

REVEALING THE INVISIBLE

How Visualization can Translate Water Quality Data
into Accessible Stories that Inspire Solutions

Matthew Seibert

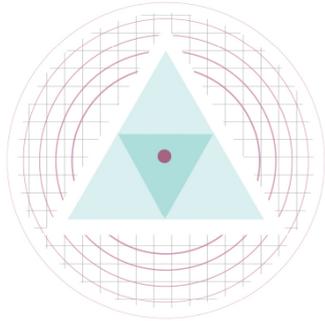
Principal, Landscape Metrics LLC

LANDSCAPE METRICS

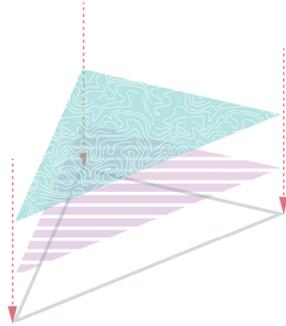
Telling Visual Stories Through Data and Design

Landscape Metrics LLC

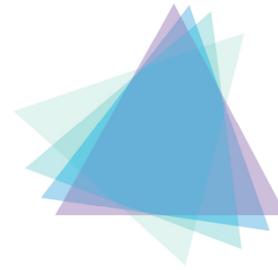
transforms information into interactive web applications, video animations, and cartographic visualizations. Drawing on our team members' diverse backgrounds in geographic information systems, architectural design, web development, and systems ecology, Landscape Metrics synthesizes complex data into compelling visual narratives.



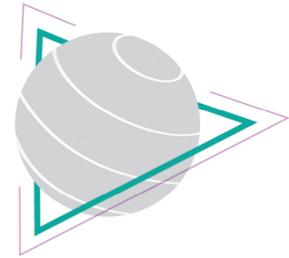
**Geospatial Web Application
Development and UX Design**



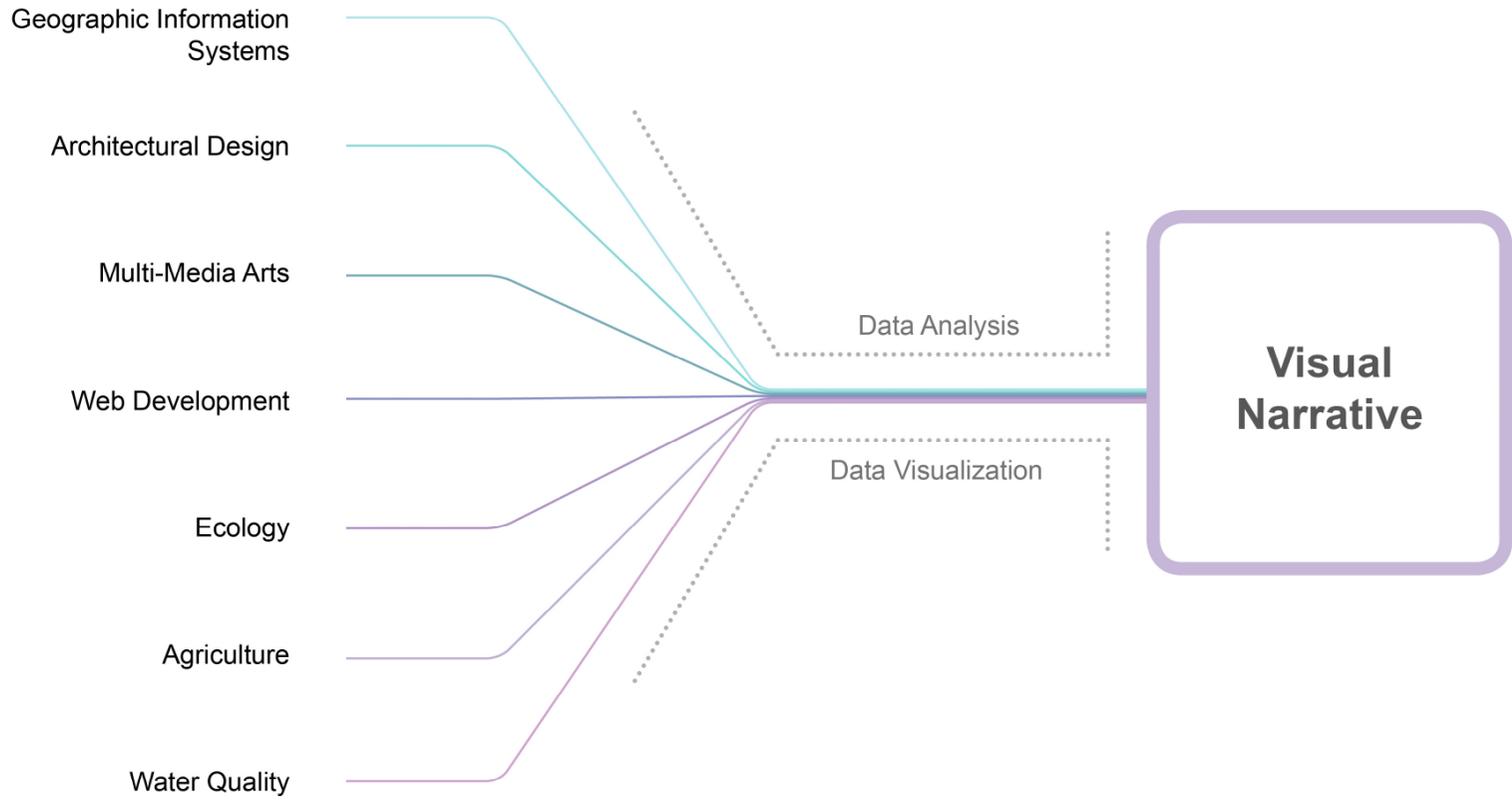
**GIS Data Analysis, Synthesis,
and Research**



