

Using Endangered Beetles to Introduce Conservation Science to Teens

Michael Dawson

Conservation Education Liaison, Education Department, Saint Louis Zoo
1 Government Drive, Saint Louis, MO 63110 USA

Bob Merz

Zoological Manager, Invertebrates, Saint Louis Zoo
Director, Center for American Burying Beetle Conservation
1 Government Drive, Saint Louis, MO 63110 USA

ABSTRACT

Citizen science projects like the Great Backyard Bird Count, FrogWatch USA, and NABA Butterfly Counts have been a great way to engage and capture the public's interest in conservation. However, these activities allow only a limited opportunity for volunteers to participate in the actual conservation projects. Many of our conservation projects - both the in-situ and ex-situ - are usually assumed not suitable for public participation or non-skilled volunteer assistance. But what if certain taxa and certain types of conservation work were actually ideal for volunteer participation? What characteristics would these conservation projects exhibit?

The Saint Louis Zoo's American Burying Beetle (ABB) project has allowed teen volunteers to become intimately involved in all aspects of the conservation of this endangered species. The following will discuss how our program was adapted to include the direct use of teen volunteers and the impact this type of hands-on involvement is having on participants. We will also explore the characteristics that make this type of conservation program ideal for teen volunteers, and we discuss how other institutions could identify and adapt similar conservation projects that enable this level of participation.

OVERVIEW

For centuries, members of the public (i.e. non-professionals and unpaid scientists) have been contributing to scientific research as amateurs, naturalists and hobbyists. Many fields of science developed from the work of these individuals (Louv, 2012). Today these same types of individuals are often labeled as "citizen scientists." They range from young to old, come from a variety professional backgrounds, and are involved in a huge array of projects. The term "citizen science" was traditionally used to describe projects that relied on research collaborations between scientists and volunteers (laymen). In the past twenty years - with advances in social technology, increased conservation issues, and a cultural push to connect the next generation

with the environment - a variety of projects have popped up under the umbrella of citizen science. Many of these projects differ greatly in goals (research, education, conservation, etc.), scope, and the degree to which volunteers can participate. Some citizen science projects focus mainly on observational data collecting, while others focus on conservation. Due to these extreme differences, many definitions of citizen science have recently been proposed, as well as new terms to describe these different experiences.

If you Google the term “citizen science,” you will find many different definitions. To add to the confusion, the National Science Foundation’s Center for the Advancement of Informal Science Education (CAISE) proposed the term “public participation in scientific research” (PSSR). CAISE defines PSSR as collaborations in which members of the public engage in the process of research to generate new science-based knowledge (Shirk et al., 2012). Other studies have proposed the term “community-based monitoring” (CBM) to describe similar projects and activities (Conrad, 2010). For the purpose of this paper we will continue to use the term “citizen science” to refer to projects that rely on collaborations between scientists (paid professionals) and volunteers (laymen and non-scientists). These collaborations could include any level of participation, from observatory (BeeSpotter, Firefly Watch, FrogWatch, Christmas Bird Count) to more hands-on projects (Missouri Stream Team and local/regional BioBlitz activities). We define the ABB project as a citizen science project that has a strong conservation focus and utilizes a large level of volunteer participation.

Regardless of the level of volunteer involvement, all citizen science projects require some form of volunteer training and mentoring. In general, the more involvement a project asks of its volunteers, the more training and mentoring is required. Due to resource availability and project goals, most projects that utilize volunteer participation offer few hands-on opportunities and more often use volunteers to assist in observational data collection. However, in many cases, there may be notable benefits to designing projects that utilize a greater level of volunteer participation. Before we focus on the benefits, we will first review our concerns and how the ABB project overcame these barriers.

APPREHENSION LEADS TO ENTHUSIASM

The history of this partnership is one that has been dotted with apprehension and careful planning. To say there was trepidation on the part of the Center for American Burying Beetle Conservation is an understatement. There is considerable concern when dealing with an endangered species, and the more people who are involved, the more concern there is. So in the beginning, only Invertebrate Unit staff had any involvement with this species.

Around 2008, the Invertebrate Unit approached the Zoo's Education Department staff to discuss some limited involvement in its conservation efforts. The plan to involve Zoo Alive teens with American Burying Beetle recovery was designed to ease all partners into the entirety of this project. It began in 2010 with a survey for the endangered American Burying Beetle. This was not busy work, or a specially designed "teaching survey." This was a real survey, with real results contributing to the overall data for that season.

Training sessions preceded the survey trip. These sessions included things like:

- The strict methodology of surveying
- How the pitfall traps are assembled
- The importance of identification of every specimen
- Just how terrible the bait (fetid chicken) smelled
- The importance of sanitation and so on

The teens helped construct traps sets, set and bait the pitfall traps, survey an area for the beetles, and identify and record every specimen they found. Spreadsheets were later filled out and analyzed, and this information was included in the year-end report submitted to the United States Fish and Wildlife Service as a condition of our permit (Merz, B. & Cooney, E., 2011).

