

The Economics of Biophilia: How Green Infrastructure Fosters Economic Development

Charlie Hall

Department of Horticultural Sciences, Texas A&M University, 2133 TAMU, College Station, Texas 77843-2133 U.S.A.

c-hall@tamu.edu

Keywords: Green industry, economics, green infrastructure.

INTRODUCTION

There is little doubt that the green industry supply chain has experienced unprecedented growth, innovation, and change over the last several decades. However, recent slower growth in demand and tighter profit margins point to a maturing market. Survival in the next decade will require a progressive mindset and a willingness to strengthen existing core competencies or develop entirely new ones, which may involve greater firm-level risk. If the green industry can position itself in such a way that its products/services are considered to be *necessities* in people's lives and not mere *luxuries*, that is the best mitigation strategy against recession and weather-related risks it can employ.

The objective of this presentation was to provide documentation of the economic development benefits of green infrastructure. Green infrastructure refers to ecological systems, both natural and engineered, that act as

living infrastructure. Green infrastructure elements are planned and managed primarily for stormwater control, but also exhibit significant economic, environmental, and health and well-being benefits.

ECONOMIC BENEFITS

Beautification Draws Customers, Reduces Shopper Stress, And Enhances Store Appeal

In today's economic climate, businesses are seeking out new methods to effectively maintain their customer base. What few businesses realize is that the simple addition of landscaping to a store front can make a significant difference in how a customer perceives the store. The positive environment created by aesthetically pleasing landscaping not only welcomes customers inside, but also enhances their perception of

the level of quality of products and services offered by that store. Consumers are willing to pay higher prices, travel further to, and shop longer in a store that they perceive to be a quality establishment. Adding flowers or shrubs to the exterior of a business can boost sales and widen the consumer base to include more customers.

In addition, ornamental plants are an effective way to revitalize a stale business, bring in additional customers, and improve the overall environment of the store. Furthermore, the presence of ornamental plants reduces shopping-related stress and customers feel more at ease in a store, which is a leading factor in increasing the total amount of time they spend shopping. Landscaping is an effective way to invite more customers to a store and to keep them coming back to experience the positive environment they encounter there.

Boost Occupancy Rates

Landscape amenities represent an effective tool to boost the occupancy rate of apartments and other commercial buildings. People enjoy aesthetically pleasing areas and are much more likely to choose to live and work in buildings with attractive landscapes, so there is a high correlation between nice landscaping and high occupancy rates of buildings. It therefore becomes more economically feasible to invest money in landscaping because the return in the number of tenants and amount of rent money they represent far exceeds the cost of installing ornamental plants.

Tourism Revenue

Parks and botanical gardens have been shown to be effective tourist attractions in both large and small cities, and consequently, a strategic source for generating tourism revenue. Tourist expenditures on food, transportation, lodging, etc. represent

additional sources of revenue for local businesses that provide these services. Moreover, new revenue from outside the region adds to the overall financial prosperity of a city's economy. Admissions and ancillary dollars from botanical parks also augment municipal revenue through the community's attendance at special events and recreational attractions held on park premises. This revenue gets filtered back into the economy and adds to the financial prosperity of the community.

Reduced Health Care Costs

Through the direct use of the free or fee-based recreational services, residents of an area with urban green spaces benefit from improved physical fitness. Residents are much more likely to exercise if there is an aesthetically pleasing community park or other green space nearby for them to utilize. Healthy people spend less money each year on medical and other associated health care costs, and thus have more disposable income. By saving money on health care, residents tend to increase their spending on other services and goods.

Increased Property Values

Home improvements can add significant value to a property, but may not always yield a 100% return on money invested, with the exception of landscaping. Landscaping yields, on average, a 109% return on every dollar spent, much more so than other home improvements. Home buyers respond positively to homes with professionally landscaped and manicured lawns, and consequently perceive a higher property value. With landscaping, it is possible to increase its value to potential buyers and receive a significant positive monetary return on this external home improvement investment.

Tax Revenue Generation

Properties that are close to parks, botanical gardens, and other urban green spaces generally have a significantly increased property value compared to properties that are not. As such, they indirectly increase municipal revenues generated through its property tax base. The amount of additional property tax revenue generally means that urban green spaces are self-sustaining since cities can use the additional property tax income to pay for upkeep and improvements.

