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River Voices

Build Green, Save Green, Be Green:

Green Communities for Clean Water

by Gary Belan & Katherine Baer, American Rivers www.americanrivers.org

On our way to a conference recently, we were forced to brake suddenly as we approached a curb extension that jutted into the street, narrowing the road. Filled with shrubs and grasses, the extension had an attractive landscaped look to it. Such traffic calming measures not only slow cars, creating safer streets, but also slow stormwater from nearby roads and driveways, otherwise headed directly to a nearby stream. We had just "run into" an example of green infrastructure. That vegetated curb extension, like other green infrastructure techniques, provides multiple benefits, foremost of which is cleaner water.

Photo credit: Applied Ecological Services

That curb extension was protecting a local stream by slowing stormwater, infiltrating it into the soil and filtering out pollutants. For too long, our development practices have created polluted stormwater runoff, and both our engineering and legal systems have responded by treating stormwater as a waste product instead of a resource. Small changes like the curb extension and bigger changes like protecting riparian buffer zones, when used consistently, can reverse this trend and add up to big results for clean water. One of the most positive aspects of green infrastructure techniques is the multiple benefits it provides. In addition to managing stormwater, they create a more attractive, livable and clean community. The suite of benefits includes:

- *Cleaner water* – green infrastructure filters pollutants and reduces sewer overflows;
- *Fewer and less severe floods* – peak flows are reduced when flood water is detained by soil and vegetation and slowly released back to local streams, minimizing erosion and stream damage;
- *Protection against droughts* – baseflow is better maintained providing more consistent water levels;
- *Cooler temperatures and reduced energy use* – urban heat islands can be reduced and some techniques, like green roofs, can decrease energy demand;
- *Expanded drinking water supply* – demand for potable water supply can be decreased as more water is kept on-site to irrigate landscapes;
- *Cleaner air* – trees and vegetation can absorb air pollution;
- *Economic benefits* – green infrastructure techniques are often more cost effective than hard infrastructure stormwater solutions and can create new, green jobs and protect and enhance valuable recreation and riverfront assets;
- *More community green space* – creates more livable and healthy communities;

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River Network

Connecting People, Saving Rivers

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River Network is a national, nonprofit organization whose mission is to help people understand, protect and restore rivers and their watersheds.

From The President

Photo credit: River Network Collection

"Green building." Many people consider this term an oxymoron. But today, techniques abound for limiting the environmental impact of new development. Indeed, when all the best current practices are combined, the impact of well-planned new development (in the right places) can approach the vanishing point—and the net effect of thoughtful *re*development can be decidedly *positive*.

Green building involves much more than saving a little water or energy here or there as an afterthought. It means thinking an entire project through from the start with clear environmental goals in mind. Goals should always including preservation (or restoration) of pre-development hydrology, prevention of polluted runoff, protection of habitat and absolute minimization of water and energy use.

When these and other important goals are considered together from the start, integrated solutions appear. For example, using and reusing stormwater, graywater and treated wastewater wherever possible and appropriate in a development can limit demands on drinking water supplies, slash water and sewer infrastructure costs, and save every future homeowner hundreds or thousands of dollars per year from now on in avoided water, sewer and energy bills.

Green building is a rapidly expanding and evolving field. With this issue of *River Voices*, we offer examples of some of the best current thinking and techniques. We hope you find it helpful—and that you will share your ideas and success stories with us in the months and years ahead.

Don Elder

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- *Habitat* – green infrastructure can protect or enhance habitat for fish and other stream-dependent wildlife.

And because the whole is greater than the sum of its parts, all of these benefits together increase community and ecological resilience, the ability to manage extreme swings and stresses brought on by a warming climate. There is a real opportunity now to rethink stormwater and advocate for incorporation of green infrastructure practices that will benefit our rivers and communities and provide added resilience in the face of global warming.

Green Infrastructure Defined

The definition of green infrastructure is fairly broad, and the term's exact meaning remains a point of discussion. While some interpretations define green infrastructure purely as landscape-scale green space conservation and restoration, others define it as site-based natural stormwater management tools. However, these two views are not mutually exclusive, and both are extremely important to protecting the integrity of our rivers and streams.

As a working concept, green infrastructure can broadly be defined as an approach to water management that reduces stormwater runoff, flooding, and sewer overflows by maintaining or restoring the natural hydrology of an area often through the use of plants and soils. This can be accomplished by reducing impervious surfaces and maximizing the opportunities for stormwater to infiltrate into the ground or transpire back into the atmosphere. It can also include techniques to capture, slow, filter and/or reuse stormwater. To reconcile the different interpretations of green infrastructure, it's useful to split it into three different scales: the site-specific level, the neighborhood/sub-watershed level and the landscape level.

The site specific level (frequently called "Low Impact Development") refers to management techniques that can be used at the house or building level. Examples include rain gardens and green curb extensions (part of a broad category of "bioretention" techniques), rain barrels and green roofs. These techniques capture stormwater on site, slowing it down, infiltrating it into the soil and transpiring it back into the atmosphere, minimizing the amount of water that escapes as surface runoff.

Neighborhood or sub-watershed scale green infrastructure is based on techniques or design guidelines that can have an impact on multiple buildings or entire development areas. Design guidelines include narrowing street widths and creating neighborhood conservation projects, to minimize impervious surfaces over a multi-property scale. There are two basic approaches to managing stormwater at this scale: (1) a centralized green infrastructure system for an entire area, or (2) many individual lot-level techniques that cumulatively can manage stormwater for an entire area. For example, a constructed wetland in Lansing, MI, was designed to receive and treat the stormwater runoff of an entire neighborhood. When rain barrels or rain gardens are used extensively throughout a neighborhood, the cumulative effect can be similar to the stormwater stored in regional wetlands. Generally, the most effective strategy is to encourage neighborhood-scale techniques in conjunction with multiple site-specific ones over an entire subwatershed. Used together in this manner, the combination of techniques can make a significant difference on river and stream health.

The landscape level focuses on conservation practices, particularly the preservation of small streams, stream buffers and wetlands. To protect our streams and rivers it's critical

to preserve watershed and riparian green infrastructure such as stream buffers and wetlands. Many stormwater problems, particularly those connected with flooding and erosion and sedimentation, are caused by overdevelopment in the watershed and development too close to stream banks. Focusing on the protection and restoration of critical riparian habitat and wetlands can prevent or mitigate stormwater related flooding and sediment pollution, and can be achieved through comprehensive land use planning at the local and state levels.

Most research has shown that green techniques can be effective in tandem with or substituting for conventional stormwater infrastructure, though we still need more data on optimal techniques and placement for specific conditions. In fact, green infrastructure routinely outperforms conventional infrastructure in terms of reductions in sediment, heavy metals, petroleum products, flooding and thermal pollution. It is important to remember that green infrastructure practices have to be designed properly and may not work in all situations. And conventional and green techniques work most efficiently when designed in tandem with each other. Additionally, as with conventional infrastructure, regular maintenance of green infrastructure is critical (e.g., sediment must periodically be removed from bioswales to keep infiltration pores from clogging).

Growing Momentum Presents Opportunities

Fortunately, green infrastructure has passed the "tipping point," and has gained significant momentum with developers, policy makers, and the public, fostered both by the success of the green building movement and the proliferation of on-the-ground projects.

At the federal level, the Environmental Protection Agency's (EPA) Green Infrastructure Initiative is actively promoting these techniques as part of stormwater management and combined sewer overflow (CSO) control. Working with a variety of partners, EPA is finding ways to integrate green infrastructure into stormwater permits and sewer overflow control plans by developing model permit language and making clear to the regulated community that green infrastructure can play a key role in meeting clean water regulatory requirements. In a national victory, as part of the 2007 Energy Act, all new federal facilities larger than 5,000 square feet are now required to maintain pre-development hydrology.

On the state level, there are several leaders. Most recently, advocates in Maryland were successful in passing a new stormwater law that requires the use of "environmental site design" (another term for green infrastructure) techniques for development projects. Regulations to implement the 2007 law are currently being developed. A New Jersey law, which recently withstood legal challenges from developers, requires 300-foot streamside buffer zones for certain waters, some of the strongest riparian protections in the nation, and also requires that new development maintains the pre-development hydrograph.

Across the country there has been a great deal of innovation and success with integrating green infrastructure into planning and development, at both the local and watershed level. Changing ordinances, zoning, development design standards, and even parking lot requirements are all ways to facilitate smarter stormwater management and grow greener communities. A new Sustainable Sites Initiative, led by the American Society of Landscape Architects, will create voluntary design standards and a

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rating system for built landscapes parallel to those created for green buildings under the Leadership for Energy and Environmental Design (LEED) program to establish a benchmark for sites that use green development approaches.

Photo credit: Patricia Pennel
WMEAC green roof
Grand Rapids Michigan

Here are just a few of the many examples of places that have successfully integrated green infrastructure into their development and regulatory requirements:

Portland, Oregon – Perhaps best known for its "green streets" program, Portland is a leader in sustainable stormwater management using green development techniques supported by financial incentives for property owners. In the early 1990s, as the city was developing its municipal stormwater permit (MS4), research and evaluation of new techniques was included. This allowance for new techniques led to better information and acceptance of green infrastructure. Since then, Portland has pioneered Green Streets to reduce polluted runoff from roads, which comprise approximately one-third of the City's hard surfaces. By retrofitting streets with curb extensions, swales, street trees, and pervious pavements, the city is managing stormwater while providing aesthetic benefits and slowing traffic. Another important component of Portland's program is Clean River Rewards, a financial incentive program aimed at encouraging property owners to manage stormwater on-site. The program works by reducing water rates for customers who reduce impervious surfaces, disconnect downspouts and plant rain gardens and trees.

