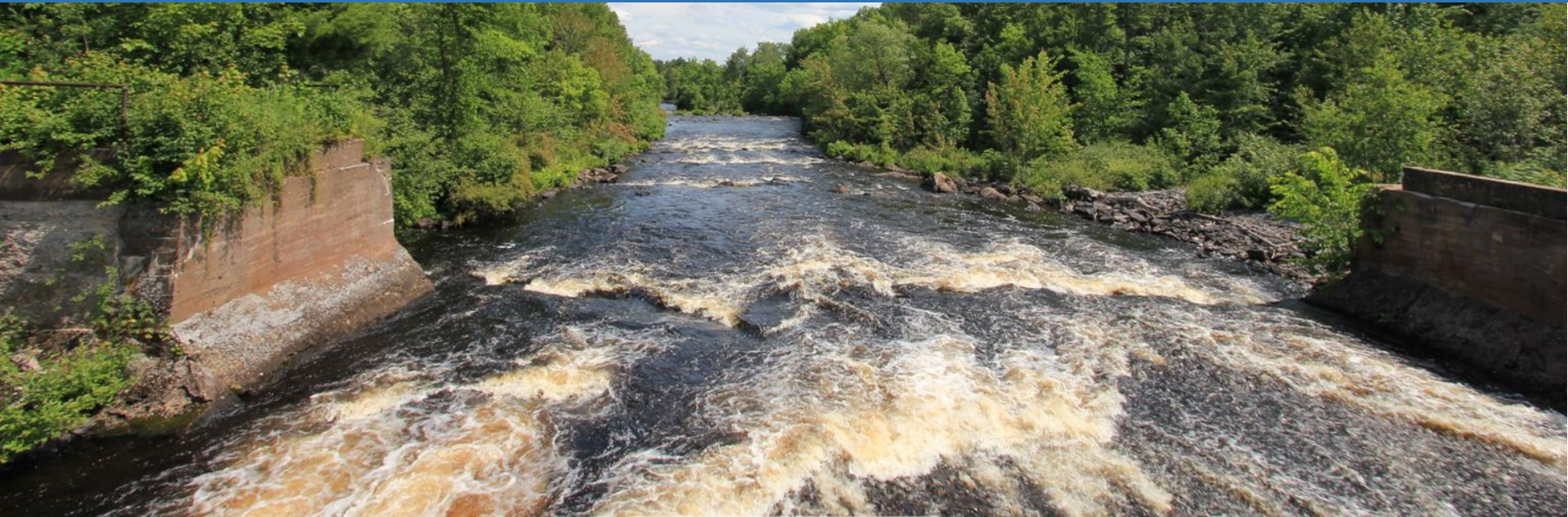


Marquette Area Climate Health Adaptation:

A rural community designs a healthy & resilient future

2018 Premier Public Health Conference

October 9 to October 11, 2018 - Bay City , MI



MICHIGAN STATE
UNIVERSITY

MICHIGAN STATE
UNIVERSITY

Extension

School of Planning, Design
and Construction

Collaborating Partners

Michigan Climate and Health Adaptation Program (MICHAP)

Michigan Dept. Health & Human Services
(MDHHS)

Lorri Cameron, Aaron Ferguson, Yonathan Kefelegn

Michigan State University

Wayne Beyea, Pat Crawford, School of Planning, Design, and
Construction

Brad Neumann, MSU Extension

Research Assistants: E Cangelosi, J Arnold, A Shaaban and W Li

Marquette County Health Department

Jerry Messana, Health Officer

Climate Adaptation Task Force (CATF)

A Marquette-based group of local leaders working to address
climate change in the area



