

The American Lawn Revisited: Awareness Education and Culture as Public Policies Toward Sustainable Lawn

Amerykańskie trawniki z bliska: świadomość, edukacja i kultura jako motywy polityki publicznej prowadzącej w kierunku zrównoważoności

Yaoqi Zhang*, Bin Zheng**, Ge Sun***, Peilei Fan****

**International Center for Ecology, Meteorology and Environment (IceMe),
School of Applied Meteorology, Nanjing University of Information Science and Technology,
Nanjing, Jiangsu 210044, China; School of Forestry and Wildlife Sciences, Auburn, AL
36849-5418, USA, E-mail: zhangy3@auburn.edu*

***College of Economics and Management, Nanjing Forestry University,
159 Longpan Road, Nanjing, Jiangsu, 210037, China,
E-mail: Zhengbin512@gmail.com*

****USDA Forest Service Southern Research Station, Raleigh, NC 27606, USA,
E-mail: gesun@fs.fed.us*

*****School of Planning, Design & Construction (SPDC) and Center for Global Change and
Earth Observations (CGCEO), Michigan State University, East Lansing, MI 48824, USA,
E-mail: fanpeilei@msu.edu*

Corresponding Author E-mail: zhangy3@auburn.edu

Abstract

Lawn has been used for landscaping, gardening, and beautification of homes and cities for a long time. The evolution of the lawn reflects important cultural and biophysical interactions between humans and nature. The American lawn, which was from Europe and has been a part of the American dream for home ownership and culture, has become an area going against nature for its extensively using chemicals and generated pollutions. Tracing how the lawn is becoming an important part of culture, this article focuses on more recent pollution and other environmental problems resulted from the lawn culture. It is argued, that awareness, education and changing culture of taste and preference can serve additional measures together with law and technological advancement toward sustainable lawn in the United States and the world.

Key words: grass, American culture, conspicuous consumption, industrialization, urbanization, pollution, aesthetics, landscaping

Streszczenie

Trawnik już o dawna był używany w kształtowaniu krajobrazu, ogrodnictwie i upiększaniu domów. Ewolucja trawników odzwierciedla istotne kulturowe i biofizyczne interakcje pomiędzy ludźmi i przyrodą. Trawnik trafił do Ameryki z Europy i stał się częścią amerykańskiego snu o własności i kulturze domu. Później stał się on jednak obszarem przeciwstawiającym się naturze z uwagi na intensywnie stosowanie substancji chemicznych i generowanie zanieczyszczeń. Wykazując, w jaki sposób trawnik staje się ważną częścią kultury, ten artykuł skupia się na bardziej aktualnych kwestiach zanieczyszczeń i innych problemów środowiskowych. Wykształcenie świadomości, zmieniająca się kultura smaku i preferencje, łącznie z prawem i technologią, mogą stanowić dodatkowe środki prowadzące w kierunku zrównoważonego kształtowania trawników w Stanach Zjednoczonych i na świecie.

Słowa kluczowe: trawa, amerykańska kultura, demonstracyjna kultura, industrializacja, urbanizacja, zanieczyszczenie, estetyka, krajobraz

Introduction

Grass is considered to be one of the most successful plants on earth. Grasses are found in almost every habitat and they also dominate large areas of the planet. Their strong roots allow them to adapt to difficult conditions better than many other plant species. In human society, grasses have served mankind in many different ways. The cereal grasses were originally used as food for livestock and they aided in man's transition from nomad to farmer. In Egypt, grass was used to make paper. In some Asian countries (e.g., China, Japan), grasses are still the main materials for traditional handicraft products.

Ornamental grasses are always favored by gardeners to create harmonious depictions of their gardens and aesthetic nature. Gardeners use different combinations of shapes, textures, and colors in order to tell a story. On one hand, grasses can soften the whole design. On the other hand, grasses can make a picture sparkle.

In Europe, lawn was greatly appreciated, but the expansion was limited by space and management costs, and was not affordable by normal families. In Asia (particularly China and Japan), the high population densities could allow much land for lawn use, and the high maintaining costs were not affordable to most households. Instead, elements such as ponds, streams, islands, and hills to create miniature reproductions of natural scenery are more often used in Asia. Gardening has been limited to public parks and to some elites rather than to ordinary homes.

In North America, the European culture together with the abundant space and more-affordable land, and accompanied by car invention for long-distance transportation, and technological advancements in chemical and management equipment have made lawns of large sizes affordable to ordinary families, especially in the US. Consequently, lawns have been weaving into US culture to such a degree that the lawn is now a part of the *American dream* for home ownership and the month of April is known not only for containing Earth Day, but also for National Lawn Care Month.

Nowadays, turfgrass lawns are major components of urban landscapes and are highly valued for recreational, aesthetic, and environmental purposes (Beard and Green, 1994). They are dominant features of residential landscapes in North America (National Turfgrass Federation, 2003; Milesi et al., 2005). The aggregated estimates of lawn coverage in the United States fall between 10 and 16 million ha, surpassing those of some US food crops including barley (5 million ha), cotton (4.5 million ha), and rice (1.1 million ha) (Robbins and Birkenholtz, 2003). Millions of Americans love their home lawns and are satisfied

with the pure grasses for amenities as well as recreation facilities.