Chicago, Illinois – Chicago has emerged as a leader in using an integrated approach to incorporate green infrastructure into planning and retrofits for clean water, cooler temperatures, and more attractive neighborhoods. The city has promoted a wide range of techniques including green roofs, urban forestry, rain gardens, and downspout disconnection. Prompted by the need to reduce combined sewer overflows and Mayor Daley's personal commitment to a greener city, the city has modeled techniques such as a green roof on City Hall as well as subsidies for certain materials and an expedited green permitting program. One city program provided rain barrels for $15 to 400 families, which is projected to divert 760,000 gallons of runoff from the combined sewer system and reduce localized sewage backups into basements. Under the Green Alleys program, Chicago is retrofitting its alleyways, 2,000 miles of small streets, with permeable pavement to reduce polluted runoff.

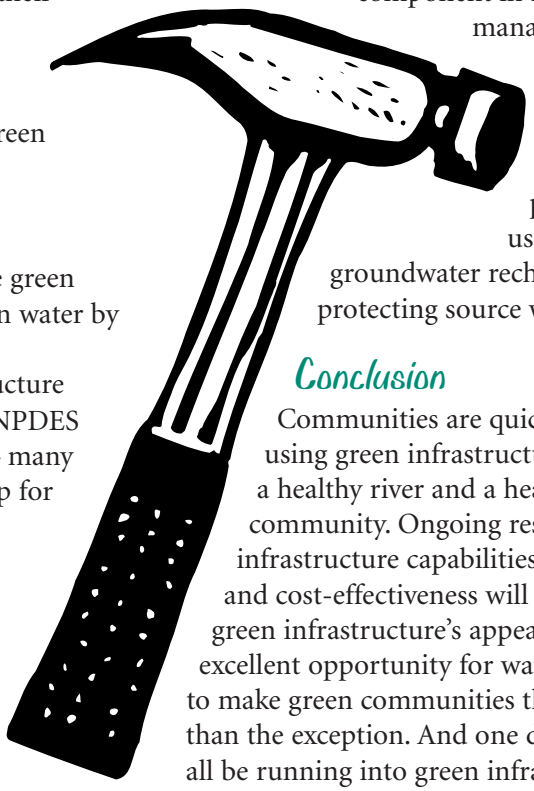
Grayling, Michigan – Grayling is a small town of about 2,000 people located in Northern Michigan. One of Grayling's biggest assets is its local river, the Au Sable, which supports a large fly fishing-based tourism industry for the town. Grayling recognized several years ago that

stormwater runoff from the town had the potential to create a negative impact on the Au Sable, and thus Grayling's livelihood. The community decided to take a proactive approach using green infrastructure to allow the Au Sable River to continue to be fed by groundwater recharge, rather than warmer, dirtier overland runoff. The project aims to redirect as much as 90 percent of polluted stormwater runoff from paved surfaces in the community to bioretention systems. Project proponents believe this will translate into financial savings for the community, higher quality of life and reduced water pollution. Grayling is one of the first communities in Michigan to retrofit the entire city's storm drain system. The town's innovation recently paid off, as their stormwater program recently received a $758,000 grant through the Clean Michigan Initiative to support its use of green infrastructure.

Opportunities

River activists can help promote green infrastructure solutions for clean water by advocating for these actions:

- Incorporate green infrastructure provisions into your state NPDES Stormwater MS4 permits – many of these permits are now up for renewal;
- Incorporate green infrastructure provisions into Long Term Control Plans for combined sewer overflows;
- Review your community's codes and ordinances to evaluate barriers to green infrastructure and suggest ordinances that promote green approaches;
- Work with local utilities to integrate green infrastructure into projects that use federal Clean Water State Revolving Fund money;
- Encourage local leaders and utilities to subsidize rain barrels, raingardens and downspout disconnection programs to reduce runoff and outdoor water use;
- Urge your local community to add green infrastructure to public buildings and facilities like schools, libraries, parking lots or start your own program such as a rain barrel sale or community raingarden education program;
- Advocate inclusion of green infrastructure approaches as a primary component in flood management and water supply plans by minimizing outdoor potable water use, maximizing groundwater recharge, and protecting source waters.



Conclusion

Communities are quickly finding that using green infrastructure assures both a healthy river and a healthy community. Ongoing research on green infrastructure capabilities, maintenance and cost-effectiveness will only broaden green infrastructure's appeal, presenting an excellent opportunity for watershed groups to make green communities the norm rather than the exception. And one day soon, we'll all be running into green infrastructure.

Making Sense of Sensible Buildings:

Green Buildings 101

By
Gwen Griffith
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What do you think of when you hear the words "green building"? Yurts? Straw bale houses? Once upon a time, maybe—but not anymore. Green building now means state-of-the-art housing and commercial buildings with energy and water efficiency, excellent indoor air quality, and long term durability with minimum waste products. These high performance buildings, whether homes or businesses, are finally beginning to pave the way toward broad scale applications leading to cleaner air, water and land resources.

This is a good thing too since our housing patterns are making ever more impact on our landscape. According to the National Association of Home Builders, from 1970 to 2005 we've dramatically increased the square footage and number of stories in our average house size, while average family size has actually gone down.

FINISHED AREA	1970	2005
Average square footage (sf)	1,500	2,434
Percentage less than 1,200 sf	36%	4%
Percentage greater than 2,400 sg	10%	42%
One story	74%	44%
Two stories or more	17%	55%

Over the past few years green building programs have responded to the need for low impact, high performance buildings and homes with many methods to achieve increased sustainability during and after construction. This is critical because buildings have the single largest impact on the way our landscapes and watersheds perform. Building sites transform the landscape from its natural pervious character to hard surfaces that create stormwater runoff problems, including floods, water pollution and lack of groundwater recharge. In addition, buildings are responsible for 40% or more of our total green house gas emissions and global energy consumption. In the U.S., office buildings alone consume 65% of electricity, 30% of raw materials, 12% of potable water and take up 12% of our land space.

The good news is that the average "green" building—residential or commercial—saves 30-70% on energy use, 30-50% on water use, 50-90% on waste costs, and reduces carbon dioxide emissions by 35-50%. The EPA estimates that if each building owner took on the challenge of becoming green, by 2015, the U.S. could reduce its greenhouse gas emissions by the equivalent of 15 million vehicles while saving 10 billion (with a B) dollars!!

For a building or site to be considered "green," several criteria come into play, all of which serve to reduce or eliminate the negative impacts before, during or after construction. Together, these criteria represent what the Cumberland River Compact calls the "Continuum of Care" (see page12), meaning ways to reach for sustainability at every step of the planning, design, development, construction and operations process. Reaching maximum green requires a coordinated team approach and sustainability integrated from the very beginning. However, it is still possible to improve the sustainability of a site with certain features, even if you start in the mid-development process.

Green Building Program Choices

In response to the call for "greener" buildings, a variety of different programs have developed that offer independent third-party verification of the green building standards achieved. These programs vary in complexity and administrative costs. A few are national in

scope, some are regional, and there are many smaller local programs springing up across the country. Common features include requiring builders to take a training program, and use of a flexible, menu-based worksheet scoring system that gives credit for various green features. Minimum requirements must be met, and additional points are earned by achieving other sustainability goals. Here's a brief sketch of the major national programs and an example of a regional program in the Southeastern U.S.:

- **EPA Energy Star / WaterSense**

  The EPA offers Energy Star certification for whole house or building sites. Energy Star Homes must be at least 15% more efficient than homes built to the 2004 International Residential Energy Code plus have additional energy features that make it at least 20-30% more efficient than standard homes. EPA estimates Energy Star Homes typically reduce green house gas emissions by 4500 pounds per year. The rating is verified by Home Energy Raters, certified technicians who measure the tightness of the housing envelope and duct system, the insulation quality, and appliance efficiency. In the Southeastern U.S. states, the **TVA Energy Right Program** offers a similar whole house certification for all electric homes. Many local utility providers offer incentives and rebates to builders who achieve Energy Star / Energy Right ratings. Typical energy efficiency features include upgraded insulation, high performance windows, tight construction and ductwork, high efficiency heating and cooling equipment, efficient appliances and products and third-party verification. Visit: www.energystar.gov

- **U.S. Green Building Council – LEED Program**

  The USGBC - LEED Program stands for Leadership in Energy and Environmental Design. This program offers the most comprehensive and stringent national rating system dedicated to the highest building performance standards possible. The early focus for LEED was commercial buildings, with hundreds of major buildings qualifying as Certified, Silver, Gold or Platinum ratings. The LEED for Homes program is relatively new but hundreds of LEED for Homes projects are already underway across the country. Visit: www.usgbc.org

- **National Association of Home Builders - NAHB Model Green Home Guidelines**

  This relatively new program offers an in-depth set of guidelines for home builders to follow. Still in its pilot phase, it is gaining in popularity with many state and local green building programs adopting the NAHB guidelines as the basis for their local programs. Visit: www.nahb.com

- **EarthCraft House Program**

  EarthCraft House (ECH) is one of the first regional green building programs in the country. Launched by Southface Energy Institute in Atlanta nearly 10 years ago, this program is gaining ground across the Southeast, thanks in part because it is affordable and accessible to the average home builder. Over 5000 homes are now EarthCraft House certified and many builders, including Atlanta Habitat for Humanity, are exclusively building to ECH standards. Visit: www.earthcrasthouse.com, www.southface.org, and www.morganparkplace.com

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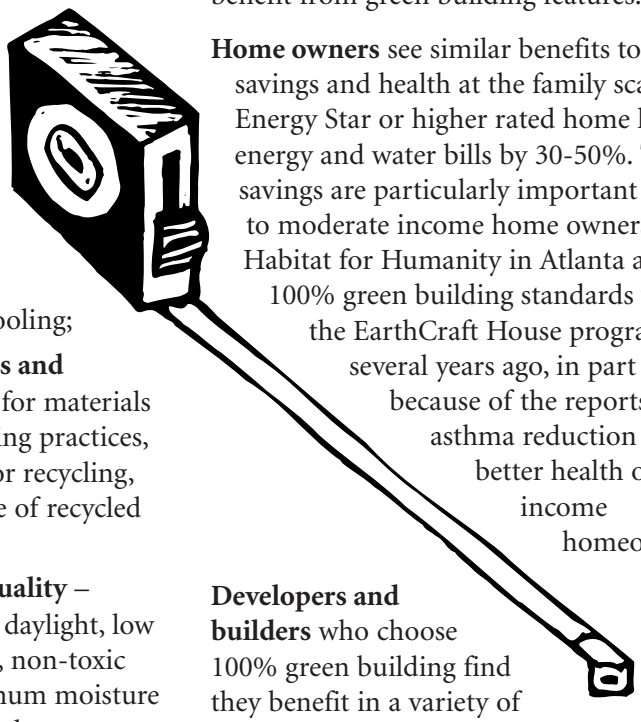
The six key areas where sustainability is designed and measured are:

- **Sustainable Site Planning** – smart growth planning, optimum building orientation and site design, efficient public transportation, preservation of critical natural areas, low impact landscape design;
- **Water Protection and Efficiency** – minimum impervious cover, high performance water fixtures and irrigation, low impact stormwater design, water recapture and reuse systems;
- **Energy Efficiency and Renewable Energy** – high performance energy conservation, use of renewables such as solar or wind power, geothermal heating and cooling;
- **Conservation of Materials and Resources** – smart design for materials reduction, advanced framing practices, construction waste reuse or recycling, durability of materials, use of recycled and recyclable materials;
- **Indoor Environmental Quality** – indoor air quality, natural daylight, low VOC paints and materials, non-toxic structural materials, optimum moisture control and ventilation; and
- **Maintenance and Operations** – owner education, smart sensor operations, programmable thermostats, conservation behavior.

