Adapting Cities to WaterWorld-Smart Growth Techniques for Rainwater Management

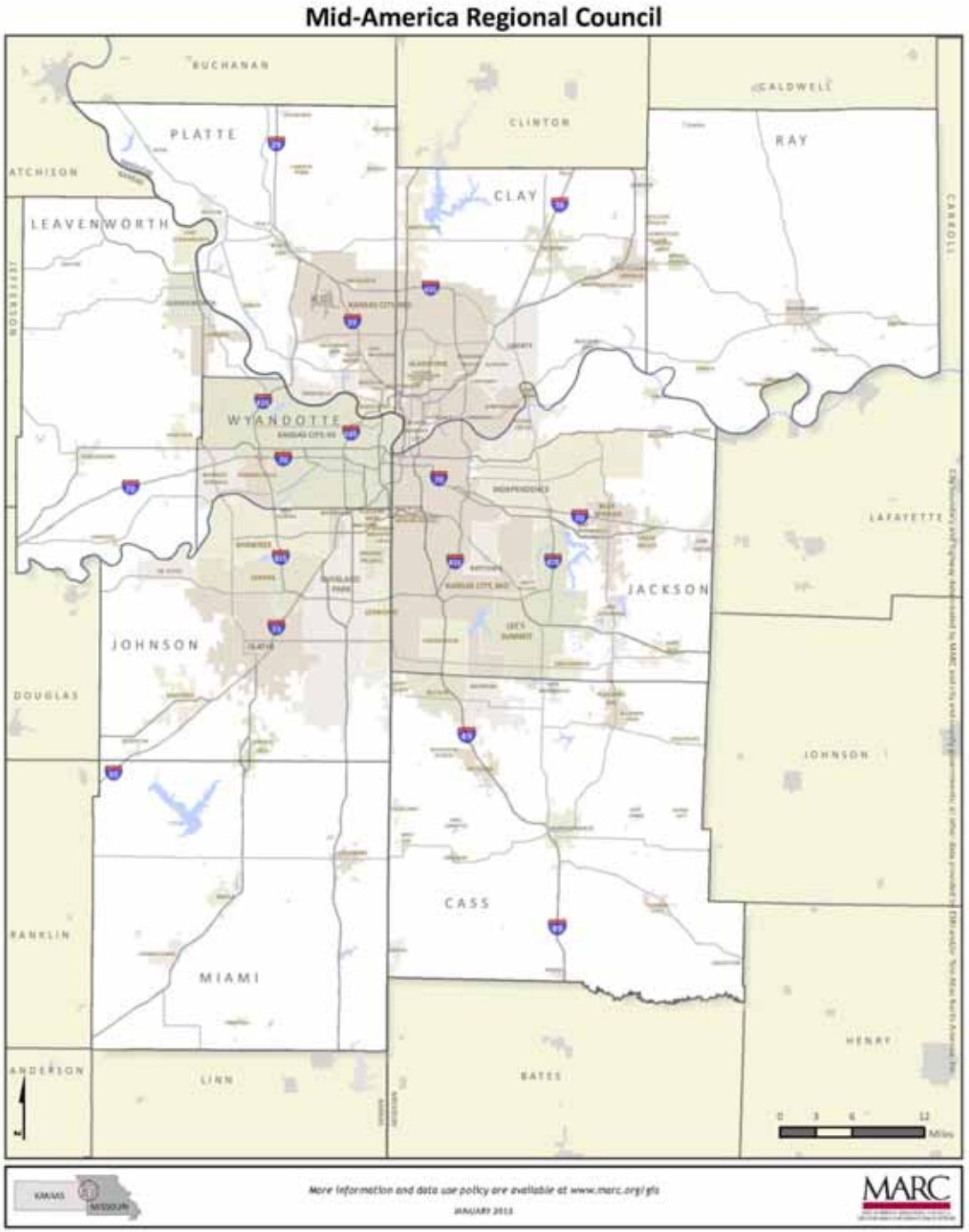
12th Annual Partners for Smart Growth Conference

February 8, 2013

MARC
MID-AMERICA REGIONAL COUNCIL

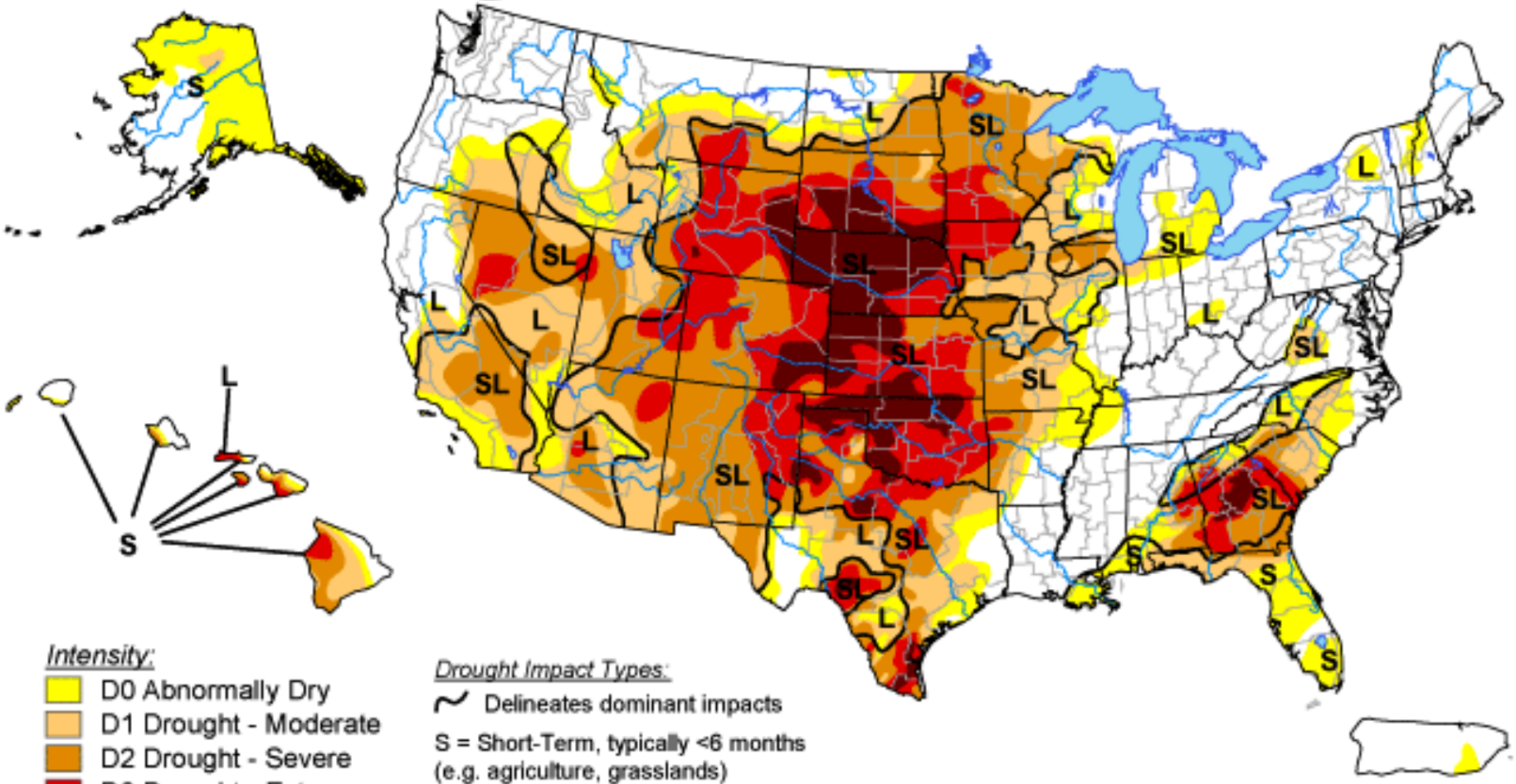
Metro Kansas City

- 2 million
- 9 counties
- 119 cities
- 4800 sq. mi.



