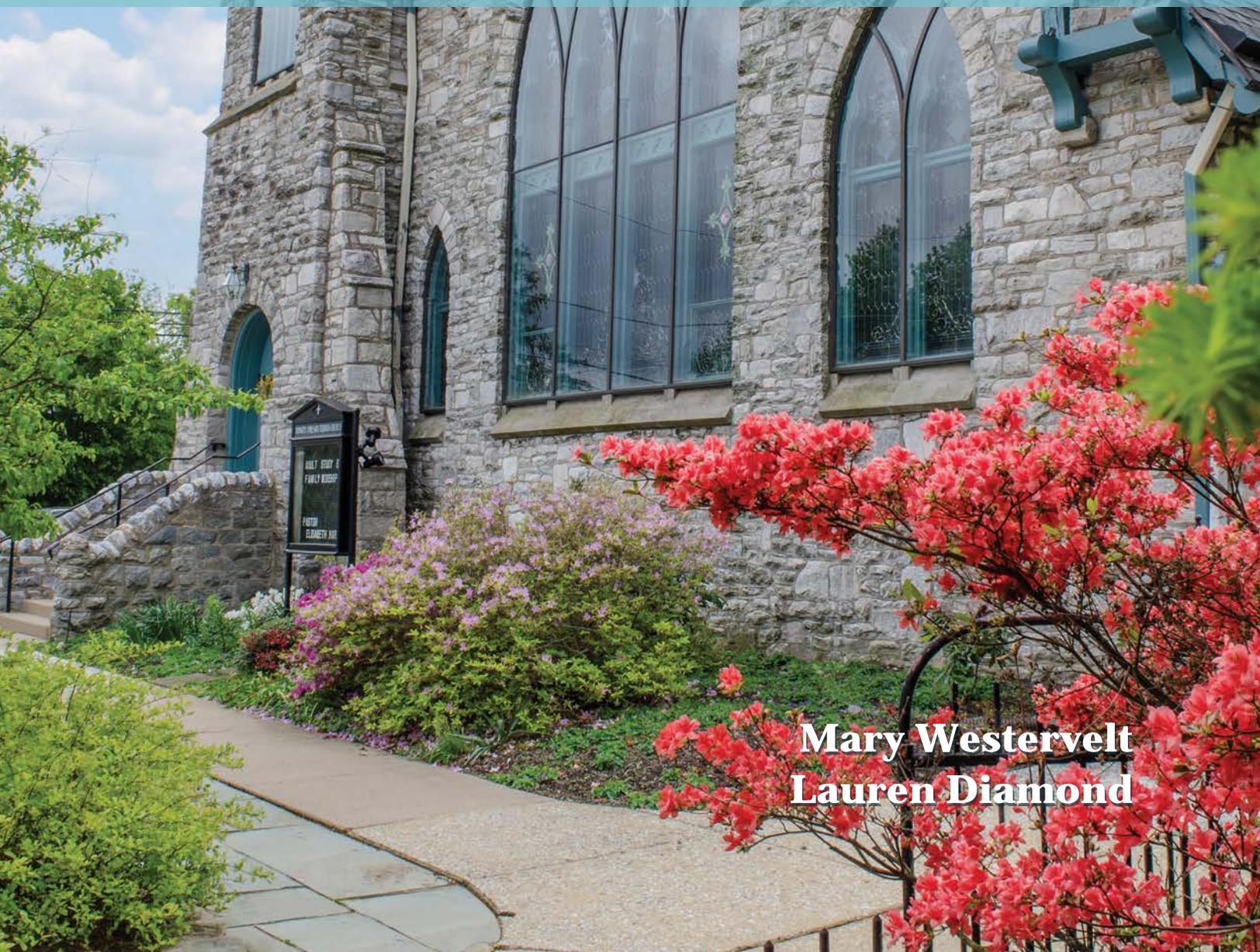




Nature That Nurtures

Landscaping to provide habitat, control stormwater, and attract people



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About the authors

Mary Westervelt has taught many subjects – among them English as a Second Language, Linguistics, Spanish, and Technical Communication – all while trying to fit her passions for gardening and the environment into what little time was left over. In 2013 she began work on a Master of Environmental Studies degree at the University of Pennsylvania, graduating in 2016. The project of re-landscaping the property at Trinity Presbyterian Church, the first in what will be a focus on carrying the environmental message to the public, has allowed her to bring her passions for gardening and environment to the forefront.

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Introduction:

Trinity Presbyterian Church in Berwyn, Pennsylvania, used to be landscaped the way most suburban churches are landscaped: Lawn bordered by a few shrubs, with color added using annuals that were changed out each season. Stormwater from the massive roofs often flooded the basement. To remedy the flooding, water from the roofs was directed to the edge of the property, where it ran into the streets.

This report tells the story of how this one church began the process of changing the landscaping, installing rain gardens, terraces, and infiltration beds to retain storm water, and planting native flowering plants and shrubs to attract pollinators and birds. The project grew over the space of two summers to involve church members and community members, and to include such related efforts as composting and conserving energy. This example can serve as a model for other groups wishing to improve their stewardship of natural resources.

On the following pages you will learn more about the facets of this project. What was done here can be generalized to provide design principles, ecological principles, and ideas for community involvement.



Trinity Presbyterian Church, Berwyn, PA. *Solidago rugosa* 'Fireworks' provides a colorful accent while also providing nectar and pollen for native bees in September.

Why change the landscaping?

A healthy ecosystem in the Mid-Atlantic region contains a variety of trees and shrubs growing over a healthy carpet of plants such as tall grasses and seasonal flowering plants. The exact mix of plants varies depending on factors such as soil type, proximity to the ocean or wetlands, and altitude. Birds, insects, and other living creatures find food and shelter in the plant communities. The soil itself harbors a rich diversity of organisms as well, from insects to fungi to bacteria. The fungi and bacteria in healthy soil actually break down minerals in the soil and make them available to the plants, while the plants in turn provide nourishment to the fungi and bacteria. Plants in a healthy ecosystem usually have access to water at regular intervals, but are able to withstand large storms and to survive periods of drought.

Compare the typical suburban neighborhood. Here, the primary landscaping feature is lawn, mown to at most three inches in height. We are taught to think that the ideal lawn is a monoculture; any mix of herbaceous plants should be kept out with herbicide treatments. Lawn grass is typically cool-season grass that greens early in the spring. It wants to be dormant by mid-summer, but lawn grasses are kept green with chemical fertilizers and watering. The soil under the typical lawn is impoverished: herbicides and the salts from chemical fertilizers have killed off the microbial life that might have been there, and frequent passes with heavy equipment such as tractor mowers have compacted the soil to the point where the permeability of the typical suburban lawn is only slightly better than that of asphalt. Plants in the suburban and urban garden typically need regular supplemental watering, but at the same time stormwater presents a problem on the property and is shunted into street-side gutters. From there the stormwater runs into a local creek, creating erosion and pollution problems downstream.

Unfortunately, more and more landscape looks like the typical suburbs while functioning, healthy ecosystems are becoming fewer, smaller, and more isolated. University of Delaware researcher Douglas Tallamy warns that if current landscaping practices are not reversed, we could see the extinction of 95% of the species that inhabited North America when Europeans first came here (see Doug Tallamy, *Bringing Nature Home*, page 36).

Reversing the trend and preventing the predicted loss of species requires some simple changes in the way we think of our yards and public properties. Instead of thinking of the yard as an extension of the building, we can think of the yard as a microcosm of nature that attracts pollinators and provides food and shelter for birds. We can landscape with native plants and control water on our property, allowing it to sustain gardens and percolate through the soil, removing contaminants and recharging underground aquifers. All this can be done while improving the appeal of the property for humans as well.



Native phlox (*Phlox subulata*), green-and-gold (*Chrysogonum virginianum*), and violets (*Viola* spp.) combine with leaf litter to make an attractive ground cover.

Naturalizing Your Property

HOW TO BEGIN

At Trinity, we did the following:

1. Started with what people see.
2. Analyzed the current plant mix.
3. Learned about the soil.
4. Designed visually pleasing plant communities by adding natives.
5. Let nature help care for the gardens.
6. Found ways to treat stormwater as our friend.

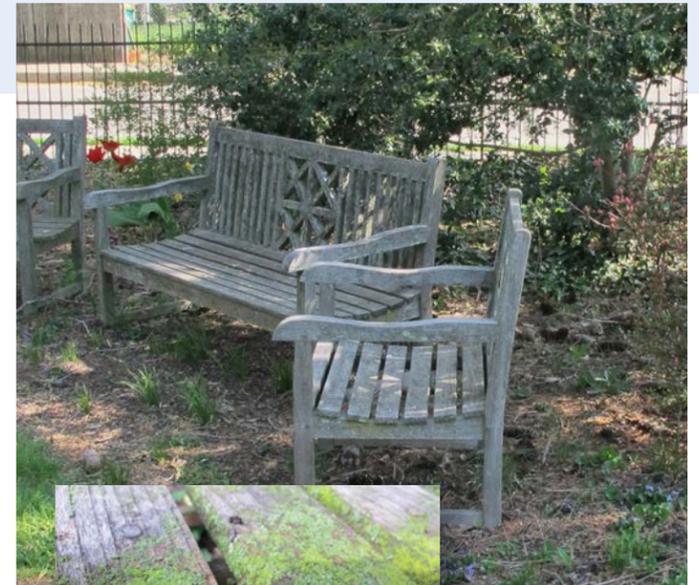


START WITH WHAT PEOPLE SEE

Look at the property from the point of view of people walking (or driving) by. What about people approaching for the first time? Now add the 'view' of pollinators and birds. How inviting is the property for all these groups?

Naturalized garden spaces will attract pollinators and birds – and they will please humans as well. With this in mind, at Trinity Presbyterian Church we started with gardens that people see and changed the landscaping there first.

It turns out that people walking by on the street, or approaching the church building for the first time, see a different aspect of the church property than do people who regularly attend church or who bring their children to the preschool. Regular attendees typically enter the church from a side entrance invisible to most newcomers. Approaching on foot and from the front, rather than by driving to the side entrance, showed aspects of the church that looked unkempt and unloved. We chose to address those aspects first.



The unappealing, weedy garden and moss-covered benches were an eyesore.



Once the benches were cleaned up and the landscape was improved, this corner became the focal point of the courtyard.



ANALYZE THE CURRENT PLANT MIX

Does your mix include plants that grew in the area before the arrival of European settlers? Or are most or all of the plants those introduced by the landscaping trade to appeal to our desire for flowers and easy care?

Plants native to an area are important because they provide high-quality habitat for native pollinators, birds, and other living creatures.

What is a 'native'? A working definition is this: Natives are plants that grew in the rich ecosystems present in the area before the introduction of non-native species. Non-natives include species purposely introduced from other continents or regions by the gardening industry. Examples are tea roses, forsythia (*Forsythia* spp.), Bradford pear (*Pyrus calleryana* 'Bradford'), Norway maple (*Acer platanoides*), boxwood (*Buxus* spp.), English ivy (*Hedera helix*), most available seasonal flowers, and most of the popular bulbs such as tulips and daffodils. Other non-natives are escapees from agriculture or simply from ship ballast – the weeds of disturbed soil or untended garden corners.