Photo: MSU SPDC

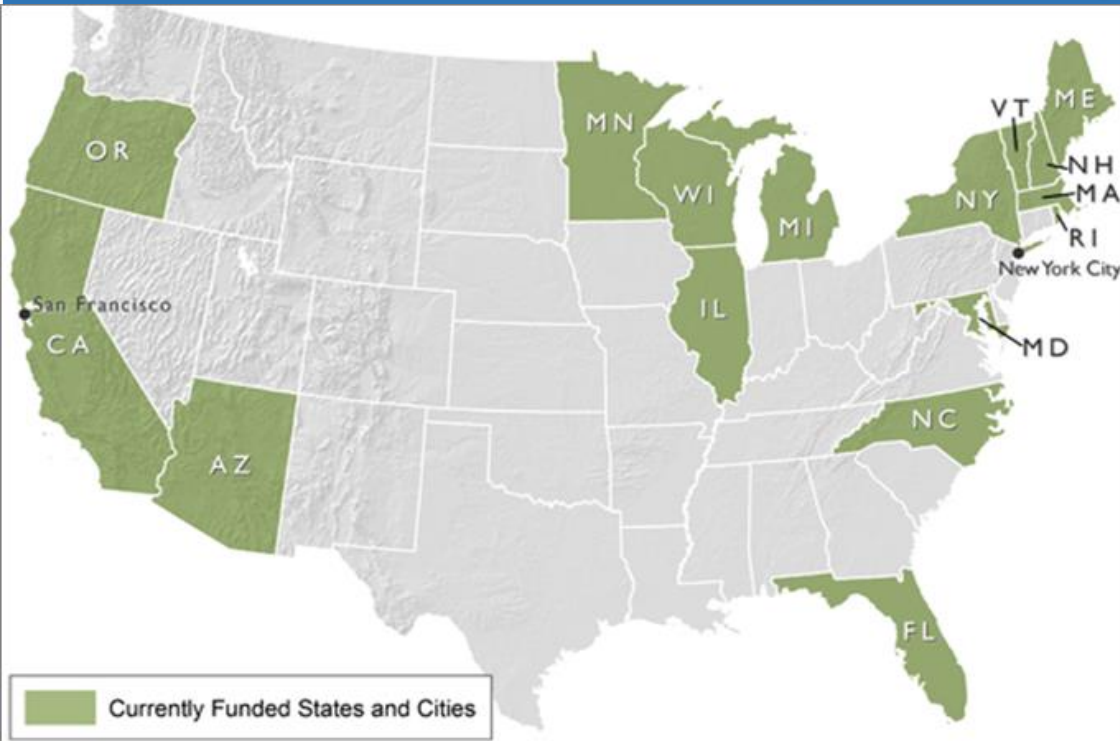
Learning Objectives

- 1. Understand how climate health threats can be addressed through local policies and design**
- 2. Describe at least 3 techniques for engaging community members in the planning process**
- 3. Identify at least 4 partners for local health departments to engage**



Project Background

Michigan Climate & Health Adaptation Program (MICHAP)



Climate Ready States and Cities Initiative

Strategic
Adaptation
Planning and
Implementation
2009 - 2013

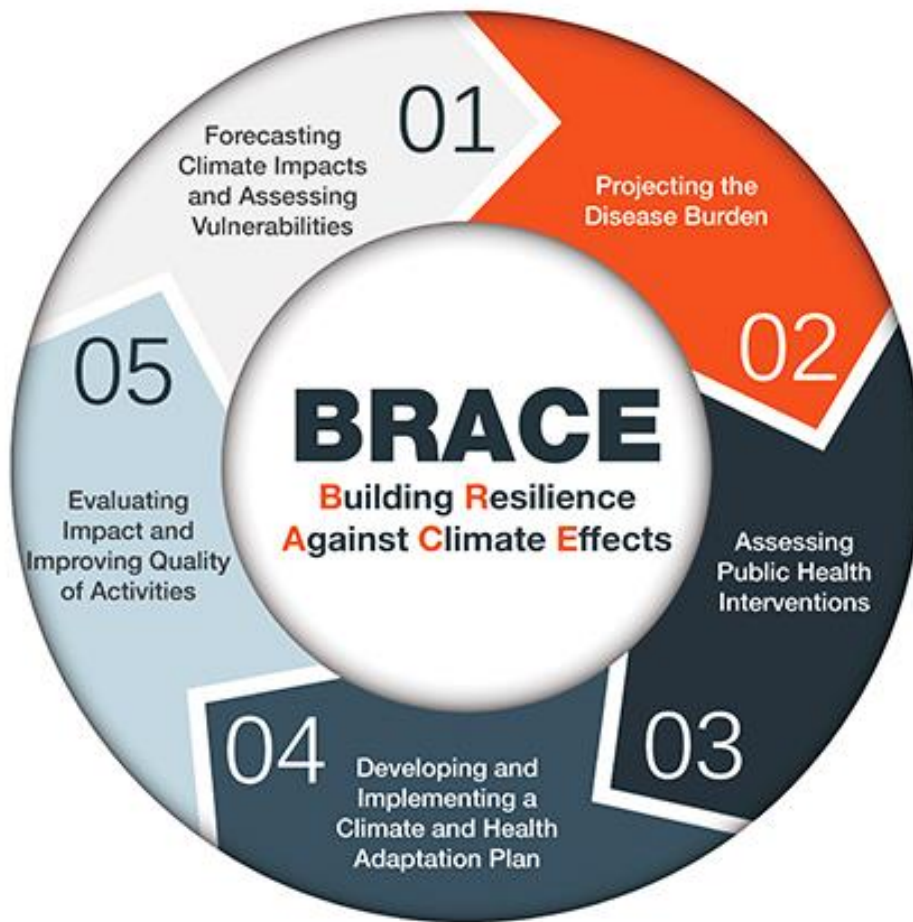


**Building
Resilience
Against Climate
Effects (BRACE)**
2013 - 2016



Climate & Health
Adaptation and
Monitoring
Program
2016 - 2021

BRACE Framework



Foundation for Intervention:

