American Society of Landscape Architects
Statement on Climate Change

February 15, 2008

The American Society of Landscape Architects has supported the principle of stewardship of the land since its founding in 1899. The Society's mission is to lead, educate, and participate in the careful maintenance, wise planning, and artful design of our cultural and natural environments. For more than a century, landscape architects have promoted this mission by developing sustainable land use policies, pioneering ecologically conscious design practices, and working with communities to create environmentally sound, well-integrated neighborhoods.

Because of this distinct mission and specialized training, landscape architects are well suited to manage and minimize environmental risks to the public's health, safety, and welfare through quality design and planning. Based on the scientific findings and evidence about the causes and impacts of climate change, the American Society of Landscape Architects recognizes that global climate change presents a serious threat to humans and our environments.

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Landscape architects use an array of tools to enable individuals and communities to develop sound land use policies, to decrease reliance on fossil fuels, and to contribute to a carbon-neutral way of life. The American Society of Landscape Architects maintains that the threat of global climate change can and should be mitigated through such means as site planning, stormwater management practices, and the creation of smart growth communities.

The American Society of Landscape Architects makes the following recommendations:

- Encourage sustainable site planning for new communities and buildings of all types.
- Require open space and parkland preservation as a component of all public and private development, from small site-specific projects to regional land use plans.
- Encourage the research and use of native and adapted vegetation in the built environment to take full advantage of the most appropriate plants to increase air quality, conserve water resources, and sequester carbon dioxide.
- Encourage the use of sustainable stormwater management practices that enhance the treatment and increase the infiltration of stormwater.
- Encourage the use of green roofs on public and private buildings of all types.
- Require comprehensive transportation and utility planning as a component of land use planning, matching infrastructure capacity with current and proposed land uses.
- Encourage the development of smart growth communities.
- Enact policies that support design of safe transportation routes for all users, including pedestrians, bicyclists, and those who use wheelchairs.

Background

Threat of Climate Change

The latest report of the United Nations' Intergovernmental Panel on Climate Change (IPCC) states that "[w]arming of the climate system is unequivocal." The IPCC reports that the average global temperature is increasing at an alarming rate. In just the past 50 years, the average Northern Hemisphere temperatures were higher than during any other 50-year period in the last 500 years, perhaps even the past 1,300 years. The IPCC projects that the Earth's surface temperature could rise by as much as 4°C in the next century.

The primary cause of the warming trend has been the increasing concentration of greenhouse gases (GHGs), especially carbon dioxide (CO_2). The 2007 Assessment Report by the IPCC indicates that GHG emissions increased by 70 percent between 1970 and 2004. These gases are primarily emitted because of human behavior through the burning of fossil fuels, with nearly half of the CO_2 emissions produced by buildings.

Left unchecked, the increase in the Earth's temperature is projected to have devastating effects. It could cause drought and wildfires, facilitate spread of airborne diseases, trigger extensive species extinction, and melt ice shelves. According to the IPCC, the projected sea level rise could reach 19-23 inches by the year 2100. Fortunately, effective land use policies and decreased consumption of fossil fuels can drastically reduce GHG emissions, helping to reduce the likelihood that these events will occur.

Mitigation of Climate Change

Site Planning

By properly positioning a building, providing for more open space, and planting appropriate vegetation, site planning techniques can significantly reduce CO_2 emissions. Site planning is the art and science of arranging the uses of portions of land. Proper site planning can lead to substantial reductions in energy use and sequester sizeable amounts of carbon emissions. By properly analyzing the environment, the landscape architect can site buildings, provide open space, and specify appropriate vegetative density, which all would help to reduce GHG emissions.

In order to develop a site plan that includes comprehensive environmental mitigation solutions, the landscape architect must perform a thorough site investigation. This site reconnaissance includes a careful evaluation of the site's ecosystem, including solar access, open space, drainage, vegetation, growing potential, and other important environmental characteristics of the site's region. The information collected through this process provides a guide for subsequent design decisions. Understanding a site's environment will ensure the appropriate positioning of buildings to gain the full benefits of surrounding trees and sunlight, maximize open space, and provide for planting strategies.

With the aim of reducing carbon emissions, a building should be situated in a way that maximizes the insulating and buffering capabilities of trees. The site plan can orient structures within a site to take advantage of trees and passive solar energy, as well as minimize the impact of development on existing environmental site conditions. Plant selection can reduce energy use for heating and cooling.

Open green spaces such as parks, meadows, and fields can be a reliable source of carbon sequestration. Open spaces also absorb heat and cool an area through evapotranspiration (evaporation and plant transpiration from the land's surface to the atmosphere). Clustering buildings and structures allows for more open space and reduces removal of existing vegetation.

Plant selection also plays a critical role in creating sustainable sites. Trees absorb CO_2, emit oxygen, and provide energy-saving insulation to buildings in the area. The US Department of Energy has shown that a canopy of 100 ten-year-old trees can sequester up to one ton of carbon each year. Trees can have a powerful impact when configured near parking lots and other paved spaces. By shading vehicles and pavement, the trees mitigate the urban heat island effect. According to a study by the USDA Forest Service, a tree canopy may even absorb vehicle emissions.

Stormwater Management Practices

Stormwater runoff can carry pollutants, overwhelm urban infrastructure, erode stream channels, and degrade aquatic habitats. In the United States, 772 cities and 40 million people live where storm drainage and sewer systems are combined. When the drainage system is overwhelmed by stormwater, combined wastewater may surface, producing detrimental environmental impacts. Even when working under regular conditions, wastewater feeds into a treatment system that draws upon energy resources.

