



Case Study: Parsippany-Troy Hills

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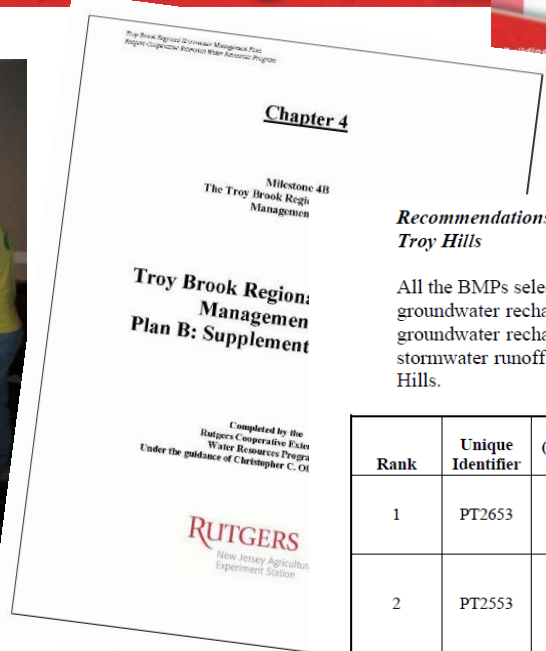
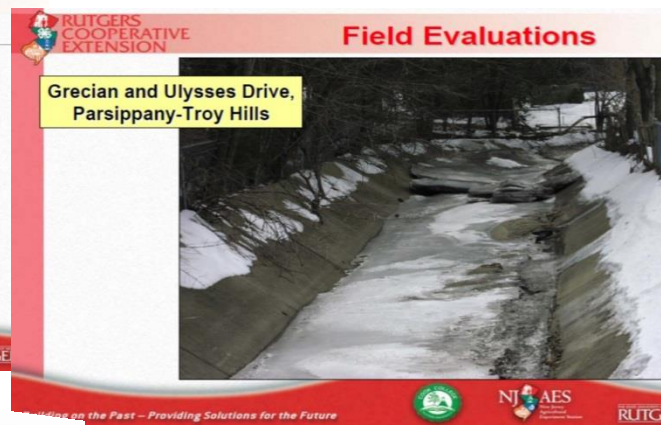
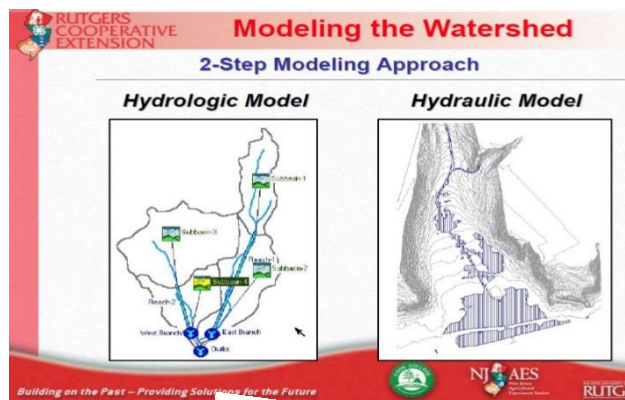
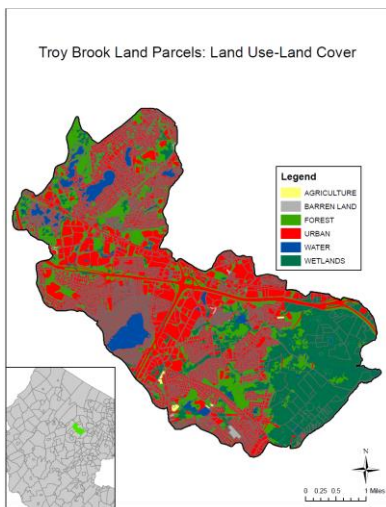
Karl Kuber

Supervisor (Retired)

Township of Parsippany, Department of Public Works

Dr. Christopher Obropta, Rutgers Cooperative Extension

- NJDEP
- Townships of Parsippany-Troy Hills, Mountain Lakes, Hanover
- Residents of Hills of Troy Neighborhood
- Whippany River Watershed Action Committee
- Cerbo's Nursery
- Tivoli Gardens Apartment Complex
- Cherry Hill Complex



Recommendations to Promote Groundwater Recharge in the Township of Parsippany-Troy Hills

All the BMPs selected to address the water quantity and water quality issues also promote groundwater recharge. The educational programs will also result in BMPs that promote groundwater recharge and will help encourage residents to take action to infiltrate more stormwater runoff. Table 4 ranks all the projects that were assigned to Parsippany-Troy Hills.

