Creating Sustainable Landscapes by Interweaving Ecosystem Restoration and Ecological Design: A Report of the September 18, 2009 (3:30-5:00 PM) ASLA Annual Meeting Education Session in Chicago, Illinois—Prepared by Lee R. Skabelund, ASLA

At ASLA's Annual Meeting in Chicago this past September, I had the opportunity to briefly discuss a number of guiding principles related to ecological restoration in urban and suburban settings, and to highlight indicators of "restoration success."

Following my presentation, Allegra Bukojemsky (Biohabitats) described work accomplished in Pittsburgh's Nine Mile Run Watershed—specifically referring to the nine steps involved in restoration design discussed in ASLA's *Successful Ecological Restoration* Landscape Architecture Technical Information Series (LATIS) paper (published online in January 2009).

Andi Cooper (Conservation Design Forum) then highlighted how ideas related to restoration influenced the design of the Kresge Foundation Headquarters in Troy, Michigan.

In 2005, geomorphologist Matt Kondolf and I interviewed 17 experts in the field of ecological restoration (including leading landscape architects and ecologists in academia, and in public and private practice) and found that a number of important themes emerged, including five ideas that should be of no surprise to those who are knowledgeable of planning/design protocols and the application of ecology to design.

The following five ideas, though seemingly obvious to some, bear repeating as they define **key attributes of successful ecological restoration projects**:

A) There is an absolute need for **effective collaboration and communication**—about project intentions, goals and approaches—between planners, designers, relevant agency personnel, other disciplines, as well as clients, stakeholders, and the public.

B) We need to base our project goals upon **a realistic appraisal of what is feasible given current and expected bio-physical and socio-political conditions** in the area and region.

C) We need to **be explicit about desired future conditions** and **establish measurable performance standards related to project intentions, goals, and objectives** if we are to determine a project success.

D) We need to recognize that **invasive species monitoring and management will likely be a part of nearly every ecological restoration effort**.

E) We need to help **build the institutional infrastructure necessary to manage a restored site, ecosystem, or landscape over the long-term**.

Per the professionals we interviewed, indicators of "successful ecological restoration" include two primary outcomes:

1) *the project's effectiveness in meeting stated project goals, objectives, and performance criteria, and*
2) *the ability to create a system that functions in accord with desired ecosystem attributes and conditions.*

How do we determine "desired ecosystem attributes and conditions"? Reference ecosystems should be created using ecological descriptions and species lists of the systems we are seeking to emulate. Additionally, we should draw upon other available and relevant sources of information (as described in many documents published with the support of the Society for Ecological Restoration International).

Other indicators of vital concern in defining the "success" of ecological restoration projects include:

▪ Employing aesthetics to create pleasing human experiences;
▪ Creating projects which are highly acceptable to clients, stakeholders, and the public;
▪ Initiating sustainability of the restored site, ecosystem or landscape by promoting the system's capacity to adapt to its particular setting – ecological and socio-political; creating systems that are productive/regenerative, complex/bio-diverse, and dynamic;
▪ Properly designing, implementing, managing, and monitoring projects by using appropriate references and specifying appropriate materials; employing appropriate tools and techniques, and ensuring that project sites are enjoyed and cared for over the long term;
▪ Optimizing multiple benefits (namely recreation opportunities, aesthetic, spiritual, and educational experiences, and ecosystem services);
▪ Utilizing resources (ecological, cultural, and financial) efficiently and wisely;
▪ Bringing participants together in a meaningful learning process; and,
▪ Helping leverage funds for other conservation and restoration work.

My introduction to our 9/18/09 education session**—*Creating Sustainable Landscapes by Interweaving Ecosystem Restoration and Ecological Design*—**drew upon the writings of some of the foremost thinkers in the circles of ecology, landscape ecology, and ecological restoration.

