

## PRICE WATERSHED HEROES: Optimizing Program Impact through Program Evaluation and Continuous Improvement

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As zoo educators, we are increasingly called upon to demonstrate the impact of the program's we design and present to audiences of all ages. This is perhaps most prevalent in work with school programs. In an era of increasing accountability, teachers are pressed to justify their instructional decisions (Whitesell, 2016). The decision to dedicate instructional time to outside programs must be considered in light of the impact any given program stands to achieve. As a result, teachers are becoming more discerning about the programs in which they participate. That signals a need for program providers to demonstrate the efficacy of their programs. We believe that program efficacy is a continuous pursuit for excellence, that is informed by experience and data that describes progress toward targeted outcomes.

This article details one such pursuit. It highlights the San Diego Zoo's efforts with the Price Watershed Heroes program. Now in its fifth year, this program has benefitted from needs-based design, followed by program evaluation. The combination of needs assessment and evaluation data have made today's program quite different from its original concept and Year 1 design. This article highlights the Price Watershed Heroes program and lessons learned over the first four years of implementation.

### The Program

Price Watershed Heroes targets students from underserved areas across San Diego County. It is designed to educate Title I students (disadvantaged or low income students) in grade 4 (9-10 years old) about the critical roles played by watersheds in each of the world's ecosystems. Over the course of three cumulative learning experiences, students learn about watersheds—their definition, the ways they support animals and plants, and the importance of watershed conservation. The design team purposely chose depth over breadth, based on research-based practice (for example, see Sacco, et al., 2014). The program's three components - schoolwide assembly (Figure 1), classroom visit (Figure 2) and zoo visit (Figure 3) - are highlighted in Table 1.

The program benefits from a STEM-focused, inquiry-based learning orientation (Reeve, 2015), which challenges students to make observations and discover how human activities have dramatic impacts on watersheds—locally and globally. Throughout each session, students encounter challenges that require collaborative application of knowledge in the science to real-world research problems. Students benefit from experiencing real-world applications of science and research, as well as exploring a range of related careers (King & Ritchie, 2012).



Figure 1: School wide assembly on the critical role played by watersheds.



Figure 2: Classroom activity looking at animal stomachs.

Figure 3: Students meeting a sugar glider, *Petaurus breviceps*.

Program Component	Original Program (Years 1-4)	Year 5 Revised Program (currently in first implementation year)
Schoolwide Assembly: Fifty-minute assembly (two assemblies are typical, K-2 and 3-5)	<ul style="list-style-type: none"> <li>What a watershed is, its relationship to the ocean and which watershed they live in</li> <li>Importance of water, how they use it in their homes, and what action steps they can take toward water conservation</li> <li>Pollutant problems and other challenges that are currently happening in watersheds around the world, and what they can do to help</li> </ul>	<ul style="list-style-type: none"> <li>How water moves through a watershed (including storm drains)</li> <li>Threats to watershed wildlife: specifically, single-use plastics and microtrash</li> <li>The sensory information processed by wildlife that would result in interaction with single-use plastics and/or microtrash</li> <li>Actions steps to protect and improve the watershed</li> </ul>
Classroom Visit: Sixty-minute classroom program with two 25-minute rotations	<ul style="list-style-type: none"> <li>How water moves and flows through a watershed; that it is captured, stored, and eventually released downhill</li> <li>Tips to help reduce non-point source pollution within their local watershed through environmental education that targets students and their families</li> <li>Dissect imitation animal stomachs and identify the animal, its prey, and if the animal was affected by a negative impact on the watershed</li> <li>Identify watersheds around the world and understand that what they do in their local watershed can affect all the different watersheds globally</li> </ul>	<ul style="list-style-type: none"> <li>Rotation A: storm drain activity, animal presentation(s)</li> <li>Rotation B: "Ooey-Gooley Guts" watershed animal wellness: a science lab activity</li> </ul> <p>Synthesis – An Action Step Commitment:</p> <p>We the 4th Grade students of _____ Elementary in room # _____. Commit to the following actions (options listed) to protect the wildlife in our _____ Watershed.</p> <p>Signed, (all students)</p>
Zoo Visit: Two-hour, onsite program	<ul style="list-style-type: none"> <li>How human activities in agriculture, industry, and everyday life have major effects on the land, vegetation, streams, ocean, and air</li> <li>Use problem-solving skills to create solutions to watershed challenges</li> <li>Healthy watershed is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life</li> <li>Skills to actively conserve Earth's resources and their local watershed</li> </ul>	<ul style="list-style-type: none"> <li>"Happy Birthday?" a single-use plastic and microtrash activity</li> <li>"The Life of the Party" Zoo activity, while moving through the Zoo's River Trail watershed, students describe scenarios in which a single-use plastic and/or microtrash "birthday party" item ends up in a particular habitat (exhibit).</li> <li>Students speculate which animal(s) may interact with the trash, what sensory information may lead the animal to the trash, what could happen as a result of the animal/trash interaction, and how that potentially life-threatening interaction could have been avoided entirely.</li> </ul>

Table 1: Price Watershed Heroes Program Composition

## The Evaluation Effort

Program evaluation was conducted throughout the initial four-year program implementation period, which ended in spring of 2018. The San Diego Zoo education team partnered with an external evaluator to explore the range of targeted outcomes defined by the San Diego Zoo and guided by the Price Watershed Heroes program focus.

