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Michigan Needs a Watershed-based Approach to Address Water Pollution and Urban Flooding

In a Nutshell

- Michigan’s economic and social wellbeing is largely dependent on the state’s natural resources – most critically, its water.
- Water resource management notably improved following the passage of the federal Clean Water Act in 1972. However, recent data and observation suggest that progress has plateaued and we are in danger of backsliding. Current policies are not sufficient to address current problems such as water pollution and flood prevention.
- To assure a healthy and safe environment for future generations of Michiganders, the state should act now to begin a transition to coherent, goal-oriented water resources management based on watershed boundaries.

Michigan is in danger of failing the next generation of Michiganders.

The health and wellbeing of Michigan residents, as well as the state’s economic prospects, require sustainable management of our natural resources. After decades of pollution control and subsequent improvement of the quality of Michigan’s water resources, progress has stalled and we are in danger of backsliding. In recent years, we have seen frequent costly flooding events, and uncovered widespread pollution in our lakes, rivers, streams, and groundwater. The causes of these emergent problems are complex. Solutions will require fundamental reform to state policy regarding how water resources are managed. Such reform is likely to be difficult. Yet, if we maintain the status quo, we will burden future policymakers and citizens with more severe, harder to solve problems.

The Status Quo

Michigan’s water has been a critical economic and cultural resource since before recorded history. Our state name, “Michigan,” was given to the land by the native peoples, meaning “great water.”

Michigan’s water resources facilitated rapid economic and population growth beginning around 1830. Larger rivers and the Great Lakes supported extractive industries such as mining and timber. Smaller rivers and streams were dammed for hydropower to support timber mills. The impact on Michigan’s natural environment was devastating. By 1910, nearly all of Michigan’s forests had been clear-cut. Rivers and streams filled with sediment and logging waste contributed to the collapse of local fisheries and overall biodiversity.

In the early and mid-twentieth century, the degradation of Michigan’s water resources intensified as cities grew and large-scale manufacturing proliferated. Rivers and streams became increasingly used for the disposal of municipal and industrial waste. Many smaller streams were channeled into conduits and buried underground – literally turned into sewers. Urban rivers essentially became large open sewers. In 1969, the Rouge River in Detroit actually caught on fire.

This dire situation began to turn-around with the passage of the Clean Water Act (CWA) in 1972. Until the CWA, there were almost no restrictions on, or regulation of, water pollution in the United States. Michigan's waters were granted additional protection by the Great Lakes Water Quality Agreement (GLWQA) of 1978, a binational treaty between the United States and Canada to restore, protect, and enhance the water quality of the Great Lakes.

After decades of improvement to water resources management, there are now signs of backsliding.

These federal initiatives supported rapid and dramatic reduction of water pollution. In many ways, Michigan's waters are in overall better condition than they have been in over a century. Wildlife has returned to many rivers and streams. Many new beaches have opened as the shoreline has become safe and attractive for swimming. It's now relatively rare to see (or smell) obvious widespread pollution in Michigan's waters.

However, it is not clear if conditions are getting better, and there are many hints that things are getting worse. We do not have data that would allow us to track water quality on a statewide basis. Part of the reason that we cannot discern recent trends in water quality is because the science of water quality assessment continues to evolve. However, a bigger issue is that Michigan's water quality regulatory authority, the Department of Environment, Great Lakes, and Energy (EGLE), has not established a framework that would support consistent reliable monitoring of water quality, nor does it have the resources to implement one.

EGLE assesses each of Michigan's watersheds only once every five years and relies heavily on non-profit organizations and volunteers to identify issues. While EGLE has made continual improvements in data collection and management practices, it is unable to discern trends or provide comprehensive snapshot assessments of statewide water quality with confidence.

We do know that we still have a lot of problems.

Persistent Surface Water Pollution

EGLE's latest CWA Water Quality Report lists nearly 1,500 known impairments of surface waters where levels of pollution do not support a designated use such as fish consumption or recreational contact.