The increase in lawn coverage leads to increased use of synthetic inputs, including water-soluble fertilizers, herbicides, and insecticides (Bormann et al., 1993; Jenkins, 1994). The USEPA (1999) estimated that 36.3 million kg of pesticide-active ingredients are applied annually in domestic settings for the control of insects, invasive plants, weeds, and fungi in lawns and gardens within the US. With a large and increasing proportion of developed space given to the lawn, the problems of mono-cultural ecology and habitat fragmentation may become more acute. Pollution and environmental problems are associated with the American lawn from multi-dimensional causes. Lawns in our own backyards are so close to our living environment. But the problems are actually harder than we think.

Technologically, alternative lawn management, such as integrated pest management (IPM), organic and natural product applications, and an untreated lawn care program, is widely explored, few options successfully achieve aesthetic results better than the commercial management using significant chemicals (Alumai et al., 2009). Cultural management of weeds in turf grass such as mowing, fertilization, irrigation, cultivation, planting, and turf grass selection to affect weeds (Emmons and Thomas, 2007; Lush and Rogers, 1992); is not very effective, overall. In many part of the country, irrigation is needed to keep a healthy lawn. Irrigation can be a large portion of the domestic water use in the arid region.

Economically, pesticides and fertilizers are relatively less expensive in relation to the marginal utility of the inputs for both the lawn managers and homeowners and lawn managers do not directly accrue returns from lawn inputs like farmers do (Robbins and Birkenholtz, 2003). Few economic policy options exist. Although a tax to increase the prices of pesticides and fertilizers might reduce the usage, the increased cost is still minor compared to more fast increasing income. Robbins et al. (2002) found that income has a positive impact on the usage of chemicals to lawn management. Unlike crops, lawn grass is not cultivated for direct sale, but is consumed indirectly as aesthetic, personal, and property values. As more wealthy people live in suburban areas, more demand has been created for large lawns.

Political impetus and momentum for reformation of water pollution priorities and regulation remain far behind the needs for change (Robbins et al., 2002). The structure of water quality management committees remains heavily loaded with suburban development interests and traditional point-source industries eager to make agriculture *pay its fair share*, while paying less attention to other important non-point

sources. An immediate and proximate toxic risk is increasingly located in the under-examined areas around homes (Robbins et al., 2002). The deeply rooted notion of private property rights in residential land, moreover, makes restrictions and land use controls far more difficult in residential areas than it does on agricultural land (Feldman and Jonas, 2000). In this article, we aim to address the issues from awareness and cultural perspective. In order to address the issues, we need to trace the history. How lawn has become an American cultural artifact and how it goes *against nature* and a significant source of environmental problems will be reviewed, and why culture should be important part of the strategy will be discussed. We extend the argument that awareness and culture could be an alternative policies to problems resulted from the pollution. The insights and conclusions are not only limited to the American lawn and may also apply to other issues and other places.

Evolving American Home Lawn

According to the Oxford English Dictionary, the word *lawn* comes from the old English word *launde*, which means an open space or glade. The early lawns were usually related to pasture fields. With frequent rains and a moderate range of temperatures, turf grasses grew easily in the maritime Western Europe climate. In Tudor and Elizabethan times, lawns were widely used in gardens to create walkways and play areas. Gardens with lawns became places to be loved and admired.

In the early 17th century, the Jacobean epoch of gardening began. It was during this period that the closely cut English lawn was born. Since owning a residential lawn was a privilege of some wealthy people at that time, it represented high social status and the aesthetic sophistication of its owners. In English gardens, the flowers of grasses are widely used to bring drama and depth to the boundaries of the properties. Inspired by European landscape paintings, lawns became an essential element of English gardens.

In the 18th century, gardening fashion went through a further change. The landscape gardens of William Kent (1685-1748), one of the most important designers of English gardens, were inspired by ancient Greece and Rome as well as the paintings of Claude Lorraine, Gaspar Poussin, and Salvator Rosa (Johnson, 1999). The open *English* style of parkland was seen across Britain and Ireland. Lawns seemed to flow from the gardens into the outer landscapes.

Dean (1986) believed the American lawn was from England. In the 17th and 18th centuries, European immigrants in America brought with them English garden styles as well as an appreciation for lawns. However, it was not until after the Civil War that the lawn became popular in middle-class residences. Since then, the traditional residential yard of turf grass has

become an important and cherished image in American culture, and lawn-care has become a main topic in all types of gardening magazines. Unlike the traditional English garden, in which lawns usually served as a setting for lawn games and as a backdrop for flower beds and trees, the American lawn has become the dominant theme in American gardens.

The historical legacy of Europe, suburbanization driven by abundant space (cheaper land) and car transportation, and the function of lawns for homeowners and is often called *living green carpet* and an *extended living room*. Nowhere in the world are lawns as prized as they are in the US. They provide a tough yet soft surface for outdoor recreation and activities. Some common lawn games include field hockey, ring toss, volleyball, clock golf, lawn bowls, horseshoes, deck tennis, croquet, badminton, and archery as democratic games that could be played on a small lawn.

