

LANDSCAPING NATURE'S WAY: USING NATURAL LANDSCAPING TO REDUCE HERBICIDE USE

Natural landscaping, creating urban landscapes that act like nature and do what nature does, puts the beauty and diversity of wilderness into our communities. At the same time, it reduces our dependence on chemically based pest management. Since landscape herbicides pose hazards to our health and commonly contaminate urban streams, landscaping nature's way is a compelling alternative to conventional landscapes.

The physical characteristics of a site, its history, and the plant communities that grew on a site prior to development determine the kind of natural landscape that is best suited to the site. Well planned natural landscapes require only minimal irrigation, mowing, and weed management once they are established. Mulching, sod removal, and gradual replacement of nonnative plants with native species allow new natural landscapes to be established without resorting to herbicide use.

Because of their low maintenance costs, high educational value, exceptional beauty, and important environmental benefits, natural landscapes deserve to be widely established in our parks, on our schoolgrounds, and in our yards.

BY BECKY RILEY AND CAROLINE COX

• *Scarlet vine maple leaves shine against a rock outcrop.*

• *The solid branches of a century-old oak tree provide respite from the summer sun.*

• *Bent Douglas fir boughs peek out from a blanket of new snow.*

• *The sun sets in a blaze of color behind a gnarled cedar clinging to a sea cliff.*

* * *

Probably all of us have treasured memories of landscapes like these. But we don't have to travel to wilderness to find these memories. In fact, we can make them part of our everyday surroundings. Natural landscaping, creating urban landscapes that act like nature and do what nature does, can put the beauty of wilderness into our schoolyards, our parks, and our yards at the same time that it reduces the need for chemically-based pest



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management. It's a growing idea!

A Good Alternative to Herbicides

NCAP's interest in natural landscaping began because the technique offers an alternative to the use of landscape pesticides. By definition, natural landscapes thrive without human intervention so that they should have no need for pesticides, particularly the widely used herbicides.

We estimate that the use of herbicides to kill landscape weeds is the major volume of pesticide use by school districts, parks, and home owners in the Northwest. While no comprehensive data exist, the little information available shows that herbicides account for 35 percent of home and garden pesticide use and 32 percent of industrial, commercial, and government pesticide use (including schools, parks, and applications made to home yards by commercial pesticide applicators).¹ Specific data collected from individual institutions also underscore the large volumes of herbicides that are used in landscapes: "the majority of pesticides used"² by the Seattle Parks and Recreation Department "are used to control weeds in shrub beds and grass along fence



A teacher and his fourth and fifth grade students created this natural landscape in front of Bridgeport Elementary School in Tualatin, Oregon. Students took advantage of existing trees, added a bark path, and installed a bench and a sign about the project.

lines and in tree wells”² and the Portland School District used over 4,000 pounds of the herbicide dichlobenil on school grounds during 1997, far exceeding the volume of any other pesticide they used.³

There are many reasons why herbicide use poses unacceptable risks to human health, especially in these settings. For example, looking at six commonly used landscape herbicides,⁴ two cause cancer in laboratory tests,⁵ two cause fetal death in laboratory tests,^{6,7} one is associated with an increased rate of miscarriages and premature births in farm families,⁸ and the sixth is associated with an increased risk of the cancer non-Hodgkin’s lymphoma in lawn care applicators.⁹

Landscape herbicides are also common contaminants of rivers and streams in urban areas. For example, the U.S. Geological Survey (USGS) found one common landscape herbicide in all four urban streams sampled in the Willamette Valley (Oregon) in a 1996 study. Another was found in three of the four streams.¹⁰ In the Seattle area, USGS found three common landscape herbicides in all 12 urban streams sampled in a 1997 study.¹¹

In spite of these findings, getting school groundskeepers, parks managers, and homeowners to kick the herbicide habit is often difficult. They believe that they are poor managers of public grounds and poor neighbors if they don’t meet aesthetic standards demanding manicured landscapes.

