

Creating Sustainable Landscapes by Interweaving Ecosystem Restoration and Ecological Design

ASLA Annual Meeting Education Session in Chicago - September 2009

Friday, September 18, 3:30 PM - 5:00 PM

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Session Objectives: *Help each participant become more proficient at ecosystem restoration and ecological design by reviewing lessons gleaned from integrated ecological restoration projects. Learn from the experiences of professionals, scientists, and interdisciplinary ecological restoration teams who have tested principles and guidelines for healing damaged landscapes and who seek to create sustainable urban systems through ecological design. Discuss ways to weave ecosystem restoration and ecological design into more regenerative urban landscapes.*

Session Structure & Introductions – ASLA-appointed Moderator

A. Defining Success in Ecological Restoration - Lee R. Skabelund (Assistant Professor at Kansas State University) will summarize findings from interviews with landscape architects and restoration ecologists regarding the hallmarks of “successful” ecological restoration efforts. The importance of developing meaningful ecological restoration goals, objectives, and performance criteria will be discussed. Particular emphasis will be given to the role of in integrated ecosystem restoration and ecological design efforts in creating sustainable landscape systems. Reference to the ASLA LATIS on Ecological Restoration (published in 2008) will be made. (*~15 minutes*)

B. Implications of Ecological Restoration related to Sustainable Landscape Planning/Design
Allegra Bukojemsky (Biohabitats, San Francisco) and Andrea Cooper (Conservation Design Forum, Elmhurst Illinois) will provide an in-depth look at ecological restoration and design projects that seek to integrate water quality and ecosystem protection with sustainable land use planning/design and ecologically appropriate construction techniques. The interrelationships between pre- and post-implementation monitoring and planning/design/construction and management will be discussed. These projects represent efforts to effectively address artistic concerns while also being socially-responsive, economically-sound, and supportive of healthy natural systems (local, regional, and global). Ways to overcome obstacles and other ecological restoration challenges will be highlighted. (*~40-45 minutes*)

C. Guided Discussion: Presenters and the audience will discuss how ecosystem restoration and ecological design can help support sustainable landscapes in various contexts and at multiple scales. Presenters encourage the audience to suggest research needs related to the practice of ecological restoration and to discuss project examples where landscape architecture design has been integrated with the restoration of functional ecosystems in various landscape contexts (urban to rural and large to small). (*~30 minutes*)

What we aim to do:

- 1) Help participants appreciate the complexity of restoring ecosystems in urban settings and enable planners/designers to develop meaningful ecological restoration goals, objectives, performance criteria.*
- 2) Provide guidance for creatively working with local stakeholders on urban ecological restoration and design projects, and facilitating efforts to create more sustainable urban systems.*
- 3) Provide in-depth understanding of designs that effectively integrate economic, aesthetic, socio-cultural, and ecological perspectives (including water quality and ecosystem protection) into local and regional systems.*

Presentation Outline – Creating Sustainable Landscapes by Interweaving Ecosystem Restoration and Ecological Design

Ecological Restoration and Ecological Design: A Preface

Plants and animals grow and thrive in habitats to which they are adapted (Patchett & Wilhelm 2008). *Ecological restoration* seeks recovery of ecosystems (SERI 2004). *Ecological design* seeks integration of human infrastructure and activities with living processes (Van de Ryn & Cowan 1996), or “design for benign and seamless environmental integration” also called “bio-integration” (Yeang 2006, 011).

A. Defining Success in Ecological Restoration – Lee Skabelund

I. Ecological Restoration in the Urban/Suburban Context (with reference to Pickett & Cadenasso 2008): How landscape architects/designers contribute to ecological restoration efforts: communication between disciplines, integration of recreation, aesthetic, and social aspects, visualization, stakeholder/community facilitation, construction planning/design and oversight (see Higgs 2003; Perlman & Milder 2005).

II. Defining “Restoration Success” (Skabelund, et.al. 2008; see also Galatowitsch 1998; Allison 2002):

A. Successful ecological restoration: a summary of key ideas for practice...

1. Integrate three primary realms (effectively address ecological, stakeholder, and learning needs).

2. Indicators of “successful ecological restoration” (Tamminga 1997; Sauer 1998; Throop 2001).

3. Tasks to incorporate into the planning/design and implementation process: a) collaborate with all essential disciplines; b) set reasonable targets and determine appropriate strategies for achieving project goals and targets (Clewell & Aronson 2007), seeking to create functional and adaptable ecosystems (France 2008); c) plan and design for effective implementation and management; d) establish protocols for monitoring and evaluating success; e) reflect upon lessons learned.

