Natural Systems Health Impact Assessment

Prepared by: Ethan Andre, Abigail Cook, and Bridget Faust

PHS 740: Health Impact Assessment of Global Environmental Change

Thursday, May 5, 2016

Screening: Current status of Madison's Natural Systems

Park Lands and Open Space:

- 2,602 acres of parkland
- 2,990 acres of additional open space
- 1,193 acres of greenways

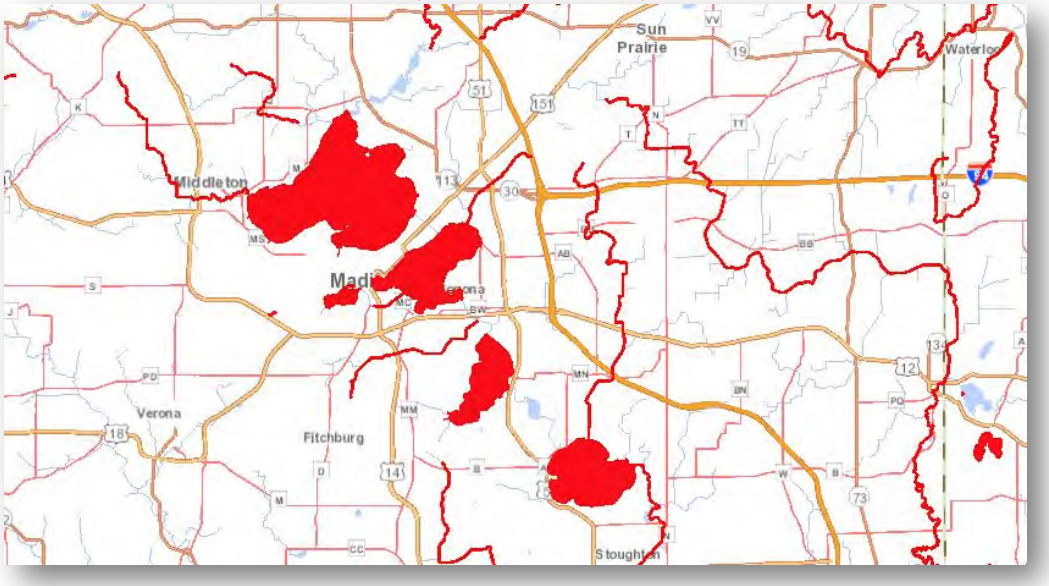
Impaired Waterways:

- Lake Monona, Lake Mendota, Lake Wingra, Wingra Creek, Odana Pond, Starkweather Creek
- Impairments: phosphorous, eutrophication, excessive algal growth, PCBs, mercury, chlorides, heavy metals, and BOD.
- 58 beach closures and 182 lost beach days on public beaches around Lake Mendota alone between 2007 and 2010.

Air Quality:

- General AQI rating of 'Good'
- 11 Dane County Air Quality Notices from 2011-2016 (ozone, pm)

Madison Metropolitan Area Impaired Waters



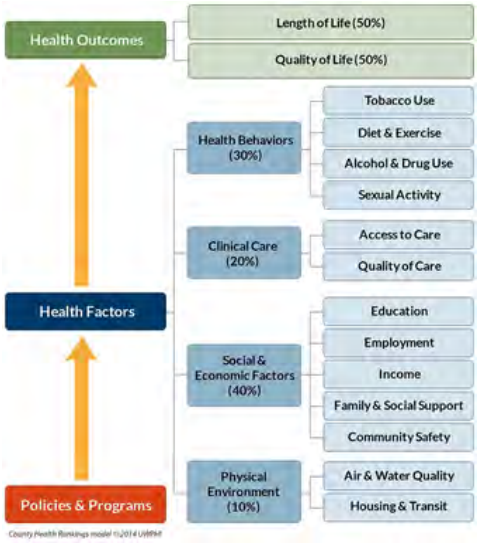
Retrieved from: WI Surface Water Data Viewer

What problem are we addressing with this HIA?

The City of Madison, Wisconsin has invested significant amounts of time and energy into developing its sustainability goals and vision for the City's natural resources. The scope of the actions recommended in the Natural Systems portion of the Madison Sustainability Plan are very broad, prioritization these actions is needed in order to maximize the city's return on investment as well as the benefits afforded to residents.

Ott, K. (2003). "The Case for Strong Sustainability." In: Ott, K. & P. Thapa (eds.) (2003). *Greifswald's Environmental Ethics*. Greifswald: Steinbecker Verlag Ulrich Rose. ISBN 3931483320. Retrieved on: 2009-02-16.

Retrieved from: Madison Sustainability Plan



Retrieved from: County Health Rankings and Roadmaps

Natural Systems Vision:

"Madison will create a state of balance between the natural and built environments wherein human, plant and animal communities live in harmony. City residents breathe clean air, drink clean water, swim and boat in clean water and enjoy those waters from the shore. Any human alteration of natural systems is balanced with restoration and enhancement of other natural system elements."

Natural Systems Goals:

1. Improve air quality.
2. Improve groundwater/drinking water quality.
3. Improve surface water quality.
4. Improve storm water management.
5. Increase water conservation.
6. Prevent solid waste from entering landfill.
7. Restore and maintain natural habitat.

Wingra Park: Photo Credit by Richard Hurd


Natural Systems

Criteria for HIA: Narrowing the Scope

Criteria used to Narrow the Scope of our HIA:

1. Clear connection between environmental and human health
2. Actionable
3. Data available
4. Published literature available

Actions Included in Our Impact Assessment:

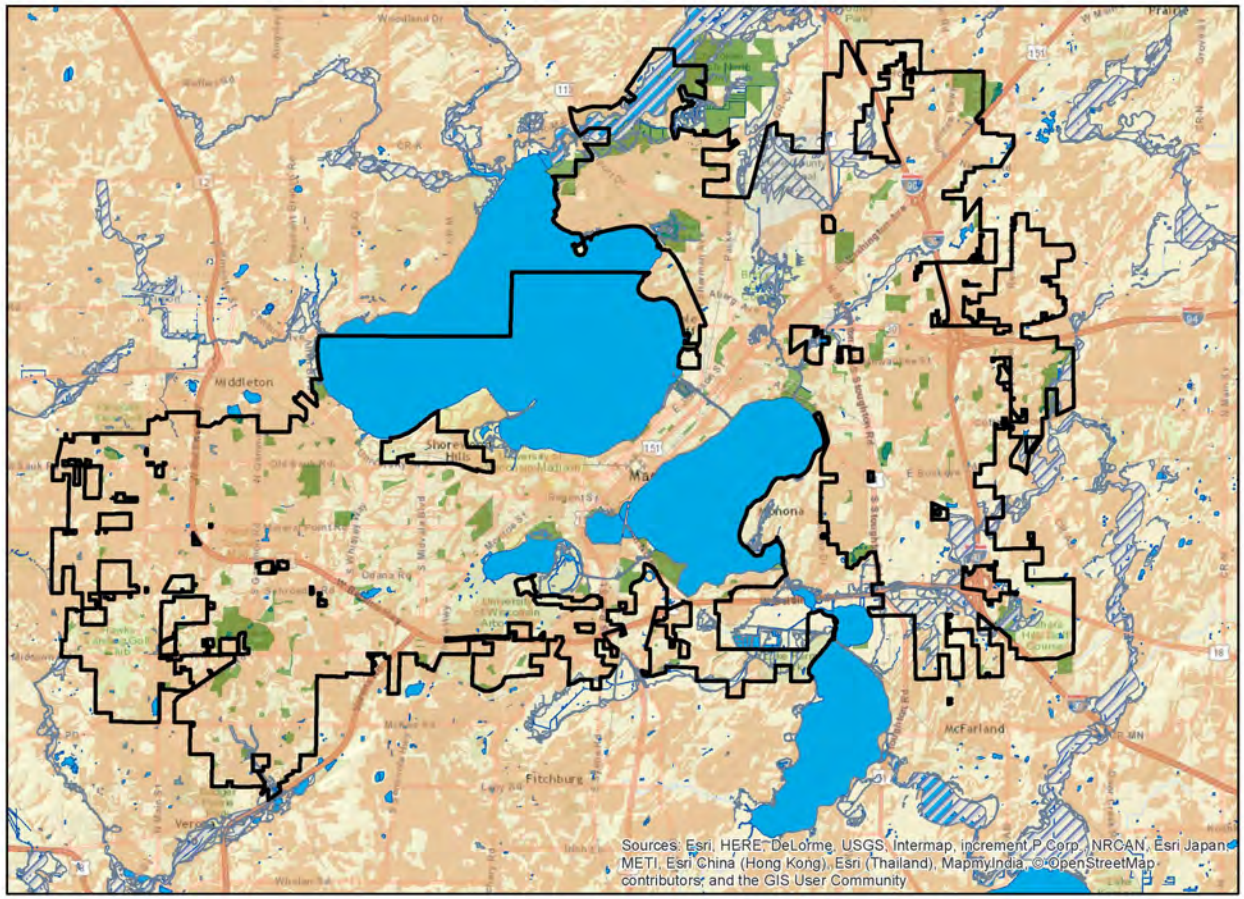
Action 3-3 "Encourage infiltration, where appropriate, through the use of pervious surfaces, the creation of rain gardens, bio-swales and other natural water purification methods."

Action 7-1 "Use linking parks, bike trail system, and stormwater management systems to expand trail recreation, physical activity, and nature study opportunities. Link all parks and open spaces to the maximum extent possible."

Action 7-11 "Promote usage of public rights-of-way (public land) and parks as edible landscapes, sculpture gardens, community gardens, prairie, etc."

Strategy: Geographic Information Systems (GIS) analysis in order to identify locations where health benefits could be maximized.

Findings Action 3-3: "Encourage infiltration, where appropriate, through the use of pervious surfaces, the creation of rain gardens, bio-swales & other natural water purification methods."



Legend

- Wisconsin_Municipal_Boundaries_Spring_2016
- 500 Year Flood Zone
- 100 Year Flood Zone
- City of Madison Parks, Gardens, Zoos, Cemeteries

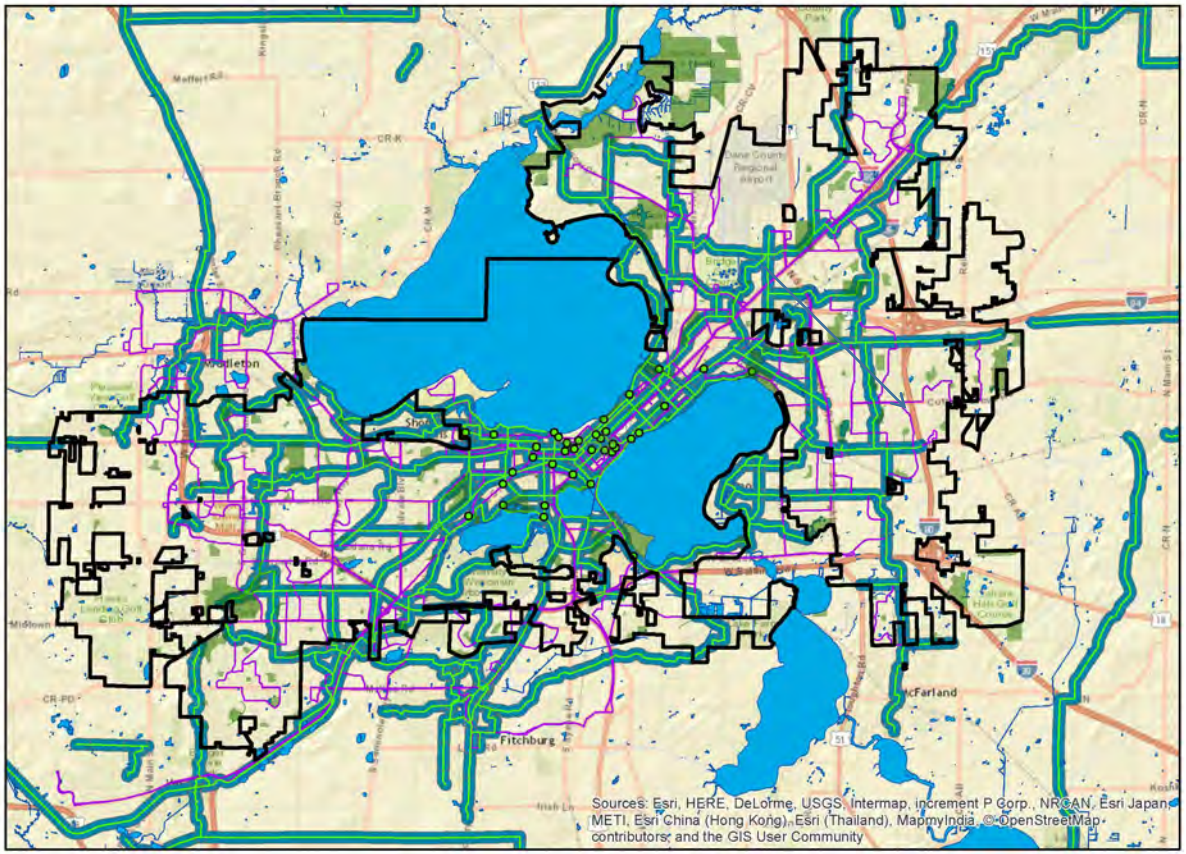
Soils

- NRCS Hydrologic Soil Group A (high infiltration capacity)
- NRCS Hydrologic Soil Group B (moderate infiltration capacity)

Health Benefits:

- Improved surface water quality
- Reduced risk of exposure to harmful algal blooms
- Reduced flood risk
- Fewer beach closures

Findings Action 7-1: "Use linking parks, bike trail system, and stormwater management systems to expand trail recreation, physical activity, and nature study opportunities. Link all parks and open spaces to the maximum extent possible."