Benefits of Green Building

Businesses and schools that have gone to "green" building practices often refer to the triple bottom line benefits of that decision. Not only does their building reduce environmental impacts to air, water and land, but they also see savings in operational costs and economic gains through increased personnel productivity with improved employee recruitment, health, performance, retention, and job satisfaction. Economic studies estimate business savings in the billions of dollars through health and productivity gains. Green schools show consistently higher student performance and green hospitals show faster patient recoveries. Thus *environment, economics* and *people* all benefit from green building features.



Home owners see similar benefits to both savings and health at the family scale. An Energy Star or higher rated home lowers energy and water bills by 30-50%. These savings are particularly important to low to moderate income home owners. Habitat for Humanity in Atlanta adopted 100% green building standards with the EarthCraft House program several years ago, in part because of the reports of asthma reduction and better health of low income homeowners.

Developers and builders who choose 100% green building find they benefit in a variety of ways too, including increased market share, reduced liability and call back costs, and better quality subcontractors. Builders who adopt 100% green building standards earn a reputation for high performance quality.

Communities are perhaps are the biggest benefactors when green building becomes widespread. Air and water quality improves, stormwater impacts drop and local utilities can serve growing populations without

being forced to build new water or power plants. When a community can add two to three "green" houses, on less land with less impact, for the same infrastructure investment of one "conventional" house, the whole economy of the community benefits. Of course, this assumes that the entire spectrum of low impact development is in place for that community. Many cities are waking up to this reality and beginning to call for green building standards. Recently the City of Nashville was one of many cities around the country to adopt a green building standard. All municipal public buildings that are over 5000 square feet or $2 million in budget are now required to achieve LEED certification. This is a wise investment for the city to make in its long term sustainability.

Costs of Green Building

The very best news is that, contrary to common beliefs, it really does not cost much more, if any, to build green. Overall, industry figures quoted indicate that higher performance construction can cost 1-5% more. However, that surcharge is frequently down to zero with the second or third building where experience begins to pay off. If you look at the true life cycle costs it clearly saves money to build green. The savings in utilities, maintenance and property value pay back any added construction costs to the building owner in very short time frames. Even for the speculative builder, increased market share and reduced liabilities, can let that builder keep just as much profit as the conventional builder.

Looking Ahead

In spite of the growth in green building programs, we have a ways to go before it becomes mainstream. In a recent survey only 20% of architects, engineers and developers had participated in a "green building" project and only 9% of homeowners and tenants could say the same. However, the future for green building is very bright. The applications to green building programs have exploded in the past two years. Even more encouraging, the goal of zero-net energy homes is already achievable in limited case studies. Long range thinkers go beyond that to the concept of "regenerative" and "restorative" buildings that actually return back more energy and cleaner air and water than they consume, and with 100% recyclable materials, they yield zero waste when the building is no longer useful. With the rapid rate of urbanization and population growth around the world, it is imperative that these far reaching "green building" concepts be fully embraced if we are to reach sustainable conditions.

The BOB Experience

The Cumberland River Compact's Building Outside the Box (BOB) Program has worked with the help of EPA Watershed Initiative Grants for the past four years to partner with builders and developers to demonstrate and educate on sustainability practices. The BOB demonstration project sites and educational programs have catalyzed the first certified "green" homes in Tennessee. We helped make possible over 100 EarthCraft House certified residences, 3 new "green" nature centers, and one green farm house retrofit. We coupled the green building with stream restoration work to improve water quality one site at a time. Our building partners have embraced the sustainable approach and have been honored with numerous local, state, regional, and national awards for their achievements. Visit www.cumberlandrivercompact.org for more details.

Cumberland River Compact – Building Outside the Box Program

www.cumberlandrivercompact.org

Continuum of Care:
Good for Buildings and for Rivers

by Margo Farnsworth
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Cumberland River Compact
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I work for rivers.
I work for air.
I work to keep people healthy.
I've got to make a living.

What if we could take an approach to sustainable building where we could meet all those needs? When the Cumberland River Compact embarked on "Building Outside the Box" we were, first and foremost, building for healthier rivers. To us, this meant reducing sediment runoff from sites and reducing water use. As we brought on more partners, we were confronted with their needs as well—indoor air quality, decreased energy usage and doing it all while making a profit.

During this time, a new idea was birthed—building through a "Continuum of Care." In considering how developers move toward sustainable building, we saw many businessmen and women interested in "dipping their toes" into water or energy-friendly technologies but not necessarily ready for more advanced or costlier programs. At the same time, partners like Jim Giattina with Region 4 EPA were very enthusiastic about developing a holistic approach.

"We need to embrace our nation's move toward sustainable building practices, but we have to go further and embrace the concept of whole sustainable communities."

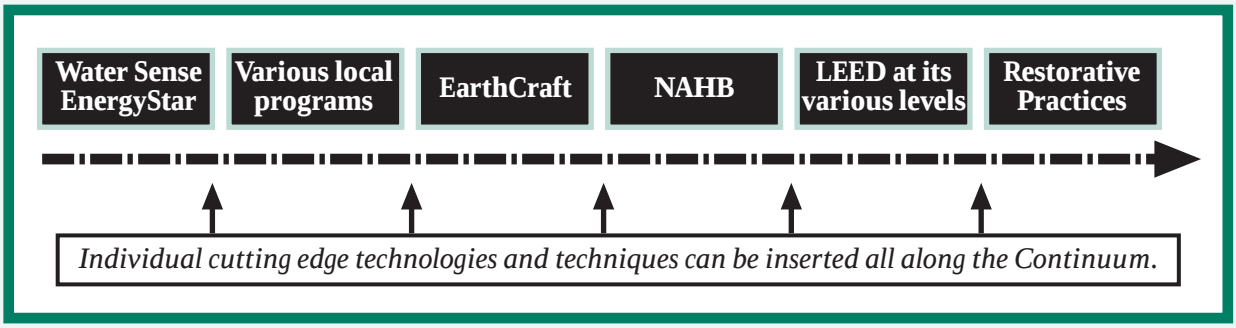
With easy-to-apply programs like EnergyStar and WaterSense on the simpler end of the Continuum, we compared and added programs on the progressively more advanced end of the Continuum including programs like EarthCraft and LEED at its many levels. The point is, a developer/builder can jump on at any point of the Continuum and be recognized for doing a measure of "good." Our job then becomes educating those "beginning sustainable developers" on

Photo credit: ©Margo Farnsworth

BOB Partners at Morgan Park Place utilized rain gardens between buildings, native plants and compost tea to minimize effects from stormwater.

how they can do even better—and helping make that process as simple and achievable as possible through workshops, trouble-shooting, site tours and other Building Outside the Box offerings.

One of our favorite sayings is, "We don't want to build a smart house on a dumb site," but there are corollaries that accompany this saying which include, "We don't want to build a house which the developer can't afford." "We don't want to build a house where you can drink the water but can't breathe," and so on. Through utilization of the sustainable



"Continuum of Care" mode of building, developers can be comfortably welcomed on at any point of the Continuum. Then, as they learn more and recognize the value of their niche, they can work step by step to build more and more livable, holistically sustainable houses which offer the purchaser an ever-healthier, more cost-effective and environmentally-friendly home.

The results are clear. Partners at Morgan Park Place in Nashville began with EnergyStar appliances and moved to EarthCraft certifications and are now working toward LEED Platinum residences. Affordable Housing Resources Authority started with one house and is now working to make all its units environmentally friendly.

We like it. They like it. The customers like it. And the rivers seem to like it too.

Building certification programs follow a *Continuum of Care* which includes a full range of programs and sustainable building technologies and techniques. Even the simplest of programs, inexpensive and easy to attain, represent an improvement from most "traditional" practices. The goal in reaching toward sustainability is not about which certification is used (or necessarily in what order it's listed), but more about climbing onto the Continuum where one is able and then moving toward higher levels on the Continuum over time. At the far right end of the Continuum lie restorative practices, those which create a net gain for the environment and ultimately a net gain for business, community and citizens.

Sustainable building at a restorative level means making choices for sustainability at each stage of development. My colleague, Gwen Griffith refers to starting with financing and quality growth planning, moving to site design and green building practices and finally to home owner/building operator practices on the other end as the ultimate continuum. We use the phrase "banker to bricklayer" to express this idea. Everyone involved in the development process can learn ways to improve their practices and begin to make a difference at any stage of development.

Putting the Green in Green Building:

The Economics of Low Impact Development

by Steve Wise
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Center for Neighborhood Technology
www.cnt.org/natural-resources

Put aside, for a moment, the billions of gallons of clean water that return to watersheds and aquifers from catching raindrops where they fall. Never mind, at this point, the building energy savings, urban heat island reductions and urban habitat that vegetated roofs and tree planting create.