Rank	Unique Identifier	Location (Subbasin No.)	Management Measure	Type of BMP	Cost
1	PT2653	26	Disconnection of impervious surfaces for two-year storm	Convert existing basin into bioretention basin	\$130,000 to \$260,000
2	PT2553	25	Re-establish access to floodplain behind Public Works Bldg.	Wetlands	\$122,000 to \$244,000
3	PT0011	0	Microbial Source Tracking	PT26530551	unknown
4	PT2552	25	Disconnection of impervious surfaces at Tivoli Garden Apartments	Rain gardens	\$28,000 to \$56,000

16 square mile watershed.
Tributary to the Whippany River,
which is part of Passaic River basin.

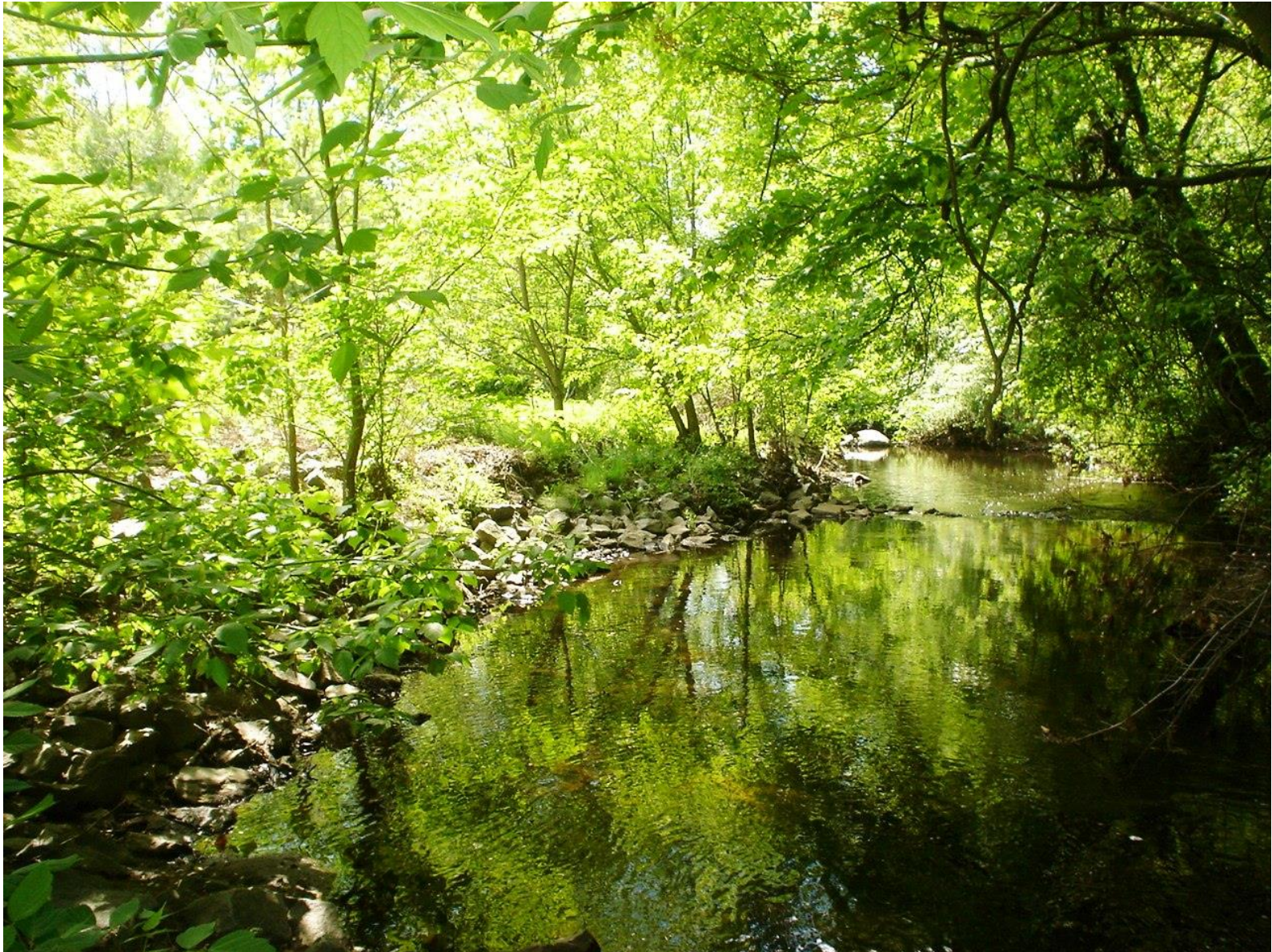


Originally all stormwater runoff from 18 buildings and parking lots directly entered the Troy Brook.

Ten rain gardens were installed to capture roof runoff, disconnecting 12 downspouts. These gardens disconnect approximately 7,500 square feet of impervious surface and on an annual basis will infiltrate roughly 188,000 gallons of runoff, 0.25 lbs. of TP and 24 lbs. of TSS.



- The focus of the Phase I implementation grant was to build upon existing partnerships within the watershed to implement some of the BMP recommendations identified in the Troy Brook Regional Stormwater Management Plan.
- The overall project goal is to demonstrate and evaluate how the required 60% reduction in nonpoint source phosphorus loads can be achieved in a portion of the Troy Brook Watershed.







This access road leads down to the Troy Brook. When almost any amount of rain fell, water entered into the building just to the left of this picture



*Flooding no longer occurs in the building.
It did not occur even during Hurricane
Irene, which brought 7+ inches of water to
Parsippany.*

- The pavers disconnect approximately 10,400 ft² of impervious surface.
- Disconnects the rear of the building roof + access road



Harvested water is used for street sweeping and/or truck washing.