**Motion Graphics and Video
Narratives**



**Graphic Design and Data-Driven
Representation of Place**



TELLING A VISUAL STORY THROUGH DATA AND DESIGN

4. Nation: What's Local?

3. Region: A Resource Out of Place

- 1. Neighborhood: The BK BioReactor
- 2. City: Advancing Waters

ENGAGING ACROSS SCALES

From Neighborhood to Nation

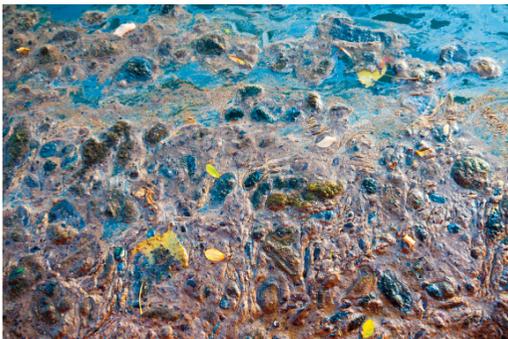
Soil Productivity Index and Agricultural Landcover overlay

- Promotes multidisciplinary, multi-institutional collaboration (lead by Nelson Byrd Woltz Landscape Architects)
- Leverages geospatial microbial abundance and metabolic pathway data to reveal the microbiome of a Superfund
- Represents the past, present, and future of Brooklyn's historic waterway through motion graphics