Why are these plants problematic? The first problem is that they provide little wildlife value. (Having deer eat your non-native tulips and hostas does not count as providing high-quality habitat!) Swallowtail butterflies are indeed attracted to the nectar in the flowers of butterfly bush (*Buddleja*



Flowers of non-native butterfly bush (*Buddleja davidii*) attract pollinators like this eastern tiger swallowtail - but native butterflies won't lay their eggs on this alien plant, because it doesn't provide food for insect larvae.

davidii). However, they won't lay their eggs on butterfly bush; swallowtail larvae can't eat the leaves. To ensure generations of swallowtails, you need to have the plants their larvae can eat: native wild cherry (*Prunus* spp.), basswood or linden (*Tilia americana*), tulip tree (*Liriodendron tulipifera*), birch (*Betula* spp.), and willow (*Salix* spp.) among others for the eastern tiger swallowtail. Each native butterfly has its preferred native plant food; to ensure a wide variety of butterflies, you must plant a wide variety of natives.

Having plants that don't appeal to insects may seem like a good thing, but having no insects means death for birds. Migrating or nesting birds must have an ample supply of insects to eat or to feed their young. If the bird population is healthy, birds will keep the numbers of insects in check, and the insects foraging on the leaves of native plants will be hardly noticeable to humans.

The second problem with non-natives is that in many cases they are invasive and crowd out the native species. Many sprout earlier in the season than the natives (Japanese honeysuckle (*Lonicera japonica*) and lesser celandine (*Ranunculus ficaria*) are examples). Some non-natives kill by smothering or strangling less aggressive natives, as is the case with English ivy (*Hedera helix*) and oriental bittersweet (*Celastrus orbiculatus*). Prolific seed producers such as Norway maple (*Acer platanoides*) and Amur honeysuckle (*Lonicera mackii*) seed themselves throughout yards and into uncultivated spaces, shading out natives and soon taking over where natives might once have thrived. (Bradford pear, though itself a sterile cultivar, can cross with other *Pyrus calleryana* specimens and produce fruit that birds will spread into natural spaces, where callery pear thickets shade out the native species present there.)

A third problem with non-natives is that in some cases they need extra care – and often chemicals – to remain healthy in the local climate. Hybrid tea roses are the prime example here. These plants are susceptible to black leaf spot and attack by aphids in the muggy summers of the Mid-Atlantic region. On the other hand, the native roses such as *Rosa caroliniana* do not suffer from disease and are strong enough to fight off aphid attacks. But beware of the similar-looking *Rosa multiflora*, which is a nasty invasive that is very difficult to eradicate!



Native butterfly weed (*Asclepias tuberosa*) provides pollen for native bees and butterflies. In addition, its leaves provide food for monarch butterfly larvae. With the loss of *Asclepias* species, monarchs no longer have host plants for their eggs and larvae.



Monarch caterpillar on common milkweed (*Asclepias syriaca*), a butterfly-weed relative that used to edge crop fields and highways before spraying with Roundup became common.



Skipper on Blue Mist Flower (Conoclinium coelestinum) in the Terraced Garden on the east side of the sanctuary.

So you already have non-natives in your plant mix. What now?

It's a mistake to pull out every non-native plant on your property. Some indeed need to come out – English ivy, for example, which will smother other plants and will kill trees it climbs. Take out plants that are rampant and keep the natives from growing, or that produce berries that birds carry to natural areas.

On the other hand, some non-native plants may serve a useful purpose on the property. Remember that one purpose is to attract people! The Trinity property boasts a collection of azaleas of unknown provenance, which are well established and provide beautiful color in the spring. Visitors walk through the gardens just to see them. If those plants were removed, instead of attracting people, we would drive them away.

Plants may not harbor insect species needed by birds, but they may provide soil stability and reduce the weed population. For example, at Trinity, on the east side of the sanctuary we did

not pull out the existing *Vinca minor*, a popular spreading ground cover with purple flowers and evergreen leaves that are not favored by deer. The United States Department of Agriculture says that *V. minor* “can be weedy or invasive” (<http://plants.usda.gov/core/profile?symbol=VIMI2>), spreading by runners. Fortunately, unlike so many invasives, it does not produce berries for birds to carry into wild areas. If the Trinity property bordered a nature preserve, we would work hard to eradicate *Vinca minor*. However, since the plot where the Vinca is located is between a street and a building wall, we can leave it in place until other plants are found to replace it.

Large trees serve many benefits even if they are not native. They store carbon; they provide shelter for birds, even if they don't provide insect larvae for them to feed their nestlings; and they slow rainfall, reducing stormwater runoff. The ideal large tree is a native, but cutting down a non-native is not always the right solution.

What about cultivars?

Plant propagators are continually producing cultivars of many natives to emphasize traits attractive to humans – but are the cultivars still attractive to pollinators? Evidence is building that they are not. To ensure that your garden is attractive to pollinators as well as people, plant mostly straight-species natives. In particular, avoid cultivars with multiple layers of petals where once the flower was simple – pollinators are not able to find the pollen at the center of the flower if the petals hide it. Also note that, in general, straight species are hardier and longer lasting than cultivars, which have a reduced gene pool to depend on for disease resistance.

Some of those ‘weeds’ are really your friends!

It may take some education of the group and the public for these natives to gain acceptance, but there are good reasons for making the effort. Here are two natives you're likely to find in your plant mix that are worth keeping.



Using violets as a ground cover provides a springtime carpet of purple.

Violets (Viola species). Most guides for lawn maintenance list violets as one of the nasty broadleaf species that need to be attacked with chemicals. However, many species of violets are native to North America. Doug Tallamy lists violets as host plants for the larvae of various species of endangered fritillary butterflies. Violets self-sow readily, and masses of the green leaves with purple or white flowers can be a very attractive ground cover.

Virginia creeper (Parthenocissus quinquefolia). This beautiful vine produces leaves in groups of five that turn brilliant red in the fall. Attractive purple berries add a great

accent and provide food for birds. Virginia creeper can be a great addition to a mixed ground cover, and it is attractive climbing a fence. Some draw the line at letting it climb the walls of a building, but it is easy to pull off the wall and redirect.

Virginia creeper, unlike the damaging and invasive English ivy and oriental bittersweet (*Celastrus orbiculatus*), can climb a tree without hurting it. English ivy smothers a tree and damages the bark with its rootlets. Oriental bittersweet twines around the tree trunk, girdling it and choking it to death. Virginia creeper, on the other hand, grows straight up the trunk of a tree, holding on with tiny adhesive disks. Doug Tallamy lists Virginia creeper as a host plant for the larvae of sphinx moths. Donald Leopold lists Virginia creeper as one of the two native vines with the most attractive fall foliage. (The other he lists is poison ivy, which he does not recommend for planting. In the interest of attracting people to your property, do not encourage poison ivy to grow there!)



The vibrant fall colors of Virginia creeper make an attractive covering for a fence.



Native golden ragwort (*Packera aurea*) combines well with non-native spring bulbs.

Before you pull ‘volunteer’ plants, do your best to identify them. You may have useful volunteer natives! Consider leaving them.

Here are two volunteers that we’ve kept in the Trinity Gardens:

A red oak (*Quercus rubra*) coming up in the azaleas under an old Norway spruce that appears to be failing in health. The oak may some day replace the spruce – and oaks have some of the best wildlife value of all east-coast trees.

A black cherry (*Prunus serotina*) that sprouted nearby. We may need to move this sprout to a better location, but it’s worth keeping for its wildlife value.

On the other hand, we pull black walnut sprouts. Although black walnut (*Juglans nigra*) is native to the mid-Atlantic region, it is not a great choice as a landscape tree. It leafs out late and drops its leaves early; it produces a substance called juglone (an allelopathic substance) that discourages other plants from growing near it; and the nuts with their green husks stain pavement and can actually present a danger to people, who might be hit by a falling nut or stumble on the round fruits on the ground.



LEARN ABOUT THE SOIL

Plants that are native to the area will usually grow without much fuss in your local soil. However, ‘native to the area’ is a broad category. The plant community that grows well on a sandy beach or a marshy river edge will struggle if your property features clay soil on a ridge. It pays to get to know your soil type before investing in plants. Here are some questions to ask.

What is the basic structure of the soil?

Soil scientists describe the mineral content of soil in terms of the size of particles. **Sand** is formed of relatively large particles that allow air to get into the soil, but that also allow water to drain away very quickly. **Clay** consists of super-fine particles that do not allow air or water to pass through; however, clay does contain minerals that plants need. The particle size of **silt** is in between that of sand and clay and is ideal for gardening.

Check the structure of the soil by taking a moist ball of soil in your hand. If you have sand, the ball will feel gritty and will crumble easily. Try extruding a bit between your thumb and forefinger. Clay will form a ribbon of about an inch or more before breaking off. More silty soil will break off sooner.

Trying to change the soil structure on a large property can be very expensive and labor-intensive. If you find that you have soil at one of the sand or clay extremes, the best solution is to choose plants that work in those soils. Over

time, as you add organic matter in the form of composted yard material, the soil texture will move closer to the ideal.

Soil consists not only of mineral particles and organic matter, but also of the spaces between the particles. These pore spaces are necessary for plant growth because both air and water move through them to the fine roots of the plants. Soil can become compacted during building construction, or even from use of a rider lawn mower or from heavy foot traffic. You can loosen compacted soil (even clay soil) by mixing in some sand and compost. You might try this in a small garden bed, even if you can’t do it for the entire property. However, soil that has been ‘fluffed’ needs to settle before plants are added or the plant roots will be exposed when the soil sinks.

What is the soil’s pH?

Soil pH is a measure of its acidity or alkalinity. Neutral soil has a pH of about 7 and is hospitable to most plants. Some plants, like azaleas and especially members of the Ericaceae family such as blueberries, like acid soil with a pH of 5.6 to 6. Alkaline soils, with pH above 7, are less common in the Northeast and Mid-Atlantic region but do occur in spots, especially on limestone.

You can check soil pH with a simple test kit purchased at a hardware store or garden center. For more accuracy, send soil samples to a testing service (see the section ‘How about getting a detailed soil analysis?’ (p. 11) for more information).



A healthy layer of leaf litter and wood debris will house fungi, worms, and myriad other creatures that hid themselves before the camera could capture them.

Do you have ‘critters’ living in the soil?

Small organisms of many kinds live in healthy soil. Necessary bacteria may not be visible, but fungi appear as white threads, or as mushrooms, which are the fruiting bodies of the fungi. Tiny protozoa and nematodes eat the bacteria and fungi. They in turn are eaten by tiny critters with legs and hard exoskeletons (the arthropods), which are then eaten by birds, moles, and other animals.

The most visible population in healthy garden soil is the worms, who shred and digest leaf litter and burrow in the soil, aerating it with their tunnels. The vermicastings (worm poop) they leave behind are higher in organic matter than soil that has not passed through a worm digestive tract.