Don't even mention the increase in property value that accompanies greening efforts in otherwise degraded cityscapes, the recreational value of healthy green space in our cities, or the startling notion that green infrastructure is connected with lower crime rates.

Green infrastructure or Low Impact Development (LID) practices produce a dramatic range of social and economic benefits, but that is the second part of the financial story on LID.

The CNT Green Values Stormwater Calculator (greenvalues.cnt.org) is designed to arrive at a first approximation of the hydrologic and financial conditions for a site that is defined by the user.

More Drain for the Dollar

The simple economic truth of green infrastructure is this: putting open space and natural drainage practices to work saves money.

The enormous economic value of clean water and additional social benefits all improve a community's quality of life. But the evidence is coming in, consistently and strong, that all of those benefits come on top of real cost savings for builders and communities. The most recent study to confirm green infrastructure's economic cost-effectiveness comes from U.S. EPA. *Reducing Stormwater Costs Through Low Impact Strategies and Practices* looked at 17 case studies from 8 eight states and two Canadian provinces. The cost savings of using LID approaches instead of conventional stormwater infrastructure ranged from 15 to 80 percent, and those practices improved stormwater infrastructure performance while they saved money. "In most cases, LID practices were shown to be both fiscally and environmentally beneficial to communities."

The Center for Neighborhood Technology's GreenTechnology's Green Values™ Calculator provides a similar assessment for individual homeowners or developers. The calculator allows you to compare the life cycle costs, ecological and economic benefits of conventional "grey" stormwater infrastructure with an approach applying native vegetation, rain gardens, vegetated swales, tree planting, permeable pavement or green roofs to an individual lot or a development. In a typical case, green infrastructure approaches can cut runoff by 30 percent and save 20 percent in capital and operating costs.

Unpaving the Way

Cities across the country are finding significant savings by integrating LID practices into their existing infrastructure. Particularly in the realm of sustainable street design, they are finding that LID in right-of-way can turn the problem of streets' contribution to runoff pollution into cost-saving solutions. Portland, Oregon turned its Green Streets program from a pilot into a citywide standard, requiring that all street projects include green stormwater measures. One of the main reasons they did this was the cost savings. Combined with residential downspout disconnection, green streets can save 40 percent compared to the cost of a comparable street with conventional stormwater gutters and sewers. Seattle's Street Edge Alternative project found a similar cost and ecological efficiency, removing 90 percent of runoff with beautiful street-side plantings and saving 25 percent of the conventional cost by avoiding curbs, gutters and other grey infrastructure.

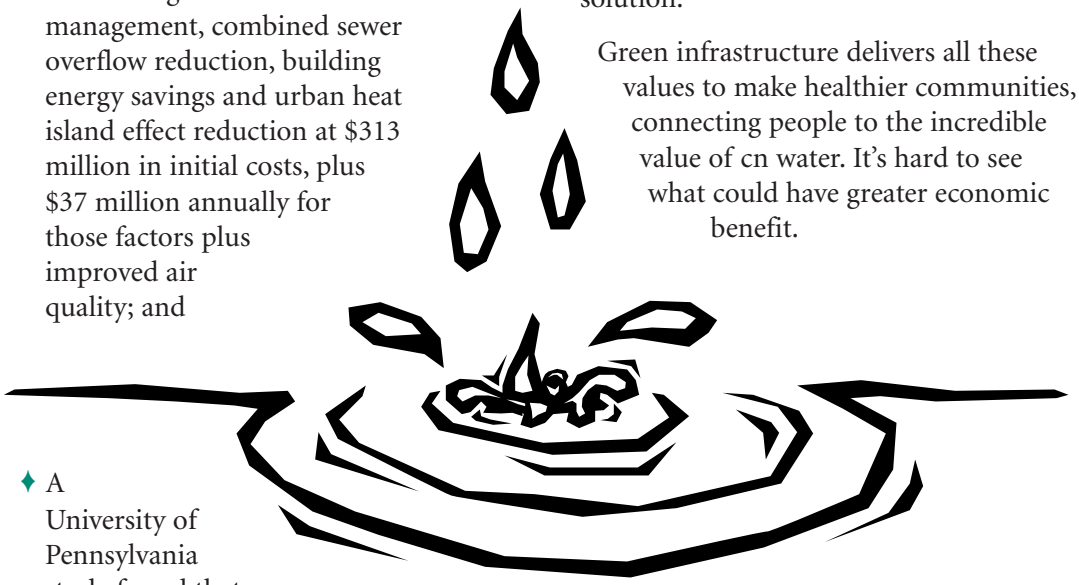
Then there are all of the additional benefits, many of which also produce measurable economic savings:

- Seattle's 2007 Urban Forest Plan estimated that increasing tree canopy from 18 to 30 percent would yield more than $44 million in annual benefits, including stormwater mitigation, air cleaning, carbon sequestration, energy savings, aesthetics and other values;
- Chicago looked at the impact of installing green roofs citywide and estimated that it could save $100 million in annual energy costs and conserve the equivalent of three coal-fired power plants' worth of energy use;
- An estimate of benefits from green roofs across the city of Toronto put the total savings for stormwater management, combined sewer overflow reduction, building energy savings and urban heat island effect reduction at $313 million in initial costs, plus $37 million annually for those factors plus improved air quality; and
- A University of Pennsylvania study found that tree planting raised property value 10 percent and greening of otherwise vacant city land raised values as much as 30 percent.

Perhaps the most surprising, and possibly invaluable effects are positive social impacts associated with green infrastructure in cities. The University of Illinois Landscape and Human Health Laboratory looked at the influence of trees and green space at some of Chicago's most disadvantaged housing projects. That study found that compared with areas that had little or no vegetation, buildings with high levels of greenery had 52 percent fewer crimes. Families living near greener spaces reported less stress and domestic violence.

Green infrastructure's increased visibility also gives people a chance to learn that that how we live and build our communities affects our water and ecosystems. Home downspout disconnection, rain barrels, rain gardens and other residential efforts help people see how they can be part of the solution.

Green infrastructure delivers all these values to make healthier communities, connecting people to the incredible value of cn water. It's hard to see what could have greater economic benefit.



VOICES FROM THE FIELD

Just as there are different shades of green, there are also different shades of green building. Below are a few ways that River Network Partners are encouraging green practices throughout the country.

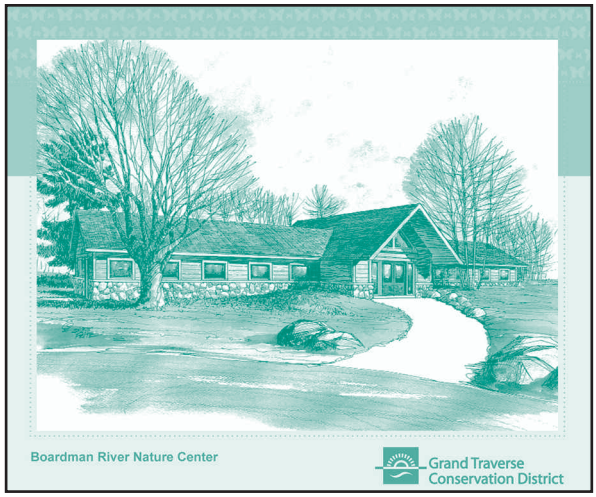
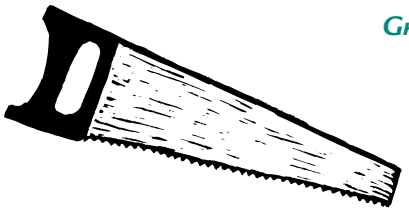


Photo credit: Grand Traverse Conservation District

The Grand Traverse Conservation District (GTCD) has worked with community members, construction contractors, architects, builders, designers and engineers to implement many "green" building techniques in the construction of the Boardman River Nature Center in Traverse City. A few examples include Insulated Concrete Forms construction, use of local/recycled/reused materials, recycling and reusing construction waste, use of a temporary energy efficient corn burning stove and use of ecologically safe finishing materials. These construction techniques will make the building more energy efficient, lead to receiving Green Certification by Built Green Grand Traverse and to serve as a model for Green construction. The GTCD staff looks forward to sharing the Grand Opening of the Nature Center with the public in summer 2008.



Grand Traverse Conservation District (MI)
www.gtcd.org

The U.S. EPA is applying emerging low impact development (LID) practices in Lower Downtown Denver. The new EPA office building, a gold LEED certified new building, is using a green (vegetated or eco) roof to reduce stormwater discharge from the roof to the South Platte River basin. The roof is an "extensive" green roof, meaning that it is not a rooftop garden or a landscape architectural feature that is intended for recreational purposes or purely for aesthetics, though the vegetation is much more aesthetically pleasing than a bare roof with a typical impervious membrane or with gravel ballast. The primary goals of the project are to mitigate stormwater runoff loading from the roof, to reduce urban heat island effects and to perform applied research to determine the efficacy of this emerging technology in the high elevation, temperate, semi-arid Front Range region. The EPA has partnered with Colorado State University, Urban Drainage and Flood Control District, Denver Botanic Gardens, Alliance for Sustainable Colorado and others to perform applied research and monitoring activities.

U.S. Environmental Protection Agency
Office of Technical & Management Services Region 8 (CO)
www.epa.gov/oaintrnt/facilities/denver-hq.htm
www.epa.gov/sciforum/2006/poster_abstracts/built_environment/BE_Brady.pdf.

The Charles River Watershed Association's "Blue Cities" Initiative takes a water-oriented approach to redevelopment in urban areas. Going beyond "green" building, "blue" development incorporates designs for the built environment that engage with every stage of the water cycle. This approach to urban redevelopment is designed to sustain and restore water resources by identifying critical watershed problems in a given area, identifying potential solutions to those problems and bringing people together to build support for restoration efforts. Blue development focuses on urban hydrology, and incorporates a variety of environmental sustainability concepts like Smart Growth, Low Impact Development (LID), Green Building, etc. at various planning and design scales.

