Behind the Scenes of Wetland Restoration: Critical Roles for Landscape Architects

Learning Objectives:

• Learn what experts in the field of wetland restoration have discovered about why wetland restorations fail and the need to rethink how things are done.

• Learn about objective ways to define success which can help streamline the process and provide measurable performance metrics.

• Get insight into some of the key ecological and design ingredients that create realistic and achievable goals during the permitting, design, construction and performance monitoring phases.

• Discuss how LA’s must both lead and follow, by adapting design methodologies to the creation of natural systems, while recognizing the primary role of ecology and science to identify and evaluate standards.

• Gain insight into effective ways to build partnerships and collaborations.
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Resources and links:

A good place to start if not trained in ecology:


Guidance/framework documents:

Resources and links (cont’d):

More technical and specific books and articles:


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Wetland Restoration (Creation, Enhancement): Critical Roles for Landscape Architects Summary:

- **Team Builder/Coordinator**
  - Integration of details and ideas from all the other disciplines and stakeholders.
  - Define clear, practicable goals - critical for restoration projects

- **Graphic representation**
  - Create images and plans that help the other project team members see, respond to, and understand and design the complete program
  - Visuals for other stakeholders (public, permitting agencies, clients, etc.) for engagement and support of the project

- **Planning + Permitting**
  - Content and visual communication tools to develop and define reasonable objectives and communicate to permitting agencies

- **Design Phase**
  - Address the mechanics of ecosystems, shaping the land, construction phasing, low impact construction methodologies, build in flexibility and adaptive strategies, reduce costs and change orders.
  - Increase the community value and appreciation of a project through well designed access, interpretation, and views of the project.

- **Construction document preparation**
  - Clear, organized and concise construction drawings are critical for appropriate bid as well as a guide for construction:
    - clearly demarcated preservation areas and haul routes
    - important grading details
    - Notes to define critical constraints and requirements – ex. low ground pressure equipment, planting and seeding dates (that recognize potential for seasonal delays).
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Wetland Restoration (Creation, Enhancement): Critical Roles for Landscape Architects

Summary:

• Construction document preparation (Cont’d)
  • Specifications critical for bidding information as well as construction:
    ▪ soil salvage, handling, amendments
    ▪ plant & seeding requirements
  
• Planning and design for post-construction monitoring and maintenance:
  ▪ Install post-construction monitoring measures during construction phase (flagging, monitoring wells, etc)
  ▪ Create plant layouts that are easy to locate and monitor, and balance the creation of appropriate plant communities
  ▪ Create conditions that minimize the need for watering, weeding and maintenance (mulch, materials certification to eliminate weed seeds and invasive plants

• Construction coordination, oversight, and management
  • Require pre-bid meetings to communicate important details for contractor clarification
  • Pre-construction meeting – address critical requirements and constraints and partner on problem solving.
  • Plan for strategic field oversight (monitoring): site layout of important features (access roads, stockpile areas, etc.) soil materials inspections, grading process (full time), plant reviews and layout.
  • Long term management: Create a maintenance plan with critical permitting and performance goals, site constraints (ex. use of herbicides allowed?), and key contact information.
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**Identified Causes of Failure and Recommendations for Success**

**Zedler’s Recommendations:**
- Use clear terminology; use terms consistently
- Base assessments on multiple indicators (of structure and function) that relate to the specific project objectives
- Report assessment data
  - *e.g.*, clapper rail habitat mitigation: 8 attributes, each with quantitative standards
- Describe progress made toward objectives giving
  - the list of objectives and standards,
    - *e.g.*, nesting habitat with tall cordgrass (*max. extended leaf >60 cm on average*)
  - the degree to which each objective was met
  - overall outcome: Compliance or not, explaining irregularities/shortcomings
- Limit using “success” to a specific definition in a specific context—say who is making the judgment and for what purpose.

**Lewis, Pruitt, Urban and Weber’s Recommendations:**

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<tr>
<th>Cause of Failure</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>1. Wetland restoration designed incorrectly</td>
<td>Better training</td>
<td>Provide training for wetland professionals including consultants, regulators and monitoring and enforcement personnel</td>
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<td>2. Poor site selection</td>
<td>Focus on restoring areas that were once wetlands, and channelized stream reaches, instead of creating wetlands in uplands.</td>
<td>Millions of acres of wetlands and miles of streams have been degraded for various reasons (mining, industry, flood control, etc.). Restoration of former ecosystem functions will benefit the landscape and watershed, as well as the public.</td>
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## Identified Causes of Failure and Recommendations for Success