The Brooklyn BioReactor

Investigating the Unseen Microbiology of the Gowanus Canal

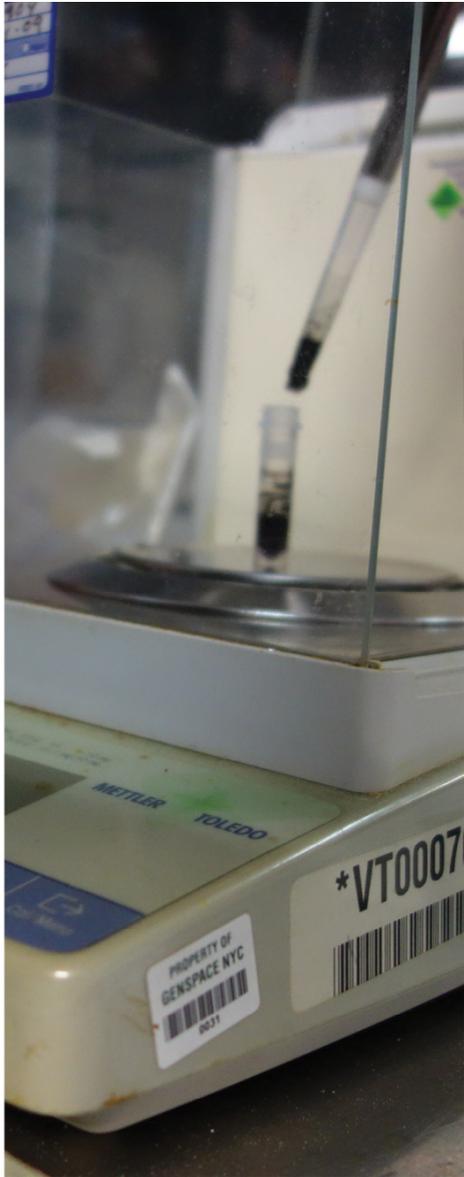
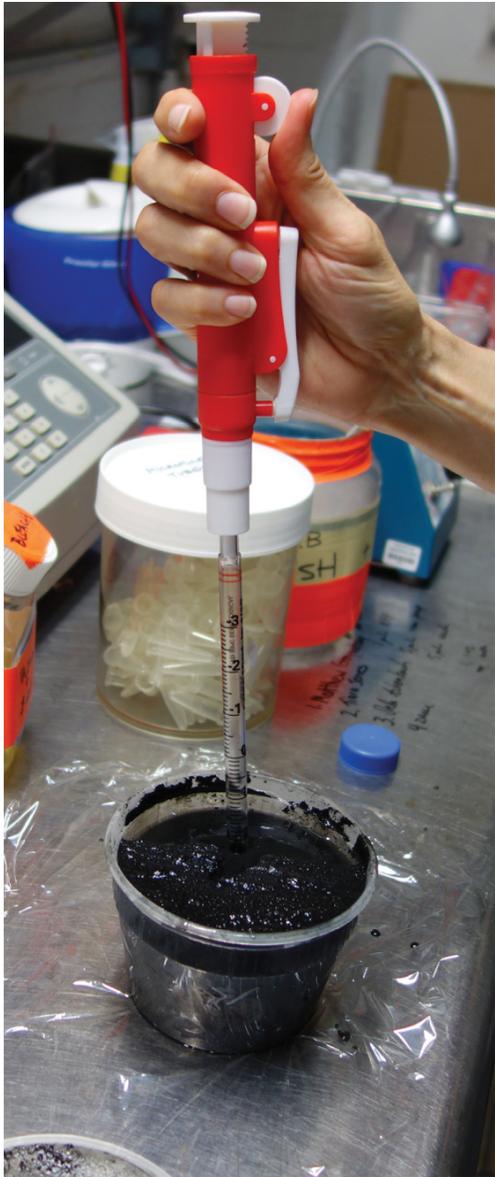




Sampling Sediment

Equipped with DIY sampling instruments, a deep curiosity in the invisible microbiology of this toxic environment, the team and a crew of volunteers sampled sediment at 14 targeted sites along the two mile stretch of the canal. Site attributes such as turbidity, light exposure, depth, salinity, and location were assessed to select sites that exhibited a spectrum of environmental influences.





Extracting and Sequencing DNA

These samples were subsequently taken to GenSpace, a nonprofit organization dedicated to promoting citizen science and access to biotechnology, to extract the DNA of the collection of organisms – or microbiome -- in the sediment and store it as a genetic library.

The extracted DNA is then sequenced, computationally identifying the microbes and their functions with this data. Since the initial sampling, originally envisioned as a one-time expedition into the genetic material of the Gowanus Canal, the project has developed into a seasonal investigation of these extreme and resilient life forms.