U.S. Drought Monitor

January 29, 2013
Valid 7 a.m. EST



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

Delineates dominant impacts

S = Short-Term, typically <6 months (e.g. agriculture, grasslands)

L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, January 31, 2013

Author: Mark Svoboda, National Drought Mitigation Center

1951 Flood – West Bottoms, KCMO

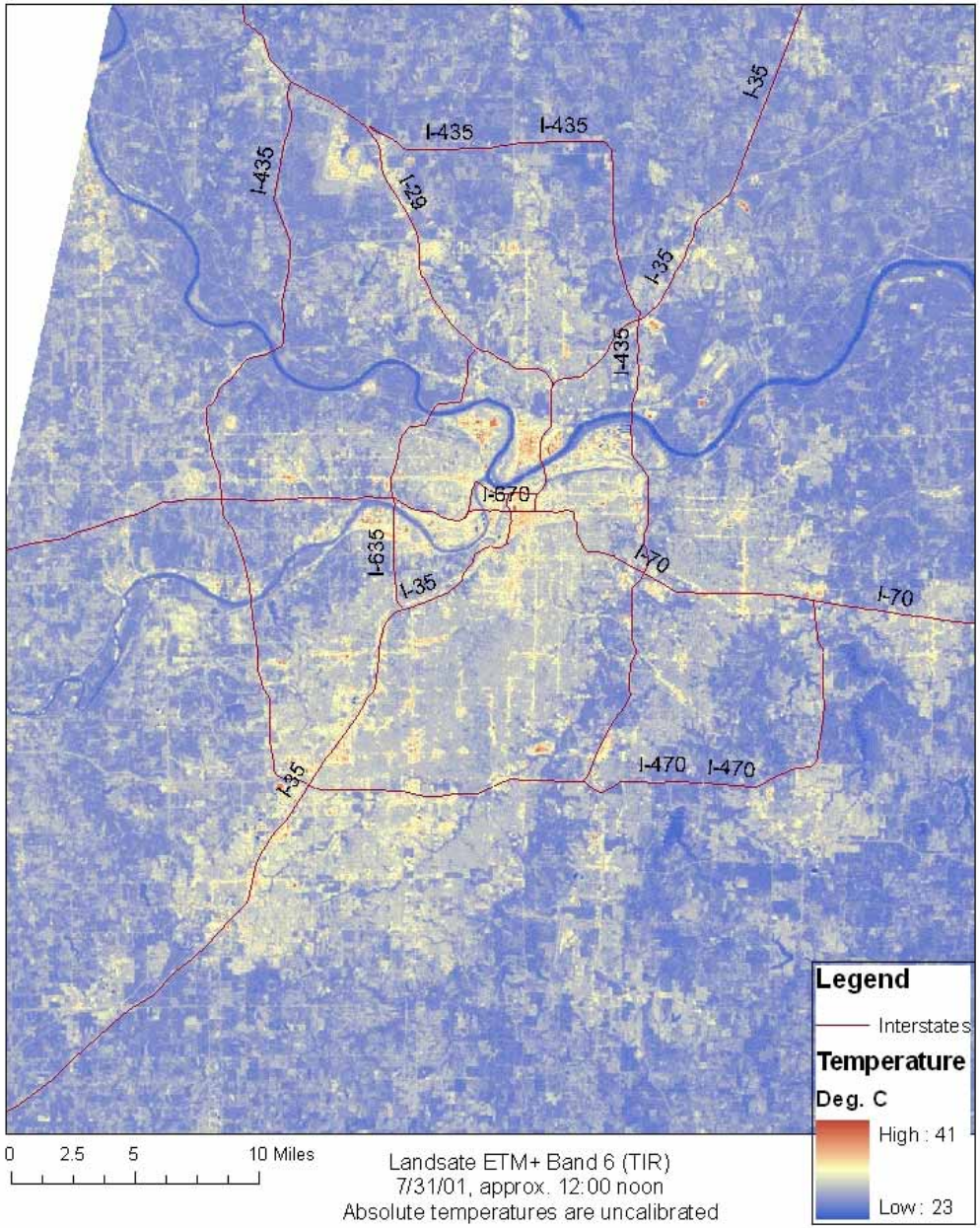
Green Infrastructure strategies to mitigate or adapt to changing precipitation patterns

- Urban forestry
- Planning – GIS-based natural resource inventory
- Stormwater management
- Regional greenway/GI system
- Ecosystem based mitigation

Green infrastructure and Climate mitigation/adaptation

- Urban forestry
- Planning – GIS-based natural resource inventory
- Stormwater management
- Regional greenway/GI system
- Ecosystem based mitigation

Land Surface Temperature for Kansas City Metro Area



Landsate ETM+ Band 6 (TIR)
7/31/01, approx. 12:00 noon
Absolute temperatures are uncalibrated