There is some thought that a high worm population is actually harmful to a forest ecosystem, because worms cause leaf litter to break down at a speed that is not natural to the

forest. However, in a garden, worms can only be considered friends. Worms and all the other soil life help to make nutrients available to the roots of the living plants.

Dig a shovelful of soil and poke through it for evidence of fine roots and living organisms. If you have some, great! If not, it’s time to change the way the soil is treated. Skip chemical fertilizers, herbicides, and pesticides. Don’t till the soil frequently – doing so shreds the fine roots, insect secretions, and fungus filaments in the soil and traumatizes larger organisms.

Learn more about soil biology at the USDA Natural Resources Conservation Service: Soils website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/biology/>

For more about working *with* instead of *against* healthy soil populations, see *Teaming with Microbes*, by Jeff Lowenfels and Wayne Lewis.

Is there enough organic matter?

Organic matter such as broken-down plant material and insect bodies feeds the plants and improves the soil structure. Native plants do best if the soil contains about eight percent organic matter. If the property has been managed in the traditional way, with all leaves and grass clippings removed, the soil is likely low in organic matter. The immediate remedy is to stop removing leaves and grass clippings. If need be, you can run over the leaves with a mower before adding them to garden beds so the leaves stay in place.

Should you add nutrients? Not in the form of chemical fertilizers. First of all, native plants are able to work with the local soils (if the soil contains organisms to help make the nutrients available); adding fertilizer only helps the non-natives, many of which are the invasive weeds you want to avoid. The second reason is that chemical fertilizers provide nutrients in the form of salts, which irritate the living organisms in the soil. If these organisms are depleted, then your plants become dependent on the chemical fix of fertilizers, and your job becomes harder.

How about getting a detailed soil analysis?

The standard soil test provided by a state extension service checks only for pH and chemical imbalances. Typical recommendations for correcting imbalances are to add chemicals (and they are likely to be aimed at growers of corn, not at native-plant gardeners!). However, soil health is much more than chemical composition. Since getting a standard soil analysis for the soils in the Trinity gardens, we’ve learned that there are labs that more thoroughly examine the life-sustaining capability of the soil. Cornell University offers such a Comprehensive Assessment of Soil Health, not just for farmers, but also for suburban gardeners. Find out more at <http://soilhealth.cals.cornell.edu/>

At Trinity we investigated geologic information that influences the soil composition on the property. While such an investigation isn’t absolutely necessary when planning a garden, it is very interesting. To learn more, explore these websites:

- The USDA Web Soil Survey site allows you to explore the soils of any region in the United States. Go to <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx> Or for more detailed instructions on how to use the site, try <https://websoilsurvey.nrcs.usda.gov/app/>
- You can view maps detailing the geology of Pennsylvania at the Pennsylvania Department of Conservation and Natural Resources Geology page: <http://www.gis.dcnr.state.pa.us/geology/index.html>



In April, bloodroot (*Sanguinaria canadensis*) emerges from the healthy leaf litter at Jenkins Arboretum, Devon, PA.



DESIGN VISUALLY PLEASING PLANT COMMUNITIES BY ADDING NATIVES

Once you've established where you want to plant and what soil and exposure you have to work with, the fun begins! Rather than trying to take on the entire property at once, start small. Review the first section, Start with What People See. Now pick one or two focal points: Around a sign, at the doorway, or along a walk.

What makes natural settings beautiful? A sweeping vista across a meadow to a stand of old-growth oaks and hickories is at once calming and inspiring. A densely-wooded forest path provides ever-changing scenes viewed at close range. Both of these settings combine focal points with a backdrop of vegetation, rock, and sky.

In a suburban or urban setting, recreating a totally natural plant community is not possible or even desirable. Aim to design a small plant community that harmonizes with surrounding elements, be they old trees and shrubs, or stair-steps and rock walls.

Where to buy plants

Look for native plant nurseries in your area; the garden center at the local hardware store probably does not have natives. They specialize in the favored few seen repeated everywhere – privet, boxwood, barberry, butterfly bush, winged euonymus or burning bush, Norway maple – none of which is native



Wild landscapes like this New Hampshire meadow in November exhibit visually pleasing masses of color and texture.

to North America, and all of which have escaped cultivation and become invasive.

Also avoid shopping where you can't find the scientific name of the plants: 'rose' and 'holly' will not tell you what you need to know! Good advice is to carry a plant book or use your cell phone to look up any plant you consider buying: Where is it native? What climate and habitat does it favor? How aggressive a spreader is it?

Choosing plants: Think wildlife

- Supplement any valuable non-natives already in your gardens with attractive natives that will provide flowers, berries, and seeds for wildlife.
- Design with a mix of trees, shrubs, and grasses/flowering forbs (herbaceous plants that die back every winter) to provide shelter, nesting space, and food for a variety of birds and insects.
- Choose the plant palette to extend the bloom and berry season from early spring through late fall. Extending the season helps wildlife and pleases people.

Laying out the garden: Think people

- Consider all directions of view of a garden. When planting a strip between a parking lot and a street, remember that both people passing by on the street and people in the parking lot see the garden.
- Plant pollinator-magnets where people will see and enjoy the native bees and butterflies.
- Consider height: tall in the back or for focus, short in front or at the edge. Be sure tall plants don't cover windows!
- Avoid planting in rows. Go for groups of threes, fives, and more.
- Consider color and interest over the seasons. Choose plants with attractive winter stems and branches where possible – reds of red-twig dogwood, blotchy white of sycamore. Plant red-twig dogwood in front of an evergreen such as inkberry holly (*Ilex glabra*) or eastern redcedar (*Juniperus virginiana*) to show off the winter color. Remember that seed heads on grasses and meadow flowers can add visual interest in the winter.

Plant for success!

Here are tips from lessons we learned at Trinity over the first two years.

- Use appropriate plants for the amount of sun and water available. Notice where microcosms occur: extra warmth next to a south-facing wall, extra moisture at a downspout, extra dryness in a spot by the street.
- For ground covers and flowering plants, plant in masses rather than with individual plants. Aim to cover the ground with plants rather than with mulch; masses will survive better, and their roots will improve the soil better.

- If it isn't possible to fill the space with plants right away (plants *do* cost money, and tiny plants *do* need a bit of space to grow!), mulch to conserve moisture and prevent weeds. Use broken-up leaf mulch or un-dyed root mulch. When fine filaments (called *hyphae*) or mushrooms appear in your mulch, be glad – they are breaking down the mulch to improve the soil.
- Don't mix strong competitors with weak ones. If the plant nursery says "fast growing, spreads readily by rhizomes, sun or shade, any soil", you are dealing with a strong competitor. Other strong competitors are those that set large amounts of seed. Use these cautiously to fill space.
- Avoid planting tall or sprawling plants where they will need to be cut back from sidewalks. Plant tall individuals or masses at the back of the garden. If need be, control 'flop' by setting a wire cage over a plant before it grows. Another 'flop' control is to trim plants such as asters back to half their height in early-to-mid June. Doing so will reduce the 'legginess' of the stems without reducing the number of flowers in September.
- A shrub that is expected to grow six feet tall and wide is TOO BIG for a four-foot-wide strip garden between a wall and a sidewalk! Don't plant shrubs where you'll have to trim them to fit the space.

Final considerations

- If deer or rabbits are a nuisance, avoid plants that these herbivores devour (or cage the plants). (By the way, non-native but ubiquitous hostas are deer magnets. Hostas are one non-native that should be removed in deer country!)
- Be ready for plants to move. We planted anise hyssop (*Agastache foeniculum*) along the east walk to the church. The next year it showed up around the corner in the terraced beds, where seed had washed down.
- Be ready to move plants. We planted New York ironweed (*Vernonia noveboracensis*) on an east-facing wall, at the foot of a gutter downspout. It was so happy there that it grew eight feet tall and sprawled out onto the walk! It has had to be moved from that spot to one with less sun and water.
- Don't become discouraged when changes in the landscaping don't immediately look great. Give new plantings time to mature and soften the edges of rock walls and fences. Be willing to move plants that overgrow their space, flop onto walks or hide signs, or otherwise become the wrong plant for the space.



An eastern tiger swallowtail feasts on the nectar of spotted Joe Pye weed blossoms (*Eutrochium maculatum*).

Thomas Rainer and Claudia West provide great advice for landscaping in an urban or suburban setting. While most of their examples are large-scale installations, their design strategies work as well at the small scale. Here are a few tips from the book:

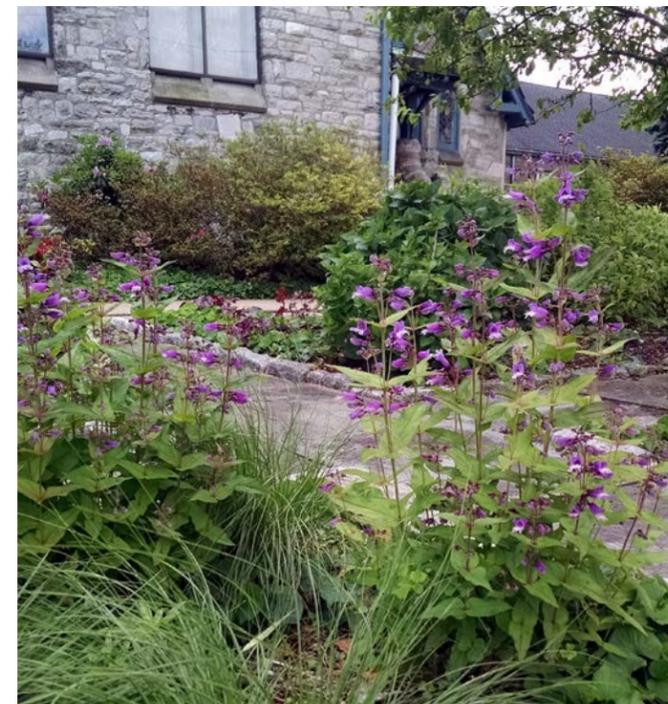
- Don't just think **horizontally** when planning the garden. Populate the **vertical** space by planting low growers, mid-height grasses, flowering plants, shrubs, and a few trees if space permits.
- A designed plant community should be attractive to wildlife while remaining **legible** to people: where is the focal point? How does the design flow from point to point?
- In a small area, stick with a few species; in a larger area, add a greater variety of species to create a larger **designed plant community**.
- Plan to **manage**, not **maintain** the designed community. Let it change over time as plants find their niches.

Rainer, T. & West, C. (2015) *Planting in a post-wild world: Designing plant communities for resilient landscapes*. Timber Press, Portland, Oregon



LET NATURE HELP CARE FOR THE GARDENS

Gardening is much easier if you aren't concerned about removing every stray plant or twig or raking up every fallen leaf. Yes, weeding is still necessary; but if the weed isn't going to seed, pull it, break it up, and leave it in the garden to enrich the soil. (If that seems unsightly, tuck the pulled weeds behind a shrub.) Disturb the soil as little as possible to avoid exposing new weed seeds or damaging the soil structure.