Legend

- Wisconsin_Municipal_Boundaries_Spring_2016
- City of Madison Parks, Gardens, Zoo, Cemeteries

Bicycle

- Existing Bike Routes
- City of Madison B-cycle Stations
- 0.1mi Buffer Around Existing Bike Routes

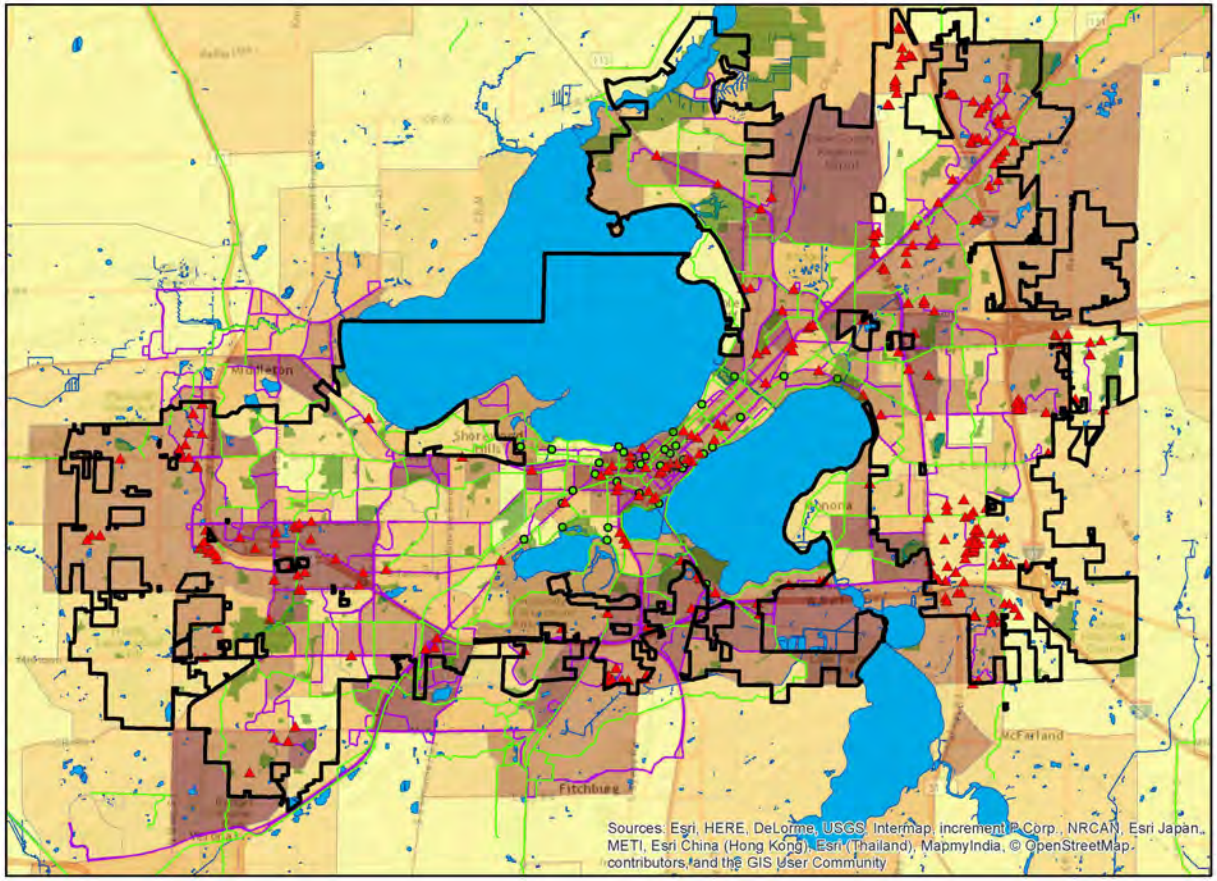
Bus

- Existing Bus Routes

Health Benefits:

- Increased exercise
  - Physical health
  - Mental health
- Increased connectivity with nature
- Foster social/community involvement

Findings Action 7-11: "Promote usage of public rights-of-way (public land) and parks as edible landscapes, sculpture gardens, community gardens, prairie, etc."



Legend

- Wisconsin_Municipal_Boundaries_Spring_2016
- City of Madison Parks, Gardens, Zoos, Cemeteries
- Madison Vacant Land Sales

Transportation

- Existing Bike Paths
- Madison B-cycle Stations
- Existing Bus Routes

Dane Country Heat Vulnerability (county based quantiles)

- Low (bottom 20%)
- Moderate Low
- Moderate
- Moderate High
- High (top 20%)

Health Benefits:

- Reduction of urban heat island effect
- Improved air quality
- Increased food security
- Increased opportunities to recreation/physical activity

Recommendations:

1) Utilize this assessment as a baseline in order to target future investments in parks, open spaces, trails, and green infrastructure.

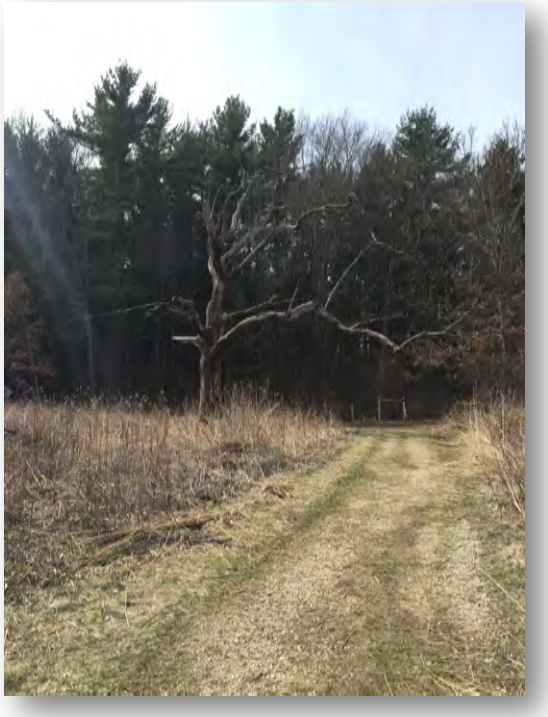
2) Utilize the spatial assessment to identify vulnerable communities that would best benefit from the establishment and/or expansion of parks.

Monitoring Progress Towards Recommendations:

1) Monitor the extent to which strategic investments are made in vulnerable communities.

2) Continue to monitor air quality, water quality, flood damages, stormwater infrastructure failures, and changes in urban heat island effects.

3) Engage citizens in identified vulnerable neighborhoods via surveys or public meetings in order to determine how changes in access to parks and open spaces are impacting their health and behavior.



Thank you!

Questions?

Promoting Multi-Use Land Planning and Active Transit in Madison

Planning and Design

Kendra Brown, Mikal Drye, Ben Goodwin

Executive Summary

Using urban planning to transform the way that individuals in Madison interact with the built environment to ultimately improve health through:

- Encouraging physical activity
- Increasing access to healthy foods
- Stimulating sustainable building
- Promoting mixed-use development

Statement and Magnitude of Problem

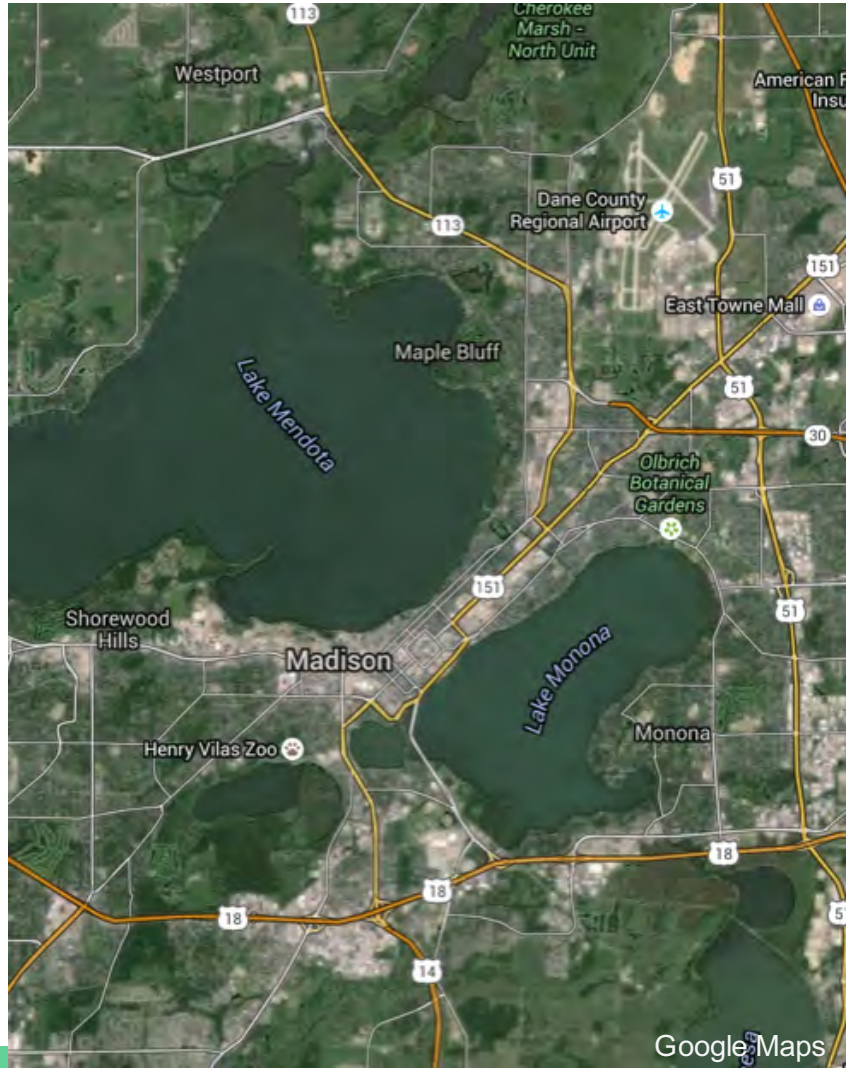
- Massive increase in chronic health problems
  - ⅔ Americans overweight or obese
  - Childhood obesity tripled since 1970s
  - Increased rates of depression and ADHD
- Linked to car-dependent, single-use city planning
  - Low connectivity
  - Low physical activity
  - Low access to healthy spaces

Stakeholders and Stakesharers

Who will this affect?

- Current Residents
- Future Generations
- Visitors
- Other municipalities

Madison has and can continue to be an exemplar of forward thinking planning for sustainability. **Act local, think global.**



Madison Sustainability Goals: Planning and Design

Goal 1: Improve Transportation Planning and System

- Modernize and expand public transit system
- Promote pedestrian and bike infrastructure

Goal 2: Foster Holistic Land Use

- Use systems thinking in planning and development
- Ensure residents can meet daily needs near home
- Infill development
- Continually review and reassess neighborhood development plans with these objectives in mind

Madison Sustainability Goals: Planning and Design

Goal 3: Support Sustainable Infrastructure and Buildings

- Incentives for sustainable building
- Increased Opportunities for Physical Activity
- Mixed-use Development

Goal 4: Promote and Foster Local Food Systems

- Facilitate connection between local producers and consumers
- Support and encourage urban agriculture and community gardens
- Increase land for local food production by 200%

Recommended Actions and Rationale

Goal 1: Improve Transportation Planning and System

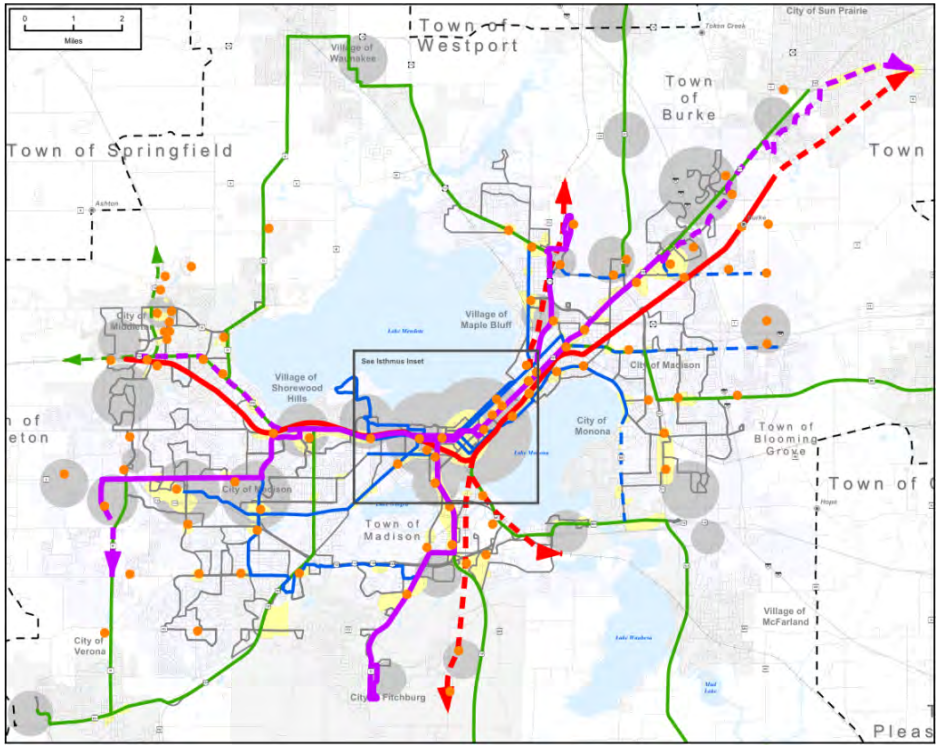
Action 4: “Planning for Bus Rapid Transit”

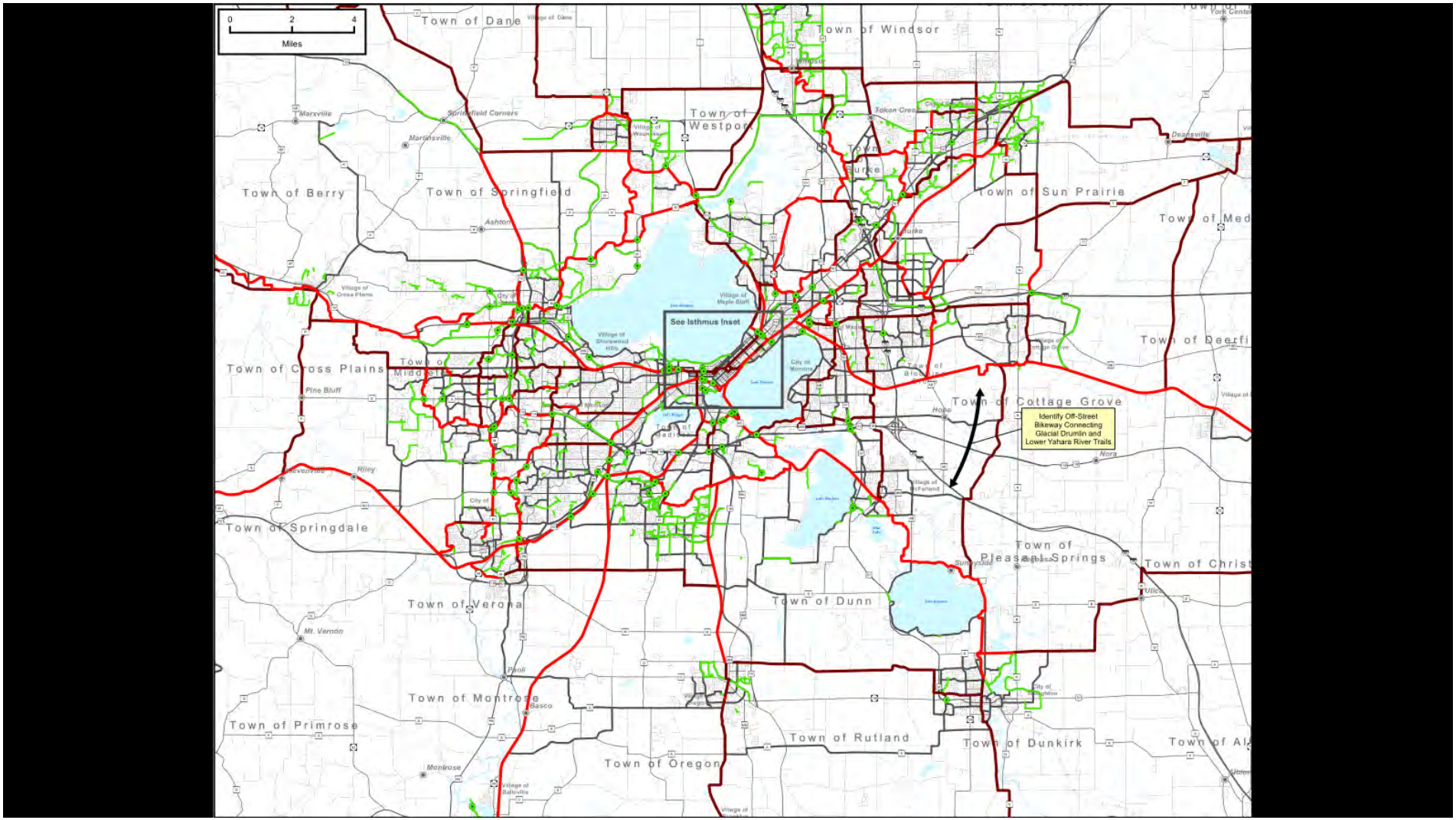
Efficient commutes

Key for transit oriented development

Action 9: “Improve pedestrian and bicycle infrastructure”

Focuses on expanding current infrastructure for active transit




0
2
4
Miles
Town of Dane
Town of Windsor
Town of Westport
Town of Berry
Town of Springfield
Town of Sun Prairie
Town of Cross Plains
Town of Cottage Grove
See Isthmus Inset
Identify Off-Street Bikeway Connecting Glacial Drumlin and Lower Yahara River Trails
Town of Springdale
Town of Pleasant Springs
Town of Verona
Town of Dunn
Town of Montrose
Town of Primrose
Town of Rutland
Town of Dunkirk
Town of Oregon
Marxville
Springfield Corners
Marshall
Ashton
Pine Bluff
Riley
Mt. Vernon
Paoli
Basco
Montrose
Deansville
Hope
Nora

Recommended Actions

Goal 2: Foster Holistic Land Use

Action 1: “Plan and create walkable neighborhoods. Upgrade walkability of existing hoods.”

