



Trends in Sustainable Landscapes

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Landscape architects have always been the forebearers of emerging technology in the landscape industry. Understanding what design challenges the profession of Landscape Architecture is resolving is a window to the future. The broad nature of Landscape Architecture encompasses both the physical design and the public planning realm and as a result many of these emerging practice concepts are embodied in policy and code which create new regulatory requirements for the landscape industry. Let's explore some of the trends which are changing the landscape industry.

Green Roofs and Walls

A green roof or living roof is a roof of a building that is partially or completely covered with vegetation and a growing medium, planted over a waterproofing membrane. These roofs can be elevated or at ground level which may not be evident as a green roof to the casual observer. Whereas a green wall is a wall partially or completely covered with vegetation that includes a growing medium, such as soil.

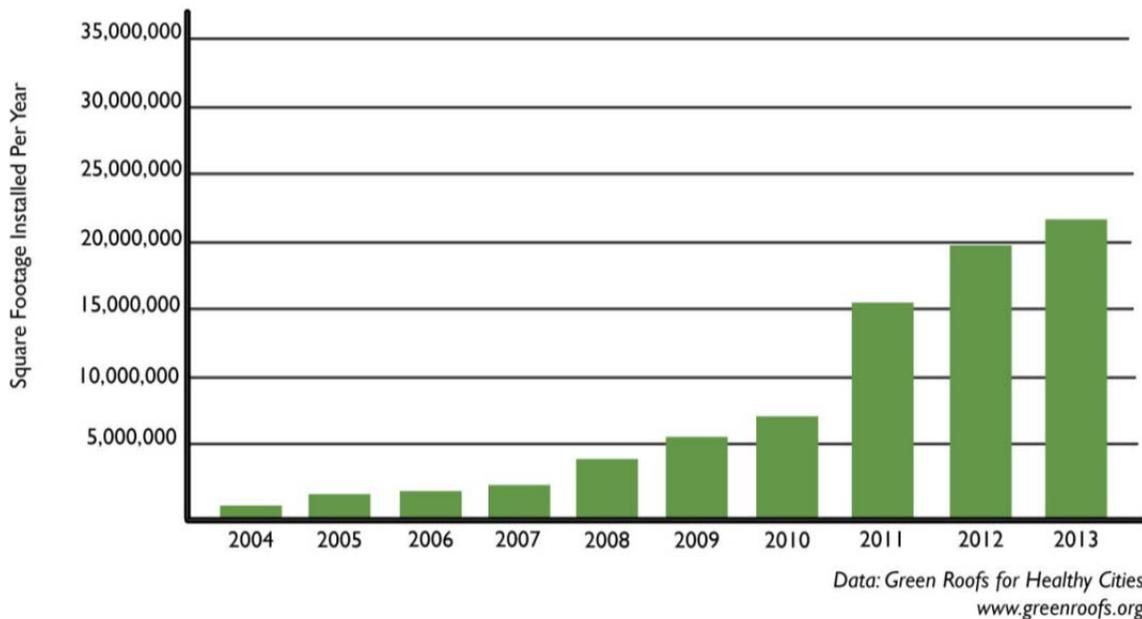
The wide array of the benefits that are driving the implementation of these green roof and wall technologies are both public and private. Public benefits include improving air quality, increasing biodiversity, reductions in urban heat island effect and storm water reduction. Private benefits which are accrued to the property owner are energy conservation, improved thermal performance, increased roofing membrane longevity and the creation of an economic asset which attract tenants. According to Lux Research Intelligence *"Unlike other green sectors such as solar photovoltaic or biofuels, green roofs and walls adoption is not driven by national-level policy measures, but entirely by city-level hyperlocal priorities such as building code requirements and financial incentives"*.

Each year since 2004, Green Roofs for Healthy Cities (GRHC) has conducted a voluntary survey of its corporate members in order to collect data on the growth and composition of the green roof industry across North America. In terms of reported totals, members recorded 6,421,538 square feet of green roofs installed in 2013, up from 5,588,098 square feet installed in 2012. These growth figures pale in comparison to Europe which has a long history of green roof implementation since the 1960's. The total

coverage of green roofs in Europe is estimated to be 150 million square feet compared to North America's fledgling industry.

The opportunity for explosive growth in this industry segment is substantial. It is estimated that less than one tenth of one percent of the roofs in North America has been retrofitted with green roof technology. Some forecast the global green roofs market will be a \$7 billion market by 2017 with a \$2

Estimated Growth of the North American Green Roof Industry - 2004 to 2013



billion opportunity for suppliers of waterproof membranes, vegetation and installation.

If green roofs are the leading edge, then green walls are the bleeding edge. Like green roofs their perpendicular counterparts green walls are covered in vegetation and provide the similar public and private benefits. However, the technology for achieving sustainable low maintenance, low cost systems is in development with many new manufacturers entering the market in the past few years. Green walls present many unique regional challenges inherent in the application such as solar access, wind, moisture control and maintenance. Many of the building codes adopted by cities have not caught up with green wall technology leading to challenges in permitting.

Blue is the New Green

Green spaces have always represented value to the community. While the asset value of green space is increasing within the economy, it is also shifting in function. The Environmental Protection Agency's non-point source storm water pollution targets have placed increased regulatory focus, both local and federal, on storm water management with the National Pollution Discharge Elimination System (NPDES) permit process. The solution to meeting these new requirements has turned "natural" by utilizing the

natural water courses and drainage features of a development parcel as storm water management facilities which also function as recreation and green space amenities. The development community has found a new appreciation of those difficult and underutilized natural features as ecological assets in solving regulatory compliance and increasing the desirability of a development for a new environmentally conscience consumer. The historical approach of bulldozing a site, installing concrete conveyance structures and re-establishing a vegetative cover is giving way to a much softer development footprint which takes into consideration the inherent natural assets of the site including, most importantly, the drainage features while incorporating these assets into a green space framework. We are quickly learning that while working around these features may cost more initially than traditional approaches, in the long term the increased property values more than make up for this incremental development cost.