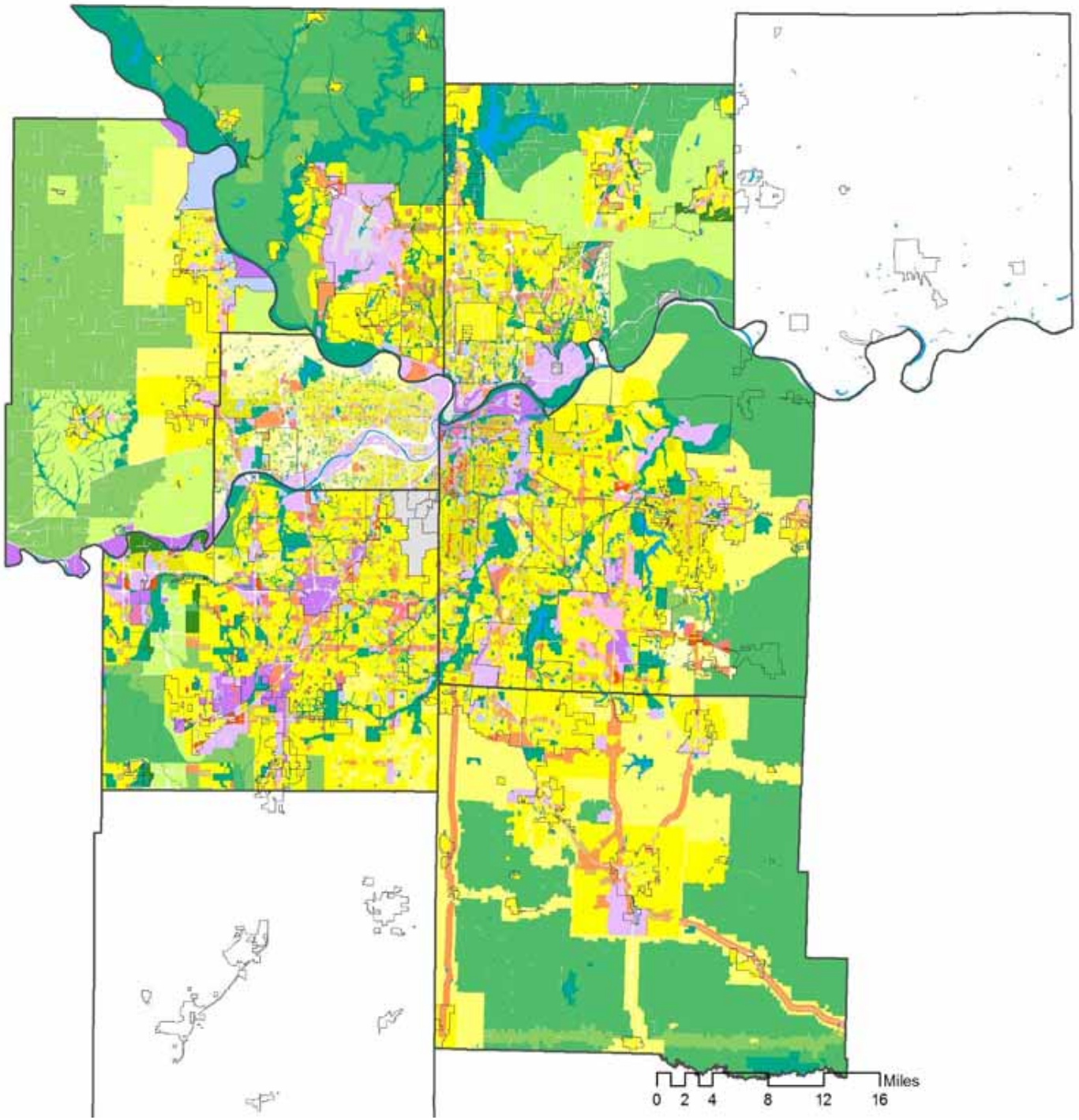
Future Land Use

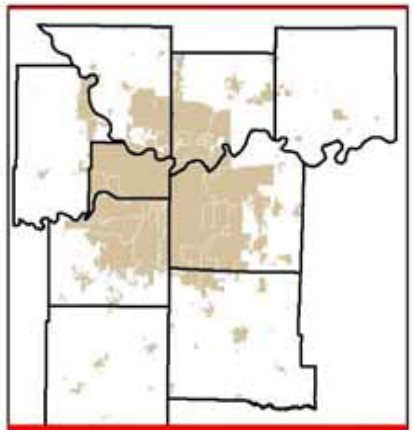
DRAFT January 2008.
Land use data is from city and county plans and 2005 appraiser's data. All recent future land use data changes may not be included. MARC has converted all local land use types to a common set of classes.

Legend

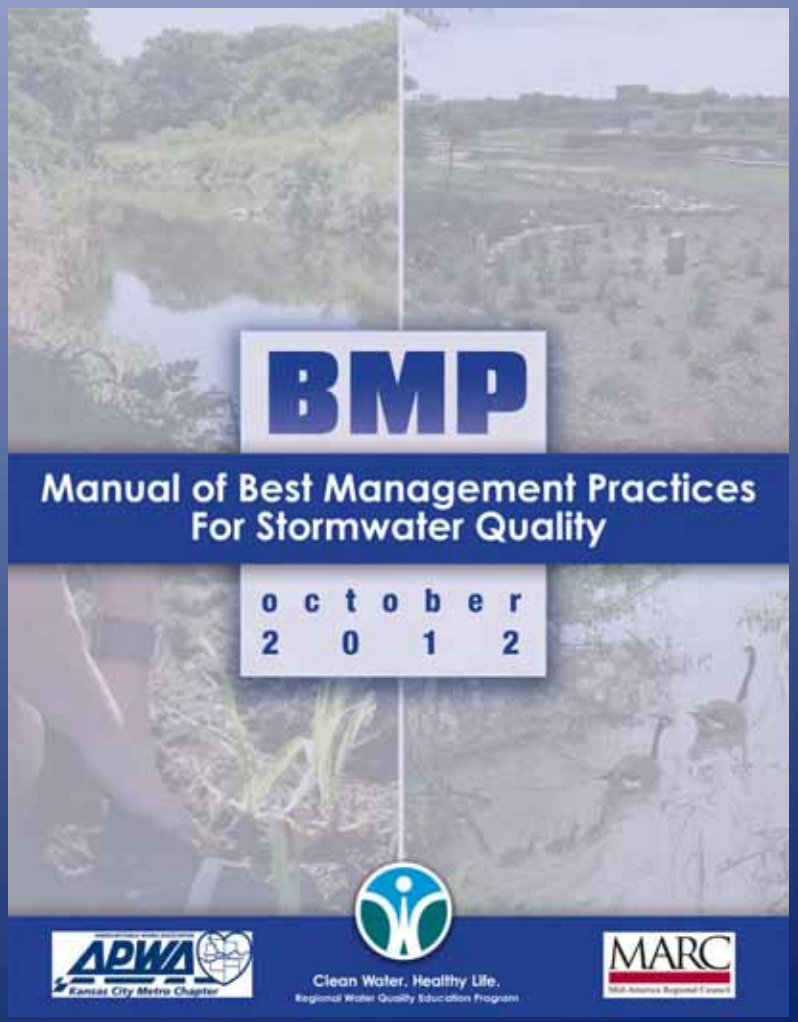
Future Land Use Type

- Agriculture/Vacant
- Rural Policy Area - .1 Units per Acre (UPA)
- Rural Residential - .2 UPA
- Urban Fringe - .5 UPA
- Residential SF Large Lot - 1 UPA
- Residential SF Very Low - 1.5 UPA
- Residential SF Low - 2.5 UPA
- Residential SF Medium - 5 UPA
- Residential MF Low - 8 UPA
- Residential MF Low-Med - 12 UPA
- Residential MF Medium - 15 UPA
- Residential MF High - 20 UPA
- Residential MF Very High - 30 UPA
- Protected/Parks
- Public/Semipublic (Low) - .22 Floor Area Ratio (FAR)
- Public/Semipublic (High) - .3 Floor Area Ratio (FAR)
- Commercial (Low) - .2 FAR
- Commercial (High) - .3 FAR
- Office (Low) - .25 FAR
- Office (Medium) - .275 FAR
- Mixed Use (Low) - .17 FAR
- Mixed Use (High) - .65 FAR
- Industrial/Bus. Park (Low)- .2 FAR
- Industrial/Bus. Park (High) - .24 FAR