Build a city that is not dependent on cars

Action 4: “Encourage higher density single family dwellings”

More efficient living

Makes available more land for greenspace and parks

Action 8: “Develop guidelines for developers and committees when reinventing old commercial districts”

Find more beneficial use for land and parking lot

Assures development is well thought out

Recommended Actions

Goal 3: Support Sustainable Infrastructure

Action 7: “Create Incentive Programs Encouraging Sustainable Development”

Madison Housing Boom

Action 9: “Promoting Pocket Parks”

Cost Effective/Shorter Time Frame

Recommended Actions

Goal 4: Foster Local Food Systems

Action 2: “Work to eliminate food deserts”

Equitable access to healthy food

Action 10: “Connect local farmers with local institutions”

Farmers have a steady buyer and institutions a steady source of healthy, local food.

Barriers to Implementation

Goal 1: Improve Transportation Planning and System

State legislative opposition to Dane County Regional Transit Authority

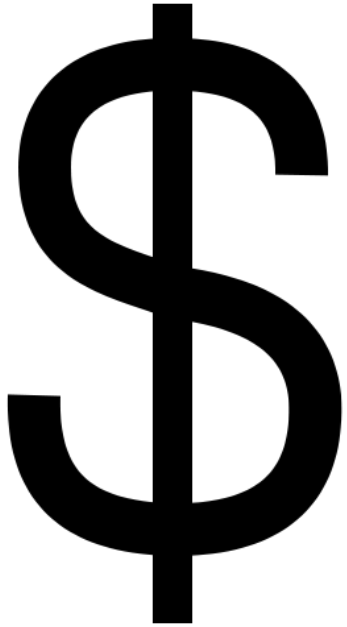
Population growth and connecting new, suburban neighborhoods

Retrofitting old streets

Goal 2: Foster Holistic Land Use

Economic ease of leapfrog, single use development that results in urban sprawl

Lack of incentive to redevelop low income neighborhoods using holistic principles



Barriers to Implementation

Goal 3: Support Sustainable Infrastructure

- Funding/Realistic Incentive Programs
- Spaces for new growth/ Timeframe

Goal 4: Promote and Foster Local Food Systems

- Affordability of local food
  - May not be economically feasible currently for producers, retailers, or consumers
- Availability of local food
- Societal Values
  - Many residents firmly entrenched in the "western diet" food system

Next steps: How to monitor for progress

Goal 1: Improve Transportation Planning and System

- Implementation of Bus Rapid Transit → more rapid commute times
- Number of bike/walk commuters
- Number of pedestrian and bicycle crashes and fatalities
- Miles of bike lanes, bike paths, and sidewalks

Goal 2: Foster Holistic Land Use

- Use Geographical Information System (GIS) to assess resident distance to daily needs
  - Residents should be within .5 miles of healthy food, health care, employment, natural space, recreation opportunities, and public transit.

Next steps: How to monitor for progress

Goal 3: Support Sustainable Infrastructure

- Effectiveness of Incentive Programs
- System of Observing Play and Recreation in Communities (SOPARC)

Goal 4: Promote and Foster Local Food Systems

- Production of local food: Amount of food produced intended for sale in Dane County
- Availability of local food: Distance to and affordability of local food
- Focus on the community nutrition environment as well as the consumer nutrition environment
- Freedman Food Store Survey[1]
  - Store Audits for price, placement, and availability of various food products

[1](Freedman, 2009)

Conclusions

Promote active transit and more efficient public transit

Zone for high-density, mixed-use neighborhoods close to amenities

Incentivize sustainable, “green” infrastructure

Prioritize local farmers and improve local food distribution systems

Questions?

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Health Impact Assessment
City of Madison Sustainability Plan

Ana Dyreson, Austin Gerdes, Josh Wolf, Tin Nwe Oo
PHS 740 Spring 2016

Transportation

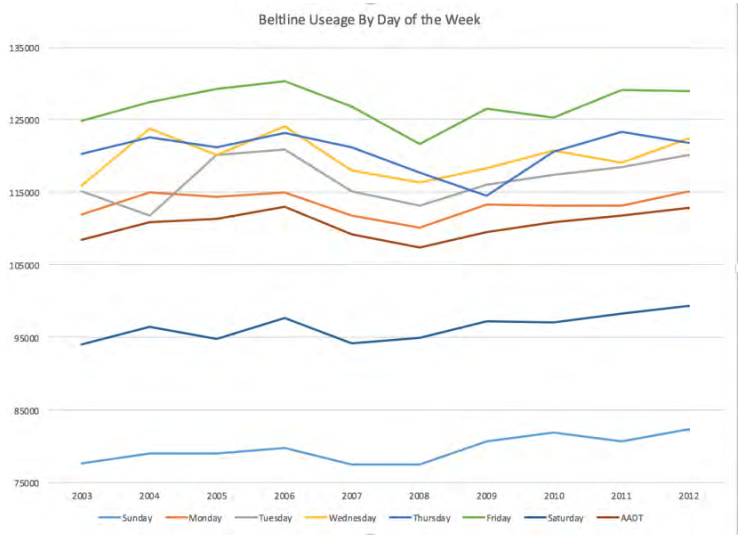
Statement of Problem

United States heavily dependent on automobiles for personal transportation- 85.3% of workers use personal auto for daily commute

73% of Dane County residents commute to work alone

Traditional solo commuting has large effects on air pollution

Solo commuters were responsible for ⅙ of total US carbon emissions.



Magnitude

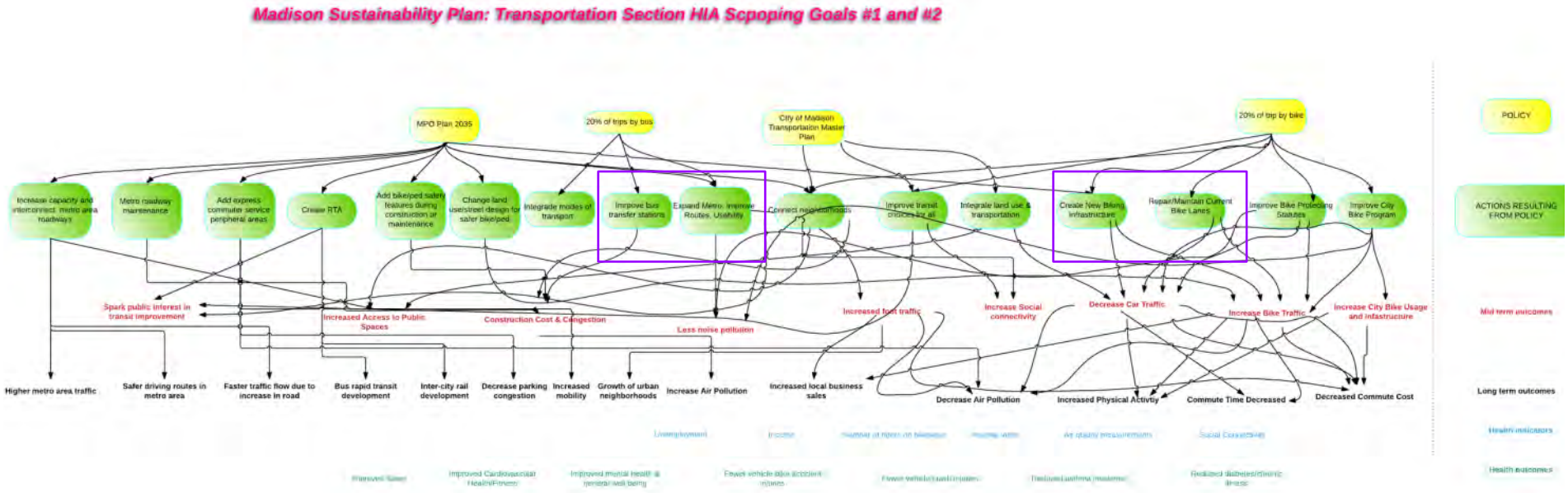
Those commuting by bike or bus transit saw an increase in health benefits from participating in active transit.

Typical households spend 20% of income on transportation

Although Madison's overall transit score is good at 7.3/10, <10% of commuters use public transportation.

20% of Dane County residents report a BMI of overweight.

Problem Mapping



er Transportation goals not included:
tablish a dedicated funding source for alternative transportation.
stablish uniform, consistent evaluation methods for understanding sustainable transportation usage and goal achievement.
ximize the use of alternative transportation infrastructure by implementing and/or improving marketing strategies.
ster better collaboration between City agencies, departments and committees.

se goals are viewed as supporting to those included in t he concept map above, so their impacts are included though they are not specifically stated above.

Analysis of Intervention: overview

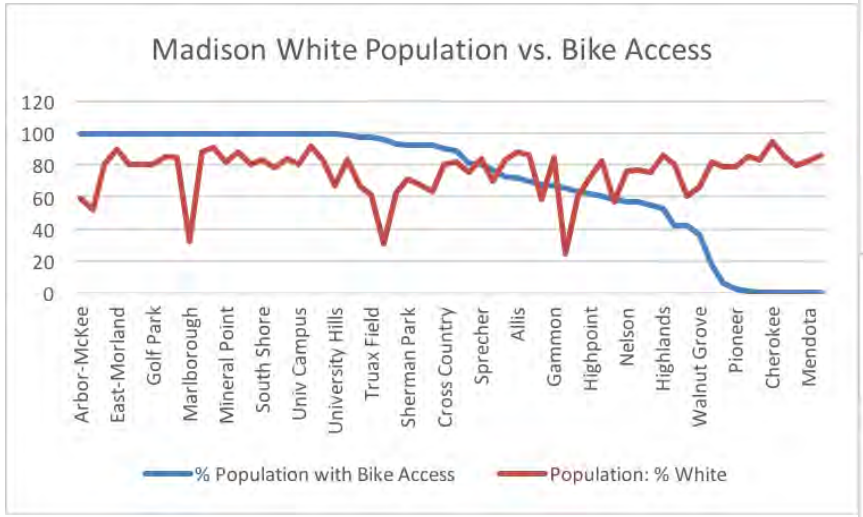
Expand madison metro: improve routes, usability

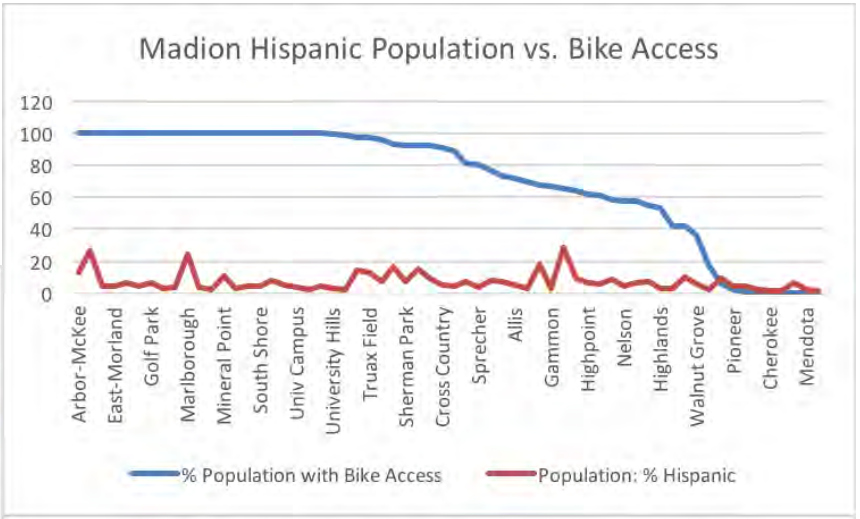
- Madison Metro's existing system and use patterns
- Air pollution health impacts for converting drivers to riders

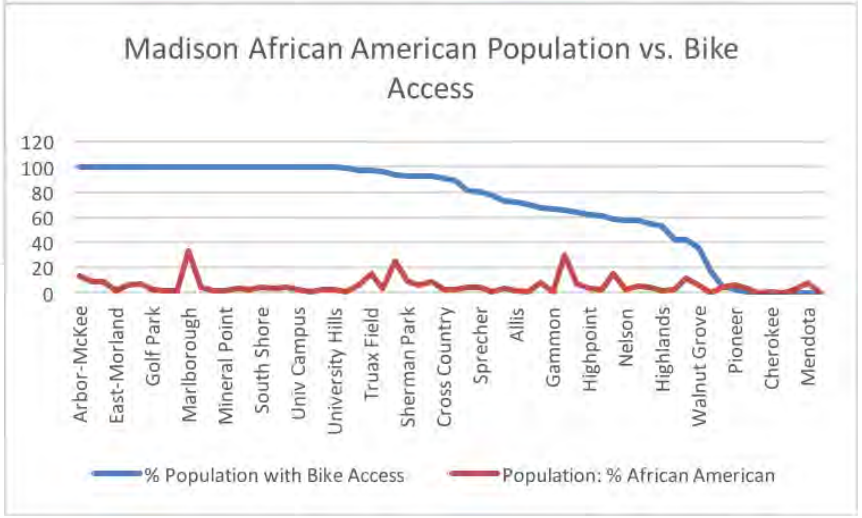
Create and maintain bike infrastructure

- Madison's existing bike network and ridership
- Air pollution health impacts for converting drivers to bikers
- Physical activity health impacts for converting drivers to bikers