- 5,000 gallon cistern
- Annually harvest approximately 116,297 gallons of water.
- Disconnects front of building roof in season.
- During the 1.25 inch rain in 2-hours amount of runoff would be 4,286 gallons, filling the cistern.



- Municipal Rain Gardens – disconnect 75% of roof (9,400 ft²)
- Normandy Parking Lot – Pervious pavers – disconnect 1.25 acre
- Hills of Troy Cluster Rain Gardens – Disconnect 2,500 ft²
- Totals:
 - 2,859,000 gallons of runoff
 - 935 lbs. of total suspended sediment
 - 6.2 lbs. of total Phosphorus

- Started out to be continuation of the same....
- Do great **projects**, work with great partners, introduce green infrastructure, reduce impacts of impervious surfaces in the Troy Brook that were leading to flooding issues and water quality impairments.
- But it turned into.....

Project

- Structured time, deliverables, personnel
- Scope defined, low risk, typically not subject to change, solution already determined,
- Stakeholders: are limited in number and input
- The overall environment is stable. Technological and scientific solutions are utilized to achieve the outputs.

Program

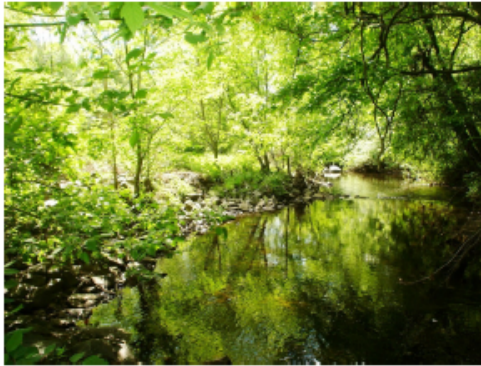
- Ongoing, benefits which may be less quantifiable, personnel less easily quantified also
- Scope may be broader, problem may not be agreed upon, may be more flexible within certain bounds, solutions may be “hammered out” through a process, risk may be acceptable to achieve the goal
- Stakeholders: may include a significant number and their input may be critical
- The environment is dynamic, potential for disagreements on the solution as it is not necessarily technology/scientific based



Parsippany-Troy Hills DPW is approximately 3 acres. The parking lot is 66,300 square feet and approximately 72% of the stormwater runoff drains to one corner of the parking lot. The amount of runoff to that corner is approximately 1,600,000 gallons per year.