Many of the weed management techniques that reduce or eliminate the use of herbicides (manual weed pulling, weed-whacking, flaming, and more recently, hot water methods or use of “least-toxic” chemical controls such as corn gluten meal) do not provide a perfect solution. Like herbicides, most of these methods address symptoms, but not causes of weed problems, and have to be used over and over again. Furthermore, many of these methods are labor-intensive, costly, and wasteful of natural resources. Manual methods can be perceived as drudgery. Fossil-fuel powered equipment is noisy and polluting to air and water. Other

BENEFITS OF NATURAL LANDSCAPES

The advantages of natural landscapes include the following:

Preserving unique plant communities that distinguish each region. Natural landscapes strengthen the identity of a community or neighborhood by preserving its unique characteristics.¹

Reducing landscaping costs because they are less intensively managed. Natural landscapes have reduced maintenance costs up to 90 percent.²

Reducing air pollution. Standard lawn maintenance pollutes air. An hour of lawn mowing, for example, is more polluting than driving a new car.²

Reducing noise pollution. Lawn mowers and other lawn maintenance equipment are often noisy.²

Reducing soil erosion. Many native plants have deeper root systems than common turf grasses, and are thus better able to stabilize soils.²

Improving water quality. Natural landscapes thrive without the use of fertilizers and pesticides which often end up in rivers, streams, lakes, ponds,

or wetlands.²

Providing habitat for wildlife. Natural landscapes provide the food and habitat animals need to survive.²

Increasing biodiversity. As development encroaches on natural lands, many species disappear. Natural landscapes allow some of these species to survive.¹

Educating people about the unique and special place in which they live. This education will strengthen community support for conservation and environmental protection.²

Providing recreational opportunities. Natural landscapes can be ideal sites for walking, running, bicycling, skating, bird-watching, photography.²

Providing sites for scientific studies. Scientists, students, and amateurs can carry out their own biological research close to home.²

1. Harker, D. et al. 1999. Landscape restoration handbook. 2nd ed. Boca Raton : Lewis Publishers. Pp. 1-7.
2. Northeastern Illinois Planning Commission. 1997. Source book on natural landscaping for local officials. Chicago IL. Pp. 9-15.

techniques, like concrete mowing strips or landscape fabrics, are costly to install (although they are installed only once) and have negative environmental impacts. Mowing strips can increase runoff and little information is available about either the pollution created by the manufacture of landscape fabrics or their impacts on soil health.

To solve this dilemma, we can recognize that groomed-looking landscapes are inherently “unnatural.” Their design generally ignores natural processes. In fact, they require us to do constant battle against nature.

Rather than fighting nature, natural landscapes give us another approach. Wild landscapes are attractive, and don’t need

constant pampering, weeding, or watering. How does nature do it? We can learn from, mimic, and work with nature when establishing and maintaining our human-created landscapes. By “landscaping nature’s way” we can have beautiful landscapes that don’t require pesticides.

Benefits of “Nature’s Way”

Many of nature’s most beautiful elements are missing from conventional landscapes. A tongue-in-cheek hypothetical conversation between St. Francis of Assisi and God that’s been circulating via the internet humorously points this out. In answer to God’s question about what happened to all the beautiful flowers He had put on earth during the creation, St.

Dennis Lueck



Horticulturist Dennis Lueck transformed a barren yard (left) into an attractive and biologically rich natural landscape (right) at his home in Eugene, Oregon. The new landscape was created and maintained without chemical herbicides. It features native trees, shrubs, and flowers, and a healthy, low maintenance lawn composed of a variety of nonnative grasses and flowers.

Francis says, “It’s the tribes that settled there, Lord.” He then explains, “They started calling your flowers weeds and went to great expense to kill them and replace them with grass.”

By changing our perspective about landscapes and landscaping nature’s way, we not only solve weed problems, thus reducing herbicide use, and restore life in all its beauty to urban landscapes, but we “reduce maintenance costs, conserve natural resources, increase biological diversity, and benefit wildlife.”¹² (For a more detailed list of potential benefits, see “Benefits of Natural Landscaping,” p. 3.)