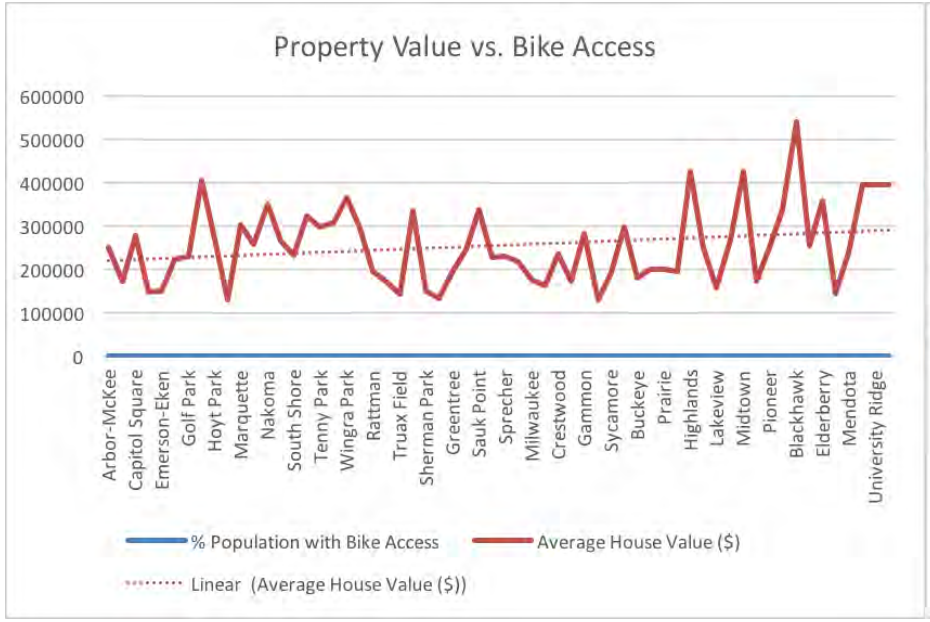
Analysis:
Bike Access Vs. Race

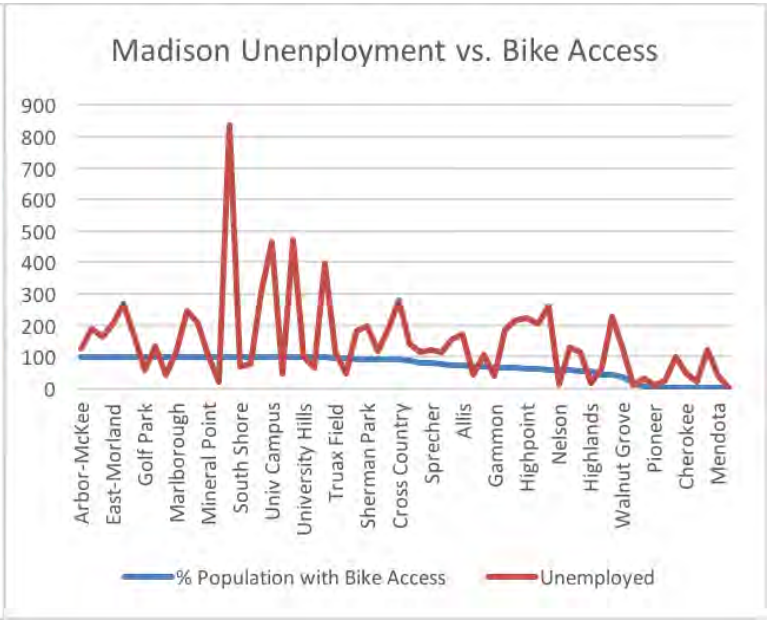






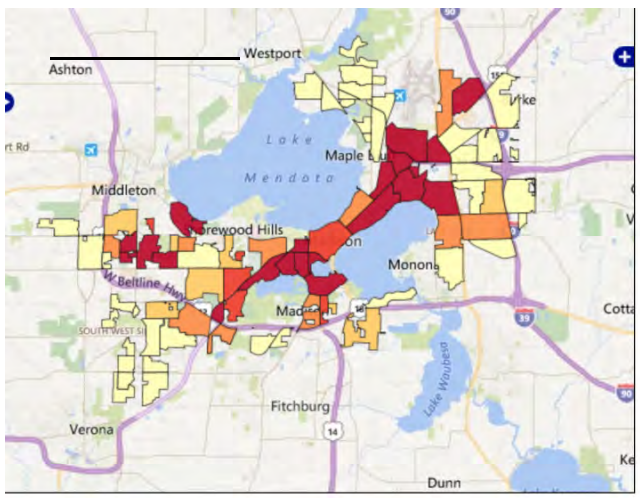
Analysis:
Bike Access Vs. Other Socioeconomic Indicators

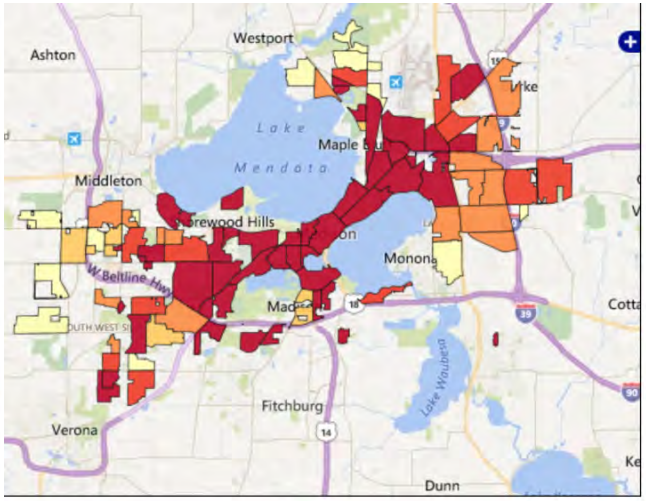




Analysis: How Bike Access has Changed

2008 2014





Select Range

0 to 15.9

16 to 42.9

43 to 73.9

74 to 93.9

94 to 100

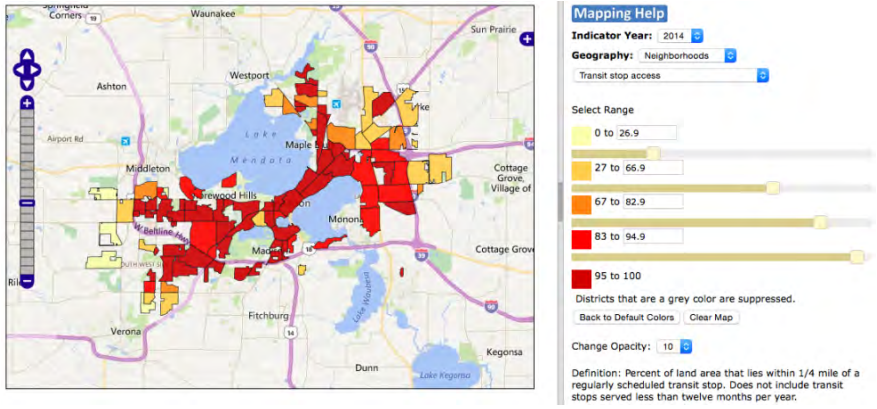
Districts that are a grey color are suppressed.

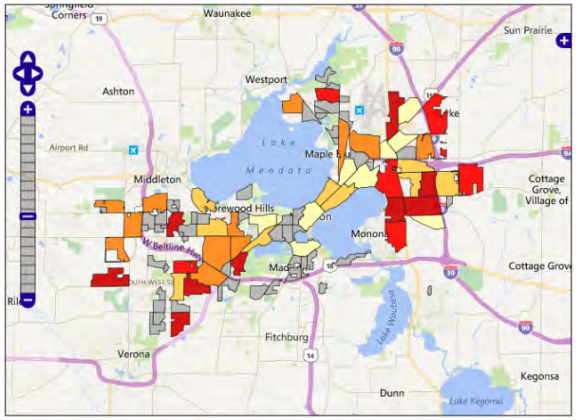
Back to Default Colors | Clear Map

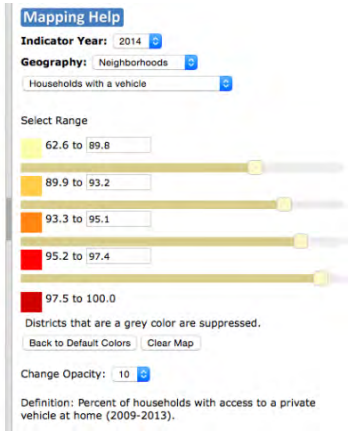
Change Opacity: 10

Definition: Number of dwelling units that fall within 1/2 mile of a bike network segment; this includes off-street paths and higher level on-street facilities such as bike boulevards and buffered bike lanes. Current year data source and tabulation method differ from previous year.

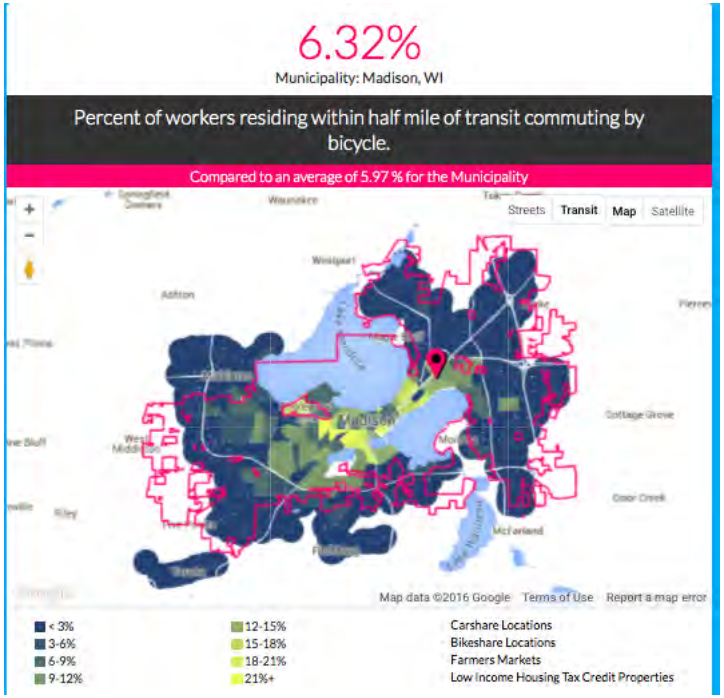
Analysis: Equity to transit access

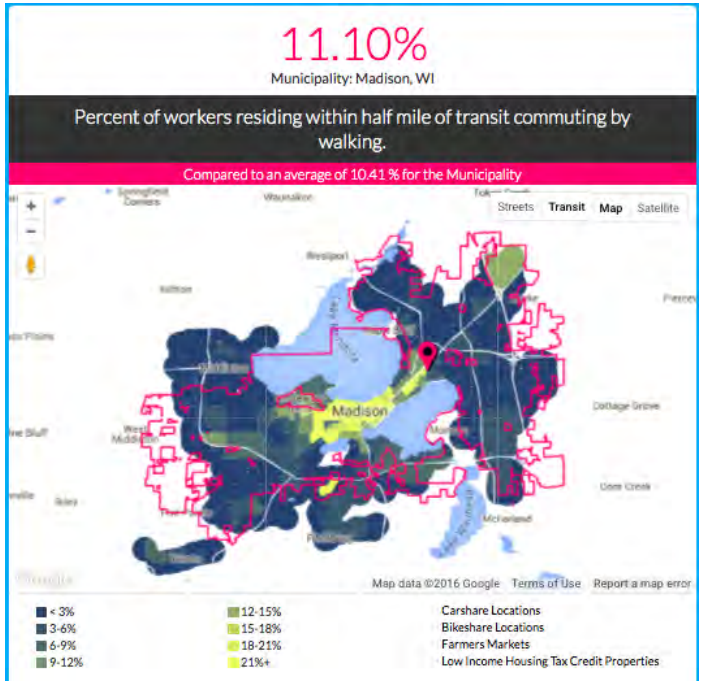






Analysis: Transits and active transport





Analysis: health impacts for physical activity

Literature survey

Increase in physical activity can increase life expectancy, even accounting for the increased risks

Cycling in the Netherlands amounts to an increase in a half year of life expectancy per adult

benefits from bicycle commuting begin later in life

Impacts of bike commuting rates in Madison due to increased physical activity.

HEAT analysis for Madison

% of workers commuting by bike (2010 baseline)	# Bike Commuters	Avoided deaths per year
5.3% (baseline)	7323	1-3
10.6% (double)	14646	3-6
20% (goal)	27633	6-10

Analysis: health impacts due to air pollution

Literature survey

Research worldwide has shown the potential benefits of alternative transportation for air pollution

London and Delhi: avoided premature deaths were 122,000 in the year 2030 due to alternative transportation

Benefits vary by region and depend on baseline air quality, vehicle fleet, and other local factors

Estimates for Madison from Grabow et al.

Health benefits in Madison area for eliminating all car trips < 8km (equivalent to 20% residential use).

Indicator	Mortality	Respiratory problems
PM2.5 -0.02	1	565
	Mortality	Acute respiratory
Ozone ppm -0.12	<1	135

Barriers & Opportunities

Busing	Biking
Funding	Safety
Rider experiences - convenient, comfortable, inefficient travel	Public opinion on high performance of bike infrastructure
	Low priority road sharing- limited space
	Convenience and climate
	Bicycle Cost
	Challenge to bringing bus on transit
	Adequate bike storage
	Concerns of theft and vandalism

Recommendations

Expand madison metro: improve routes, usability

- Focus on providing fast service in an equitable manner through the city
- Leverage the quantified health benefits due to air pollution and the unquantified: mental health, physical activity, access to job.

Create and maintain bike infrastructure

- Focus on supporting safe biking routes throughout the city (especially underserved neighborhoods, minority populations)
- Leverage the quantified health benefits due to air pollution and physical activity

Continue to be a model city

Leverage the citizens' already above average enthusiasm for both alternative transportation to reach new riders.

Evaluation

Bike Indicators

Direct Counting, surveys, automobile usage rates

Bus Indicators

Direct Ridership Counts, surveys, automobile usage rates

Health Indicators

Cardiovascular Disease, Type II Diabetes, mental health, physical fitness

Tougher to prove causation

Question???

Madison is a great place to ride bikes, let's make it a great place for *everyone* to ride bikes

Health Impact Assessment Carbon and Energy

Chris Hoffman, Nick Lardinois, Jesse Simpson

May 10th 2016

Problem Statement: Carbon and Energy

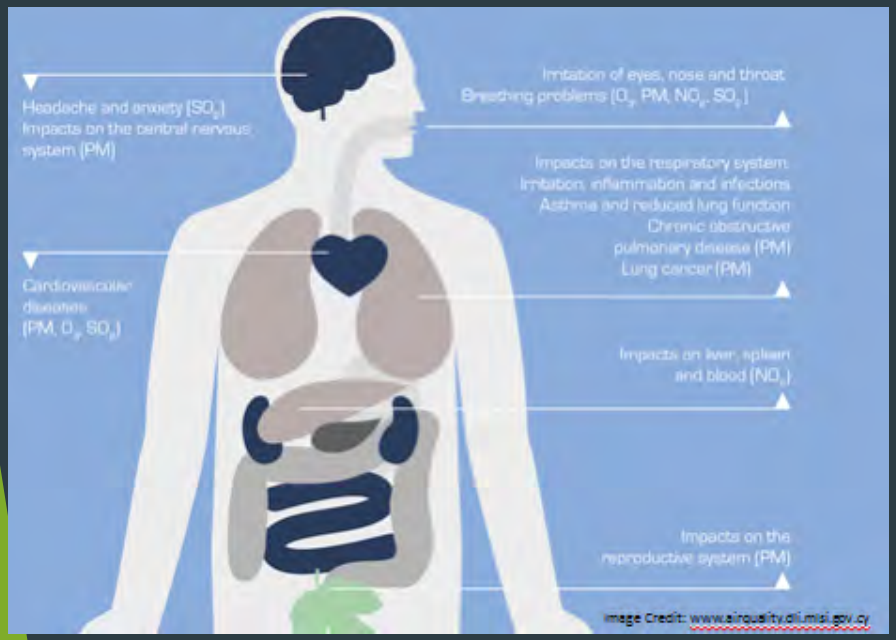
- Madison is a net carbon producer
  - City
  - Businesses
  - Residents
- Actions need to be taken
  - Reduce Emissions
  - Costs Money
- Need to communicate these actions effectively
- If not communicated effectively, the plan may die at the voting booths

Stakeholders

- Government and Agencies
  - City, State, Federal
- Private Sector Businesses
- Residents
- Public Utilities
  - MGE, Alliant

Goal 1: Influence reductions in transportation related carbon impacts

Target: Reduce car miles traveled and increase low-carbon fuel use so that Madison achieves 10% emissions reduction every 5 years to get to a goal of 40% by 2030.



Percent Reduction in Emissions by an Electric Vehicle Compared to New Gasoline Vehicle *(Source: Southwest Energy Efficiency Project)*

Pollutant	% Reduction
Volatile Organic Compounds (VOC)	**99.7%**
Nitrogen Oxide (NOx)	**76.1%**
Particulate Matter between 2.5 and 10 micrometers in diameter (PM10)	**49.3%**
Particulate Matter smaller than 2.5 micrometers in diameter (PM2.5)	**64.8%**
Sulfur Dioxide (SO2)	**95.7%**

Goal 1: Influence reductions in transportation related carbon impacts

Target: Reduce car miles traveled and increase low-carbon fuel use so that Madison achieves 10% emissions reduction every 5 years to get to a goal of 40% by 2030.

