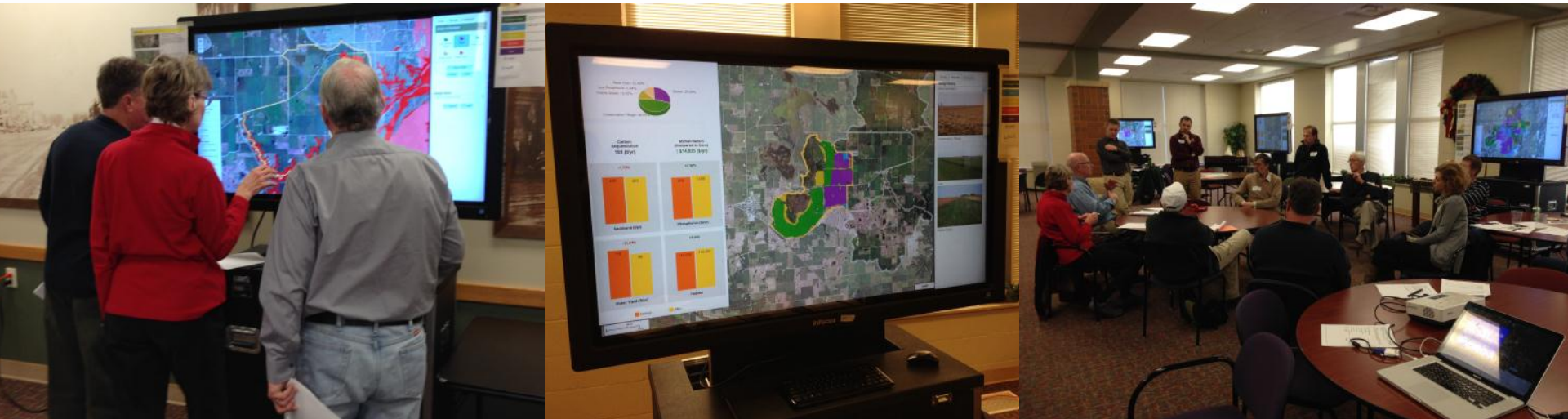


Collaborative Geodesign for Multifunctional Landscapes



Innovations in Collaborative Modeling
Michigan State University, June 4-5, 2015

Carissa Slotterback, PhD, AICP
Director of Research Engagement, Office of the Vice President for Research
Associate Professor, Urban & Regional Planning
University of Minnesota



Geodesign

Builds on planning
support systems +
public participation
GIS



technology, analysis
+ decision support

Integrates
**technology +
decision making
processes**



integrate geographic,
environmental & social
data + rapid iterative
modeling + engaged
planning & design

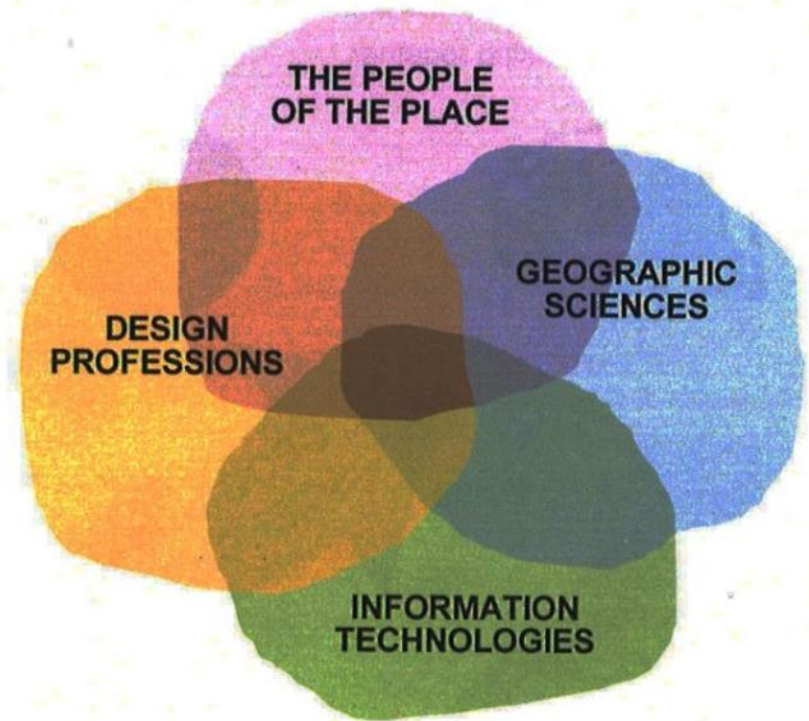


Collaborative Geodesign

Allows for active, real-time engagement with information, place + people

Beyond just making GIS available to public – supporting collaborative decision making