Given its many benefits, natural landscaping is enjoying increasing support from federal, state, and local agencies, including the U.S. Environmental Protection Agency (EPA),¹³ state fish and wildlife agencies,¹⁴ and local soil conservation districts.¹⁵ Natural landscaping has received official support from the federal government; President Clinton signed an executive order in 1994 encouraging federal agencies to incorporate native plants, reduce fertilizer and pesticide use, and conserve water in landscapes on federal land.¹⁶

Wisconsin landscape architect John Diekelmann and his coauthor Robert Schuster sum up the benefits of natural landscaping with a delightful example. “Consider,” they write, “what can be done in an unused corner of lawn shaded by a

single, mature tree. Naturalizing such an area might involve replacing lawn grasses with a variety of moderately shade-tolerant plants native to open woodlands. The selection could include several species of small shrubs, a number of woodland wildflowers, a variety of ferns, and several woodland sedges.”

“Such a planting would do more than free the landscaper from the perennial chores of mowing watering, and fertilizing. It would allow one to look forward to the rich smells of forest soils and the appearance of new seedlings each spring. Its soft, irregular lines would provide a rewarding contrast to the severe geometry that dominates most urban areas. Its foliage would provide privacy. And, with the addition of a path and bench, even this small planting could become a place to escape daily routines and to enjoy instead the songs of birds and the changing patterns of plants. Weeds, a perpetual problem in formal lawns, would essentially disappear within as little as two years as the native plants became established and the planting matured.”¹⁷

Getting Started

The easiest way to get a natural landscape is simply to preserve and use what nature has already provided. When building new schools, parks, or homes, the best approach is to design and build in ways that preserve as much native vegetation

as possible and disturb the soil as little as possible. Landscaper architects call this building “within the envelope.”¹⁸

However, we don’t often have this kind of opportunity. But we can all revitalize established landscapes, transforming them from conventional landscapes to natural ones. Whether you are designing a new landscape from scratch (starting from bare soil) or trying to transition from an established conventional landscape to a more natural landscape, many of the same steps apply. Keep in mind the following principles:

- **Look at nearby natural areas** (grasslands, wetlands, and forests) for guidance as to what native plants are suited to your site and locale. Notice the range of conditions that various plants seem to prefer. (Sunny? Shady? Wet? Dry?) Also study how these plants grow together in plant communities. Look for patterns. You can ask local native plant or natural landscaping experts for guidance or consult books in your library.

- **Study current and historical conditions.** Are old photographs or descriptions available in the local museum, from the county historical society, or through the native plant society? What was on your site before it was developed?

Conditions have undoubtedly been altered over time. Carefully describe the current situation. What is the existing vegetation? Study soil type and drainage.

Consider whether soil tests might provide useful information. Map shade, sun, and wind patterns. Are there natural water sources on the site? How does water enter and leave the site? Are the native soils still present or have they been replaced with fill from elsewhere? If conditions are similar to what was once on the site, restoring plant communities that grew there in the past is a good option.

Recognize that the concept of "restoration" is complicated, and even experts can disagree about what to do and how to go about it. One reason for this is that natural landscapes are not static, but are continuously changing and evolving over time. Wetlands fill, waterways change course, trees turn grassy meadows to woodlands, and fires have dramatic effects. A given landscape has likely gone through many changes over time. A site could be restored to one of several different types of landscapes that may have been present at different times.

- **Go native!** To the extent possible, use local plants that are indigenous to the site or nearby area. Plant collections of species that naturally grow together. Native species are much easier to care for than most nonnative plants. Usually they require no supplemental irrigation once they are established, and are pest resistant. They also belong in the area, and contribute to ecological vitality by providing habitat for native birds, insects, amphibians and mammals. They blend in with the surrounding natural environment, and the textures, foliage, and colors are subtle and comforting.

Many people are excited about planning landscapes that attract birds or butterflies. This does not have to mean abandoning the use of native species, however. Look for native plants that are attractive to native animals.

Native plants are not yet widely available at conventional nurseries, but you may be able to find local nurseries that specialize in them. Remember to order far in advance. For plants that are easy to start from seed, consider collecting seeds from nearby natural areas. Be sure to get permission from the landowner and fol-

low guidelines for responsible collection. Another option is to salvage, with permission, native plants or bulbs from areas where construction, development, or other activities will soon destroy them. In some communities, local groups are organized to do this. Check with a university landscape architecture department,

a local chapter of The Nature Conservancy, a local native plant society, or city officials. You can also learn how to propagate local native plants from cuttings or divisions; look for instruction books in your local library or bookstores.