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<td>3. Wetland not accurately classified</td>
<td>Use a classification system that is consistent across wetland types and reproducible among wetland scientists</td>
<td>Provide training for wetland restorationists</td>
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<td>4. Inadequate baseline and target restored hydrology</td>
<td>Establish current hydrology and conceptual target hydrology by using an analog, historic or constructed reference condition</td>
<td>Monitor surface and ground water hydrology at a proposed restoration site during normal seasonal rainfall, tidal, etc. conditions; Establish current frequency and duration of flooding, ponding, and/or soil saturation; Predict post-construction or restoration conditions using reference conditions, and set as an attainable performance standard. See above. Training needed.</td>
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<td>5. Aquatic restoration not constructed properly</td>
<td>Hire construction contractors with experience &amp; qualifications in restoring aquatic resources (e.g., streams &amp; wetlands. Require As-Built Plans of the completed project for purpose of monitoring performance objectives &amp; to determine if adaptive mgt is necessary.</td>
<td>Montana Dept. Of Transportation has developed a list of pre-qualified construction contractors for aquatic resource restoration projects. This may be prudent for other areas of the country, as it is specialized work in every aspect. Contractors who have experience in such work will be more efficient and provide inputs during construction that result in a better product on the ground.</td>
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<td>6. Lack of consideration of the historical context and previously published work on success.</td>
<td>Kusler and Kentula (1989) (the USEPA version) with added notes from the authors or substitutes to bring them up to date. Make freely available.</td>
<td>Providing a bibliography is not enough. Wetland professionals and regulators are busy people. It is often difficult or impossible for them to access good free science. This would start to overcome that impediment.</td>
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<td>7. Lack of consideration of wetland processes</td>
<td>Establish current and targeted nutrient cycling, pollutant sequestration or transformation, carbon export</td>
<td>Conduct import/export studies and/or establish correspondence with proxies or indicators of processes; Measure increase in biomass or NPP of woody, rooted vegetation, soil organic matter in O and A horizons</td>
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<td>8. Inadequate respect for the experience of current professionals with proven track records.</td>
<td>Provide a method for precertification by regulatory agencies and requirements for applicants to use trained professionals in wetland design.</td>
<td>In consultation with federal, state and local wetland planning, and design and permitting agencies, develop approved lists of wetland design and construction professionals who have proven track records of successful restoration and monitoring, and recommend their use.</td>
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<td>9. Lack of experienced oversight professionals</td>
<td>Insure that an experienced restoration professional is on site during stream / wetland construction.</td>
<td>Ensures that a project is correctly constructed and provides direction to the contractor. When problems with designs are encountered in the field; corrections can be made at the direction of the restoration professional.</td>
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<td>10. Inadequate assessment of current &amp; future adjacent land use practices</td>
<td>Establish current and future land use practices at multiple scales (e.g., watershed, stream segment, wetland area) within the catchment of the restoration site</td>
<td>In consultation with state and regional planning centers, forecast future development and land use changes within the catchment of the restoration site; Implement a restoration plan that includes an adaptive management program which accounts for future land use changes</td>
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<td>11. Inadequate water quality investigation (&quot;build it and they will come &quot;misconception)</td>
<td>Document current and future water quality conditions at both the watershed and stream segment scales</td>
<td>Conduct current physiochemical and biological water quality and sediment quality and quantity conditions; Establish ecological integrity based on baseline conditions with and without project; Set predicted conditions as an attainable performance standard</td>
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<td>12. Beef up compliance monitoring and enforcement activities to stop repeated errors in design with distribution of “lessons learned.”</td>
<td>Document current wetland restoration and creation efforts on the regional level to keep professionals apprised or progress in more successful wetland restoration and creation efforts.</td>
<td>Current progress towards improving the practice of successful wetland restoration and creation is hampered by the lack of freely availability documentation on who, what and where are the successful projects being done, and what monitoring and reporting is available for professionals to review and learn about these efforts and improve their practices.</td>
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<td>13. Scientific studies versus regulatory monitoring</td>
<td>Both communities need to agree on what constitutes monitoring requirements and assess the costs of implementation of regulatory requirements to monitor restored areas.</td>
<td>In the world of mitigation restoration, few have the funds or dollars to conduct detailed bio-geochemical analyses, and import/export studies of nutrients. Funds are drying up in many avenues; agencies are short on staff and funding to conduct annual inspections, etc. Work together to provide better projects.</td>
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<td>14. Regional performance standard templates</td>
<td>The majority of regulatory performance standards have been developed for the wetter areas of the US and do not equate to the drier arid regions of the country.</td>
<td>There need to be regional performance standards developed similar to the Regional Delineation supplements. As well as the development of performance standards for stream restoration.</td>
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<td>15. Drowned woody vegetation plantings</td>
<td>Plant woody plants after water regimes have established over a period of 3 to 5 years.</td>
<td>Many resource agencies want woody vegetation planted immediately, but experience is that even with good hydrologic data site, actual hydrology will throw a curveball. Suggestion: plant woody plants as water regimes establish after 2–3 years, to prevent drowning and avoid costs of replanting.</td>
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Presenters’ Bios:

Lisa N. Cowan, PLA, ASLA, Studioverde
- Lisa is Principal of Studioverde - a collaborative of landscape architects and site practitioners specializing in resource economics, ecology, horticulture and public art. Lisa’s work exemplifies a lifelong interest in the restoration of natural systems and community engagement in the natural world. She has expertise in ecology-based planning, design, low impact construction and land management and was the lead landscape architect on over thirty successful wetland and riparian creation and restoration projects. Lisa is a co-chair of ASLA’s Sustainable Design and Development Professional Practice Network. Lisa has been active in professional and public outreach on the Sustainable Sites Initiative rating system since 2009.

Marla J. Stelk, MA (Community Planning & Development), Association of State Wetland Managers
- Marla is a Policy Analyst at the Association of State Wetland Managers (ASWM) and has been actively involved in climate change and sustainability issues since 1993. Her professional background in business, fundraising and volunteer management has contributed significantly to her ability to develop collaborative frameworks for engaging stakeholders in meaningful and effective decision-making contexts. Marla spearheaded the development of partnerships between the ASWM, the American Planning Association, and the American Society of Landscape Architects to develop transdisciplinary strategies for sustainability planning and development. Her professional background in studio art and sculpture underpins her interest in cultural economy, creative place making and community design efforts.

Allegra Bukojemsky, ASLA, Wildlands
- Allegra is a landscape architect specializing in ecological restoration with a background that includes biology, animal behavior, sustainable architecture, and industrial design. This broad range of experience comes from her passion to strengthen and repair our connection to and stewardship of nature. Allegra has worked in a variety of offices and award winning consulting firms on projects ranging from master planning to public parks, private residences, commercial development, and habitat restoration. At Wildlands, a mitigation banking firm, she designs and manages the construction of wetlands and endangered species habitats.