Coastal Zoning Solutions

DRAFT for Steering Committee Review, April 7, 2025

How to use this Compendium

This resource is designed to help land use decision-makers in the more than 300 local jurisdictions that touch a Great Lakes shoreline wisely manage their portion of our statewide treasure.

For those new to this role, or for those just embarking on a coastal management endeavor, begin with the Coastal Conundrum section to get a broad understanding of the fundamental challenge of coastal management.

For those who have a grasp of the central tensions, Sections II and III provide a tour of the two basic, complementary approaches that land use managers can use to support the health of both the water and the community: giving the water space to move, and providing a natural border between the water and the built environment.

This is where many communities get stuck. Even with clear organization and a basic understanding, the next question is the hard one: but which of these tools is right *for us*? No community will (or should!) implement all of them, so how do we know which ones to spend our precious capacity developing? Now is the time to move on to the Coastal Solutions Guide in Section IV. This Guide recommends a set of specific zoning changes for your community to consider based on the answer to a series of questions about your shoreline's physical characteristics, your regulatory capacity and conditions, the existing and likely future development on your shoreline, and your community values. Section V offers a detailed compendium of zoning and regulatory tools that support each approach, including potential obstacles to implementation, and successful examples.

Once a package of zoning changes has been developed for your individual community to consider in its quest to support wise coastal management, the Getting It Done section offers advice and direction for moving from idea to implementation. This process begins with introducing it to the public and stakeholders, includes formal adoption processes, and continues into the future with periodic review, regular communication, and a readiness to adjust as conditions change...which they certainly will.

I. The Coastal Conundrum

Framing the Problem

Just about everyone loves a shoreline. Walking the beach, listening to the surf, wading and splashing—people are so strongly attracted to the water's edge that we can't stay away and can't get enough.[1] We, as communities, have placed every kind of development as close to it as we can get: commercial downtowns to take advantage of tourism and recreation; industrial facilities to use its transportation and energy resources; and most of all, residential development to just experience it. Nearly every lake, river, and coast in Michigan, including our 3288 miles of majestic Great Lakes freshwater shoreline, finds itself lined with buildings and the infrastructure to support them.

One way to name the problem is to call it "flooding and erosion"

But every reward comes with risk. Water is dynamic, both its movement and in its inherent chemical nature. Plenty of disaster lies at the intersection of water and development: rot, corrosion, erosion, instability. Achieving both closeness and safety has always been a conundrum.

Flooding happens when the surface of the waterbody expands into an area where development exists. It's useful to remember that the development is a critical part of the definition: where the surface expands but doesn't adversely affect a human investment, it's just called a natural hydrologic process. The Great Lakes water levels rise and fall of their own accord, with a span of variation that is increasing as climate change progresses. These changes, and the science behind them, are described in detail in Chapter 2 and 3 of MCMP's Resilient Coastal Communities Planning Guide. In times of low levels, there is a tempting mirage of opportunity to extend our own habitat out to meet it, only to be met with the lake's punctual return and reclamation. This is unpredictable only on a short timeframe. When we expand our time horizon to consider all we know about the lakes, we can see that this is a mistake we need not keep repeating.

Erosion refers to the force of the water wearing away the surface of the earth. This wearing away destabilizes any structure that the earth was supporting, and eventually the force of the water washes that away too. Unlike flooding, we call erosion by the same name regardless of whether the process affects our development, but we generally only address it when that's the case. "Managing" erosion often starts by trying to manage the water's action, since that is the driving force.

[1] Blue space: The importance of water for preference, affect, and restorativeness ratings of natural and built scenes. Journal of Environmental Psychology, Volume 30, Issue 4, December 2010, Pages 482-493. https://www.sciencedirect.com/science/article/abs/pii/S0272494410000496?via%3Dihub

But our efforts to get closer to the water's edge are not just subject to erosion—they can also create and facilitate it. When we remove coastal plants that are blocking our view of the water or forming obstacles to reaching it, we also remove allies that hold the ground in place with their roots and absorb the kinetic energy of the water. A shoreline is not a static line on a map; it is a complex ecosystem that developed its own checks and balances long before humans arrived on the scene. Here, too, we may be suffering from a bit of myopia by focusing so intently on ourselves. When we expand our considerations to include the coastal habitat more generally, we can see opportunities to align ourselves with existing processes.

- MCMP Building Coastal Resilience Video series (box)

Another way to name the problem is to call it "existing development"

For at least the whole history of the United States, communities large and small have valiantly built their way out of this conundrum. We've prioritized proximity to water, willing to trade uncertainty and perpetual investment to preserve and enjoy our access to it. Levees, seawalls, dams, breakwaters, jetties, groins, riprap, sandbags—we accept that all of this "armoring" just comes with the territory.