Some problems appear to be getting worse – most notably pollution from concentrated animal feed operations (CAFOs). CAFOs often dispose of animal wastes (largely manure) through land application on farm fields. Animal waste is rich in phosphorus – a “macronutrient” and beneficial crop fertilizer in limited quantities. But when more nutrients are applied to cropland than can be taken up by the crops, excess can runoff and enter surface waters. Phosphorus in surface water results in harmful algal blooms (HABs) – excessive growth of cyanobacteria that impair water quality in multiple ways, including oxygen depletion and the production of harmful toxins.

Such emergent sources of pollution have recently degraded water quality in many inland lakes and Great Lakes shorelines. Among other issues, this has contributed to more frequent beach closures. 2024 was a record year for beach closures in Michigan.

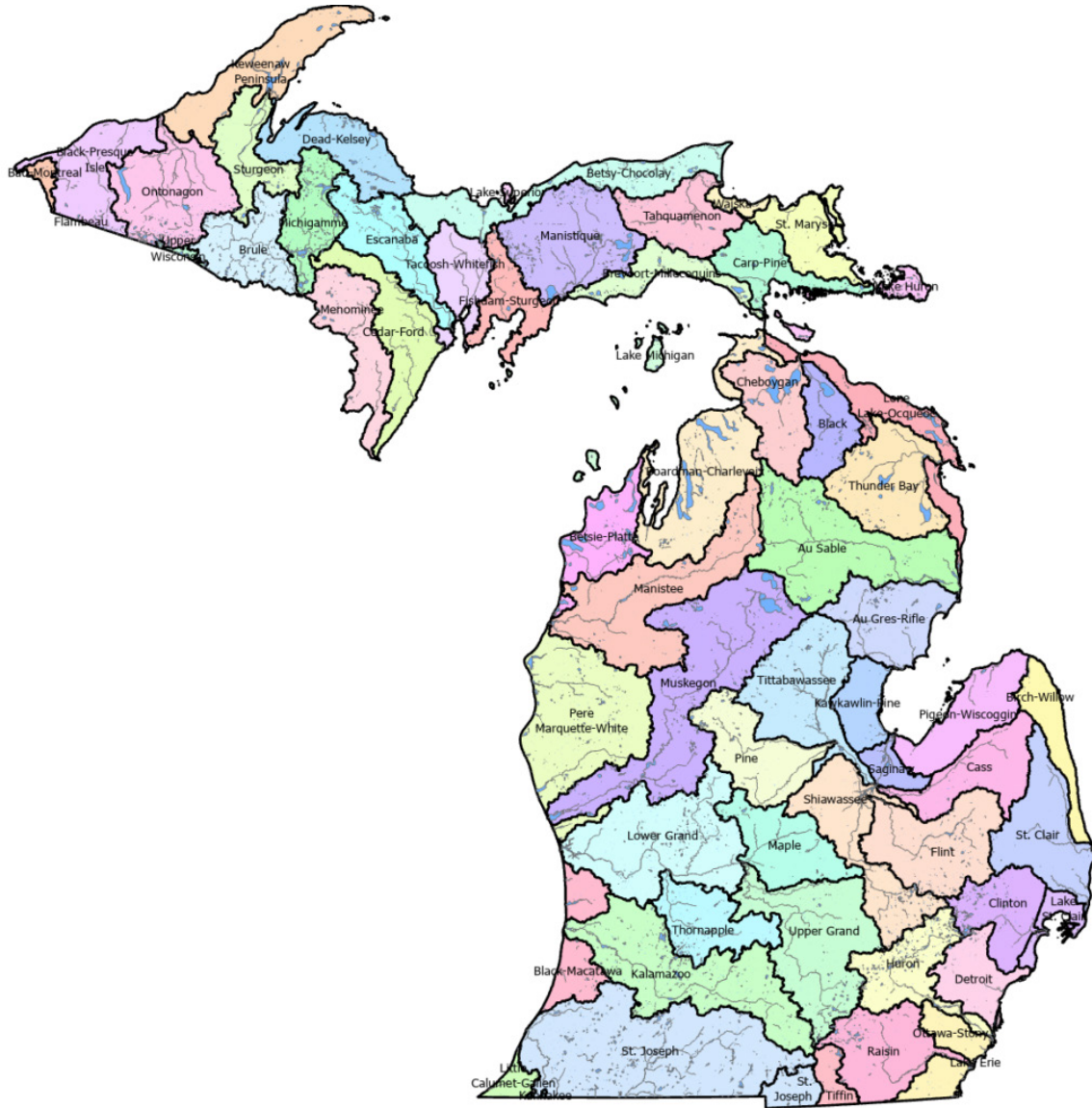
Surface water pollution is increasing due to concentrated animal feed operations, which create tons of animal waste that are often applied to farm fields, producing polluted runoff.