They are also the products of learned aesthetic tastes and cultural traits that have become popular over the past 120 years. North American lawn monoculture is derived from English gardens and the manor-house landscape fads of the 18th century, which was a product of Italian landscape paintings. North Americans learned the new English landscape fashion through paintings, books, and English gardeners. Some early wealthy Americans emulated English estates and integrated European garden styles into their New World environments (Jenkins, 1994).

Widespread pastures allowed the immigrant grass species from Africa, Asia, and Europe to flourish on the American continent. Grass was critically important to the survival of the earliest settlements because it was used to support livestock. At that time, lawns were managed very differently. Pasture land was usually maintained through grazing by sheep or other livestock. Most residential lawns belonged to wealthy people because maintaining a well-cut lawn involved a lot of labor. Thomas Jefferson, the third president of the United States, is thought to have owned the first American lawn (Bormann et al., 1993).

It is also widely accepted that Andrew Jackson Downing, Frank J. Scott, Frederick Law Olmsted, Sr., and Frank A. Waugh were the original creators of the ideal suburban landscape, which includes traditional turf grass lawns (Jackson, 1985). However, according to Charles Morrow Wilson, *lawn* did not become an everyday American word until after the Civil War. In 1868, Olmsted designed one of the first planned suburban communities in America – Riverside, just outside of Chicago, Illinois. Riverside provided the original layout of today's front lawn, in that *each house be set back thirty feet from the road, and it prohibited walls (...), each owner would maintain one or two trees and a lawn that would flow seamlessly into his neighbors, creating the impression that all lived together in a single park* (Pollan, 1989). Scott (1873) claimed that a lawn with a

closely cut smooth surface is by far the most essential element of beauty on the grounds of a suburban house.

Americans maintain gardens and lawns to provide additional beauty and to provide a natural look to their home. Lawns were initially used to create a park-like community and to beautify the housing landscape. Some researchers found that the key attractiveness of a piece of land to early arrivals in New England was its grassiness. More specifically, Balling and Falk (1982) found that people generally prefer a savanna-like environment. The universal appeal of lawns, with smooth topography and green color, is similar to the setting of the savanna (Balling and Falk, 1982).

Like any other gardening activities, maintaining a lawn can be fun and can give a person a sense of satisfaction. The physical exercise involved in working on the lawn benefits a person's physical health. Lawn mowing has been advertised to be a healthy exercise and hobby interest. Gardening provides an experience that also has a positive impact on a person's mental health (Gigliotti and Jarrott, 2005). To pursue a green lawn is part of the American dream. As a parcel of private property, a front lawn represents the Jeffersonian ideals of freedom, democracy, and opportunity, in addition to an outdoor expression of 1850s conformism.

From the 1880s through the 1920s, American culture was transformed from a producer society into a consumer society and conspicuous consumption was emerging (Veblen, 1899).

Many articles delivered the information to an expanding middle class on how to achieve the perfect lawn. Having a perfect green lawn has become a symbol of the wealth, power, and prestige of the upper class in society. Middle-class Americans have shown an unprecedented level of spending power during the economic boom in the late 20th century. They maintained perfect lawns to present their wealth and high status. *Darker lawns helped people to show off their wealth, under the assumption that the greener the grass, the greater the cost – theorem by Craig Edminster of International Seeds* (Steinberg, 2006, p.76).

In the 19th century, widespread car ownership combined with a government-subsidized road and housing boom caused people to begin moving to the suburbs. Suburban houses were furnished with front lawns in emulation of upper-class, park-like estates. In 1830, John Ferrabee and Edwin Budding invented the lawnmower, which greatly reduced the labor involved in gardening. Also, the increased availability of a public water supply and the importation of appropriate grasses brought the cost of maintaining a lawn within the reach of a growing middle class of homeowners (Bormann et al., 1993). By World War II, the pattern for suburban developments had become more or less fixed. Developers used grass to

surround houses and the families who purchased the houses were left to take care of these new lawns.

In the 19th century, suburbanization was accompanied by the rise of neighborhood associations. A neighborhood association provides a range of services to residents such as garbage collection, street maintenance, lawn mowing, and gardening. It controls not only the types of land use but also matters of aesthetics, including the color of the house paint, the placement of trees and shrubbery, and the size and location of fences (Nelson, 2002). In a word, the neighborhood association provides the community with the power to judge individual residents' behaviors.

In the process of perceptual formulation, the uniform appearance of front yards is deeply embedded in American culture. *If householders wished to be good Americans, they would maintain a respectable, open front yard with a grass lawn* (Weigert, 1994). Front lawns are a very public demonstration of personal values and can be a significant source of satisfaction and a connection to the community. American lawn was originally a symbol of high status. George Washington and Thomas Jefferson were two elite landowners who had enormous public and symbolic stature, and their designed images of their private properties have contributed to the status of the American lawn for the individual homeowner in the later period when people were more affordable (Harch, 1971; Manca, 2012).

