

**Report:**  
**The Resilient Watersheds Initiative: A Value-based Landscape Design Approach to  
Promote Watershed Resiliency through Collaboration**

Submitted to:  
Resilient Watersheds Initiative  
Steering Committee

Mark A. Davis, Ph.D.<sup>1</sup>  
Brian D. Anderson, Ph.D.<sup>1</sup>  
Brian Miller, Ph.D.<sup>2</sup>

<sup>1</sup>Prairie Research Institute  
University of Illinois Urbana Champaign

<sup>2</sup>Illinois-Indiana SEA Grant  
University of Illinois Urbana Champaign

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**Executive Summary**

On Tuesday, October 20, 2015, the Resilient Watersheds Initiative held its kick-off meeting at the iHotel and Conference Center on the campus of the University of Illinois at Urbana Champaign. Nearly 40 watershed scientists from 14 units participated in this

meeting. The overarching goal was to identify a research agenda for future funding opportunities from the Resilient Watersheds Initiative.

Dr. Brian Anderson, Interim Executive Director of the Prairie Research Institute, provided an overview of the Resilient Watersheds Initiative and plotted a course for success going forward and a strategy for leveraging the Resilient Watershed Initiative's seed money to provide additional research opportunities for watershed scientists at the University of Illinois and the National Great Rivers Research and Education Center. Dr. Brian Miller, Director of Illinois-Indiana Sea Grant, provided examples of tangible, emerging opportunities for applications of the initiative in the State of Illinois. Dr. Mark Davis, Research Scientist at the Prairie Research Institute, discussed Value-based Landscape Design, the framework that will guide the Resilient Watersheds Initiative process going forward.

Participants in the workshop rolled up their sleeves and spent considerable time laying the groundwork for this initiative. Brainstorming sessions revealed the values that Illinois watersheds provide. A follow-up discussion identified variables associated with each value that could inform coupled models. Additionally, data needs and their availability were assessed. Finally, an open discussion ensued about next steps and which watersheds could serve as initial pilot geographies for the initiative.

Ultimately, the Resilient Watersheds Initiative kick-off meeting was successful in bringing together a broad and diverse coalition of watershed scientists from across the University of Illinois at Urbana-Champaign and the National Great Rivers Research and Education Center to provide guidance for the initiative going forward. The information and momentum generated by this meeting will be harnessed by the Resilient Watersheds Initiative Steering Committee as they forge a path forward to increase the ecological, economic, and social resilience of Illinois' watersheds.

## **The Resilient Watersheds Initiative Overview**

The Prairie Research Institute is strategically positioned to serve as a hub for service units at the University of Illinois at Urbana Champaign. The Prairie Research Institutes' existing relationships with the Institute of Government and Public Affairs, National Center for Supercomputing Applications, University of Illinois Extension, and Illinois-Indiana Sea Grant can catalyze integrated, applied initiatives that coalesce the diverse science capacities of the University with the education and outreach capacities of the University's service units to address the greatest resource challenges of the Anthropocene.

One such challenge is that of maintaining and enhancing ecosystem services provided by watersheds in heavily altered agricultural systems of North America which are responding to the food and energy demands of a globalized economy. Illinois' watersheds are under myriad pressures with manifold effects that may impact the sustainability of ecosystem services these watersheds provide. The Resilient Watersheds Initiative seeks to provide a science-based and data-driven approach to promoting resilient, sustainable Illinois watersheds.

The Resilient Watersheds Initiative is guided by a Steering Committee and embraces a three-phase approach prescribed by a "Value-based Landscape Design" framework. Coupled Models, incorporating data on climate, hydrology, land use, ecosystem processes, sediment and nutrient loading will be developed by University and National Great Rivers Research and Education Center researcher. These models will inform decision-support tools to be created by Illinois-Indiana Sea Grant to inform a value-based watershed prioritization and guide best management practices at key locations in the watershed. Finally, local workshops led by Extension community economic development specialists will deliver the aggregated information to end users to generate buy-in and promote implementation.

The Resilient Watersheds Initiative is poised to leverage its original \$300,000 investment to provide funding opportunities for participants. Targeted proposals to IISG, NSF, DOA, NOAA, IEPA, DCEO and OWR will pave the way to expand the initial investment and provide opportunities for University and Center scientists. Emerging opportunities, including the Department of Housing and Urban Development's disaster resilience grant opportunity and Illinois' emerging nutrient management strategy, are tangible example of the opportunities and synergies the Resilient Watersheds Initiative can provide.

## **The Housing and Urban Development's Resilient Communities**

Illinois-Indiana Sea Grant recently submitted an expansive proposal to promote resilient communities under the Department of Housing and Urban Development's (HUD) National Disaster Resilience Competition. This competition is designed to spur innovation, creatively distribute limited federal resources, and help communities cope with the reality of severe weather that is being exacerbated by a changing global climate. The IISG proposal seeks to promote resilient Illinois communities that may be impacted by exaggerated drought cycles and flood pulses.