This survey was followed by another survey in a different area a year later. A nearly identical training and survey methodology was implemented. The results exceeded expectations. The maturity of the hand-chosen group, their seriousness, enthusiasm and application to the tasks at hand convinced us that there was considerable potential for more involvement in the project.

In the meantime, the effort to reintroduce the American Burying Beetle to Missouri began in 2012. At the beginning of this effort, a deliberate decision was made to not include many zoo personnel for the actual reintroduction. Mindful of regional politics and the local citizen's concern with government interjection into local affairs, it was decided that a cadre of local volunteers would quell a lot concerns of this nature. However, in 2013, a severe thunderstorm stalled over the reintroduction site, flooding all of the introduced beetles out of their carefully prepared burial chambers. Partners in the project decided that in 2014, there would be two separate reintroductions. This second reintroduction was now the perfect opportunity to involve Zoo Alive volunteers to a greater degree.

The current model for involvement was developed in 2014. For the actual reintroduction, the Zoo Alive teens travel across Missouri to the reintroduction site. They assist with a brood check from the previous reintroduction. Then, on the day of the reintroduction, they help set up the "brood lines" at each site. This involves plotting, with flagging tape and string, the precisely measured markers for each brood chamber. The teens lay out fencing and stakes and divvy up the tools needed at each site. For the reintroduction, they remove the soil plugs, excavate the side, burial

chambers for the beetles. They then place a quail and beetle pair in each chamber before resealing and securing with poultry fencing and garden stakes (Merz, 2012).

This high level of involvement required engaging the teens at an earlier stage of the process – the daily care of our beetle colony at the Zoo– for the two months prior to their help with the actual reintroduction. This stage in the process would not only help them gain handling skills and familiarity with the beetles and Invertebrate Unit staff, but it would also give them a good look at the entirety of the project, from surveys to rearing, to pairing beetles, reintroduction and follow-up brood checks.

This involvement created what we call, “the Tom Sawyer effect.” Those familiar with the Mark Twain novel The Adventures of Tom Sawyer might recall when Tom was tasked with the undesirable job of whitewashing Aunt Polly’s fence. To complete the job, he pretends that it is the most fun, most desirable thing he could be doing. Other children notice this and begin begging a deceptively reluctant Tom to allow them to paint the fence. He eventually relents and lets them help after they offer him various items that he finds worthy (an apple, some marbles, a kitten with one eye, a brass door knob, etc.). It seems the involvement of the Zoo Alive teens created a great deal of interest in our paid Education Department staff. We now have several Education Department “volunteers signing up for the opportunity to feed and clean our individual beetle habitats prior to reintroduction. This has created an enthusiastic, in-house squad of American Burying Beetle groupies who frequently lament that they are not able to do more. No brass doorknobs or kites have been offered, but we receive considerable, enthusiastic help with a task that most of the Invertebrate Unit staff has been doing daily since 2004.

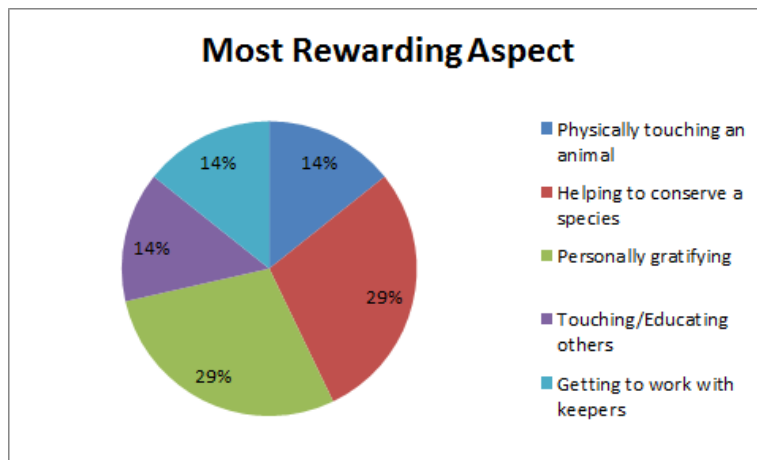
IMPACT AND EVALUATION

Using volunteers to assist with this project came with additional training, monitoring, and the need for more resources. These needs can make it challenging to effectively accomplish the goals of a project. However, these barriers can be easily outweighed by the benefit to both the success of the project and the volunteers. For the ABB project, once volunteers were trained to assist with the feeding and cleaning of the individual beetle habitats prior to reintroduction, it enabled the keeper staff to work on other projects. The use of volunteer assistance with fieldwork shortened the length of time for ABB release trips and made a small and reliable work force available.