Reduced Street Repairs

Planting trees along paved residential roads reduces temperatures on the ground and helps increase the longevity of the asphalt. When asphalt gets continually heated by the sun causing high temperatures, it tends to break down faster, requiring more frequent maintenance that can cost a great deal of money, and be a source of inconvenience for residents. The simple installation of shade trees greatly reduces the sun's effect on the asphalt, lowering the temperature of the ground and lengthening the asphalt's life span. This ensures that streets stay well-paved and usable for longer periods of time, saving the city money on maintenance costs, and providing residents with shade over pedestrian walkways.

ENVIRONMENTAL (ECOSYSTEMS SERVICES) BENEFITS

Carbon Sequestration, Improved Air Quality

Trees and other ornamental plants are crucial to the sequestration of carbon from the earth's atmosphere and play an important role in reducing the urban and rural carbon footprint. Research has shown that large trees can absorb significant amounts of carbon from the atmosphere each year, as the tree absorbs carbon dioxide and release oxygen

through respiration. As such, trees and other landscape plants serve as an important tool in improving air quality in cities. Trees and landscaped areas absorb particulate matter in the air that would otherwise pollute the atmosphere. Increasing urban green spaces will also help to mitigate a city's already existing poor air quality, which can oftentimes be so poor that it adversely affects the population. Trees and landscape plants also help to absorb odors and potentially harmful chemicals in the air.

Attract Wildlife and Promote Biodiversity

Cultivating urban green spaces is an effective way to help wildlife thrive in otherwise inhospitable areas. Providing animals, a natural refuge away from highly populated areas minimizes the likelihood of animal populations being adversely affected by urban sprawl and vice versa. Maintaining urban biodiversity is an important aspect of keeping a city environmentally friendly and this biodiversity is sustained through the balance between ecosystems, populations, and their habitats, and ensuring that local animal populations have a place to live is a key aspect of sustaining this biodiversity.

Energy Savings

Planting trees and other ornamental plants around a building can significantly reduce the sun's radiation effect on the temperature of the outer walls and lower the associated cost of energy for heating and cooling. In turn, this means that heating and cooling the building will require less energy, reducing the environmental impact that the building will have on the community. Thus, planting trees around a building or business is not only a positive step towards reducing energy consumption, but it also has a significant financial benefit as well.

Reduce Heat and Cold Damage

Trees offset the effects of heat waves and cold air, creating barrier between the walls of the building and the elements. Not only does this affect the building's temperature, it also reduces the effects of other negative effects of the weather, such as gradual wearing away of the walls. Surrounding a building with trees and landscaping is an effective way to protect it from the elements and, at the same time, lower heating and cooling costs.

Offset Heat Islands

Most cities are largely composed of cement and asphalt, which absorb heat from the sun's rays during the daylight hours. This can make city life uncomfortable and hot, especially for people who choose to walk along pedestrian walkways. The inclusion of urban green spaces in a city's landscape can offset the urban heat islands that often occur. Trees and other landscaping plants absorb heat and sunlight, reducing cooling costs and creating a much more enjoyable urban environment for residents of a community.

Reduce Noise Pollution

Trees and urban green spaces can help to reduce the amount of noise in neighborhoods, benefitting both human and animal populations. Noise and light pollution can cause animals to shift activity patterns, urban noise pollutants can cause physiological stress, and the loss of top predators can cause mesopredator release. Landscaped areas absorb noise pollution (sound waves considered to be abrasive and annoying to residents). By installing natural landscaping, noise pollution levels can be significantly reduced. This improves the quality of life for both the human population in a community and the local wildlife who may be affected by unwanted noise.

Reduce Soil Erosion

Planting trees and cultivating landscaped areas is an effective way to reduce the amount of soil lost due to erosion. Tree and other ornamental plant roots create an infrastructure below the surface that helps anchor the soil in place during torrential downpours and holds twenty times more soil than traditional tilled soil. Above the surface, plant foliage and surface cover help to reduce the wind's negative effects on topsoil, reducing the amount of soil lost as dust in the air. Urban green spaces also protect the fertility of the soil, ensuring that it remains sufficiently supplied with nutrients and minerals that enhance plant life.