The evaluation was designed to describe the program's impact and provided data and perspectives from students, teachers, and chaperones who helped guide the zoo visit. Data collection with students utilized a pre/post online instrument that contained outcome-specific knowledge and attitudinal measures. Teachers and chaperones completed an online survey following the conclusion of their program. The teacher survey included items that addressed observed impact, implementation factors, program alignment with existing curriculum, and program logistics. The chaperone survey items explored observed impact, self-efficacy in leading a group of students during the visit, and program logistics.

## Results

The focus of this article is on the process, rather than the results. However, for context, we offer the following result highlights from the program's initial four-year implementation period. The revised program is currently in its initial implementation school year. Data comparing the original program to the revised version will become available from September 2019.

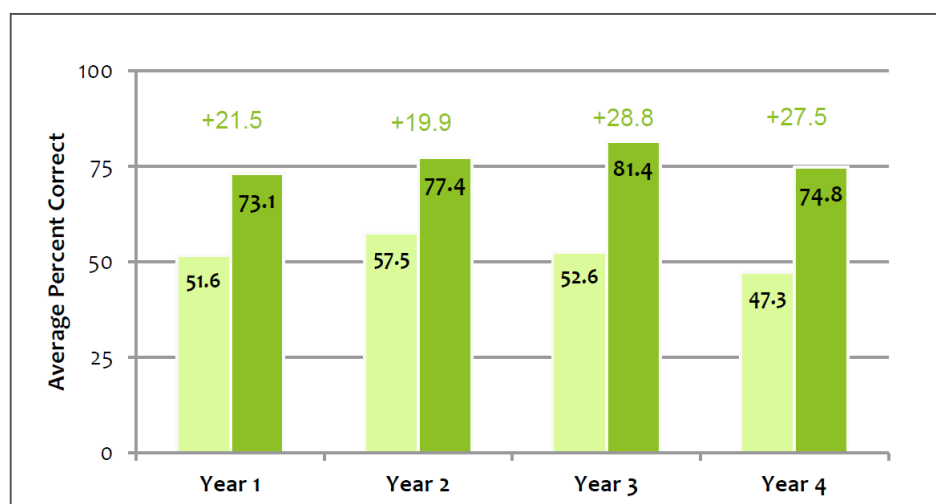


Figure 4: Student performance pre-to-post on program content-aligned assessment.

Student performance on content-specific items improved each year, on average, by 19 to 28 percentage points (Figure 4). Each year's differences proved statistically significant (t-test for independent groups,  $p < .05$ ). Of particular interest, students in Year 4 pre-tested lower. However, that lower entry point did not reduce the amount of gain realized. Results from Years 1 and 2 differ most significantly from Years 3 and 4. We attribute this to program refinements, and also sharing the results with educators responsible for conducting the school visits and field trips.

Student-reported conservation behaviors did increase in each program year, relative to pre-program levels. However, the average differences were slight. The greatest change was specific to shower length. Of particular interest, conservation behavior increases were observed to be considerably higher for students from inner city, highly urban schools, relative to schools in more suburban settings.

Teacher response to the Price Watershed Heroes program was exceedingly and consistently positive over the four-year data collection effort. Participating teachers praised the program, in particular, for its: (a) active learning approach; (b) real world, authentic application of science; (c) ability to spark their students' interests in science; and, (d) availability in Spanish for their English learners. Over the evaluation period, teacher criticisms were largely directed toward program logistics surrounding their zoo visit. These comments helped optimize the program's operation during the visit itself.

## Lessons Learned

The first four years of the Price Watershed Heroes program has yielded a number of lessons learned. Here, we describe four learnings that stand to inform the practice of zoo educators worldwide.



### Continuous improvement requires investment

One of the hallmarks of the Price Watershed Heroes program has been its responsiveness each year to teacher and student feedback and the yearly external evaluation data. Changes in education standards, specifically the Next Generation Science Standards that came into play during the program's first four years, also informed program changes. While it is necessary to focus on presenting the program, it takes the investment of time and money to measure impact, consider implications from evaluation findings, and make adjustments each year.

### Sharing the data

While measuring program outcomes requires investment, such investment can pay dividends. For example, having the external evaluator present findings from Years 1-2 to the educators responsible for presenting the program in schools brought tears to the eyes of more than one. For some, this was the first time they had seen credible evidence of the impact of their work. Others took the current levels of student performance as a challenge for improvement, as they set out to implement the program in the following year. The reader has likely noted the improvement seen between Years 1-2 and 3-4. This sharing of results to improve implementation may have contributed to the increased student performance. The opposite is both true, and far too often seen: evaluation results that sit on a shelf in never-referenced reports are a missed opportunity to improve programs, and heighten impact.

### "One and Done" should become "More for the Score"

Teacher response to the Price Watershed Heroes program has been exceedingly and consistently positive over the four-year data collection effort. Most common among comments from participating teachers was praise for the program's three-session format. We suggest that the types of evaluation-proven outcomes achieved in the program's first four years would have been unlikely in a single session format. The three sessions provide the time to fully cover content, and time in between sessions for students to contemplate what they have learned. Our experiences illustrate what can be accomplished through multi-component programs, relative to one-session "events" with limited or non-existent results. Yet, even with three sessions, the evaluation data and experience of our educators has led to further focusing of program content in Year 5 (see Table 1: Year 5 Revised Program).

### The Future

The goal remains to have the best program and curriculum, such that targeted objectives are met and impact is optimized. We will continue to use program evaluation to monitor the program and inform continuous improvement efforts.

### Acknowledgements

The authors would like to acknowledge Price Philanthropies for their generous support of the Price Watershed Heroes program, which has provided a first visit to Balboa Park and the San Diego Zoo for many children throughout San Diego County.

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