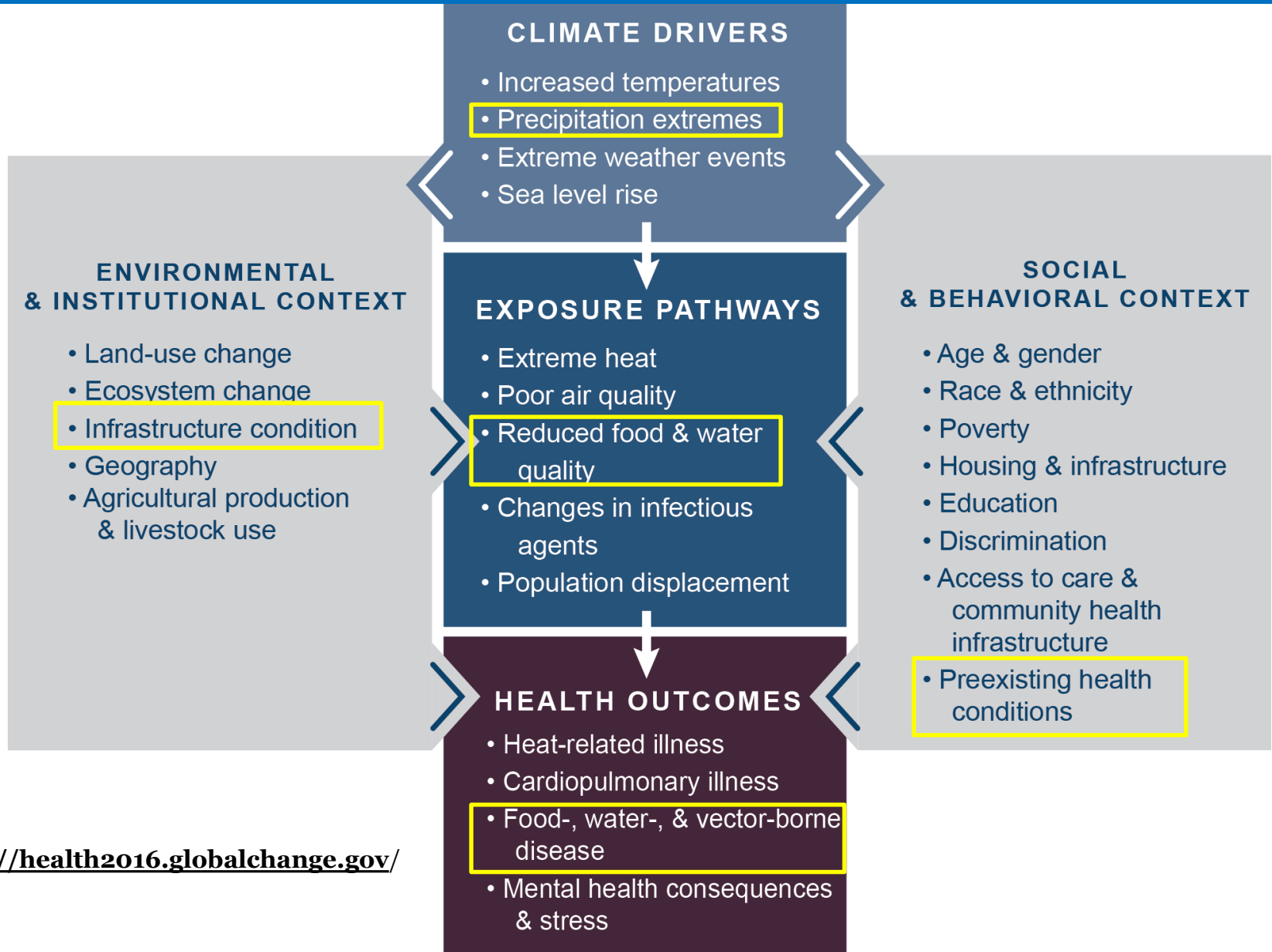
- MI Climate and Health Profile Report
- Heat Morbidity and Mortality Disease Burden Projections
- Climate and Health Intervention Assessment
- Statewide Vulnerability Assessments for: heat illness, respiratory, and waterborne diseases
- Strategic Plan Update: 2016 - 2021

Priority Climate-Related Health Impacts

1. Respiratory conditions
2. Heat Illness
3. Storm –related Injury, CO poisoning
4. Water – borne diseases
5. Vector – borne diseases



Interrupting the Pathway from Climate Change to Health Impacts





Marquette Project Overview

- **What:** Pilot a process that builds community capacity through collaboration and built environment design to reduce the negative health impacts of climate change
- **Why:** Climate driven events have and will impact health and quality of life, particularly for vulnerable groups
- **How:** Stakeholder-driven, collaborative process coupled with built environment design and policy recommendations



Project Process

MICHAP & MSUE Partnership- MSUE

MSUE Mission: *MSUE helps people improve their lives through an educational process that applies knowledge to critical issues, needs and opportunities.*

- **Ongoing presence** in every Michigan county
- **Bring education to community**
- **Community trust**
- **Local needs focused**
- **Wide range of specialties:**
 - Agriculture, Business & Community, Family, Food & Health, Lawn & Garden, Natural Resources and 4-H & Youth
 - **Greening Michigan Institute:** Natural Resources, Community & Economic Development
 - **MSU Model of Health Extension:** MSUE and MSU College of Human Medicine partner on research and community primary care to enhance health care delivery and education



Source: MSUE Leadership Webpage
http://www.canr.msu.edu/outreach/about/msue_leadership

Process Overview

1. Highly **collaborative**

Health, MSU, Community

2. **Stakeholder-driven**, community engagement

Focus on community driven concerns and acknowledge community identity (Crawford et al, 2018)

3. **Visual Design**

Visual design renderings by MSU SPDC
Landscape Architecture Design Team
(Crawford et al, 2018)

Process focus:

1. Stakeholder-driven concerns
2. Connection through visual design
3. Research informed recommendations
4. Feedback and improvement (iterative learning loops) (Brown et al., 2016; Henly-Shepard et al., 2015; Gray et al., 2017; Crawford et al, 2018)