Stormwater Planning



i-tree
A regional forest assessment

TREE FUND

Heartland Tree Alliance

Regional Forestry Assessment

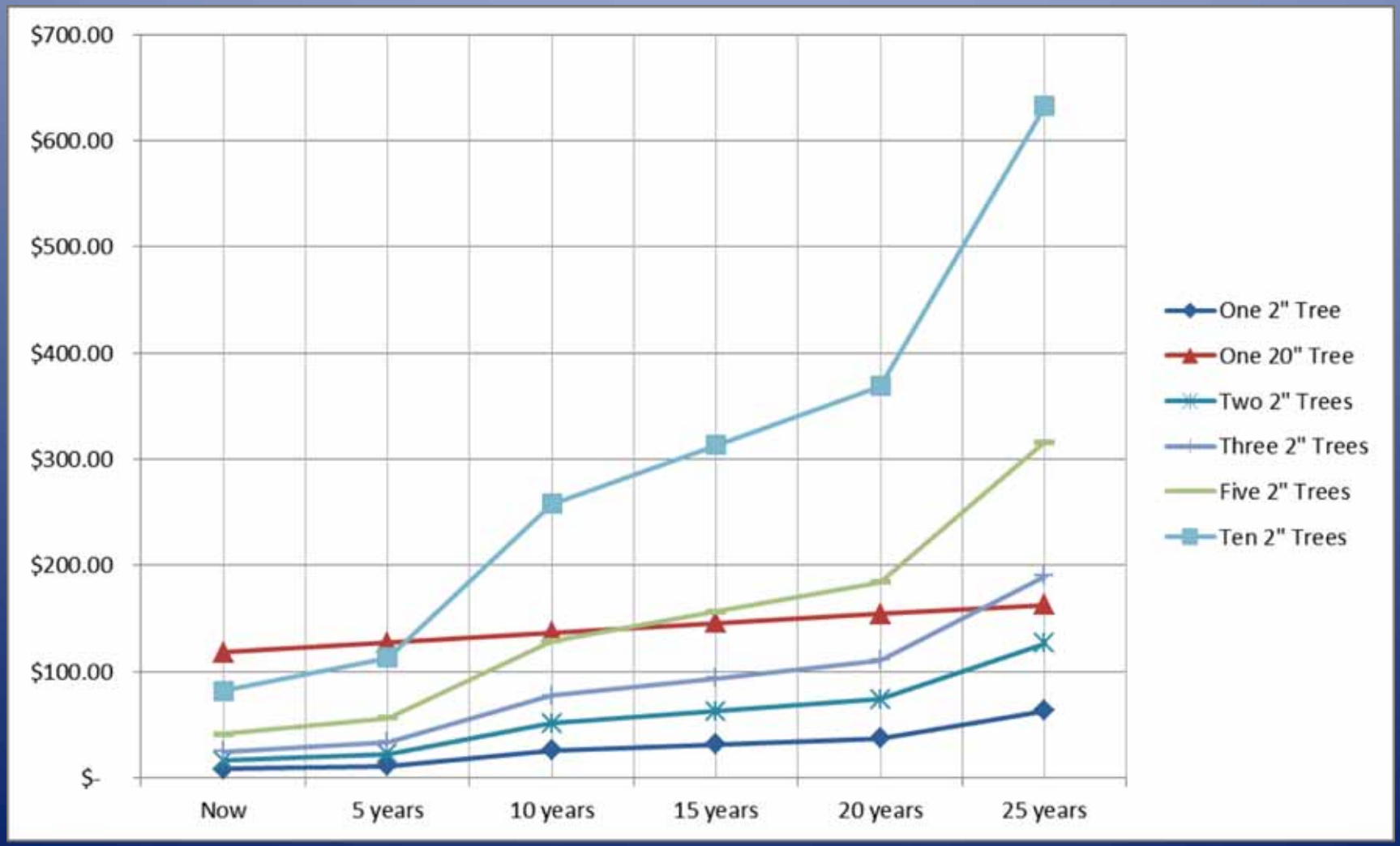
Feature	Measure
Number of trees	249,450,000
Tree cover	18.6%
Pollution removal	37,000 tons/yr ($286M/yr)
Ozone removal	23,040 tons/yr ($207M/yr)
Carbon storage	19.9M tons ($411M)
Carbon sequestration	1.0M tons/yr ($20.7M/yr)
Building energy reduction	$14M/yr
Total value per year	$320M/yr
Total value, 25 years, 10% increase in canopy coverage	$8 billion

POLICY AND PLANNING FRAMEWORK

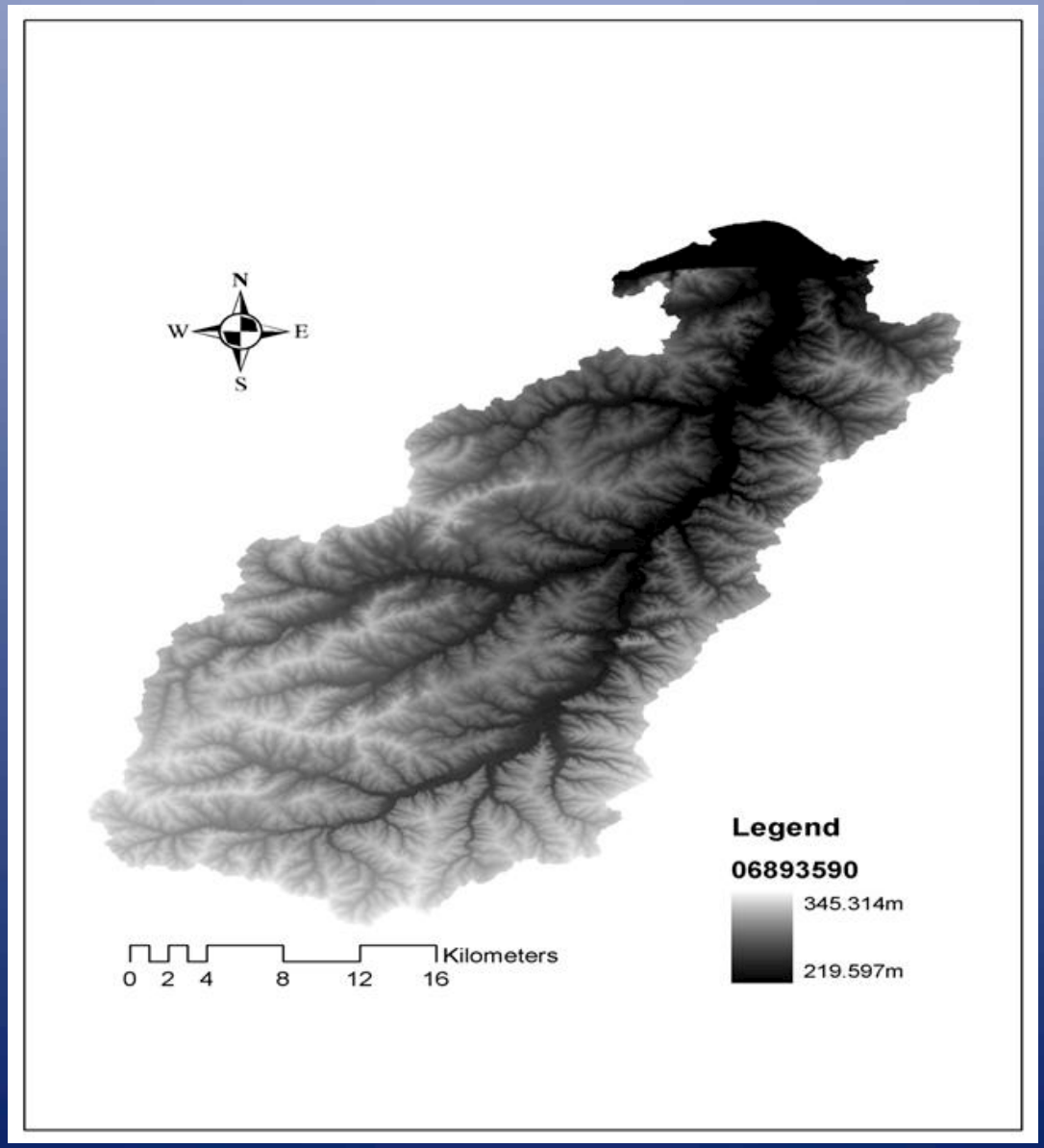
STRATEGY	REGIONAL ACTION (EXAMPLE)	LOCAL ACTION (EXAMPLE)
POLICY & PLANNING	*Plan Integration*	*Adopt Tree Protection and Replacement Ordinances*
URBAN DESIGN	*MetroGreen*	*Implement conservation-focused stormwater BMPs and sustainable site design*
OPERATIONS & MAINTENANCE	*Workforce Development*	*Create public – private partnerships for tree care*
ENGAGEMENT & EDUCATION	*Public Relations / Outreach*	*Implement Regional Tree Fund; Support Heartland Tree Alliance*

