Assessing the Effectiveness of Green Infrastructure in Residential Subdivisions

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Project Report

This project proposed to implement post-occupancy evaluation in twelve case studies of suburban residential developments. These are presented in table 1 and listed in the upper portion of the table. Two of the original 12 case study sites were removed from the study due to problems with data – Stapleton (Denver) and Sea Pines (Hilton Head). However an additional 4 sites were added from the Pacific Northwest: Northwest Landing, Defiance Park and Lincoln Green (Whatcom County), and High Point (Seattle). In all five regions, the case studies were chosen in three main categories based on a typology of subdivision developments implemented nationwide: neo-traditional developments, conservation subdivisions and conventional suburban developments.

Table 1: Subdivisions included in the study by region and subdivision type.

Region	Subdivision Type		
	Neo-traditional	Conservation	Conventional
Mid-Atlantic	Kentlands City of Gaithersburg, Maryland	Wesley Chapel Woods, Baltimore County, Maryland	Dufief City of Gaithersburg, Maryland
Southeast	I'on Mt. Pleasant, South Carolina	Spring Island Beaufort County, South Carolina	~~Sea Pines~~ ~~Hilton Head Island, South Carolina~~
Mid-West	Prairie Crossing Lake County, Illinois	The Fields of St. Croix, Lake Elmo, MN	Cloverdale, Washington County, MN
Mountain West	~~Stapleton~~ ~~Denver, Colorado~~	Hidden Springs Boise, Idaho	Rosecreek, Herriman, Utah
Pacific Northwest	Northwest Landing, Pierce County, Washington	Lincoln Green and Defiance Park, Whatcom County, Washington	High Point, Seattle, Washington

Each of the three types of subdivision was clustered as much a possible in each region to allow some comparisons to be made between the cases on a regional as well as a typological level (eg. comparing the three types of subdivision development occurring in one region), and the comparison of four or five cases of one type (eg. neotraditional as implemented in four different regions of the United States).

Each case was studied according to the following methodology:

1. Forest stand and green infrastructure protection goals. Local codes and site plan approval documents were collected for each jurisdiction, analyzed for the protection goals and put in tabular form. Where possible, codes for the period of approval of the development were collected. This proved difficult in some cases, since several developments were permitted between the early 70's and early 90's. Jurisdictions vary in whether they keep an accessible archive of their old ordinances, so these were variably available. In some instances codes in effect at the time of approval could be interpolated from the legislative history printed within the code, but this also varied with jurisdiction. Interviews with local planners and developers (as available) were completed to expand the understanding of initial goals for green infrastructure, and why those goals were or were not implemented. Code summaries were completed for all of the developments.

2. Evaluation of pre-development forest stand protection. Current and pre-development aerial photographs were collected for all of the sites. These were visually compared to identify the amount of existing forest stands that were protected during the development process. Copies of these aerial photographs appear on the website.

3. Inventory of current forest stand and open space management and protection measures. Using GIS data layers the ownership of each protected open space parcel was identified. Using the covenants and restrictions filed with each development in concert with the homeowners association codes, a comprehensive view of the protection and management measures for the open space in each development was collected and analyzed.

4. Inventory of current forest stand and open space protection outcomes. Each open space parcel was mapped with GIS layers and aerial photographs at a minimum one meter resolution. Each site was visited, photographed at ground level, and an analysis sheet(s) completed to assess the level of success of

i. ecosystem and habitat protection;
ii. stormwater quantity and quality protection;
iii. recreational opportunities; and
iv. visual and aesthetic quality.

Table 2: Methods used to assess protection outcomes in the 15 sites included in the study.

Protection Outcome		***Method***		
		GIS	*Site Survey*	*Documents*
Ecological	*quality*		rapid assessment	
	patch size	acreage		
	veg. type		transect	
	connectivity	Patches, corridors and distance		
	management			community docs
Water Quality/ Quantity	*impervious surface*	% land area		
	BMPs		visual/photos	
	connectivity			engineering docs
Recreation	*type*		visual/photos	
	amount	acreage		
Visual	*views*		visual/photos	
	access	distance		

A mixed method approach was used in the analysis, combining spatial analysis, content analysis and expert observation in the field. Table 2 details the methods applied to each aspect of the evaluation.

5. *Level of compliance and/or achievement of forest stand and green infrastructure protection goals.* The final level of analysis was a comparison of the initial development and regulatory goals with the existing conditions, and the effectiveness of the original regulatory scheme or protection measures.

Final Products:

All final products can be accessed either on the website and/or in the Dropbox folder link sent by separate email. Only unpublished articles are not posted on the website.

Website:

The website containing major publications, and case study synopses can be accessed at http://community-open-space.org.previewdns.com Use a username of "guest" and password "openspace." The website will be made public in concert with the publication of the book – in that way each will reinforce the impact of the other. Social media has been shown to be an effective publicity vehicle, so this project will take advantage of that synergy.

More emphasis has been placed on outreach through the website, rather than through trade journals. Publication in trade journals is both not as readily available, and not as effective in reaching a broad audience of professionals, citizen activists and municipal decisionmakers.

Journal Articles:

Published:
Brabec, Elizabeth. 2009. Imperviousness and Land Use Policy: Toward an effective approach to watershed planning. Journal of Hydrologic Engineering 14 (4): 425–433.

In Review:
Hamin, Elisabeth, Yaser Abunaser and Elizabeth Brabec. **(in review).** Climate Adaptive Urban Planning. Nature Climate Change.

Sleegers, Frank and Elizabeth Brabec. **(in review).** Linear Infiltration Systems Along Urban Streets: A Comparison of Aesthetic Values. Landscape Journal.

In development:
Brabec, Elizabeth. **(in development)** Does Better Design Lead to Better Open Space? Analyzing Process and Outcomes.

Conference Proceedings:

Brabec, Elizabeth, Elisabeth Hamin and Chingwen Cheng. 2010. "Local Surface Water Policy Under Conditions of Climate Change (abstract)," LANDSCAPE LEGACY: Landscape Architecture between Art and Science, joint conference of the International Study Group on the Multiple Use of Lands (ISOMUL) and the Council of Educators in Landscape Architecture, Maastricht, Netherlands, May 12–14,

Brabec, Elizabeth and Sarah Rigard. 2009. An Evaluation of Open Space Quality in Suburban Residential Communities: A comparison of neotraditional, cluster and conventional developments. CELA 2008-2009 Teaching + Learning Landscape, University of Arizona, Tucson, Arizona, January 14-17, 2009, p. 250-251.

Brabec, Elizabeth. 2009. An Evaluation of Open Space Quality in Suburban Residential Communities: A comparison of neotraditional, cluster and conventional developments. ACSP 5th Anniversary Conference, Reinvesting in America: The new metropolitan Planning Agenda, Crystal City, Virginia, October 1-4, 2009.

Brabec, Elizabeth. 2007. An evaluation of open space quality in a neo-traditional community: A case study of Kentlands. *Negotiating Landscapes, CELA 2007, The Council of Educators in Landscape Architecture Conference*, Penn State University, August 14-19, p. 13-14.

Thesis

Rigard, Sarah, "Critique of a Wildlife Habitat Evaluation Method Applied to Residential Open Space" (2010). All Graduate Theses and Dissertations. Paper 643.
http://digitalcommons.usu.edu/etd/643

Book Proposal

To Island Press

Leveraging of Project Funds:

To date the project has leveraged additional funds including $11,400 from the USDA Hatch program to look at open space conservation practices in New England, $6,300 to compare US practices with those in Vancouver, Canada, and an additional $12,000 in research assistant support from the University of Massachusetts Amherst.