Increasing Flooding

Not only is Michigan struggling with water quality problems, but many Michigan communities are increasingly subject to water quantity problems (i.e., flooding). Urban flooding and water pollution are deeply related. Floods wash debris and pollutants directly into surface waters. Flooding and water pollution also result from the same problem – decades of policy and engineering decisions that did not consider the function of watersheds.

A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. The entire state of Michigan is in the Great Lakes watershed, which can be subdivided into smaller watersheds. The map below shows Michigan's primary watersheds.

Map: Primary Watersheds in Michigan



Source: Michigan GIS Open Data Portal, Watershed Boundary – 8 Digit

All water within a watershed is hydrologically connected. Activities at every point in a watershed impact all points downstream and are impacted by activities at all points upstream.

Human intervention in watersheds can make water connections very complex.

For example, municipal water systems may draw water from one watershed for use in another, while sewer systems may drain wastewater and stormwater to yet another. Development and associated construction in one part of a watershed may impose impervious surfaces that fast-track water downstream, leading to flooding in areas where the precipitation did not fall. Undersized or unmaintained sewers in one municipality may

contribute to sewage backups and basement flooding in another municipality.

Many of the flooding and related pollution problems we now experience are the result of incremental development and localized solutions to stormwater, imposed over decades without consideration of watershed function.

Depleted and Polluted Groundwater Aquifers

Rural areas also suffer from lack of watershed management. Many farms have irrigated crops using ancient underground aquifers for decades, without anyone considering how quickly these aquifers may be recharged. As a result, some wells have run dry. The traditional solution for a dry well is to drill deeper. But some Michigan aquifers are so depleted that drilling a deeper well only draws up saltwater left over from the time that Michigan was covered with a salty inland sea.

Michigan may be in the midst of a groundwater and drinking water crisis.

Other areas of the state are drawing up well water contaminated with PFAS or other pollutants, and the extent of the problem is almost entirely unknown. In response to Michigan's latest Clean Water Act reporting, the EPA commented that:

"[EGLE] states that, 'Most of Michigan has an abundant supply of high-quality groundwater.' ... EPA would encourage EGLE to support that with assessments of groundwater as per original [CWA] 305b guidance, especially in areas where groundwater is used as a source of drinking water and where groundwater has a clear connection/influence on surface waters. ... EPA recommends a dedicated Chapter on Drinking Water Sources since they have their own geography and methodology separate from other water resource types."

The EPA made the exact same comment on the previous report (2022). EGLE's response to the comment in 2024 stated, in relevant part:

"At this point there is no plan for a dedicated summary chapter related to Drinking Water Sources. ... EGLE currently has no plans to assess groundwater quality."

In other words, Michigan may be in the midst of a groundwater and drinking water crisis, and the state has no plans to try to understand the extent of the problem.

Need for Reform

We owe much to federal and state policymakers in the 1970s and 1980s for the subsequent improvements that we've seen to Michigan's rivers, lakes, and streams. The most egregious sources of water pollution have been negated – largely due to the Clean Water Act and Great Lakes Water Quality Agreement. Yet there are now signs that improvement has plateaued and we are in danger of backsliding.

There are multiple reasons for this, including reduced funding and regulatory authority at the federal level. However, the framework through which Michigan manages water quality and flood control is also a barrier.

All water within a watershed is connected. Activities at every point in a watershed impact all points downstream and are impacted by activities at all points upstream.

