

**An Examination of
The Pennsylvania State University Landscape
and its Implications on
Learning and the Environment**

Steve Saari
Graduate Student in Ecology
The Pennsylvania State University

Introduction

Penn State began as the Farmer's High School of Pennsylvania in 1855. The charter states that the school was established as "an institution for education of youth in the various branches of science, learning and practical agriculture, as they are connected with each other" In this statement there are the seeds to an interdisciplinary approach to strengthening students' connection with the earth. In looking at what is currently taught at PSU, it appears that this decree is still carried out. We have strong schools of Agriculture, Science and Engineering and each of these schools is firmly grounded in education and research.

But what sort of lessons are students being taught by the campus lands and their management? Are the university grounds being used effectively to teach students about the environment and our place in it? Do the campus grounds encourage a connection with the earth, or distance students from it? There are several reasons why we should take a close look at how the landscape of Penn State is maintained and used and what it teaches:

- The recently approved Master Plan states that the university should "base future land-use decisions on environmental impact considerations and evaluation".
- The university is a place of learning. If its lands are not used for teaching, they are being underutilized.
- The campus landscape is a symbol of the university. The landscape's

design and maintenance make a powerful statement about whether Penn State is a national leader, or part of the status quo.

- Many life lessons are taught outside of the classroom. If the university grounds are teaching "lessons" that are different than what are taught in lecture halls, then they are counterproductive.

As part of my thesis work, I set out with these ideas in mind, to examine the Penn State University Park landscape from an economic, ecological and educational perspective. This paper summarizes what I found and provides examples of how the university could better incorporate the above ideals into its landscaping.

The Current State of the University Landscape

Economic Costs

Penn State spends 3.5 million dollars each year maintaining the grounds of the University Park campus. This figure includes the golf courses and the land bounded by College and Park Avenues, Atherton Street, and Porter Road for a total of 366 hectares (900 acres). This means that the university spends \$9,600 to maintain each hectare of land on campus (the average American household spends \$2,500¹ per hectare while the average farmer spends

¹ Saari, S. 1999. Paradise Lost? An Examination of the Ecological, Economic and Educational Impacts of the Suburban and university Landscape (Master's Thesis). University Park, Pennsylvania: The Pennsylvania State University.

\$420 per hectare² - twenty-two times less than the university).

In examining the university accounts I found that Penn State spends around the same amount of its budget (0.75 percent) on landscaping as the United States spends (0.5 percent of the GNP). However, unlike most suburban households, the way the university maintains its lands actually brings in money. Every year alumni, corporate officers, legislators, and prospective students alike visit the campus and every year the budget, donations and enrollment are based, to some extent, on impressions of the campus landscape.

But to what extent is this true? Are there places on campus that could be maintained in a less intense way without harming enrollment or donations? Could adopting low maintenance techniques be used to attract donations, research grants and students – in other words could a low cost/low impact campus be viewed as a selling point?

Environmental Costs

Air Pollution

Lawn equipment creates a significant amount of air pollution because small engine emission standards are more lenient than large engine standards. In general lawn equipment produces ten to thirty times more air pollution per liter of gas than a car.³ Because of the size of Penn State's grounds, the maintenance crews are more dependent on machinery in

landscape maintenance than the average citizen.

Noise Pollution

Because the university relies heavily on motorized equipment in maintaining its land, a great deal of unwanted sound is produced. This sound, called noise pollution, has been shown to have detrimental effects on learning. High noise levels can affect the teacher's ability to impart information as well as impact the student's ability to absorb what they are attempting to learn. However, it is difficult to translate quantitative sound levels into qualitative noise annoyance levels. What can be said is that noise pollution is a growing problem at Penn State and that it affects the faculty's ability to teach outside thereby removing an educational tool from our professors.

Loss of Biota

With the exception of trees, a walk around campus reveals very little biodiversity, and the life that is found tends to be non-native or generalist species. The prominent flowerbeds contain high-maintenance, exotic annuals while highly bred grasses that may also be exotic dominate open spaces. Perhaps because of the homogeneous environment, there is very little variety in wildlife. Generalist species like European sparrows, gray squirrels, chipmunks and crows are the predominant animals found on campus. Although the campus has a great number of different trees, many of them are exotic as well and are of little use to wildlife.

