

Sustainability and Water

Thinking Critically about Science, Policy, and Ethics



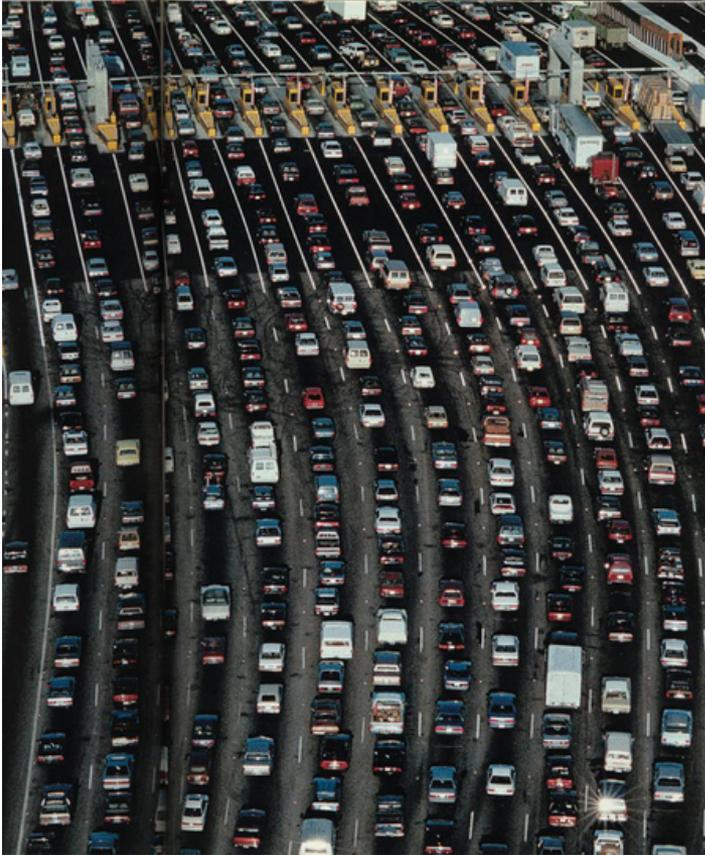
Michael A. Bryson, Sustainability Studies

JJC Sustainability Guest Lecture

14 November 2011



Sustainability Defined



This is not sustainable . . .



. . . but this is.

Sustainability Defined



Not so good.



Ah, much better.

Sustainability Defined



Nope.



Yep.



The green roof of Chicago's City Hall
(source: City of Chicago)

In a Sustainable Future:

Environmental resources are conserved for both future human generations as well as non-human biota.

Economic development occurs not at the expense of the natural environment, but in a way to mitigate ecological costs and impacts.

Equity – social, economic, and environmental justice – governs the process of sustainable development.

Discussion: How do some of these images relate to water?

Wal-Mart Unveils Plan to Make Supply Chain Greener

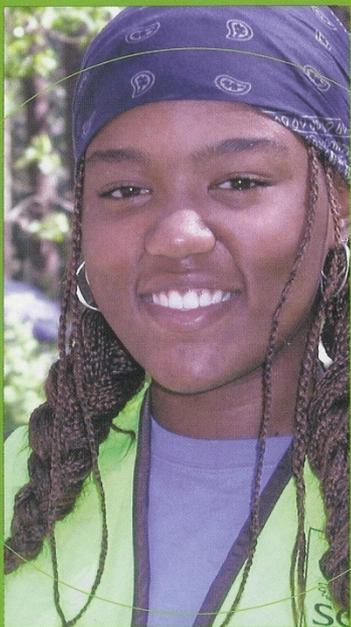
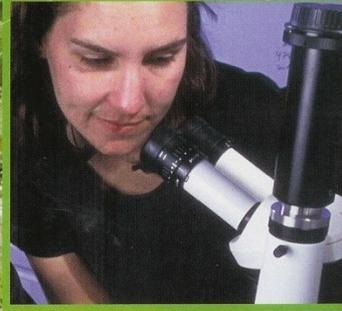
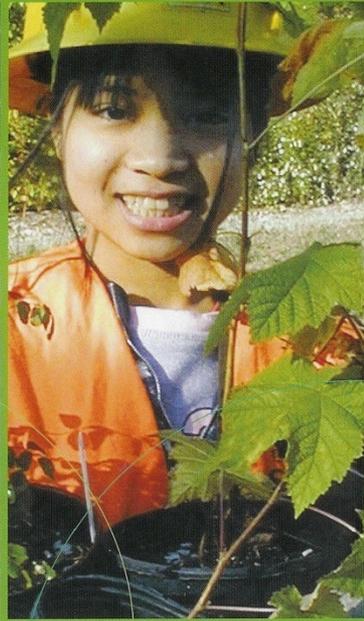
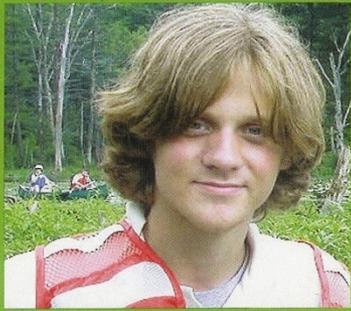
February 26, 2010 / The New York Times