Blue development offers a comprehensive approach for addressing a variety of problems faced in the urban water environment including flooding, declining base flows in streams, groundwater recession, water quality violations, eutrophication, build-up of contaminated sediment, loss of habitat and recreational opportunities, polluted stormwater runoff, combined sewer overflows and excessive thermal loading. The overarching goal is to help the urban watershed function like a natural watershed: collecting rainfall, filtering it through plants and soils, storing it for use in dry seasons and releasing it, clean and cool to the River. The approach recommends the pursuit of policy and design innovations that can help improve water quality, reduce flooding, provide habitat, contribute to groundwater recharge and foster beautiful networks of pedestrian corridors and open space.

Blue development offers opportunities to restore natural hydrologic functions and create a healthier, more pedestrian friendly urban environment in addition to addressing environmental problems. By employing water-sensitive design within the architecture, landscape architecture and engineering of cities, we can improve the health of the River and its surrounding neighborhoods.

Charles River Watershed Association (MA)
www.crwa.org

Photo credit: Charles River Watershed Association

Milwaukee Metropolitan Sewerage District (MMSD) hired The Conservation Fund (TCF) to run Greenseams. Greenseams identifies and purchases undeveloped, privately owned properties in areas that are expected to have major growth in the next 20 years and parcels of open space along streams, shorelines and wetlands. Sales are completely voluntary. TCF is a national non-profit conservation organization that forges partnerships to protect America's legacy of land and water resources. All land acquired will remain as open space, protecting water and providing the ability to naturally store rain and melting snow in critical areas. Wetlands maintenance and restoration at these sites will provide further water storage.

Milwaukee Metropolitan Sewerage District (WI)
www.mmsd.com/floodmanagement/greenseams.cfm

Photo credit: Prairie Rivers Network

Prairie Rivers Network of Illinois recently worked with Land of Lincoln Legal Assistance to design a rain garden for their new commercial property in downtown Champaign. The over 1,000 square foot rain garden drains the property's paved parking lot and mimics a gravel stream channel with native plants securing and beautifying the mulched slopes. The rain garden was designed to be deep and large enough to handle the worst storms, and saved Land of Lincoln thousands of dollars in municipal sanitary sewer fees.

Prairie Rivers Network (IL)
www.prairierivers.org

The Village of Cross Plains is part of the Black Earth Creek watershed; in 2006 they constructed the first LEED (Leadership in Energy and Environmental Design) library in the State of Wisconsin (see www.cross-plains.wi.us for info and photos of the library). While BECWA was not actively involved in lobbying for the new library, we have been an active voice in the community to protect and highlight the value of the Creek for over 20 years. When we celebrated our 20th anniversary in October of 2007, we presented the Library with one of our awards—for an Outstanding Green building, contributing to the health of the Black Earth Creek.

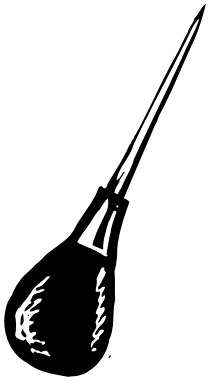
Black Earth Creek Watershed Association (WI)
www.becwa.org

We are a coalition of landowners, businesses, non-profits, neighborhood associations and local, state and national agencies that have joined together to protect the urban stretches of the Milwaukee River. We are working to create a protected greenway that will preserve and improve water quality and the natural habitat and provide public access to the river valley. We are working with the City of Milwaukee and suburbs to establish, by municipal zoning, a viewshed in the river valley that regulates new development along the river's edge. The Village of Shorewood has already crafted their municipal shoreland zoning ordinance and will soon acquire the last private bluff properties which will be transferred to public hands. They are also beginning a trail construction and bluff restoration project on these lands. The City of Milwaukee voted to enact a 2-year interim study period in which to work out the details of the greenway proposal.

Milwaukee River Work Group (WI)
www.protectmilwaukeeriver.org

Photo credit: Center for Watershed Protection

Rain Garden Construction



We will soon open the Herring Run Watershed Center, a silver-LEED project. The Herring Run Watershed Center will be a vibrant community resource that promotes green spaces and a clean Herring Run Watershed in more than 50 Baltimore City and Baltimore County neighborhoods. The building will feature a number of green technologies including a green roof, toilets that will be flushed with water diverted from the roof, denim and corn-based foamed insulation, one composting toilet, Solartubes that will bring light into the lower level, low-VOC materials and much more. Environmental programs for children and families, teachers, builders and others will be offered. The Herring Run Watershed Association raised over $500,000 for the renovation of the former bakery.

Herring Run Watershed Association (MD)
www.herringrun.org

Photo credit: Hunter Nichols

In 2005, the Cahaba River Society faced strong developer opposition to recommendations that development design standards should be raised to protect watersheds. We believe that resistance was due to unfamiliarity with low impact development (LID) techniques, which fueled fears that these requirements would "cost too much" and "stop all growth." We have since focused on education, using strategies of one-on-one meetings with development and local government professionals, partnering in LID training and instituting "Blue-Green Development" awards for projects using good LID design.The recent surge in the green building movement in our region is producing many young professionals in engineering, architecture, etc. and interested developers who are more knowledgeable and are producing successful projects that prove LID is technically feasible and cost-effective.

Cahaba River Society (AL)
www.cahabariversociety.org

We convened a group of stormwater experts, developers and members of local governments to develop recommendations for reducing the impacts of urban runoff on Oregon's streams and groundwater. The report, *Stormwater Solutions: Turning Oregon's Rain Back into a Resource* is available at www.oeconline.org/rivers.

Following up on one of the recommendations from the Stormwater Solutions Team, it looks like our funding proposals will be successful and this fall we will be able to launch a series of low-impact development workshops for local governments, designers and developers in Western Oregon, outside the Portland metro area. We're working with Oregon State University Extension's watersheds program and as we hone in on the specific locations of the workshops we would love to partner with local watershed councils.

Finally, our annual Forum for Business and the Environment will focus on sustainable communities this year. One of the forums is titled "The Next Green Building Revolution: Zero Impact and Better." The forums will take place spring through fall 2008.

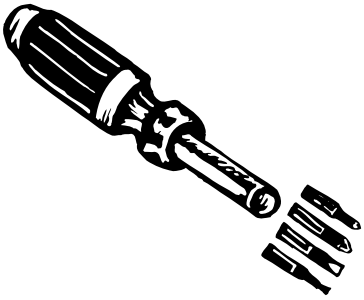
Oregon Environmental Council (OR)
www.oeconline.org

The New York City Council passed legislation in early 2008 to tackle the sewage overflow problem in the City's overburdened sewer system. The legislation advances the implementation of green design elements, which mimic nature's own filtering systems, into the City's existing streets, parks and other public spaces and into existing and new development projects.

Storm Water Infrastructure Matters (S.W.I.M.) – a coalition of more than 50 organizations, including community and environmental groups, environmental justice organizations, architects, water engineers and community development corporations—partnered with Councilmember James Gennaro, Chair of the City Council's Environmental Protection Committee, to advance the landmark legislation. In addition to providing a roadmap for solutions to the CSO problem, the law requires the City to notify the public when sewer overflows occur, so recreational boaters, kayakers, swimmers and fishermen can take appropriate precautions.

The S.W.I.M. coalition also supports other initiatives pending before the City Council and City Planning Commission to promote the use of green infrastructure in New York City, including zoning and other legislative requirements that would ensure that all of the million trees to be planted under PlaNYC are installed in common-sense ways that optimize their stormwater capture potential.

Natural Resources Defense Council (NY)
www.nrdc.org



Friends of Rock Creek's Environment (FORCE) obtained a grant from the District of Columbia's Department of the Environment to install eight demonstration projects at private homes, one in each of the city's eight wards. The projects have five components: a rain garden, bayscaping (creek-friendly landscaping), replacing hard surfaces with pervious paving, a rain barrel and tree planting. They are designed to show how people can make changes in their own yards to address the problem of stormwater.

Friends of Rock Creek's Environment (DC)
friendsofrockcreek.org

Photo credit: Center for Watershed Protection

For our county's General Plan Update, we gave a presentation to the Planning Commission on the function of riparian areas and meadows in storing water and keeping it clean, and the places in our county with concerns. We also included information about the water cycle, the importance of infiltration and left them with handouts from NEMO: *Nonpoint Education for Municipal Officials*.

Feather River Coordinated Resource Management Group (CA)
www.feather-river-crm.org

Chippewa Creek is a tributary to the historic Cuyahoga River. It flows through 3 communities before it enters the river in the Cuyahoga Valley National Park. In 2006 it endured a 500 year rain event which helped motivate the local communities to support a watershed based management plan. The *Cuyahoga River Remedial Action Plan* (RAP) secured a grant to be part of a Pilot Project sponsored by the Ohio Lake Erie Commission to develop a watershed plan based on Balanced Growth Principles. The workshop will review the extensive use of GIS-based analysis and community feedback that established Priority Conservation Areas which protect critical watershed features.

Special analysis for wetlands and wetland stressors were also developed using a newly developed system to identify Restoration Potential for wetlands in a suburban setting.

The Plan also links community BMPs to the protection of the critical watershed features. The analytical process the RAP used has become the model for watershed planning for other Cuyahoga Tributaries.

Cuyahoga River Remedial Action Plan (OH)
www.cuyahogariverrap.org

Photo credit: Center for Watershed Protection

Short Setbacks

Building "green" was once considered a cause advocated mostly by hardcore environmental groups. Not so today. With rising energy costs and emerging technologies catching on, "green" buildings are smart solutions for both businesses and homeowners serious about reducing pollution, mitigating environmental impact and saving money.

The Chesapeake Bay Foundation's (CBF) Philip Merrill Environmental Center, which opened in 2001, is one of the world's most energy-efficient buildings, incorporating natural elements into a fully functional workplace which has minimal impact on its Bay- and creek-front surroundings. The center and its sophisticated systems have won international acclaim as a model for energy efficiency, high performance and water conservation.