Reduce Storm Water Runoff / Improved Water Quality

Green spaces absorb water in two ways: above the surface through the leaves and below ground through the root system. By absorbing water, trees and plants reduce the amount of runoff that the city has to deal with, pump out, or purify after significant rainfall events. This reduces the cost of storm water treatment plants and saves the city money. Landscaping is a natural solution to reducing storm water runoff. Landscaping also improves water quality by reducing the amount of dirty storm water that a city has to purify makes current purification methods more effective. Moreover, landscaping absorbs some of the pollutants in the water, meaning that there is less pollution in the water that the city has to purify. Plants and trees improve water quality by ensuring that current purification methods can effectively treat reasonable amounts of runoff.

Reduce Urban Glare

Urban glare is the excessive reflection of sunlight off reflective surfaces such as windows and buildings. Green spaces reduce urban glare in cities by absorbing light, strategically placed landscaping becomes an important tool for city planners to capture the light and deflect it so that the light is not so harsh and unpleasant for residents and drivers, improving the quality of life in the community.

Windbreak

Urban green spaces can reduce the harmful effects of wind in cities by slowing the wind and greatly diminishing its strength, helping to preserve delicate natural environments which could be harmed by high speed winds. Minimizing wind strength also reduces soil erosion due to wind gusts, keeping soil healthy and hospitable for new growth. Moreover, it reduces the need for extensive heating and cooling in buildings by moderating the effects that wind would have on temperature.

WELL-BEING BENEFITS

Health and Recreation

Parks and urban green spaces impact people's health by providing them with an expensive (often free) and convenient recreational service. There is a positive correlation between the presence of a park in a neighborhood and the level of physical activity of the residents; people are much more likely to exercise when there is a no-cost, aesthetically pleasing area or facility for them to use. As a result, residents of neighborhoods with beautiful parks are more likely to be healthy since their increase in exercise makes them less susceptible to physical ailments and more resilient against minor illnesses. As a result, these residents do not spend as much each year on health care and

medical treatment because they require fewer of these services. Healthy people are happier people; residents who exercise often have excellent overall health and therefore have a more positive mental outlook.

Reduce Community Crime / Community Cohesion

When residents feel greater pride in the beauty of where they live, they are much less likely to detract from it (either by graffiti or endangering people within it). Communities that choose to clean up their parks and beautify crime-ridden neighborhoods have less crime and fewer criminals to deal with. Parks can positively affect the community by reducing criminal acts and bringing residents together. Cohesion in the community is critical to the success of the community as a whole, and this can be achieved through unifying people around a park or botanical garden. Parks decrease incentives for people to commit crimes in the community, and at the same time help to bring neighbors together. They can also increase local political activism. Urban green spaces inspire people to come together and fight for what they know is holding them together as a community.

Traffic Safety / Driver Satisfaction

Beautifying traffic medians not only improves the aesthetics of the roadways, it also affects driver attitudes. Studies show that drivers are more at ease on roadways with natural landscaping and are much more inclined to think positively about the community that they are driving through if the roadways are beautiful. Furthermore, adding trees to roadways creates a sort of natural obstruction which could reduce the likelihood of cars crossing medians into oncoming traffic lanes. This improves driver safety and makes the community a safer place for everyone to live.

Upgrade Effect

As more businesses and neighborhoods take on the task of beautifying their surroundings, other competing areas will be forced to follow suit. In other words, as a community works to better itself, other parts of the area will be forced to upgrade as well to keep drawing people in; this phenomenon is known as the upgrade effect. The upgrade

effect positively affects everyone, because it keeps communities from ignoring the benefits of landscaping and developing green spaces, it forces competition and keeps the area looking beautiful. Neighborhoods will be encouraging each other to keep beautifying the landscaping, setting off a cycle of self-improvement that has positive ripple effects outwards to all sectors of the community.

SUMMARY

This paper has summarized the substantial peer-reviewed research that has been conducted regarding the manner in which green infrastructure enhances the quality of life for consumers by providing significant economic benefits, environmental amenities in the form of eco-systems services, and a plethora of health and well-being benefits. This research should be strategically incorporated into both industry-wide and firm-specific marketing messages that highlight the quality of life value proposition in order to maintain the industry's sense of value and relevance for consumers of the future.