



# Lessen effects of Stormwater Runoff on the Great Lakes Watersheds - A Logic Model Overview

What is the current situation?	Current Projects (organized by categories chosen at the logic model meeting)	Inputs - What will the program need to invest?	Outputs - What activities/products will the program include?	Outputs— Participation Who will the program reach?	Outcomes/Impact Short Term Results (based on individual learning)	Outcomes/Impact Midterm Results (based on individual actions)	Outcomes/Impact Long Term or ultimate impact Change in a condition
<p><b>1. What are the threats to communities?</b> Climate change impacts:</p> <ul style="list-style-type: none"> <li>Precipitation will fall in heavier, more frequent storm events which will increase runoff, especially in spring and winter → <b>nonpoint source pollution, flooding, combined sewer overflows, droughts</b></li> <li>Increased fluctuations of lake levels may increase erosion and periodically expose formerly submerged lands → <b>shoreline management</b></li> <li>Local, regional, national, global supply/demand for water management presents myriad challenges → <b>water shortages</b></li> <li><b>Increased stress on Ecosystem sustainability – high &amp; low lake levels</b></li> </ul> <p><b>2. What should be Great Lakes Sea Grant's program priorities?</b> Integrate climate change into planning activities at the federal, state, local levels by focusing on the following priority water resource issues:</p> <ul style="list-style-type: none"> <li>Non-point source pollution</li> <li>Flooding</li> <li>Combined sewer overflows</li> <li>Shoreline management</li> <li>Water shortages</li> </ul> <p>Focus adaptation efforts on decision-makers and professionals in the following sectors:</p> <ul style="list-style-type: none"> <li>Land Use Planning</li> <li>Water Resources Planning</li> <li>Watershed Planning</li> </ul> <p>Guiding principles:</p> <ul style="list-style-type: none"> <li>Focus on restoring and promoting ecosystem resiliency and community adaptive capacity</li> <li>Target issues at the scale (local, state, national) where implementation is most feasible and will achieve highest impact</li> <li>Pursue no regrets, low hanging fruit policies, policies that achieve both mitigation and adaptation, and policies that achieve multiple benefits</li> <li>Avoid reinventing the wheel – incorporate adaptation efforts into work already being done</li> <li>Focus on more cost-effective, proactive adaptation rather than reactive adaptation.</li> <li>Be careful about linking efforts explicitly to climate. Will linking it advance progress or could it hurt? This will depend on the specific community and audience.</li> <li>Climate change adaptation strategies/BMPs address overarching water resource management issues (are not unique to climate),</li> <li>Climate change risks treated as same in existing set of risks faced by decision makers.</li> </ul> <p><b>Mission—Communities are resilient to changing climate.</b></p>	<p><b>1. WORKSHOPS / TRAININGS</b></p> <ul style="list-style-type: none"> <li>PA – Lake Erie NEMO program (slowed down a lot due to lack of funding)</li> <li>NOAA Great Lakes Collaboration - GLC4 Modules</li> <li>MN – LID/Green Infrastructure workshop (CCCAI Project)</li> <li>IISG/CMAP – water conservation municipal outreach (using tools)</li> <li>?? - Full cost pricing for water &amp; wastewater presentation/workshops</li> <li>IISG Planning with POWER</li> </ul> <p><b>2. PRESENTATIONS</b></p> <ul style="list-style-type: none"> <li>IISG – presentation on Green Infrastructure study/practices for stormwater</li> <li>IISG/CMAP – water conservation municipal outreach (using tools)</li> <li>MI – presentation on community planning for climate change in the Great Lakes region for public officials and Sea Grant educators (CCCAI project)</li> <li>MI – Conference on climate change adaptation for communities (CCCAI project)</li> <li>MN – presentation on climate change and water quality/stormwater</li> <li>?? – Full cost pricing for water &amp; wastewater presentation/workshops</li> </ul> <p><b>3. MANUALS, FACTSHEETS, BROCHURES</b></p> <ul style="list-style-type: none"> <li>Guidebook to Stormwater BMPs under altered GL climate (also addresses climate change implications for stormwater management) for public officials – MISG (CCCAI project)</li> </ul> <p><b>4. TOOL DEVELOPMENT / INVENTORY / APPLICATION</b></p> <ul style="list-style-type: none"> <li>Add section on climate adaptation to Clean Marina certification</li> <li>IISG benchmarking for full cost pricing</li> <li>Some model ordinances on GL coastal setbacks published – WI SG through SG Legal Program</li> <li>IISG/CMAP water conservation municipal outreach (using tools)</li> </ul> <p><b>5. ONLINE RESOURCES</b></p> <ul style="list-style-type: none"> <li>?? – Some topics are covered on webinars at coastalclimatewiki.org</li> </ul> <p><b>6. MAPPING ASSISTANCE</b></p> <ul style="list-style-type: none"> <li>PA- Presque Isle Watershed plan – list completed, now started work on Lake Erie watershed plan</li> <li>MN Lake Superior