The shift from green to blue is not without its challenges within the new economy. The historical approach has been to engineer linear solutions for green spaces that move water as quickly as possible to the next land owner. The emerging blue approach is to manage storm water to the greatest degree possible on site while allowing these systems to maintain their dynamics and natural processes. Green planning is no longer about using brute force in a man-made solution but rather letting nature do what nature does best, create equilibrium and balance. Undertaking a green development process requires adding new partners to the project team, including such diverse professionals as ecologists, landscape architects, wetland scientists, and urban foresters. Early in the development process these professionals are invaluable in identifying, protecting and enhancing these natural assets which will reduce infrastructure costs, reduce operational costs and increase market value of the project. As an industry we have only just begun to creatively apply the opportunities of sustainability to the development footprint. The future is only limited by our innovation to understand how to incorporate natural cycles and processes inherent in green spaces, to solve the impacts of human intervention on the land.

Driven by the Clean Water Act, stormwater control measures are now a standard requirement in urban planning and building guidelines in virtually all developed countries. The primary aim of these regulations is to minimize the volume and speed of runoff over the impervious surfaces created by urban developments. According to Conor Dennehy, a water technology market analyst for BlueTech Research, *“Estimates of private capital in green infrastructure are non-existent but estimates for conservation projects are available. Conservation is estimated that between 2009 and 2013, global conservation impact investments were \$23.4 billion. However, out of this, only \$1.9 billion came from private investors, and the rest were from development financial institutions. That said, while the private investors invested only \$1.9 billion, that funding has grown at an average rate of 26% per year. In fact, between 2014 and 2018, private investors expect to deploy \$5.6 billion”*.

At the same time that huge investments are being made in the control and management of stormwater, the industry is seeing increasing restrictions in use of water for landscapes. Many of the new green codes and rating systems such as Sustainable Sites Initiative™ (SITES™) or the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System is intended to minimize or eliminate the use of outdoor water use. This encompasses potable water, natural surface water (e.g., lakes, rivers streams), and groundwater withdrawals for outdoor use, including landscape irrigation and created

water features. This trend has shifted focus on collection of non-potable water from sources such as rainwater, graywater, air conditioner condensate, or stormwater basins to use for irrigation purposes.

Integrated Green Infrastructure

Depending on the context in which it is used green infrastructure means different things to different people. Some people refer to the urban tree canopy as green infrastructure because of the green benefits provided. Others refer to engineered structures (such bioswales or green roofs) that are designed to improve water quality through natural methods as green infrastructure. In the broadest terms green infrastructure is defined as an interconnected network of green space that conserves natural ecosystem values and functions.

According to the Conservation Fund, “Just as growing communities need to upgrade and expand their built infrastructure (roads, sewers, utilities, etc.), so too they need to upgrade and expand their green infrastructure—the network of open space, woodlands, wildlife habitat, parks and other natural areas that sustains clean air, water and natural resources and enriches our quality of life. The concept of green infrastructure repositions open space protection from a community amenity to a community necessity”.

Integrated green infrastructure differs from conventional approaches to landscape development because it looks at connecting built green infrastructure components into systems which delivers known and measureable eco-services. Other landscape approaches typically are undertaken in isolation in development. For all of history we have created our landscapes and green spaces primarily for aesthetics or visual interest. Today we are entering the era when green spaces will also function as green machines managing and mitigating man’s impact on the environment.

There is a large market in the United States for green and sustainable infrastructure. The United States market demand goods and services provided by the green infrastructure at state and local government levels is estimated by CH2M Hill at \$72 trillion. With over 30 infrastructure funds ready to invest in the U.S. market with a levered purchasing power of approximately \$475 billion the market will continue to thrive for the foreseeable future.

It is conceivable to envision a future world where integrated green infrastructure becomes a utility providing public service no different than the water, gas or sewer utilities. In this new era the focus of the solution will center on water, its availability, its distribution, its power to sustain a diversity of life within the urban context. In 2009 the United Nation’s Convention on Biological Diversity stated that “The fight for all life on Earth will be won or lost in cities.”

As an industry we have the greatest responsibility and opportunity to contribute to a sustainable future by recognizing that green makes good business sense and that utilizing those precious natural resources as green spaces contributes to the viability of the industry. As we move forward the smart money is betting on a continued market expansion which will change the traditional delivery model for the green industry. As Vishwas Chavan elegantly once wrote “Only those who are able to adapt to changing scenarios will continue to survive and prosper. Success is directly proportional to the degree of positive adaptation to change.”

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Jeffrey L. Bruce, FASLA, is Owner of Jeffrey L. Bruce & Company (JBC) a national landscape architectural firm. Founded 1986, JBC provides highly specialized technical support to many of the nation's leading Architectural and Landscape Architectural firms on a wide variety of project profiles including engineered soils, green roof technologies, urban agronomy, green infrastructure, performance sports turf, water harvesting, and irrigation engineering.

Award winning projects of his firm, Jeffrey L. Bruce & Company, has received over 120 separate design awards and have been published 200 times. In 1996, Mr. Bruce was elected Fellow of the American Society of Landscape Architects. He is Past President of the American Society of Irrigation Consultants (ASIC) and Chairman of Green Roofs for Healthy Cities (GRHC).

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