ADVANCING WATERS

Tracking the Physical Toll of Sea Level Rise across
New York City's Five Boroughs

- Leverages the 2010 Census, NYC Selected Facilities and Program Sites, and National Elevation datasets
- Renders an evocative view of increasing risk through a unique interactive catalog of communities and infrastructure threatened by climate change



ADVANCING WATERS

Tracking the Physical Toll of Sea Level Rise Across New York City's Five Boroughs

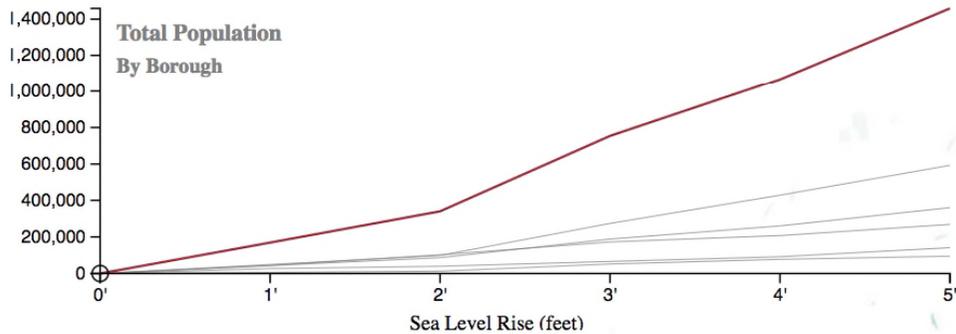
People

Education

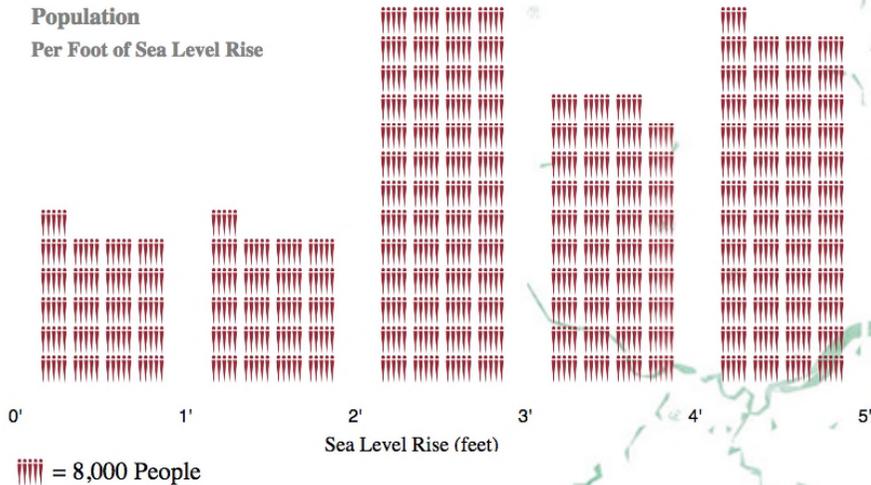
Transportation

Waste

0 People Affected in **New York City** at **0'** Sea Level Rise



Population Per Foot of Sea Level Rise



- 
- Leverages open source water quality and tributary discharge data available from the USGS and the National Center for Water Quality Research at Heidelberg University.
 - Provides a web application that helps tell the story of phosphorus-fueled eutrophication in Lake Erie.
 - Users can explore the flow of phosphorus in the Lake Erie watershed since the 1970s with more than 55,000 observations embedded in the visualization.