Even though this type of hands-on citizen science project can only handle a small group of volunteers - compared to a traditional observation style projects such as FrogWatch - it has a much greater impact on its volunteers. To get an understanding of how our volunteers were affected by working with this project, we used GoPro cameras to capture their experiences and to

record short interviews. A formal post survey was also sent out to all ABB volunteers. One question on the survey asked what the most rewarding part of the volunteer’s experience has been. 29% reported the experience to be personally gratifying; 29% said the experience was rewarding because it enabled them to assist in the conservation of the species; 14% said the experience was rewarding because they could physically touch the species; 14% found the experience rewarding because it allowed them to educate others; and 14% found the experience rewarding because of the opportunity to work directly with the keeper staff. One of our volunteers stated, “I went on a trip with the zoo to Belize. While we saw some amazing wildlife in Belize, nothing can compare to the feeling of helping an endangered species increase its presence in the wild.”

Many of our zoo teens had the opportunity to participate in more than one of the activities (surveying, helping to clean ABB habitats prior to release, releasing ABB, and brood check). We believe the opportunity to participate in multiple distinct aspects of the ABB project helped our volunteers feel more connected to the mission of the project. We feel this increased connection to our project’s mission led to repeat participation by many of our zoo teens and other volunteers. Many citizen science projects have recruitment issues, especially for repeated participation. Even the volunteers who only participated in one of the activities, or were only able to participate in this year’s season, said they wish they could have had the opportunity to participate more and planned to try to participate again the following year..

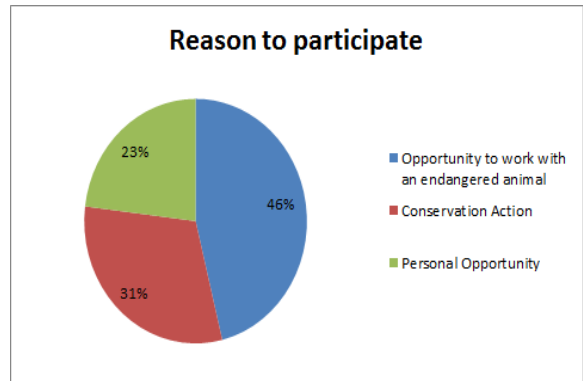
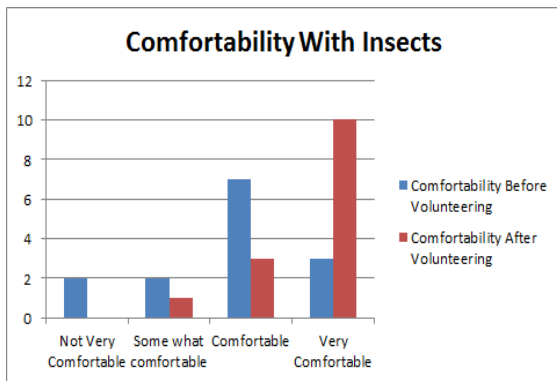


INSECTS ARE GOOD CANDIDATES FOR CITIZEN SCIENCE PROJECTS

One of the main reasons we were so successful using volunteers to help with this project, especially teens, was because of the focal animal. So what characteristics make this large black and orange nocturnal beetle a good candidate for a citizen science project? Based on our post

survey, when asked “Explain why you decided to participate in this experience” 46% responded with a statement that mentioned the opportunity to work with an endangered species. Being able to work so closely with an endangered species, and helping in its conservation, can be a rewarding experience for many volunteers. Many current citizen science projects do not have an endangered species as their focus or a direct conservation action associated with their volunteer participation.

Another aspect that makes the ABB an ideal candidate for this type of citizen science project is the fact that it is an insect. Studies suggest that insects, depending on the species, can make great candidates for citizen science projects (Rich, 2011). Many species such as butterflies and pollinators are already well known to most volunteers. Many insects pose a very low risk of harm or injury to volunteers, and many species are quite hardy and resilient when handled. The ABB also has a very unique and fascinating natural history that makes its conservation appealing to most of our volunteers. The ABB program also allowed volunteers to increase their comfort level with insects. Based on our post survey, 50% reported their level of comfort with insects increased after having volunteered with this project.



CONCLUSION

The Saint Louis Zoo’s American Burying Beetle project has allowed for teen volunteers to become intimately involved in all aspects of this species’ conservation. It is an excellent model for other citizen science projects to follow. There are many other invertebrates that exhibit similar characteristics to the ABB and thus could be great candidates for other like programs. We are currently reviewing the idea of using volunteers to assist in Partula snail conservation. Creating these types of experiences and opportunities for our teens and our public will help create a more scientifically literate and conservation-minded society.

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