A well-maintained lawn is seen as a symbol of conformity to social norms (Nassauer, 1988). Having and taking care of lawns is an American norm and an honorable obligation. Those who do not keep their front lawn clean and green are considered to be in violation of community standards and are not good citizens in the eyes of their neighborhoods. The attractiveness of front lawns comes from the expressed *care* in maintenance (Nassauer, 1995). In a lawn landscape, care is shown by neatness and uniformity of the overall lawn. A well-ordered and tidy lawn is expected to show conformity to the aesthetic standard of the community. The aesthetic of care is thought to be laden with good intentions and the social meaning of stewardship, work ethics, personal pride, and contributions to community.

People can judge a family by the lawn in front of their house. In the neighbors' eyes, a well-maintained lawn means that the owner is well-educated and has a job and a good family. Most homeowners have historically maintained their lawns in order to be good neighbors and to have a *proper* appearance. Those who did not maintain a lawn often come under extreme social pressure. Some residents even select plants that are already in the neighborhood to show a willingness to be part of the community. For example, Kaufman and Lohr (2002, p. 296) wrote, *the folks straight behind us obviously have a big vested interest in the way we keep our yard (...). Before we*

moved in, they asked our mutual friends – how well do they keep up their yard?

Thus, by demonstrating conformity with local norms and by encouraging community ties, lawn mowing reflects the individual's personal identity. It also represents the image of a harmonious family. On the other hand, those who maintain a messy front yard are often branded as being *selfish, unneighborly, unchristian* and *undemocratic* (Pollan, 1989). As a reflection of social status, lawn mowing can influence the economic value of property. For many homeowners, maintaining the front lawn is simply an investment in capital. Front lawns are semi-public spaces that impact the community. As a whole, they contribute to the overall image of the community. Yards that are allowed to run wild are considered to be detrimental to the value of the property and they affect the neighborhood's overall property value (Clayton, 2007).

Gardening in a publicly visible setting provides opportunities for social communication, like Steinberg said, *a neatly trimmed, perfectly green lawn that unfolded across the front yard like a living version of boardroom* (Steinberg, 2006, p.14) In the US, children learn how to mow the grass from their fathers when they are very young. It is a method for teaching children responsibility. Neighbors get to know each other when sharing information about lawn care experiences, including fertilizer and seed use and gardening practices (Lewis, 1990). The incentive to socialize is especially important at a time when Americans are increasingly isolated from others due to the privatization of house properties.

A homeowner's aesthetic standards are also affected by the public media and/or other people's opinions. To spur the widespread adoption of the residential lawn, popular magazines provided a new forum focused on the aesthetic appeal of the lawn. *'Lawns Beautiful' tells what many estate owners are doing to improve their lawns and proves it through interesting pictures* (Jenkins, 1994).

Businesses promote lawns and lawn care needs support businesses. Many businesses and industries provide equipment, services, and other products to homeowners. The invention of mower made to mow lawn much easier (Kennedy, 2000), and the fertilizer and pesticide chemical industry make weed control and greening manageable although it is not cheap.

Americans spend an estimated \$40 billion per year on lawns and acreage of turf is still growing quickly (Steinberg, 2006). The production, sales, and processing of home lawn products generates employment, economic activity, income, and tax revenue. The lawn-dependence industry is part of the life blood of the American economy. According to a survey of home lawns in Minnesota, the average lawn size was estimated to be 0.62 acres (0.25 ha), with an estimated 872,660 acres (353,427 ha) in home lawns and annual spending of \$200 per home and \$150 mil-

lion in total expenditures over the entire state (Meyer et al., 2001).

Advertisements have been selling an image to the public of the *beautiful scenery of the spacious, newly designed lawn and garden area surrounding a lovely house*. Many owners of small homes enjoy these pictures and try to fit their own properties into this picture of a green, velvety carpet of grass. The growing lawn industry together with the chemical industry used popular magazines to sell the image of a *good* or *perfect* lawn for middle class Americans. The ideal *industrial lawn* was thought to be *composed of grass species only; free of weeds and pests; continuously green; and kept at a low, even height* (Bormann et al., 1993, p. 62) The pursuit of a perfect lawn was reinforced by advertising and horticultural advice in popular magazines, in addition to advertisements promoting lawn standards in order to sell more lawn care products.

Advertising sought to display a high-class image for their product and attract consumers to follow this trend. Maintaining a perfect lawn would indicate being good neighbor, a good citizen, and a good family man. The successful advertising images became cultural icons (Jenkins, 1994). That is, images of lawn mowing became icons of American culture. Homeowners were urged to buy new lawn care products and to spend hours every week on lawn maintenance. Industrially produced, this archaic landscape form was well-suited to post-World War II technology and management techniques (Jenkins, 1994). It demonstrates, moreover, the marketing of an ideal through media imagery that promotes lawn perfection as ordered monoculture (Bormann et al., 1993).

When Culture Going against Nature

The current extra amount of chemicals used on lawns is partly the result of lawn culture shaped from the history (see Figure 1): the homeowner's quest for a *perfect* lawn and low tolerance for weeds and insect pests is unusually predisposed to the romantic bucolic associated with rural landscape and imagery (Waldichuk, 1998). The culture of residential lawn as an ordered monoculture has proven nearly intractable to reform (Feagan and Ripmeester, 1999), and does not tolerate lawn heterogeneity (Bormann et al., 1993). The total annual input of yard insecticides represents a class of ecological policy problems previously unseen.