Of particular interest, I noted Pickett and Cadenasso's call for designers to work closely with plant ecologists and other scientists to better understand how design influences ecological functions in urban settings. Pickett and Cadenasso (2008) also call upon planners, designers, and engineers to recognize the dynamic nature of interwoven ecological and cultural landscapes and to engage in a design process that adequately account for uncertainty and complexity.

So how can landscape architects and designers contribute?

Clear communication, integrative thinking and action, visualization, stakeholder and community facilitation, and ground-truthed plans, designs and construction efforts are essential.

The creative integration of planning and design ideas with actions that restore or reclaim specific sites and landscapes to **functioning ecological systems** (which I argue should be considered as a primary goal for every project) can happen as landscape architects work closely with biologists, ecologists, other scientists, and local community members to understand the historic trajectory of these living, dynamic, multi-dimensional places (past, present, and future).

To achieve our restoration goals in urban settings we need to remember and act **three critical needs and perspectives**: **understanding ecological processes and site context**, **considering possible futures for the area**, and **recognizing the dynamic nature of landscapes and the forces that influence them**.

As we seek to achieve restoration success in the projects we undertake we should recognize the vital and interrelated roles of integration, understanding and communication, and application.

First, we should seek to meet specific project goals related to **stakeholders** in regards to aesthetics, economics, recreation, and other cultural and educational values, **ecological and bio-physical needs and requirements**, and **learning needs**.

Second, we should develop specific goals, objectives, and performance criteria by which we will be able to measure success, including goals related to desired ecosystem functions, conditions, and attributes.

Principles we need to employ in our project efforts include (as noted by many professionals in many different venues) **specifically defining what we mean when we use the term "ecological restoration"** *as well as* terms such as rehabilitation, reclamation, ecological design, water-sensitive design, and low impact development. We do this by **clearly and realistically stating what we are aiming to do.**

Additionally, we need to **state our goals in a manner that can be evaluated by others** (particularly by ecologists and other scientists) – **with a clear explanation of the changes we expect to see in ecosystem patterns, processes, and dynamics**.

Of course, our goals related to expected human interactions with the restored ecosystem also need to be specifically articulated. As examples, we should ask: What levels of physical, mental, psychological, and spiritual involvement do we expect to see? What types of leadership and participant training are needed to achieve our desired ecological and social goals? And, how can we most effectively engage people in really caring about this place, enough that they will take the time to contribute to ongoing, long-term monitoring and management?

According to Geist & Galatowitsch (1999) **helping people feel personally rewarded and part of an actively-contributing community helps engender attachment to place and creates the long-term commitments necessary to restore ecological systems**.

Recognizing restoration myths is a good way to overcome the limitations of simply espousing abstract ideals and remaining in the realm of fuzzy thinking. Not adequately addressing uncertainty in relation to landscape change and system dynamics, and oversimplification of restoration approaches can each thwart our ideals for restoring ecological systems.

Many people seem to think that ecological restoration can do in a matter of years what takes decades or centuries under natural conditions. A number of our underlying beliefs tacitly assume that systems will return to a "natural" state in fairly short order if they are just nudged in the right direction through adjustments to physical attributes or by regulating species composition. **Expecting complete restoration on human time scales is unreasonable, even where full recovery may eventually occur**.

In order to address uncertainty and surprises related to complex system dynamics restoration efforts require periodic intervention and adaptive management to increase the chances for the creation of responsive and successful projects.

As an example of the relationship between the need to really understand a site and its larger landscape context *and* the accompanying need to set appropriate goals, I refer to a "stream restoration" project that was based on an inaccurate understanding of local and regional geomorphic and hydrologic processes. At Uvas Creek, the designer's idealized goal of creating a gently meandering stream did not fit the flashy canyon and urban-fed watershed conditions that continuously re-shaped this braided stream corridor. The goal of creating a stable stream in an intense and dynamic corridor created a recipe for failure, although the removal of debris piles was certainly important and led to a partial albeit less recognizable type of restoration success. A real understanding of geomorphic and ecological processes (based on adequate study of the channel history, catchment level influences for the site, and analysis of flow records) was needed, rather than application of 'cookbook' approaches based on mimicry of form (Kondolf 1998, 50). Had the designer worked closely with a geomorphologist who understood this landscape, appropriate design goals could have been established and public embarrassment avoided.

