Ahead of the Learning Curve

Building skill sets for sustainable economic and environmental practice

BY LISA NISENSON

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In one of the most ambitious multiuse public space projects, New York City's Highline Park uses green roof technology on an abandoned elevated rail line.

Sarasota County, located on the west coast of Florida, has a longstanding reputation as an "early adopter" of sustainability. Sarasota County was the first county in the nation to adopt the American Institute of Architects' 2030 Challenge for Carbon Neutrality, following through with policies for carbon neutrality in everything from procurement procedures to water treatment facilities, public transit, and utilization of renewable energy technologies.

Recently, the county benchmarked its progress and found that the early work in "Sustainability 1.0" was no longer sufficient for meeting goals for water quality, open space preservation, and quality of life. In terms used to describe sustainability's evolution, the consulting firm Global Urban Development notes that cities and counties in southwest Florida are now moving past the largely regulatory phases of Sustainability 2.0 into a third version that integrates land use, economic development, and wider adoption of sustainability practices (Nixon and Weiss 2010). Other sustainability experts, notably professor Timothy Beatley of the University of Virginia, have referred to *Sustainability 3.0* to describe building sustainable practice into enterprise development.

However, the shift to Sustainability 3.0 is concurrent with a new economic reality, featuring tighter budgets and staffing shifts, which may include more contract work, smaller staffs, or consolidated operations. Perhaps the biggest challenge for natural resource professionals is the adoption of Sustainability 3.0's rapidly evolving curriculum with smaller training budgets.

This article looks at the next phase of stormwater management and some of the skill-set-building needed to get to the next stage—both in the profession and for watershed management overall. Certainly this is a much larger topic than can be addressed in one article, so this piece looks at several issue areas to tee up discussions to come.

Sustainability 3.0 and Stormwater

Extending the "version" terminology reference above to water management, it is instructive to look at Stormwater 1.0 as the "curb, gutter, and pond" phase of managing runoff. Version 2.0 ushered in the use of low-impact-design techniques for individual projects such as road segments and residential subdivisions. However, this small-scale view of water management often missed cumulative impacts related to development patterns. Moving to Stormwater 3.0, we can expect to better articulate water management at the watershed, subwatershed, and individual project scales.

The shift to redevelopment and retrofit introduces new economic directions and implications for regulatory practices. With the economic slowdown, tools used to address extensive new growth no longer apply, at least to the same degree. Even among redevelopment projects, the economic circumstances can vary, with municipal separate storm sewer systems (MS4s) hosting a range of real estate values and ability to "pencil out" advanced stormwater systems. Stormwater 3.0 recognizes that simply inserting stricter standards into zoning codes will not fix watersheds.

So how do stormwater and sustainability dovetail in the new 3.0 versions of both? There are several wider trends worth noting that imply changes for stormwater management:

1. Stormwater practitioners are under increasing pressure to shift from a stick-driven regulatory approach for runoff management to one that is more carrot-like to foster economic development.
2. Cities and counties around the country are using district-area plans to coordinate economic development, multimodal transportation, open space, and land uses. These efforts pay close attention to retrofit and redevelopment as more localities come to realize they cannot grow their way out of existing watershed problems.
3. Planning and regulation involving green infrastructure is bringing a variety of quantitative measures related to ecological services, and translation of those services into costs and/or savings.
4. Cities and counties are using public-private partnerships not only for road and drainage projects but also for a wider range of activities related to planning, funding, and maintaining the built environment, parks, and open space.

From these trends, three interest issues form a framework for understanding new skill sets needed to address sustainability: new planning models for infill and redevelopment, project management, and public outreach and engagement.

Infill and Redevelopment: A New Middle Level of Planning

While large master-planned communities dominated construction within the county over the past 25 years, infill and redevelopment will comprise a larger share of construction activity moving forward.

This shift presents several new areas of practice with strong stormwater themes. While early low-impact-development (LID) work focused on individual development sites, redevelopment points to new practice areas where building footprints deliberately take up the entire site to support multimodal transportation or historic preservation. This does not rule out green practices, but rather elevates the role of shared infrastructure within a planning area. As such, stormwater engineers can expect a greater role in small-area planning, which means being brought in for the early stages of planning and project design.

Small-area planning is a catchall term for many types of planning efforts, such as a downtown master plan, a transit-oriented development plan, or sector and subarea plans. While master-planned communities represent a type of area planning, the new generation of infill is expected to meet a greater number of environmental objectives. This new "middle level" of planning for infill will present several large shifts in skill sets needed.

Planning Ahead of Time. Small-area planning means communities will be developing plans long before a developer or developers are ready to submit site plans and blueprints. In the past, planning for growth focused on new subdivision platting and a sequence of reviews, including drainage. Small-area planning, where stormwater improvements are envisioned as an incentive, changes this series of steps. Imagine calculating runoff parameters not for individual projects, but for a planning area as a whole to meet a total maximum daily load (TMDL), control flooding, or establish a credit and trading system. This scenario means envisioning buildout ahead of time not from a planner's point of view, but rather from the new intersection of stormwater control and economic development. As runoff rules grow more stringent, the ability to point to a public works project as covering requirements for stormwater control, in part or full, becomes a valuable incentive for developers.