Ecosystem Service Benefits

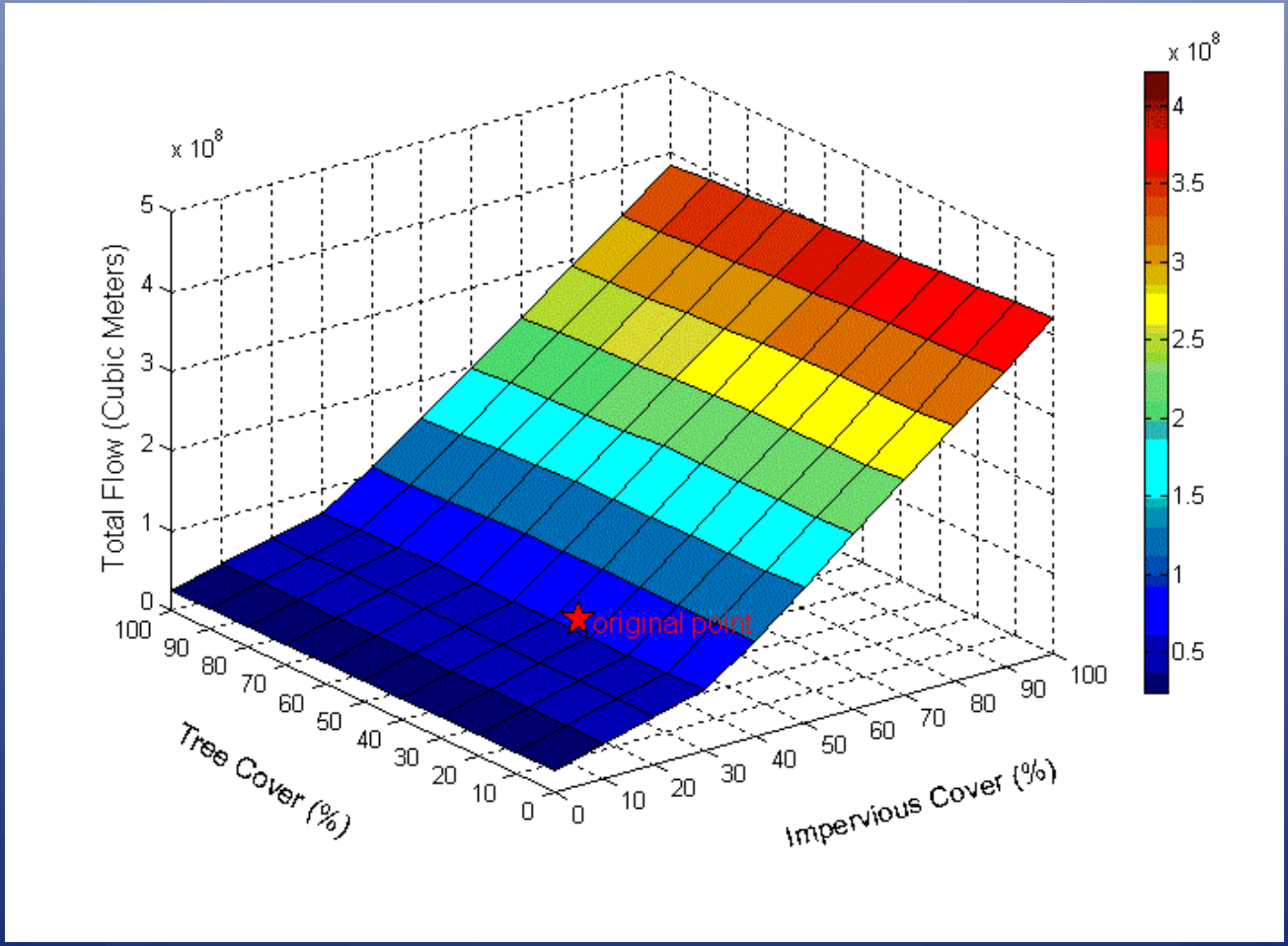
Ecosystem Service Benefits



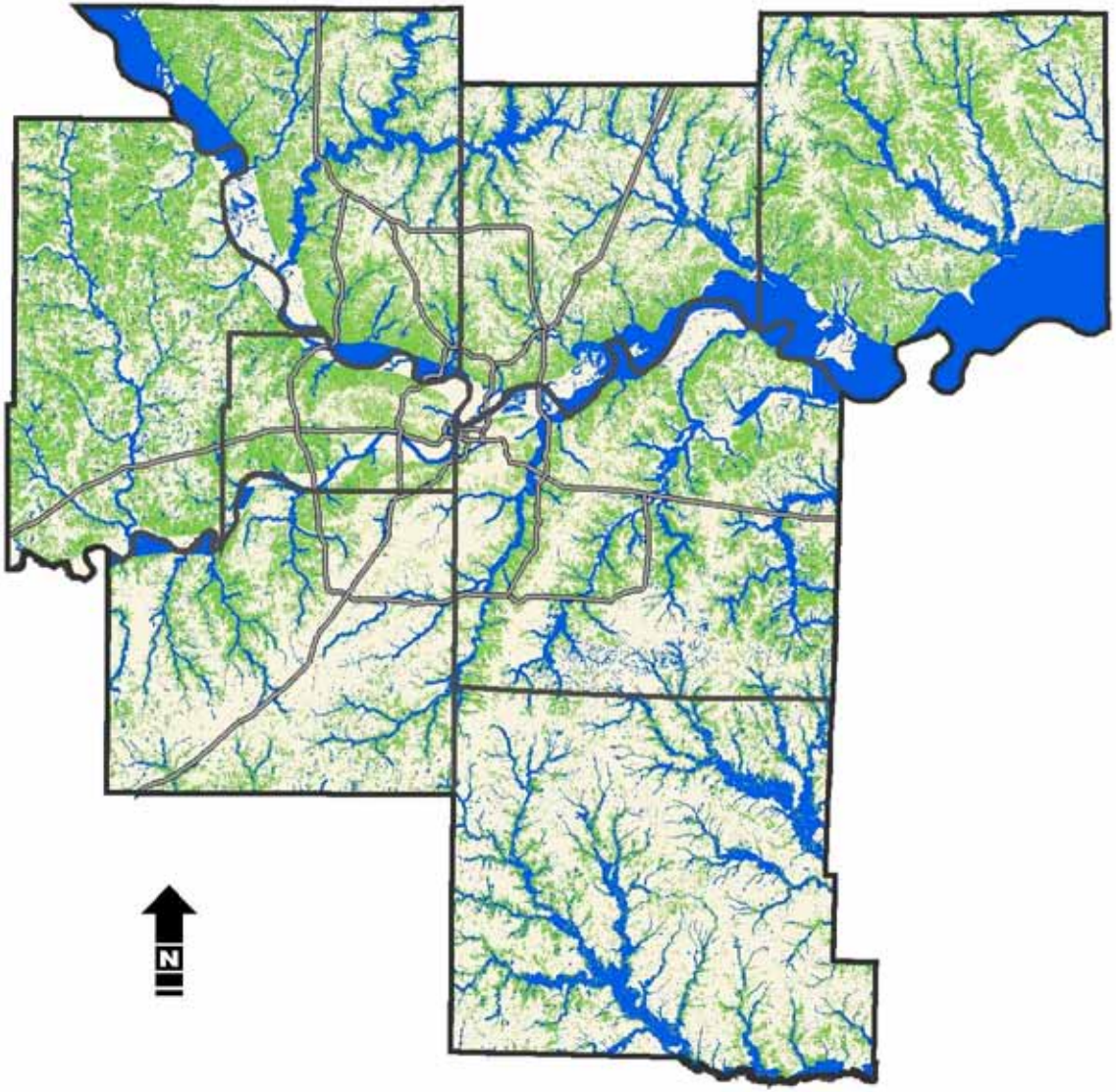
i-tree Hydro


N
W
E
S
Kilometers
0 2 4 8 12 16
Legend
06893590
345.314m
219.597m

Changes in total flow during simulation period based on changes in percent impervious and percent tree cover. Red star indicates current conditions.