In this May photo, blooming foxglove (*Penstemon digitalis*) provides the focus behind emerging grasses and violets.



Coneflower seed heads in December.

Simplify the work of fall garden cleanup by doing the following:

- Leave seed heads in place as much as possible for late-season finches and overwintering sparrows to feed on. The seed heads are visually appealing to people as well.
- Leave leaf litter in place on garden beds and under trees. If the leaves blow around instead of staying put, or if they get stuck in the low branches of shrubs, rake them into a clear space and run over them with a mulching mower to break up the larger pieces. Then rake them back under the trees and shrubs. Leaves feed the soil and protect it from freeze-thaw cycles during the winter. Some beneficial insect larvae overwinter in leaf litter. If you bag up the litter, you lose the larvae as well.
- Leave stubble in the ground rather than clearing it away. Some above-ground plant material helps the roots of perennials overwinter. Stubble can help hold mulching material such as dry leaves in place. Break off the dead stems in early spring when new growth first appears at their bases. Soon birds will be looking for those small twigs, stems, and bits of dried grass to build into nests.



TREAT STORMWATER AS A FRIEND

In nature, rainwater falls on the leaves of trees and shrubs, trickling slowly from them to the ground. A healthy layer of leaf litter further slows the water's passage into the soil. Along the way, the water nurtures plants and wildlife.

On the other hand, in built-up landscapes, water falls on hard surfaces such as building roofs, streets, and parking lots and is directed into storm sewers, carrying with it any pollutants that might have been on the paved surfaces. Even turfgrass does not allow water to percolate into the soil – and any chemicals that were added to the lawn are likely to end up in the storm sewers and the nearby creek. Treating stormwater as a friend would mean keeping it on the property and integrating it into the landscaping in a way that nurtures plants while allowing the water to percolate into the soil and replenish the aquifer.

Water can be integrated into the landscaping in many ways. The most direct way would be to reduce hard surfaces. While it may not be possible to remove pavement, re-planting areas of turfgrass with other herbaceous plants, and with shrubs and trees, will help.

Another help is to collect stormwater from roofs in a rain garden: an area shaped to collect water and planted with attractive water-loving species. The ideal rain garden captures all the water from a given impervious area such as a roof or a parking lot. Once in the rain garden, the water percolates into the soil, ideally in a matter of hours, rather than overflowing the garden edge to create flooding.



The rain barrel can be integrated into the garden to be both attractive and useful. Just be sure you can still get to both the upper and the lower spigots!

If your property doesn't have room for a rain garden, you can still collect the water and keep it on the property. Adding a rain barrel under a downspout provides a way to hold water for use in the landscape. (A rain barrel should have a spigot at the top as well as the bottom to allow excess water to be drawn off in a heavy rain storm. A hose can be attached to the upper spigot and directed to some part of the garden that needs water.) Alternatively, water can be directed into an extended planter with one end under a downspout. The water can feed plants in the planter, but if it leaves the planter, be sure to direct it away from building foundations! Take excess water to where it can soak into the soil away from the building.

At Trinity Presbyterian Church, stormwater had been treated more as an unwanted guest than as a friend. Water from the massive rooftops often flooded the basement or made sidewalks impassible. In order to get the water away from the building, underground pipes had been installed to carry it to the edge of the property, where it was dumped into street-side gutters to run into a tributary of Darby Creek. In this way Trinity reduced its own stormwater

problem, but the church was contributing to the degradation of Darby Creek in the process.

We wanted to treat stormwater more responsibly. Over time we added a rain barrel to collect water from one set of gutters, and we installed simple detention basins to capture water from a parking lot. The water soaks into the basins instead of eroding the bank and running into the street. Water that's not causing erosion or flooding can be treated as a friend.

The very first step in treating water as a friend at Trinity was to install a rain garden to capture and make use of the water from the roofs on a large portion of the church building. How the rain garden was designed and installed is described in the next section, **Capturing Stormwater in a Rain Garden.**

Do you know what watershed you live in?

Water that flows into a particular body of water is called its **watershed**. What stream is fed by the storm sewers in your neighborhood? Where does the water go after that?

You can locate your watershed by going to the USGS website **Science in Your Watershed** at <https://water.usgs.gov/wsc/>. Enter your address to zoom in on the correct area. Learn more about watersheds in general at the website as well.



An unsightly rock pile marked the spot where stormwater ran to the edge of the property, often flooding the sidewalk before finding a storm drain.



Stormwater from the streets around Trinity has caused serious erosion in this tributary to Darby Creek, toppling retaining walls and eroding banks along its length.

Capturing Stormwater in a Rain Garden

At Trinity we had a natural spot for a rain garden at the edge of the courtyard, where water was already directed from the roofs. Gutters collected water from roughly 5,000 square feet of roof surface. The water was then funneled into 144 linear feet of gutter and transported underground to the outflow point at the edge of the property (See satellite image p. 21), where it surfaced in an unattractive bed of river rock and ran into the street. The goal was to replace that field of rock with an attractive garden where water would soak into the ground.

How big a rain garden was needed?

A typical rule of thumb is to make the rain garden area 20-30% of the area of the roof that drains into it. The roof drainage area we were working with was 5,000 sq. ft., which would mean a garden of from 1,250 to 1,700 sq. ft. in area. Yet the size of the rain garden was limited to a space about 18 feet in diameter (about 286 sq. ft.) at the edge of the courtyard, tucked between a sycamore and a group of benches that had been cemented in place. The original question, "how big a rain garden do we need?", became a new one: "given the constraints we have on the size of the proposed rain garden, is it worth putting it in?"

The calculations based on square footage alone do not adequately capture the detail that the rain garden is not just a surface – it is a three-dimensional space intended to hold a volume of water. Our roof surface might generate 42 cu. ft. of water in a one-inch rain storm! We did some more calculations and realized that a basin measuring 18 ft. in diameter might hold that much water only if the soil in the basin were quite porous.

We decided that it was worth putting in the rain garden – but that we would need to increase the porosity of the soil. Then, even if our garden were to overflow in a fast, heavy storm, it could make good use of smaller, slower showers. It would help that the underground pipe from the gutters was perforated, and that the soil we were working with was already fairly loose and water-absorbent, at least in the top 12 inches. We further amended the soil in the center ten feet of the rain garden down to a depth of 20 – 24 inches, removing the compacted clay that we found beginning at about a foot in depth. That clay was used to form a berm at the back (the street side) of the rain garden to further enhance the ability of the garden to hold stormwater until it could soak into the ground.



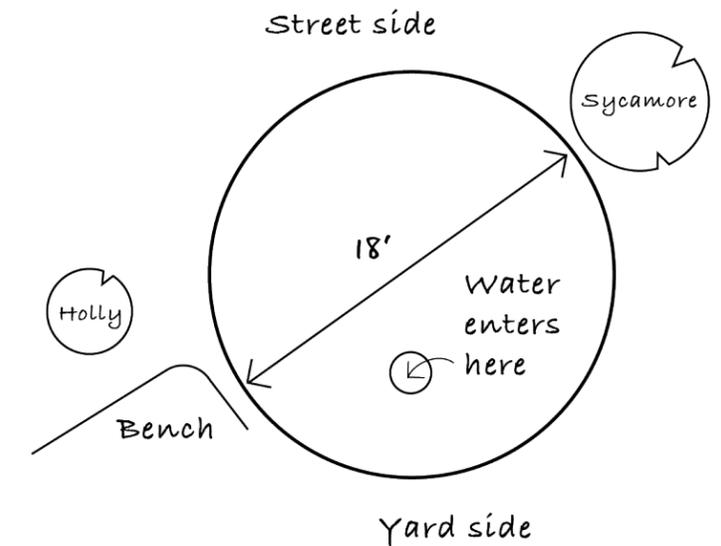
Members of Boy Scout Troop 219 from Wayne, PA began the process of installing the rain garden by removing the river-rock around the outflow pipe that brings water across the courtyard.

The process

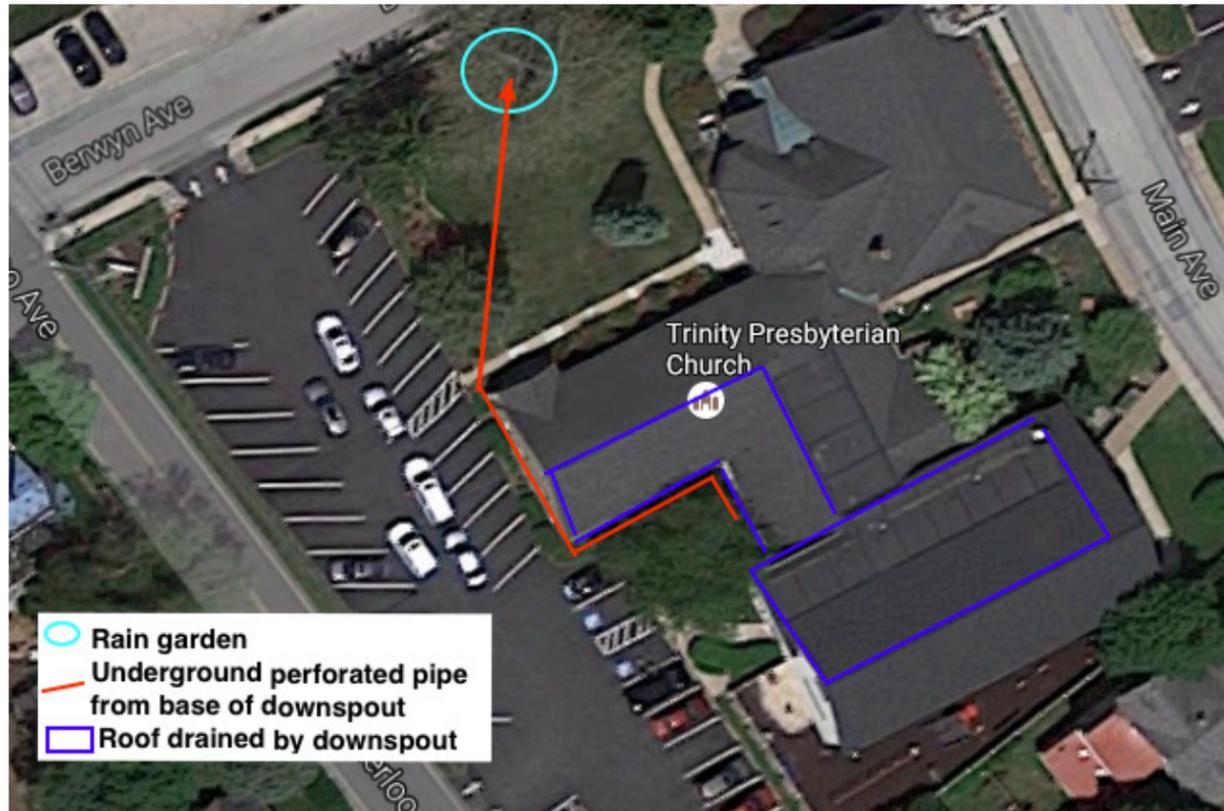
Detailed instructions for installing a rain garden can be found on the Internet (see Resources/ Rain gardens and other stormwater-management techniques).

