



Understanding Landowner Potential to Improve Water Quality

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Small Decisions Can Have Large Effects

It may be hard to imagine how individual homeowners can have an effect on water quality, but collectively, the decisions people make about their properties and households does matter a great deal. This is because the quality of the water in streams, lakes, and wells is a product of the surrounding land. There are over 600,000 landowners in New York State which places the decisions of about 85% of the land in the hands of private property owners (DEC, 2011). **Watershed** is the term that is used to describe all of the land that drains water to a network of streams and rivers. All the rain and snow that falls into this area will travel down hill toward a water body. The quality of the landscape impacts water quality because stormwater inevitably flows over the land toward our water bodies and picks up the pollutants it encounters along the way. This pollution from a variety of diffuse sources is called “nonpoint source pollution” and accounts for 90% of water quality issues in rivers and streams in New York (2008 NYS Sec. 305(b) Report). Local government officials, managers, and outreach professionals can help improve the quality of watersheds by engaging landowners as partners in watershed management efforts to reduce the flow of contaminants to our water.

Predicting and Changing Behavior

Landowners and residents make decisions about their households and properties every day; from lawn care to chemical and waste disposal. There are many behaviors landowners can adopt that have the potential to improve water quality. Motivating behavior change in landowners is an important step in addressing problems that stem from nonpoint source pollution. Outreach and education to evoke voluntary behavior adoption is important because monitoring and enforcement of

regulations related to private property management is difficult, expensive (Thompson, 2004) and controversial. A tailored outreach campaign that targets landowners and homeowners to alter their behavior can help local officials and communities reach their water quality goals.

Steps to Designing a Tailored Outreach Campaign¹

1. Identify the problems that are causing a need for outreach and the audiences associated with those issues;
2. Analyze underlying attitudes, perspectives, motivations, barriers, and other measures that will give insights to the relevant audiences;
3. Use social marketing strategies to design education and outreach based on attitudes, identified barriers, and current behaviors;
4. Evaluate effectiveness of outreach strategies and adapt where necessary.

Research Methods

In the Spring and Summer of 2009, a mail survey was conducted (n=1,422, response rate=26%) to gather data on landowner attitudes toward water resource management in the 13 municipalities of the Wappinger Creek Watershed in Dutchess County, New York. A set of questions was asked regarding a select number of behaviors:

Use and Awareness - to determine the extent to which the behaviors are already used in the watershed and where potential for education exists;

Willingness to Try - to determine how many non-practicing landowners are willing to try adopting the new behaviors;

Barriers to Behavior Change - to understand what factors have prevented landowners from previously engaging in the positive behaviors that protect water quality.