By Stephanie Rosenbloom

Wal-Mart, the nation's largest retailer, announced on Thursday that **it would cut some 20 million metric tons of greenhouse gas emissions** from its supply chain by the end of 2015 — the equivalent of removing more than 3.8 million cars from the road for a year. . . .

Essentially, **suppliers are being asked to examine the carbon lifecycle of their products**, from the raw materials used in manufacturing all the way through to the recycling phase. . . .

Wal-Mart's sustainability executives will work with suppliers to help them figure out what measures to take.



I am green
environmental
& conservation
careers

Science/Engineering:

- Energy manager/technician
- Hydrologist
- Restoration ecologist
- Toxicologist
- Water/wastewater engineer

Business/Professional:

- Brownfields real estate developer
- Corporate recycling manager
- Environmental quality certification specialist
- GIS specialist
- Risk manager
- Sustainability officer

Social Science:

- Geographer
- Museum curator
- Parks and recreation specialist
- Planner
- Policy analyst

Arts and Humanities:

- Environmental communications
- Landscape architect
- Technical environmental writer



- **Fosters environmental literacy** through interdisciplinary work in the natural sciences, social sciences, and humanities;
- **Engages public policy** concerns surrounding consumption, energy usage, and viable economic growth;
- **Explores social justice** issues on a range of fronts, including environmental justice, resource allocation, urban development, and social equity;
- **Educates students to be leaders** on issues of sustainability, one of the critical issues of the 21st century.

Greening the University: A Three-fold Process



Greening the Physical
Campus



Launching
Sustainability Studies



Making Community
Connections



Core Courses

SUST 210 Sustainable Future
SUST 220 Water
SUST 230 Food
SUST 240 Waste

Advanced Courses

SUST 310 Energy and Climate Change
SUST 320 Sprawl, Transportation, and
Planning
SUST 330 Biodiversity
SUST 340 Policy, Law, and Ethics

Special Options

SUST 350 Service Learning
SUST 390 Special Topics



Crosscutting Themes

Science and Environmental Literacy
Environmental and Social Justice
Urban and Suburban Systems

Pedagogical Highlights

Interdisciplinary Learning
Field Trip Experiences
Service Learning Opportunities
F2F, Online, and Hybrid Classes

SUST Field Trips

Hands-on education using the urban and suburban environments as learning laboratories

Cultivation of academic-community partnerships / service-learning opportunities



Des Plaines River Wetlands Demonstration Project
– wetland restoration and mitigation (spring 2009)





**Exploring the waters of the Des Plaines River Wetlands
Demonstration Project (fall 2010)**



Chicago Center for Green Technology – learning about sustainable design (Feb. 2011)



Stearns Quarry Park on Chicago's South Side – wetlands, parklands, and the reclamation of urban public space (June 2011)

Service Learning and the Community

Curriculum

- **SUST 230 Food** (community gardens and urban agriculture)
- **SUST 220 Water** (watershed monitoring and stream restoration)
- **SUST 330 Biodiversity** (non-native species control)
- **SUST 350 Service and Sustainability** (environmental justice and social activism)

(at right: RU students and faculty at the Chicago Lights Urban Farm)

Partnerships

- Chicago Lights Urban Farm
- Field Museum of Natural History
- Friends of the Chicago River
- Chicago Wilderness
- Local Community Colleges



Water, Sustainability, and the Chicago Region



Freshwater supply

Water quality and pollution

Wastewater treatment

The Chicago River and The Great Lakes

Invasive Species

Watersheds and green infrastructure

Wetlands conservation/restoration



Jardine Water Filtration Plant on Chicago's Downtown Lakefront

Water Quality Indicators

Temperature

pH

Turbidity

Dissolved oxygen (DO)