It's taken some time to see just how expensive it all is. There's the cost of installation, which can be eye-popping all by itself. Eventually, the cost of maintenance emerges as the cumulative effort needed to supply an opposing force that can keep pace with tireless and capricious hydrodynamics adds up. Then there is the inevitable cost of the failures and losses, because we certainly don't win all the battles we pick with nature. More recently, a new cost is coming into focus: the system-wide harms and casualties of these battles. Seawalls distribute the water's force onto neighboring properties. Groins disrupt regenerative sand transport. Water quality suffers without protective wetlands. Ever-longer stretches of coastline are taken out of the public trust. The evidence suggests that our tradeoff needs rebalancing.

Rather than being perpetually at arms with our state's most awesome natural feature, it is time to consider an approach that carefully considers and deeply respects the reality of how that feature behaves. Prioritizing safety and health—of both the human-made development and the aquatic system—means some measure of deprioritizing our proximity to the water's edge.

The concept of a tradeoff is key to any change in approach. All existing development that is at risk of flooding and erosion represents an investment, and each type of development has its own delicate, intricate challenges when considering how best to protect it. There is the sheer number of residences, each in its own unique circumstance. There is the public economic impact of commercial development and infrastructure. And there are the environmental and pollution concerns with industrial development. In all of these instances, both change and the status quo pose possible perils.

The shift from coastal management to coastal resilience

Historically, communities have taken a reactive approach to flooding, erosion, and other issues, only mounting action once these issues are urgent and then forgetting about them again once levels drop. There has been a perception that coastal issues are manageable.

As coastal challenges increase in frequency, severity, and cost, this approach is increasingly inadequate. The rising costs of emergency repairs, disaster recovery, and infrastructure upgrades have formed a growing financial incentive for a more proactive approach. There is measurable value in planning for resilience in advance, investing in nature-based preventative measures, and using land use planning to reduce the need for emergency response.

Leading this shift rests at the feet of local decision-makers

Taking a general approach of moving development away from the water's edge is difficult for practical reasons, and it's also difficult to want to do: that shoreline is magnetic and alluring, and the status quo is almost always the easiest path. After all, in many cases the buildings are already there. And where they are proposed, the economic potential seems much more immediate and concrete than the risk.

For the most part, because land use decisions are made at the local level in Michigan, this responsibility is in the hands of the more than 300 individual local units of government that line the Great Lakes coast. It's a hard ask for 300 separate entities to manage a single feature harmoniously. Yet, that is what the task requires: while land can be divided up with borders, water resists this imposed order. It moves under its own power, and it crosses our borders with impunity. Water quality somewhere is water quality everywhere.

Moreover, the line of responsibility between local leaders and safeguards of both public and private investment is often quite clear. We issue the permits that allow residents and businesses to build at the shoreline. We invest public dollars in roads and marinas. We bear the costs of cleanup when disaster strikes. We are the only ones charged with the hard job of balancing immediate apparent gain with long-term considered risk.

Framing the Solution

The way to support both water quality and resilience to hazards is to give the lakes what they need: space to move, and a natural shoreline. By pulling our investments out of harm's way and allowing the shoreline to produce, use, and benefit from its own resources, our communities benefit, too. We won't need to be in continuous conflict with a jousting partner that never flags or makes a mistake. And by understanding "the lake" as not just the surface of the water and the earth beneath it but the

inseparable, dynamic interface between the two, there is even more of it to love than there was before. Planning and zoning are two powerful tools that can do that.

Space to move

This Compendium describes the regulatory approaches that can move and keep private development investments out of the range of harm from the Great Lakes' natural processes. We discuss how zoning districts and development standards can be supported by data and planning to navigate the balance between permitting wise use of the shoreline and falling prey to the temptation to get too close to the water. Approaches to public investments use the same data and planning processes to support tools like ownership, easements, and projects. We also consider the unique role of land division.

Naturalized shoreline

As the long-term difficulty posed by armored shoreline becomes clearer, we need to understand what should be done instead. The natural conditions that arise where the water meets the land answer that question. This section of the Compendium discusses how to support and recreate those conditions through policy, ownership, and projects, and how to prescribe them through the zoning and development tools. This approach is already mandated at the state level in specific and defined areas, and we discuss how local actions can support and emulate them.

Why isn't this already done?

This Compendium certainly isn't the first effort to advocate for planning and zoning to support wiser coastal development, yet in many ways it seems that the implementation of change is moving at a much slower pace than the understanding of the need for it. Existing research has documented a few key reasons for this mismatch. These are worth acknowledging so that we can overcome, untangle, work out, and press forward on known impasses.