Identifying Key Behaviors

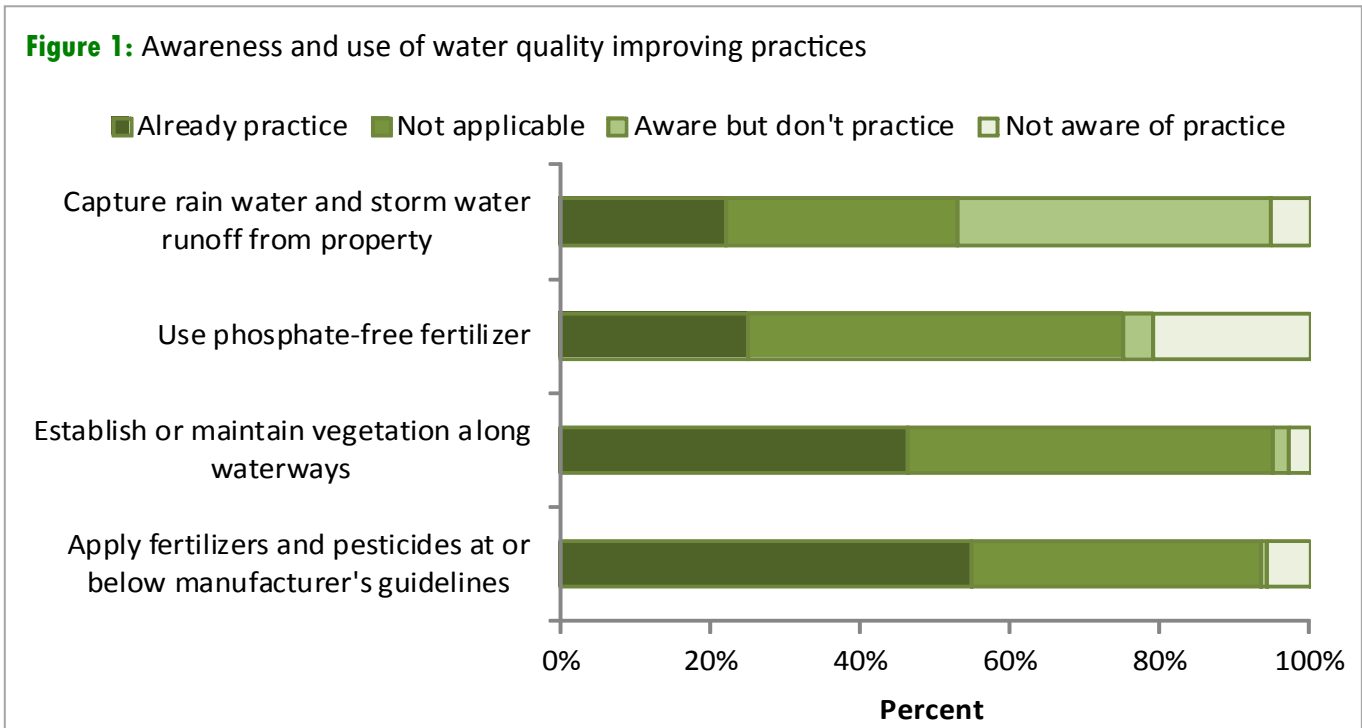
Five behaviors were identified as having the potential to improve water quality if implemented in the Wappinger Creek Watershed. These behaviors were chosen based on water quality issues in the watershed and the potential of landowners to impact these issues. Table 1 lists the behaviors that survey respondents were asked about and describes why each was included in the survey.

Table 1: Landowner Behaviors Identified as Having the Potential to Improve Water Quality in the Wappinger Creek Watershed		
Nonpoint Sources of Pollution	Resulting Water Quality Impacts	Remediating Behavior
Excess nutrients and chemicals can be easily swept into nearby water bodies when lawn chemicals are over applied	<ul style="list-style-type: none"> • Poses a risk to human health and degrades drinking water quality • Degrades habitat and recreational value by supporting excess weed and algae growth 	Apply fertilizers and pesticides at or below manufacturer's guidelines
The phosphorous in phosphate-containing fertilizer is unnecessary on many lawns and ends up in streams and lakes	<ul style="list-style-type: none"> • Degrades habitat by reducing oxygen for aquatic organisms • Impairs recreational use of water bodies by supporting excess weed and algae growth 	Use phosphate-free fertilizer
Traditional development directs stormwater off of the landscape at a rapid pace via storm drains and hardened surfaces (roads, driveways, roofs)	<ul style="list-style-type: none"> • Increases runoff and raises peak stream discharge which can lead to more flooding • Depletes long-term water supply when stormwater is not allowed to infiltrate the soil and recharge aquifers • Unfiltered stormwater carrying contaminants is allowed to enter streams 	Capture rainwater and stormwater runoff from properties
Lack of streamside vegetation	<ul style="list-style-type: none"> • Stream banks are easily eroded because plant and tree roots are not present to stabilize them • Sediment, nutrients, and chemicals cannot be filtered out of the rapidly moving • Biodiversity is lower because streams do not act as rich habitat for terrestrial or aquatic species without vegetation 	Establish and maintain vegetation along water bodies
Faulty septic systems	<ul style="list-style-type: none"> • Bacteria and nutrients enter the ground and surface waters that feed streams and drinking wells 	Regular inspection and maintenance of on-site septic systems

Research Results

Landowners were asked to indicate whether they were aware of or had practiced the behaviors listed in Table 1 on the previous page. Respondents had a general awareness of most of the practices (Figure 1). In terms of actual behavior, the greatest level of implementation was for applying fertilizers at or below manufacturer's guidelines followed by establishing or maintaining vegetation along waterways. The results of on-site septic system inspection and maintenance questions are reported later in this publication.

