A CONCEPTUAL MODEL DEMONSTRATING EXPERIENTIAL LEARNING, WATERSHED EDUCATION, AND VOLUNTEER RESEARCH USING CAMPUS STREAMS AND LAKE HERRICK

Jordan N. Francis, James B. Deemy, and Todd C. Rasmussen

AFFILIATION: Warnell School of Forestry and Natural Resources, University of Georgia, Athens, Georgia 30602
REFERENCE: *Proceedings of the 2017 Georgia Water Resources Conference*, held April 19–20, 2017, at the University of Georgia.

Abstract. Campus streams and Lake Herrick provide excellent venues for experiential learning in water resources at the University of Georgia. A variety of courses serving science majors and non-science majors use these water bodies to teach aquatic sciences and field research techniques. After participating in experiential learning opportunities through courses, some students become interested in aquatic sciences and volunteer on research projects done in the Warnell Aquatic Resources Group (WARG) or other UGA water research groups. Our goal was to create a framework that enhance the training of students planning to enter water resources professionally and assist non-science major students in becoming informed and scientifically literate citizens. To address this goal we created a conceptual model based on concrete student experiences that can serve as a framework for involving multi-discipline student teams in water resources research.

INTRODUCTION

Tanyard Creek, Lily Branch and Lake Herrick provide excellent venues for University of Georgia students to learn about water resources through experiences in class or research. Experiential learning opportunities with water resources can take many forms and range from short field trips to long-term volunteer projects spanning multiple semesters. At the University of Georgia a variety of courses serving science majors and non-science majors use these water bodies to introduce students to aquatic sciences and field research techniques. Course based experiences with water resources can facilitate further interest in water resources for some students (Pahl-Wostl 2002, Kolb and Kolb 2005).

Occasionally students are inspired to take further coursework or participate as volunteers on research projects. One such opportunity is where students volunteer to help collect baseline water quality data on campus streams or Lake Herrick parallel to other projects on these waters being completed by the Warnell Aquatic Resources Group (WARG). This volunteer research team is made up of a variety of students including water and soil resource majors, science majors related to aquatic science and non-science majors.

This study aims to 1) highlight the avenues and learning experiences that lead students to volunteer and participate in independent research projects, 2) demonstrate these avenues in a conceptual framework that can inform experiential learning curriculum design, and 3) showcase how classroom skills, experiences, and engagement have led to professional and personal development of both science majors and non-science majors regarding water resources.

METHODS

A model pathway was created to compare the experiences and pathways that led students from varying academic fields and interests into a common format. This model was also intended to identify discrete steps and important experiences in the development of these future water resources professionals. The pathway also demonstrates the collective deliverable skills, knowledge acquired through experiences with campus water resources.

Five individual students with differing academic fields and educational backgrounds were provided personal narratives and filled in the pathway model with their individual experiences that have led to water resources career interests (Figure 1). Students that contributed their pathways into water resources ranged along a gradient of scientific training and interest. Students ranged from Russian/international affairs double major, wildlife sciences, terrestrial ecology/environmental chemistry, and two water and soils majors from different departments (Table 1). The specific experiences narrated by our focal students were synthesized to create a conceptual model of how experiential learning opportunities using campus waters can lead students with diverse backgrounds into water resources (Figure 2).

RESULTS

Individual pathways exhibited common themes that students follow when becoming involved with water

resources. Each student had unique steps but each step was similar in that it generally involved experiential learning using campus streams and Lake Herrick. Students in water resources, tangentially related science majors and non-science majors all followed similar paths that ultimately ended in diverse career goals and opportunities. This informed the overarching framework because student narratives and pathways could be placed into a generalized framework.

It was found that Lake Herrick serves as a major introductory experience for students who are introduced to campus waters through introductory biology and introductory to marine biological sciences. Additionally, wildlife, ecology, and water resources classes use campus streams and Lake Herrick to provide examples of urban waters and the impacts of urbanized watersheds.

Upper-level water resources courses also use campus waters to practice methods and to provide applied examples of how urbanized watersheds impact streams. Students also noted that volunteer and formal independent study research using campus waters also had an important role in both inspiring academic program choice as well as preparing them for career opportunities.

Table 1. Students who contributed experiences to model development.

