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## The Art and Science of Rain Barrels: A Service Learning Approach to Youth Watershed Action

Patricia Rector

*Rutgers Cooperative Extension of Somerset and Morris County, rector@njaes.rutgers.edu*

Rachel Lyons

*Rutgers Cooperative Extension of Morris County, lyons@njaes.rutgers.edu*

Theresa Yost

*Rutgers Cooperative Extension of Morris County, yost@njaes.rutgers.edu*



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## The Art and Science of Rain Barrels: A Service Learning Approach to Youth Watershed Action

### Abstract

Using an interdisciplinary approach to water resource education, 4-H Youth Development and Environmental Extension agents enlisted 4-H teens to connect local watershed education with social action. Teens participated in a dynamic service learning project that included learning about nonpoint source pollution; constructing, decorating, and teaching families about rain barrels; and selling the barrels at the county fair. The program resulted in significant knowledge increase among the teens. Furthermore, rain barrel installation rates were higher than the average rates of similar Extension programs. This program, while small in scale, illustrates the potential of employing teens as teachers in interdisciplinary Extension programs.

### Patricia Rector

Environmental and  
Resource Management  
Agent  
Rutgers Cooperative  
Extension of Somerset  
and Morris Counties  
Morristown, New  
Jersey  
[rector@njaes.rutgers.edu](mailto:rector@njaes.rutgers.edu)

### Rachel Lyons

County 4-H Agent  
Rutgers Cooperative  
Extension of Morris  
County  
Morristown, New  
Jersey  
[lyons@njaes.rutgers.edu](mailto:lyons@njaes.rutgers.edu)

### Theresa Yost

4-H Program  
Associate  
Rutgers Cooperative  
Extension of Morris  
County  
Morristown, New  
Jersey  
[yost@njaes.rutgers.edu](mailto:yost@njaes.rutgers.edu)

## Background

The roots of the 4-H program are firmly tied to the concept of technology transfer. Using youth to drive attitude and behavior change within their family unit was the trademark of the original corn clubs that gave birth to the 4-H program (Van Horn, Flanagan, & Thomson, 1998). Although 4-H serves a wide range of ages, adolescents may have a better grasp of the complexities of the environmental concerns than younger students, while maintaining an affinity for the natural environment and acting as effective catalysts of change in family behavior (Easterling, Miller, & Weinberger 1995).

A collaborative program between Environmental and 4-H Extension programs provided a new approach to water resource education by providing 4-H teens with an environmental learning experience coupled with a hands-on activity that was readily transferable. Applying the technology transfer concept the project allowed teens to teach others the theory and technology of building and installing rain barrels, while becoming part of the solution to an environmental problem at home and

in the community.

The development of land, with its concomitant increase in houses, driveways, and roads, does not allow the water to slowly seep into the ground, and stormwater is carried swiftly over impervious surfaces into the nearest storm drain and directly into the nearby waterbody. This high velocity stormwater carries pollutants, including sediment, and erodes our stream banks and impairs aquatic life. The United States Environmental Protection Agency (2009) estimates that watering of gardens and lawns can account for up to 40% of the household water use in the summer months. Rain barrels may save up to 600 gallons in just one rain storm (1.25inch) from an 800 ft<sup>2</sup> residential roof (Bakacs & Haberland, 2010).

The introduction of one rain barrel is not significant, but cumulatively, rain barrels can provide a positive influence on a stream (Mullett, Kevelighan, Bails, & Pate 2002). Therefore education and change of behavior are critical, and this is where Extension professionals can serve as catalysts. 4-H teens can provide an excellent mechanism for reaching the intended audience, as they become educated, socially conscious, and motivated to be part of the solution.

## Introduction

Since 2008, the Be The Change (BTC) 4-H Program has provided teens (grades 8-13) in Morris County, New Jersey with a formal opportunity to work together to serve their community. With a service-learning focus, BTC is designed by teens in partnership with adults to promote leadership and citizenship competencies through planning and implementing a variety of local service projects. One of the projects they planned for 2010 was a hands-on community awareness water conservation project.

## Program Description

The Environmental Extension agent provided an interactive build-a-barrel workshop to lay the educational foundation of the project. The BTC teens participated in several components over a 1-month period. The components of the project were:

- Background about nonpoint source pollution, stormwater runoff, and water conservation taught through PowerPoint lecture provided by Environmental agent.
- Teens built ten rain barrels during the non-formal building session; the teens learned how rain barrels function and how to install them.
- Teens worked with a former 4-Her who outlined several different designs on the barrels, so everyone felt confident painting and decorating the rain barrels.
- Teens practiced and later delivered rain barrel-building demonstrations at the fair (teach-back).
- Ten rain barrels were conspicuously placed around the Morris County 4-H Fair and sold in a silent auction.

