because people that take the course suffer from not knowing what they don't know; which calls to her pointing out the need for a multidisciplinary team because just an ecologist, or hydrologist, or engineer will not be able to assess the stream the same way that a group of specialists might.