² U.S. Department of Agriculture. 1996. Agricultural Statistics, 1995-1996. Washington, D.C.; National Agricultural Statistics Service.

³ U.S. Environmental Protection Agency. 1995. Nonroad Engines and Air Pollution EPA Factsheet #420-F-94-003. Washington, D.C.: Environmental Protection Agency.

Soil/Water Pollution

Last year Penn State applied 9,374 kilograms of solid and 948 liters of liquid pesticides to its grounds. These pesticides are designed to kill, and often they kill more than their target pest. In addition PSU used 6,775 kilograms of fertilizer in landscaping. These pesticides and fertilizers have a higher probability of impacting young scholars because they are spread on the same areas where students live, study and play.

Scientists have found that lawn care accounts for ten percent of common water pollution and three percent of toxic water pollution in the U.S. The high rates of runoff at PSU (a water retention pond near Millbrook Marsh that was only recently built is already at capacity) and the highly erosive limestone bedrock of Centre County make water pollution from pesticides and fertilizers a growing concern.

Educational Costs

Although the economic and environmental costs associated with landscaping at Penn State are high, perhaps the greatest costs are educational ones. The educational costs incurred because of how the university maintains its lands are not monetary costs, but instead are opportunity costs – and students pay these expenses. These costs are incurred because the campus lands are an underutilized (and highly renewable) educational resource. The university is *intended* to be a place of learning, yet its lands are rarely used for this purpose.

In a survey of seventy-four professors representing every college in the University, only thirty-four percent have ever taught classes outside and

most (fifty-nine percent) believe that outdoor teaching is not useful. Because university professors rarely use the local environment for examples in their courses, it is implied that knowledge is independent of knowledge in place. In fact, a recent study found that the majority of students leave Penn State without knowing the name of the watershed that the university lies in, where their sewage goes, or from where their energy they use or the water they drink comes. In the words of one architectural critic, the campus is “regarded mostly as a place where learning occurs, but is, itself, believed to be the source of no useful learning.”

Suggestions for how University Lands can be Better Utilized

Suggestion 1 – Involve Students and professors at all levels of Landscape Management

Students, professors and managers must be involved in the design, maintenance and use of the campus landscape. Students, staff, and professors, as those who will use the campus landscape, have a strong stake in how it is designed and maintained. Maintenance workers must also be involved in decision-making, because they are the ones that will care for any designs. Through their involvement at the design level, the landscapes that are produced will be more livable for students, more useful for teaching and easier to maintain. If each department, building or college is allowed to design and maintain its own landscape, the array of landscapes possible is infinite. Imagine a campus where:

- The geology department maintains a rock garden where it also teaches.
- The music department cares for an outdoor amphitheater where it gives public concerts.
- The chemistry department cares for plants with an array of chemicals that humans use (like tannins and caffeine).
- The geography department tends a living map of the vegetation zones of the United States.
- Cultivating forests and finishing forest products from Stone Valley Experimental Forests – from planting seedlings, to thinning and harvesting, to creating finished wood, hemp, etc. products, to selling them in local markets.

Suggestion 3 – Use the University Landscape and its surroundings as examples in teaching

Along with developing talents through trade skills, University lands could be used to help students learn about and appreciate their locality. The Centre County region should be used to teach students local history, politics, economics, species, soils and natural resources... and they should learn how to find this information when they move to a new locale. For example, an educator in the engineering department might have students analyze the efficiency of power created by the campus Physical Plant, or an anthropology professor might have a class examine the culture surrounding iron ore production. A forestry professor might have students study how local tribes planted and harvested oak acorns, while a wildlife management educator might look at how native cultures controlled deer population. Using examples from the local landscape makes the subject they are studying real – not abstract. Experiments carried out in the local environment not only further student’s education, but can also give valuable information to the local community.

Suggestion 4 – Use the University landscape to teach environmental education

Suggestion 2 – Teach life skills through landscape management

In addition to imparting intellectual instruction, Penn State could use its landscape to teach trade skills. Penn State could teach valuable life skills through its landscape by having students and professors run and maintain all aspects of such diverse activities as:

- Bread baking and wine making⁴ - from growing grains and grapes, to milling and baking the bread and pressing the wine, to serving it in university dining halls.
- Growing fruits and vegetables and flowers at Circleville Farm – from planting and caring for the trees and crops, to harvesting, to preparing and serving them in the dining halls or selling them at farmer’s markets.