Figure 1: Awareness and use of water quality improving practices



Follow Manufacturer's Fertilizer and Pesticide Application Guidelines



Figure 2 shows the reasons that have prevented these individuals from following the recommended guidelines. The largest barriers reported were not knowing how to follow the manufacturer's guidelines and not believing that over application is a problem.

Fertilizers and pesticides are used by many homeowners in their lawn and garden maintenance. Figure 1 above indicates that the majority of respondents reported that they already apply fertilizers and pesticides at or below manufacturer's guidelines (55%) or believe the behavior is not applicable to them (39%). Less than 1% reported that they are aware of the guidelines but do not follow them while 6% did not know that guidelines exist. All of those that do not follow the guidelines reported willingness to try following them.

Figure 2: Barriers to applying fertilizers and pesticides at or below manufacturer's guidelines

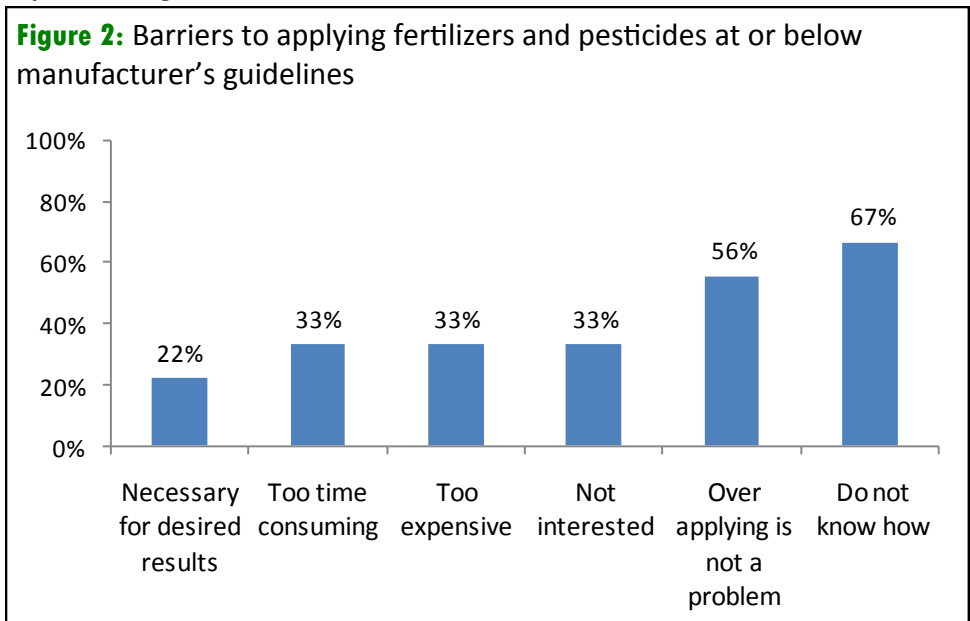
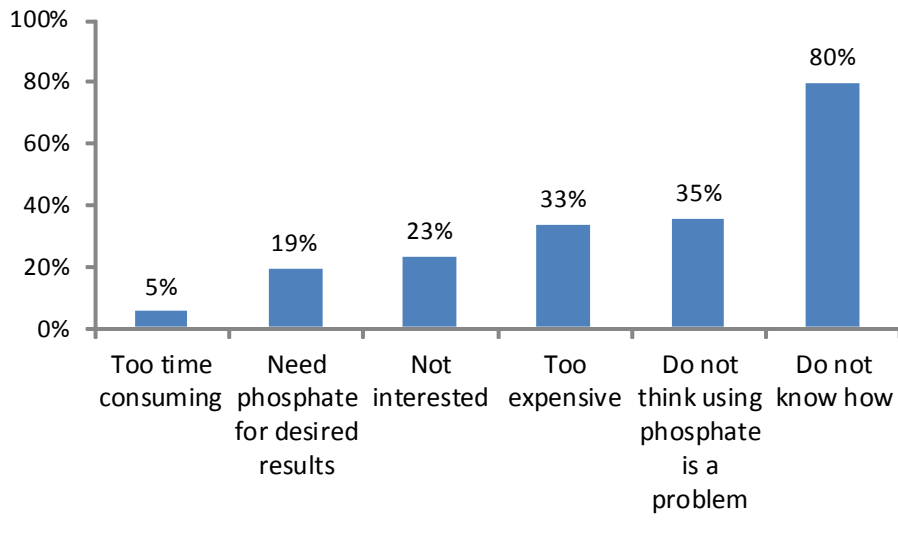