Applied Research Assumptions

Effective public participation strategies around climate change adaptation require understanding:

1. **Importance of community identity** (Crawford et al, 2018)
2. **Potential resistance** - climate deniers; property rights (Crawford et al, 2018)
3. **Community starting point** – “Six Americas” (Crawford et al, 2018)
4. **Iterative learning loops** (Brown et al., 2016; Henly-Shepard et al., 2015; Gray et al., 2017; Crawford et al, 2018)
5. **Targeted stakeholder invitations may be more effective than an ‘all call’ approach** (Few et al., 2007)



Project Timeline



Targeted Stakeholder Meetings

1. Over 4 months, the team met with over **30 community stakeholder groups** representing a range of vulnerable populations.
 - Accommodating on-site meetings
 - Targeted stakeholder invitations important (Few et al., 2017)
2. Marquette Area Climate Adaptation Task Force (CATF) **reviewed and identified key issues.**



Stakeholder Groups:

1. Climate Change Expertise
2. Local Government
3. Health Professionals
4. Agencies serving Vulnerable Populations

Primary Priorities

Flooding

Water Shortage

Road Access

Wildfires

Secondary Priorities

Ticks

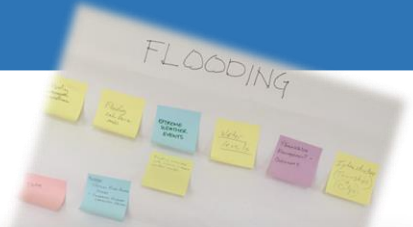
Air Quality



Meeting One- Community Visioning

In November 2017, the team presented the stakeholder feedback to community members for additional input via easel pads, sticky notes, maps, and colored dots for ranking. We and asked individually (I) and in groups (G):

1. (I) Biggest climate and health threats to county?
2. (G) Vision of area future with issues fully addressed?
3. (G) Rank concerns and visions.



Our Hopes for the County

- LESS SPRAWL COUNTY WIDE
LESS ISOLATED, RURAL
DEVELOPMENT ●●
- PRESQUE ISLE & SHIRAS
POWER PLANTS ARE GONE
(AND REPLACED W/ CLEAN, GREEN & FUN STUFF)
- CARLESS CORRIDORS
PEDESTRIAN "MALLS"
- POPULATION INCREASE IS
● URBAN W/ MASS TRANSIT
CONNECTING MQT-NEGAUNEE
AND ISHPERING



Designs & Policies

Community input guided:

1. Visual design interventions
2. Relevant recommendations

Visual design helped:

- Draw the connection between climate impact, health, and built environment adaptations
- Build consensus



Physical Interventions:

1. Trail
2. Vegetated swale
3. Pervious pavement
4. New trees

Sample Policies:

- Limit tall grasses near trails to create a “buffer zone” between recreational areas and tick habitats.
- Implement natural infiltration systems in municipal development to filter runoff before reaching the lake.
- Identify coastal areas at risk for flooding and protect them as greenspace that can withstand temporary flooding.
- Create a county wide Shoreline Protection Zone to require enhanced building standards and further setbacks in coastal areas, including for roads to ensure accessibility of roadways.

Sample Health Measures:

- Miles of established tick buffer zones in county
- % of low-impact-development stormwater management techniques used in municipal upgrades and development
- % of publicly owned coastal land cover dedicated to green spaces
- % of waterfront covered by a Shoreline Protection or Beach Overlay Zone

Ticks 

Flooding 

Road Access 

Water Quantity 

BEFORE



AFTER



Before Design Example



After Design Example






Visual Explanation






Physical Interventions:

1. Educational signage
2. Short plants
3. Vegetated swales

Sample Policies:

-  Increase educational signage in public places on tick awareness and prevention.
-  Follow Firewise techniques in public places to remove brush, limit tall and dry grasses, and thin and prune trees.
-  Increase low-impact-development in all public spaces. Ensure the use of native, low-water-dependent landscaping on public properties.

Sample Health Measures:

-  # of educational signs in public places
-  # of Firewise sites in Marquette County
-  Change in the number of municipal properties with LID practices