The economic growth is supporting the culture. The use of lawn care inputs, especially chemicals, has been shown to be positively associated with high levels of income and education and is disproportionately heavy amongst consumers who not only claim environmental concerns but who also acknowledge the negative effects of their actions (Robbins et al., 2002).

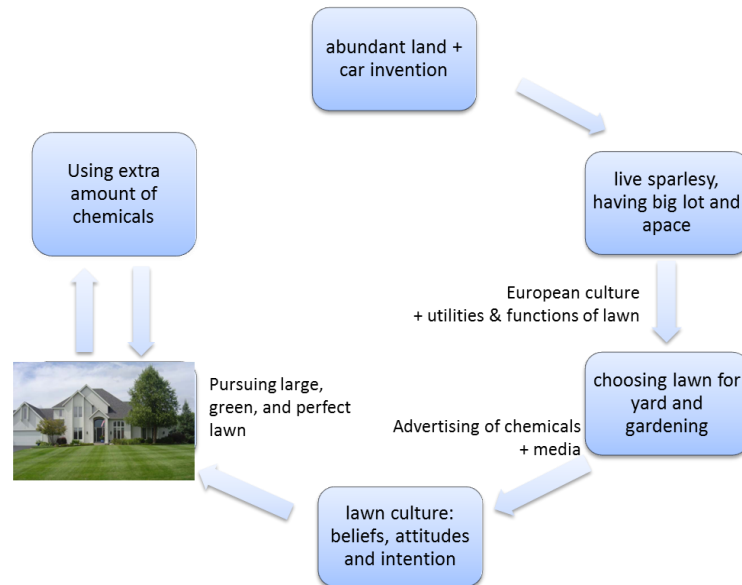


Figure 1. The American lawn culture and the pollution to the residential environment

People are placing too much attention and concern toward the green color of a lawn, even though a lighter green lawn represents better fertility, root development, and disease resistance. However, commercial advertisements try to convince homeowners that the greener the grass, the higher the aesthetic value. Advertisements describe a picture of a harmonious family – a rich green lawn sets off your house to its best aesthetic advantage and makes a wonderful area for children to play and for adults to sit and enjoy the finest scenery.

Deep green turfgrass usually involves more chemical use. It turns out that the much-touted deep-green lawn is not the healthiest turf. According to a study by the National Oceanic and Atmospheric Administration, only about half of the nitrogen and phosphorus in fertilizer is utilized by plants. The rest is dissolved in the groundwater and it causes tremendous growth in the number of bacteria, leading low oxygen into the water and the killing aquatic animals. Water consumption is also a problem (Shuman, 2002). The average lawn requires about 10,000 gallons of water over the course of a summer to keep it green (Melyayev, 2002). This is a tremendous amount if we consider that at least 40% of the world's population faces serious water-shortage problems.

The obsession with the ideal of having pure grass leads to the overuse of herbicides and pesticides. The home lawn landscape is considered to be part of nature, but it is also an extension of the home. Weeds are often viewed as unaesthetic in appearance and as uninvited trespassers. Insects are quite normal in nature, but they are also unwanted in a perfect lawn. Some lawn service companies, which rely heavily on quarterly or bi-monthly pesticide applications, leave the consumer with the perception that healthy, attractive lawns require frequent applications of assorted

chemicals. Most suburban households and lawn-care operators apply more herbicides and pesticides per acre on lawns than most farmers spread to grow crops in large fields (US Senate, 1991).

Although advertisements have routinely claimed that the use of fertilizers and pesticides is safe, the actual safety of these chemical applications has been brought into question by others who claim that they may be toxic or harmful to humans. Carson (1962) examined and demonstrated the chemical industry and her work eventually led to a ban on some chemicals for home use (e.g., DDT).

Even the pesticides that are still permitted by the EPA are often known toxic substances. Some chemicals commonly used on lawns and gardens have been associated with birth defects, mutations, adverse reproductive effects, to causing cancer in laboratory animals. Children, infants, and fetuses may be especially vulnerable to the health effects of pesticides (Landrigan and Garg, 2002). Grass is food for many animals such as geese, squirrels, prairie dogs, and rabbits living in suburban areas. Some pesticides are toxic for them. For example, the pesticide Diazinon was banned in 1986, because it caused the death of songbirds, waterfowl, eagles and other birds (Daniels, 1995).

The use of fertilizers, pesticides, and herbicides in lawn management contributes offsite water quality problems observed in American rivers. Most important water quality parameters such as sediment, nitrate, phosphorus are all related to lawns (Sun and Lockaby, 2012). Less recognized harm that lawns can cause to the environment is how lawns affect runoff and local climate. Lawns that were converted from forests can generate more storm flow than forest lands for two reasons: 1) soils are much compacted in lawns such rainfall cannot fully infiltrate; 2) grass intercept much less rainfall during storms

and uses less water than trees in the plant transpiration process thus the soils under the lawns have less available storage to absorb rainstorm. The end results contribute to frequent flush flows, deep cut of urban watersheds (thus river bank erosion), and general watershed degradation (Sun and Lockaby, 2012). In addition, it is well known that clearing forest vegetation in urban areas promotes *Urban heat island* (Konopacki and Akbari, 2002).

