Green Infrastructure – A Move Toward Sustainability

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Innovative green practices have become increasingly popular in recent years, offering not only environmental benefits, but ecological, economic and social benefits, as well. From use on a small scale by an individual homeowner, a medium scale in the construction of a subdivision, to large scale uses in municipal stormwater management, green infrastructure is still developing in the market place and proves to provide long term sustainable benefits.

Green infrastructure has been found to help offset the negative effects of a changing globe – namely catastrophic flooding, extreme temperature records (both high and low temperatures) and other devastating natural hazards.

Recent reports released by the Center for Clean Air Policy Urban Leaders Adaptation Initiative suggest that utilizing green infrastructure into land use planning within communities can have positive effects on community resilience, human health, air quality, energy demand and economic prosperity. The two reports, *The Value of Green Infrastructure for Urban Climate Adaptation* and *Lessons Learned on Local Climate Adaptation from the Urban Leaders Adaptation Initiative,* document the ways in which pioneering communities have developed and applied proactive approaches to increase community resilience by planning for and adapting to emerging climate change impacts. (Center for Clean Air Policy (CCAP) Press Release – February 28, 2011 – Press Contact, Marielle Walter)

Whether required by regulation or part of a sustainable design, practices such as green roofs, tree planting, bioretention and infiltration, permeable pavement, and water harvesting are but a few of the green infrastructure techniques that can be used to reduce our stormwater footprint. The benefits of green infrastructure practices are many, but for the purposes of this article we will only outline a few:

Benefit	**Reduces Stormwater Runoff**				Reduces Energy Use	Improves Air Quality	**Improves Community Livabiilty**		Improves Habitat
	Reduces Water Treatment Needs	Im[proves Water Quality	Reduces Grey Infrastructure Needs	Reduces Flooding			Improves Aesthetics	Improves Recreational Opportunities	
Practice									
Green Roofs	●	●	●	●	●	●	●	Maybe	●
Tree Planting	●	●	●	●	●	●	●	●	●
Bioretention & Infiltration	●	●	●	●		●	●	●	●

Permeable Pavement	●	●	●	●	Maybe	●			
Water Harvesting	●	●	●	●	Maybe	Maybe			

(*The Value of Green Infrastructure*; Center for Neighborhood Technology 2010)

Progressive communities all over the United States such as Milwaukee, Wisconsin and Denver, Colorado are finding that there are huge pluses for the use of green infrastructure. For example, the Milwaukee Metropolitan Sewerage District (MMSD) has found that for managing its stormwater, flooding and sewer overflow problems in their urban areas, purchase of upstream conservation areas and the use of green infrastructure is cheaper than building capital infrastructure ("pipes and traps") (*The Value of Green Infrastructure*; Center for Neighborhood Technology 2010). "Green infrastructure is so much more sustainable than capital infrastructure", states Dave Fowler of the MMSD. "While it will never completely replace capital infrastructure, it goes a long way in reducing the overall costs on operation and maintenance." "We have seen other positive effects, as well," states Fowler. "In urban areas, it encourages the property owners to become a stakeholder in the process. When they find out the money that can be saved, they want to be a part of it."

Another green infrastructure proponent is the Urban Drainage and Flood Control District (UDFCD) of Denver, Colorado. The UDFCD was created in 1969 to assist local governments in the Denver Metropolitan Area with multijurisdictional drainage and flood control problems. The UDFCD has found the Natural and Beneficial Functions (NBF) of many of their projects, such as trail corridors, parks, recreation, wildlife habitat, flood storage, and groundwater recharge areas can serve as amenities to adjacent neighborhoods and entire communities. "We recognize that nature can protect us from the extremes of nature. Stream corridors are truly community treasures", states David Mallory of UDFCD.

Probably the easiest, the least costly, and one of the most long term sustainable green infrastructure initiatives, is the planting of trees. Trees, especially as part of a regional or urban green ecosystem, help create a better quality of life and are cost-effective, sustainable and environmentally friendly. Urban forests conserve natural ecosystems and sustain clean air and water. Urban forests also reduce stormwater runoff, cool the urban heat island effect, reduce energy consumption, reduce air pollution, and provide wildlife habitat. Communities, through wise land use practices, can offset the ecological impact of land development by utilizing the urban forest's natural capacity to mitigate negative environmental impacts. Urban forests also provide social and health benefits for individuals through outdoor recreation, as well as economic benefits for communities in increased land values for properties surrounding these green areas. (Planning the Urban Forest, James Schwab, APA Planning Advisory Service, 2009)

Green infrastructure is a great flood fighting mechanism, as well. Green infrastructure reduces stormwater runoff volumes and reduces peak flows by utilizing the natural retention and absorption capabilities of vegetation and soils. By increasing the amount of pervious ground cover, green infrastructure techniques increase stormwater infiltration rates, thereby reducing the volume of runoff entering our combined or separate sewer systems, and ultimately our lakes, rivers, and streams. Green infrastructure can also improve the rate at which our groundwater aquifers are "recharged" or replenished, which, in turn, increases the base flow in our rivers and streams. This is turn, can boost the supply of drinking water for private and public uses. (US Environmental Protection Agency, Managing Wet Weather with Green Infrastructure, http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

Statisticians tell us that the built environment will increase by an astounding 50% in the next 15 years and that many of those structures will be built in high risk areas. Additionally, at full build out, flood heights are projected to increase dramatically, while sea level rise is expected to continue. As we move into the next decade, the gatekeepers of our natural environment will be met with challenges like they have never witnessed before. At the same time, we, the users of our natural environmental, will be called on, to become better stewards of our natural resources. The use of green infrastructure just makes good common sense. Hopefully, if we all work together to promote sustainability and resiliency, by the use of green infrastructure, we will find a green legacy in our footprints and leave our planet a little better off than how we found it.

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