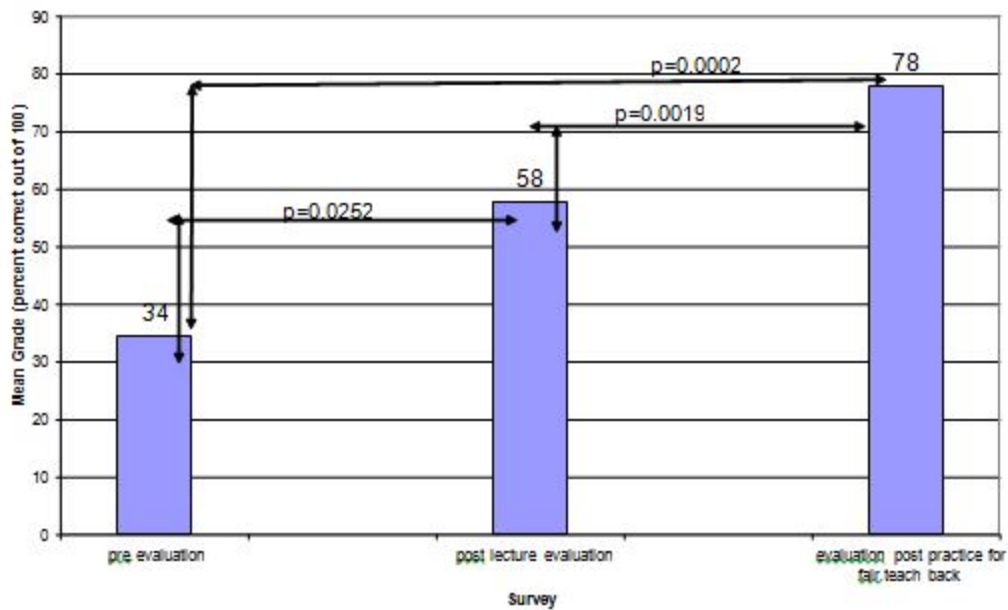
All barrels were installed by the summer of 2011. Teens explained the installation instructions, and Fact Sheets were available. Eighty percent (8) were purchased by 4-H families; these teens directly brought stewardship home.

## Evaluation and Impact

The teens were evaluated on their increase in knowledge based on a pre- and post-survey and a subsequent survey conducted after they prepared for the teach-back component. The mean scores (n=9) increased significantly from the pre-survey (34%) to the post-survey (58%), with a second increase in learning at the teach-back survey to 78%, an additional 20% increase (Figure 1). Potentially, the combination of a hands-on project with an educational component and the practice to teach what they had learned provided the increase in learning beyond the initial plateau. Des Marais, Yang, and Farzanekhia (2000) noted that "service-learning is the most powerful approach in youth leadership development."(p679). Stafford, Boyd, and Lindner (2003) found by adding written and oral reflection to the service experience, youth gain reciprocal learning. They can richly articulate what they have learned, as well as become more aware of issues in the community.

**Figure 1.**

Comparison of Mean Grades for Evaluations Before Lecture (pre-test), After Lecture (post-test), and After the Teens Prepared to Teach at the Morris County 4-H Fair



Another measure of evaluation was the overall success of the project. All rain barrels were sold at the silent auction. Bakacs, Muscio, Haberland, and Rector (2011) found that 71% of rain barrels were installed after attending a Build a Barrel Workshop. Installation of the rain barrels for the BTC Silent Auction Barrels was 100%. Although this was a small sample size, the installation rate appears to indicate a direct linkage between building and painting of the barrels by the 4-H members and the purchase of the barrels by their family members, an example of children bringing the stewardship home. Installation itself indicates a change in behavior, as homeowners must make physical alterations to their homes to install each barrel. Ten rain barrels can collect 1,500 gallons of

roof runoff during each 1.25 inch storm event (Bakacs & Haberland, 2010).

## Conclusion

The BTC participants learned through applied knowledge as they built rain barrels. The increase in knowledge was greater when the students were preparing to present at the County 4-H Fair. This civic demonstration of environmental consciousness and responsibility was facilitated as they demonstrated rain barrel construction and described how a rain barrel could be part of the solution, moving from environmental concern to environmental action. The project provided teens with knowledge of a real environmental problem and a hands-on solution they were able to bring to their families and the community, while enabling Extension agents to reach audiences not always captured with traditional environmental programs.

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