Developing Community-Based Environmental Stewardship in 4-H Youth

Introduction

Environmental education is one way to foster environmental stewardship. Yet, investments in environmental education opportunities have primarily been made in public –school learning environments (Potter 2009). Not all children may have access to these opportunities. Specifically, homeschooled children may not have access to real-life, engaging opportunities that could inspire environmental stewardship. Environmental education curriculum available to k-12 students has undergone some review and development to promote stewardship (Neal & Palmer 2003, p.23). Though, some argue that the environmental education field is outdated and not written to incorporate key ideas important for motivating stewardship, such as systematic change in and knowledge of personal responsibility for the environment (Potter 2009).

For this project, we created an environmental education activity that bridges the gap of research-based environmental education opportunities available for homeschooled children attending a 4-H youth club in Tompkins County. We incorporated principals of systematic change and stewardship motivation in a real-life activity involving water quality testing of different locations along Fall Creek.

Children will become stewards of their own local environments and develop key attitudes towards long-term environmentally responsible behavior.

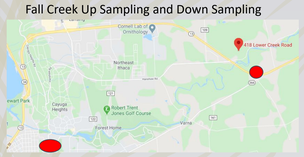
Who and Where

WHO: 4-H is a national youth development program run by cooperative extension centers across the United States. This environmental education intervention targets the 4-H Conservation Club in Tompkins County run by Cornell Cooperative Extension. The club is attended by ten homeschooled students ages 10-17 who aspire to make positive environmental change. The children live in remote, rural areas of Tompkins County. Moreover, they are mostly from economically disadvantaged backgrounds.

WHERE: This activity will begin at the 4-H Conservation Club headquarters at 418 Lower Creek Road in Ithaca, NY. From here, we will travel to upper and then lower Fall Creek to get the between site differences in water quality.

4-H Conservation Club Headquarters

Fall Creek Up Sampling and Down Sampling



Environmental Monitoring

Youth will become leaders of their local riparian habitats by learning a simple water sampling technique used to rapidly assess water quality. This technique, called the EPT Index, involves surveying organisms that live on the bottom of streams to indicate water quality. The premise of this water quality measuring technique is that high quality streams have the greatest diversity of small aquatic insects. The more polluted a river or stream, the fewer number of species it will have (McQaid 2012).

The particular group of organisms identified in the EPT index is the *benthic microinvertebrates.* These organisms are sensitive to stress, and many human activities that affect the environment result in a fluctuation of this organism's population.

How to Sample

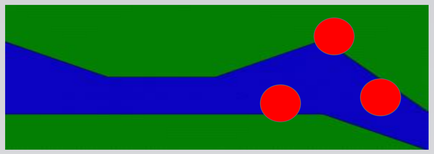
Collecting Samples:

Students will begin by collecting samples from the habitats of the aquatic insects. This is a group activity that ideally involves three children. The technique that will be used is called kick-netting, and involves one person to hold the net and position it on the stream floor, another person to stabilize the net from a lower position, and a third person to kick the river floor and forces organisms that are on the floor into the net (McQaid 2012).

It is important for the kids to improvise and be creative in finding ways to sweep areas under roots, mud banks, and rocks into the net for collection.

Children Kick-netting (purposefully blurred) (McQuaid 2012)

Collecting will be conducted across the stream to complete a holistic sampling technique. Children will get to be explorative in this phase, as they sample areas on the corner, sides and middle of the stream (shown in red on the diagram). Part of the scientific sampling technique is uncovering and excavating, something many children are inclined to do already.

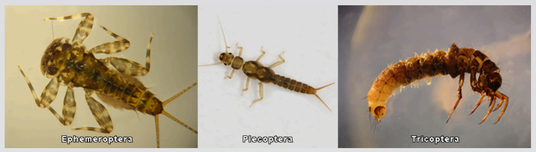


Diverse Habitat Sampling Within Stream

The net captures invertebrate and they are washed in a bucket so they can be more identifiable. They are then taken back into the classroom for identification.