community resource inventory – online community maps for planning</li> <li>SARP – Toledo, OH and Duluth MN</li> </ul> <p><b>7. PARTICIPATING IN PLANNING</b></p> <ul style="list-style-type: none"> <li>IL-IN Sea Grant involvement in NIRPC's climate change committee for 2040 regional comp. Plan</li> <li>IL-IN SG involvement in regional water supply plan (CMAP) and water conservation toolbox (NIRPC)</li> <li>IL-IN SG involvement in Chicago wilderness climate change adaptation plan for nature</li> <li>MN NEMO Program</li> </ul> <p>1. NOAA OCRM Adaptation strategies Guide</p> <p>Regional Planning commission updates to comprehensive plans</p> <p>GLRI funded IISG "Healthy landscapes Healthy Lakes" will provide training in lawn/landscape BMPs that reduce stormwater runoff/toxics content of stormwater runoff</p> <p>MN Sea Grant and Partners paired neighborhood residential BMP assessment</p> <p>Milwaukee (MMSD) buying land to create wetlands in upper watershed</p> <p>Erie PA – Cascade Creek installation of riparian buffers/stream restoration project (GLRI proposal)</p> <p>Erie PA - Working with property owners to put in more green space in parking lots along sidewalk</p> <p>Erie PA – ongoing land conservation projects anywhere along coast (some projects focus on stream protection)</p> <p>MISG – "Guide to stormwater BMPs under altered Great Lakes Climate"</p>	<p>1. Expertise/time of:</p> <ul style="list-style-type: none"> <li>Sea Grant educators, specialists, communicators</li> <li>Elected municipal officials (see Participation column)</li> <li>Municipal personnel (see Participation column)</li> <li>Regional planning organizations/agencies/partnerships</li> <li>Sea Grant Legal Program</li> <li>University faculty</li> <li>NGO leaders</li> <li>NOAA employees involved in climate science and adaptation projects</li> </ul> <p>2. Money (for training, travel, salary, equipment, conducting state events, etc.)</p> <p>3. Materials/curriculum (references, manuals, project books, etc.)</p> <p>4. Equipment</p> <p>5. Facilities</p> <p>Extension staff</p> <p>\$</p> <p>Climate Expertise</p> <p>Local Research</p> <p>Social science/policy</p>	<p>1. Workshops / Trainings</p> <p>2. Presentations</p> <p>3. Manuals, factsheets, and brochures (E.g., Adapt/disseminate existing NEMO manuals for Great Lakes regional use)</p> <p>4. Tool inventory and development</p> <ul style="list-style-type: none"> <li>Vulnerability assessments</li> <li>Benchmarking tools, audits (e.g. comprehensive plan climate-proofing audit), certification programs (e.g., add climate adaptation chapter to Clean Marina certification)</li> <li>Model ordinances and regulatory language (e.g., coastal setbacks, groundwater areas overlay zones, wetlands protection ordinances)</li> <li>Prepare case studies of communities already preparing for climate change</li> <li>BMP effectiveness comparisons including cost</li> <li>Grant resources for implementing BMPs</li> </ul> <p>5. Online Resources – web access to #2-4</p> <p>6. Mapping Assistance (e.g., provide GIS support for vulnerability assessments)</p> <p>7. Participation in community planning by meeting face-to-face meetings, convening groups, and connecting people</p> <p>1. BMP Demonstrations</p> <p>2. Visualizations</p> <p>3. Local program funding research to address local stormwater needs (Watershed specific)</p> <p>4. Research on effects of seasonal changes, rain versus snow, runoff</p> <p>5. Needs assessment – where communities are right now</p> <p>6. Engage researchers as they are doing research (e.g., RISA) – researchers interacting with communities</p> <p>7. Go into communities and see what their plans are right now – scenarios</p> <p>8. Training for engineers/system designers/stormwater managers on performance of stormwater practices</p> <p>9. Assist state and communities in developing policies – model ordinances, delivery through SCD network</p> <p>10. Evaluate existing SW plans for suitability to climate change impacts</p>	<p>Municipal* personnel</p> <ul style="list-style-type: none"> <li>Planning and zoning</li> <li>Drain / water resources commissioners</li> <li>Emergency management</li> <li>Water Utilities and Public works: engineers, water treatment, wastewater treatment</li> </ul> <p>Elected municipal* officials</p> <ul style="list-style-type: none"> <li>Mayors</li> <li>city/village managers</li> <li>township supervisors</li> <li>city councils</li> <li>planning commissions</li> </ul> <p>Citizens</p> <p>Regional planning organizations/agencies/partnerships</p> <p>NGOs (e.g., watershed councils)</p> <p>Consultants (e.g., engineers, planners contracted by municipalities)</p> <p>Professional organizations (e.g., American Planning Association state chapters, American Public Works Association state chapters)</p> <p>*municipal = village, township, city, county</p> <p>Regional Planning</p> <p>Community planning</p> <p>Stormwater managers</p> <p>Engineers</p> <p>Elected officials</p> <p>Public</p>	<p>By 2013, 50% of communities understand how to assess their vulnerability to climate change.