Guidelines always include these pointers:

- Locate the rain garden at least ten feet away from any building foundation.
- Check with utility companies before digging to avoid electrical wires and pipes.
- Test the soil to assess its ability to absorb precipitation. If the soil is compacted or heavy in clay, replace or amend it with sand and loose, loamy soil.
- Size the garden to be able to handle the water from the impervious surfaces (roofs, parking lots, and the like) that will feed it.
- If the rain-garden location is sloped, create a level area with a berm to hold the water in place until it soaks into the soil.
- Leave the surface of the rain garden about six inches below the surface of the surrounding ground to allow for ponding.
- Plant the rain garden with native plants that like moisture but can withstand dry periods.
- If the garden collects water from a parking lot, include plants that are salt-tolerant (grasses and sedges often work well).
- Add mulch to control weeds during the first seasons and until plants fill out. Mulch also increases the fungal component of the soil, necessary for breaking down compounds and providing nutrients for the plants. Mulch can help absorb salt and contaminants from paved surfaces.



Keep slight downhill slope,
yard to street
Add berm at street edge



Stormwater from the roof sections outlined in blue runs through underground pipe (red) to the rain garden (circled in aqua) at the edge of the property. Annotated Google satellite image.



After removing the river rock from the area of the future rain garden, Scouts dug out the center to a depth of about 24 inches, exposing the pipe that carries water from the church roofs.



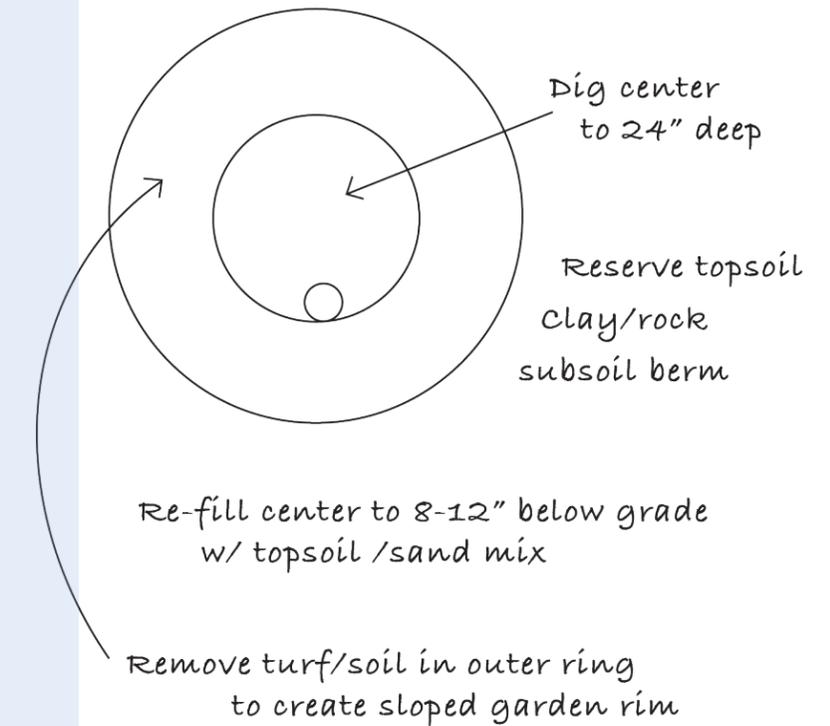
Sand and topsoil were added back to bring the surface to about a foot below grade. Then the surrounding turf grass and soil were removed to create a sloping basin.

What about contaminants in the water?

What if the water from your roof or garden contains harmful minerals, hydrocarbons, or salts? Low levels of such pollutants can be removed by plants or broken down by soil microbes and natural chemical processes. It's important to provide a way for the water to percolate into the soil so these processes can happen! A rain garden or other system can do this.

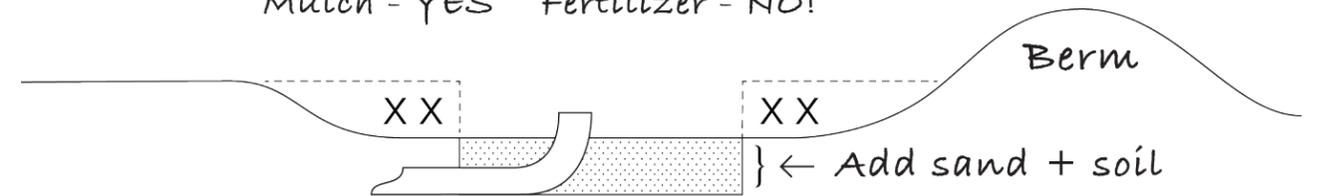
However, if the soil is already heavily contaminated with industrial products, the problem is more complex. Sometimes a rain garden with an underground holding chamber is used to allow anaerobic digestion of more difficult pollutants. This might be useful in a highway median, for example. In most cases, however, it's enough to let the water percolate through the soil. By keeping the water out of the storm sewer, you're contributing in an important way to improving the health of the watershed.

Rain garden layout



Plant water-lovers center
 sun-lovers front edge
 shrubs side, back edges.

Remember - berm back side = street view!
 Water lightly to settle plants & soil
 Mulch - YES Fertilizer - NO!





Scouts used the river rock to create a spiral in the garden. Plants and mulch finished the project.



The rain garden provides an attractive focal point in the Courtyard in late summer. Photo by Sally Willig.



Neighbors enjoy the garden area for an outdoor meeting on a warm autumn day.

Combining Purposes



East side of the sanctuary in March, 2015, before the addition of terraced gardens. Winged euonymous (*Euonymus alatus*) hid the stained-glass windows. Weeds and trash provided finishing touches to the unappealing picture.

In the church courtyard just described, already-existing flower beds were altered to include native plants. The rain garden was created as a new, separate garden at the edge of the courtyard. On the other hand, when we tackled the east side of the sanctuary, we chose to combine native plantings and stormwater control throughout.

On the east side of the sanctuary, the church property consists of a sloping strip roughly ten feet wide and 60 feet long. Here we chose to treat the water as an asset rather than a liability by terracing the 60-foot strip so water could remain in place long enough to soak into the soil. Weeds and undesirable plants (photo to left) were removed and topsoil was added to raise the level of the terraced beds. Shrubs were chosen with four criteria in mind: First, they should be native to the mid-Atlantic area and provide berries and cover for birds; second, their maximum height should be such that they would never block the stained glass windows; third, they should thrive in moist soil but not mind drying out between rainstorms; and finally, they should be visually appealing to people. To provide cover and color while the shrubs mature, native flowering plants were added to the mix.

The resulting terraced gardens along Main Street are perhaps the part of the church property most noticed by passers-by. People often stop to comment on the beauty of the gardens.

Terraced Garden, East Side of Sanctuary

Trinity Presbyterian Church

640 Berwyn Avenue Berwyn, Pennsylvania

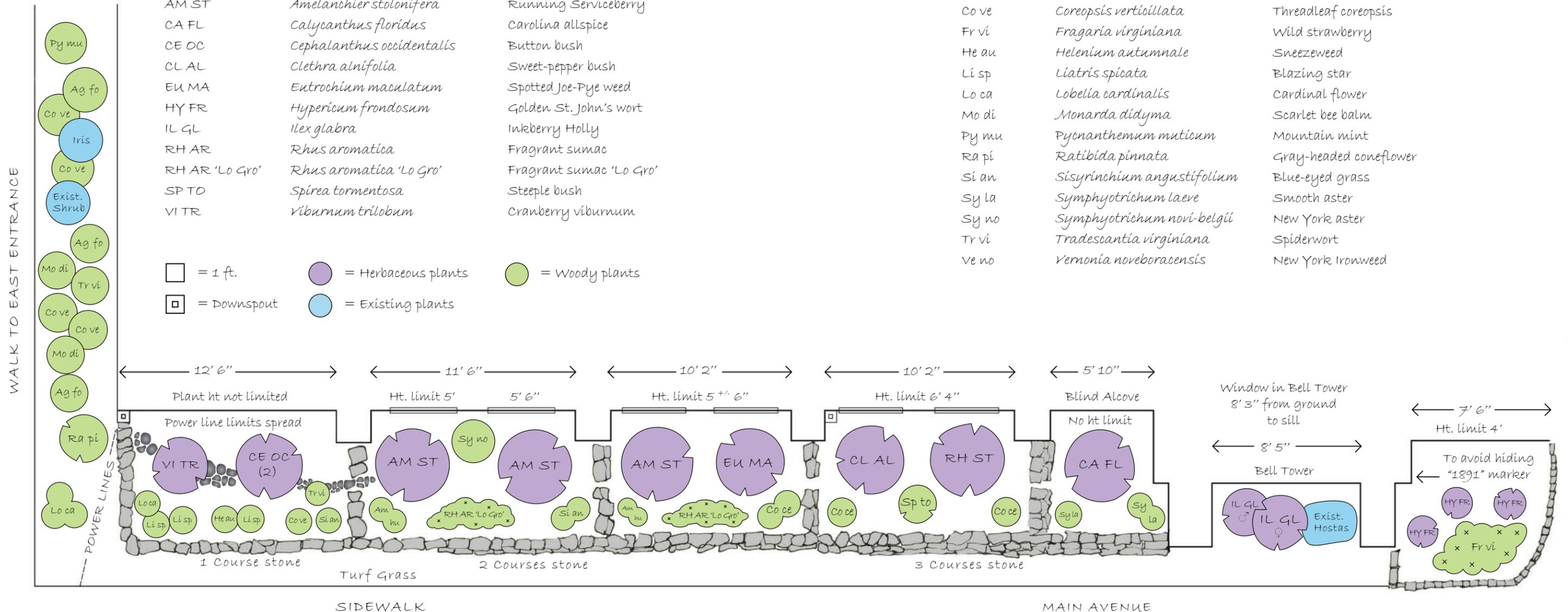
Shrubs & Woody Herbaceous Species

AM ST	<i>Amelanchier stolonifera</i>	Running Serviceberry
CA FL	<i>Calycanthus floridus</i>	Carolina allspice
CE OC	<i>Cephalanthus occidentalis</i>	Button bush
CL AL	<i>Clethra alnifolia</i>	Sweet-pepper bush
EU MA	<i>Eutrochium maculatum</i>	Spotted Joe-Pye weed
HY FR	<i>Hypericum frondosum</i>	Golden St. John's wort
IL GL	<i>Ilex glabra</i>	Inkberry Holly
RH AR	<i>Rhus aromatica</i>	Fragrant sumac
RH AR 'Lo Gro'	<i>Rhus aromatica 'Lo Gro'</i>	Fragrant sumac 'Lo Gro'
SP TO	<i>Spirea tormentosa</i>	Steeple bush
VI TR	<i>Viburnum trilobum</i>	Cranberry viburnum