Hidden Costs of Energy (2010) - National Research Council

Annual Vehicle Miles Traveled in Dane County: 4,920,752,245 (Wisconsin Department of Transportation)

40% Reduction: Equivalent to removing 2 billion VMT annually

Health Improvement Opportunity (HIO) Calculator

Vehicle Miles Traveled (VMT)		
Vehicle	Light duty (i.e:automobile)	2,000,000,000 miles
	Heavy duty (i.e:truck)	0 miles
Value of statistical life		9.97 Million $
HIO Estimate		Medium

Criteria pollutants	HIO	$38,081,980
	HIO per VMT	1.90 ¢
Carbon	HIO	$46,504,629
	HIO per VMT	2.33 ¢

Total	HIO	$84,586,609
	HIO per VMT	4.23 ¢

Goal 2: Systematically upgrade existing buildings, equipment and infrastructure

Reduce overall energy consumption by 50% of 2008 levels by 2030 in the public and private sectors.

According to ACEEE: as of 2013, the City saw a 9.1 % decrease in energy usage

Goal 2

Action 7
Retro-commissioning of city buildings
LBNL study

Action 8
One additional LEED Certified Building per year
AJPH
38 additional work hours per yr for employee in LEED building

Table 1. Examples of existing-building commissioning project costs and savings.

Target	Location	Sites	Energy Savings	Peak Demand savings	RCx Cost ($/sf)	Payback time (years)*	Source
Local government buildings	California	11 sites; 1.5 MSf	14.3% source energy (11% electric; 34% gas)		1.01	3.5	Amaranani et al (2005); Amaran and Roberts (2006); Pierce and Amaran (2006)
Offices and hotels	New York	6 sites; 6 MSft		10%	0.34	2.0	Lenihan (2007) - projected
Offices	Connecticut	5 buildings; 2 MSf	8.5% electricity (3% to 20%)			0.5	Building Operating Management (2006)
Class A Offices	Connecticut	3 bldgs; 1.2 MSF	7.3% electric		0.62	1.37	McIntosh (2008)
Mixed comercial	Colorado	27 buildings; 10 MSf	7% elect	4.2% (0-26%)	0.185	1.51	Franconi et al. (2005)
Three offices + hospital	Colorado	4 buildings; 1.8 MSf		8%	0.026	0.38	Mueller et al. (2004)
University buildings	California	26 buildings; 3.4 MSf	10% total source (2-25%)	4% (3-11%)	1.00	2.5	Mills & Matthew (2009)
Elementary schools	Michigan	4 schools			0.38	2.5	Freidman (2004)
Supermarkets	Central California	10 stores; 0.5 MSf	12.1% elect (4.3-18.3%)		0.14	0.25	Zazzara and Ward (2004); Emerson (2004)
Mixed commercial	Northwest	8 buildings			0.221	3.2	Tso et al (2003)
Mixed commercial	Oregon	76 projects	10-15% electric (5%-40%)		0.175	1.24	Peterson (2004)
Mixed commercial and educational	California	All California Programs (2007-2008)	1.7-8.1% electric		0.40	3.0	PECI and Summit Building Engineers (2007) - estimates
Total or simple average values		**186**	**~10-15%**	**~7%**	**0.41**	**1.8**	

Notes: All impacts shown using local energy prices and commissioning costs; averages are floor-area-weighted averages.

Goal 3: Improve new buildings and developments

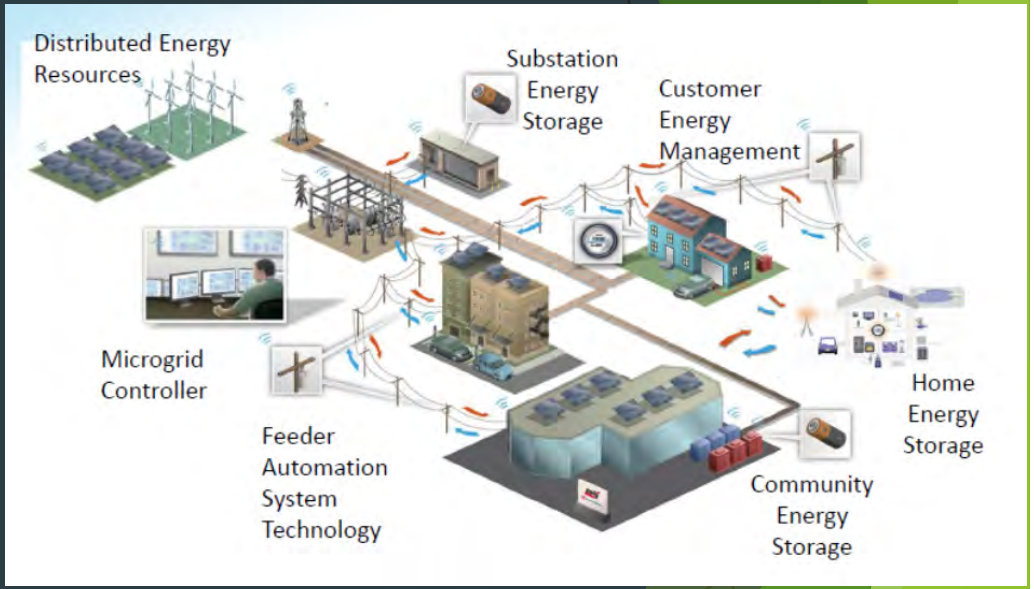
- Create a target for new buildings and developments to meet zero net energy standards by 2030.
- Have city set example for zero net energy by retrofitting or building a facility that demonstrates techniques and concept of zero net energy by 2015.

Goal 3

Action 3
Create commercial LEED certification program

Action 7
Reduce urban heat island, optimize carbon sequestration and promote water retention

Action 8
On site energy generation
350 distributed energy sources throughout MGE service area



Goal 4: Engage the Public in Energy Efficiency and Climate Change Programs

The plan has two broad, measurable goals:

1. "Work to have **20%** (currently 40,000 people based on 2010 population of Madison's population) actively participating in energy efficiency and climate change programs by 2030."
2. "Mobilize marketing, programs, measurement and targets through educational programs and community partnerships so that by 2030, **60%** of Madison's population is aware that community members are being encouraged to engage in energy efficiency and climate change programs, such as Mpower Madison"

Goal 4: Scoping, Screening, and Assessment

- Actions 4 and 7 have large impact on information the public will receive.
  - Action 4: Create and Implement an Energy Consumption Feedback System - allowing consumers to compare their energy consumption with other consumers in Madison.
  - Action 7: Create rotating 5-year marketing campaign partnerships with media groups that spread the message on energy conservation and carbon reduction

Goal 5: Obtain 25% of electricity, heating, and transportation energy from clean energy sources by 2025

Adverse health effects through entirety of energy life cycle

- extraction: mining
- transportation: oil spills
- combustion: air pollution
- waste: coal ash

Goal 5: Obtain 25% of electricity, heating, and transportation energy from clean energy sources by 2025

Total amount of kWh consumed by the City that is Renewable

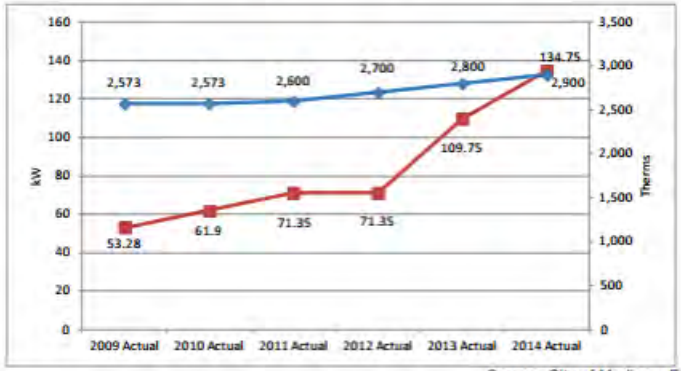
	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Target
Renewable kWh	11,725,039	12,313,163	11,256,326	10,596,638	10,913,698	633,956
Renewable % of Total KWh	21.8%	23.5%	24.8%	23.4%	23.4%	1.4%

Source: City of Madison, Engineering Division

The City of Madison has decided as part of the 2014 Adopted Budget to reduce the amount of green power the City purchases. Instead, the City has invested capital funding into implementing the Sustainability Plan which will increase the funding available for building renewable energy facilities and implementing programs to reduce energy.

Total Amount of kWh and Therms of Renewable Energy Generated by the City of Madison

	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Actual
Nat. Gas Therms	2,573	2,573	2,600	2,700	2,800	2,900
Total Electricity kW	53.28	61.9	71.35	71.35	109.75	134.75



Source: City of Madison, Engineering Division

Source: 2015 Madison Measures

Goal 6: Report Carbon Footprint to the Public

- Develop a comprehensive Carbon Footprint Report
- Highlights green house gases and air pollutants emitted
- Provide report to the public every two years.

- https://www.lafollette.wisc.edu/images/publications/workshops/2014-carbon.pdf

Table 1: CO_2e Totals by Inventory Year and Sector

	2010 CO_2e (Metric Tons)	2012 CO_2e (Metric Tons)	Difference	Percent change
Commercial	1,574,096	2,157,848	+583,752	+37.1
Residential	859,582	823,390	-36,192	-4.4
Industrial	373,254	623,245	+249,991	+67.0
Transportation	1,073,720	822,705	-251,015	+23.4
Waste	73,641	81,290	+7,649	+10.4

Goal 6: Scoping, Screening, and Assessment

- Action 5: Publicizing the plan and incorporating goals into future planning, budget and outreach activities
- Action 6: Creating Carbon Footprint measurement and take CO2 into account when determining city projects

Recommendations

Goals complement each other

- Reduce energy emissions: Goals 1, 2, 3, 5
- Communicate relevant energy and carbon emission information, and rationale for policies: Goals 4 and 6
- Energy efficiency most cost-effective: Goals 2 and 4
- Developing new infrastructure and financial incentives important for long-term sustainability: Goals 1 and 5

Questions?

Comments?

Concerns?

Economic Development HIA

Assessing the health impacts of economic development in the Madison Sustainability Plan

By Nate Miller, Miranda Ehrlich, and Michael Wieseckel

Problems?

- Ranked in top 25 of Forbes “Green Cities”
- Among Brookings Institute’s “20 strongest metro areas” economically

- More can still be done!
  - Environment
  - Economy
  - Society

Goals

- Economic Sustainability Goals
  - Encourage sustainable business practices
  - Share resources
  - Increase market for green products/services
  - Foster initiatives that promote sustainable economic development
  - Create sustainability index tool
  - Promote consumption of local foods
  - Support diversified economy

Health Impact Assessment Framework

- What is health impact assessment (HIA)?
  - "HIA is an approach to assessing the risk factors, diseases, and equity issues that create poor health outcomes in the USA" (Committee on Health Impact Assessment, National Research Council 2011).
  - HIA supports policy decision-making
  - Assesses potential health outcomes, both positive and negative
- We utilize the HIA framework throughout our analysis to inform our ultimate recommendations
- Used scoping to narrow down our analysis to primarily local food consumption/production and subsidies for clean energy initiatives

Health Impacts of Economic Development

- Madison Sustainability Plan goals have yet to be reached
- Failure to meet the goals within the 3 criteria could have “unhealthy negative impacts on the area’s long-term quality of life.”
  - Direct and Indirect Health Impacts
  - Some have access to sustainable products, but many do not
  - Low-income residents are disproportionately affected

Stakeholders

- Citizens
- Businesses
- Local Farmers
- City of Madison

Key Determinant: The Economies of Madison and Dane County

- Median household income: $53,958
- Unemployment rate of 3.7%
- Most work in either the Healthcare, Agriculture, or Manufacturing
- In a current tech, biotech, and startup boom
- Create 800 jobs and $66 million in investment in 2015

Key Determinant: Access to Local Foods

- Dane County Farmers' Market
  - The largest producer-only market in the US
  - Over 40 years old
  - Has about 150-170 individual stands during summer
  - 50-100 stands in the winter
- Other farmers' markets on the east and west sides

Key Determinant: Access to Local Foods Con't.

- Over 60 Community Gardens in the greater Dane county area
  - At least 50 in Madison
- Study of 26 gardens showed
  - 48% of participants fell below the poverty line
  - 701 families had plots representing 2137 individual people
  - An estimated 5000 hours of work was put into upkeep, operations, and administration annually

Key Determinant: Access to Local Foods Con't.

- Dane county is a major agricultural area for the state
- 66% of all land in Dane county is farmed
- $15.9 million in sales
- 84.1% of these farms are family owned with another 8.2% owned by family partnerships
- Earn an estimated $2.9 Million dollars in local food sales each year

Increasing Local Food Consumption

- Need to measure the amount of food consumed each year
  - Vermont Farm to Plate Initiative
- Need to define what is local
  - Current federal definition is up to 400 miles
  - That could take us to Missouri or Kansas!

farm to plate
STRENGTHENING VERMONT'S FOOD SYSTEM

Increasing Local Food Consumption Con't.

- REAP and Farm to School Initiatives
  - Funded by the USDA
  - Already in some Wisconsin schools
- Zoning for Community Gardens and Farmers' Markets
  - Community Gardens can be developed in any zone
  - Farmers' Markets under 15 stands can be established in NMX without needing approval
- A proposed public market

Other Sustainability Efforts

- MPower plan
- Capping of landfills in Dane County with solar panels
  - First of its kind
  - Aims at collecting and producing energy from captured carbon dioxide
  - Set to be completed in July of 2016

Barriers to Implementation and Policy Priority Setting

- Budget
- Strength of the economy
- State legislature interference
- Local attitudes
- Special interests
- Zoning

Recommendations

- Find and develop metrics to measure local food production and consumption.
- Increase local food consumption at sites like senior centers, low-income sites, child-care centers and schools.
- Increase support for Public Market and Packaging Facility efforts.
- Define key words such as “sustainable” in the context of business.
- Identify specific goals and benchmarks within the sustainability plan.
- Adopt a multi-faceted outreach approach for communicating this plan to the public.

Evaluation and Next Steps

- Health surveys to determine local food consumption patterns
- Farmers' market growth measurements
- Determine amount of money spent on local produce

Conclusion

- Sustainable economic development can have positive health impacts
  - While some drawbacks exist (such as runoff from increased local agriculture), the risks outweigh the benefits
- Local food is a primary area for economic development
- Other initiatives (such as subsidies for solar, etc.) are better taken up at the state and federal levels due to budgetary concerns

Questions?