Nutrients (nitrogen and phosphorus)

Bacterial indicators (coliform)

Metals and organic contaminants (lead, copper, benzene, PCBs, hexavalent chromium)

Emerging contaminants (pharmaceuticals, synthetic hormones, flame retardants)





Dealing with Wastewater



MWRDGC's **John Egan Wastewater Treatment Plant**, Schaumburg IL / Busse Woods



ROOSEVELT UNIVERSITY
EVELYN T. STONE COLLEGE
OF PROFESSIONAL STUDIES

Dealing with Wastewater



WMRDGC's **Racine Avenue Pumping Station**, Bubbly Creek, Chicago

The Chicago River



Nature, Science, Policy, and Community

Understanding the Chicago River as a modified natural ecosystem (natural sciences)

Developing policies regarding water quality, river use, sewage treatment (social and natural sciences)

Representing the river as a cultural resource (humanities)

Restoring the river: water quality, biodiversity, riparian zone vegetation, citizen access and recreation (all disciplines)



Testing the water quality of the **Chicago River's North Branch** (May 2010)



Canoe trip down Bubbly Creek, an industrialized tributary of the South Branch of the Chicago River (May 2009)

Invasive Species: Asian Carp

- The Silver and Bighead Carp are non-native species introduced in the US to control algal growth in aquaculture ponds in the 1970s
- They escaped confinement and have spread rapidly throughout the Mississippi River basin during the 1990s and 2000s
- These fast-growing species grow rapidly to a large size (50+ lbs) and consume up to 40% of their body weight in plankton per day; they also reproduce rapidly
- Environmental impacts include disruption of food chain (since they feed on plankton, the primary producers of aquatic ecosystems), displacement of native fish species, presentation of danger to boaters (the silver carp jump when disturbed)
- Current crisis: the impending invasion of Asian Carp into the Great Lakes watershed via the Chicago and Calumet Rivers

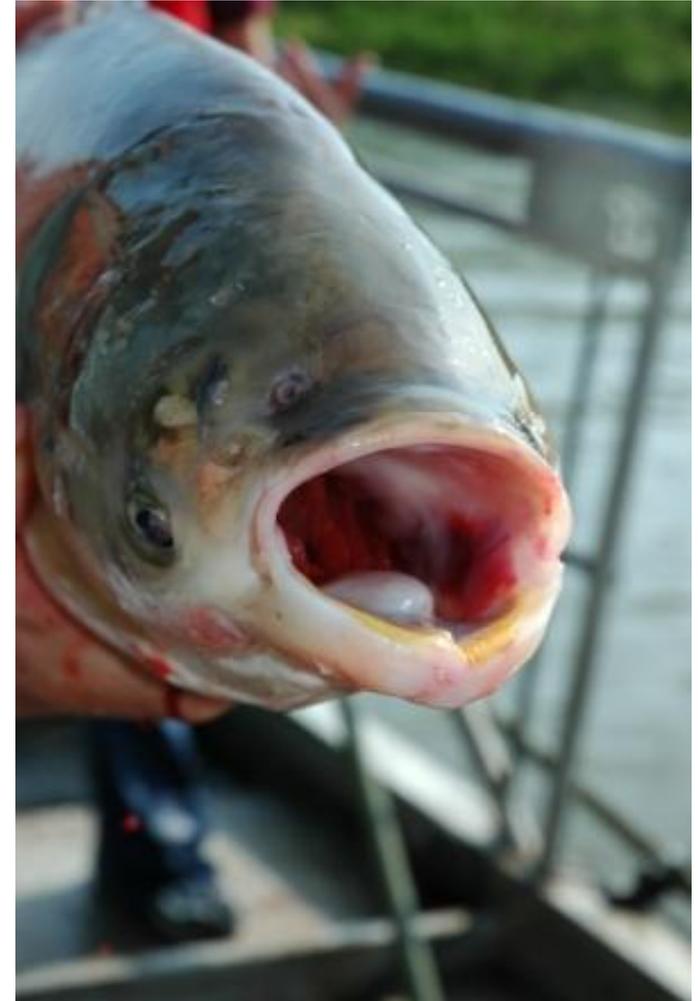


Photo: Great Lakes Fisheries Commission



Silver Carp leaping from the Illinois River, where they are very numerous along with Bighead Carp. Such behavior poses a significant boating hazard. (Photo: Great Lakes Fisheries Commission)