While it is desirable to plant native species, it's not necessary to be a "purist"

SCHOOLS AND NATURESCAPING: A STUDENT'S PERSPECTIVE

As a gardener, I have always enjoyed the beautiful simplicity and the peace found in nature's wild outdoor gardens. When I helped develop a native habitat restoration project at South Eugene High School (SEHS), I was introduced to a variety of new reasons for developing such a garden.

School landscapes are often designed to be controlled through routine maintenance. Given recent budget cuts in the educational system, however, the traditional landscape wastes scarce labor and money. The solution proposed by my school district involved the use of pesticides. Fortunately, a petition generated by NCAP and other concerned community members stopped them from introducing harmful chemicals into our school environment.

SEHS teachers, environmental club students, parents, local native plant experts, and NCAP began to plan a new landscape for the school--one that would include indigenous plants, serve as an outdoor classroom, soften the school's sterile architecture, and require minimal work in the long run.

After a tremendous group effort in planning, preparing, and planting a courtyard and a front planter bed at SEHS, our dream has begun to

materialize. We hope that in time, as the project develops, teachers in every department will be able to use our project as an educational tool.

Hopefully, the site will give students some insight into ecology that they could not have gained by simply reading a book or by taking notes. This insight and the appreciation of nature is necessary for the future of our planet.



At the SEHS site and in the thousands of schools around the world that have chosen to replace their old, barren landscapes with creative and ecologically beneficial naturalized gardens, we are making an effort to compensate for the loss of natural habitat, and a better place couldn't have been chosen. After all, the habitat that we create in schools will affect the environmental responsibility and concern of our future citizens. --Sarah Marshall

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Sarah Marshall is a student at South Eugene High School (Eugene, Oregon).



An inspired art teacher and his students at Rowe Middle School in Tualatin, Oregon, converted the lawn in this school courtyard into a natural landscape. Work began in the fall of 1996. With help from AmeriCorps and Rotary Club volunteers, lawn and concrete sidewalks were removed using mattocks and shovels; native plants were then added. A path was built by layering newspapers and cardboard and covering them with bark. No herbicides were used in preparing the site, and none are used in its maintenance. Art, ecology, math, language arts, advanced technology, and journalism students have all used the new landscape for educational purposes. The school district no longer mows or otherwise maintains the site.

about allowing exclusively native plants in a natural landscape. Recognize that attempting to eliminate every last nonnative plant may lead to undue pressure to use chemicals.

- **Minimize lawn.** Single species lawns are not only expensive to install and maintain, but are ecological disasters. To achieve a groomed look, they require fertilization, irrigation, mowing, and too often, herbicide use or expensive renovations. According to EPA figures, a gasoline powered lawn mower emits 11 times the air pollution of a new car for each hour of operation.¹⁹ Also, mowed lawns provide virtually no habitat for wildlife. Naturalizing an existing lawn can be a good approach. Add species to a conventional lawn that mimic natural meadows. Often, you can encourage native species by mowing less frequently and later in the season.

- **Minimize pavement.** Use materials that allow water to soak into the soil wherever possible. This permits oxygen to reach the soil, and lets rainwater percolate through and replenish aquifers. One common technique in Europe is called “grass-crete.” Grass-crete is used for paths and driveways and consists of grasses or other plants seeded into holes in pre-cast concrete blocks.

- **Use nonchemical site preparation techniques.** Herbicides are not necessary to prepare a site for a natural landscape. If you choose to kill existing vegetation, use the methods described in “Preparing a Landscape Site without Chemicals,” p. 22. Start small, with an area that you’re sure you can manage.

If you’re starting from a mature existing landscape consider taking on the transformation to a natural landscape in small phases. Gradually replace existing

nonnative trees, shrubs, and other plants. If possible, start with trees first, get a natural canopy going, and then add understory plants. The process will take a while and you will not get an instant landscape but you will be able to learn from nature, and see which plants do well on your site. A patient learning attitude will let you gently guide, not control, your landscape.