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Health Impact Assessment: Education

Prepared for: Supporters of the Madison Sustainability Plan

Jake Wolf
Victoria Jarocki
Lara Rubinyi

Madison Sustainability Plan

Vision

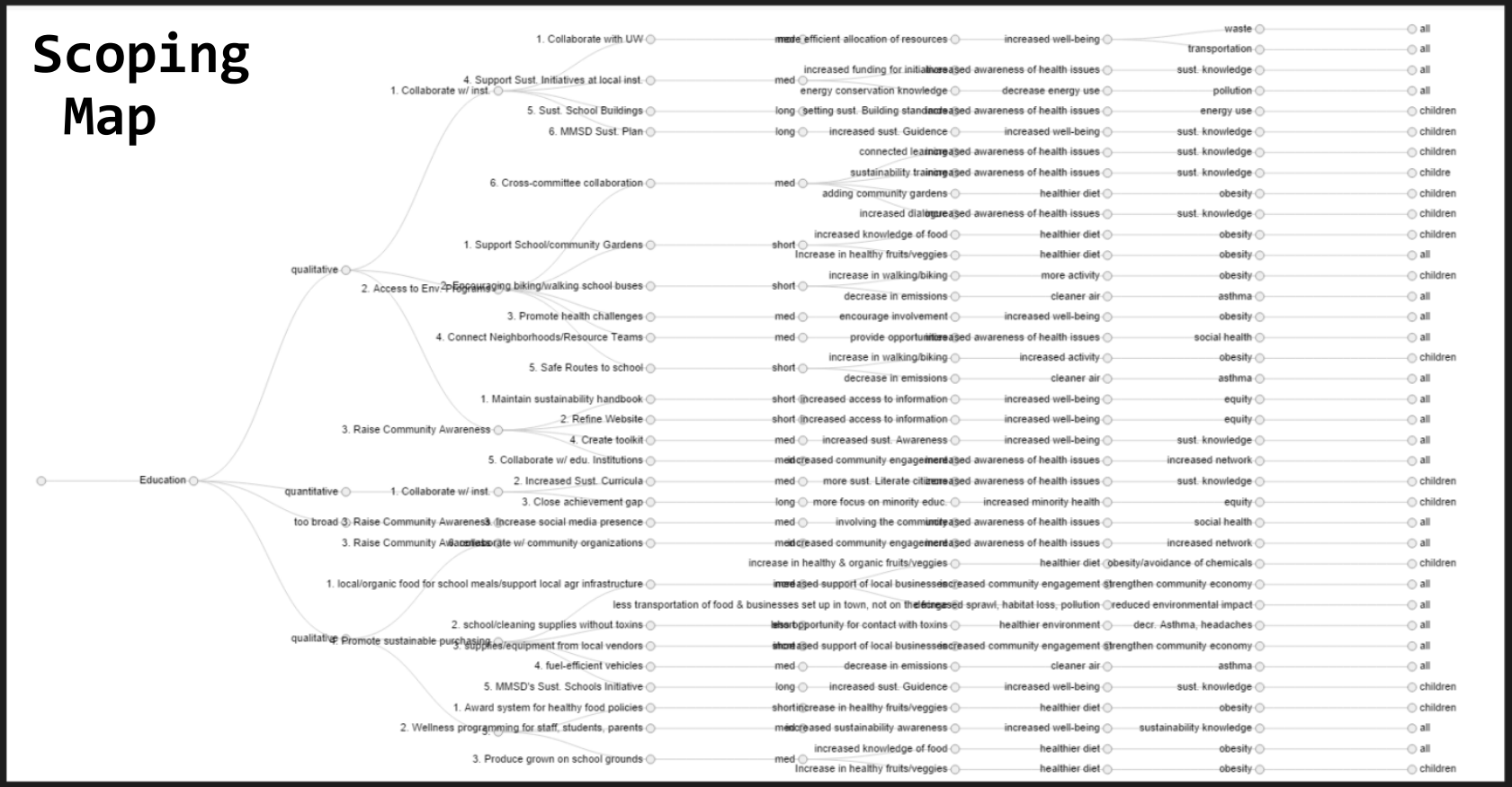
"An informed citizenry that is committed to the stewardship of resources, respect for place, and the health and well-being of the broader community, now and in the future...MMSD has a unique opportunity to create awareness of the environmental, economic and social principles associated with sustainability and to facilitate cultural and behavioral shifts that will lead to more sustainable living, both now and in the future."

Goals

1. Support and collaborate with educational institutions in their sustainability efforts and initiatives.
2. Ensure all youth have access to environmental stewardship programs and information.
3. Raise sustainability awareness within the Madison Community.
4. Promote sustainable purchasing initiatives.
5. Support "Healthy Schools" programming.

EDUCATION

Scoping Map


Education
qualitative
1. Collaborate w/ inst.
1. Collaborate with UW
med
efficient allocation of resources
increased well-being
waste
all
transportation
all
4. Support Sust. Initiatives at local inst.
med
increased funding for initiatives
increased awareness of health issues
sust. knowledge
all
energy conservation knowledge
decrease energy use
pollution
all
5. Sust. School Buildings
long
setting sust. Building standards
increased awareness of health issues
energy use
children
6. MMSD Sust. Plan
long
increased sust. Guidence
increased well-being
sust. knowledge
children
6. Cross-committee collaboration
connected learning
increased awareness of health issues
sust. knowledge
children
med
sustainability training
increased awareness of health issues
sust. knowledge
childre
adding community gardens
healthier diet
obesity
children
increased dialogue
increased awareness of health issues
sust. knowledge
children
2. Access to Env. Programs
1. Support School/community Gardens
short
increased knowledge of food
healthier diet
obesity
children
Increase in healthy fruits/veggies
healthier diet
obesity
all
2. Encouraging biking/walking school buses
short
increase in walking/biking
more activity
obesity
children
decrease in emissions
cleaner air
asthma
all
3. Promote health challenges
med
encourage involvement
increased well-being
obesity
all
4. Connect Neighborhoods/Resource Teams
med
provide opportunities
increased awareness of health issues
social health
all
5. Safe Routes to school
short
increase in walking/biking
increased activity
obesity
children
decrease in emissions
cleaner air
asthma
all
3. Raise Community Awareness
1. Maintain sustainability handbook
short
increased access to information
increased well-being
equity
all
2. Refine Website
short
increased access to information
increased well-being
equity
all
4. Create toolkit
med
increased sust. Awareness
increased well-being
sust. knowledge
all
5. Collaborate w/ edu. Institutions
med
increased community engagement
increased awareness of health issues
increased network
all
quantitative
1. Collaborate w/ inst.
2. Increased Sust. Curricula
med
more sust. Literate citizens
increased awareness of health issues
sust. knowledge
children
3. Close achievement gap
long
more focus on minority educ.
increased minority health
equity
children
too broad
3. Raise Community Awareness
3. Increase social media presence
med
involving the community
increased awareness of health issues
social health
all
3. Raise Community Awareness
4. Collaborate w/ community organizations
med
increased community engagement
increased awareness of health issues
increased network
all
qualitative
1. local/organic food for school meals/support local agr infrastructure
increase in healthy & organic fruits/veggies
healthier diet
obesity/avoidance of chemicals
children
increased support of local businesses
increased community engagement
strengthen community economy
all
less transportation of food & businesses set up in town, not on the edge
decreased sprawl, habitat loss, pollution
reduced environmental impact
all
2. Promote sustainable purchasing
2. school/cleaning supplies without toxins
short
decrease opportunity for contact with toxins
healthier environment
decr. Asthma, headaches
all
3. supplies/equipment from local vendors
short
increased support of local businesses
increased community engagement
strengthen community economy
all
4. fuel-efficient vehicles
med
decrease in emissions
cleaner air
asthma
all
5. MMSD's Sust. Schools Initiative
long
increased sust. Guidence
increased well-being
sust. knowledge
children
1. Award system for healthy food policies
short
increase in healthy fruits/veggies
healthier diet
obesity
children
2. Wellness programming for staff, students, parents
med
decreased sustainability awareness
increased well-being
sustainability knowledge
all
3. Produce grown on school grounds
increased knowledge of food
healthier diet
obesity
all
med
Increase in healthy fruits/veggies
healthier diet
obesity
children

Focus: Madison Metropolitan School District (MMSD)

- Connection between education, environment and health
  - We know school is a place of learning, and that behaviors learned at a young age can affect behaviors through a lifetime
- Feasibility of Action
  - MMSD is progressive school district, with the institutional desire to improve sustainability education and food infrastructure
- Available Resources
  - By narrowing it down, can target cost-efficient strategies that reach the largest number of kids

Current Education Climate

- Madison Metropolitan School District (MMSD) enrolls 27,000+ students in 48 schools
- Annual budget for 2015-2016 = $332 million
- MMSD students perform better than the state average on…
  - Reading/Math
  - AP Exams
  - ACT
- Madison is #2 place to raise children according to study in Children's Health Magazine
  - Criteria included quality of schools, teacher to student ratio, and strength of curriculum
- MMSD has an Aaa credit rating (excellent); district among small percentage of Wisconsin school districts in financial strength.

What problem are we addressing with our HIA?

Poor Health Outcomes

- 93% of kids do not get daily recommended serving of vegetables
- 33% of kids are overweight or obese
- 21% of medical spending ($190.2 billion) caused by obesity/comorbidities

Role of Supporters of the Madison Sustainability Plan

- Connect stakeholders
- Advocate for healthier, more sustainable schools
- Provide guidance to the MMSD

Our Actions

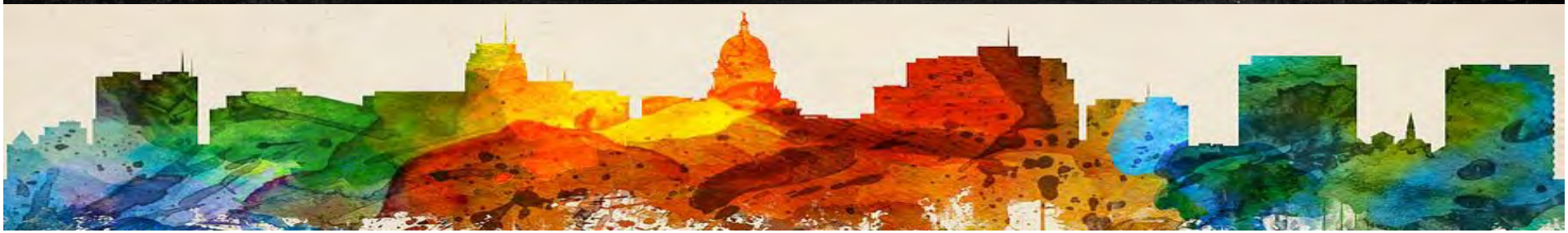
Goals pertaining to education:

- Goal 4: Promote sustainable purchasing
  - Action 1: Sustainable Institutional Food Purchasing
- Goal 5: Support "Healthy Schools" Programming
  - Healthy Food Policy Award System
  - Support Use of Produce Grown on School Grounds

Evaluation on Goals

- Feasibility, Efficiency, Equity, and Health Benefits

sustainable madison



#1: Sustainable Institutional Purchasing

Three Aspects

- Support already existing school-level initiatives (REAP)
- Join a Food Purchasing Group
- Create School Wellness Committees

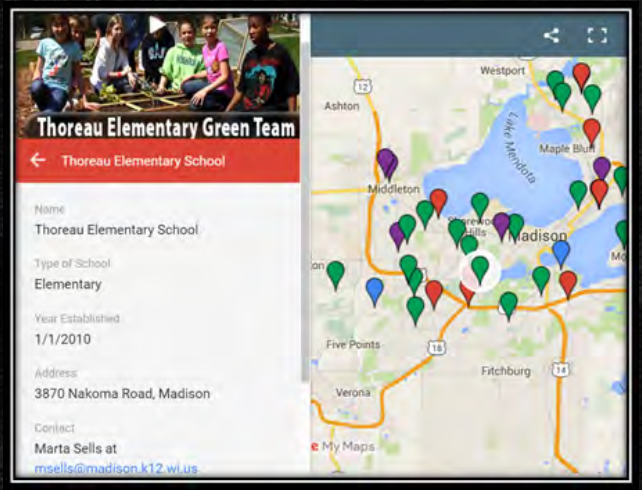
Goals

- Feasibility (MEDIUM): Support from local producers, but may be difficult to see as a priority
- Equity (HIGH): Reaches entirety of school population, everyday
- Efficiency (LOW): More costly, difficult to work around what is in season
- Health benefits (HIGH): Large health benefits to eating fresh produce, long-term learning

#2: Education for Sustainability (EfS) into Core Curriculum

Description of the alternative

- Would provide K-12th grade the skills/tools necessary for healthy lifestyles and sustainable decision making; increase fresh produce
- Example projects/curriculum include...
  - School Gardens
  - Environmental Footprint Calculators
  - Hula Hoop Biodiversity



Feasibility (MEDIUM): new core curriculum barrier, but progressive with support

Efficiency (MEDIUM): High cost to train (initial start-up); but low maintenance for future

Equity (MEDIUM/HIGH): 27,000+ students; misses private schools, depends on admin/parental support

Health Benefits (HIGH): sustainable education provides ability to learn healthy and sustainable lifestyles; reduce risk of chronic disease; surplus of fresh produces

#3: Award System

- MMSD's participation in USED's award system
- Community ceremonies
- Example award systems:
  - USED Green Ribbon Schools
  - Florida Golden Shovel Awards

Feasibility (HIGH): current examples
Efficiency (HIGH): time spent filling out applications
Equity (LOW): concern for unfairness between health/wellness programs
Health Benefits (MEDIUM): improved community behavior

Goals/Alternative Matrix

Goals	#1 Sustainable Institutional Purchasing	#2 Education for Sustainability	#3 Award System
Feasibility (Technical, Political, Scientific)	MEDIUM	MEDIUM	HIGH
Efficiency	LOW	MEDIUM	HIGH
Equity	HIGH	MEDIUM/HIGH	LOW
Health Benefits/Outcomes	HIGH	HIGH	MEDIUM

Recommendations/Monitoring Success

- Recommendation: Supporters of MSP propose our three alternatives to MMSD
- Primary Evaluation (including qualitative & quantitative analysis):
  - Supporters of the MSP should follow- up on recommendations made to MMSD
  - MMSD should measure success (pre & post-program evaluations of students' knowledge, administrative & parental satisfaction, and behavior change)
    - Interviews, surveys, other records of indicators (hours of sustainability education, # of outdoor classrooms, gardens implemented, meals served, etc.)
- Secondary Evaluation (optional)
  - 3rd party evaluation of long-term health outcomes
  - Awards given (by USED & MMSD's own award system)


What Questions Do You Have?

Sustainable Madison Plan
Affordable Housing

PHS 740.HIA

Melinda Fenn, Carolyn Harvey, Ashton Rollings

May 5, 2016

What's the Issue?

- 1/3 of households spend 30% of their income on housing.
- Half of the those who earn 50% AMI, spend 50% of their income on housing.
- Between 2010 and 2040 there will be an additional 64,000 households: 11,000 of these will earn 50% of the AMI.
- Too few rental units
- Too many small rental units

Why should I care?

- Affordable Housing =

  Food Security and Nutrition, Safety, Education, Child care, Transportation, Regular Health Visits

- Affordable Housing =

  Strong Communities, Stable Work Forces, Healthy Families, Healthy Children, Protects Vulnerable Populations,

All Healthy Things Grow; if families are spending 30-50% of their income on housing that's not happening.

Where Do We Start?