COSTS

- Labor and materials costs were \$36,000
- Design costs were \$3,500 through the Rutgers Cooperative Extension Water Resources Program (other costs may be higher)



Troy Brook behind the Parsippany-Troy Hills DPW.
Photo credit Pat Rector.

MAINTENANCE

Regular maintenance for this pervious paver area includes mowing, irrigation (as necessary especially in the first year) and fertilizers (if needed). Irrigation and fertilizers were not required at this site

Replacement seeding may be necessary if bare areas become apparent. If erosion becomes apparent, the flow should be slowed, perhaps with river stone to break the velocity

Deicing salts should not be used as this would negatively impact the grasses

A snowplow may be used to clear the surface. The blade does not have to be lifted when plowing



Greening the Department of Public Works (DPW) Facility in the Troy Brook Watershed Permeable Grass Pavers



The Parsippany Department of Public Works (DPW) facility is approximately three acres. Most of the area consists of impervious surfaces. During a 1.25 inch two hour water quality storm, an estimated 71,275 gallons (9,801 ft³) of stormwater runoff are generated at the facility.

For more information please contact:

Brochure created by Pat Rector, Rutgers Cooperative Extension Environmental and Resource Management Agent for Morris and Somerset Counties and Christopher C. Obropta, Ph.D., PE., Associate Extension Specialist in Water Resources

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Implementation Project completed by
Rutgers Cooperative Extension Water Resources Program
and Rutgers Cooperative Extension of Morris County under
a 319(h) Grant from the
NJ Department of Environmental Protection.





DPW was our partner as we worked to redo the mouth of the swale.



The DPW provided insight into solutions for how to place the piping in the basins.

Installing the Sed basins



Having installed the sedimentation basins the guys are familiar with them and have a sense of ownership.

Maintenance has a different meaning under these circumstances.



- Our suggestion was to place a guard rail on the berm to prevent trucks from running over it by accident.
- DPW staff provided great input.
- As the staff explained: when it was time to remove sediment the guard rail would be hard to reach over. It would also mean that if a part of the guard rail was damaged an entire section would need to be replaced.
- A better idea would be the cement blocks often seen at parking spots. They could easily be moved for maintenance and be replaced easily.



THE BERM AND OUTLET



The berm is the low earthen wall of the swale that is planted with upland plants. The berm defines the edge of the swale and helps maintain the flow of the runoff within the channel of the swale.
Photo credit, Pat Rector



The rip-rap apron at the outlet provides for final settling and velocity reduction prior to entering the Troy Brook.

From top to bottom: Putting up silt fence; Hand-planting rip rap stones; Blue flag iris growing among the stones.
Photo credit Pat Rector

CHANNEL



Grass plugs are ready for installation in the swale.

As mentioned previously grasses and sedges are planted in the channel to help reduce the velocity of flow to promote settling. Grasses will bend with the onslaught of water but still provide resistance to the flow, and by planting several types can be vibrant from early spring until late fall. Grasses are also a less costly means to fill in an extensive channel.



Vegetated swale several months after planting.
Photo credit Pat Rector

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COSTS AND MAINTENANCE

- Excavation was done by the DPW staff, while planting was done by Rutgers faculty, staff, students, and Rutgers Master Gardener volunteers
- Plant and associated costs were \$2,250, while the Rutgers Water Resources Program design costs were \$4,750.
- During the first year, plants need to be watered regularly. Native grasses will still need to be watered in the first year.
- The plants on the berm should be weeded, watered, and mulched to assure good growth the first year. Watch the berm for signs of erosion.
- Always check the rip rap outlet for signs of standing water, a breeding ground for mosquitoes.

For more information please contact:

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

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VEGETATED SWALE

Greening the
Department of
Public Works (DPW)
Facility in the Troy
Brook Watershed