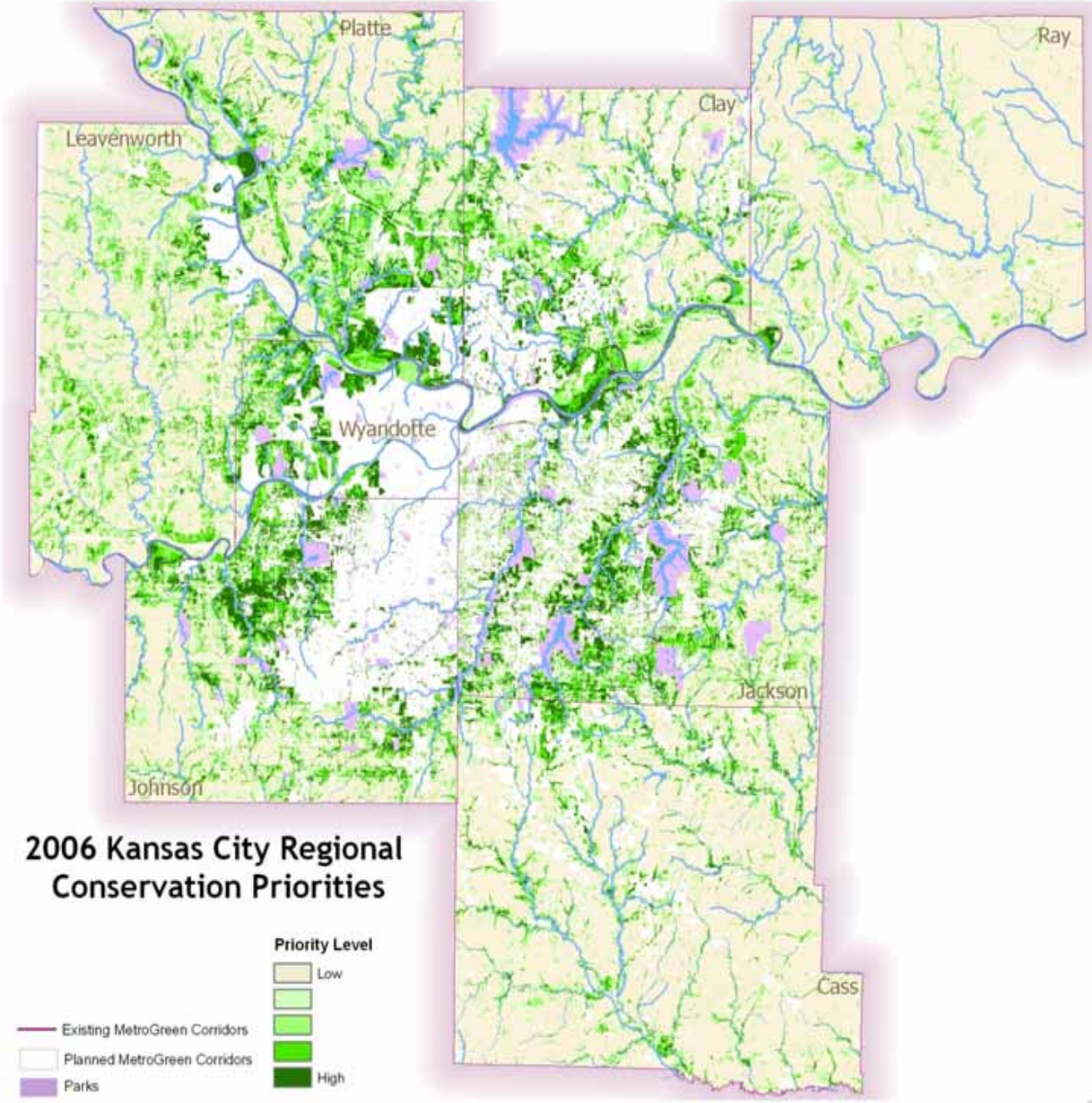


Regional Natural Resource Inventory 1.0

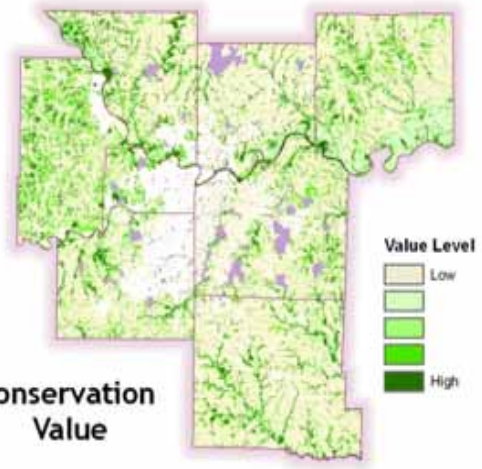


Water Resources

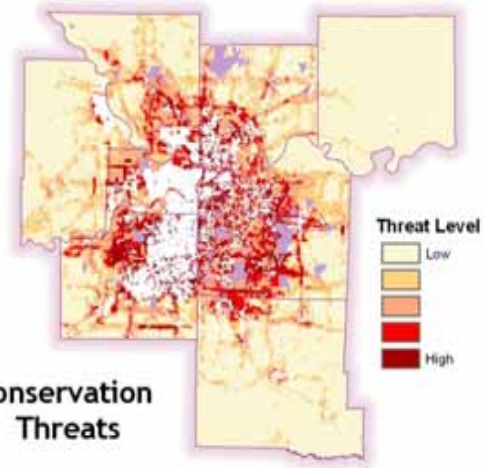
Upland Resources



2006 Kansas City Regional Conservation Priorities



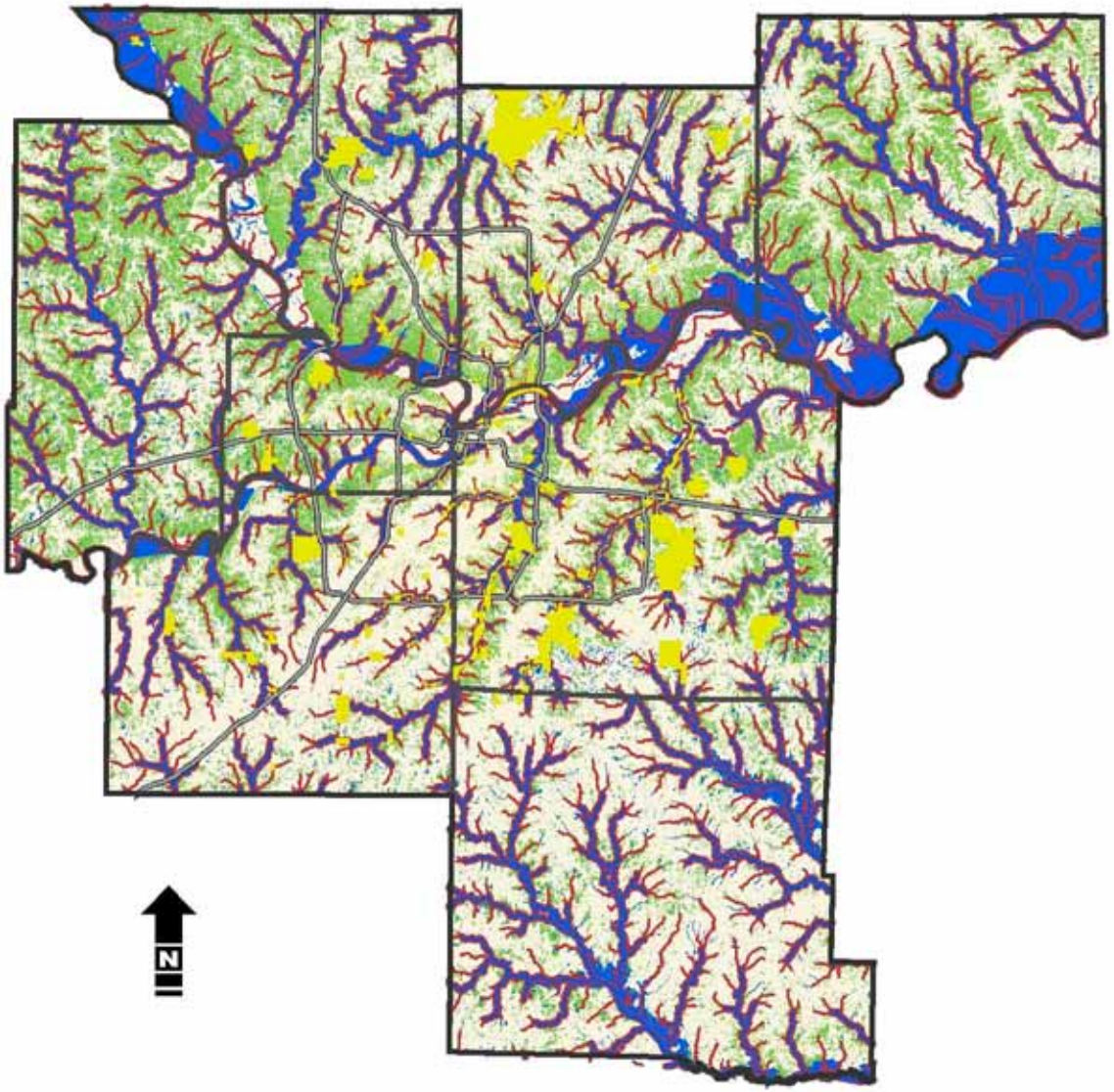
Conservation Value



Conservation Threats

metrogreen

Stream Buffers

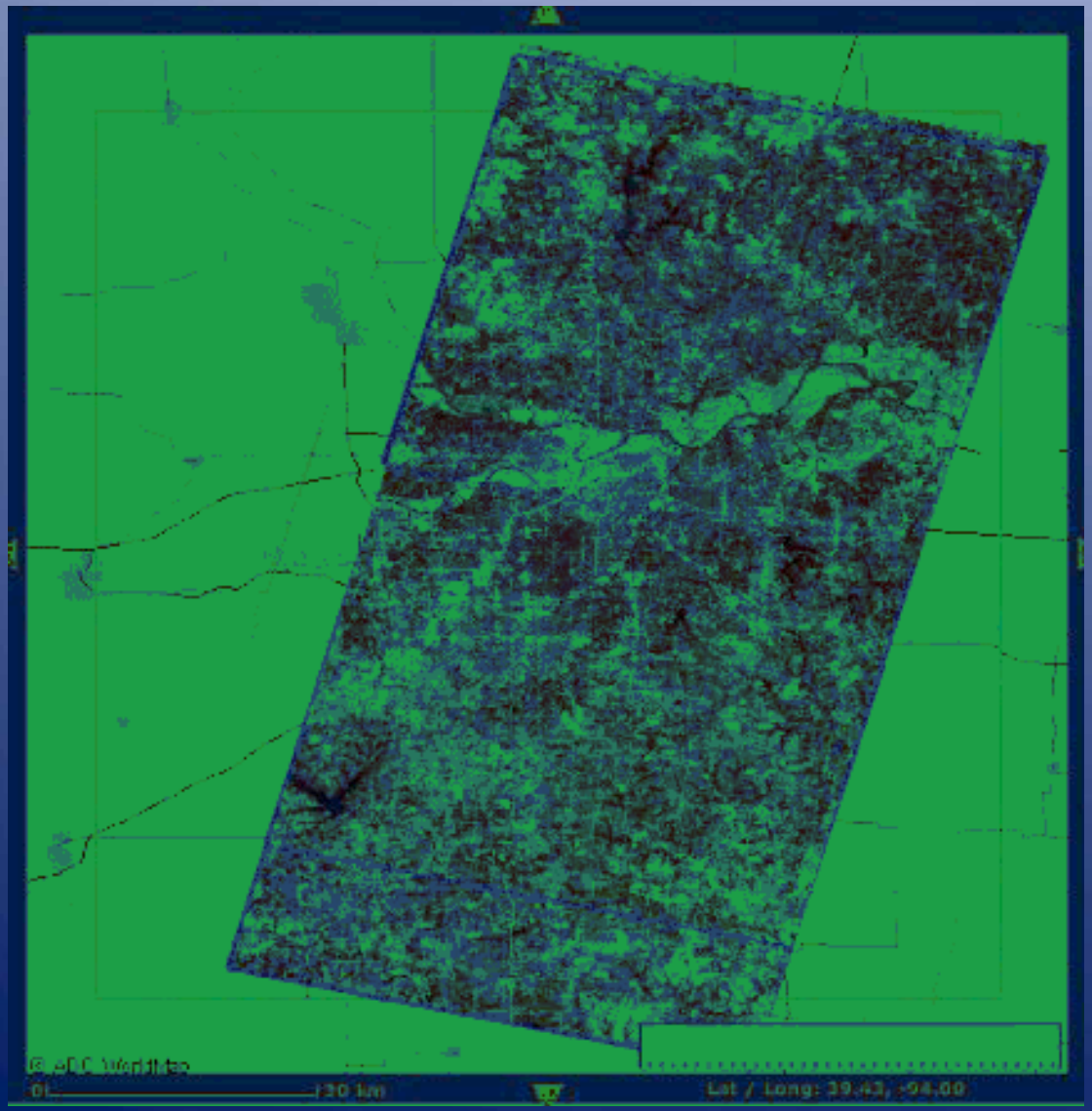


Water Resources

Upland Resources

Parks

NRI 2.0 – SPOT Imagery