Flooding 

Water Quantity 

Wildfires 

Ticks 

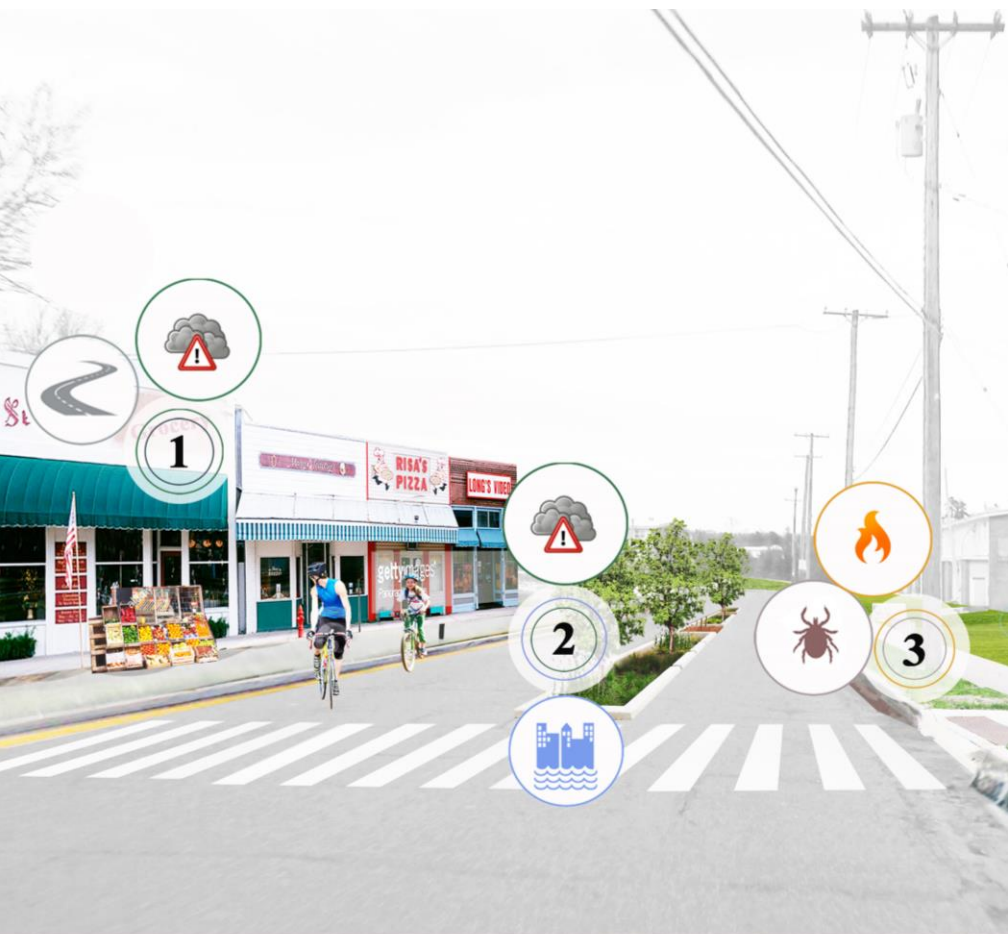
Before Design Example



After Design Example






Visual Explanation






Physical Interventions:

1. Mixed-use development
2. Vegetated Swale
3. Short mown grass

Sample Policies:

-  Incentivize mixed-use development in rural/remote communities which include businesses to meet the basic needs of the community residents (e.g. grocery stores, health centers, etc.)
-  Encourage homeowners to adopt Firewise standards to ensure home ignition zone safety through education campaigns.
-  Encourage “Tick-Safe Yards” (CDC) practices such as short mown grass and debris-free yards.

Sample Health Measures:

-  # of vital-needs businesses in rural communities and within short walk of most residents.
-  # Number of site in Marquette County listed on the Firewise USA map
-  Miles of established tick buffer zones in county

Ticks 

Flooding 

Wildfires 

Road Access 

Air Quality 

Meeting Two- Design Input

In March 2018, the team presented the designs and sample policies and metrics to the community and asked for feedback via sticky notes and feedback sheets.

Questions asked:

1. What do you like?
2. What's missing?
3. Any improvement suggestions?



Guidebook

Volume I Example

The Climate Adaptation Task Force (CATF) provided expert review and further feedback.

With complete feedback the team produced the Marquette Area Climate and Health Adaptation Guidebook.

- **Volume I:** Visual Adaptation Designs
- **Volume II:** Policy Recommendations
- **Volume III:** Implementation Monitoring Strategy

Volume 2 Example

Impermeable surfaces, such as parking lots, sidewalks, and traditional grey infrastructure can block rainwater from filtering into the ground, leading to flooding and drinking water contamination caused by excessive runoff.¹ Permeable surfaces such as stones and permeable pavement allow more water to pass through to the ground below rather than washing into the sewer system.¹ Soil and plants help filter out harmful contaminants before they reach the water basin.¹ More plants and trees also help absorb harmful pollutants from the air, improving the air quality of an area.¹ This is particularly important for vulnerable populations such as the elderly, small children, and people with asthma.



Permeable Pavers and Winter Weather

A common misconception is that permeable pavement types cannot withstand the freeze-thaw cycles of winter climates. While minimal regular maintenance is required, when installed correctly, this form of pavement holds up well to freeze-thaw cycles, allowing space for water to expand upon freezing (SEMCOG, 2008). Permeable pavement also reduces the amount of salt needed to melt ice on pavement by up to 75% (Roseen et al, 2014).



¹ United States Environmental Protection Agency, 2018a

Policy Recommendations

Climate Driver	Impact	Interventions	Recommendations	Metrics
Wildfire	Smoke	Education and Inclusion Public Outreach Goal: Prevent wildfires at campsites	Public 1. Develop communication plan to address campfire safety through: – signage; – leaflets; and – incorporation of campfire education in online camp registration process.	Number of people registered for campsites that receive campfire safety education Number of fires caused by campfires
		Education and Inclusion Public Outreach Goal: Promote education on smoke danger precautions	Public 1. Develop wildfire communication plan based on CDC wildfire smoke fact sheet and Firewise USA public education techniques. Use: – PSAs; – local news interviews; – mobile device messaging; – flyers and leaflets; – social media advertising; and – community engagement sessions. 2. Develop localized air quality communication plan which includes smoke forecasting of EPA Air Resource Advisory (ARA) program.	Number of people reached by wildfire communication plan Number of people reached by air quality communication plan
		Education and Inclusion Thinning/Pruning/Tree Removal/Brush Clearing on Private Property Goal: Engage residents' participation in wildfire prevention	Private 1. Encourage large landowners to complete a forest management plan through the U.S. Forest Service's Northern Institute of Applied Climate Science. 2. Encourage residential adoption of Firewise standards through: – public information campaigns and – grant programs.	Number of large landowners who have completed a forest management plan Number of sites in Marquette County listed on the Firewise USA map