Student	Major	Experience	Career
A	International Affairs and Russian	Field Trips to Lake Herrick	International Water and Wildlife Conservation
B	Ecology and Environmental Chemistry	Field Trips to Campus Streams and Lake Herrick	Coupled Aquatic and Terrestrial Systems
C	Water and Soil Resources	Field Trip to Campus Streams	Hydrology Career
D	Wildlife Sciences	Field Trips Campus Streams and Lake Herrick	Wildlife Professional with Aquatics Emphasis
E	Water and Soil Resources	Field Trips to Lake Herrick	Hydrology Science and Water Resources Education

DISCUSSION

Experiential learning in each course is achieved through field trips and fieldwork. In the introduction to Marine Biological Environment Lab (MARS 1020L), there is a two-part field experience at Lake Herrick on aquatic ecology and water quality. Within the Wildlife Sciences major courses, there are a variety of trips to campus, as well as, local Piedmont region streams, lakes, rivers, and wetlands to learn about the hydrology, ecology, and wildlife of the aquatic ecosystems. Within the Water and Soil Resources Major, there is focus on campus waterway exploration, in addition to, explanation of importance and effects of urbanization. These experiences prepared multiple students for capstone maymester experiences such as the Hydrology, Geology, & Soils of Georgia (WASR 4700/6700) maymester course which explores a variety of different water bodies throughout the state of Georgia and water resources management issues.

A common central theme was an early field experience involving interaction with a water body on campus. Frequently, volunteer research was the next step toward lasting involvement with water resources. Volunteer research also generally led to expanded elective coursework or independent study. These experiences further inspired changes in program of study or pursuit of internships related to water. Examples of career impacts include students securing post-graduation employment in water resources at USGS, pursuit of graduate programs focused on aquatic wildlife, and career goals centered on interfaces between science and society.

CONCLUSIONS

Our model shows connections between classroom experiences and skills acquisition, student engagement through experiential learning, and further involvement through research in association with WARG or other water resource research groups. Our model provides a framework that can be used to guide the implementation experiential learning into other water resources education and research programs.

The framework exemplifies how multidisciplinary student teams have meaningfully supplemented their education and assisted with research on campus water resources outside of their standard undergraduate curriculum. In particular, we emphasize how this model can also be used as a guide for assisting non-science major students in achieving scientific training and scientific literacy. Student research experiences can provide long lasting interest and personal investment with a subject. We intend for this student experience based model to provide a framework that guides such lasting interest and engagement.

LITERATURE CITED

Kolb, AY, DA Kolb, 2005. " Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education". Academy of Management Learning and Education 4 (2): 193-212

Pahl-Wostl, C. 2002. "Towards Sustainability in the Water Sector - The Importance of Human Actors and Processes of Social Learning" Aquatic Sciences 64:394-411 .