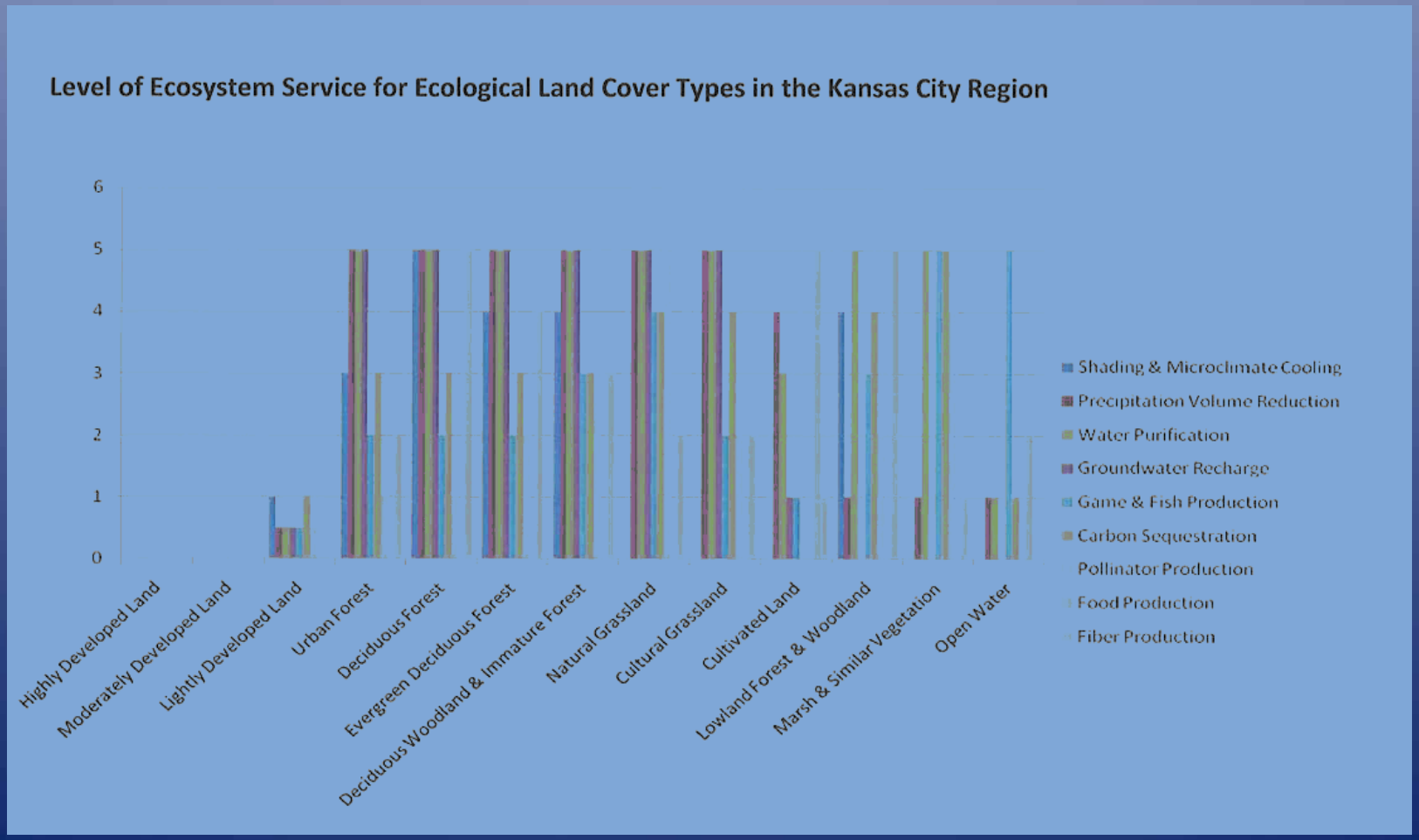


- 2012 Remote sensing
- 2.5m resolution
- 11 classes
- 9 county coverage

Subjective ecosystem valuation

- Water purification
- Water flow regulation
- Erosion control
- Air purification
- Microclimate moderation

Ecosystem services – sample output



Initial applications

- Parcel-based urban forest canopy coverage
- Impervious coverage
- Ecosystem-based mitigation
- Planning and design at multiple scales
  - Site
  - Transportation or greenway corridors
  - Sub-watersheds
  - County
  - Region/Basin

Recommendations

- Good data is fundamental
- Proactive and integrated planning
- Structural change/capacity building
- Show practical, cost effective applications
- Scaling
  - Site (complete streets, stormwater)
  - Meso-scale (corridors, watersheds)
  - Landscape scale (regional green infrastructure)

Questions & Discussion

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