Figure 3: Barriers to using phosphate-free fertilizer



Phosphate Fertilizers in New York State

In July 2010, then New York State Governor Patterson signed The Household Detergent and Nutrient Runoff Law² to reduce phosphate pollution of our water bodies. Not only will this law improve water quality but it will also reduce costs to local governments that are required to remove excess phosphate from storm and waste water.

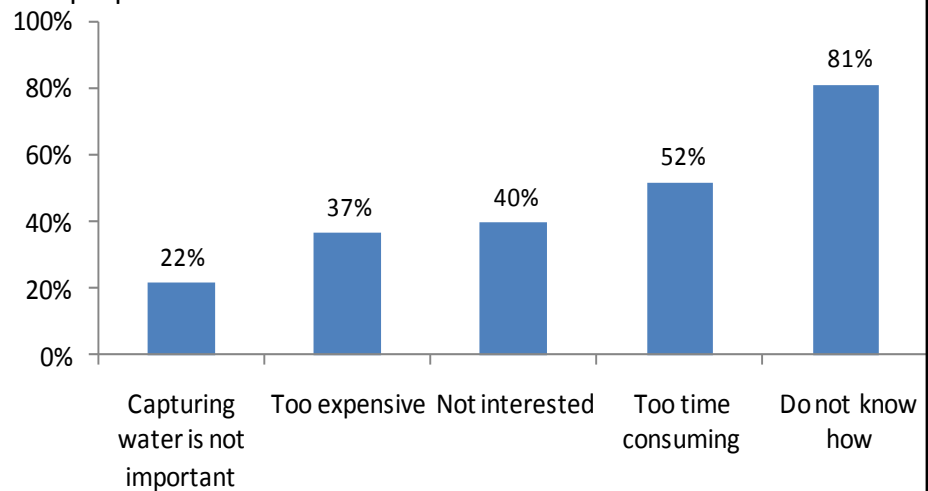
Use Phosphate-free Fertilizer on Lawn or Property

Figure 1 on the previous page shows that 25% of respondents already use phosphate-free fertilizer and 50% reported the practice is not applicable to them. Only a handful are aware of the practice but don't use it (4%) and the remainder have never heard of phosphate-free fertilizer (20%). Almost all of those not using the practice reported willingness to try (94%) and the largest barrier to trying was lack of knowledge about the product and how to use it (80%) (Figure 3).



Capture Rainwater and Stormwater Runoff

Figure 4: Barriers to capturing rainwater and stormwater runoff from properties



Twenty-two percent of landowners responded that they already capture rainwater and stormwater runoff and 31% reported that the practice does not apply to them. A large number of respondents reported having awareness of the practice but are not implementing it (42%) which presents potential for outreach and education to overcome the barriers that have prevented their engagement. The remaining 5% have never heard of the practice (Figure 1 on previous page). Seventy-five percent of respondents that do not already capture rainwater and stormwater runoff reported that they are willing to try, representing the greatest number of individuals willing to try a new behavior (n=115) and great potential for education. Figure 4 shows that knowledge (81%) and lack of time (52%) play significant roles in preventing people from capturing rainwater and stormwater runoff.

Establish and Maintain Vegetated Buffers along Water Bodies

Figure 1 indicates that 46% of landowners leave vegetation along water bodies when managing their property and 49% reported that the practice is not applicable to them. Only 2% are aware of the practice but do not use it and another 3% have never heard of the practice. The majority of those not engaging in the behavior are willing to try it (77%) and lack of knowledge is a significant barrier (67%). Figure 5 shows that a belief that it is better to clear vegetation down to the water is held by half of those that reported not maintaining a vegetated stream buffer.



Stand By Your Stream³

Streamside vegetation plays a critical role in maintaining the health of our streams and can help prevent many common watershed problems. The functions that they provide include flood control, stream bank stabilization, nutrient removal, and wildlife habitat.