Asian Carp in U.S. Waters



Since their introduction to the US in the 1970s, the Asian Carp have become widespread within the Mississippi, Missouri, and Ohio River basins. Chicago is the gateway to the Great Lakes watershed. The following slide shows us that flash point in greater detail. (Map: NPR)

A river reversed, a problem created

The Chicago and Calumet rivers were once tiny waterways that trickled into Lake Michigan. Beginning in 1900 the city dug a series of canals that reversed their flows so they could carry the city's waste into the Mississippi River basin, and away from the lake – the city's drinking water source. A push is now under way to engineer a system to re-establish the natural hydrological divide between Lake Michigan and the Mississippi.

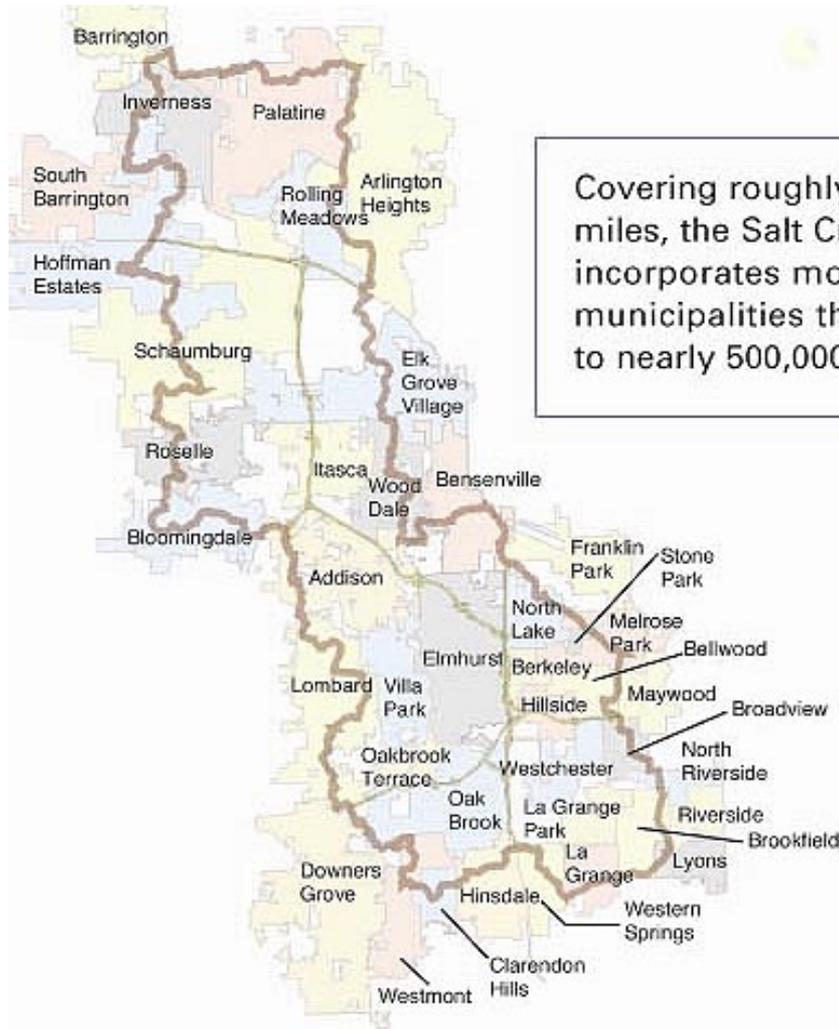


Sources: Great Lakes Fishery Commission

Journal Sentinel

These maps from the Great Lakes Fisheries Commission show the pre-1900 hydrology of the Chicago-area waterways; note the continental divide. The right map shows current flows, location of locks and water treatment plants, and A. carp sightings as of summer 2010.