The Merrill Center is an interactive model that educates and inspires people, including hundreds of businesses, organizations and government agencies. It is extremely cost effective and operates in harmony with the land, natural resources and the Chesapeake Bay, proving that "green" buildings work. Our facility also proves that it isn't necessary to lose comfort or beauty to build responsibly.

Chesapeake Bay Foundation (MD)
www.cbf.org

Since 2001, the Farmington River Watershed Association (FRWA) has worked with seven towns in the Farmington Valley of Connecticut on the Farmington Valley Biodiversity Project—an effort to survey, map and conserve biodiversity in the region. Through this project we tripled the amount of natural resource information available for the region in the State's Natural Diversity Database, and each town has incorporated "biodiversity" as a value to be protected into their town Plan of Conservation and Development. Today, we have a Land Use Specialist who is working with the town leaders, planners and engineers to incorporate "best development practices" to preserve biodiversity and protect water quality. Cool biodiversity maps of each town and other resources can be found on our website if you go to www.frwa.org/land_use.html and then click on the "Farmington Valley Biodiversity Project" hyperlink.

Farmington River Watershed Association (CT)
www.frwa.org

Photo credit: Center for Watershed Protection

Residential Rain Garden

Friends of Milwaukee's Rivers has worked to install rain gardens/rain barrels in neighborhoods and at a school. We've also worked with city officials on design guidelines, especially in zones near rivers. We have one especially intense project going on for the Milwaukee River in the City of Milwaukee. This last one is a collaborative project, but we're the fiscal agent and fundraiser for the project and we employ the lead person.

Friends of Milwaukee's Rivers (WI)
www.mkeriverkeeper.org/projects/home.htm

Merrimack River Watershed Council (MRWC) has been advocating within the Merrimack Valley for Low Impact Development (LID) designs including vegetative roof covers (aka green roofs). One obstacle we encounter are engineers and architects who create green roof designs at a "Rolls-Royce" level, when a "Toyota Prius" level would be cost effective and economically efficient. Part of the problem is that (1) a Rolls-Royce design has a prohibitive cost that discourages property owners to construct green roofs, and (2) mortgages are not set up to account for an extended life on the roof. When a developer attempts to take out a loan it is normally on a 30-year payable schedule even though a green roof has more than double the life of a conventional roof. It seems to me that watershed groups need to educate developers as well as the financial institutions that will support these products. In response to the cost savings of green design, a few financial institutions have developed "green mortgages."

Merrimack River Watershed Council (MA)
www.merrimack.org

Code and Ordinance Worksheet:

Understanding Your Local Development Rules

Extracted with permission from the Center of Watershed Protection's *Code and Ordinance Worksheet*

The Center for Watershed Protection's Code and Ordinance Worksheet allows an in-depth review of the standards, ordinances, and codes (i.e., the development rules) that shape how development occurs in your community. You are guided through a systematic comparison of your local development rules against model development principles. Institutional frameworks, regulatory structures and incentive programs are included in this review. The worksheet consists of a series of questions that correspond to each of the model development principles. Points are assigned based on how well the current development rules agree with the site planning benchmarks derived from the model development principles.

The worksheet is intended to guide you through the first two steps of a local site planning roundtable.

- Step 1: Find out what the development rules are in your community.
- Step 2: See how your rules stack up to the model development principles.

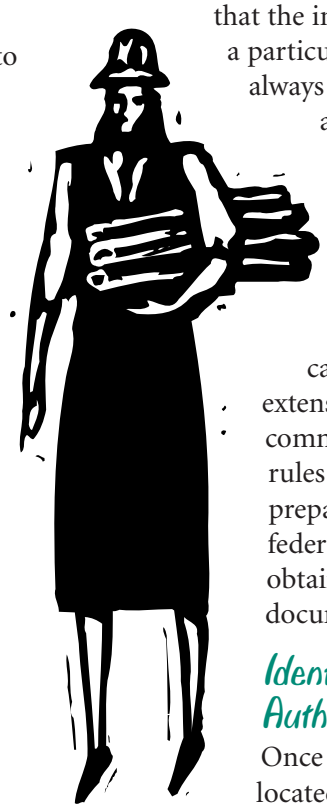
The homework done in these first two steps helps to identify which development rules are potential candidates for change.

Getting Started

Initially, two tasks need to be performed: you must identify all the development rules that apply in your community; and you must identify the local, state, and federal authorities that actually administer or enforce the development rules within your community. Both tasks require a large investment of time and a team approach may be beneficial. Consider enlisting the help of a local plan reviewer, land planner, land use attorney, or civil engineer. Their real-world experience with the development process is often very useful in completing the worksheet.

Identify the Development Rules

Gather the key documents that contain the development rules in your community. A list of potential documents to look for is provided in the worksheet. Keep in mind that the information you may want on a particular development rule is not always found in code or regulation, and may be hidden in supporting design manuals, review checklists, guidance documents or construction specifications. In most cases, this will require an extensive search. Few communities include all of their rules in a single document. Be prepared to contact state and federal, as well as local agencies to obtain copies of the needed documents.



Identify Development Authorities

Once the development rules are located, it is relatively easy to determine which local agencies or authorities are actually responsible for administering and enforcing the rules. Completing this step will provide you with a better understanding of the intricacies of the development review process and helps identify key members of a future local roundtable. Creating a table provides a simple framework for identifying the agencies that influence development in your community.

Completing the Worksheet

Once you have located the documents that outline your development rules and identified the authorities responsible for development in your community, you are ready to compare your development rules to the model development principles. The worksheet presents seventy-seven site planning benchmarks posed as questions. Each benchmark focuses on a specific site design practice, such as the minimum diameter of cul-de-sacs, the minimum width of streets, or the minimum parking ratio for a certain land use. You should refer to the codes, ordinances, and plans identified in the first step to determine the appropriate development rule. The questions require either a yes or no response or specific numeric criteria. If your development rule agrees with the site planning benchmark, you are awarded points.

Calculating Your Score

A place is provided on each page of the worksheet to keep track of your running score. In addition, the worksheet is subdivided into three categories:

- Residential Streets and Parking Lots
- Lot Development
- Conservation of Natural Areas

For each category, you are asked to subtotal your score. This "Time to Assess" allows you to consider which development rules are most in line with the site planning benchmarks and what rules are potential candidates for change.

The total number of points possible for all of the site planning benchmarks is 100. Your overall score provides a general indication of your community's ability to support environmentally sensitive development. As a general rule, if your overall score is lower than 80, it may be advisable to systematically reform your local development rules. A score sheet is provided at end of the worksheet to assist you in determining where your community's score places in respect to the Model Development Principles. Once you have completed the worksheet, go back and review your responses. Determine if there are specific areas that need improvement (e.g., development rules that govern road design) or if your development rules are generally pretty good. This review is key to implementation of better development: assessment of your current development rules and identification of impediments to innovative site design. This review also leads directly into the next step: a site planning roundtable process conducted at the local government level. The primary tasks of a local roundtable are to systematically review existing development rules and then determine if changes can or should be made. By providing a much-needed framework for overcoming barriers to better development, the site planning roundtable can serve as an important tool for local change.

Download the Code & Ordinance Worksheet—included in the *Better Site Design* handbook—for free at www.cwp.org/PublicationStore/bsd.htm.

CASE STUDY

Using Local Development Codes to Protect the James River

by Bill Street
Executive Director
James River Association
www.jamesriverassociation.org

The James River is Virginia's largest river, flowing across the entire state from its beginning at the headwaters of the Cowpasture and Jackson Rivers in Bath and Highland Counties, to its mouth at the Chesapeake Bay in Hampton Roads. The James is Virginia's largest tributary to the Chesapeake Bay. The river is 340 miles long, which makes it one of the longest rivers in America that begins and ends in the same state.

The James River Watershed encompasses approximately 10,000 square miles, which makes up almost 25% of the state. It is home to one-third of all Virginians who live in its 39 counties and 19 cities and towns, and touches the lives of more Virginians than any other feature on the landscape.

One of the greatest threats affecting the future health of the James River is development of the land in the watershed. Removal of vegetation close to waterways loosens the soil and allows for sediment run-off, which smothers river life, blocks out much-needed sunlight, and carries pollutants into the water. However, new environmentally friendly development practices have been developed that can reduce water quality impacts of new development.

In 2007, James River Association (JRA) held a symposium to present the findings of its Building a Cleaner James River project which reviewed the development codes of the 45 major counties and cities in the James River watershed. The symposium was a joint effort of JRA and our project partners: Virginia Tech, University of Virginia, Virginia Commonwealth University, and the Center for Watershed Protection. The audience included local government representatives as well as state agencies, conservation organizations and private citizens.

Key recommendations resulting from the analysis include:

- The need to restore and improve riparian buffers throughout the basin by establishing stream buffer ordinances beyond those localities under the jurisdiction of the Chesapeake Bay Preservation Act;
- Specifically allowing environmentally friendly practices, such as rain gardens, into local code;
- Reducing the amount of impervious surface with development;
- Zoning for cluster development; and
- Designating growth areas based on critical areas assessments.

The locality scores ranged from 14 to 72 (out of 100). "The results show that much work is needed at the local level to remove barriers to environmentally friendly development," said Amber Foster, JRA's Watershed Scientist. "The good news is that many localities in the James River watershed can still protect their vital

environmental assets while accommodating future growth by implementing new environmentally friendly codes and avoiding code conflicts that prevent them."

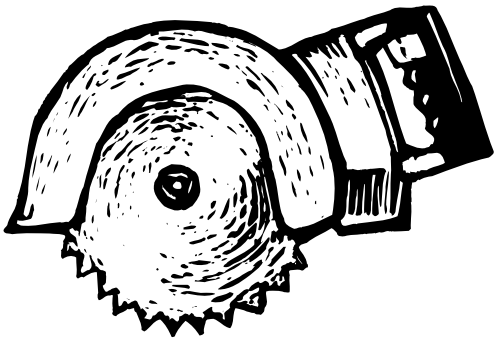
Photo credit: Center for Watershed Protection

Rooftop Runoff to Pervious Surface

The most urgent need to update local codes is in rapidly developing counties that scored low in the analysis. Many rural localities also scored low and may appear to be "unfriendly" when it comes to environmentally friendly development rules. However, because these localities are not facing the same development pressures as other jurisdictions, development codes specific to enhancing water quality have not yet been written. Therefore, local officials in these rural localities have time to update codes and ordinances to better protect their local streams and the James River.