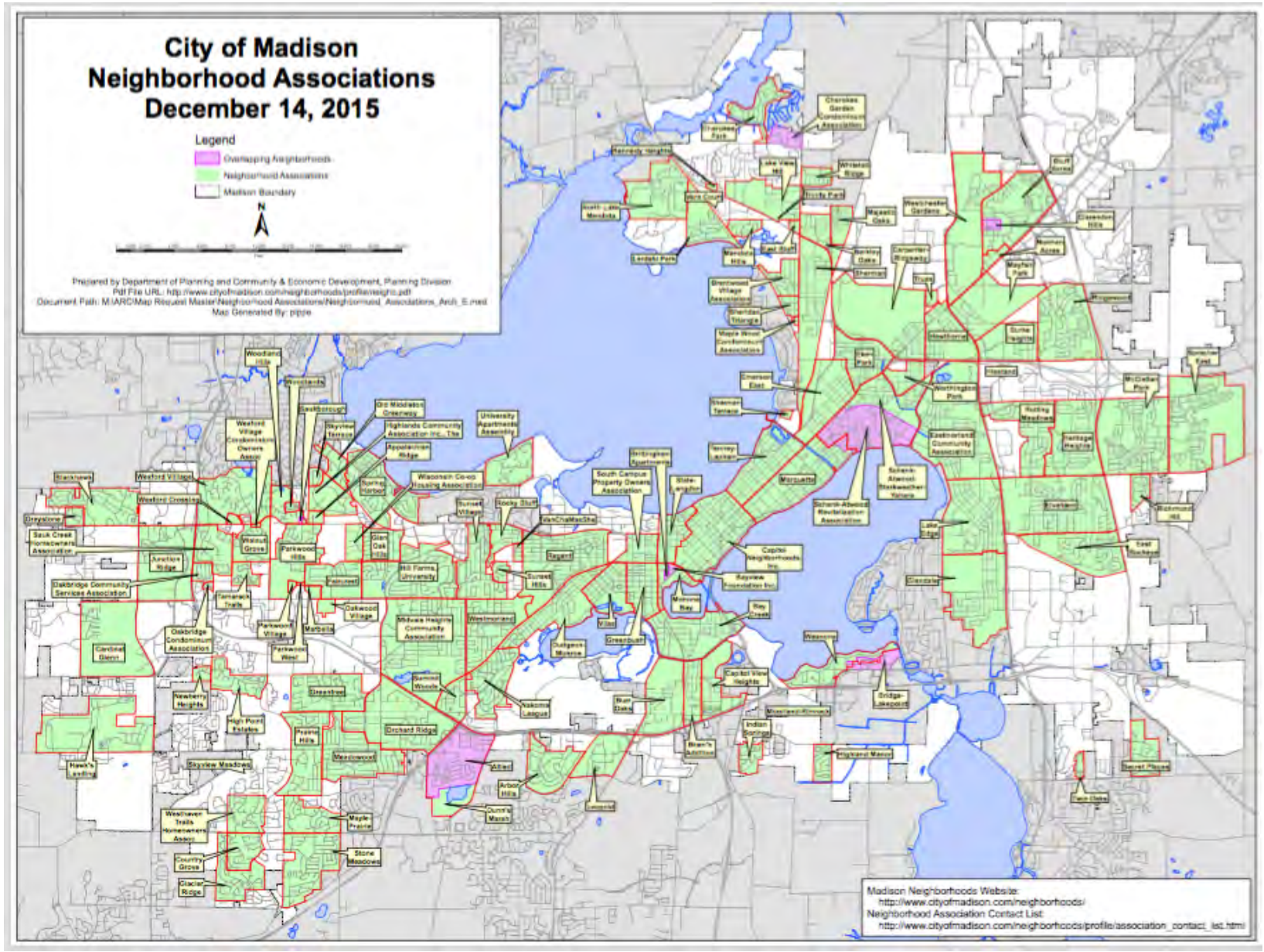
- Goals & Actions
  - Diversify Neighborhoods
  - Build Affordable Housing
  - Near Transportation
  - Energy Efficiency Updates
  - Green Housing
  - Decentralize Services
- Key Determinants

Policy, Programs, Actions

Goal: Diversify neighborhoods

Using Neighborhood Indicators, identify neighborhoods that would:

- Benefit from economic diversity
- Be willing to work with the city to expand affordable housing in the neighborhood


City of Madison
Neighborhood Associations
December 14, 2015
Legend
Overlapping Neighborhoods
Neighborhood Associations
Madison Boundary
N
Prepared by Department of Planning and Community & Economic Development, Planning Division
Pdf File URL: http://www.cityofmadison.com/neighborhoods/profile/neighc.pdf
Document Path: M:\ARC\Map Request Master\Neighborhood Associations\Neighborhood_Associations_Arch_E.mxd
Map Generated By: pjpie
Madison Neighborhoods Website:
http://www.cityofmadison.com/neighborhoods/
Neighborhood Association Contact List:
http://www.cityofmadison.com/neighborhoods/profile/association_contact_list.html

- Work with neighborhood associations to locate underutilized buildings and eyesores
- Work with developers to convert this space into quality affordable housing

Neighborhood association votes to oppose Marling Lumber redevelopment proposal

http://host.madison.com/ct/business/neighborhood-association-votes-to-oppose-marling-lumber-redevelopment-proposal/article_61887f16-a070-59e8-9a47-076a1b28292f.html

Marquette Neighborhood Association board member Jesse Pycha-Holst criticized the developer, Campbell Capital Group, for not seeking affordable housing options

"We've asked the Campbell group at every turn to even do a very cursory inquest into including an affordable housing component," he said. "Not that all 230 units be affordable housing, but just to do due diligence and do some homework and maybe pick up a phone and make a call or two and find out if there were any subsidies available at the local, state or federal level. What we were told quite repeatedly is, 'That's not our business model.'"

Policy, Programs, Actions

Bus Rapid Transit

- Reduce transit travel time
- Improve connections
- Expand carrying capacity
- Improve operational efficiencies

Feasibility

Health Impacts

- Access to Services
- Social and Economic
- Health Behaviors
- Environment

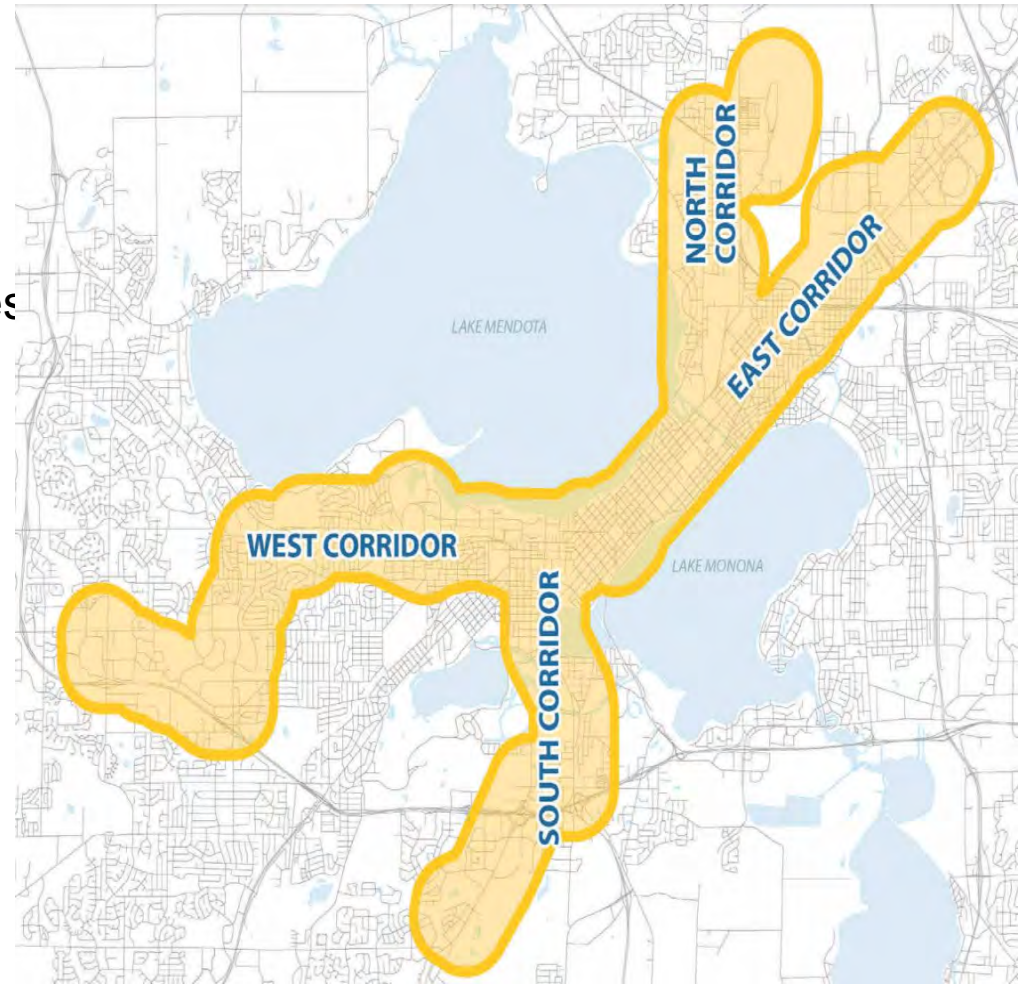
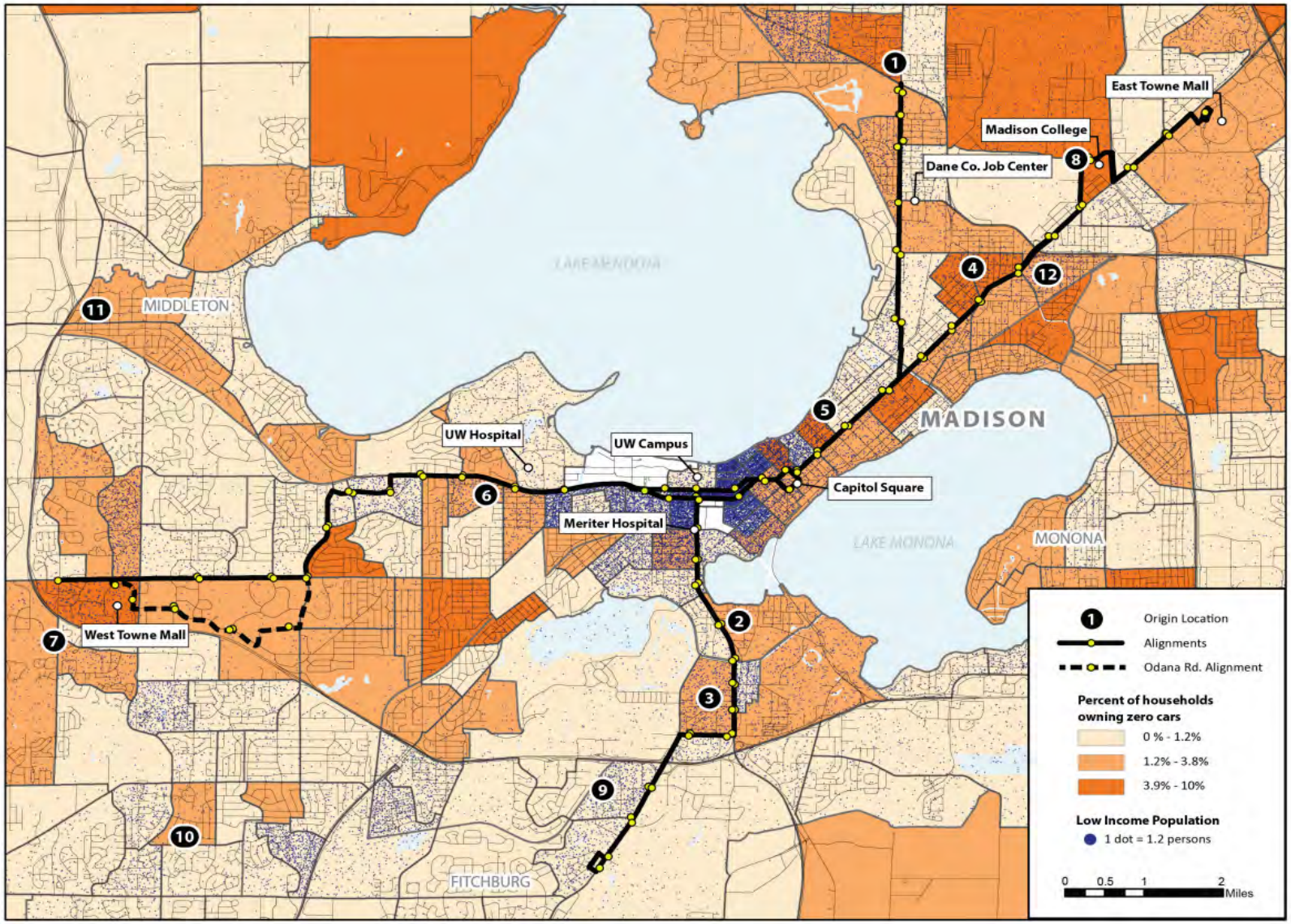


Figure 30: Low Income/Transit Dependent Origin Destination Pair Locations



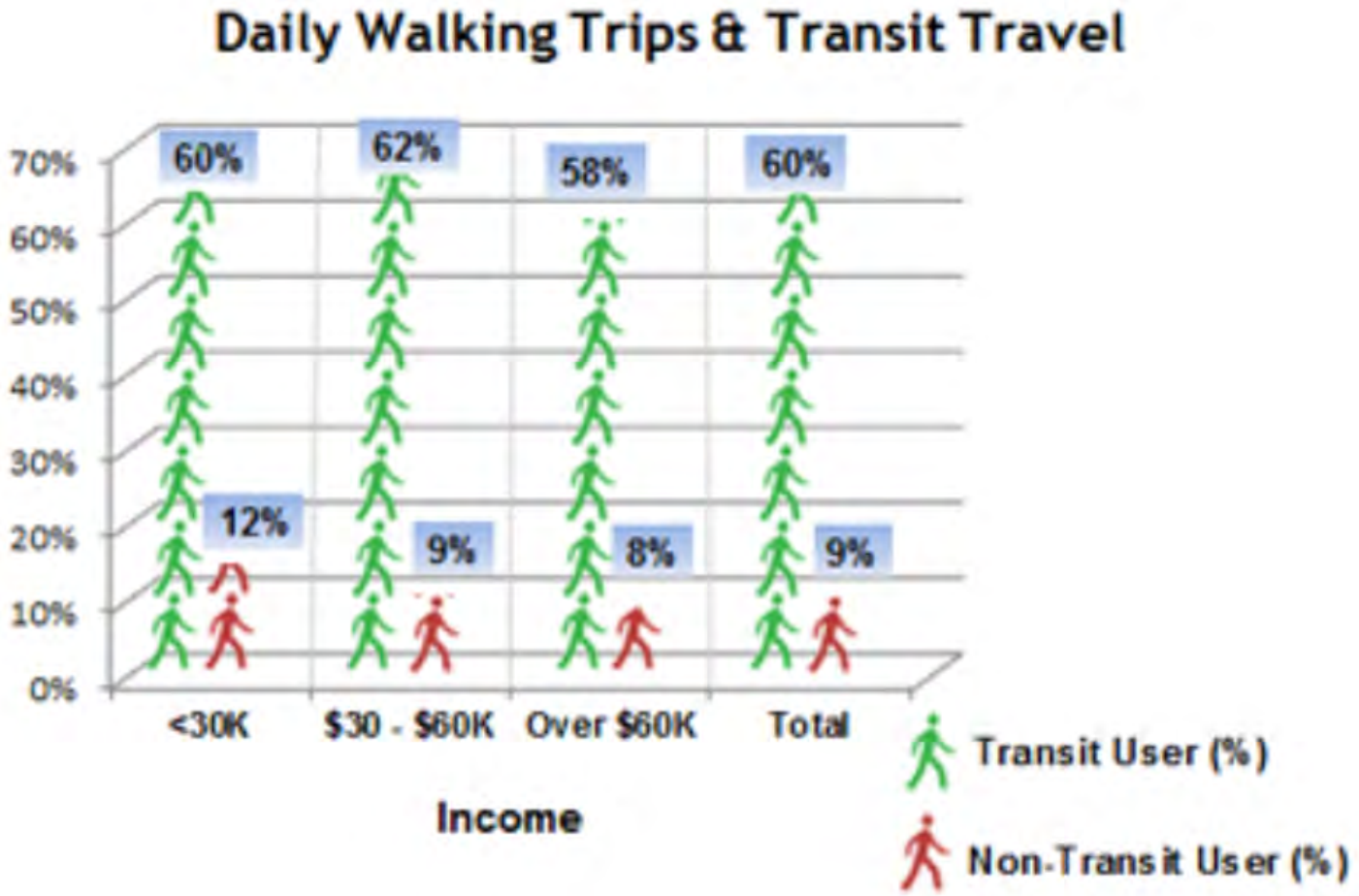
Source: Madison Area Transp. Planning Board

Table 61: Low Income/Transit Dependent Origin Destination Pairs

	Origin Intersection		Closest Corridor	Major Employment and/or Shopping Area	Existing transit in-vehicle travel time (minutes)	Proposed in-vehicle service travel time (minutes)	Difference (minute)	% Time Savings
1	Thackeray Rd	N Sherman Ave	North	Meriter Hospital	41	24	-17	41%
2	W Olin Ave	Lowell St	South	Dane County Job Center	36	23	-13	36%
3	Cypress Way	Dane Street	South	Madison College	44	30	-14	32%
4	E Johnson St	North Street	East	East Towne Mall	20	15	-5	25%
5	E Gorham St	N Paterson St	East	West Towne Mall	48	38	-10	21%
6	Shepard Terrace	Kendall Avenue	West	Capitol Square	16	13	-3	19%
7	Watts Road	S High Point Rd	West	Capitol Square	41	35	-6	15%
8	Wright St	Anderson St	East	Capitol Square	19	18	-1	5%
9	Luann Ln	Greenway Cross	South	West Towne Mall	33	32	-1	3%
10	Sara Rd	Putnam Rd	West	UW Campus	38	38*	0	0%
11	University Ave	Parmenter St	West	UW Hospitals and Clinics	36	36*	0	0%
12	Milwaukee St	Portland Pkwy	East	UW Campus	25	25*	0	0%

*Note: Using existing local routes would be faster than using BRT to make this trip; therefore it is assumed passengers would continue to use local routes and would not see a difference in travel times.