III. Steps in Restoration Design (Skabelund, et.al. 2008):

A. Establish a collaborative team

B. Undertake a site inventory and evaluate the historical context

C. Understand the social, cultural, and political context

D. Review historical information and reference sites to develop realistic models of what could be restored

E. Strategically address constraints and opportunities in an integrated fashion

F. Set goals and articulate specific objectives related to primary issues and concerns

G. Develop detailed designs and construction drawings/specifications to effectively portray proposals

H. Construct/implement the restoration design in accord with project goals and objectives

I. Monitor the restored ecosystem so that management of the system can be adapted

B. Implications of Ecological Restoration related to Sustainable Landscape Planning/Design

Two projects highlight the integration of ecological restoration into urban/suburban landscapes, and the values created as an outcome of this green infrastructure approach to Landscape Architecture.

Nine Mile Run - Allegra Bukojemsky

Ecological restoration work for Nine Mile Run was planned/designed from 2001-2005 and implemented from 2004-2006 in two phases (see pg. 3 for an outline, pg. 5 for a project summary sheet, and the November 2007 LAM article by Peter Harnic on the Nine Mile Run project).

Kresge Foundation Headquarters - Andi Cooper

The Kresge Foundation Headquarters landscape was planned/designed in 2004-2005 and implemented in 2006 (see pg. 6 for an outline, pg. 7 for a project summary sheet, and the December 2007 LAM article by Adam Regn Arvidson on the Kresge Foundation Headquarters project).

C. Open Discussion: Interweaving Ecological Restoration and Design - Speakers and the audience will discuss opportunities to interweave design *with* the restoration of functional ecosystems (France 2008).

***Nine Mile Run* – A comprehensive ecological restoration plan for a degraded stream and its riparian corridor; an area besieged by crumbling and leaking infrastructure, encroachments from urban development, and the filling of over 20 million tons of slag into the stream valley.**

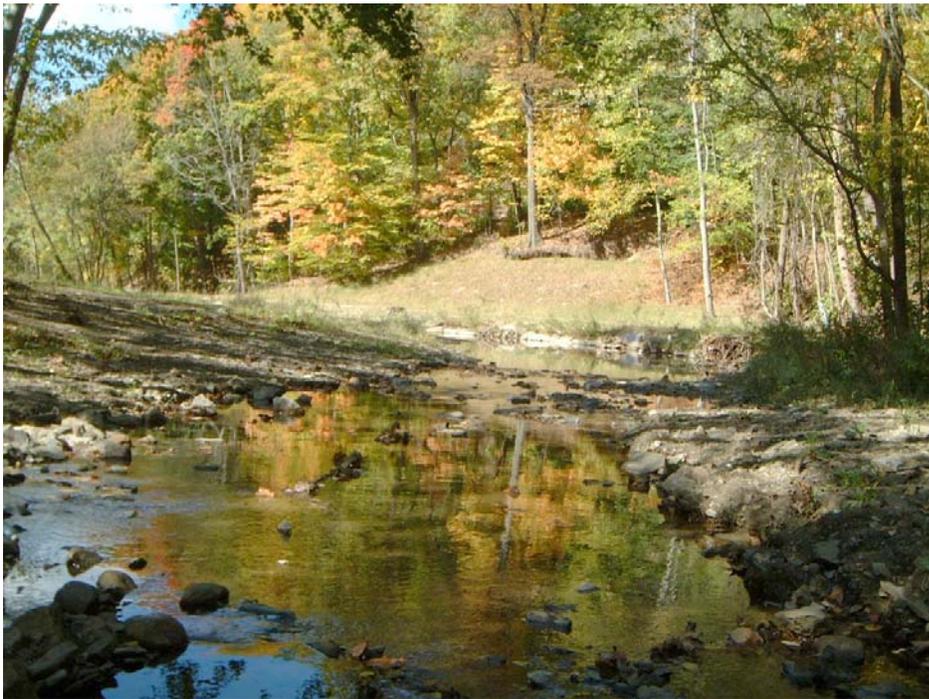
1. Clients (Design Client – City of Pittsburgh; Construction Client – Pittsburgh District)
2. Funding (206 Ecosystem Restoration Project; Corps of Engineers, Pittsburgh District)
3. Local sponsor – City of Pittsburgh
4. Location – Frick Park; Type of Watershed – Urban residential
5. Key stakeholders
 - City of Pittsburgh
 - Corps of Engineers, Pittsburgh District
 - Frick Park
 - Nine Mile Run Watershed Association
 - Allegheny County Sanitary Authority (ALCOSAN)
6. Site assessment
 - degraded conditions
 - combined sewer overflow
 - mix of uses
 - existing wildlife use
 - fish barriers
7. Restoration of culverted tributary creek and wetlands
 - daylight waters from culvert
 - recreate wetlands
8. Restoration of the main channel
 - steep slag slopes
 - realignment and reshaping of the stream channel
 - fish barriers
9. Successes and lessons learned:
 - Highlights and anecdotes from Biohabitat’s built works.
 - Pre- and post-implementation monitoring *and* planning/design/construction and management.
 - Ways to overcome obstacles and other ecological restoration challenges as we seek to create places that are socially-responsive, economically-sound, and supportive of healthy natural systems.