If you’re starting with a landscape that contains a mixture of native and introduced species, some of the techniques for restoring natural areas are appropriate. An Australian who spent a lifetime doing volunteer restoration of natural areas has written a book, *Bringing Back the Bush*,²⁰ that provides detailed techniques for this kind of restoration. Many of the techniques in the book, and her patient approach that avoids labor-intensive methods, can be adapted to other plant communities.

- **Consider labor and maintenance costs** in your design. Many people want to include artificial ponds and streams in a natural landscape, but they are not natural and can be expensive both to build and to maintain. Also, make sure plants that drop leaves are located so that leaves can be left where they fall.

- **Timing is crucial.** Plan to plant at the appropriate time of year, usually the dormant season. Here in the maritime Northwest, plant bare root or container plants during the late fall and winter. Seed native grasses during the fall or spring. Planting times will also depend on weather and the species you are using.

- **Remember human needs.** Especially in public places like schools and parks, be sure to design at least part of your natural landscape so people can use it. Boardwalks, benches, and trails will encourage people to appreciate its beauty.

Caring for Natural Landscapes

By definition, natural landscapes thrive without human intervention. Once your landscape is planted, it should need little ongoing maintenance. Important maintenance principles include the following:

• **Use natural weed control** for maintenance of a natural landscape. The cliché “nature abhors a vacuum” is definitely true for landscapes. Conventional shrub beds, with their relatively sparse plantings and lots of bare soil between plants, simply invite weeds to move in to bare areas. Shade is one of nature’s best ways of controlling weeds, and fallen leaves are free natural mulch and “herbicide.” To mimic this natural strategy, avoid leaving bare soil areas. Ensure that all soil is either shaded or covered with wanted plants and leaves.

Many weeds thrive in disturbed areas, so you will have fewer weeds if you minimize disturbance.

Grass growing close to newly-planted trees and shrubs inhibits their growth. Thus, to get plants off to a good start, it’s important to suppress grasses close to the trunks for at least the first two years. This can be accomplished by keeping a thick layer of mulch around the base of each plant, or covering small areas with landscape fabrics temporarily.

To reduce or eliminate herbicide use, it may be wise to accommodate some nonnative grasses and weeds. Years of landscaping practices and other human activities have introduced many nonnative plants to our local environments, and some may be well adapted to local conditions. Some nonnatives contribute to the ecosystem by providing food and shelter for wildlife.

Vigilance is important in dealing with weeds in your natural landscape. Regularly check the landscape and pull or cut unwanted plants. If you watch carefully and catch weed establishment early, pulling a few plants is not a major chore. Again, the underlying philosophy is to watch your landscape develop, learn from it, and provide it with gentle guidance.

• **Minimize water use.** Automatic irrigation is expensive and wasteful of water. While irrigation may be helpful when trying to maintain certain landscapes without herbicides (athletic turf, for example), it is not needed or desired for natural landscapes. Native plants don’t need supplementary irrigation, as they are

adapted to local climatic conditions.

There is an important exception for new landscapes: transplanted trees and woody shrubs must be watered for their first two growing seasons or until they have established root systems. If possible, use recycled water for this irrigation. Mulching will help retain moisture and minimize the need for irrigation.

• **Use natural recycling.** A natural ecosystem recycles its own leaves, dead plants, and fallen limbs. Nobody rakes leaves or removes twigs; instead they decompose naturally. In the process, they contribute valuable organic matter to the soil, act as a natural fertilizer, and smother weeds. To simulate natural processes in our human-created landscapes, leaves, twigs, and prunings of plants can be left to compost naturally near where they are cut or fall. If necessary, they can be composted on site and used as mulch. Avoid bringing in soil or mulch unless absolutely necessary. In addition to the costs (financial and environmental) of transporting it, you also may inadvertently bring in unwanted seeds or spores.

• **Keep educating.** Your natural landscape may attract attention because it’s different from what people have come to expect. If your project is in a park or on schoolgrounds, post signs explaining the project and its benefits. Update them as necessary. If it’s in your yard, let your neighbors know about your plans and the reasons why you think natural landscaping is important. Keep them informed as the project develops.