Management and oversight of water resources in Michigan is an intractably complicated network of state and local agencies, regional planning agencies, non-profit watershed commissions, and others. Agencies tasked with implementing environmental protection law often do not have the funding, resources, or clear authority to do so.

There are thousands of individuals dedicated to protecting and improving water resources, but these efforts are limited by frameworks imposed by state law, or lack thereof. It is difficult to envision a future in which Michigan sustainably manages water resources without fundamental reform. Such reform must consider the relationships between water issues within a watershed. Without watershed-based management, solutions may be uncoordinated, inefficient, or even counterproductive.

Better Understanding is Needed to Enable Meaningful Reform

If Michigan wants to effectively improve water quality and flood control across the state, it needs to adopt a framework that allows for integrated watershed management. This will not be easy. Michigan's current approach to water resource management is so unlike an integrated approach that it is difficult to envision any meaningful improvement without fundamental reform. To avoid creating more problems through uninformed solutions, we first need to study the problem.

Therefore, we recommend that the legislature create a watershed management workgroup within state government. The workgroup would be tasked with advising on legislative changes needed to transition to a rational watershed-based approach to water resource management. The workgroup should be sufficiently funded and staffed to administer a series of three studies to be reported to the public and legislature.

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First Report: An Overview of Current Water Resources Policy

The first task of the watershed management workgroup should be to provide a comprehensive understanding of the current state of water resources management in Michigan.

A primary component of the first report would be the identification and summary of laws that currently impact watershed management, including (but not limited to):

- The Natural Resources and Environmental Protection Act, Public Act (PA) 451 of 1994
- The Drain Code, PA 40 of 1956
- The Administrative Procedures Act, PA 306 of 1969
- The Zoning Enabling Act, PA 110 of 2006
- Applicable federal law, regulations, and treaties
- Local government codes and policies
- Applicable court rulings that impact implementation of such laws

The first report should also include a summary of entities and stakeholders relevant to watershed management, including (but not limited to):

- The Michigan Department of Environment, Great Lakes, and Energy
- The Michigan Department of Agriculture and Rural Development
- The Michigan Department of Health and Human Services
- County Drainage Commissions
- Regional Planning Associations

- Nonprofit Watershed Councils
- Other local authorities including county health agencies and municipal public works departments

The report should include an assessment of how well situated and funded these various entities are to perform their respective roles in watershed management. Redundant responsibilities, as well as gaps where there is no clear responsible entity, should be identified.

Finally, the first report should provide an overview of what is known (and unknown) about the condition of Michigan's watersheds based on available data. This should include:

- Known locations of impaired surface water as defined by the Clean Water Act
- Areas of Concern as defined by the Great Lakes Water Quality Agreement
- Locations of frequent beach closures due to health concerns
- Known locations of contaminated groundwater
- Quality of drinking water
- Active remediation efforts
- Flood-prone regions, including urban areas subject to recurrent flooding
- Sustainability of aquifer withdrawal rates
- Forecasted impact of climate change
- Critical data gaps that prevent confident assessment of watershed health

This first report would be a best effort to understand the current management practices and condition of Michigan's watersheds. This should be delivered to the legislature and made available for public review. It would be valuable in itself, as this information currently exists in dozens of different silos (to the extent it exists at all). Moreover, it is a prerequisite to the next step, which would be to propose a framework for coherent goal-oriented management of Michigan's watersheds.

Second Report: Proposed Framework for Integrated Watershed Management

The second report should propose a reformed system of comprehensive water resource management in Michigan based on watershed boundaries. Such reform will be politically contentious, and thus must be sensitive to existing frameworks and interest groups. There is no one 'right way' to do this, and thus the study could include multiple alternatives. Each alternative should be earnestly and equally evaluated with regard to:

- Anticipated efficacy (i.e., potential to achieve goals)
- Perceived regulatory efficiency (e.g., federal compliance)
- Inclusion of local knowledge and democratic engagement
- Ability to generate appropriate sustainable funding
- Impacts on existing agencies, stakeholders, and interest groups

Development of viable alternative governance structures is likely to be complicated. Yet there are resources to draw from. For example:

- A New Approach to Managing Water in the State of Michigan: Assessing the Feasibility of Integrated Watershed Commissions, from Grand Valley State University Annis Water Resources Institute, 2017.
- A New Approach to Fund Watershed Management: An Evaluation of Funding Mechanisms, from Public Sector Consultants, 2016.
- Case studies of watershed-based approaches in other states, including California, Florida, Minnesota, Nebraska, and Washington.