Nine Mile Run stream restoration construction work.



Late summer along Nine Mile Run.



Autumn along Nine Mile Run.

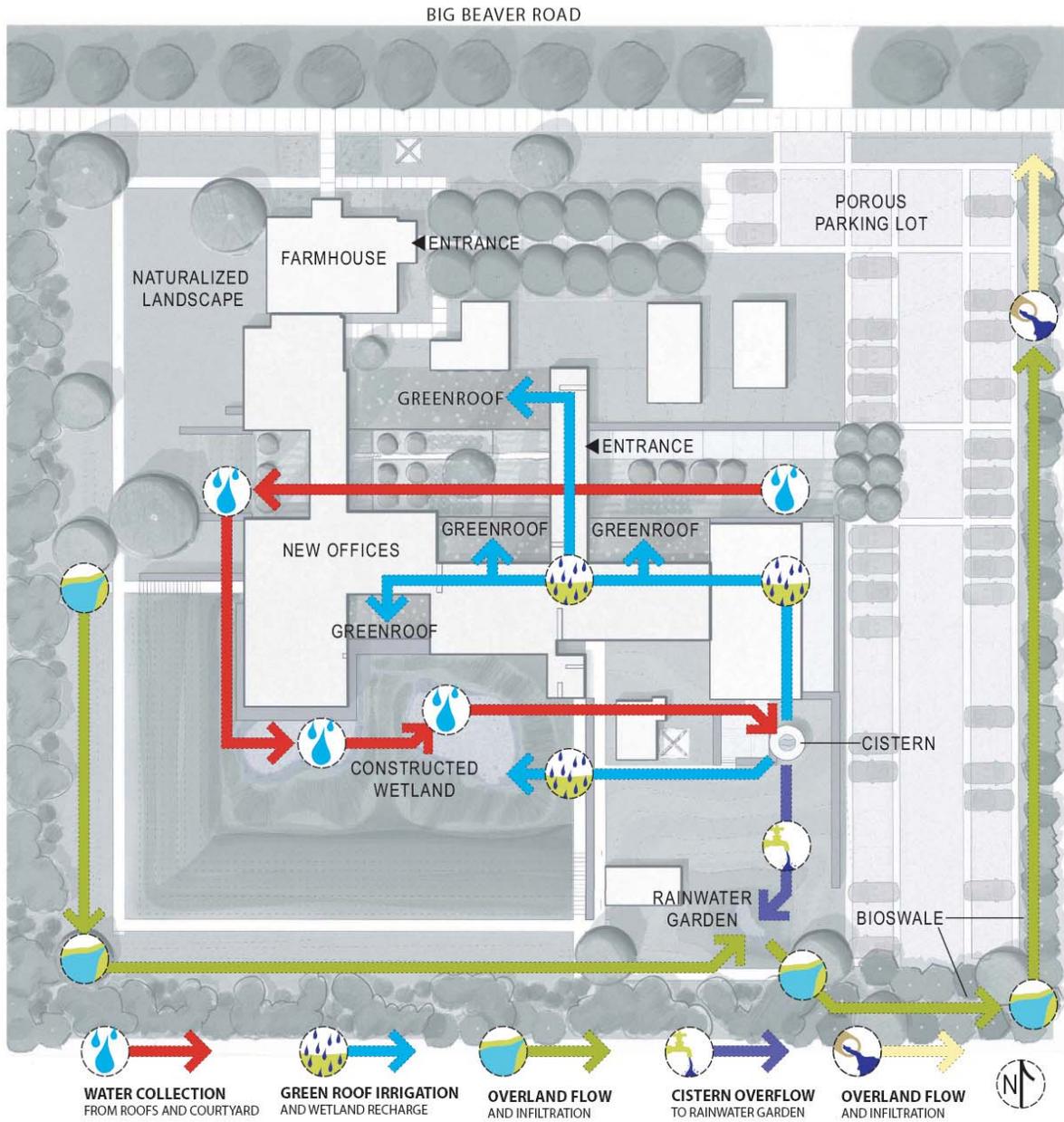
For a more detailed review of the Nine Mile Run project refer to the November 2007 Landscape Architecture Magazine article by Pate Harnic.

