Where Is the Water at Virginia Tech?

By Eryn Turney

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Eryn, a May 2017 graduate in Natural Resources Conservation in Virginia Tech's Department of Forest Resources and Environmental Conservation, was the spring 2017 intern for the Virginia Water Resources Research Center.

As a senior in the College of Natural Resources and Environment, I have been exposed to many realms of environmental study. This experience included witnessing the establishment of my department's newest major, Water Resources, Planning, and Management—the first of its kind nationwide. If an incoming student were to express interest in studying water, they would likely be pointed in this direction. This program has a unique, interdisciplinary design that is easily adapted to student interest. Its design initially sparked my curiosity about how far the study of water reaches at Virginia Tech.

So, as a student interested in pursuing a career in the field of water resources, I began to explore the question "Where is the water at Virginia Tech?" I used this to uncover opportunities and interests I had not previously been exposed to, as well as see how Virginia Tech is working cooperatively to help invent the future for water. From exploring various fields of study and talking to many professionals, I have found the short answer to this question; it is *everywhere*.

In reflecting on that experience in this article, I hope to provide a resource for individuals both within and outside of a university setting (Virginia Tech or otherwise) to understand the many directions water research and education are going, and why it matters. Undoubtedly, there will be areas of work I have neglected. This is simply meant to provide a stepping stone for those who have questions about water resources as a field of study, a career path, or both – as I do.

One Person's Piece in the Puzzle

To begin understanding the scope of water in our everyday lives, consider a concept called the "water footprint." As defined by the Water Footprint Network, a water footprint "…measures the amount of water used to produce each of the goods and services we use."

Understanding the concept of a water footprint helps bring to light the many ways humans use water. Showers, washing dishes, and watering our plants are obvious ways water is used on a daily basis; however, water used to grow and produce food, clothes, and electricity may be less conspicuous and more often taken for granted.

A Water Tour at Virginia Tech

Because water is the center of life, humans are all connected through the utilization, conservation, and exploration of this resource. Virginia Tech is working towards understanding and educating the public on a large scope of characteristics related to water because of the many ways humans use it, affect it, and are affected by it.

To begin to see the scope of where water can be found at Virginia Tech, I will take you on a tour.

We begin at Cheatham Hall, where posters line the hallways and the stairways are emblazoned with colorful murals. This is the home of the Departments of Fish and Wildlife Conservation, Forest Resources and Environmental Conservation, and Sustainable Biomaterials. These departments--along with the Department of Geography, which is not located in Cheatham--make up the College of Natural Resources and Environment. Some examples of what people here are working on include watershed management, wetland and stream ecology, aquatic toxicology, climate change effects on meteorology, effects of land management/development on water quality, and hillslope hydrology.

Next, walk down a hill to Seitz Hall. It's easy to get lost in the labyrinth of hallways through this building, where one corridor even ends within another building. Seitz is the home of Biological Systems Engineering, part of the College of Agriculture and Life Sciences. Here, you will find people studying and teaching hydrologic and water quality modeling, non-point source pollution, public health impacts, and stream/wetland restoration.

Beyond the doors of Seitz, look across the Drillfield to the Burruss Hall, an iconic image of Virginia Tech; to the right is Patton Hall. Among its wood paneled halls and pictures of alumni is the home of Civil and Environmental Engineering. In this department, there's work on drinking water quality, fluid mechanics, water quality monitoring and modeling, groundwater and pollution transport, hydrology, water infrastructure, and wastewater treatment.

Coming out of the North side of Patton, walk down a hill zig-zagging amongst buildings until you reach the distinct Derring Hall. Derring Hall, the one building on campus rumored to be designed by a University of Virginia architect, appears to be made up of endless hallways with haphazardly numbered classrooms separated by swinging double doors. This building is the home of Biological Sciences and study of the influence of hydrology on biogeochemical cycling, the effect of landscape disturbance on stream ecosystems, and eutrophication (nutrient enrichment of water bodies).

Within these buildings, many faculty members shared with me some insights about what they do, why they do it, and how they believe their work fits into the bigger picture of working for change at Virginia Tech as applied to the world outside.