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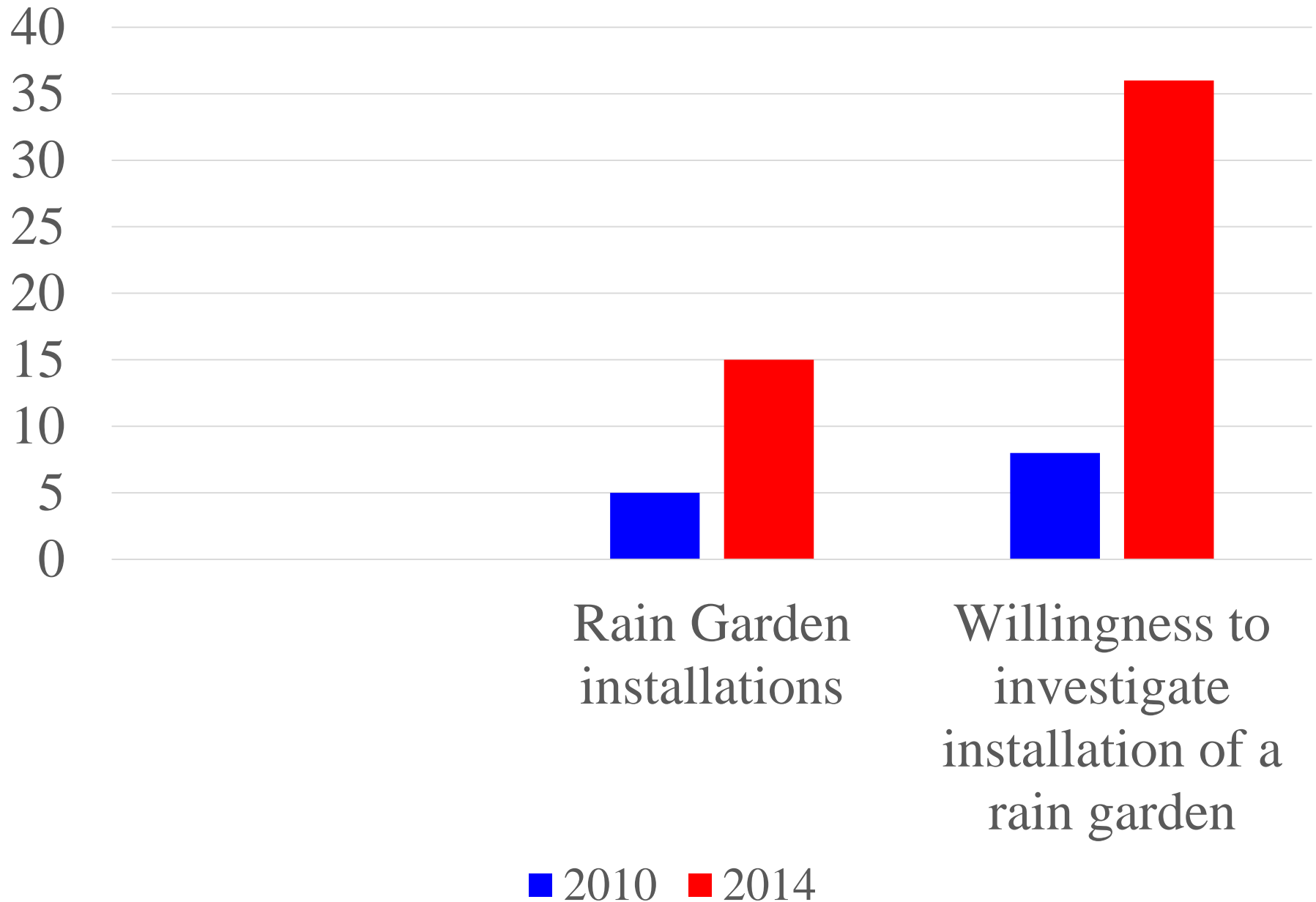
- This is a Hills of Troy Cluster Rain Garden installed in 2010.
- Five (5) rain gardens were installed.
- Eight (8) residents were interested.