Beyond expert systems, *allows public to be the experts*



Steinitz 2012



Collaborative Geodesign

Capabilities:  **Outcomes:**

Integrates multiple data sources

Simulates impacts - visualization

Decreases cycle time of participatory design processes

Participants **discuss** data sources (including own perceptions)

Interactive technology supports **social learning**

Consensus emerges through group-based exploration of alternatives

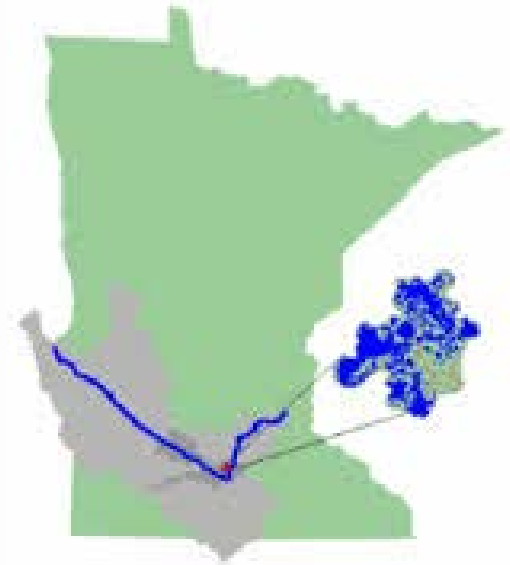
Application

Seven Mile Creek Watershed

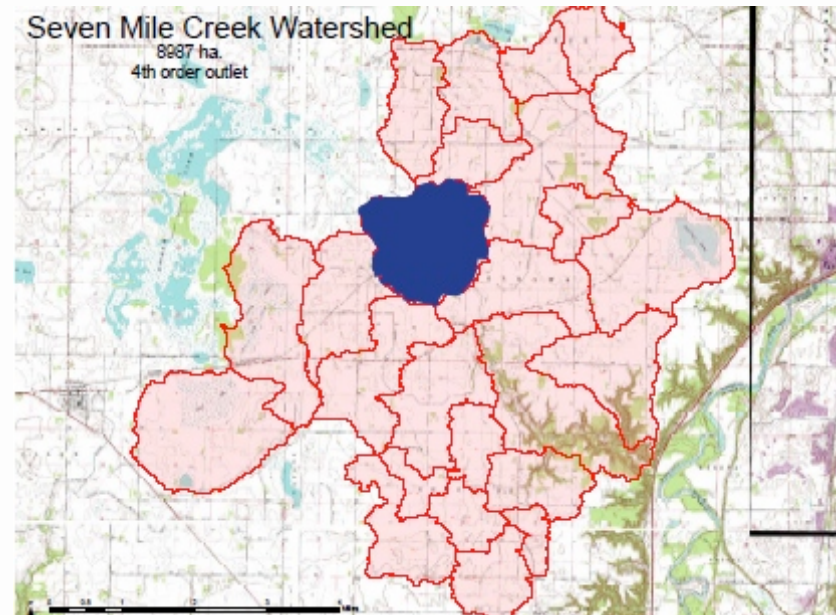
Goal: Sustainable Intensification –
more commodities + more
conservation from working agricultural
landscapes

Building a Community- based Bioeconomy

- Engage diverse stakeholders
- Examine information – food, biomass, water quality, habitat
- Identify values
- Design for biomass production
- Explore tradeoffs, prospects for win-win**



24,000 acres



Realizing the Bioeconomy

In real places, with real people

Hope and skepticism: Farmer and local community views on the socio-economic benefits of agricultural bioenergy

