

Cost Benefit of Groundwater-friendly Practices

This case study outlines the potential cost savings of practices included in the Groundwater Guardian Green Site program application.

Soil Testing

Testing a site's soil to determine nutrient analysis is an important step in ensuring healthy turf and preventing over-application. Application of fertilizer in the appropriate amount reduces the chance for excess nutrients to leach into groundwater supplies and runoff into surface water bodies. Annual testing is recommended and the cost of analysis is approximately \$20.¹

Fertilizer Application

Proper application of fertilizer reduces costs and can reduce the chances of groundwater contamination from over application. Calibration of application equipment, controlling application around active wells and other high risk areas, and adapting fertilizer strength according to soil sample recommendations, can reduce fertilizer cost. This reduction is variable for each site due to specific application rates and areas and the variable costs of specific fertilizers. When comparing costs of fertilizer application versus cleanup costs, consider that a while a pound of nitrogen fertilizer only costs around \$5, the cost of a water cleanup project for nitrogen pollution is \$225 per pound of nitrogen.² Other factors to consider include time spent maintaining equipment, training, and identifying high risk areas to avoid.³

Pesticide Application

Reducing pesticide use can lower input costs in the same manner as fertilizer, while preventing groundwater contamination. The development of a pest management plan allows site managers to determine when and where it is appropriate to apply specific pesticides. The reduction in pesticide cost is also variable, as the type and amount of pesticide applied is determined by what species need to be controlled and the size of the area affected. The timing of pesticide application is also dependent upon wind speed. To prevent loss of pesticide and potential contamination, drift factors need to be considered during application⁴ and application should be avoided on windy days. Other factors that can affect the cost of pesticide conservation include the time spent performing maintenance on application equipment, identifying species that need to be controlled, the development of a pest management plan, and training of personnel. Proper rinsing and disposal of used pesticide containers can also reduce cost and pollution, as proper rinsing of containers can increase pesticide efficiency by up to two percent.⁵

Water Conservation

Maintenance and monitoring of irrigation/sprinkler systems is an important step in reducing water consumption. By knowing how much water to apply, and when and where application is needed, site managers can reduce water-related input costs. This can be accomplished by ensuring that irrigated areas receive the proper amount of water at the time(s) of day when the water will be most effective, avoiding periods of time when water loss due to evaporation are increased (i.e. apply water in the early morning when the risk of evaporation is lessened due to lower wind speed, lower temperatures, and lack of sunshine). Costs associated with water conservation include maintenance costs, and time spent measuring/modifying water application.⁶

High Input Plant Replacement/ Landscape Modification

When designing or modifying the landscaping, site managers can consider using low input, climate-adapted plants to save money on input costs. The practice of replacing water-intensive turf grass and other exotic and non-native plants with low-water grasses, wildflowers, and plants that are native can decrease water usage by up to 60%.⁷

By modifying the landscape, a manager can reduce the inputs required to maintain an area. The selection and placement of low input plant species reduces the need for irrigation, fertilizer and pesticide. By reducing these inputs, the area can be managed at a lower cost per year. Landscape modification can also help reduce water consumption. The use of mulch on bare soil reduces soil water evaporation, and the use of porous paving materials in high traffic areas increases water infiltration.⁸ Costs associated with landscape design are variable with the type of plants selected and the intensity of the project, but landscaping can be performed over time to reduce concern over initial costs.

Chemical Handling, Storage and Clean-up

The proper storage and handling of fuels, fertilizers and pesticides decrease the potential for spill events. Proper equipment and storage facilities need to be in place. The initial cost to construct these types of facilities can be large, but in many cases they may already exist and/or simply need to be modified to ensure it is secure and capable of containing spills. The development of a spill response plan can reduce the impact of spills on the environment, while preventing high clean-up costs associated with spills.⁹ Costs associated with spill prevention, handling and clean-up include, personnel protection equipment, spill containment equipment, planning for the disposal of contaminated material and actual disposal in the event of a spill, time spent training and preparing for spill response, including development of a response plan.¹⁰

Well Maintenance

Wells are a direct conduit to an aquifer, making them a potential source of contamination if they are not properly monitored and maintained. By properly protecting active and inactive wells, site managers can prevent contamination. The cost of sealing inactive wells can range from \$300 to \$1500 depending upon the size and design of the specific well.¹¹ Local cost share programs may exist. By sealing off inactive wells, site managers protect both the public and the environment from contamination and danger. In addition, site managers can reduce the amount of chemical they use and protect the well by maintaining a no-application zone of at least 10 feet around active and inactive wells.

Drinking water wells should be tested for contamination at least annually. This testing can provide information about the current water quality of the area. Testing costs vary depending on what contaminants are being tested for, and vary by lab. Generally, prices can range from \$10 to \$185 dollars per sample.¹²

The Benefits

While the actual dollar benefits of implementing groundwater and environmentally-friendly practices on a site may vary from site to site, it should be noted that in general, these practices actually provide cost-savings. Some savings may not be immediately realized, such as in introducing low input plants, but will increase over time. In addition, many of these practices

complement each other and may produce more noticeable results, such as the cumulative effect of soil testing and the subsequent reducing fertilizer and even water applications. In the same way, the dollar amount may not be evident in a practice that focuses on prevention, such as with chemical storage facilities that are secure and capable of containing any spills.

References

Information compiled by Erik Doran, University of Nebraska-Lincoln Environmental Studies Student, Spring 2009 semester

¹ Cost of Soil Testing

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=831>

<https://www.midwestlabs.com/content/view/60/200/>

² Money saved by only applying needed fertilizer

<http://www.fwfonline.org/E-news?it's%20Time%20To%20End%20The%20Slime-With%20FWC.pdf>

³ Money saved by only applying needed fertilizer

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=1172>

⁴ Money saved by only applying needed pesticide

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=862>

⁵ Money saved by only applying needed pesticide

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=816>

⁶ Water Conservation

<http://www.ianrpubs.unl.edu/epublic/live/g1859/build/g1859.pdf?redirected=true>

⁷ High Input Plant Replacement/Landscape Modification

Postel, Sandra. (1997). "Last Oasis: Facing Water Scarcity." New York: W.W. Norton & Company, Inc.

⁸ Cost of low input plants vs. standard plants

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=1024>

⁹ Cost of spill cleanup

<http://www.epa.gov/owm/mtb/spillprv.pdf>

¹⁰ Cost of spill cleanup

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2275/BAE-1012web.pdf>

¹¹ Cost of sealing wells

<http://www.ianrpubs.unl.edu/epublic/live/g1471/build/g1471.pdf>

¹² Cost of testing well water

<https://www.midwestlabs.com/content/view/75/208/>

<http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=407>