As climate patterns change, some regions will confront scarce water resources, making it much more critical to provide for the conservation, reuse, and recycling of water. A wide variety of innovative techniques are available that retain and recycle stormwater, as well as filter the water that does reach the conventional drainage system. Porous pavements in place of impervious surfaces will increase infiltration of stormwater into the soil. Strategies to create collection points for stormwater runoff, and to include bioretention areas, stormwater planters and tree boxes. These areas can be designed to be periodically saturated with stormwater, providing another layer of protection against excessive runoff.

These green surfaces can also mitigate the urban heat island effect (UHIE), which is primarily caused by the expanse of hard and reflective surfaces, such as roads, parking lots, and conventional roofs, which absorb solar radiation and re-radiate it as heat. According to the US Environmental Protection Agency, peak utility loads increase 1.5-2.0 percent for every 1°F increase in summertime temperature. Over the past several decades, the UHIE temperature increases have translated to a 3-8 percent increase in community-wide demand for electricity. Just as open green space can alleviate the UHIE, green stormwater technologies such as bioswales, rain gardens, and green roofs can minimize these reflective surfaces.

Green roofs are becoming increasingly recognized across the nation for their environmental benefits. A green roof is a roof that is either partially or completely covered with plants. By cooling the surface of the roofs, green roofs can help a region mitigate global warming by reducing energy use and GHG emissions. Green roofs mitigate the UHIE effect through the process of evapotranspiration, releasing cooling water into the atmosphere and lowering ambient temperatures. Plants also convert CO_2, water and sunlight/energy into oxygen and glucose through photosynthesis. This cyclical

process supplies animals and humans with oxygen and food and reduces the concentration of CO_2 in the atmosphere.

Green roofs also regulate roof temperatures and protect them from the wide temperature swings that boost energy consumption. With decreased heating and cooling needs, buildings with green roofs use less energy. Situation models found that a typical one-story building with a growing medium of about 3-4 inches would result in a 25 percent reduction in energy consumption for summer cooling.

Smart Growth Communities

The United States contains only five percent of the world's population; however, it emits one-fifth of global CO_2 emissions from fossil fuels. One-third of US GHG emissions come from the transportation sector. Smart growth communities feature more compact, pedestrian- and transit-oriented communities with a mix of residential and commercial uses. By contrast, developing and building sparsely populated communities that are isolated from reliable transportation systems and commercial businesses require increased vehicle usage resulting in significant GHG emissions. The principles of smart growth design can assist in reducing vehicle use, and thus, fossil fuel dependence.

A study by the National Resources Defense Council found that if all conditions that tend to accompany densely populated communities were present, such as good transit, proximity to shopping and recreational activities and a walkable environment, families in that community would reduce vehicle use by 25-30 percent. Appropriate design of roadways and streetscapes can reduce the need for personal vehicles, decreasing the amount of GHG emissions. Comprehensive transportation planning must incorporate community-based accessibility strategies. Walkable and bikeable communities inspire residents to use non-motorized transportation significantly more than traditional communities. A set of design options known as *complete streets* can help maximize alternative transportation opportunities, thereby decreasing GHG emissions. Complete streets strategies provide for the design of efficient sidewalks, crosswalks, wide shoulders, medians, exclusive bus lanes, raised crosswalks, bike lanes, and other transportation corridors that provide safe access for all users. One study showed that each 1 percent of automobile travel replaced by walking or cycling will decrease motor vehicle emissions by 2 to 4 percent.

These smart growth design principles also provide safe and fun opportunities for recreational activities. Creating neighborhood open space for recreational purposes reduces vehicle use when families are searching for entertainment outlets. The open spaces also support plants, trees, and other vegetation that convert CO_2 into oxygen, which can assist in mitigating global climate change.

Conclusion

If steps are not taken to reduce greenhouse gas emissions, the United Nations Intergovernmental Panel on Climate Change predicts that by the year 2100 the Earth's surface temperature could increase by 4°C, resulting in devastating effects on the planet. However, there are various land-use policies and best practices that can reduce GHG emissions to protect the health, safety, and welfare of the planet and its inhabitants. Through sustainable site planning, innovative stormwater management practices, and the development of smart growth communities, landscape architects can serve society in a multifaceted strategy to contend with global climate change.

Appendix

Related ASLA Public Policies
Environmental Sustainability
Livable Communities
Open Space
Vegetation in the Built Environment
Transportation Corridors and Facilities
Urban Growth and Development

Resources:
United Nations Intergovernmental Panel on Climate Change: http://www.ipcc.ch/
United States Environmental Protection Agency: http://www.epa.gov/climatechange/ .
United States Department of Energy: http://www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html.
USDA Forest Service, Urban Forest Research Unit: http://www.fs.fed.us/ne/syracuse/
The Sustainable Sites Initiative: http://www.sustainablesites.org/
Columbia University Center for Climate Change Research: http://ccsr.columbia.edu/index.html
Low Impact Development Center, Design Tools: http://www.lid-stormwater.net/lid_techniques.htm
Green Roofs For Healthy Cities: http://www.greenroofs.org
Natural Resource Defense Council/ Global Warming: http://www.nrdc.org/globalWarming/default.asp
Natural Resource Defense Council/ Smart Growth: http://www.nrdc.org/smartgrowth/default.asp

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