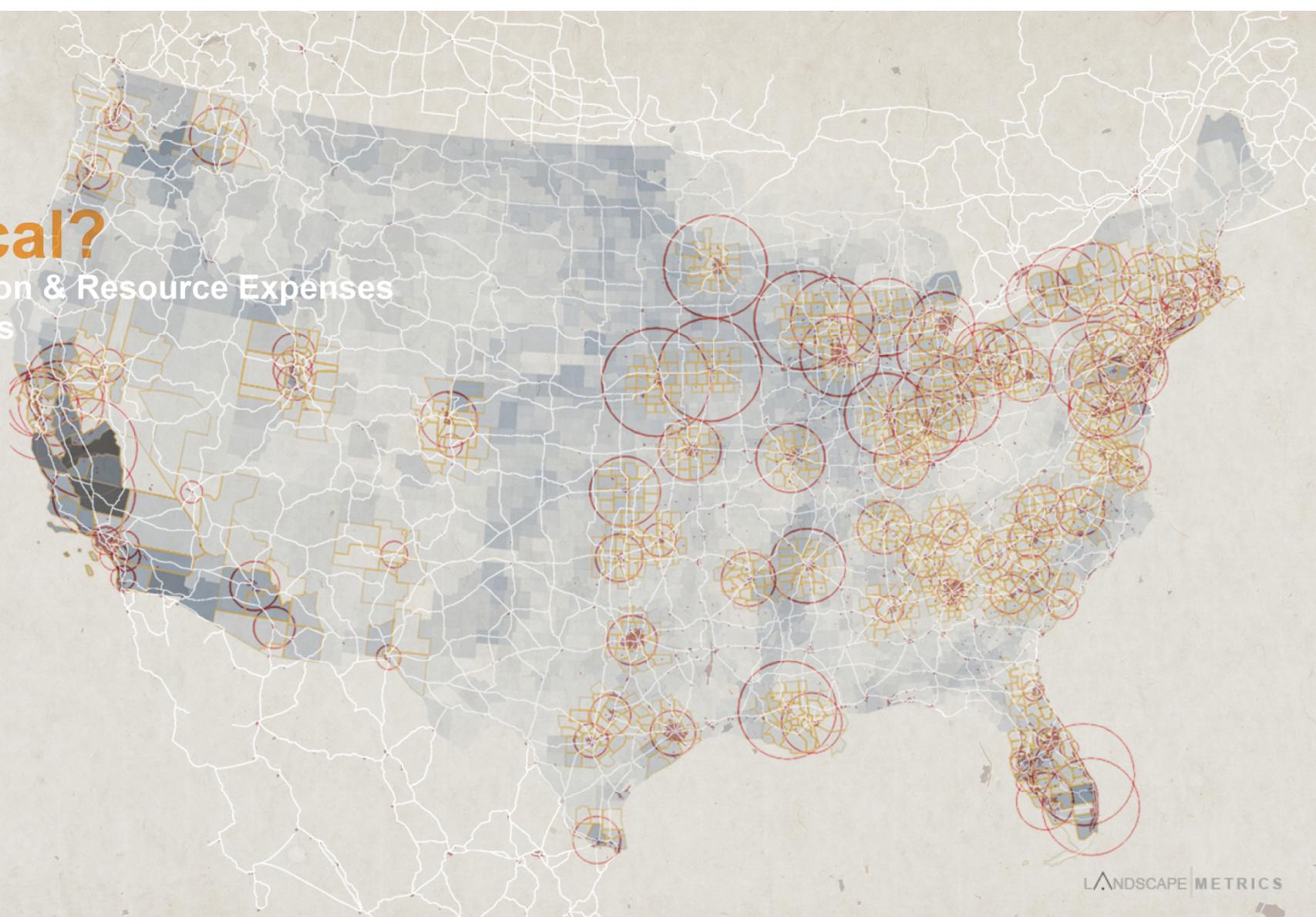
A RESOURCE OUT OF PLACE

The Story of Phosphorus, Lake Erie, and Toxic Algal Blooms

What's Local?

Agricultural Production & Resource Expenses Near U.S. Urban Areas

- USDA 2012 Census of Agriculture data is leveraged to enable an interactive exploration of local food systems for the nation's 100 most populous urban areas.
- Agricultural production and dollar investments are visualized across multiple scales, allowing the user to get a sense of costs associated with local products and facilitating comparisons between urban areas.
- The application can help educate consumers, producers, policy makers, and researchers by promoting a more nuanced view of how local agriculture can relate to sustainability.



Conclusion

- Big data isn't enough – sensory capacity does not necessarily lead to more effective, timely action
- Innovations in data communication are required to capitalize on this new frontier of data and support meaningful action
- Visualization is a key piece that is most powerful when integrated with data analysis, synthesis, and design
- This requires a novel, interdisciplinary approach

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www.landscapemetrics.com