Watersheds and Green Infrastructure

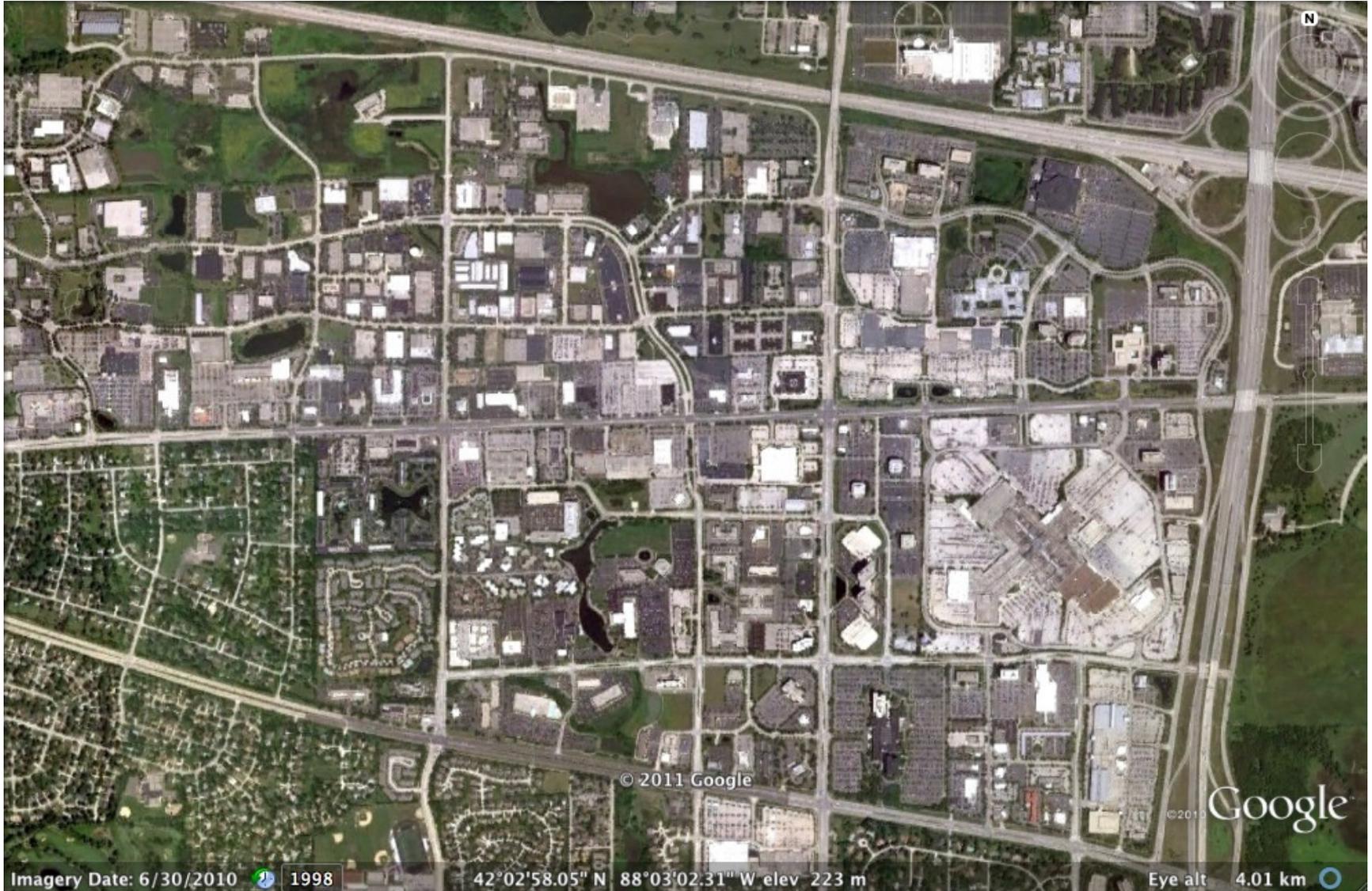


Covering roughly 150 square miles, the Salt Creek watershed incorporates more than 30 municipalities that are home to nearly 500,000 people.