Encouragingly, the Society for Ecological Restoration International and others are seeking to broaden and deepen the sharing of "restoration lessons learned" via their website (www.ser.org) and journal articles in *Ecological Restoration* and *Restoration Ecology*.

These five central ideas will help us along the pathway towards ecological restoration: **collaborate**; **set reasonable goals**; **consider implementation and management as integrated aspects of restoration planning/design**; **establish protocols and procedures for monitoring restoration designs**; and **make time to evaluate, reflect upon, and share lessons learned**.

As we seek to move beyond restoration myths let us remember the following advice: **Restoration projects with decision points along the way allow for critical assessment and possible intervention with contingency plans** if things are not proceeding appropriately.

Also, it is important to note that although maximizing species diversity is thought of as vital for the creation of well-functioning and adaptable ecological systems, we need to be careful about making claims in absolutes. Our **goals should include multiple scientifically defensible end points of functional or structural equivalence—with invasive species playing a role in ecosystems where they are simply too entrenched to extricate from highly-altered urban landscapes**. As noted by Patchett & Wilhelm (2008), Ahern (2009), and others, we cannot expect that species which require near-pristine conditions to do well in locations where waters and soils are and will likely remain somewhat degraded.

Multiple end points implicitly increases resilience by increasing the adaptive capacity and response diversity of the system and are typically far more realistic and attainable than plans and designs based on carbon copy or field of dreams approaches to ecological restoration.

Restoration projects should **expand goals and expectations beyond quantitative targets or ranges for ecological attributes** by considering ecological services and capital, connectivity, and variability. Modest and explicit goals (including land acquisition and conservation of selected species) may be best understood by the public, be achievable, and offer measurable planning/design metrics and outcomes.

Mary Palmer and other authors (2005, summary) discuss **five criteria for measuring success in river restoration**, and emphasize the importance of an ecological perspective to restoration efforts. First, the design of a river restoration project should **be based on a specified guiding image of a more dynamic, healthy river that could feasibly exist at the site**. Second, the river's ecological condition must be measurably improved. Third, the river system must be more self-sustaining so that only minimal follow-up maintenance is needed. Fourth, during the construction phase, no lasting harm should be inflicted on the ecosystem. And, fifth, both pre- and post-assessment must be completed and data made available.

According to Matt Kondolf, if we wish to successfully restore streams and rivers we better do our interdisciplinary homework, and prepare for long-term monitoring and adaptive management.

Typically, a primary goal of most ecological restoration projects should be to ***re-establish functional ecosystems of a designated type in a manner that allows for the maturation of these systems by natural processes*** (Clewell, et al. 2005)—after exotic weed control, planting, and possibly grading, temporary biotechnical stabilization, and irrigation. In short, ***restored ecosystems should be capable of responding to changing environmental conditions, particularly if proposed within or near urban landscapes.***

Once restored, a site or ecosystem ***will likely require periodic management in order to maintain "ecosystem integrity"*** in response to ongoing human impacts. Thus, as John Cairns, Jr. noted in his Spring 2006 article entitled "Restoring Damaged Aquatic Ecosystems" (53), although complete restoration may be our aspiration, ***partial restoration*** *is typically a more realistic goal*. Active, ongoing monitoring and management are attributes of what I now view as the "partial and early stages of restoration" initiated at Furstenberg Park in Ann Arbor, Michiga—a project I cut my ecological restoration planning/design teeth on while working at Pollack Design Associates in the early 1990s.

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For more information related to the Sep. 2009 presentation refer to the following document: 22454-Skabelund_ASLA-mtg-pres-outline-Sep-2009