Figure 5: Barriers to establishing and maintaining vegetated buffers along streams

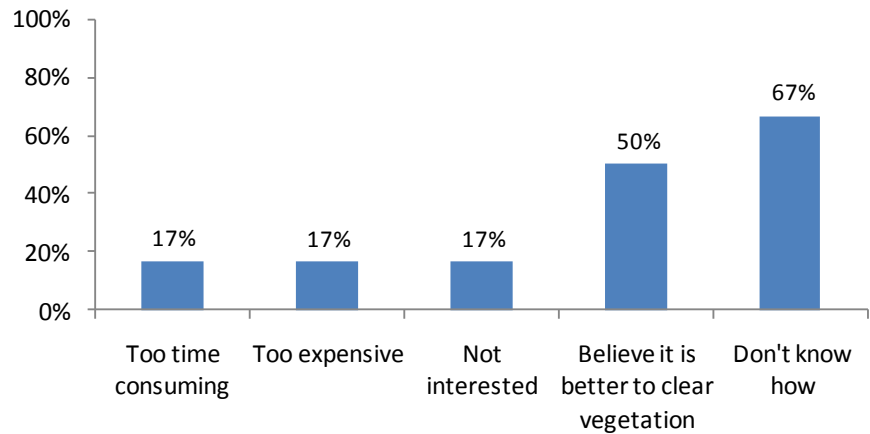
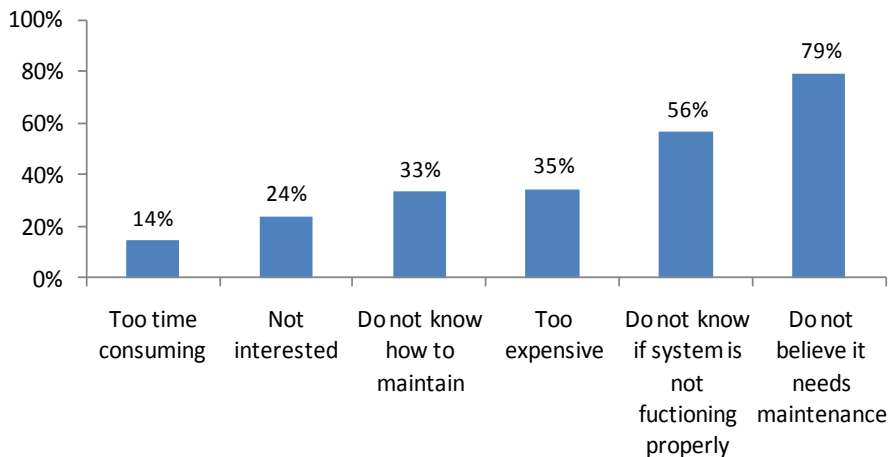


Figure 6: Barriers preventing homeowners from regularly maintaining on-site septic systems



Government Role in Septic Systems

When asked about the possibility of local governments taking a role in septic system maintenance, 48% of municipal officials thought that local government should handle inspection of systems but only 8% thought that they should handle the actual maintenance of systems.

On-Site Septic System Inspection and Maintenance⁴

The majority of survey respondents have an on-site septic system (86%) and more than half have their systems maintained at the recommended rate of at least every 3-5 years (67%). Twelve-percent maintain their systems every 6-9 years, 8% maintain every 10 years or more, and 13% reported never maintaining their systems. Figure 6 shows the various barriers that have prevented landowners from maintaining their systems regularly. The most frequent response was that individuals do not believe their systems need to be maintained (79%) followed by not knowing how to tell if their septic system is not functioning properly (56%). This represents a significant area for education and outreach to improve local water quality.

Social Marketing and Best Education Practices

It has been noted by many researchers and practitioners that we need to build more effective educational strategies to promote improved water quality. Community-based social marketing is an alternative to information-intensive education campaigns that have been used in the past to enhance stakeholder knowledge. However, lack of knowledge is only one barrier that individuals face when making decisions about their behavior. Community-based social marketing identifies activities that promote behavior adoption while reducing barriers. Understanding who already implements water quality-enhancing behaviors on their property and what inhibits others from engaging in these activities allows us to design tailored outreach campaigns that have proven more effective in reaching stakeholders to improve water quality (McKenzie-Mohr, 2000).