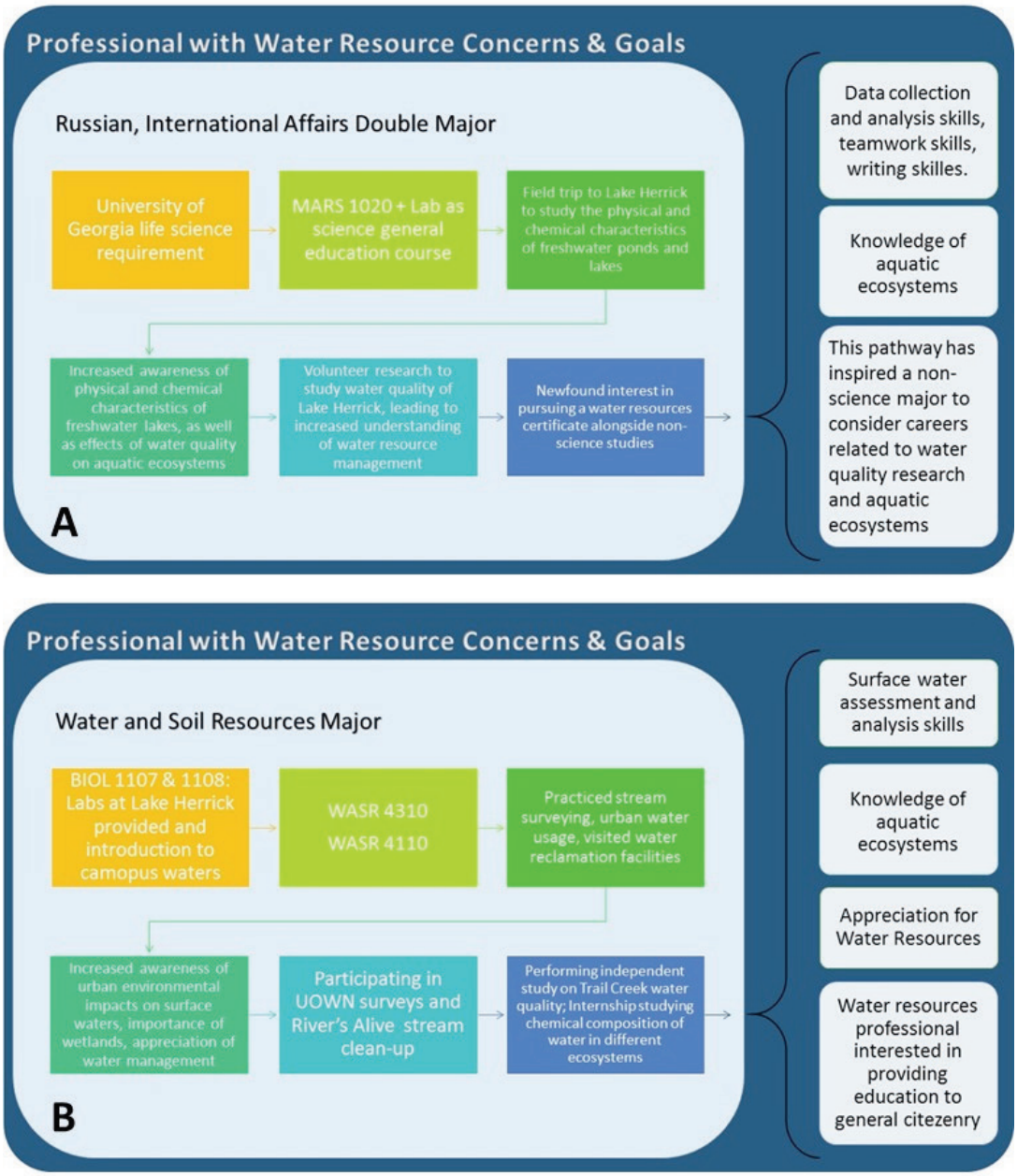

Figure 1. Examples of student pathways into water resources. A) Non-science major that decided to pursue further scientific training after field experiences in a life sciences course and subsequent volunteer research. B) Science major that pursued volunteer and independent research projects on campus as training for a future career with water resources.

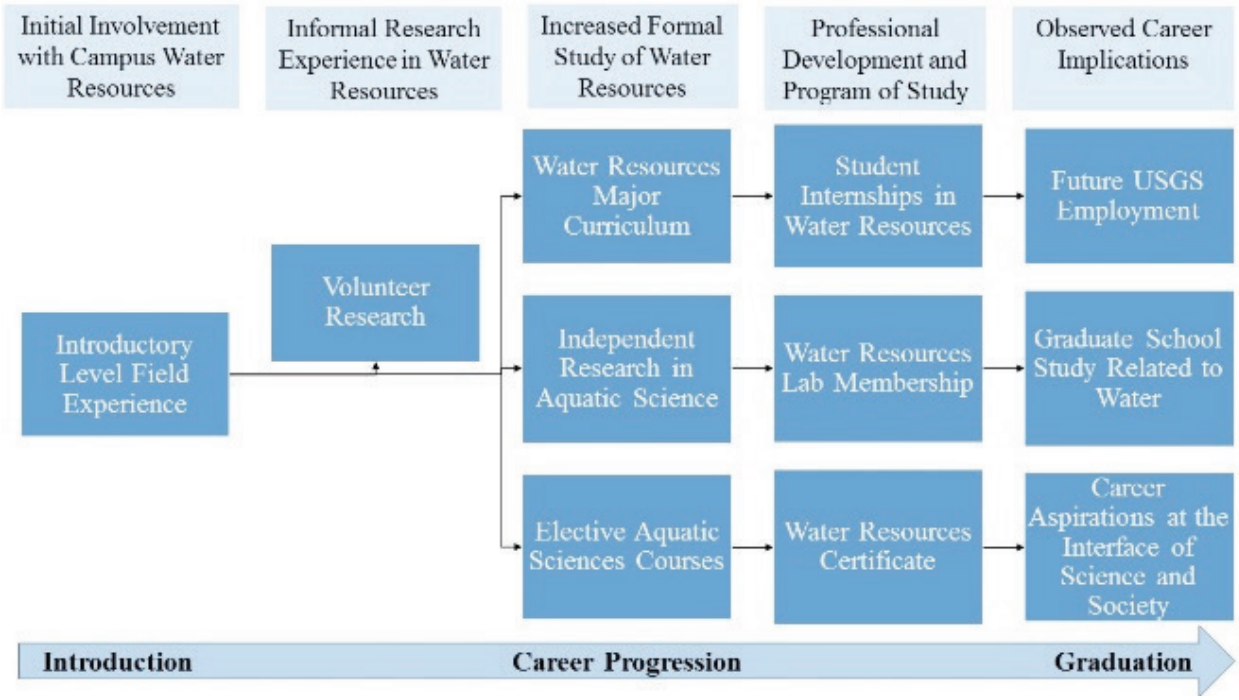

Figure 2. Overarching framework with generalized pathway for students to enter participation with water resources. This framework generalizes steps that students used to further their engagement in water resources as well as the long term implications of being involved in water resources research at UGA.