“Why Science is Important to Landscape Architecture”

How science & landscape architecture relate in 5 minutes.
(Hah! No small task!)

Take home message: Many different strategies and interventions can enhance human well-being and conserve ecosystems, esp. as designers work closely with scientists and develop ecological understandings.

Per Newman (2007) climate scientists tell us we need to rapidly remake cities in ways that reduce oil usage and greenhouse gases.

Lee R. Skabelund, ASLA - Kansas State University
Landscape Architecture/Regional & Community Planning
ASLA Annual Meeting - San Francisco 2007
Millennium Ecosystem Assessment
Context for Designers & Decision-Makers

Four Main Findings:
Humans are rapidly changing ecosystems altering the biosphere & atmosphere! With growing human demands, life’s diversity continues to be in jeopardy.

Many people have benefited; many remain disenfranchised. Ethics compel us to assist both impoverished people and ecosystems.

Degradation of ecosystem services may significantly increase and pose problems for people worldwide.

Significant changes in policies, institutions, and practices are needed to conserve and enhance ecosystem service. Scientists, planners and designers have critical roles to play in promoting positive change!

Source: World Resources Institute 2005, 1
Changes in drivers that indirectly affect biodiversity – population, technology, and lifestyle – often lead to changes in drivers directly affecting biodiversity, such as use and consumption of land and resources, and the application of fertilizers and pest controls...

Often, these changes result in negative impacts to ecosystems and the services they provide, thereby affecting human well-being.
David Orr (*Earth in Mind* - 1994, Intro.): “ecological design intelligence is the capacity to understand the ecological context in which humans live, to recognize limits, and to get the scale of things right. It is the ability to calibrate human purposes and natural constraints and do so with grace and harmony…motivated by an ethical view of the world and our obligations to it” (2-3, italics added).

Johnson & Hill (*Ecology and Design* - 2002): Scientists can help us better understand, recognize, and relate our plans and designs within nested scales of ecological systems. To be relevant over the long-term we must make site-scale projects healthy contributors to the larger landscapes with which they are inextricably linked.

Scientists can help us determine how to safeguard well-functioning ecological systems and organize, reclaim, rehabilitate & restore degraded ecological systems.
James Karr defines 14 key concepts for “ecological thinking”:

1. Integrity & Health;
2. System & Scale;
3. Landscape & Context;
4. Parts & Processes;
5. Natural History & Life Cycle;
6. Resilience & Resistance;
7. Disturbance & Equilibrium;
8. Chance & Change;
9. Trajectory & Cycles;
10. Connections, Limits, Collapse;
11. Root Causes & Patterns;
12. Effect, Consequence, Aftermath;
13. Simplification, Complexity, Diversity;

(Karr 2002, 148-149; 151-152)

Karr argues: Designers are more likely to understand and use key concepts if they are learned by:

1. Basic familiarity with the language of ecology;
2. Exposure to and familiarity with organisms, their natural histories, and their environments;
3. Supplemental learning of abstract concepts (related to regional and global scales) with walks in the real (local) world to examine their biology;
4. Specific, real-world interdisciplinary work.
Ken Yeang’s (2006) 31 Design Instructions, include:

Interrogate the premises for the design;
Determine the level of environmental integration that can be achieved in the design;
Evaluate the ecological history of the site;
Inventory the designed system’s ecosystem (establishing the ecological baseline and context for planning and design to protect ecosystems & restore degraded ecosystems);
Delineate the designed systems boundaries (establishing the general extent for ecosystem & biodiversity enhancement);
Design to balance the biotic and abiotic components of the designed system;
Design to improve existing linkages and create new, viable ecological linkages.
Integrating Science *Into* Design

- Design teams need to understand three primary issues related to ecology:
  1) essential physical & ecological processes associated with the ecosystems of interest;
  2) regional drivers of environmental change;
  3) site specific dynamics where design interventions are being considered.

- Integrating science and design requires regular two-way communications between disciplines & effective collaboration on specific problems.

- Likely results: *Pollination of design work by knowledgeable scientists broadens and deepens design recommendations.*

See: Johnson & Hill (2002)
Ecological Restoration requires integrating science & design

Indicators of “successful ecological restoration”:

- Meets stated project goals, objectives & performance criteria.
- Creates a system that functions in accord with desired ecosystem attributes & conditions.
- Employs aesthetics to create pleasing human experiences (is accepted by the client, stakeholders & the public);
- Initiates sustainability of the restored site/ecosystem (promoting the system’s capacity to adapt to its particular setting);
- Is productive/regenerative, complex/biodiverse & dynamic;
- Is properly designed, implemented, managed & monitored (uses appropriate references, specifies appropriate materials, employs appropriate tools/techniques, is enjoyed & cared for over the long term);
- Optimizes multiple benefits (provides recreation opportunities, creates aesthetic, spiritual & educational value, enhances ecosystem services);
- Uses resources (ecological, cultural, financial) efficiently & wisely;
- Brings different disciplines together in a meaningful learning process;
- Helps leverage funds for other conservation and restoration work.
Principles for ecological restoration efforts undertaken within urban settings (adapted from Dahl, Phillips & Skabelund 2002)

1. Use an ecosystem-based approach – accounting for structure, functions, and dynamics over multiple scales, and understanding site and landscape changes over time. {Howard & Bourgeois}

2. Involve local community members in ecological restoration planning and decision-making; develop appropriate vehicles for public education and outreach. {Morrison}

3. Make “place-making” and “ecological art” part of an integrated approach to ecological restoration. {Morrison}

4. Do as little as is necessary to restore target ecosystems, critical landscape components & life-sustaining functions. {Morrison}

5. Develop long-term monitoring and management protocols to address internal and external influences that may undermine the success of ecological restoration projects. {Howard & Bourgeois}

6. Learn from other ecological restoration projects; work closely with ecologists and other scientists and professionals to prepare and implement plans/designs and to understand successes and failures related past and current projects. {Howard & Bourgeois}
Cited References


• Newman, Peter & Isabella Jennings. 2007. Cities as Sustainable Ecosystems. Island Press.