Let's consider how these different academic areas are approaching one given water subject: wetlands. While I, as a student, learn about forested wetland ecosystem functions and values, a civil engineer is focused specifically on the point of where groundwater and surface water interact. While a chemist is concerned with the rate of denitrification that occurs in this same wetland, a biologist studies the variance in benthic macroinvertebrate structure in response to human disturbance of this land. A forester studies how Best Management Practices are affecting the forest structure of the area, while a wildlife toxicologist is concerned with how individual amphibians respond to various levels of pollutants in the water. An economist or policymaker is concerned with determining a monetary value for a natural environment, while a social scientist works to understand how different people prefer to utilize the same area.

In the examples, notice there is not only a difference in *focus* amongst disciplines, but also one of *scale*. Some see from a bird's eye view an ecosystem function or issue, while others take a pinpointed view to understand the driver of a particular issue.

How the Pieces Fit

In speaking with people from each of these different departments, I kept waiting for research topics, studies, and interests to overlap. While the core of water resources work for many is improving water systems for the future, specifics of the work typically did not cross over. This is encouraging. Through collaboration, scientists across various disciplines are working towards improvement across a wide array of problems that can become large-scale contributions to society.

Collaboration allows individuals to utilize the knowledge and experiences of others, making it possible to understand the drivers of specific problems and to consider more solutions, and eliminating the need for any one person or group to know "everything." This allows busy individuals to avoid the extended effort involved in coming to a basic understanding of something that someone else may be an expert on. At its best, collaboration among water specialists allows individual interests to fit together as pieces of a larger puzzle, revealing the many relationships water has to life around us.

The more faculty members I spoke to, the more I began to hear about this cohesion among disciplines, where relationships between individuals led to communication and collaboration. I received the general impression that collaboration is very beneficial, but I also learned that it's not always a perfect solution to understanding a situation. For example, one professor described to me a project where individuals from varied interests and expertise attempted to collaborate, but the project became disorganized and ultimately failed. According to the professor, the problem in this case was a failure to establish a common mission or goal. Without that focus, synthesis within the group as a whole didn't occur.

Water beyond the Classroom

As a land grant university, Virginia Tech's three primary goals and responsibilities are teaching and learning, research and discovery, and outreach and engagement[1]. So far, I have described my experience learning from professors about their teaching and research. In accordance with Virginia Tech's motto "*Ut Prosim*" ("That I May Serve"), water is also found in the third part of this mission, in outreach and engagement, and collectively serves individuals far beyond the university.

For one, I started all of this exploration at the Virginia Water Resources Research Center, which is housed on campus in Cheatham Hall with the College of Natural Resources and Environment. The Water Center collaborates with many other state and national organizations dedicated to providing the general public with information.

Other organizations and programs that I visited on campus concerned with water resources study and sustainability included the following: Virginia Cooperative Extension; Global Change Center; Virginia Water Monitoring Council; Virginia Household Water Quality Program; Stream Research, Education, and Management (StREAM) Lab within Biological Systems Engineering; and Virginia Tech Research Team for Flint, Michigan. Organizations like these provide information, services, employment, events, and other opportunities to learn about water resources to local citizens, but also to those statewide, nationwide, and worldwide.

Tech in the Larger Puzzle

Water is everywhere, and is a resource everyone relies on every day. Water quantity and quality stresses in response to human and climatic changes call for individuals everywhere to be stewards of these resources.

The depth of the water resources field is immense. In the words of the person I spoke to the most about this exploration, "…like a river, [it is] wide and deep." Though I dove into many places, I missed many others including: management, tourism, international studies, human health and medical study, recreation, agriculture, horticulture, architecture, and urban affairs. In one particularly humorous omission, I forgot to include Ocean Engineering, an incredibly obvious area considering oceans contain the majority of earth's water.

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[1] Mission Statement of the University. Retrieved May 02, 2017, from https://www.president.vt.edu/about-the-office/mission-vision/index.html

Take that oversight from an undergraduate student as an example: there is always more to discover. What is going on at Virginia Tech serves as an example, but only one, of what is being done across the world. From that though, get excited, because there is more to be done, and lots of places to do it. Ask questions and explore, and your understanding and curiosity will only grow with time. From one student exploring this immense puzzle a little more each day to you, I hope this article has helped to open your eyes to the boundless, unique opportunities that exist in the realm of water resources, and shown reasons to care about why it's all happening in the first place.

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