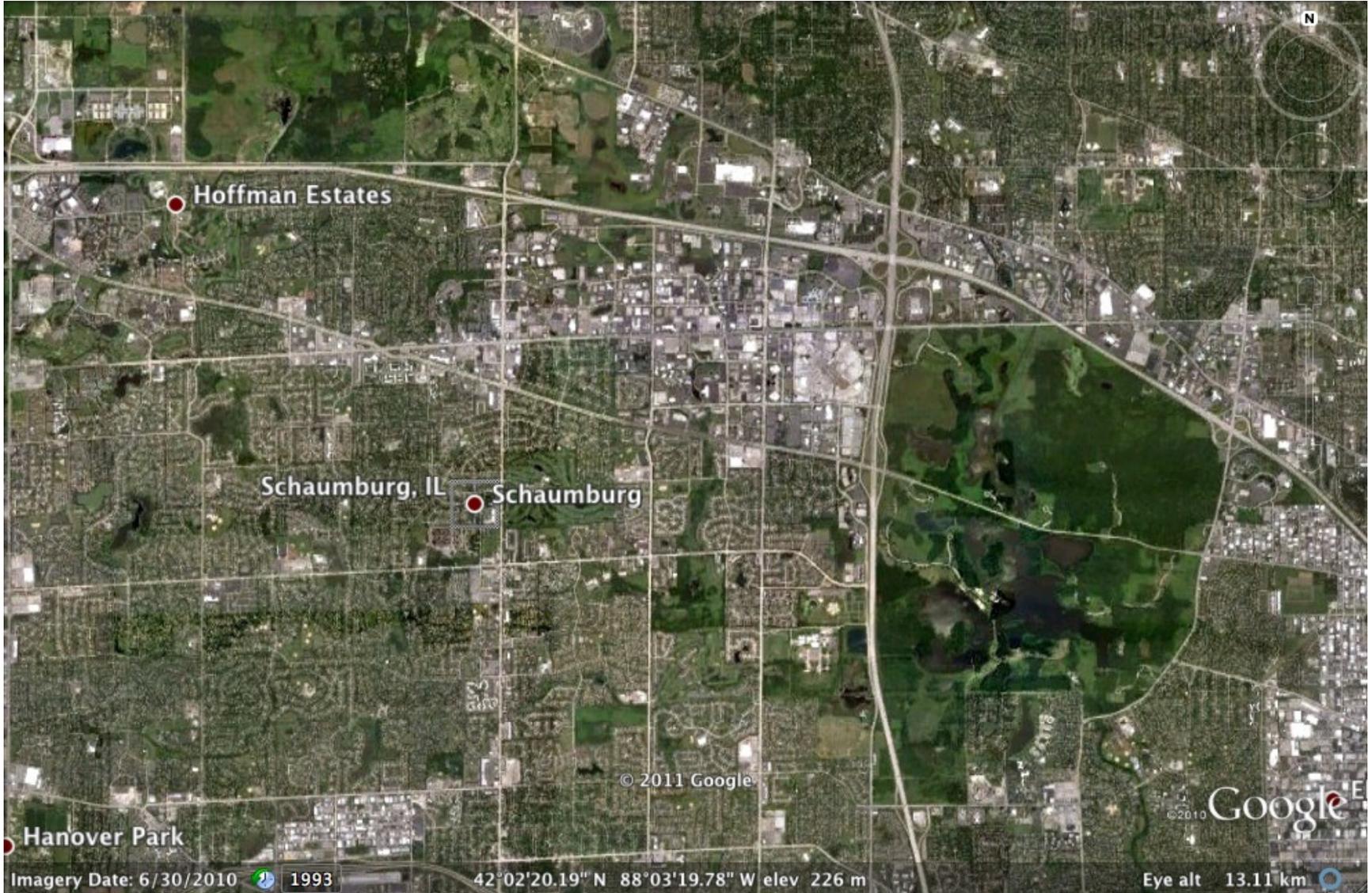


Suburban Hardscape





Green Infrastructure



A Green Vision for RU' s Suburban Campus

Schaumburg campus (established 1996) is the only comprehensive college campus in Chicago' s northwest suburban region



Visionary Possibilities:

Sustainable landscape plan: native plants, prairie plots, walking paths, wetland, orchard,

Water conservation strategies: bioswales, cisterns, rain gardens, pervious paving

Outdoor education / recreation: experimental wetland restoration, native plant gardens, aquaponics pond, greenhouse, urban farm

The Existing Foundation:

SUST undergraduate major/minor/credential

Strong science programs: biology, chemistry, pharmacy

Underutilized green space

Schaumburg' s Biodiversity Plan (2004) and Green Action Plan (2008)