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Application

Workshop series with stakeholders

Agriculture, conservation, & governance **stakeholders**

Initial workshops –
framing/data on production,
dialogue on issues and values

Latter workshops – active
geodesign with visualization,
landscape design, evaluation

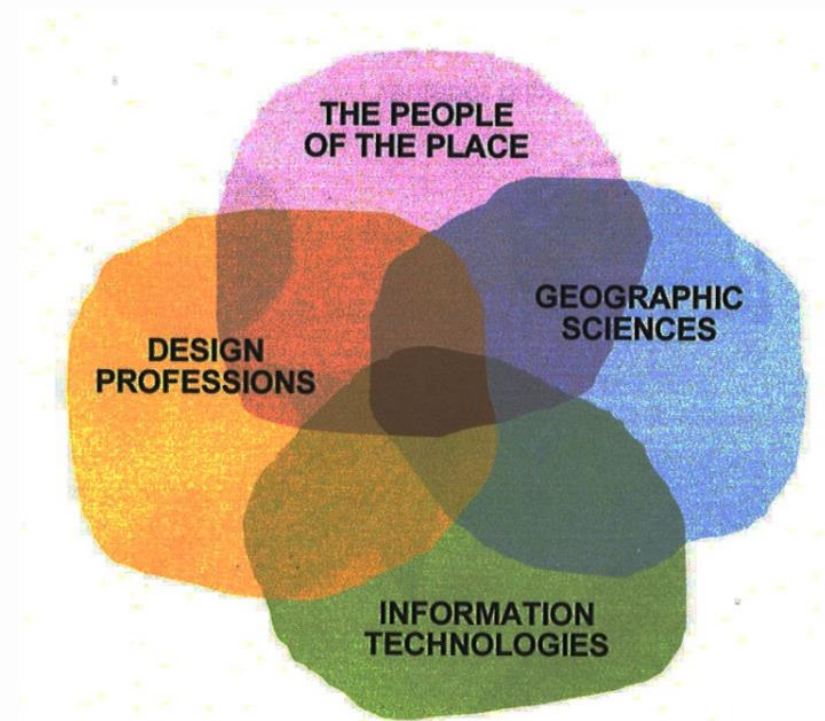


Application

Designing for biomass with Geodesign

Goal: More commodities and more conservation from working agricultural landscapes

Collaborative Geodesign allows for active, real-time engagement with information, place, + people



Carl Steinitz. 2012. A Framework for Geodesign:
Changing Geography by Design. Redlands, CA:
ESRI



Application

Designing for biomass with Geodesign

Geodesign system

55" touchscreens

Multiple orientation + data layers

Users control presence + transparency of layers

Users design with multiple practices

Images of visual appearance of practices

Instantaneous performance feedback via models

Allows multiple iterations

Conservation
tillage
Low phosphorus
Stover harvest
Native prairie
Switchgrass

Roads + water features
Section boundaries
Land cover + topography
Watershed boundaries
Restorable wetlands
Habitat quality
Soil erosion + water quality
contamination susceptibility
Crop productivity

Total suspended solids
Phosphorus
Total runoff
Habitat quality
Carbon sequestration
Financial profitability