Index Scoring:

EPT Index scoring can be successfully taught to teachers, students and volunteers. Basic identifications are required for the animals and can be done with the naked eye. Three taxa, or population groups, are identified. They are, trichoptera ephemeroptera, and plecoptera (and all three are relatively distinct looking).



Examples of three taxa (UNH Biomonitoring)

The EPT index is the total number of species from these three groups found in the sampling. A simple table can be used to identify general water quality health.

Rating	Excellent	Good	Good-fair	Fair	Poor
EPT	>27	21-27	14-20	7-13	0-6

EPT Index (McQuaid 2012)

Discussion

In this section we use previous research to invoke potential short-term and long-term benefits of our proposed environmental education intervention. In creating this activity, it was our purpose to incorporate historically neglected principals of environmental education. As previously mentioned, two primary learning goals not explicitly included in the 1990 National Environmental Education Act and that are integral to fostering environmental stewardship are inculcations of systematic environmental change and personal responsibility (Potter 2009).

Learning about systematic environmental change is represented in the between-sampling method in our activity. Children learn to monitor change in their local environments between two different geographic areas. They first learn that river health is dependent on water quality which relies on the nearby environment. They sample two different river sections miles apart, with different nearby environments. With this systematic knowledge, they can then go on to analyze what might be responsible for the degraded water quality depending on their sample results. Comparisons between different geographic sampling points is fundamentally about change, represented at the scale of aquatic habitats. Change in the aquatic habitat is linked to change in the nearby anthropological environment.

As shown in Bramston et al. (2011), environmental stewardship motivation is internally consistent with developing a sense of belonging, caretaking the environment, and expanding personal learning. We believe that this organized activity touches on all three aspects of motivation, but largely the last two. This sampling technique taught to youth is a tool that can be added to their repertoire of environmental caretaking. Monitoring is a consistent form of environmental caretaking and stewardship, as practiced by environmental professionals. Moreover, this tool is a praxis of environmental caretaking that is applied to the youth's local and familiar environments. Youth have the opportunity to personally reflect on their habits as well as the everyday routines of their local environment which could be contributing to pollution of Fall Creek and Cayuga Lake.

Lastly, we theorize on how this intervention can improve the life chances of the children in our proposal. Our population is of economically disadvantaged rural children that are all homeschooled. Traditionally, parents supplemented their children's educations in a variety of ways. Parents with more financial resources spend more money on learning activities outside of school than parents with fewer financial resources (Kaushal et al. 2011). Not only does this intervention bridge the aforementioned gap of environmental educational opportunities available to homeschooled children, it also bridges the educational supplementation possible for parents of lower income backgrounds, both of which can be important for children's later achievement. Additionally, there is well documented evidence that poverty increases life stress. This activity takes place in natural settings of riparian habitats, and there is evidence that proximity to nature buffers stress among rural children populations (Wells & Evans 2003). Additionally, activities like this can have an impact on long-term learning, as a study shows how nature-based lessons resulted in better in-classroom performance and engagement (Kuo et al. 2018). Though the studies population was of students in traditional schooling, the positive underlying impact on student concentration primarily lead to improvements in classroom behavior through engagement. Above all, we predict that teaching skills that children can use to understand their immediate and surrounding environments will have a lasting effect on the motivation to continue stewardship. When the tools presented are simple and accessible, this will encourage youth to achieve a sense of competence in their environments. Deyoung (2000) states that "competence" can be a "fundamental resource" in environmentally responsible behavior. It can be "integregal at taking care of the planet, at either a global or local level" (Deyoung 2000, p. 522).

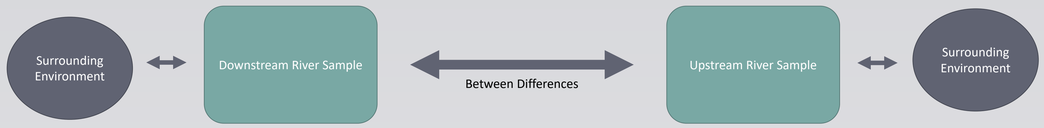


Diagram shows systems behind activity

References

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