Awareness and Culture towards Sustainable Lawn

The lawn was created and developed by the consumption determined by the economic factors such as income, costs of land, labor, and fertilizers, but also promoted by culture and tastes (Larson et al., 2009). Lawn question can be seen as a subset of cultural and political ecology research problems, linking political economy, culture, and behavior to land cover change (Robins et al., 2002). To promote a sustainable lawn, we need to know not only the ecology but also the backyard culture and economy. Abundant evidence show culture should be included to address, not limited to lawns but also other environmental issues (e.g., Larson, 2009; Trigger et al., 2008; Domene and Sauri, 2007; Head and Muir, 2007; Luc 2014).

Culture is integrated system of learned behavior patterns which are characteristic of the members of a society and which are not a result of biological inheritance (Hoebel, 1966). Culture is related to ethics, habits, customs and value judgment. Broader economy mobilizes and produces *tastes* (Wilson, 1992). In recent decades, the tastes of nature or a *natural aesthetic* have been an increasing trend. Such a culture has resulted in problems as well as become barrier to collect the problem as illustrated in Figure 1. Towards sustainable lawn, we need to start from culture of individual attitudes and taste, which will lead to intentions to and acting on changing (See Figure 2). The intention will bring and seek new technologies, more acceptable weeds and not so green lawns and even replacing with more trees.

Awareness education is critical for the change as in many cases (e.g., Pawul and Sobczyk, 2011). Current education and extension are mostly limited to technology of lawn care, simply how to keep lawn green and pure. We should also promote and tell the public that the green lawn is not green, and the green and perfect lawn is not beauty. As Nassauer (1997a) indicated, *appreciation based on knowledge is the only way to avoid aesthetic omissions and deceptions*. Our culture should promote a new perception of beauty: only a healthy lawn can be aesthetic. Messy is acceptable and can also be beautiful (Nassauer, 1997b).

More ecologically landscaping is more socially desirable. Such an attitude should go beyond individual level into culture. Many people do realize that the

yard management generates pollution as wealthier people are using more pesticide and fertilizers (Robbins et al., 2002), but the society accept the pollution but not messy but environment friendly yard. New culture and norms of social goodness would induce homeowners to plant more trees, produce better habitats, and apply less water, pesticides and herbicides.

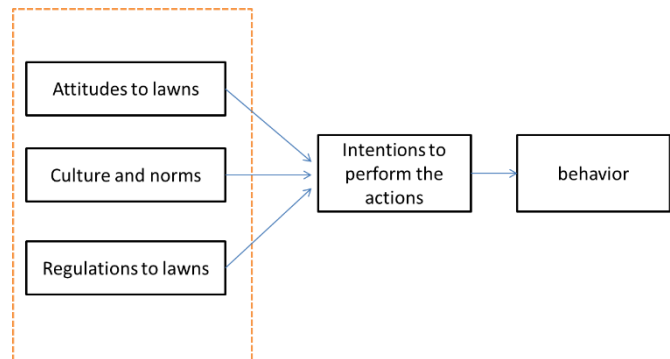


Figure 2. From attitudes, culture and regulation to lawn management

How to change public perceptions and attitudes, or broadly lawn culture? As Steinberg (2006) argued, the American obsessive quest for the perfect lawn has been largely promoted by individuals with commercial interests. However, governments and other non-commercial organizations can use the media to influence the public perception. The National Wildlife Federation offers certification of schoolyards and community areas. Community areas are certified when they accumulate a certain amount of points based on their population. In 2006, more than 74,000 yards, schools, and communities had been certified, including more than 12,000 in the last six months.

Working through various public media, education could help to shape public attitudes and perceptions about landscaping. It is especially important if members of younger generations form different attitudes regarding landscaping. Zheng et al. (2009) also found the impact of an educational background to the preference of landscaping. Based on a study on the public's attitude toward woodlot management in urban areas in Finland by Tahvanainen et al. (2001), it was found that the younger the person, the more positive their attitude toward the natural state of nature. Kays et al. (2006) is an excellent manual for reaching out to small woodland owners about managing their backyards. Messy is acceptable and environmentally beneficial. Annual awards to honor landscaping that meets a new, desired standard might help to promote awareness and adoption by homeowners.

Homeowner associations can also promote sustainable lawn and landscape management, promoting the notion that yards should have more trees and lawns should be smaller in order to limit the use of chemicals and reduce runoff. Trees should be used as an energy saver for urban homeowners. *Close-to-nature* concept should be promoted, especially in arid regions where lawns entirely depend on irrigation.

Further research is needed for investigation toward how we can reshape the existing culture, increasing the awareness.