Funding. There will also likely be shifts in current funding programs—for example, use of payment-in-lieu-of fees. Once considered the best management practice (BMP) of last resort, these fees can be used to shape planning programs and incentive plans at the front end of the process. Establishing fee equivalents ahead of time provides predictability, which developers note is a strong incentive.

Planning at the project scale comes with an obvious funder in the project proponent. Likewise, comprehensive and regional plans required by state or federal law command their own line item in local budgets. However, funding for a new middle area of planning among several property owners for future development requires new project management skills,

both in making the case for complex funding, and then in managing those funds within a shared plan context.

Working with Multiple Owners. For counties and suburban areas, infill also presents a shift from large single-owner master-planned communities to redevelopment areas with multiple owners. While cities deal with multiple owners on a routine basis, this may be new territory for suburban areas seeking redevelopment of struggling retail strips and corridors. Landowners, accustomed to planning their own property in competition with neighboring landowners, now must cooperate. One of the more difficult planning exercises involves "who gets what." Imagine what happens when one landowner must accommodate open space and green infrastructure to support other owners' new density. Watershed managers will be called upon to negotiate among multiple interests with promises of fairness, predictability, and a product that mutually benefits all stakeholders involved.

Project Management

Project management is typically associated with discrete projects, such as an intersection improvement project or a stormwater detention facility. The move to Sustainability 3.0 is introducing subtle yet important shifts in teams, budget, and project details.

Communicating Balance Sheets. Key aspects of project management undergoing change can be characterized as "balance sheet" issues. The use of pervious pavers provides good illustration of sustainability's new spreadsheets. In most applications, pervious pavers have a higher materials cost than traditional paving methods. However, the pervious materials can eliminate the need for stormwater ponds. Pervious pavers can also have lower repair costs, because only the area directly above the damaged site need to be lifted and reinstalled. In this example, three budgets often evaluated separately (materials, stormwater, and maintenance) need to be considered together in order to understand the overall metrics of a green road project retrofit.

The ability to move from separate department budgets in a five-year capital improvement plan to a combined lifecycle-cost budget will not be easy. Capital costs often come from large fund sources, such as bonds or federal programs, while maintenance is a local issue scattered among several budgets. Imposing higher capital costs in one department to get lower maintenance costs in the out-years of capital plans in another is understandably not an easy sell. The best champion will likely be a city or county manager who oversees all budgets and forecasts. In the near term, you may need to stick with separate budgets, though include green budgeting in presentations.

Managing for Ecological Services. Infrastructure and landscaping designed to provide ecological services, rather than to serve aesthetic needs, pose significant shifts in outreach, training needs, contract language, and cost tracking.

Plant selection. Plant selection will be dominated by one word: performance. In decades past, the main performance indicator was ornamental value. Pressure on water supply introduced new aspects of performance for drought tolerance. Urban planners have gotten into the game, seeking plants that block noise and light; the term *opacity* is used to describe how thick a vegetated buffer is between two projects. Stormwater management for volume, filtration, recharge, and rates of discharge now heap additional performance requirements on medians, buffers, parks, and open space. Communities will need to develop plant performance matrices based on the myriad expectations of landscaped areas across departments, clients, and the public.

Long-Term Maintenance. With sustainability, landscapers need to shift from a "mow, blow, and go" model of maintenance to one based on a scientific approach, where installations are evaluated until plants and their performance are established. As stormwater rules and reporting grow more quantitative, mere existence of a BMP will no longer suffice for compliance. Thus maintenance contracts will increasingly reflect this shift, as contractors are on the hook for ensuring plant performance, not just plant survival, over time.

Communication. Green infrastructure will pose a shift from landscaping

that provides immediate ornamental appeal, such as bedding plants, to natural plantings that involve several growing seasons to provide both visual and environmental benefits. Urban planners are using illustrations and animated graphics to show how a place "fills in" over time. Green infrastructure needs similar tools not only to educate the public but also to manage expectations for the early years of installation.

Outreach: Rethinking Adoption of Innovations

Low-impact development is often characterized as a return to old practices, but it is really an innovation for most builders, homeowners, and local governance boards. As such, it helps to look at LID as an innovation. In the breakthrough book *Diffusion of Innovation*, Everett Rogers segments various innovation adopters, with emphasis on the "early adopter" group (Rogers 1995). Early adopters are famous for taking on a new technology first, despite initial higher costs and chance for trial and error. Beyond the early adopters lies the next phase, the "early majority" of adopters, those who have a more cautious wait-and-see attitude. Impaired watersheds, however, don't have the luxury of waiting.

What does this mean for LID? It is helpful to look at how the solar industry has examined adopter phases. In 2007, the Solar Electric Power Association surveyed solar customers to determine motivations of adopters and to forecast changes needed to move past the saturated early adopter group (Yasmeen, Taylor, and Shao 2009). While the early adopters surveyed were generally wealthier, had post-graduate degrees, and were driven by environmental concerns, the next bracket of potential customers came with different motivations and characteristics. For solar, the early majority is expected to have a more median income and median education level. This group will be more wary of new technologies, more risk averse, and more worried about system maintenance. The early majority will not be trusting of vendor information, instead relying on third-party verification.