The second report would again be delivered to the legislature and made available to the public. Comprehensive reform will require the support of a broad coalition of stakeholders. The alternatives proposed in the second report can guide the conversation such that one of the alternatives (or perhaps a hybrid approach) can be identified as the most politically viable.

Third Report: Implementation of Integrated Watershed Management

Once the watershed management workgroup has identified a preferred alternative, they can commence work on the third and final report, which will provide a clear legislative strategy to implement coherent watershed management in Michigan.

The third report should first outline the vision of the proposed reforms. This will include an overview of the proposed regulatory framework, roles of respective agencies and stakeholders, and explanations for how such a framework will enable solutions not available in the current system.

More importantly, the report should provide a specific and detailed legislative approach to amending the appropriate sections of Michigan law. Current law is too complex to simply provide general objectives. The legislature should be guided and provided with specific proposals.

A change of this magnitude must allow for a managed transition between current law and a watershed-based approach. Organizations and individuals will need time to prepare for new roles. Incremental steps and pilot programs may be useful to avoid unintended consequences of reform.

Summary

As 'The Great Lakes State,' the health of Michigan's waters directly impacts Michigan's economy and the wellbeing of its residents. Yet the current governance of Michigan's water resources is overly complicated, fragmented, and inefficient. This framework has hindered efforts to protect the environment and invited new problems such as nutrient pollution, contaminated groundwater, and recurring urban flooding.

If we want to ensure that we leave a healthier more productive state for future generations, we must transition to watershed approach to water resource management.

This will not be simple or easy reform.

It is not likely that water resource management can be meaningfully improved with minor legislative changes. The current approach involves an intractably complex web of laws, regulations, organizations, and individuals. Fixing this mess requires first understanding it as best we can. Any proposed reforms must consider not only the needs of the watersheds and residents, but the objectives of dozens of government agencies, non-profit organizations, and interest groups.

We recommend moving forward earnestly, but deliberately, beginning with the creation of a dedicated watershed management workgroup within state government. The workgroup should be appropriately resourced to advise the legislature on water resource management policy, specifically with the delivery of a series of three reports.

The first report will summarize the current state of water management in Michigan, including relevant laws, organizations, and data. This will identify and highlight problems that need to be addressed.

The second report will propose a series of alternative frameworks that would enable Michigan to address our problems. The inclusion of multiple alternatives is important because successful adoption of any alternative will require broad support.

The third report will outline a final, preferred alternative based on the learnings and feedback from the first two reports. Most importantly, the third report will provide a specific and detailed legislative approach for a managed transition from the current system to a watershed-based management.

This will not be a simple or easy reform. Even with focused attention and broad support, it may be a decade before reforms can be adopted and begin making measurable real-world impact. Such is the nature of meaningful change. By many measures, Michigan's watersheds are in better health than they have been in over a century. This is largely a result of policies adopted over 40 years ago. But progress now appears stalled. We have reached the limits of what current policy can accomplish.

If we want to leave a healthier, more prosperous state for future generations, we need to begin tackling these hard problems now.

ABOUT THE AUTHOR

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Eric joined the Citizens Research Council in 2022 as an expert in civil infrastructure policy. Previous to his position with the Research Council, Eric spent nearly ten years as a transportation systems analyst, focusing on the policy implications of emerging technologies such as autonomous vehicles, connected vehicles, and intelligent transportation systems. Eric has been a Michigan-licensed professional engineer (PE) since 2012. As a practicing engineer, Eric has design and project experience across multiple domains, including highways, airfields, telecommunications, and watershed management. Eric received his Bachelor's degree in civil engineering from Michigan State University in 2006. Eric also holds Masters degrees in environmental engineering and urban/regional planning, both from the University of Michigan.

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