References

- ALUMAI A., SALMINEN S., RICHMOND D., CARDINA J., GREWAL P., 2009, Comparative evaluation of aesthetic, biological, and economic effectiveness of different lawn management programs, in: *Urban Ecosystem*, vol. 12, no 2, p. 127-144.
- BALLING, J. D., AND FALK, J. H., 1982, Development of visual preference for natural environments, in: *Environment and Behavior*, vol. 14, p. 5-28.
- BEARD J.B., GREEN R.L., 1994, The role of turfgrass in environmental protection and their benefit to humans, in: *Journal of Environmental Quality*, vol. 23, p. 452-460.
- BORMANN F.H., DIANA B., GORDON T. G., 1993, *Redesigning the American lawn*, Yale University Press, New Haven.
- CARSON R., 1962, *Silent Spring*, Houghton Mifflin.
- CLAYTON S., 2007, Domesticated nature: Motivations for gardening and perceptions of environmental impact, in: *Journal of Environmental Psychology*, vol. 27, p. 215-224.
- DANIELS S., 1995, *The green lawn handbook*, Macmillan, New York.
- DEAN M., 1986, *In Search of the Perfect Lawn*, Black Moss Press, Windsor, ON, p. 37.
- DOMENE E., SAURI D., 2007, Urbanization and class-produced natures: Vegetable gardens in the Barcelona Metropolitan Region, in: *Geoforum*, vol. 38, p. 287-298.
- EMMONS R., and THOMAS R. D., 2007, Turfgrass Science and Management – Fourth Edition, in: *Delmar Learning*, (800) 354-9706, <http://www.delmarlearning.com>.
- FEAGAN R B., RIPMEESTER M., 1999, Contesting naturalized lawns: a geography of private green space in the Niagra region, in: *Urban Geography*, vol. 20, no 7, p. 617-634.
- FELDMAN T. D., JONAS A. E. G., 2000, Sage scrub revolution? Property rights, political fragmentation, and conservation planning in Southern California under the federal endangered species act, in: *Annals of the Association of American Geographers*, vol. 90, no 2, p. 256-292.
- GIGLIOTTI C. M., JARROTT S. E., 2005, Effects of horticulture therapy on engagement and affect, in: *Canadian Journal on Aging*, vol. 24, p. 367-377.
- HATCH P. J., 1971, *Thomas Jefferson's Flower Garden at Monticello*, University of Virginia Press; 3rd edition.
- HEAD L., MUIR P., 2007, *Backyard: Nature and Culture in Suburban Australia*, University of Wollongong Press with Halstead Press.
- HOEBEL A., 1996, *Anthropology: Study of Man*. McGraw-Hill, 3rd edition, New York.
- JACKSON K. T., 1985, *Crabgrass Frontier-The Suburbanization of the United States*, Oxford University Press, New York.
- JENKINS V. S., 1994, A green velvety carpet: The front lawn in America, in: *Journal of American Culture*, vol. 17, no 3, p. 43-47.
- JENKINS V. S., 1994, *The Lawn: A History of an American Obsession*, Smithsonian Institution Press, Washington and London.
- JOHNSON K., 1999, English landscape gardens in the 1700s: The history of English garden design from classical to natural style, in: *Garden Design*, July 1999.
- KAUFMAN A. J., LOHR, V. I., 2002, Where the lawn mower stops: The social construction of alternative front yard ideologies, in C.A. Shoemaker (Ed.) *Interaction by design: bringing people and plants together for health and wellbeing*, Iowa State Press, Iowa.
- KAYS et al., DROHAN J., DOWNING A., FINLEY, J., 2006, *The Woods in Your Backyard: Learning to Create and Enhance Natural Areas Around Your Home*, Ithaca, Natural Resource, Agriculture, and Engineering Service, New York.
- KENNEDY M., 2000, The evolution of the lawn mower, in: *Grounds Maintenance*, vol. 35, no 5, p. 16-20.
- KONOPACKI S., AKBARI H., 2002, *Energy Savings for Heat Island Reduction Strategies for Chicago and Houston (Including Updates for Baton Rouge, Sacramento, and Salt Lake City)*, Paper LBNL-49638. Lawrence Berkeley National Laboratory, Berkeley, CA.
- LANDRIGAN P. J., GARG A., 2002, Chronic Effects of Toxic Environmental Exposures on Children's Health, in: *Journal of Toxicology – Clinical Toxicology*, vol. 40, no 4, p. 449-456.
- LARSON K. L., CASAGRANDE D., HARLAN S. L., YABIKU S. T., 2009, Residents' Yard Choices and Rationales in a Desert City: Social Priorities, Ecological Impacts, and Decision Tradeoffs, in: *Environmental Management*, vol. 44, p. 921-937.
- LEWIS C. A., Gardening as healing process, in M. Francis, and R. T. Hester Jr. (Eds.), 1990, *The meaning of gardens*, MIT Press, Cambridge, MA, p. 244-251.
- LUC M., 2014, Placing the idea of sustainable landscape in ecophilosophy, in: *Problemy Ekorożwoju/Problems Of Sustainable Development*, vol. 9, no 1, p. 81-88.