- = 1 ft.
- = Herbaceous plants
- = Woody plants
- ◻ = Downspout
- = Existing plants

Herbaceous Species

Ag fo	<i>Agastache foeniculum</i>	Anise hyssop
Am hu	<i>Amsonia hubrechtii</i>	Amsonia, Blue star
Co ce	<i>Conoclinium coelestinum</i>	Blue mist flower
Co ve	<i>Coreopsis verticillata</i>	Threadleaf coreopsis
Fr vi	<i>Fragaria virginiana</i>	Wild strawberry
He au	<i>Helenium autumnale</i>	Sneezeweed
Li sp	<i>Liatris spicata</i>	Blazing star
Lo ca	<i>Lobelia cardinalis</i>	Cardinal flower
Mo di	<i>Monarda didyma</i>	Scarlet bee balm
Py mu	<i>Pycnanthemum muticum</i>	Mountain mint
Ra pi	<i>Ratibida pinnata</i>	Gray-headed coneflower
Si an	<i>Sisyrinchium angustifolium</i>	Blue-eyed grass
Sy la	<i>Symphotrichum laeve</i>	Smooth aster
Sy no	<i>Symphotrichum novi-belgii</i>	New York aster
Tr vi	<i>Tradescantia virginiana</i>	Spiderwort
Ve no	<i>Vernonia noveboracensis</i>	New York Ironweed



In the 2016 growing season, the flowers planted in the terraced beds and along the walk to the east entrance were covered with pollinators, including butterflies and both native and honey bees. Water from the downspouts is now directed to the base of shrubs, where it percolates into the soil. There is no sign of water damage to the foundation wall. What had been a boring, embarrassing bit of forgotten property is now a focal point of the landscaping.



The terraced gardens under construction in October of 2015. Neighbors found it a good place to take a break.



The terraced gardens in summer of 2017.

Comments

I love this garden! This is what I want to do in my own yard! Mind if I take some seeds?

I used to walk by this church and think, "it's such a shame – this could be so beautiful." Now it truly is – the gardens really set off the stone building!

Getting People Involved

The ongoing landscaping projects at Trinity were initiated by one person: Mary Westervelt. However, none of the projects would have gone anywhere without the involvement of church members, friends, and volunteer organizations. This section summarizes lessons learned along the way for encouraging team-building on a project like this.

Present the idea in a way that invites collaboration.

- **Put the environmental focus in the context of the larger goals of the group** (in the case of a church, stewardship of Creation and care for 'the least of these').
- Once there is interest, **arrange meetings to brainstorm** about how to address issues. Focus on what has already been done and on the strengths represented in the group: how can these move the project forward?
- **Avoid accusing; start with acknowledgement of progress made on the environmental front.** Progress might have been made inside the building rather than outside. Has your group had an energy audit? Does the building use energy-efficient lighting, heating and cooling, and appliances? Have you added double-paned windows?
- **Expect to find – and acknowledge – strengths that others can bring to the effort.** Express a desire or a goal and see who contributes. Gardeners may contribute native plants. Some will know about composting and want to get involved in starting that effort. Others may have materials and equipment on their property that they would love to donate.

- **Graciously accept help and contributions even if they don't quite meet strict standards.** When congregants offer non-native plants or bulbs, consider: Will including those in the garden include more people, either as helpers, or as admirers? If people stop to admire the blooms, will that offer a chance to explain about the project, its purpose, and the value of including natives as well as (for example) spring bulbs? If you have room for both natives and non-natives, and if the plants offered aren't invasive or harmful, why not include them?

Check for constraints such as these:

- Other uses for the property (preschool activities, group gatherings, etc.) that need to be included in the landscaping plan
- Legal restrictions on planting, for example at street corners (check with municipal authorities)
- Location of underground pipes or wiring that might be disturbed by digging (check with utilities & municipal authorities).

Remember that some constraints provide opportunities to include others.

- **The installation requires labor!** For one-time projects such as the installation of a rain garden, call on Boy Scouts, Girl Scouts, and high school service organizations. Such groups are looking for opportunities to lend a hand in a meaningful project. Our rain garden installation was the Eagle Scout project for a local Scout. Remember to acknowledge the labor of service organizations in some way in the installation.
- **The maintenance is ongoing!** Form a gardening team. Our small once-a-week gardening team has become a tight-knit group able to expand to include others as needed for special projects.

- **The project costs money!** People who aren't able to help out physically can get involved by making donations.
- **The project needs plants!** Some home gardeners will be glad to share their native plants. Also reach out to local groups (a public garden, a plant nursery, a garden supply center) for donations of or discounts on native plants, mulch, and the like. When approaching these groups, be prepared to explain how helping your project furthers the group goals. Once the plants are installed, include signage that acknowledges the donations.

Keep your team – and the public – informed. Be sure to point out to the public (the congregation, the users of the municipal building, passers-by, etc.) any signs that the new plants are attracting birds and pollinators, and that the new rain gardens or similar features are making use of water on the property while avoiding runoff. Posters and short messages in a bulletin work well for this. In a church setting, a 'minute for missions' message is appropriate for explaining how the gardens are furthering the church's mission to exhibit responsible stewardship. Add attractive signage to the gardens. These should be signs that can be updated as seasons and concerns arise. Label plants so viewers can identify plants they would like to add to their own gardens.

Remember that the landscape will change with time; work with that change. New plantings need time to mature and soften the edges of rock walls and fences; be patient! Some plants will not work where they were planted. Be willing to move plants that overgrow their space, flop onto walks or hide signs, or otherwise become the wrong plant for the space. As shrubs and trees mature, what was a sunny spot may become shady and not suitable for the sun-loving flowering plants you originally planted there. Even if the space doesn't change, some attrition is to be expected. Don't beat yourselves up if some plants don't make it!

These pointers will help get the project going and keep it vibrant. You can then use this visible project as a springboard to other facets of responsible environmental stewardship. At Trinity, we've been able to add a compost pile to take care of both yard waste and kitchen waste. The Environmental Stewardship Team is leading the initiative to use resources wisely by looking into whether it makes better ecological sense to wash dishes, to use recyclable plastic, or to use compostable paper products. The office staff are looking for ways to use less paper – including having paperless church services.

The entire environmental stewardship project needs the leadership of one person or a small committee – but its ongoing success depends on getting everyone involved as they are able.

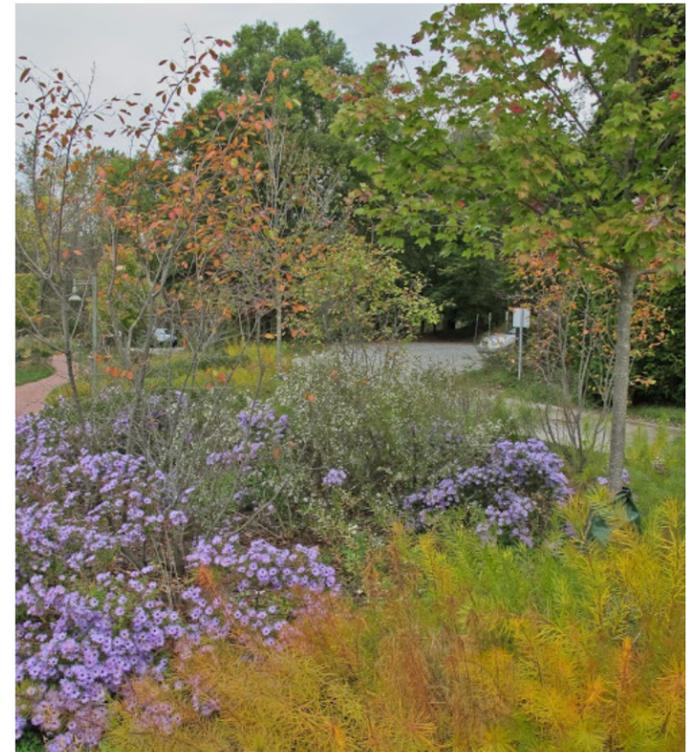
Look around for inspiration!

More and more institutions are realizing that landscaping can be so much more than turfgrass dotted with a few annual flowers. Now you know more about what can be done, and why it should be done. Look at both your own landscaping and that of others with a critical eye. What draws people in while creating a thriving ecosystem?

Here are examples of what has been done with outdoor spaces to attract both people and pollinators, while controlling stormwater.



This sign by the rain garden explains the purpose as well as acknowledging the Boy Scouts who installed it and the arboretum that supplied plants.



Swaths of autumn color in this garden at Stroud Water Research Center, Avondale, PA are visually appealing to humans, while the flowers attract pollinators and the layered planting controls stormwater much better than turfgrass would.



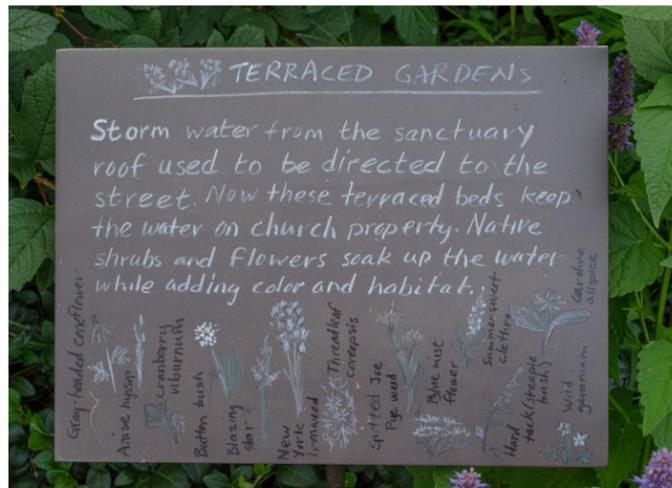
Native grasses, flowers and shrubs mix with non-native colorful species along this walk by Shoemaker Green, University of Pennsylvania, Philadelphia, PA.



Water is directed to a detention basin along a path of river rock lined with attractive native species. Shoemaker Green, University of Pennsylvania, Philadelphia, PA.



Native grasses and trees along Woodland Walk soften the lines of Papadakis Integrated Science Building at Drexel University, Philadelphia, PA.



These sturdy metal signs can be written on using wax pencils, allowing you to update the information as seasons change. Signs available from Nelson-Harkins Industries, Chicago (see end of Resources list for address).

References for More Information

Burrell, C. C. (2011) *Native Alternatives to Invasive Plants*. Brooklyn Botanic Garden Guides for a Greener Planet, Handbook #85. Useful for zones throughout the continental U.S.

Darke, R. & Tallamy, D. (2014) *The Living Landscape: Designing for beauty and biodiversity in the home garden*. Timber Press, Portland, Oregon

Leopold, D. (2005) *Native Plants of the Northeast*. Timber Press, Portland, Oregon. Includes plant lists for wet soil, dry soil, sun, shade, and to attract birds, butterflies, or mammals.