</p> <p>By 2013, 50% of communities will be aware of climate adaptation plan training (100% will have access).</p> <p>By 2013, 50% of community planners/policy makers are aware of BMPs to address vulnerabilities.</p> <p>The outputs developed by the program will ensure that community and infrastructure planners and decision makers...</p> <ul style="list-style-type: none"> <li>Understand climate change implications for their sector (See Climate literacy LM)</li> <li>Understand the range of future climate conditions that should be planned for in their sector (See Climate literacy LM).</li> <li>Know where to access climate change science</li> <li>Understand why communities should prepare for changes now instead of react to them later (pay now vs pay later)</li> <li>Understand the concept of a climate ready community or sector</li> <li>Know where to access information, tools, and trainings for conducting vulnerability assessments</li> <li>Are aware of the steps in conducting a vulnerability assessment as part of a climate preparedness plan.</li> <li>Understand how to define and assess their sector's vulnerability to altered climate scenarios (see Vulnerability LM)</li> <li>Understand links between land use, stormwater runoff, water quality and climate and know watershed management principles</li> <li>Are aware of land use planning BMPs including stormwater ordinances, zoning overlays and development regulations to protect natural resources</li> <li>Are aware of stormwater BMPs including green infrastructure, LID, grey infrastructure retrofits (see Stormwater LM)</li> <li>Are aware of water conservation and wastewater mgmt BMPs including full cost pricing, demand side strategies, 'fit for purpose' strategies ,</li> <li>Have access to case studies of communities of different sizes and contexts already assessing vulnerability or already implementing BMPs</li> <li>Know where to find resources necessary for public outreach regarding the need for infrastructure investment based on best science of climate model probabilities and risk factors</li> </ul> <p><b>CONTINUED ON NEXT PAGE</b></p>	<p>By 2015, 35% of communities will conduct vulnerability assessments.</p> <p>By 2015, 40% of communities receive adaptation plan training allowing them to access and use data and tools for climate adaptation training and response.</p> <p>By 2015, 30% of communities will develop plans, ordinances to address their vulnerabilities, by incorporating climate data climate change scenarios into plans.</p> <p>The outputs developed by the program will ensure that community and infrastructure planners and decision makers can...</p> <ul style="list-style-type: none"> <li>Assess climate related vulnerabilities</li> <li>Consider climate-related impacts and conditions into their decision-making process.</li> <li>Adopt land use planning BMPs to protect natural resources key for climate change preparedness (e.g., groundwater recharge area overlay zones, wetlands protection ordinances)</li> <li>Adopt land use planning, stormwater management and water conservation BMPs</li> <li>Incorporate predictive GIS models of future climate scenarios to effect change in municipal codes and on-the ground development patterns.</li> <li>Undertake public information campaigns and water conservation events/workshops</li> </ul> <p><b>Evaluation Metrics</b></p> <ul style="list-style-type: none"> <li>Number of communities that have conducted vulnerability assessments (formally or informally)</li> <li>Number of communities that receive adaptation plan training (through workshops, online modules, one-one interaction)</li> <li>Number of communities that have adopted/implemented BMPs</li> </ul> <p>Community = municipality, municipal department, utility, organization, etc.</p> <p>By 2015, 40% of stormwater system designers account for climate change impacts when designing practices and technologies</p> <p>By 2015, 80% of Great Lakes states' stormwater design manuals incorporate best and most recent information on rainfall frequency (tech pub #40 IL) and regional projections</p> <p>By 2015, 40% of Great Lakes stormwater management plans maximize resilience to projected changes in precipitation patterns and storm intensity using approaches such as &lt;10 or green infrastructure.</p>	<p>By 2020, 20% of Great Lakes communities will:</p> <ul style="list-style-type: none"> <li>have climate adaptation plans</li> <li>be climate-ready certified (or drought-ready or stormwater ready) (See stormwater LM)</li> </ul> <p>To reduce their hazard risk, loss of life and property and recovery time associated with climate change scenarios.</p> <p>Stakeholders are climate literate and able to undertake policy and planning processes addressing adaptation to climate change.</p> <p>Stakeholders will engage in land use planning addressing climate change vulnerability and water resource protection. There is a reduction of nonpoint source pollution such as sediment, pathogens, nutrients, toxic contaminants in Great Lakes Basin watersheds</p> <p>Stakeholders will incorporate system vulnerability assessments into mid and long range water resource planning.