The Resilient Watersheds Initiative can be synergistic with the IISG HUD resilience grant by providing a framework (see Value-based Landscape Design, below) for promoting resilient watersheds that provide ecosystem services to current and future generations. We envision the Resilient Watersheds Initiative to provide a framework within which relationships between the UIUC and NGRREC watershed scientists, the Prairie Research Institute, Illinois-Indiana Sea Grant, and University of Illinois Extension can be organized to provide efficient application of new discoveries in watershed science to solve on-the-ground watershed problems. Given the respective strengths of these institutions, we have the potential to deliver a comprehensive approach to increase the resilience of Illinois' watersheds and the communities they support.

## Value-based Landscape Design

Value-based Landscape Design (V-bLD) provides the philosophical underpinning of the Resilient Watersheds Initiative. It combines both a process (to design) and products (including decision support tools, maps, priority areas portfolio, and best management practices) that serve to promote resilient watersheds that provide sustainable ecosystem services. It is derived from the U.S. Fish and Wildlife Service's Landscape Conservation Design (LCD) framework, which is a component of the Strategic Habitat Conservation paradigm. However, V-bLD and LCD are divergent in the sense that the former emphasizes ecosystem services and watershed values while explicitly tying them to ecosystem function, while the latter focuses on ecosystem functions, often without consideration of ecosystem services and landscape values. As Illinois watersheds are predominantly working landscapes, a framework that underscores the broad spectrum of values and the tangible benefits watersheds provide, and quantifies how those benefits change with changes in land-uses and practices, is of great utility.

Value-based Landscape Design combines geospatial data with biological information and models to create tools that evaluate the potential of every acre of habitat to support ecosystem services. It specifically ties watershed values (e.g. swimmable, fishable, drinkable, productive watersheds) with ecosystem functions (e.g. carbon sequestration, water storage and filtration, groundwater recharge). Finally, V-bLD guides planning, decision-making, and collaboration by identifying specific actions at specific places to affect specific targets.

The V-bLD framework has proven effective in addressing large-scale landscape planning. The Prairie Research Institute is engaged in landscape designs related to the Lower Fox River and Green Bay ecosystems in Wisconsin, as well as Great Lakes coastal wetlands. The latter initiative has been recognized as one of the first four Resilient Lands and Waters recognized by the White House. Ultimately, landscape design represents the preeminent paradigm of the Anthropocene in promoting resilient ecosystems.

## **Resilient Watersheds Initiative Kick-off Meeting Working Session: Identifying Watershed Values and Assessing Data Needs & Availability**

The bulk of the RWI kick-off meeting was spent in facilitated brainstorming sessions.

The goals of the sessions were:

- Identify watershed values
- Detail data needs to assess threats and drivers of watershed functions and values
- Assess availability of those data

In the first session, a total of 29 watershed values were identified (Table 1). These values ran from clean water to agricultural productivity, to biodiversity, to spiritual and cultural fulfillment, to tourism. Within these 29 categories of watershed values, 227 data needs were identified, averaging approximately 8 data needs per value. Thus, assessment of watersheds under Value-based Landscape Design could require a substantial amount of data collection, organization, and visualization.

To determine the feasibility of securing and incorporating these data into useful models and decision support tools, and to identify data gaps for better targeting RFPs, the assembled watershed scientists assessed data availability and potential data sources for all 227 data needs. Ultimately, sources were identified for 176 of the 227 (~80%) categories of the data needed for assessment of the 29 watershed values. These data sources are documented in full in the V-bLD Rapid Prototype (attached).

Finally, a discussion was conducted of the appropriate scale for model development and which watersheds provided the most data rich environments to begin modelling to support landscape designs. If data limitations do not preclude it, it was proposed that comprehensive modelling of the entire Illinois River watershed would be both an ambitious and compelling approach to watershed design in Illinois. However, from a pragmatic standpoint, it was recommended that the Spoon River and Kankakee River watersheds present the greatest areas of opportunity, as vast amounts of data and many existing models are already available and these can be immediately brought to bear on assessing those watersheds under the V-bLD framework. The data assessment and geographic recommendations will be considered by the RWI Steering Committee in the coming months.

**Table 1.**

Value	Data Needs (n =)	Availability (n =)	Proportion
Clean Water	15	15	1.00
Food Production	6	6	1.00
Energy Production	9	9	1.00
Transportation	21	11	0.52
Recreation	14	14	1.00
Flood Risk Management	17	10	0.59
Carbon Storage & Green House Gas Regulation	10	3	0.30
Climate Change Mitigation	16	7	0.44
Timber Production	8	7	0.88
Fisheries	7	6	0.86
Water Quality	10	8	0.80
Aesthetics	6	4	0.67
Spiritual & Cultural Fulfillment	6	4	0.67
Snow/Ice Removal & Management	8	4	0.50
Public Education	9	9	1.00
Green Spaces	6	6	1.00
Wildlife habitat	6	6	1.00
Mineral Extraction	4	4	1.00
Riparian Buffering	1	1	1.00
Agricultural Drainage	4	2	0.50
Tourism	7	7	1.00
Emerging Markets	4	0	0.00
Invasive Species	5	5	1.00
Human Health	10	10	1.00
Air Quality	5	5	1.00
Productive Soils	1	1	1.00
Sewage Treatment	5	5	1.00
Storm Water Management	2	2	1.00
Biodiversity	5	5	1.00
			0.77533039
<b>TOTAL</b>	<b>227</b>	<b>176</b>	<b>6</b>