Conclusion

Jane Scott, author of several books about gardening with native plants, makes an eloquent plea for more natural landscapes. “We gardeners like to think of ourselves as being in tune with nature, yet how can we view the endless sheared lawns and clipped shrubbery that now blanket our landscapes without being plagued by nagging doubts? Where is the drama of the changing seasons? Where are the birds and butterflies? Where, in fact, is the regional landscape that once defined our very roots?”²¹ Establishing

natural landscapes gives us a winning combination, both an answer to Scott’s questions and a way to reduce pesticide use in our communities. ♣

References and Notes

1. Aspelin, A.L. 1997. Pesticide industry sales and usage: 1994 and 1995 market estimates. U.S. EPA. Office of Pesticide Prog. Biological and Economic Analysis Div. Washington, D.C. www.epa.gov/opbhead1/95pestsales/index.html. p. 12
2. City of Seattle. 1999. City of Seattle pesticide use fact sheet. Seattle WA. <http://www.ci.seattle.wa.us/oem/documents/pestbri3.doc>.
3. NCAP in conjunction with the Oregon Center for Environmental Health. 1998. Pesticide use by the Portland school district. Eugene OR. www.pesticide.org.
4. Ref. #1, p. 19. The most commonly used home/garden and industrial/commercial/government herbicides are 2,4-D, glyphosate, dicamba, MCPP (mecoprop), diuron, and dacthal.
5. U.S. EPA. 1999. Office of Pesticide Programs list of chemicals evaluated for carcinogenic potential. Washington, D.C., Aug. 25. (dacthal and diuron)
6. U.S. EPA. 1990. IRIS substance file: 2-(2-Methyl-4-chlorophenoxy)propionic acid (MCP). www.epa.gov/iris/subst/0067.htm
7. U.S. EPA. Office of Drinking Water. 1988. Dicamba health advisory. Washington, D.C. (Aug.)
8. Savitz, D.A. et al. 1997. Male pesticide exposure and pregnancy outcome. *Am. J. Epidemiol.* 146:1025-1036. (glyphosate)
9. Zahm, S.H. 1997. Mortality study of pesticide applicators and other employees of a lawn care service company. *J. Occup. Med.* 39:1055-1067. (2,4-D)
10. Anderson, C.W., T.M. Wood, and J.L. Morace. 1997. Distribution of dissolved pesticides and other water quality constituents in small streams, and their relation to land use, in the Willamette River Basin, Oregon, 1996. Portland OR: U.S. Dept. of the Interior. U.S. Geological Survey. Water-Resources Investigations Report 97-4268.
11. U.S. Geological Survey, Washington State Dept. of Ecology, and King County Hazardous Waste Management Program. 1999. Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, Washington. USGS Fact Sheet 097-99.
12. Harker, D., et al. 1999. *Landscape restoration handbook*. Boca Raton : Lewis Publishers. p.6.
13. Northeastern Illinois Planning Commission. 1997. *Source book on natural landscaping for local officials*. Chicago IL. p.1.
14. Naturescaping: A Place For Wildlife. www.dfw.state.or.us/ODFWhtml/Education/Naturescaping.html
15. City of Portland, Environmental Serv. and East Multnomah Soil and Water Conservation Dist. 1996. Naturescaping for clean rivers. Portland OR.
16. Ref. #13, p.77.
17. Diekelmann, J. and R. Schuster. 1982. *Natural landscaping: Designing with native plant communities*. New York NY: McGraw-Hill Book Company. Pp. 7-8.
18. Wasowski, A, 1998. Building in nature’s envelope. *Wild Garden* (premiere issue): 18-22.
19. Ref. #13, p. 12.
20. Bradley, J. 1991. *Bringing back the bush; The Bradley method of bush regeneration*. Willoughby, NSW, Australia: Ure Smith Press.
21. Scott, J. 1994. Creating a gardener’s Eden. In Marinelli, J. ed. *Going native: Biodiversity in our own back yards*. Brooklyn NY: Brooklyn Botanic Gardens.