(3) See Community Wildfire Protection Plan

Volume I Example

MDHHS Draft deliberative – do not cite, quote, or distribute DRAFT Marquette Area Climate and Health Adaptation Guide — Volume I



While native plants, trees, and vegetated landscaping can all help absorb storm water to improve water quality, community gardens can accomplish similar goals with the added bonuses of improving social well-being in communities and decreasing the community's reliance on outside sources for fresh produce.¹ Additionally, gardening encourages healthy activity and eating habits. Plants also not only improve air quality by absorbing harmful particulates from the air, but local community gardens reduce residents' need to drive long distances for fresh produce, limiting car emissions released into the air.²

Community Gardens and Social Cohesion

A concern voiced by the Marquette area community that did not fit neatly into a health category was that of social cohesion in relation to future population increases believed to be predicted. Community gardens, while useful for built environment adaptations, can also be used as a means for building community. Research indicates that community gardens bring together people of diverse backgrounds to share one common interest, and promote interactions that build social capital. (Firth et al, 2011)



¹ Centers for Disease Control and Prevention (CDC), 2010

² European Climate Adaptation Platform (Climate-ADAPT), 2015

Volume I Example

MDHHS Draft deliberative – do not cite, quote, or distribute DRAFT Marquette Area Climate and Health Adaptation Guide — Volume I

Bioretention in Lansing, Michigan

The City of Lansing installed 27 bioretention facilities inside concrete planter boxes while updating the city's controlled sewer overflow system as a means to control, clean, and dispense storm water in an urban environment. Additionally, the city improved sidewalks with clay pavers, rain garden plants, and ornamental fences as part of its Michigan Avenue corridor enhancement project. The planter boxes receive storm water runoff from nearby roads and sidewalks which helps provide flooding protection for Michigan Avenue as well as protects the Grand River from pollutants such as sediment, nutrients, and heavy metals carried in storm water runoff. The planter boxes also help to reduce water temperatures and promote infiltration. (SEMCOG, 2008)