Source:Madison Area Transp. Planning Board



Source: Madison Area Transp. Planning Board

Average time most Americans spend walking each day :6 minutes

Median time public transit users spend walking each day :19 minutes

Daily walking time recommended by Centers for Disease Control : 22 minutes

Source: Madison Area Transp. Planning Board

Policy, Programs, Actions

Policy/ Program	Technical Feasibility	Economic Feasibility	Political Feasibility	Administrative Feasibility	Health Impacts
WHEDA Energy and improvement Loans	High	High	High	High	Low
WHEAP Weatherization	Moderate to High	High	High	Moderate to High	Moderate to High

Recommendations

1. Encourage neighborhood associations to participate in developing affordable housing and increasing economic diversity

1. Build Rapid Transit

1. Educate the community and provide resources for owners, renters and landlords to access funds for energy updates.

4. Conduct Energy Audits: make use of WHEPA funds.

Supporting Actions

- Build Partnerships
  - Most affordable housing projects have between 7 and 12 funders/partners.

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http://www.palgrave-journals.com/jphp/journal/v30/nS1/full/jphp200852a.html

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A Health Impact Assessment: Art, Design and Culture

Kelsey Baubie, Kasey Cragg, Bryan Haugen
PHS 740 Health Impact Assessment of Global Environmental Change
5/3/16

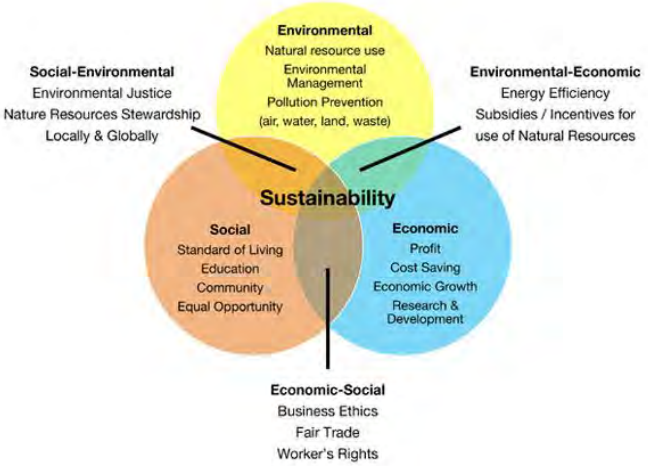
Overview

- Madison Sustainability Plan: Art, Design and Culture
- Health Impact Assessment
- Importance of Sustainable Art
- Key Determinants
- Magnitude of the Problem
- Actions and their health benefits
- Barriers
- Recommendations
- Evaluation

Photo: lakewingra.org

Sustainability

- “A dynamic process which enables all people to realize their potential and improve their quality of life in ways which simultaneously protect and enhance the Earth’s support systems” UK Forum for the Future



Art, Design and Culture

Goal 1: Integrate environmental sustainability into Madison's arts program and art and design into the city's sustainability efforts

1. Encourage sustainable practices in Madison's Public Art Program.
2. Create an addendum to the Public Art Framework and Field Guide that includes guidelines for achieving sustainability in Madison's Public Art Program.
3. Research and identify best practices in sustainable art and design and encourage incorporation of such standards into public art projects.
4. Support neighborhood dance instruction for children and adults.

Art, Design and Culture

Goal 2: Include sustainable art in city infrastructure projects

1. Encourage development of projects that serve our community and ecosystem by maintaining high design and environmental standards, creativity and community involvement.
2. Require artist and designer participation in municipal projects over $1 million and reserve a percentage of the project budget to fund the art/design fees.

Health Impact Assessment

- Examine the goals and actions of Art, Design and Culture of the sustainability plan to understand their effects on health
- Scope of Examination
  - Encourage sustainable practices in Madison's Public Art Program
  - Create an addendum to the Public Art Framework and Field Guide that includes guidelines for achieving sustainability in Madison's Public Art Program
  - Support neighborhood art programs** (not just dance instruction!)
  - Green Festivals**

Importance of Sustainable Art

- Art has the ability to educate and inform the public about sustainability
  - Create a new lens to view sustainability

Marsh Zone 2000

RiverCubes

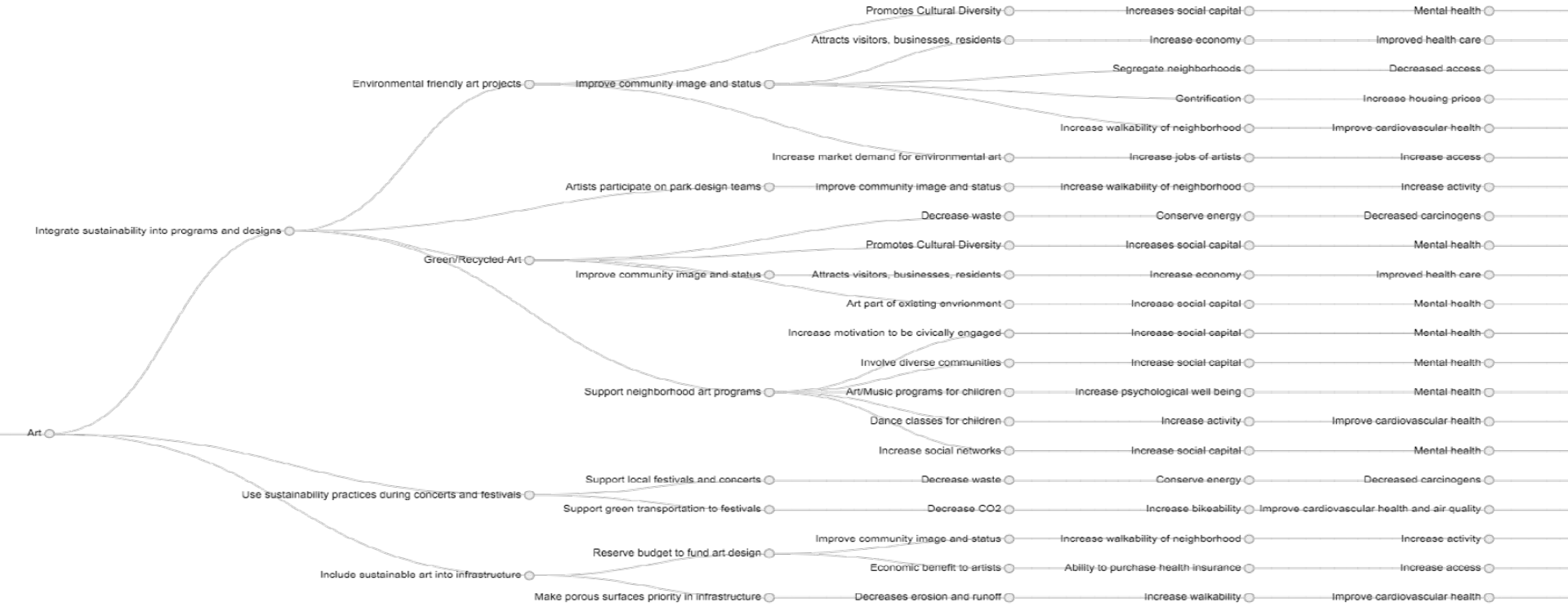
http://ecosalon.com/20_unforgettable_works_of_environmental_art/

Key Determinants

- A lack of local sustainability guidelines
- Communication of stakeholders
  - Madison Arts Commission
  - Sustain Dane
  - Artists
  - Developers
  - Community Leaders
- Funding
  - 2015 state budget allocated $80,000 to Municipal Art Fund
- Knowledge

Photo: MSCR website

Scoping: Art, Design and Culture



Creation of an addendum to Public Art Framework

- 10 principles for artists to follow when creating projects in Madison
- Current framework creates measures for:
  - Art in City Building
  - Community Partnerships: Art in Private Development
  - Public Art Ventures
  - Private
- Indirect health benefits from using recycled materials and improving mental health by requiring sustainability in art

Encourage Sustainable Practice in Madison's Public Art Programs

- Mental Health
  - Can be used to educate children about ecological boundaries
  - Serve a greater purpose, such as habitat formation
  - Addresses climate change in a more 'psychologically digestible' way.
- Recycled Materials
  - Cleans up neighborhoods and environments
  - Inspires creativity within artists and/or program participants
- Walkability
  - Public art improves aesthetic of neighborhood
  - Improved aesthetics improves walkability
  - Increased walkability of neighborhoods reduces overall hypertension risk

Support Neighborhood Art Programs

- Community-based art education (CBAE) implicated in positive mental health outcomes
  - Active
  - Passive
- Social Capital linked to placemaking
  - Place attachment

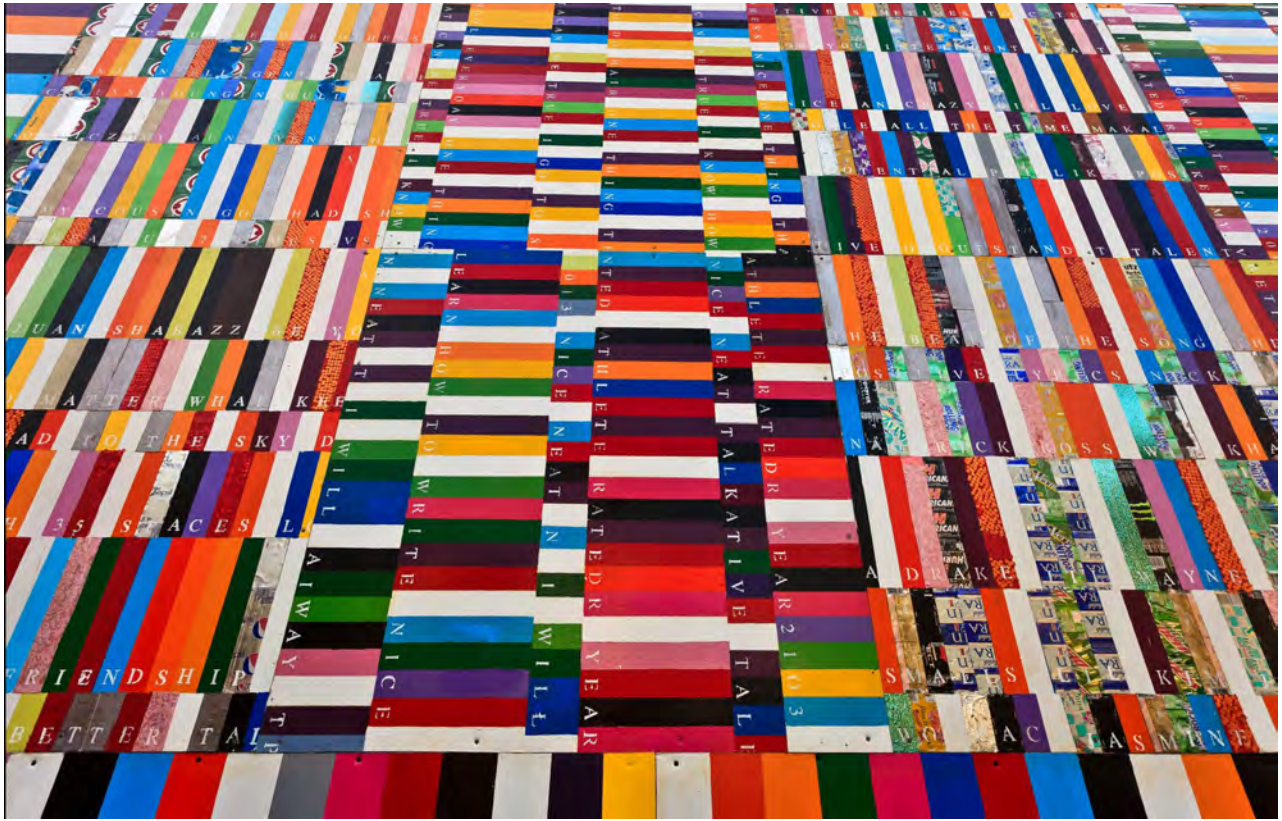


Photo: Porch Light Project

Green Festivals

- Reduction in C02 (from waste management to transportation costs)
- Reduction in food waste
- Overall reduction in carbon footprint

Photo: summercampfestivals.com

Barriers

Funding for supplies, especially in community-based programs

Art Education seen as increasingly less important compared to STEM, despite links to mental health and social capital

- Could limit further growth of sustainable art

Gentrification & lack of community appropriate/community sensitive art education

Photo: Birmingham AL city website

Recommendations

- Increase support for organizations such as Sustain Dane
    - Specifically, The smART program, a sustainable neighborhood initiative developed directly in response to the 2011 Sustainability Goals.
- Madison Art Commission partner with Sustain Dane to create neighborhood art programs
- Have Madison Art Commission adopt Public Art Sustainability Assessment and use when providing grants
- Adopt guidelines for green festivals
    - The Icarus Foundation, A Greener Festival LTD

Evaluation

- Utilize the Integrated Questionnaire for the Measurement of Social Capital every 5 years
- Measure benefits to mental health every five years using combination of the following
  - Self-reported mental health symptoms
  - Self-reported full diagnostic disorders
  - Physicians' billings for outpatient mental health visits
  - Use of psychotropic medications
- Measure number of MAC grants offered to sustainable art projects
- Measure participant satisfaction in community art groups yearly
- Measure amount of recycled material from festivals

Evaluation: a case study!

Yale School of Medicine's evaluation on Philadelphia's Porch Light program can be a guideline for other communities who are interested in evaluating the impact sustainable art initiatives have

- Decreases in relapses of addiction and better adherence to treatments and other therapies recommended by their providers
- Increases in standardized neighborhood walking environments/safety (After two years residents who lived within a mile of a Porch Light mural had more efficacy and more understanding for those with mental health struggles)
- Yale also observed a site where a mural was put up by Mural Arts but without community engagement, they observed improvements in "rate of decay" except there was no reduction of stigma in the community of a certain issue like there was when a specific group was engaged. The School of Medicine survey also used neighborhood efficacy and aesthetic measures which were standardized. Neighborhoods receiving mural installations saw improvements in both measurements.

Developing standardized and quantitative measurements to evaluate programs' outcomes can help justify their funding and continue their existence and proliferation!

Conclusion

Art is an important part of a community. If done sustainably, it can be even better for residents and even positively impact their health and the environment!

While benefits can be hard to quantify and mostly associated with mental health, this does not mean it should be disregarded.

<<<This is art! Where is it?

Photo: Histories of Things to Come blog

A Final Plug: Sustainable Spaces & Stress Relief

- One of two inaugural Allen Centennial Garden Design Challenge winners
  - Theme: Green Medicine
- “Barefooted Women”
  - Removed concrete walkway
  - Chamomile, sage, lavender for medicinal scents; marigold and double coneflower to attract butterflies
- Official reveal Friday, May 6th at 6pm; live music and Dogs on Call

Image courtesy of Erin Foley, 2016

Questions?

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