Retention Pond as Wetland



Retention Pond as Wetland



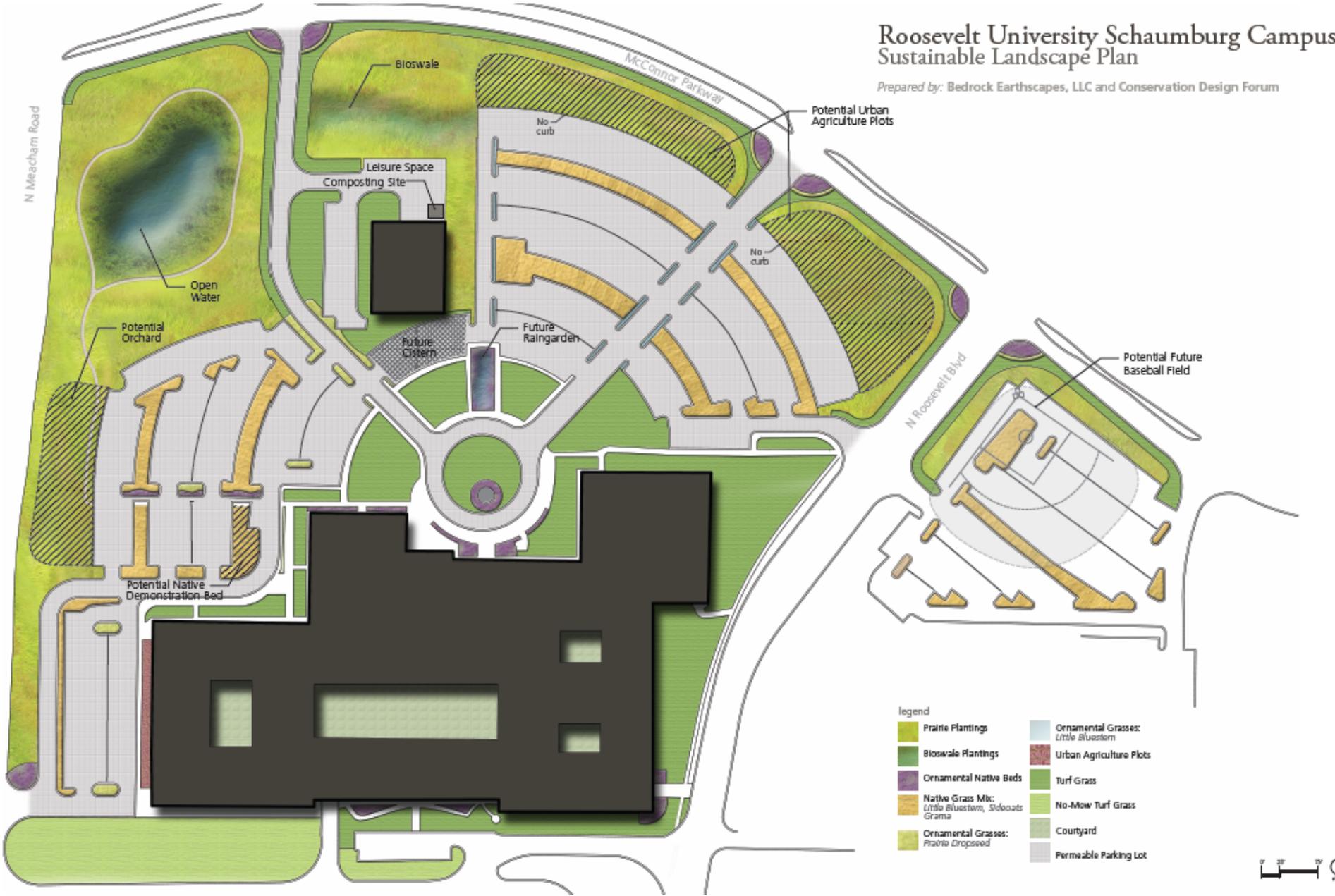
Roosevelt University Schaumburg Campus Sustainable Landscape Plan