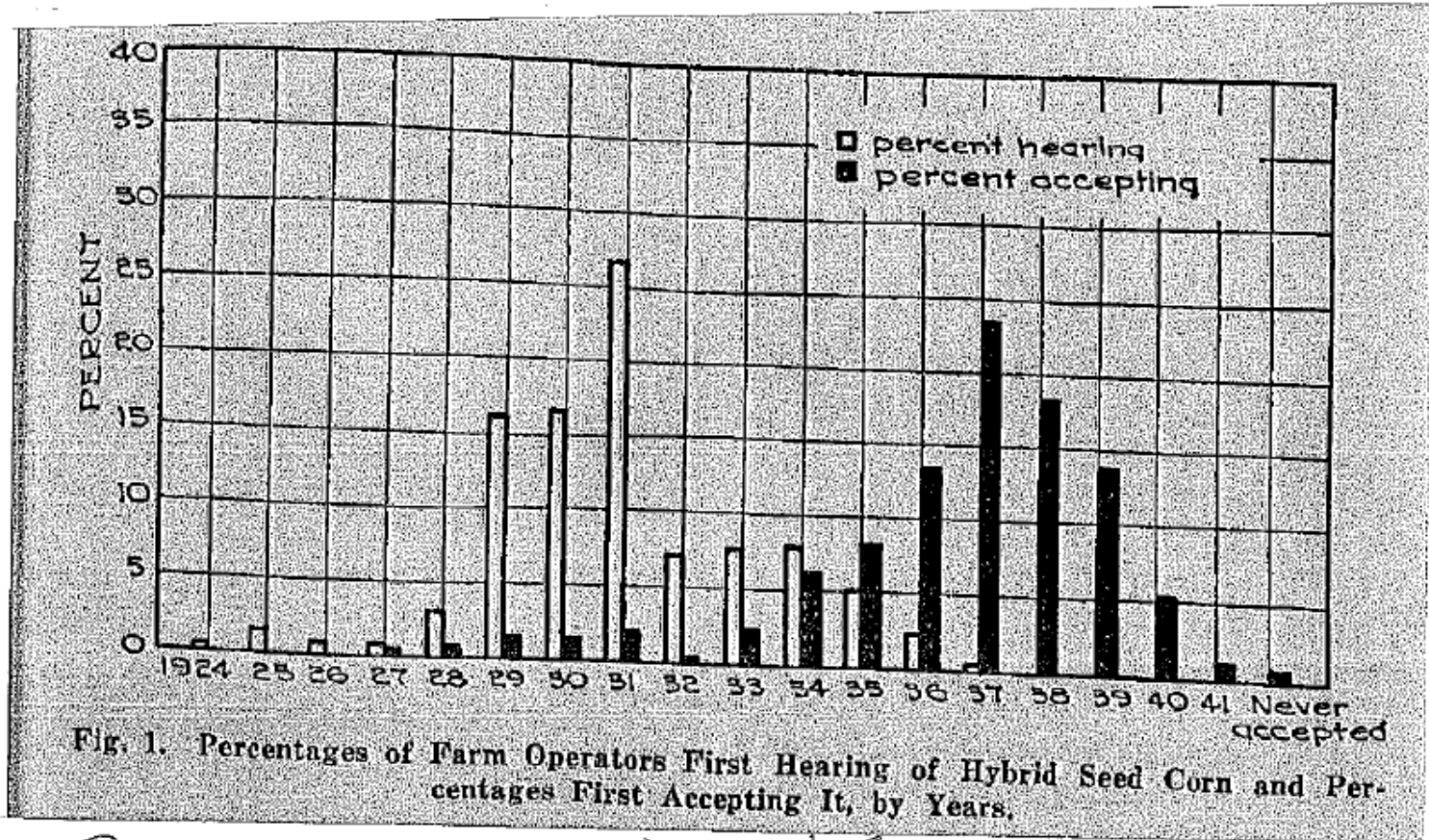


- This is a Hills of Troy Cluster Rain Garden installed in 2014.
- Thirteen (13) rain gardens were installed.
- Thirty-two (32) residents were interested.