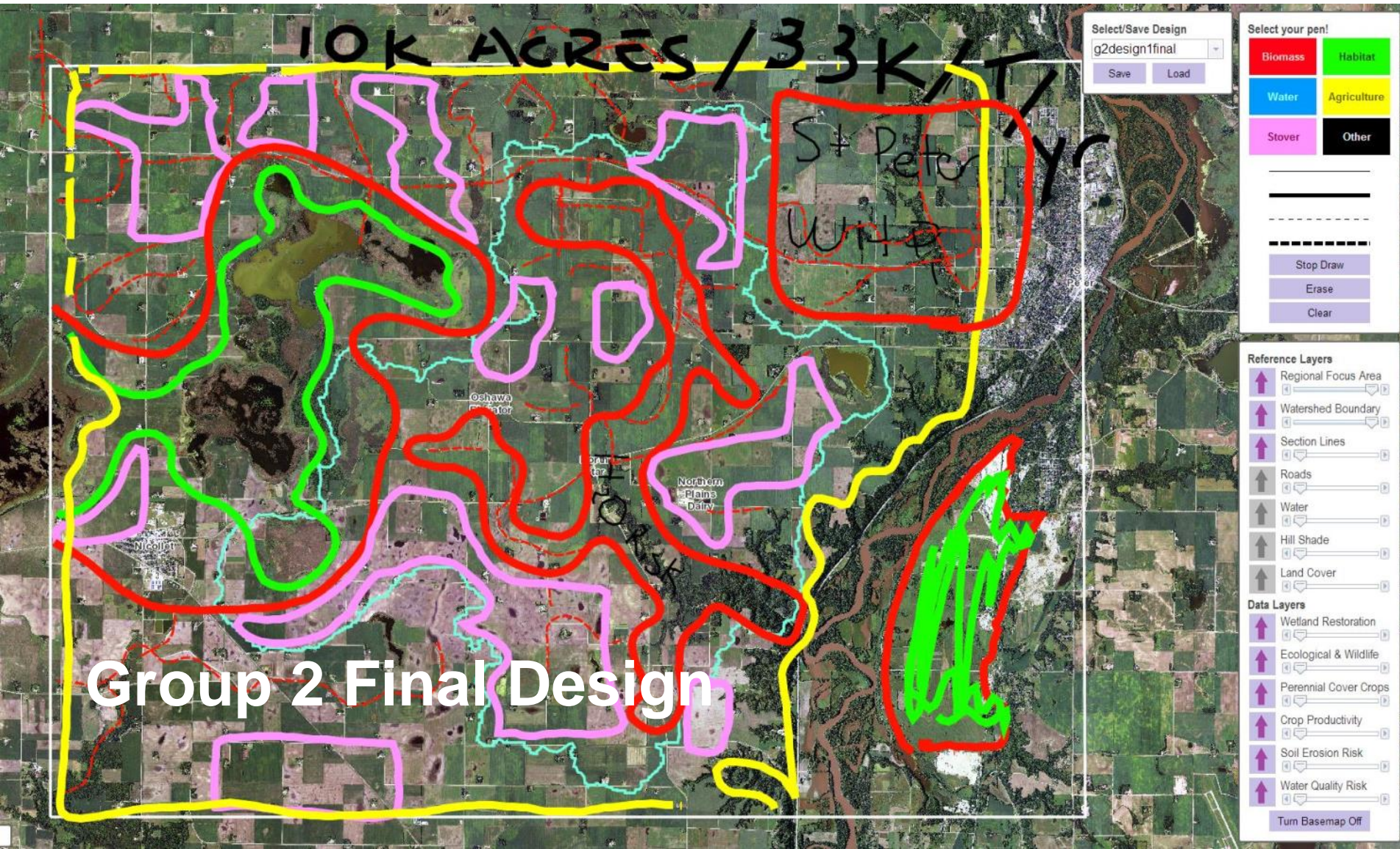
GeoDesign System Components



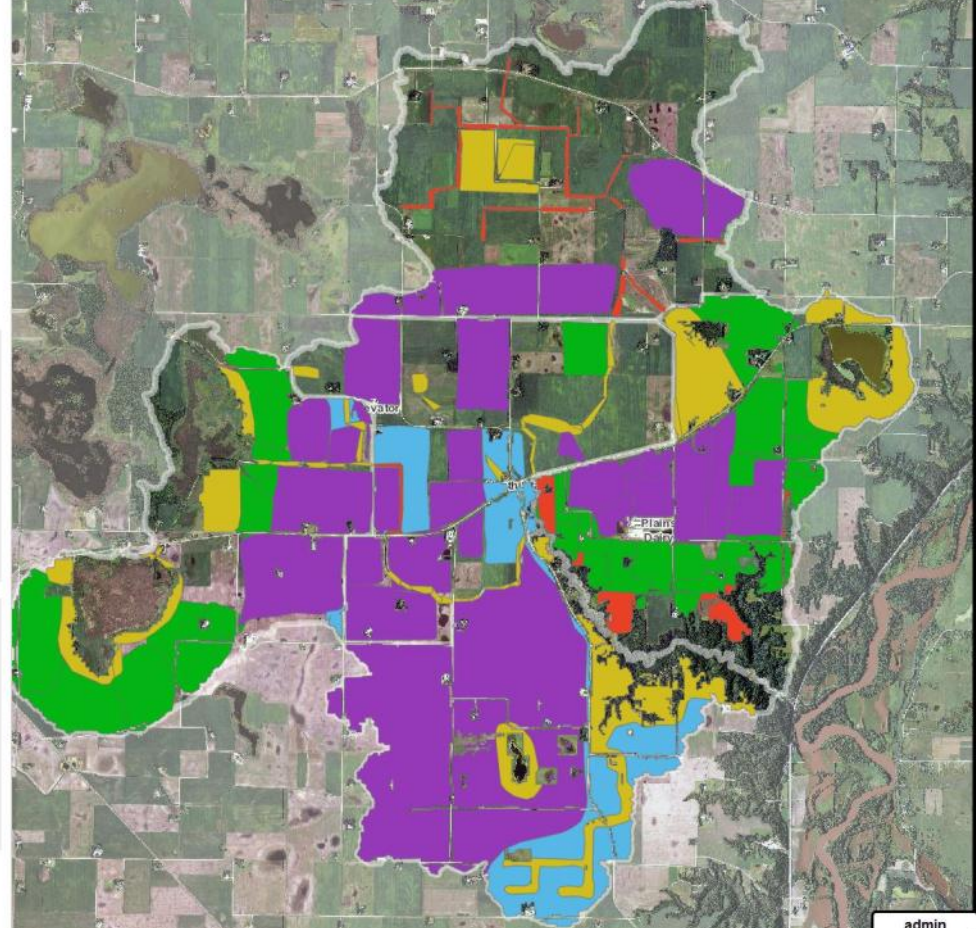
Designing for biomass with Collaborative Geodesign



Collaborative Geodesign task: 10,000 acres of biomass in 75,000 acre region



Design performance



	Carbon Sequestration (t/yr)	Market Return (\$/yr)	Sediment (t/yr)	Phosphorus (lb/yr)	Water Yield (ft/yr)	Habitat
Central	80	\$53,934	-0.42%	0.34%	-10.27%	2.39%
East	285	(\$25,428)	-14.70%	-16.78%	-23.19%	7.08%
North	113	\$6,483	-5.35%	-4.12%	-11.18%	3.70%
South	264	\$91,321	-18.11%	-17.30%	-19.38%	5.97%
West	179	\$15,050	-1.85%	2.90%	-10.63%	3.40%
Overall	1386	\$130,983	-8.53%	-7.11%	-15.13%	4.76%



Outcomes

Application + *Research*

Deliberation + design activities increased participants' belief in the potential **value of working agricultural landscapes for sustainable intensification**

Increased perceptions of **trust + shared understanding** with other stakeholders

Workshops viewed as **legitimate, credible forum** for exploring prospect of sustainable bioeconomy



Outcomes Application

Participant feedback:

Process facilitated thinking about all systems and how integrated they are

Process resulted in thinking deeper about equilibrium between environment/economy

Helped see prospect of multiple benefits from one practice

“These workshops were like a fast-forward for the evolution of a conversation – from the very simplistic agriculture-vs.-environment conflict to a much more nuanced, complicated and respectful understanding of costs, benefits, trade-offs and perspectives surrounding the potential of biomass production to be a driving force of positive outcomes for multiple interests”



Next Steps

Seven Mile Creek Watershed

Building a Community-based Bioeconomy

Build on stakeholder engagement + design for biomass

Design supply chain

Address sustainable stover harvest

Advance cover crop technology

Assess policy impacts

Pursue community economic development benefits

Exploring tradeoffs, prospects for win-win



Thank you!

Additional project team members:

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Dr. David Pitt, Department of Landscape Architecture

Len Kne, U-Spatial

Mike Reichenbach, Extension

Bryan Runck, Department of Geography

Amanda Sames, Conservation Biology Program

Cindy Zerger, Toole Design Group

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