"This analysis is the first step in increasing awareness and understanding of the benefits of environmentally friendly development practices," said Bill Street, JRA Executive Director. "We hope each locality will initiate a process to remove obstacles and create incentives for environmentally friendly development practices. It is the only way to ensure a cleaner James River for our children and future generations."

To see the final project scores for each locality, visit www.jamesriverassociation.org/watershed4.html.



Tips for Infiltrating the Development Community:

Learning to Talk the Talk

by Anne Kitchell

Watershed Planner
Center for
Watershed Protection

www.cwp.org

In urbanizing watersheds across the county, river conservationists have battled for decades with the development community against new big box retail and cookie cutter residential construction projects that threaten the quality of downstream waters. While we've managed a few victories, on balance, I'd argue that the rivers have lost. Our wetlands are still vanishing, impervious cover is still spreading, and additional urban runoff is still generated at a seemingly unstoppable pace. It's such a downer.

At the Center for Watershed Protection, we commend the passionate souls who continue to fight lousy urban development (you know who they are, the ones elected officials have nightmares about). Without your persistence and vigilance, the concepts of green infrastructure, low impact development and smart growth would never have secured "buzz-worthiness." To help you scoff even louder in the face of future environmental adversity, we offer some tips to enhance your influence in the local land development process:

TIP #1. Select the most appropriate avenue of engagement. If your agenda includes the words ***no new development ever***, complaining at a public hearing over a specific site plan is like showing up late for the dance. You need to be working with local staff during comprehensive land use planning when decisions are being made about *where* new development should and should not occur. Opportunities for public input generally happen on a five-year revision cycle, though we encourage you to become very familiar with your current comprehensive plan. Community vision statements have been successfully used to prevent new development, and frequent re-zonings/annexations contrary to these plans occur when we stop paying attention. You should also get involved with land conservation activities, such as greenway planning, fund raising for land acquisition or negotiating easements for a local land trust.

If ***minimize impact of new development*** characterizes your agenda, then you should insert yourself into the development approval process. Success here will be determined as much by the permitting process structure as by your relationship with the developers and plan reviewers. Public hearings offer the typical forum for comment, but by this time, enough resources (a.k.a. *cha-ching*) have gone into engineering and design that changes to the site plan are often too costly to be considered. However, if the approval process requires submittal of a concept plan and meeting earlier in the process, design changes can be addressed before too much *cha-ching* is spent. If not, try to meet with the developer and/or plan review staff individually to discuss your concerns and suggestions. Once the bulldozers are rolling, shift to a watchdog role and make sure erosion controls are working and that natural areas remain protected.

TIP #2. Enroll in *Land Development 101 for Advocates.* Two things matter to the development community—time and money. Learn how to speak about the benefits of better site design in these terms, and you'll be speaking their language. To do this, we recommend an immersion course in the land development process. You don't have to be an expert, but you should have a basic understanding of your local development process, the regulatory structure framing design decisions and techniques for environmentally sensitive site design. It's important to know all the hoops and hurdles of the approval process so you can determine where to best jump in. You may see opportunities to educate the development community on the cost

savings and water resource benefits of better site design. Insight into where developers step out of the picture (i.e., post-construction stormwater maintenance, homeowner education, etc.) may also help you in thinking about long-term site design implications.

Recognize that developers and their hired engineers often make choices based where the complex web of local, state and federal regulations pushes them, rather than on what they prefer. Therefore, it is critical you learn about local zoning and subdivision requirements, such as lot sizes and setbacks, local drainage and stormwater codes and state and/or federal wetland and stream permits. You will find that stormwater regulations are quickly becoming a tremendous force for influencing development projects.

Not only should you be able to read a site plan, you should be able to critique them to ensure they minimize impervious cover, protect remaining natural areas on site, and capture and treat stormwater in an efficient manner. With practice, you will be able to identify "red flags" (i.e., large cul-de-sacs, buffer encroachment, square stormwater ponds, etc.) and offer alternative design suggestions. There are many resources out there to get you up to speed quickly, starting with our *Better Site Design Handbook* (www.cwp.org/PublicationStore/bsd.htm).

TIP #3. Grease the wheels for environmentally sensitive site designs. Many communities have antiquated development codes on the books making it difficult (if not impossible) to apply innovative practices. If your suggestions for improving site designs are good, but don't make it through the regulatory web, then they probably won't be embraced. Developers are not typically interested in lengthy submittals and uncertain variance procedures to overcome these obstacles. Frankly, most plan reviewers are swamped and aren't keen on approving designs not clearly included in the codes either. Shouldn't it be easier (or at least equally laborious) in the 21st century to get environmentally sensitive designs approved than conventional designs? It is critical we work with local regulators to identify and remove these barriers in order to implement better designs. Check with your local planning department to see when the next development code update is scheduled (usually every 5-10 years), or use concurrent state or local revisions to stormwater or wetland standards as an excuse to revise on the fly. Consider holding a consensus-based roundtable with developers, local staff and environmentalists to recommend specific changes to your local codes.

TIP #4. Be sure to account for global climate change. Um, just wanted to mention it because everyone else is. I'm sure it's relevant…

TIP #5. Break bread with the development community. More so than anything else, developers, regulators and elected officials should know your intentions for promoting development with less impact—this should happen in a friendly and cordial way. Remember that developers, like people, are going to respond better to food and libation than they will to wild-eyed, environmental preachers wanting to protect "every wetland that could have been." In many cases, you can find common ground (i.e., less impervious cover = less capital costs for them, more trees = higher property value). I'm not saying there is no place for staunch advocacy, but for that $7.95 for the lunch buffet you spend introducing yourself, your concerns and your ideas will be money well spent.

CASE STUDY

Steps Your Community Can Take to Make a Green Vision a Reality:

Build it Green

by Julie Noble
River Network

www.rivernetwork.org

Is sustainable development an issue in your community? It should be. Chances are if you are living in an urban area, your municipality has already taken steps towards sustainable design by incorporating strategies for building it green. Is your community poised on the brink of change, ready to take the next step? Studies have shown cities that have the capacity to raise local taxes for sustainable development and a higher degree of local self-determination are better placed to make real changes. Make it a quality of life issue. What kinds of changes do you see your community facing in the next five, ten or twenty-five years? Are there issues of sprawl, resource allocation or population shifts that need to be addressed? Building it green means taking a holistic approach and building environmentally and economically progressive infrastructure. Does your city have enlightened civic leaders and a general public determined to make change happen with an active partnership with local businesses? OK, maybe not in those perfect conditions…but it is possible to take your community down a path of sustainability by building your next project green.

Now more then ever, the benefits of building green outweigh the costs to our cities and the global economy. What steps can your community take to understand and successfully implement a city wide green building initiative? To delve deeper, let's look to Portland, Oregon, a bastion in the lead to build it green. On January 10, 2001, Portland City Council unanimously adopted the Portland Green Building Policy that requires green building practices in all City-funded and financed projects. With a hotline up and running for green building information and a recent number one spot on *Popular Science's* Top 50 green US Cities, Portland is leading the way. How did this mid-size city on a major river get to this point?

According to the *Rethinking Development Progress Report and 5 Year Strategic Plan* by the Portland Office of Sustainable Development, "Green building provides the framework and tools to build in an economically advantageous manner while conserving natural resources and minimizing the ecological degradation from the built environment." Benefiting our communities, businesses and the world around us, green building has far reaching and lasting impacts. In *Rethinking Development,* the Office of Sustainable Development concretely identified several benefits to Portland's residents and businesses, including:

- Providing long-term financial savings for building owners and occupants;
- Saving energy and natural resources;
- Helping the city meet its goals to reduce global warming;
- Reducing the use of toxic materials;
- Enhancing the quality of indoor environments;
- Minimizing site impacts by protecting and enhancing natural spaces; and
- Minimizing damaging storm water runoff and construction-related erosion.

In Portland, Green Building expertise and technologies are central elements in an emerging environmental industry sector and provide the opportunity to strengthen and diversify Portland's economy. Portland's population has been on the move in recent years. By utilizing strategic planning processes that opened the door for smart development to truly take hold and by promoting and applying green building practices, the city has helped to stimulate

economic growth. To accomplish these objectives, Portland's Office of Sustainable Development has identified three barriers to successful green building initiatives: lack of information, regulatory hurdles and financial obstacles. From this the office suggests four strategies to achieve successful green building initiatives:

- organizational and policy development;
- demonstration projects;
- technical resources/outreach; and
- incentives.

These are strategies that strive to overcome current gaps in information and services related to green building practices. Portland has reached its green building goals by calculated cooperation and by engaging the public at large.

Organizational Policy and Development

Portland City Council, built on the City's international reputation for balancing community development, growth management and environmental stewardship, articulated a strategy for improving the quality, cost effectiveness and safety of the built environment while reducing stress on the natural environment. A major part of this strategy was the creation of Portland's Office of Sustainable Development, in which the Department of Green Building is housed.

The Office of Sustainable Development describes its orgins:

> *In 1994, a multi-disciplinary volunteer citizen group called the "Sustainable Portland Commission" was created to inform city council decisions concerning sustainable development. Soon thereafter, the citizen group commissioned a planning process exploring the potential for a green building technical assistance program and produced two principal documents: the Green Building Options study and the Green Building Initiative . In 2000, Commissioner Dan Saltzman took the Action Plan from theory to practice by rewriting the Initiative as the Green Building Policy and creating the Green Building Division, in the City's Office of Sustainable Development (OSD). Saltzman also developed the Green Investment Fund (GIF) to support the Green Building Division's staff and program. In addition, to keep with the local tradition of citizen advisory, Saltzman gathered a citizen GIF Design Committee to advise OSD staff on how to structure an incentive program that promotes green building in the commercial and residential sectors of the City. The result of these efforts was the creation of G/Rated : the City of Portland's Green Building Program, G/Rated, represents a partnership of six development-related City bureaus and other local organizations. Though its programs and services, G/Rated focuses on organization and policy development, demonstration projects, technical assistance, educational outreach and financial incentives. For residents of the city of Portland, G/Rated acts as a centralized resource for people*

cont. on page 32

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interested in incorporating green building practices in residential and commercial development. The G/Rated program is funded through residential and commercial solid waste fees, grants and contracts. Sponsorships and tuition pay for additional programs and events, such as the annual Build It Green!