Lowenfels, J. & Lewis, W. (2010) *Teaming with Microbes. The Organic Gardener's Guide to the Soil Food Web*. Timber Press, Portland, Oregon

Rainer, T. & West, C. (2015) *Planting in a post-wild world: Designing plant communities for resilient landscapes*. Timber Press, Portland, Oregon

Slattery, Britt E., Reshetiloff, Kathryn, and Zwicker, Susan M. (2003) *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*. U.S. Fish & Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. Available at <https://www.epa.gov/watersense/what-plant>

Link checked 17 January 2018.

Though the authors focus on the Chesapeake Watershed, residents of the Delaware Watershed and others can use it as well by simply selecting parameters that match their topography, water, and soil type.

Tallamy, D. (2009) *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants*. Updated and expanded. Timber Press, Portland, Oregon. Contains plant suggestions for zones throughout the continental United States.



Winterberry holly (*Ilex verticillata*) in December.

Resources for rain gardens and other stormwater-management techniques

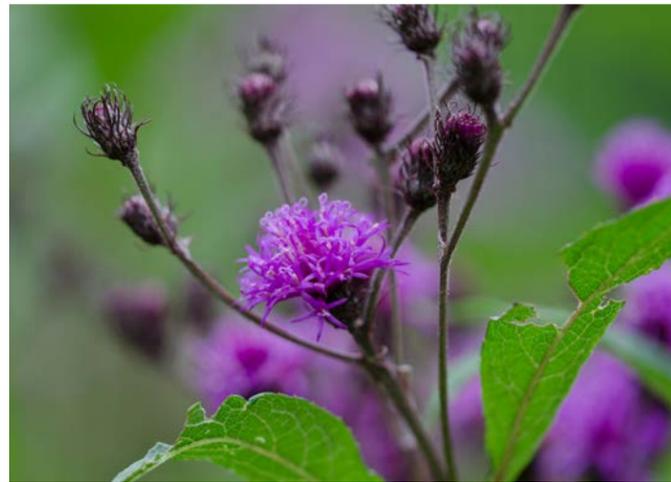
- **Androletti, J. and Melvin, E. (2008)** *Vermont Rain Garden Manual*. Winooski Natural Resources Conservation District. Available at https://www.uvm.edu/seagrant/sites/default/files/uploads/publication/VTRainGardenManual_Full.pdf.

A well-written and informative guide with an extensive annotated native-plant list applicable, not just to VT, but to greater New England and the Mid-Atlantic region as well. Contains sample plant-selection lists for various site conditions.

- **Department of Environmental Protection (DEP) RainScapes Program of Montgomery County, Maryland (2015)** *Rain Gardens for RainScapes Technical Design Manual*. Available at https://www.montgomerycountymd.gov/DEP/Resources/Files/downloads/rainscapes/fact-sheets/RG4RS_Tech_Manual_Web.pdf
The likely intended audience is large-scale landscapers, but guidelines for installation are still useful for small-scale projects. The advice to dig a two-foot hole to test soil permeability is probably not useful for small projects. We dug one-foot holes.

- **Golen, S.K and Okay, J. (2014)** *Rain Gardens Technical Guide*. Virginia Department of Forestry. Available at http://www.dof.virginia.gov/infopubs/Rain-Garden-Technical-Guide-2014-05_pub.pdf

Includes step-by-step instructions for calculating the size of a rain garden.



New York ironweed (Vernonia noveboracensis)

- **Partnership for the Delaware Estuary & Philadelphia Water Department Office of Watersheds (January, 2006)** *A Homeowner's Guide to Stormwater Management*. Available at http://www.phillywatersheds.org/doc/Homeowners_Guide_Stormwater_Management.pdf

or

<http://www.delawareestuary.org/publications02/booklets-and-brochures>

Contains advice aimed at the homeowner. *Ignore the list of trees for city-scapes, p. 10, which includes only non-natives. A list of native perennials, grasses, ferns, and shrubs appears on p. 20.*

- **Partnership for the Delaware Estuary & Philadelphia Water Department Office of Watersheds (2016)** *Homeowner's Stormwater Handbook*. Available at

<http://s3.amazonaws.com/delawareestuary/pdf/stormwater-guide.pdf>

More ideas for stormwater management for the city-dweller. Again, this manual lists non-native trees as street-tree options (p. 18) while on the same page admonishing the homeowner to plant only natives!

Source for aluminum signs, markable with wax pencil

Nelson-Harkins Industries. 5301 North Kedzie Ave, Chicago, IL 60625-4711
www.nelson-harkins.com.
Phone: 773-478-6243.

Their coated aluminum signs were recommended by Longwood Gardens, Kennett Square, PA.



Green-and-gold (Chrysogonum virginiana)

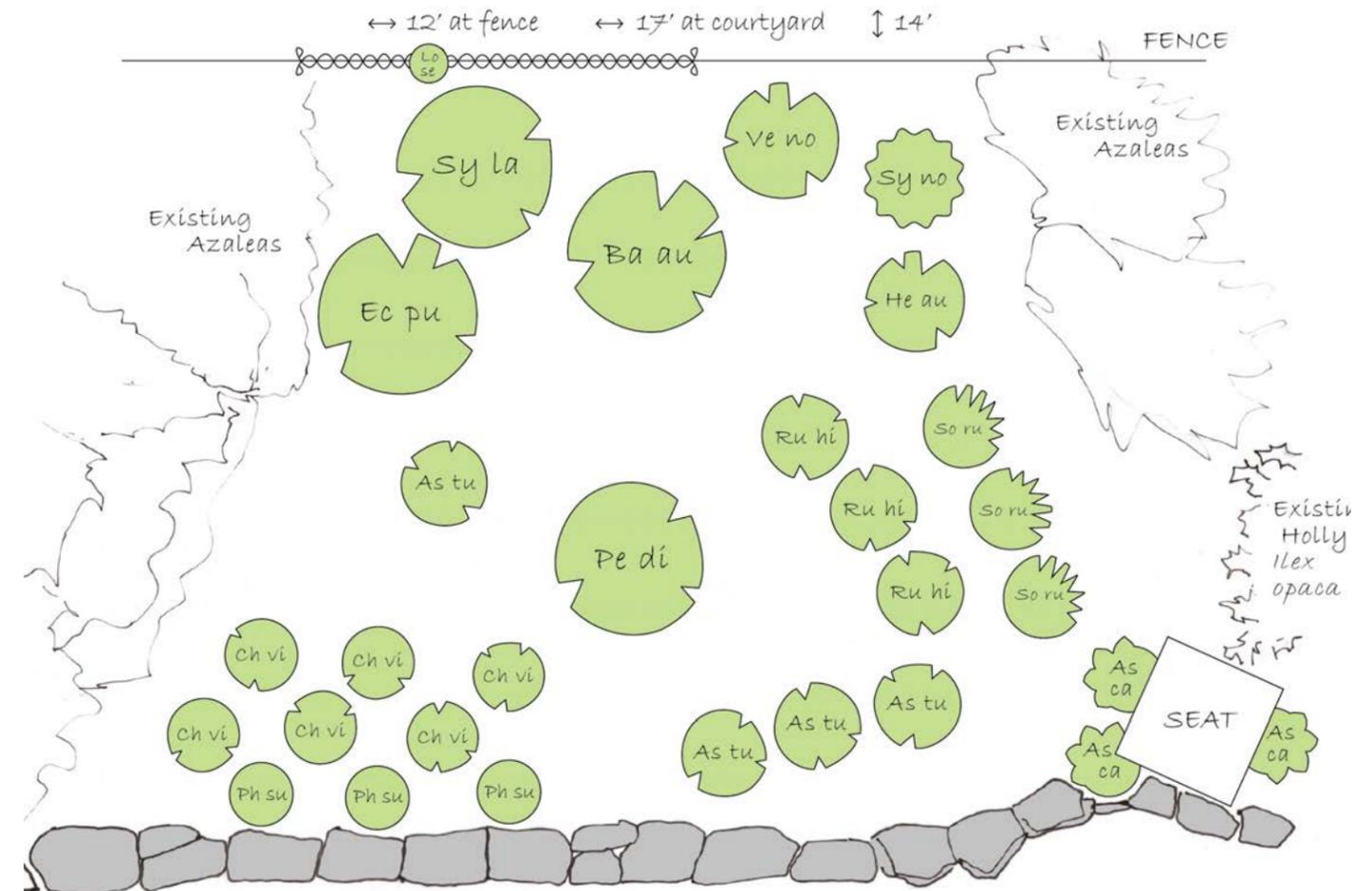
Appendix

Plants Used in Trinity Presbyterian Native-Plant Gardens						
Scientific name	Common name	Size/character	At Trinity			Comments
			Location	Sun/shade	Moisture	
<i>Agastache foeniculum</i>	Anise hyssop	herbaceous	Sunny east entrance walk	Sun	Dry to moist	Self-sows readily. Pollinator magnet.
<i>Ageratina aromatica</i>	Lesser snakeroot	herbaceous	West wall of Fellowship Hall	Sun	Dry to moist	Attracts pollinators, but self-sows to a fault. Serves as a space-filler.
<i>Amelanchier stolonifera</i>	Running serviceberry	shrub	Terrace	Sun	Moist to wet	Spring flowers, autumn fruit & color
<i>Amsonia hubrichtii</i>	Amsonia, Blue-star	herbaceous	Terrace edge	Sun	Moist	Blue flowers, gold foliage in autumn
<i>Aquilegia canadensis</i>	Columbine	herbaceous	Shade garden	Dappled shade	Moist to dry	Spring flowers, interesting foliage.
<i>Arisaema triphyllum</i>	Jack in the pulpit	herbaceous	Shade garden	Dappled shade	Moist to dry	Spring flowers produce berries later.
<i>Aronia arbutifolia</i>	Red chokeberry	shrub	Sign Garden	Sun	Moist to dry	To 9 ft. tall, vase-shaped, airy shrubs; suckers help fill space. Leaf shape, spring flowers, berries, fall leaf color outstanding.
<i>Asarum canadense</i>	Wild ginger	herbaceous ground cover	Under benches, Courtyard	Shade	Moist to dry	Interesting foliage, spreading ground-cover. Flowers are hidden.
<i>Asclepias incarnata</i>	Swamp milkweed	herbaceous	Rain garden	Sun to shade	Moist	Flowers. Attracts pollinators; monarch butterfly larval host.
<i>Asclepias tuberosa</i>	Butterfly milkweed	herbaceous	Sun garden	Sun	Moist to dry	Flowers. Attracts pollinators; monarch butterfly larval host.
<i>Baptisia australis</i>	Blue wild indigo	herbaceous	Sun garden	Sun	Moist to dry	Flowers attract pollinators; attractive seed pods in fall. Sets a tap root; can't be moved once established.
<i>Calycanthus floridus</i>	Carolina allspice, Sweetshrub	shrub-tree	Terrace	Sun	Moist	Flowers
<i>Cephalanthus occidentalis</i>	Button bush	tall shrub	Terrace/rain garden	Sun/shade	Moist to wet	Flowers
<i>Chrysogonum virginianum</i>	Green-and-gold	herbaceous ground cover	Sun garden	Sun	Moist to dry	Flowering ground cover.
<i>Clethra alnifolia</i>	Sweet-pepper bush	shrub	Terrace	Sun	Moist to wet	Flowers; pollinator magnet
<i>Conoclinium coelestinum</i>	Foam flower	herbaceous	Terrace edge	Sun	Moist	Flowers; pollinator magnet; self-sows readily
<i>Coreopsis verticillata</i>	Whorled tickseed, Thread-leaf coreopsis	herbaceous	By walk in Courtyard, West entrance walk	Sun to part shade	Moist to dry	Low-growing, produces flowers attractive to pollinators throughout summer.
<i>Cornus alternifolia</i>	Alternate-leaf dogwood	small tree	Courtyard, between spruce and fence NW corner (deer-protected)	Dappled shade	Moist to dry	Small flowering tree. To prevent deer browse, planted in a corner between a fence and a spruce tree.
<i>Dicentra cucullaria</i>	Dutchman's breeches	herbaceous	Shade garden	Shade	Moist	Spring-time ephemeral