⁴ For those who doubt that these programs can be put in place, I point to the University creamery, where students care for the cows, milk them, process the dairy products and sell them on campus.

Often environmental education is thought of as something children learn at camp rather than an ongoing process. The campus lands should be used to facilitate environmental education instruction in two ways: 1) to teach natural cycles and processes and 2) to illustrate how the choices humans make affect the environment.

1. Biological cycles like photosynthesis and respiration, and ecological cycles, such as the nitrogen cycle and the water cycle can be taught through innovative landscape design, for example living machines that demonstrate how human waste can be broken down and digested using organic processes similar to those found in ponds and wetlands. These machines can be used to demonstrate part of the nitrogen cycle and water cycle as well as showing alternatives to current ways of treating human wastewater.
2. One way the landscape can be used to illustrate the impact of human actions is through their ecological footprint.⁵ The campus landscape can be used to display the different footprints of comparable activities such as the land required to support a mean diet versus a vegetarian diet or the land required for a two mile commute by car, bus and bike. The planned arboretum could be used to illustrate the forest needed to sequester enough CO₂ to offset the

⁵ The ecological footprint is the amount of land needed to be set aside in order to produce energy to support an activity (for example lawn mowing) ad infinitum. Productive land is used as a yardstick because the use of bio-fuels generate from crops can be sustainable generated, unlike our current energy source – fossil fuels.

amount the power plant releases to the atmosphere in providing energy for the campus. Through these and other ideas, the university can create a landscape that teaches students that they are dependent on the Earth, not that it depends on us.

Suggestion 5 – Modify the University landscape to reduce its environmental impacts

Using the landscape for environmental education can not only teach, but also reduce the impact the university has on the environment. Another way of reducing these impacts is by changing the way the campus landscape is maintained. The first step in reducing the impacts of maintenance is to question if the way an area is maintained fits how that area is used. For example, does an area of lawn that is rarely used need to be mowed regularly?

Other landscaping changes may be reforms such as eliminating the use of dangerous pesticides and relying more on natural, less toxic pesticides, scaling back the use of water in landscaping, replacing non-native species with native ones, and reducing reliance on fossil fuel powered equipment by increasing human labor. In addition, managers could consider limiting the time of day that machinery is operated in order to reduce noise pollution during peak class periods. Similarly, architects could add rooftop gardens and trees near buildings to reduce the reliance on air conditioning in the summer and heating in the winter.

Suggestion 6 – Use the University landscape to facilitate biophilia

Only if students feel a sense of awe and wonder about the world around them, will they have the desire to change their lifestyle to protect what they find inspiring. Simple changes can have a dramatic impact – just encouraging walking and biking will help facilitate biophilia (the love of life), as will many of the other ideas already suggested. Other simple steps that could be taken include adding signs to trees around campus informing the reader of its species, where it is found, and some information about its life history and its uses. Perhaps Penn State could create a road-cut of sorts along one of the sidewalks that shows the soil layers and teaches about plant root and microrrhizal symbiosis. Designers might create special gardens that highlight poisonous, edible and native plants and flowers, and vegetable gardens of different historical periods.⁶ The university might also install a canopy walk on a forested section of campus lands – like the type one can find in the tourist-visited rainforests of Costa Rica.

Conclusion

In making any decision I consider the impact my choices would have on the health of three things: my body and mind, my wallet, and on the environment. I believe that the university should use the same litmus test in making decisions about how its landscape is maintained. If the University were to employ this trio of considerations in making landscape management decisions a very different landscape would evolve. The University lands would strengthen the minds and bodies of its students because professors

would be able to utilize the landscape for their classes and students would be able to lie on the lawns without absorbing harmful chemicals. Penn State's financial health would improve through new money for research carried out on its lands, and increased enrollment and alumni donations because of the University's innovative landscape designs. The health of the local environment would improve as well through reduced emissions from landscape machinery, reduced fertilizer and pesticide use and reduced runoff through innovative land management techniques, and increased species diversity through the creation of new habitat.

The campus landscape, like the university itself, is a place of learning. Just as professors constantly reevaluate what curriculum to put forth to their students, the university should consider the messages it wishes to impart through its lands and how they are maintained.

⁶ A good example of these gardens can be found at Cornell University.