Continuing Impacts

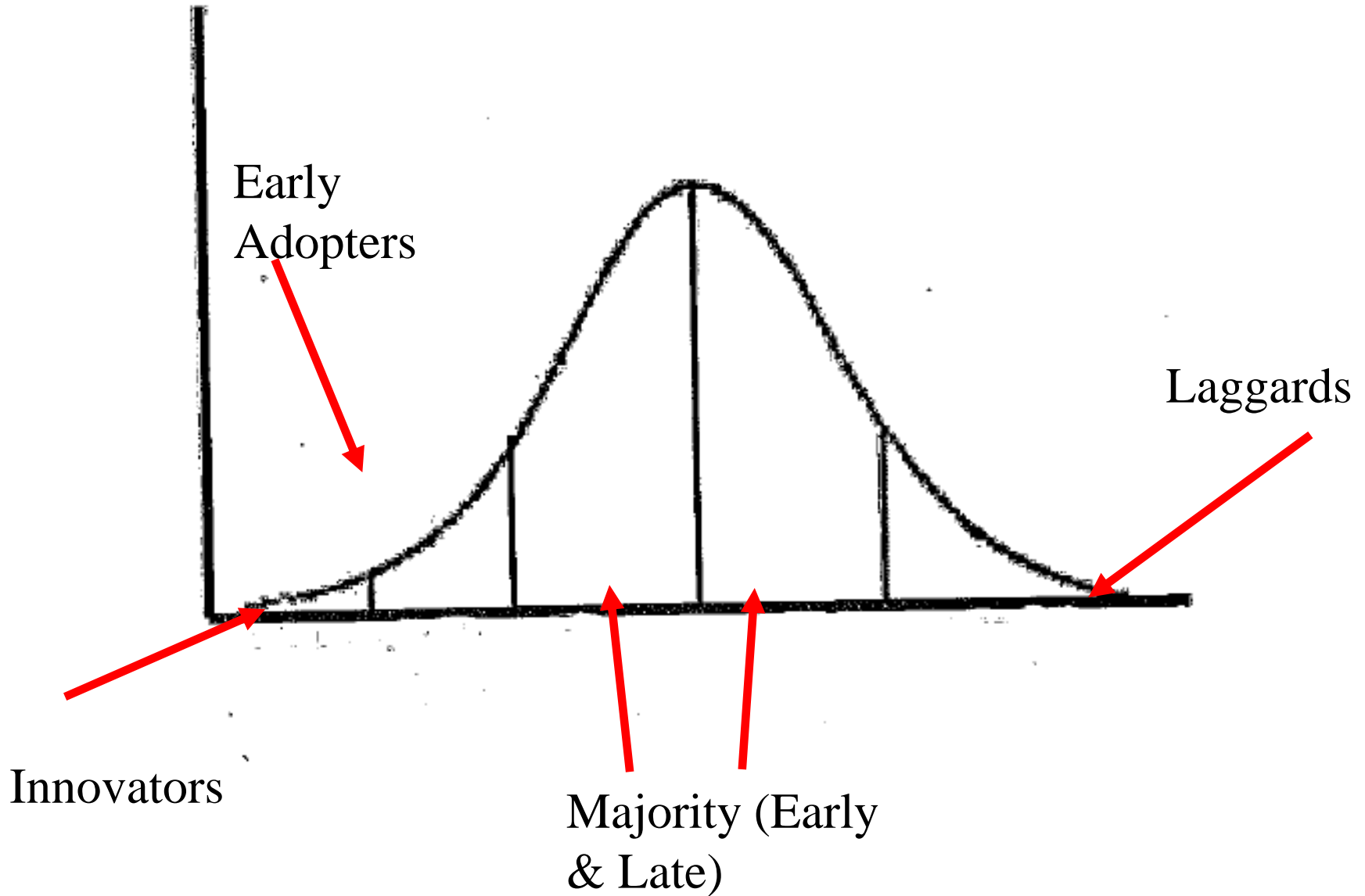


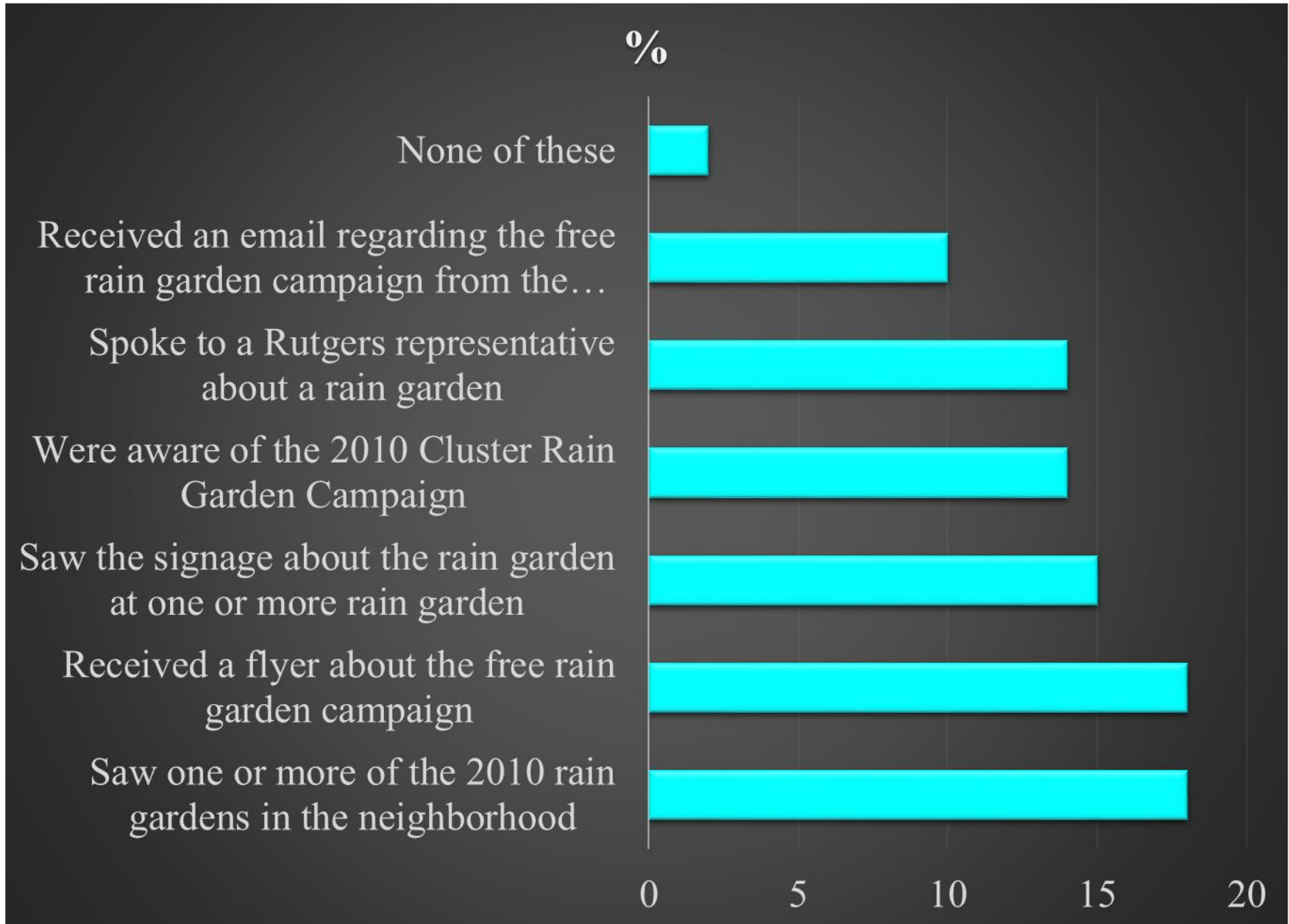


Diffusion of Hybrid Seed Corn
 Bryce Ryan 1943
 Rural Sociology

- Adoption; Awareness stage, interest stage, evaluation stage, trial stage, adoption stage.
- “A generalization apparent from many research studies is that impersonal information sources are most important at the awareness stage and personal sources are most important at the evaluation stage in the adoption process.”

Continuing Impacts





- Of those residents who were actually ready to move forward with installing a rain garden – 72% responded that they were interested due to the 2010 Cluster Rain Garden Campaign.
- More than 1 answer was possible.

Survey Question	Hills of Troy neighborhood respondents who knew the answer (%)	Canterbury neighborhood (control) respondents who knew the answer (%)
Do you know what a rain garden is?	88.5	40.0
Do you know what the function of a rain garden is?	84.6	40.0

**RIVER FRIENDLY
BUSINESS PROGRAM**





Rain Barrel workshop. Part of greening the community.

Based on survey of participants 2,700 ft² of impervious surface was disconnected with rain barrels built during this workshop. This is the amount of water collected from barrels that were placed to disconnect the downspout that led to the driveway and that then released their water to a pervious surface such as a garden. This was an important focus of the workshop.

- Porous asphalt was placed at the bottom of the driveway. Rock helps provide base.
- 300 tons of rock here.





- During Phase II of the Implementation of the Troy Brook Stormwater Plan
- We have installed significant green infrastructure projects
- We have worked with the Mtn. Lakes and Parsippany DPWs to create DPW yards that have 0% stormwater runoff during the NJ water quality storm
- We have created programs that are long-range and beneficial well beyond the scope and geography of the grant.

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Somerset Counties

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