Demonstration Projects

Entering into its seventh year, the *Build it Green! Tour of Homes and Information Event* is a self guided tour that takes place in Portland. Highlighting the best in green building and sustainable design, it is an inspiration that can be taken at your own pace online or on the street. The 2007 tour highlighted carbon neutral homes showcasing cohousing and shared space, natural building and high density urban homes.

Technical Resources/Outreach

Choosing the materials by which you build for energy efficiency and in a socially responsible manner can be a daunting task for even the most experienced green builder and simply an overwhelming one for the novice. The Cascadia Region Green Building Council (Cascadia) stretches across coastal Oregon, Washington, Canada and Alaska and is a chapter of both the U.S. Green Building Council and Canadian Green Building Council. Cascadia has partnered with an ever growing number of companies and green building professionals to promote a new direction in building green. Sensing the need for green building practitioners to have access to a more sustainable palette of building materials—from the foundation materials to the exterior paint—and to keep ahead of the demand for more efficient and innovative building materials and energy systems, Cascadia has risen to the challenge. The Pharos Project, Cascadia's system of rating building materials for the health and longevity of a building's life cycle, takes several different factors into account. The project aims to make the search for finding the building materials that are right for your project by measuring three categories: environmental/resource, social/community and health/pollution with sub-categories that add up to a rating by which an informed decision can be made. The Pharos Product Library online (www.pharosproject.com/library) can help guide you through this process.

Incentives

The Green Building program via Portland's Office of Sustainable Development provides resources for commercial and residential financial assistance through grants, tax incentives, loans and rebates. In their 2007 report *Green Building Incentives That Work* the National Association of Industrial and Office Properties found the three most widely practice incentives in use in U.S. cities today were:

1. Priority in building permit processing and plan review;
2. Tax incentives, particularly property tax abatements, for projects achieving LEED Silver or better certification; and
3. Increased Floor-to-Area (FAR) ratios, which allow a developer to construct more building area than allowed by applicable zoning.

It is obvious that the path Portland took to achieve its status as America's greenest city has been highly successful and can be an inspiration to any city or town thinking about the best way to achieve their green building goals. By highlighting investment opportunities, events to engage and inform the public and a strong partnership with local businesses, Portland has unpaved the way for other cities to follow suit.

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❑River Talk! Communicating a Watershed Message ❑Listening to Watersheds - A Community-Based Approach to Watershed Protection ❑Testing the Waters - Chemical & Physical Vital Signs of a River

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River Network works to support you and your needs. We provide training and technical assistance to our Partner groups. River Network does not promote legislation or represent your organization in legal matters.

Resources & References

REPORTS & ARTICLES

Americas 50 Greenest Cities. Popular Science reviews of some of the greener U.S. cities. www.popsci.com/environment/article/2008-02/americas-50-greenest-cities?page=1

The Environmental Benefits and Costs of Green Roof Technology is a 2004 study for the City of Toronto on the potential environmental benefits of widespread implementation of green roofs to the City of Toronto, given the local environment and climate. www.toronto.ca/greenroofs/findings.htm#study

EPA Study on LID Costs provides information to cities, counties, states, private-sector developers and others on the costs and benefits of using Low Impact Development (LID) strategies and practices to help protect and restore water quality. www.epa.gov/owow/nps/lid/costs07/

Let it Rain: From Runoff to Renewal, is Freshwater Future's collection of stories of successful stormwater management projects. http://glhabitat.org/stormwater.html

MANUALS & TOOLKITS

Catching the Rain and Local Solutions – A Toolkit for Community-Based Stormwater Initiatives (forthcoming) by American Rivers. www.americanrivers.org/site/PageServer?pagename=AR7_CatchingtheRain_Pubs

From Rooftops to Rivers is a National Resource Defense Council policy guide created for decision makers looking to implement green strategies in their own area. The guide includes nine case studies of cities that have successfully used green techniques to create a healthier urban environment. www.nrdc.org/water/pollution/rooftops/contents.asp

The Green Building Resource Guide is a database of over 600 green building materials and products selected specifically for their usefulness to the design and building professions, rather than merely their green material content. www.greenguide.com

The Household Guide to Green Building www.resourcesaver.org/file/toolmanager/CustomO16C45F87831.pdf

Managing Wet Weather Using Green Infrastructure, by U.S. EPA, explains the usage of green infrastructure management approaches and technologies infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies. http://cfpub.epa.gov/npdes/home.cfm?program_id=298

The Center for Watershed Protection's Manual 3: Urban Stormwater Retrofit Practices is described on page 33 http://cwp.org.master.com/texis/master/search/+/form/usrm3.html

PROGRAMS, ORGANIZATIONS & WEBPAGES

Cascadia's Pharos Project seeks to define a consumer-driven vision of truly green building materials and how they should be evaluated in harmony with principles of environmental health and justice. www.pharosproject.net/index.php

Construction Materials Recycling Organization promotes the safe and economically feasible recycling of the more than 325 million tons of recoverable construction and demolition materials that are generated annually in the United States. www.cdrecycling.org

EarthCraft House Program, created in 1999, is a residential green building program of the Greater Atlanta Home Builders Association in partnership with Southface. This program serves as a blueprint for energy- and resource -efficient homes. www.earthcrafthouse.com

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. www.energystar.gov

Green Building Science Center combines building physics, systems design concepts and an awareness of sustainability to promote the design and construction of buildings that are more durable, healthier, more sustainable and more economical than most buildings built today. www.buildingscience.com

Green Communities is the first national green building program developed for affordable housing. Green Communities focuses on the use of environmentally sustainable materials, reduction of negative environmental impacts and increased energy efficiency. Additionally, they emphasize designs and materials that safeguard the health of residents and locations that provide easy access to services and public transportation. www.greencommunitiesonline.org/GreenCriteria.pdf

Green Seal works with manufacturers, industry sectors, purchasing groups and governments at all levels to "green" the production and purchasing chain. Green Seal utilizes a life-cycle approach, which means they evaluate a product or service beginning with material extraction, continuing with manufacturing and use and ending with recycling and disposal. http://www.greenseal.org

The **GREENGUARD Environmental Institute** is an industry-independent, non-profit organization that oversees the GREENGUARD Certification Program. www.greenguard.org/DesktopDefault.aspx

National Association of Home Builders is designed for those interested in home building and the industry; it contains resources for both members and consumers. www.nahb.org

National Association of Industrial and Office Properties is the international association of developers, owners and professionals of commercial, industrial and mixed-use real estate. www.naiop.org/

Office of Sustainable Development – Green Building is Portland, Oregon's green building program offering free technical assistance for development projects in Portland, educational tours and classes, project guidebooks and grants that support innovative green building practices. www.portlandonline.com/osd

Partnership for Advanced Technology in Housing is a voluntary partnership between leaders of the homebuilding, product manufacturing, insurance, and financial industries and representatives of Federal agencies concerned with housing. www.pathnet.org

The U.S. Green Building Council is a 501(c)(3) non-profit community of leaders working to make green buildings accessible to everyone within a generation. www.usgbc.org

The **University of Illinois Landscape and Human Health Laboratory** is a multidisciplinary research laboratory dedicated to studying the connection between greenery and human health. www.lhhl.uiuc.edu

Using Rainwater to Grow Livable Communities, is the Water Environment Research Federation's website designed to encourage and facilitate the integration of stormwater BMPs into development projects in your area by providing tools and resources for effective communication and implementation as well as in-depth case studies that examine BMP integration in several cities across the United States. www.werf.org/livablecommunities/index.htm

WaterSense, a partnership program sponsored by the U.S. Environmental Protection Agency, makes it easy for Americans to save water and protect the environment. www.epa.gov/watersense

Making What You have Better:

Urban Stormwater Retrofit Practices

The Center for Watershed Protection recognizes that we, as a country, have degraded many of our small urban watersheds. Nearly 80% of them were developed without effective stormwater practices. The key to restoring these watersheds lies in the practice of stormwater retrofitting, which involves subwatershed detective work, storm drain forensics and imaginative design. Until now, no definitive guidance has been available on the art and science of urban retrofitting. A new manual, *Urban Stormwater Retrofit Practices*, reflects over two decades of the Center's experience in retrofitting more than 25 urban watersheds across the country. This manual can also just as easily be applied to suburban areas.

The manual outlines the basics of retrofitting, describes the 13 unique locations where retrofits can be found and presents rapid methods to find, design and deliver them to meet a wide range of subwatershed objectives. The concepts of retrofitting are illustrated in more than 75 figures, 150 photos, 60 tables and nine appendices.

The manual also:

- Helps identify the various stormwater treatment options, or retrofits, that are practical for urban areas;
- Helps identify locations for retrofits in the subwatershed;
- Provides a field form and guidance to identify and assess these retrofit locations in the field;
- Addresses common constraints of the urban environment, such as utilities or poor soils, that affect the feasibility of retrofits;
- Provides updated cost information for the various types of retrofits;
- Quantifies the amount of pollutants removed by each type of retrofit; and
- Includes tips for designing, permitting and constructing retrofits.

What makes it unique? *Urban Stormwater Retrofit Practices* provides a systematic process to identify and design stormwater retrofits in constrained urban environments and helps envision possibilities through extensive images and charts. In short, the manual provides all the resources needed to develop an effective local retrofit program. It is appropriate for watershed associations, utility staff, consulting firms and many others.

This 400+ page guidance is available as a free download by visiting the Center's website at www.cwp.org. A hard copy of this document will soon be made available.

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