Prepared by: Bedrock Earthscapes, LLC and Conservation Design Forum

N Meacham Road

McConnor Parkway

N Roosevelt Blvd



Potential Urban Agriculture Plots

Potential Future Baseball Field

Potential Native Demonstration Bed

Leisure Space
Composting Site

Future Cistern

Future Rain Garden

Bioswale

No-curb

No-curb

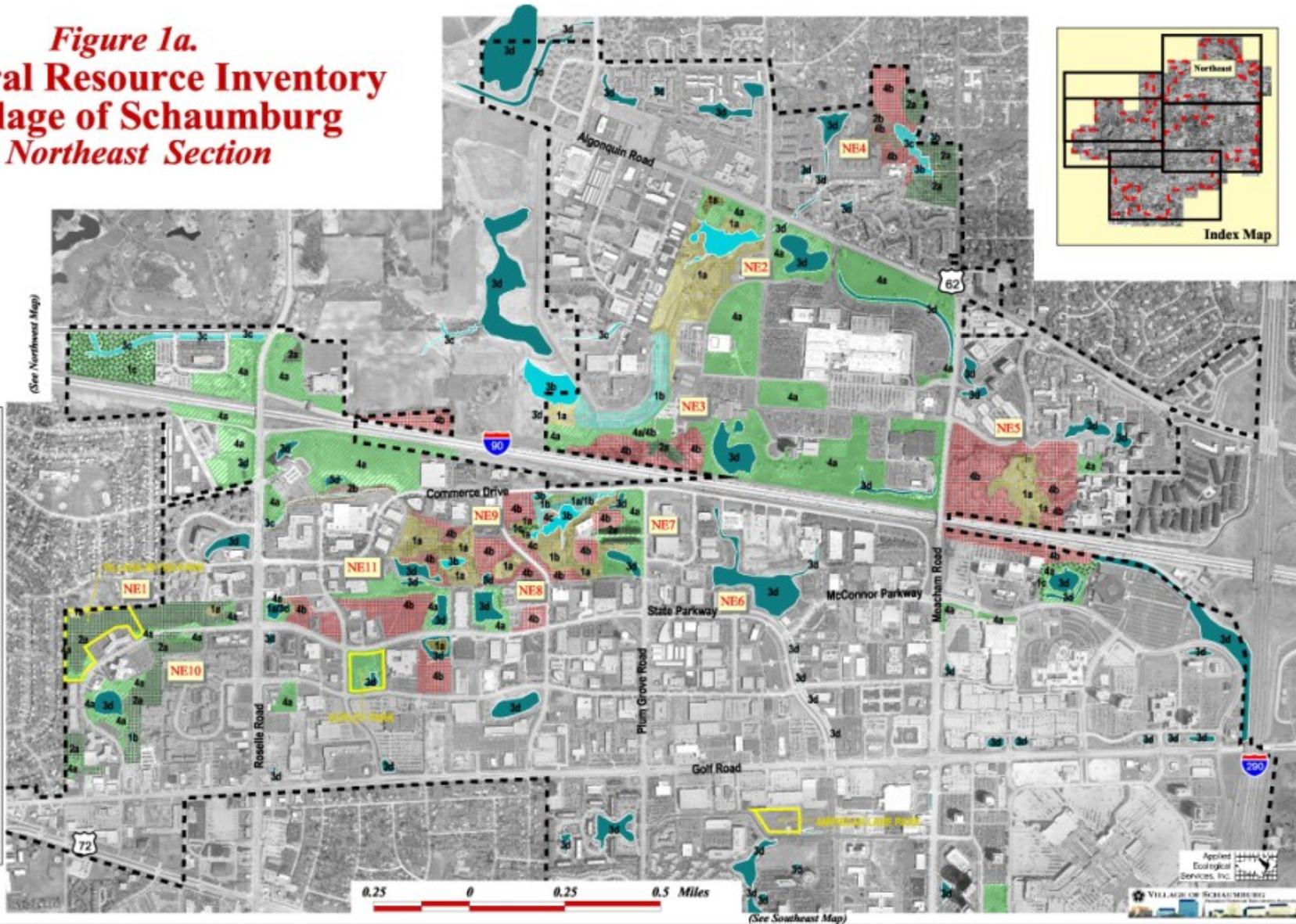
Legend

- Prairie Plantings
- Bioswale Plantings
- Ornamental Native Beds
- Native Grass Mix: Little Bluestem, Sideoats Grama
- Ornamental Grasses: Prairie Dropseed
- Ornamental Grasses: Little Bluestem
- Urban Agriculture Plots
- Turf Grass
- No-Mow Turf Grass
- Courtyard
- Permeable Parking Lot



Revised Plan / 17 February 2011

Figure 1a.
Natural Resource Inventory
Village of Schaumburg
Northeast Section



Source: Schaumburg Biodiversity Plan (2004)

Thinking about Roosevelt?

Check out these Online Resources:

Sustainability Studies [Blog](#) and [Website](#)

[Schaumburg's Sustainable Future](#) (student research project)

[Transfer Student Information](#) (admission, financial aid, majors)

RU's [Green Campus Initiative](#)

[Fast-Track Degree Completion](#) for Adult Students

Prof. Mike Bryson's [website/blog](#)