Scientific name	Common name	Size/character	At Trinity			Comments
			Location	Sun/shade	Moisture	
<i>Dicentra eximia</i>	Bleeding heart, Turkey corn	herbaceous	Shade garden	Shade	Moist	Unlike the non-native bleeding heart, <i>D. spectabilis</i> or <i>Lamprocapnos spectabilis</i> , this plant does not go dormant in summer. Spring-time blooms can repeat in fall.
<i>Eragrostis spectabilis</i>	Purple love grass	grass	Cross garden	Sun to shade	Moist to dry	Airy pinkish plumes of seed heads in late summer.
<i>Eurybia divaricata</i>	Dwarf white wood aster	herbaceous	Shade garden	Shade	Moist to dry	White flowers in late summer. Clip stems in June to control flopping. Lovely in masses at shady garden edge.
<i>Eutrochium maculatum</i>	Joe Pye Weed	herbaceous (shrub-like in size)	Terrace	Sun	Moist	Flowers; pollinator magnet
<i>Gentiana clausa</i>	Bottle gentian	herbaceous	West entrance & rain garden	Shade	Moist	Interesting closed blossoms; only bumble-bees are strong enough to open.
<i>Geranium maculatum</i>	Spotted geranium, Cranesbill	herbaceous	Corner sign garden, Terrace, Cross garden	Sun	Moist to dry	Pollinator magnet; spreads.
<i>Helenium autumnale</i>	Sneezeweed	herbaceous	Sun garden, Terrace	Sun	Moist to dry	Flowers; pollinator magnet.
<i>Hypericum frondosum</i>	St John's Wort	shrub	Northeast corner & Corner sign garden	Sun	Moist to dry	Flowers, seed pods. Pollinator magnet.
<i>Ilex glabra</i>	Inkberry holly	shrub	East side, Bell tower	Sun	Moist to dry	Need male and female for berries. Evergreen.
<i>Iris versicolor</i>	Blue-flag iris	herbaceous	Rain garden	Sun/dappled shade	Moist	Early spring flowers.
<i>Itea virginica</i>	Virginia sweetspire	shrub	Rain garden	Sun/dappled shade	Moist	Spring flowers, fall color. Arching stems, somewhat rangy. Suckers freely.
<i>Liatris spicata</i>	Marsh blazing star	herbaceous	Terrace, Rain garden	Sun/dappled shade	Moist	Flowers
<i>Lindera benzoin</i>	Northern spicebush	shrub	Rain garden	Sun/dappled shade	Moist	Spring flowers, berries if male and female plants present. Grows to 10 ft. with airy, open branching.
<i>Lobelia cardinalis</i>	Cardinal flower	herbaceous	Rain garden	Sun/dappled shade	Moist	Flowers; humming birds, insects
<i>Lonicera sempervirens</i>	Trumpet honeysuckle	vine	Fence behind sun garden	Sun	Moist to dry	Coral blossoms. This is NOT the invasive Japanese honeysuckle! Attracts pollinators, hummingbirds.
<i>Monarda didyma</i>	Scarlet bee balm	herbaceous	East entrance walk & sun garden in courtyard	Sun	Moist to dry	Flowers; humming birds, insects
<i>Muhlenbergia capillaris</i>	Hairawn muhly grass	grass	Cross garden	Sun	Moist to dry	Airy seed heads late summer to fall.
<i>Onoclea sensibilis</i>	Sensitive fern	fern	Shade garden & rain garden	Shade	Moist	Attractive space filler. Spreads where happy.
<i>Packera aurea</i>	Golden ragwort	herbaceous ground cover	Shade garden	Shade	Moist	Evergreen foliage. Spring flowers on long stalks have purple buds, yellow blossoms reminiscent of dandelions. Attract spring pollinators. Aggressive spreader in sun, more controlled spreading in shade.
<i>Penstemon digitalis</i>	Foxglove beardtongue	herbaceous	Sun garden & west wall of Fellowship Hall	Sun	Moist to dry	Flowers attract pollinators. Tubular flowers good for hummingbirds and bees.

Scientific name	Common name	Size/character	At Trinity		Comments	
			Location	Sun/shade		
<i>Phlox subulata</i>	Moss pink	herbaceous	Sun garden & Corner sign garden	Sun	Moist to dry	Flowers in spring provide a carpet of color.
<i>Pycnanthemum muticum</i>	Mountain mint	herbaceous	East entrance walk, Cross garden, & Sign garden	Sun	Moist to dry	Spreads aggressively. Fragrant foliage and flowers. Pollinator magnet.
<i>Ratibida pinnata</i>	Gray-headed coneflower	herbaceous	East entrance walk	Sun	Moist to dry	Flowers, seeds in fall for finches. Tall; tends to flop if not controlled
<i>Rhus aromatica</i>	Fragrant sumac	shrub	Terrace	Sun	Moist to dry	Flowers, foliage shape and color, berries.
<i>Rhus aromatica 'Lo-gro'</i>	Fragrant sumac	prostrate shrub	Terrace, Corner sign garden	Sun	Moist to dry	Flowers, foliage shape and color, berries. Sprawling; not great in a confined area.
<i>Rudbeckia hirta</i>	Black-eyed Susan	herbaceous	Sun garden	Sun	Moist to dry	Mid-to-late summer flowers attract pollinators; birds eat seed
<i>Sisyrinchium angustifolium</i>	Blue-eyed grass	herbaceous groundcover	Throughout	Sun	Moist to dry	Iris relative; small blue flowers in spring. Sets seed, self-sows readily.
<i>Solidago caesia</i>	Blue-stem goldenrod	herbaceous	Shade garden	Shade	Moist to dry	Late summer flowers attract pollinators.
<i>Solidago flexicaulis</i>	Zig-zag goldenrod	herbaceous	Shade garden	Shade	Moist to dry	Late summer flowers attract pollinators.
<i>Solidago rugosa</i>	Wrinkle-leaf goldenrod 'Fireworks'	herbaceous	Sun garden & Cross garden	Sun	Moist to dry	Late summer flowers attract pollinators.
<i>Symphyotrichum laeve</i>	Smooth aster	herbaceous	Terrace, Cross garden, Sun garden	Sun	Moist to dry	Flowers late summer-autumn attract pollinators. Self sows. Cut foliage to mid-height in June to control flopping.
<i>Symphyotrichum novi-belgii</i>	New York aster	herbaceous	Terrace, Sun garden	Sun	Moist to dry	Flowers late summer-autumn attract pollinators. Self sows. Cut foliage to mid-height in June to control flopping.
<i>Symphyotrichum cordifolium</i>	Blue wood aster	herbaceous	Shade garden	Shade	Moist	Mid-to-late summer flowers attract pollinators.
<i>Symphyotrichum puniceum</i>	Purple stem aster	herbaceous	Rain garden	Dappled sun	Moist to wet	Purple flowers attract pollinators.
<i>Tradescantia virginiana</i>	Spiderwort	herbaceous	Sunny east entrance	Sun	Moist to dry	Striking dark-purple flowers. Can become straggly; planted behind later-growing species.
<i>Vernonia noveboracensis</i>	New York ironweed	herbaceous	Terrace	Sun	Moist to dry	With abundant sun and water, grows to 8 ft. tall and wide. More reserved with less water/sun.
<i>Viburnum trilobum</i>	Cranberry viburnum	shrub	Terrace	Sun	Moist to wet	Flowers, fruit, fall color.
<i>Zizia aurea</i>	Golden alexanders	herbaceous	Rain garden	Dappled sun	Moist to wet	Yellow flowers attract pollinators.

Courtyard Sun Garden



- | | | |
|-------|--|------------------------------------|
| As ca | <i>Asarum canadense</i> | Wild Ginger |
| As tu | <i>Asclepias tuberosa</i> | Butterfly Milkweed |
| Ba au | <i>Baptisia australis</i> | Blue Wild Indigo |
| Ch vi | <i>Chryaogonum virginianum</i> | Green-and-Gold |
| Ec pu | <i>Echinacea purpurea</i> | Eastern Purple Coneflower |
| He au | <i>Helenium autumnale</i> | Sneezeweed |
| Lo se | <i>Lonicera sempervirens</i> | Trumpet Honeysuckle |
| Pe di | <i>Penstemon digitalis</i> | Foxglove Beardtongue |
| Ph su | <i>Phlox subulata</i> | Moss Pink |
| Ru hi | <i>Rudbeckia hirta</i> | Black-Eyed Susan |
| So ru | <i>Solidago rugosa 'Fireworks'</i> | Wrinkle-Leaf Goldenrod 'Fireworks' |
| Sy la | <i>Symphyotrichum laeve 'Bluebird'</i> | Smooth Blue Aster 'Bluebird' |
| Sy no | <i>Symphyotrichum novi-belgii</i> | New York Aster |
| Ve no | <i>Vernonia noveboracensis</i> | New York Ironweed |

Naturalizing Your Property: A Checklist



Start with what people see. What do people see as they drive or walk by? Are plants grouped to help both people see the pattern? Are first-timers able to 'read' the landscape?



Analyze the current plant mix. Does the landscaping depend heavily on easy-care plants such as turfgrass and non-native flowers and shrubs, or do you include groups of native plants? Are insects attracted to the flowers, and can they lay eggs on the leaves?



Learn about the soil. Is the soil sandy, loamy, or heavy with clay? Is the pH acid, alkaline, or neutral (about 6 or 7)? Is it rocky? What grows in nature preserves in the area?



Design visually pleasing plant communities by adding natives. Plan masses of color and texture rather than planting solitary individual plants. Keep the design legible for people, while including plants that attract pollinators. Go to local natural spaces for ideas.



Let nature help care for the gardens. Those leaves and twigs are your friends! Don't get rid of nature's way of replenishing the soil by bagging them up. Leave leaf litter and plant clippings on the ground and under the shrubs and trees.



Find ways to treat stormwater as a friend. Consider every downspout as a chance to create a rain garden, even if it's only a pocket garden. Add rain barrels. Edge the lower end of parking lots with native plants to slow stormwater and remove impurities.

Get people involved! Have fun!