</p> <p>Water and wastewater utilities are climate ready and sustainable, using cost effective operational, water demand management and supply strategies. Water suppliers are engaged with their communities about water conservation; communities use water more efficiently; water resource stewardship in the face of climate change.</p> <ul style="list-style-type: none"> <li>Climate proof land use plans and regulations</li> <li>Develop a climate ready utilities</li> <li>Participate in climate ready certifications</li> <li>Incorporate climate change into existing plans</li> <li>Integrate climate uncertainties into water planning (demand, supply conditions) to address long term water availability</li> </ul> <p><b>Evaluation Metrics</b></p> <ul style="list-style-type: none"> <li>Number of communities with adaptation plans</li> <li>Number of communities that are certified ready</li> </ul> <p>By 2020, 40% of Great Lakes coastal communities and stormwater management professionals possess plans and technical capacity to adapt to the impacts of climate change on stormwater.</p>

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Assessment of stakeholder needs is ongoing and iterative

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	<p>2. MN Sea Grant et al- local LID database and virtual tour via google Earth/ maps Dave Hart developing “Hydrologic Dashboard” GLRI project will fund runoff scenarios under climate change conditions for 3 Great Lakes watersheds CanVIS Tool – CSC CRVAT – community risk/vulnerability assessment tool – CSC Elevation mapping work in Ontario &amp; Superior – CSC/TNC</p> <p>3. Wisconsin SG currently funding Potter et al (2010-12) to address CD and stormwater management needs</p> <p>3&amp;4. IWRSS – Integrated water resource science/services – GLRI proposal – NOAA, USACE, USGS</p> <p>3&amp;4 IJC upper lakes modeling work – US/CA/GLERL</p> <p>4. WI, through WICCI is developing down-scaled climate projections including seasonality, depth of frost, humidity, ET, etc. SARP RISA</p> <p>5. MN Sea Grant – via OR SARP project “Grand Marais, MN Community Readiness Report” Sea Grant Engagement Minigrant and GLRI NERRS regional needs assessment of climate change adaptation needs among planners and stormwater managers SARP – OH – Toledo stormwater managers case study NOAA GLRI Adaptation work - \$250k SG/NOAA minigrant GLERL research needs assessment MISG - Analysis of impact of CC on Spring Lake watershed – stormwater management</p> <p>6. Potter, through WI SG funding, starting to work directly with engineers, communities on re-sizing infrastructure NOAA GLRI Adaptation Work - \$250k RISA – OH – be more proactive on networking with researchers</p> <p>7&amp;5. IL Green Infrastructure study – survey of stormwater management practices/ords in NE IL &amp; constraints to adopting new regs.</p> <p>7. Spring Lake, MI coastal community management of stormwater and climate change implications – assess results of recent SG integrated assessment?? apply climate change scenarios to evaluate effectiveness NOAA GLRI Adaptation work – 250k</p> <p>7&amp;8&amp;9 coastal community al grant for WI. Work with 1 selected community to assess/develop climate change (stormwater) preparedness plan</p> <p>8. MN Sea Grant LID/climate change workshop in Duluth to address barriers to adoption IL Green infrastructure study analyses of TSS, TN, Flow &amp; volume reduction efficiencies of BMPs (compared to detention) OH coastal training program &amp; OHSG delivers training focused on BMP performance with ?? of NH stormwater centers NOAA webinar – education minigrant CSC roadmap training SG/NOAA minigrant training modules</p> <p>9. NERR/SG extension MN and others – NEMO network activities Assist with policy development – NERRS science – collaborative/OH CTP – OH Sea Grant proposal pending to do BMP modeling, monitoring, incentive/ordinance development</p>				<ul style="list-style-type: none"> <li>Recognize investments that increase operational resiliency in a climate change impact context</li> </ul> <p><b>Evaluation Metrics</b></p> <ul style="list-style-type: none"> <li>Number of attendees to trainings, workshops</li> <li>Number of web hits to online resources</li> <li>Number of downloads of online resources</li> <li>Number of individuals with one-on-one interaction with educators</li> <li>Number of communities represented by the individuals reached in the above bullets</li> </ul> <p>Increase understanding of regionally downscaled climate projections and are aware of the implications for stormwater runoff quality and quantity also changes in seasonality</p> <p>Increase awareness of individual impacts on stormwater runoff and BMPs for individuals</p> <p>Build skills for site design and planning that reduces runoff for new developments e.g., green infrastructure, low impact development</p> <p>Increase ability to identify and design SW systems to extend capacity of existing infrastructure</p> <p>Increase understanding of ecosystem services and why they are valued</p>		

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