Image Source: SEMCOG Low Impact Development (LID) Manual for Michigan



CITY OF MARQUETTE DOWNTOWN



After



Before

Water Quality

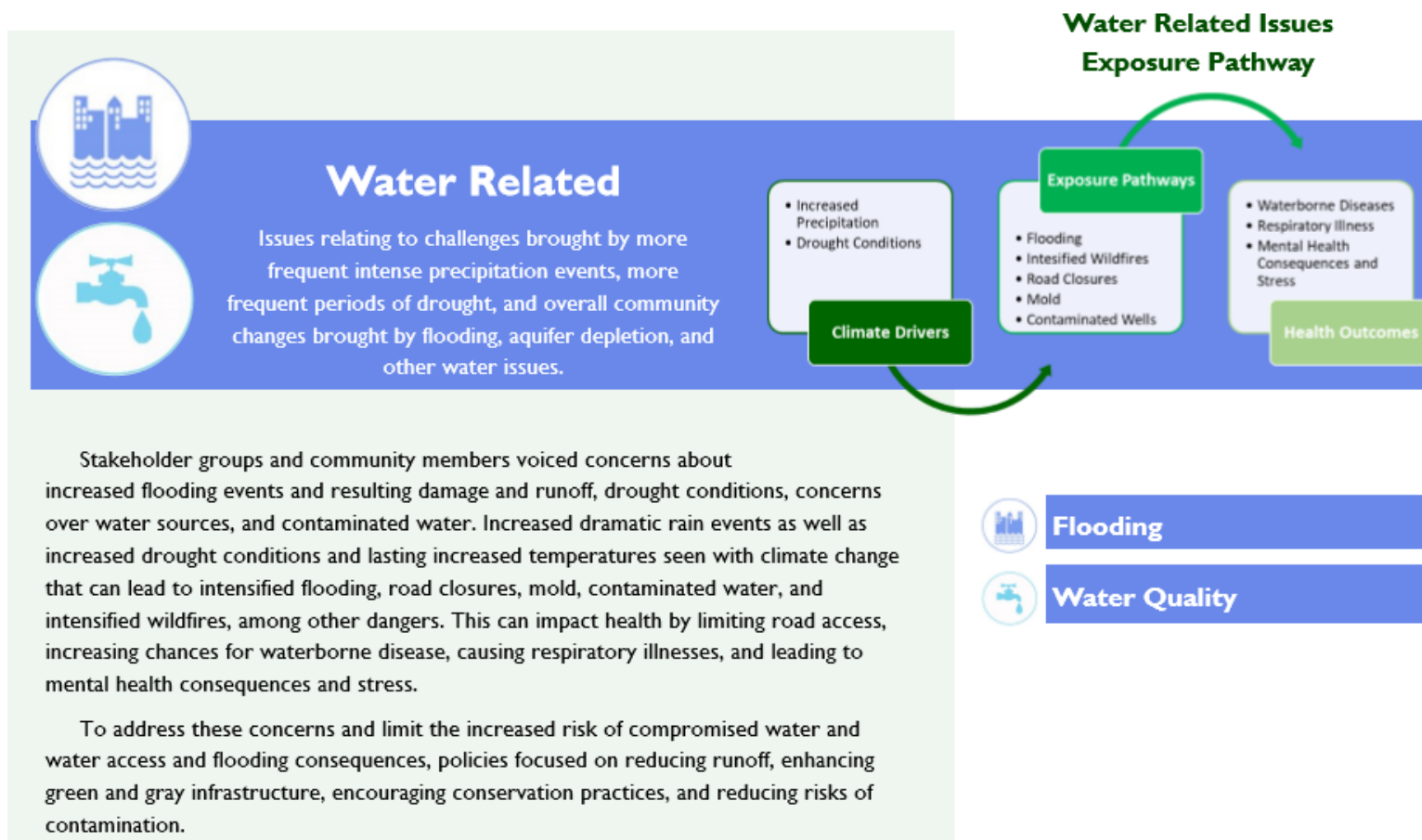
Road Access

Flooding

Volume II Example

MDHHS Draft deliberative – do not cite, quote, or distribute DRAFT Marquette Area Climate and Health Adaptation Guide — Volume II

Water Related



Volume II Example

MDHHS Draft deliberative – do not cite, quote, or distribute DRAFT Marquette Area Climate and Health Adaptation Guide — Volume II

Policy Recommendations Emergency Response/Extreme Events



Climate Driver	Impact	Interventions	Recommendations	Metrics
Flooding	Access	<u>Surveillance and Tracking</u> Track Vulnerabilities Goal: Understand where greatest risk to transport networks exist and address vulnerabilities	Public 1. Inventory critical infrastructure most vulnerable to damage by extreme weather. For flooding situations, enhance: <ul style="list-style-type: none"> – height; – drainage; – culverts; and – surrounding low-impact-development (LID) on road subject to repeated flooding.⁽¹²⁾ 	Number of road closures due to extreme events
		<u>Landscape Actions</u> Green Infrastructure/Low Impact Design Goal: Reduce road use and development along coast	Public 1. Utilize Great Lakes Shoreviewer technology to identify coastal areas at risk for flooding and assess flooded areas for potential adaptive measures such as: <ul style="list-style-type: none"> – use of pervious pavement in trail network upgrades and – alternative routes for key coastal arteries (partner with the Michigan Department of Transportation (MDOT), the County Road Commissioner, or the Army Corps of Engineers). 	Percent of publicly owned land cover dedicated to greenspaces Square footage of pervious pavement added on trail networks
		<u>Landscape Actions</u> Green Infrastructure/Low Impact Design Goal: Ensure road construction appropriately manages floodwater to allow for road access	Public 1. Identify routes at risk for flooding and assess flooded areas for potential adaptive measures such as: <ul style="list-style-type: none"> – enhanced height, drainage, culverts, and surrounding LID on road subject to repeated flooding; – use of pervious pavement in trail network upgrades and – alternative routes for key arteries (partner with the Michigan Department of Transportation (MDOT), the County Road Commissioner, or the Army Corps of Engineers). 2. Develop enhanced Floodplain Overlay Zone with updated floodplain maps to require enhanced construction standards for roads to ensure accessibility of roadways. Include enhanced height, drainage, culverts, and surrounding LID.	Number of road closures due to extreme events

⁽¹²⁾ At minimum, those identified in the 2015 Marquette County Hazard Mitigation Plan

Lessons Learned...

- With **visual design** approach, beautification/curb appeal provided a gateway for understanding a complex topic
- Framing climate change through lens of **health impacts** while using planning and design interventions can bring together a wide variety of affected populations and disciplines
- **Community identity** and climate adaptation starting point must be acknowledged (Crawford et al, 2018)
- In a rural county, one-on-one involvement of **vulnerable populations** requires additional outreach and feedback loops
- Countywide **multidisciplinary steering committee** representing a variety of viewpoints and geographic areas is necessary for long-term implementation

Next Steps

1. Deliver final Volumes I and II (Fall 2018)
2. Phase III: Implementation Monitoring Strategy (Winter 2019)
 - Identify priorities, organizations, and timelines for implementation
 - Deliver final Volume III of Guide
3. Demonstration plans and projects (Summer 2019)



Community Action and Engagement

Local Health Department



Community Readiness

Why Marquette County?

1. Rural Michigan County (pop: 66,502; den: 35.5/sq mi; area: 1,873 sq mi)
2. 2016 MDHHS Michigan Climate and Health Vulnerability Assessment identified issues
3. Research backed assumptions:
 1. Limited potential resistance (Crawford et al, 2018)
 2. Advanced community starting point (Crawford et al, 2018)
4. Existing MSUE trust and support
5. Supportive local Health Department

These facts also aided in community ownership, assistance, and potential adaptive capacity.