29. LUSH W.M., ROGERS M.E., 1992, Cutting height and the biomass and tiller density of *Lolium perenne* amenity turfs, in: *Journal of Applied Ecology* 29:611–618.
30. PAWUL M., SOBCZYK W., 2011, Ecological Education in Waste Management as a Tool for The Implementation of Sustainable Development, in: *Problemy Ekorozwoju/Problems Of Sustainable Development*, vol. 6, no 1, p. 147-156.
31. MANCA J., 2012, *George Washington's Eye: Landscape, Architecture, and Design at Mount Vernon*, Johns Hopkins University Press.
32. MELYAYEV M., 2002, *The adverse effects of green lawns*, <http://83.149.74.79/refs/29/33443/1.html> (21.04.2009).
33. MEYER M., BEHE B., AND HEILIG J., 2001, The Environmental and Economic Impact of Home Lawns in Minnesota, in: *Horticulture Technology*, vol. 11, p. 585-590.
34. MILESI C, RUNNING S. W., ELVIDGE C. D., DIETZ J. B., TUTTLE B. T., NEMANI R. R., 2005, Mapping and modeling the biochemical cycling of turfgrass in the United States, in: *Environ Management*, vol. 36, p. 426-438.
35. NASSAUER J. I., 1997a, The beauty that requires health, in: Nassauer J.I. (Ed.): *Placing nature: Culture and landscape ecology*, Island Press, Washington, D. C., p.87-106.
36. NASSAUER J. I., 1997b, *Cultural sustainability: Aligning aesthetics and ecology*, Island Press, Washington, D. C.
37. NASSAUER J. I., 1995, Messy ecosystems, orderly frames, in: *Landscape Journal*, vol. 14, no 2, p. 161-170.
38. NASSAUER J. I., 1988, The aesthetics of horticulture: Neatness as a form of care, in: *HortScience*, vol. 23, no 6, p. 973-977.
39. National Turfgrass Federation, 2003, *The turfgrass industry – present and future*. The National Turfgrass Research Initiative. National Turfgrass Federation, Beltsville, Maryland, p. 5-7.
40. NELSON R. H., 2002, Privatizing the neighborhood: A proposal to replace zoning with private collective property rights to existing neighborhoods, in: Beito D. T., Gordon P. and Tabarrok A. (eds.), *The voluntary city: Choice, community, and civil society*, The University of Michigan Press, Michigan.
41. POLLAN M., 1989, Why mow? The case against lawns, in: *The New York Times Magazine*, vol. 28, May, p. 23-27.
42. ROBBINS P., BIRKENHOLTZ T., 2003, Turfgrass revolution: the ecology of urban sprawl, in: *Land Use Policy*, vol. 20, p. 181-194. .
43. ROBBINS P., AND BIRKENHOLTZ T., 2003, Turfgrass revolution: Measuring the expansion of the American lawn, in: *Land Use Policy*, vol. 20, p. 181-194.
44. ROBBINS P., POLDERMAN A. M., BIRKENHOLTZ T., 2002, Lawns and toxins: an ecology of the city. , in: *Cities*, vol. 18, no 6, p. 369-380.
45. SCOTT F. J., 1873, *The Art of Beautifying Suburban Home Grounds of Small Extent*, New York, D. Appleton & Co.
46. SHUMAN L. M., 2002, Phosphorus and nitrate nitrogen in runoff following fertilizer application to turfgrass, in: *Journal of Environmental Quality*, vol. 31, no 5, p. 1710.
47. STEINBERG T., 2006, *American Green-The obsessive quest for the perfect lawn*. New York, W.W. Norton and Company.
48. SUN G. AND LOCKABY B. G., Chapter 3: Water quantity and quality at the urban-rural interface, in: Laband D. N., Lockaby B. G. and Zipperer W. (eds.): *Urban-Rural Interfaces: Linking People and Nature*, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, Madison, WI 2012, p. 26-45.
49. TAHVANAINEN L., TYRVÄINEN L., IHALAINEN M., VUORELA N., KOLEHMAINEN O., 2001, Forest management and public perceptions – visual versus verbal information, in: *Landscape and Urban Planning*, vol. 53, p. 53-70.
50. TRIGGER D., MULCOCK J., GAYNOR A., TOUSSAINT Y., 2008, Ecological restoration, cultural preferences and the negotiation of ‘nativeness’ in Australia, in: *Geoforum*, vol. 39, p. 1273–1283.
51. US Senate, 1991, *The use and regulation of lawn care chemicals*, Hearing before the Subcommittee on Toxic Substances, Environmental Oversight, Research and Development, Senate Hearing 101-685, Washington, D.C.
52. USEPA (United States Environmental Protection Agency), 199, *Preliminary Data Summary of Urban Stormwater Best Management Practices*.
53. VEBLEN T., 1899, *The Theory of the Leisure Class*. Macmillan, New York.
54. WALDICHUK T., 1998, A comparison of Japanese and North American attitudes towards residential landscapes in the rural-urban fringe, in: *The Great Lakes Geographer*, vol. 5, no 1 and 2 p. 15–29.
55. WEIGERT A. J., 1994, Lawns of weeds: Status in opposition to life, in: *The American Sociologist*, vol. 84, no 1, p. 80-96.
56. WILSON A., 1992, *The culture of nature: North American Landscape from Disney to the Exxon Valdez*, Blackwell, Cambridge.
57. ZHENG B., ZHANG Y., CHEN J, 2011, Preferences to home landscape: wildness vs. neatness, in: *Landscape and Urban Planning*, vol. 99, p. 1-8.