***Kresge Foundation Headquarters* – Restoration and design strategies achieved through the implementation of an integrated rain-water management plan – a design that was interwoven with architecture, site engineering, structural engineering, ecology, botany, and other disciplines.**

1. Physical context and character - The Kresge Foundation and the site/site selection
2. Integrated building and site design
3. Decentralized rainwater management approach
Water budget; rainwater plan; and water collection and reuse
4. Native landscape design and establishment
Drawings and specifications
Implementation and oversight
Ongoing management and monitoring
5. Post-occupancy ownership
6. Challenges and opportunities with an ecological restoration approach:
Highlights and anecdotes from CDF's built works.
Pre- and post-implementation monitoring *and* planning/design/construction and management.
Ways to overcome obstacles and other ecological restoration challenges as we seek to create places that are socially-responsive, economically-sound, and supportive of healthy natural systems.



Water was a primary design consideration for the project. The created wetland, green roofs, porous pavement, bioswales, and rainwater harvesting and re-use are the primary components of the integrated rainwater system. Kresge added interpretive signs throughout the landscape to communicate these design principles.



The visible celebration of water as a resource provides a principle aesthetic and functional quality to the entire site. The water-based environment was developed with a reliance entirely on the rainwater that falls on the site.



The entire site landscape thrives without the use of potable water. Rainwater is harvested, treated, and stored in a 15,000 gallon cistern to provide make-up water for the wetland, and supplemental irrigation water for the green roof system. A dining patio is perched next to the barn capitalizing on views down into the landscape.

For a more detailed review of the Kresge Foundation Headquarters project refer to the December 2007 Landscape Architecture Magazine article by Adam Regn Arvidson.

References:

- Allison, S.K. 2002. "When is a restoration successful? Results from a 45-year-old tallgrass prairie restoration". *Ecological Restoration*. 20(1):10-17.
- Arvidson, A. "Walking the Talk: A foundation that offers grants for green building decides stewardship begins at home." *Landscape Architecture Magazine* V98 (12) pp 22-28. December 2007. (see 22454-B2)
- Cairns, J. Jr. 2006. "Restoring Damaged Aquatic Ecosystems." *Journal of Social, Political and Economic Studies*, 31(1):53-74. www.johncairns.net/Papers/restoring.pdf
- Clewell, A.F. and J. Aronson. 2007. *Ecological Restoration: Principles, Values, and Structure of an Emerging Profession*. Washington, DC: Island Press.
- France, R.L., Editor. 2008. *Handbook of Regenerative Landscape Design*. Boca Raton, FL: CRC Press.
- Galatowitsch, S.M. 1998. "Ecological design for environmental problem solving." *Landscape Journal, Eco-Revelatory Design: Nature Constructed/Nature Revealed*. Special Issue 1998, 99-107.
- Harnic, P. "Nine Mile Rerun; In Pittsburg, activists bring back a biologically dead stream back to life." *Landscape Architecture Magazine* V97 (11) pp 62-71. November 2007. (see 22454-B1)
- Higgs, E. 2003. *Nature by Design: People, Natural Process, and Ecological Restoration*. Cambridge, MA: The MIT Press.
- Perlman, D.L. and J.C. Milder. 2005. *Practical Ecology for Planners, Developers, and Citizens*. Washington, DC: Island Press.
- Pickett, S.T.A., and M.L. Cadenasso. 2008. "Linking ecological and built components of urban mosaics: An open cycle of ecological design." *Journal of Ecology*. 96:8-12. www.ecostudies.org/reprints/Pickett_and_Cadenasso_J_Ecol.pdf
- Sauer, L. & Andropogon Associates. 1998. *The Once and Future Forest: A Guide to Forest Restoration Strategies*. Washington DC: Island Press.
- Skabelund, L.R., Kondolf, M., Bukojemsky, A. and C.W. Johnson. 2008. *Successful Ecological Restoration: A Framework for Planning/Design Professionals*. ASLA LATIS Series.
- SERI (Society for Ecological Restoration International), Science & Policy Working Group. 2002/2004. *The SER International Primer on Ecological Restoration*. Tucson, AZ.
- Tamminga, K.R. 1997. "Restoration planning in the urbanizing (bio) region: ecological themes and regional perspectives". *Proceedings from Opportunities in Sustainable Development: Strategies for the Chesapeake Bay*. 67-75. Edited by M. Hill. Washington DC: ASLA.
- Throop, W. 2001. "Restoring nature: balancing nature and humans in ecological restoration". *Ecological Restoration*. 19 (4): 215-217.
- Van der Ryn, S. & Cowan, S. 1996. *Ecological design*. Washington DC: Island Press.
- Yeang, K. 2006. *Ecodesign: A Manual for Ecological Design*. London: Wiley-Academy.