Superior Watershed Partnership & Land Trust

Active community conservation and adaptation organization

Adapting to Climate Change and Variability

Marquette, Michigan

September 2013



MICHIGAN STATE UNIVERSITY | Extension

MICHIGAN STATE UNIVERSITY | School of Planning, Design and Construction

2013 MSU Extension climate change adaptation project in Marquette.

Source: GLISA (2013)
http://glisa.umich.edu/media/files/projects/MSUEcommunities/Marquette_Final_Draft_Sept%202013.pdf

Local Interest in Climate Change

Climate Adaptation Task Force (CATF)

- Formed in 2013
- Mission:
 - ✓ Increase public awareness of climate change
 - ✓ Development of climate adaptation strategies
 - ✓ Encouragement of greater use of renewable energy.

Local Interest in Climate Change

(CATF) Formed by local leaders

- ✓ Former Mayor City of Marquette
- ✓ County Elected Officials
- ✓ County Administration
- ✓ County Planning Commission Members
- ✓ County Planning Commission Staff
- ✓ City Planning Commission Staff
- ✓ Public Health
- ✓ Superior Watershed Partnership
- ✓ U.P. Labor Federation AFL/CIOK
- ✓ Community Foundation of Marquette County
- ✓ Northern Michigan University Faculty and Administration
- ✓ Michigan State University Extension, Marquette County

Local Interest in Climate Change

CATF

- Has limited capacity to implement changes to the built environment
- Does provide a network to help influence local policy

Local Interest in Climate Change

Northern Climate Network (NMU)

- Campus-wide consortium providing opportunities for faculty, staff, students and community members to discuss and learn about climate change in our region.
- Mission – To share current scholarship on climate change from a wide range of disciplines
- Objective – Building an interactive database of people interested in working on and teaching about climate change at NMU.
- CLIMATE@NOON SEMINAR SERIES
- Routine local media coverage



NORTHERN MICHIGAN
UNIVERSITY

Local Interest in Climate Change

Northern Climate Network (NMC)



Local Interest in Climate Change

Local Michigan State Extension Office

- On-going interaction with local municipal planning efforts
- Established network of local government officials

MICHIGAN STATE

U N I V E R S I T Y

Extension

Local Interest in Climate Change

Superior Watershed Partnership (SWP)

- Mission: to protect and improve the natural resources of the UP of Michigan on a watershed basis; by promoting responsible individual and community actions that ensure a sustainable environment, encourage a sustainable economy and help improve quality of life.



Prior Work (Research) on Climate Change



- Hazard Mitigation Plan – July 2016
- Community Wildfire Protection Plan – July 2014
- Natural Features and Resources – November 2015

Prior Work (Research) on Climate Change



- City Master Plan – August 2015
- Community Climate Adaptation Plan – September 2013
- Storm Water Asset Management Plan and Ordinance – In Process

Prior Work (Research) on Climate Change

Research Identifies/Addresses:

- Population Trends
- Climate Trends (Temp, Precipitation, etc.)
- Weather Hazards
- Historical Info Regarding Natural Disasters
- Geographic Information
- Built Environment
- Public Health Including Social Determinants
- Vulnerable and at Risk Populations
- Strategies and Resources

MCHD - Convener

- Outreach
- Identifying key stakeholders
- Identifying local resources
- Organizing and facilitating local activities (meeting, site visits, etc.)
- Local Technical Environmental Expertise
- Peer review

Engaging Stakeholders

Climate Change	Local Government
<ul style="list-style-type: none">• Superior Watershed Partnership• Climate Reality Project• MSU Extension – Greening MI Institute• Climate Adaptation Task Force	<ul style="list-style-type: none">• Marquette County, City, Township• Chocolay Twp.• Humboldt Twp.• Sawyer• Area Chambers of Commerce• Negaunee-Ishpeming Water Authority
Health	Vulnerable Populations
<ul style="list-style-type: none">• Marquette County Health Dept.• MSU College of Human Medicine -UPHS• MSUE – Health & Nutrition Inst.• NMU – Community Health Education• Area Physicians• Emergency Response Officials	<ul style="list-style-type: none">• Alger-Marq. Community Action• Aging Services• Veterans Affairs• Homeless & Shelter Services• Continuum of Care• CUPPAD

Recent Climate Publications

American Public Health Association

- *It's time for local health departments to act on climate change*

✓ *Dr. Linda Rudolph – Director of the Center for Climate Change and Health at the Public Health Institute*



Recent Climate Publications

It's time for local health departments to act on climate change

- “Climate change also acts as a threat multiplier, exacerbating poverty, environmental degradation and political instability.”
- “Low-income communities, communities of color, indigenous populations, the very young and elderly and those with chronic illnesses are disproportionately impacted by climate harms, exacerbating existing health inequities.”
- “LHDs, work in partnership with communities to promote climate action that builds healthy, equitable and sustainable communities.”

References

Publications

1. Brown, I. Martin-Ortega, J., Waylen, K. & Blackstock, K. (2016). Participatory scenario planning for developing innovation in community adaptation responses: three contrasting examples from Latin America. *Regional Environmental Change*, 16, 1685-1700
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3. Few, R., Brown, K., & Tompkins, E. (2007). Public Participation and climate change adaptation: avoiding the illusion of inclusion. *Climate Policy*, 7, 46-59
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5. Henly-Shepard, S. Gray, S., & Cox, L. (2015). The use of participatory modeling to promote social learning and facilitate community disaster planning. *Environmental Science and Policy*, 45, 109-122

Websites

CATF: <https://superiorwatersheds.org/catf>

Rudolf Article: <http://www.publichealthnewswire.org/?p=20734>

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