A recent Stanford University study looked at adoption of solar power by zip code and found something remarkable: for every 1% increase in the number of solar panel installations in a zip code, the time until the next adoption of solar decreases by 1% (Bollinger and Gillingham 2010). In other words, adoption of innovation is contagious. This study confirms one of Rogers' key observations: "Most individuals evaluate an innovation not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. These near-peers thus serve as social models, whose innovation behavior tends to be imitated by others in their system." This suggests several areas to rethink with regard to LID.

Public Installations. Governments

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have been among the earliest adopters of LID, using demonstration projects to sell new ideas. But for whom do governments serve as "near-peers," aside from other governments? This does not mean a smaller role for government installations, but rather implies (1) using installations to get to change agents and near-peers, and (2) using demonstration projects to narrow down the list of systems best suited for local conditions and ease of maintenance.

Stakeholder Identification—Who Are the Change Agents? Change agents are those with sway, but they will be different people based on where the community is. For instance, potential vendors and other LID designers with a professional interest will have sway with early adopters, but not so much with the early majority. Change agents for the early majority will need to excel at (1) finding ways to express financial benefits, (2) identifying and addressing risk and concerns, and (3) finding ways to easily ensure long-term performance.

Stakeholder identification also needs to pay attention to sustainability near-peers. In Sarasota County, some of the most impressive sustainability practices are taking root in homeowner associations, with the conversion to renewable energy for common areas and pools. Savings, reaching $100,000 a year in some cases, have sparked wider interest in not only cost savings but also in green approaches writ large. Homeowners association presidents now give tours to their peers on both green energy and landscaping. Though anecdotal, there is also evidence that individual homeowners are adopting green practices based on "proof-of-concept" applications in common areas.

Skill Sets 3.0

What does this say about professional development? There are several areas where watershed practitioners need to seek out professional development in new or overlapping disciplines.

Planning and Economic Development. Stormwater engineers and natural resource managers need to seek out classes and conferences dealing with urban planning and economic development. In particular, look for sessions on small-area plans and community rating systems, such the US Green Building Council's LEED for Neighborhood Development or ICLEI—Local Governments for Sustainability's STAR Community Index. Increasingly, professionals will be called upon to better assign the "right BMP in the right place," so systems like Light Imprint that match BMPs with development context will come into play. Conduct walking tours of successful planning areas to point out both exemplary stormwater practices and missed opportunities. Take planners and the economic development office to key water projects with the goal of showing how to use projects in the future to stimulate economic activity.

Sarasota County

This LEED office building features all-pervious parking.

Quantification. Green infrastructure poses new challenges and opportunities in calculating ecological services and applying those to land use and investment decisions. The use of inventive geographic information systems (GIS) analysis can be used to present issues involving the intersection of land use, water resources, and economic development that are not typically presented together. As noted throughout the article, the ability to quantify the value of shared systems in planning areas, in particular for forecast modeling, will be a highly sought-after skill. For stormwater, this includes credit and trading systems for stormwater volume, treatment, and release rates.

Quantification also relates to money and cost savings. Imagine a city manager going through a capital improvements budget line by line, asking "How can this investment be used for multiple purposes, including economic incentives?"

Communication. Don't think outreach—think diffusion. Phase II of the National Pollutant Discharge and Elimination System emphasizes outreach, and with the new Census data out, there will likely be even more communities seeking effective outreach. However, it is worth asking what a 3.0 approach to public education and outreach looks like.

First, current outreach and education models talk about identifying audiences. While still valid, the field of stakeholder analysis and engagement is advancing rapidly. The 2004 paper "Tools for Policy Impact" provides a good presentation of stakeholder and policy tools that can be adapted to sustain-

ability and sustainable land/water system planning (Start and Hovland 2007). These policy tools are no longer the sole domain of policy and planning colleagues but are for all departments responsible for diffusing sustainable practice. As noted above, identifying adopter phases, change agents, and near-peer groups can help get to the next level of watershed innovation adopters. For example, suppose you have conducted GIS analysis that shows the three neighborhoods best suited to host BMPs based on soil conditions, pollutant interception, and targeted capital improvements. Then what? Research suggests that a contagion model might be useful to find the first vectors or carriers. Are LID installations in the right place to be seen? How can LID be branded as a status symbol or gardening "must-have" feature? If LID does not come with lower costs, how can it be incorporated into existing landscape budgets? What is the best way to make sure people are "exposed"? All too often, outreach materials are developed based on what is easy to produce rather than what catches on.

Project Management. There are several aspects of project management to explore, though a fuller investigation of how to develop effective contract language and project management systems for green infrastructure is needed. As first steps, localities can convene departments and stakeholders to compare standard contract language versus that needed to support high-performing, green installations. This article has highlighted several areas, including stakeholder analysis, changes to interdepartmental activities, integrating long-term maintenance into project design, and working with multiple landowners.

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Lisa Nisenson *with Nisenson Consulting in Sarasota, FL, previously worked in EPA's Office of Policy, Economics, and Innovation.*