Applying “Best Education Practices” can also be useful in designing outreach programs. “Best Education Practices” (BEPs) are based on research as well as the experiences and lessons learned by educators in the field⁵. Many BEPs use principles of social marketing (see above) which emphasize knowing your audience.

- Acknowledge landowner interest and concern for the quality of the land;
- Understand what is important to your audience so that communication is in line with their values;
- Organize and lead education events with adult learning styles in mind;
- Where relevant, provide direct and hands-on experience with new behaviors;
- Emphasize the ease of new practices and addressing other barriers that prevent behavior adoption.

Implications and Recommendations

Many watershed problems have a distinct human dimension because of the influence that human decisions have on water quality. Remedying the problems that result from diffuse sources of pollution requires engaging landowners and residents through voluntary changes they can make to their households and properties. There are steps that residents and landowners can take that have the potential to improve water quality. Collecting and analyzing data about the groups whose behavior you want to influence gives the information needed to design and implement an outreach campaign tailored to their needs.

Keeping the principles of social marketing and BEPs in mind in the Wappinger Creek Watershed, it is recommended to:

- Motivate behavior change by addressing the barriers that landowners face:
 - The largest potential for overcoming barriers exists with capturing rainwater and stormwater runoff. This practice has the largest number of landowners that are aware but do not implement the practice. There is also high willingness to try capturing rainwater and stormwater runoff. Workshops on rain barrels and rain gardens will empower landowners by giving them the hands-on experience they need to implement the practices with confidence and address the barrier that they don't know how.
 - Many landowners indicated that they already apply lawn chemicals at or below manufacturer's guidelines or reported that this practice is not applicable to them, however there is a lack of knowledge about how to follow guidelines and about the problems of over application.
 - Phosphate-free fertilizer use had the lowest awareness, a problem which will continue to have impacts on the watershed until The Household Detergent and Nutrient Runoff Law takes effect in New York State and perhaps after as well. Educating those that fertilize their lawns about the impacts of phosphates and what the new law means for them should be carried out in the watershed.

Implications and Recommendations Continued

- Conduct outreach to landowners about on-site septic systems and address misconceptions about how frequently systems should be maintained. Many respondents who do not already have their systems maintained at the recommended time interval reported that they do not believe their system needs maintenance, and are unaware of how to tell if their system is not functioning properly.
- Target landowners that own property along waterways to emphasize the importance of streamside vegetation. Many of these landowners reported that they already leave a vegetated strip along waterways therefore education should focus on the benefits of leaving that buffer intact.

Footnotes

¹Refer to EPA Getting in Step: A Guide for Conducting Watershed Outreach Campaigns for more information.

²To learn more about the Household Detergent and Nutrient Runoff Law, visit:

<http://www.dec.ny.gov/chemical/67239.html>

³To read the full Stand By Your Stream factsheet, visit:

<http://ccedutchess.org/environmentenergy/our-water-resources/102-riparian-buffers>

⁴See Cornell Cooperative Extension publication FS-1, Your Septic System for more about how to maintain your system: <http://waterquality.cce.cornell.edu/publications/CCEWQ-YourSepticSystem.pdf>

⁵Visit the National Extension Water Outreach Education website at <http://wateroutreach.uwex.edu> to learn about best education practices.

References

2008 New York State Water Quality Section 305(b) Report. (2008). Bureau of Water Assessment and Management, Division of Water, NYS Department of Environmental Conservation. Retrieved from NYS Department of Environmental Conservation: <http://www.dec.ny.gov/chemical/23837.html>

McKenzie-Mohr, D. (2000). Fostering sustainable behavior through community-based social marketing. *American Psychologist*, 55(5): 531-537.

New York State Department of Environmental Conservation. (2011). *Places to Hunt in New York State* Retrieved from <http://www.dec.ny.gov/outdoor/7844.html>

Thompson, R.H. (2004). Overcoming barriers to ecologically sensitive land management: Conservation subdivisions, green developments, and the development of a land ethic. *Journal of Planning Education and Research*, 24: 141-153.

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