The nature of local government

A few-year elected term is not enough time to fully learn about a complex issue, lead a community to consensus, develop a technical solution, and shepherd it through an official process. But this is the system we have. Local governments also face chronic limitations on capacity, funding, and specific expertise. And even just in the space of coastal management, issues ranging from disaster debris to invasive species compete for the same finite pool of attention. These are structural issues.

What can help? A thorough, well-documented planning process can help carry work from one term to another, so that new officials can get up to speed quickly. This will help them further the work of their predecessors rather than duplicate it. A good planning process is an investment, but like any good investment, it allows initial resources to stretch and multiply over time.

The nature of people

Political processes are meant to reflect the will of the people, and they often do a fairly good job. This is a double-edged sword. It's human nature to prefer short-term gain over long-term prudence; to stop worrying about a danger once the immediate threat recedes; and to look to allies for information rather than develop independent sources. This certainly makes the job of steady, responsible governance hard. It's also the human condition.

What can help? Consistent, measured, iterative community engagement builds trust between people and government. A dialogue that exchanges education and experience reveals the durable truths over time, and focuses attention on the opportunities to make progress on long-term problems. This should certainly be a part of a planning investment. And over the long term, leaders have to lead.

The nature of change

The engineering approach to water management has been in place a long time. There are deeply embedded systems that support it, and examples of it are everywhere–some of which reflect decisions made in public processes with public funds. When a resident or business is faced with making their own shoreline investment, they are most likely to reach out to a contractor in the private sector, and that person will become the source of their education and expertise on the issue. Because the limitations to the current method are showing up in the longer term and the broader scale, there are few immediate incentives to adopt a new approach. The status quo is quite durable.

What can help? Engineers, contractors, and realtors are a few of the private sector industries that could be better included in ongoing dialogues about coastal management. Ultimately, regulation is the most direct form of communication here: its purpose is to guide their work, and they respond quite nimbly to changes. The example set by the public sector is also highly valuable. It can blaze a trail forward by demonstrating the possible, and it can also thoroughly discredit a community's "talk" when it fails to deliver the "walk."

The nature of the solution

This compendium is focused on land use planning, policy, and regulation–powerful tools, but dry and technical subjects. There is often a wide gulf between the language of community desire and the legalese that implements it. "Consent of the governed" means that restrictions need buy-in, and there is a perpetual tension between regulation and flexibility. How is preference informed by data, and how do those work together when expressed in a local ordinance? This is the art and science of the work of governance.

What can help? Decisions that are grounded in data and made through transparent processes publicly connect the solutions to the problems they are intended to solve. So does measuring the effectiveness

of decisions after they are made, and periodically revisiting regulations to review the conditions they are meant to manage.

The importance of community plans

While the focus of this compendium is to provide a set of tools to address your own unique coastal conditions, it's important to remember that these tools should be grounded in your community's plans. This will provide an added level of credibility to any solutions you select, as well as help communicate the need for changes to others in the community and provide some legal protections.. And, in fact, state law requires that your zoning code be based on your comprehensive plan.

There are a number of ways your community can plan for coastal hazards. They will be called out throughout the compendium.

Comprehensive Plan

Almost every community has a comprehensive land use plan, often called the "master plan," which guides the municipality's efforts to accomplish its vision for the future. This plan is a community- wide effort which results in a description of how land within the jurisdiction should be used and developed, given that future vision. The plan typically contains policy and ordinance recommendations, a map showing desired future land use, and a zoning plan. The Michigan Planning Enabling Act requires that the plan be reviewed every five years to keep it current.

The Comprehensive Plan's community-wide focus and statutory importance makes it an important document for incorporating coastal resilience goals and recommendations. These can be included in the comprehensive plan as a separate chapter or integrated throughout.

Parks & Recreation Plan

Parks & Recreation plans are typically documents that municipalities develop to apply for Michigan Department of Natural Resources (MDNR) grants. These plans must follow the MDNR template, which looks much like the format of comprehensive plans. To be eligible for project funding, the plan must be updated every 5 years. Parks and Recreation plans offer a great opportunity to incorporate economic, social, and environmental resiliency, for example by incorporating nature-based tourism to support the local economy and acquiring land for shoreline protection and green infrastructure goals.

Hazard Mitigation Plan

Hazard Mitigation plans, also known as All Hazards Plans, typically include risk assessments and scenario development to anticipate future hazards. The risk assessments often rely on information about past disasters and known hazards to look to the future, but more and more they are

incorporating climate forecasts. These plans are helpful in identifying coastal hazards that the community should understand, prepare for, and make a plan to recover from.

An adopted Hazard Mitigation Plan is required for many types of Federal Emergency Management Agency (FEMA) grants. In most areas of Michigan, the Hazard Mitigation plan is created and updated at the county level, but localities may also produce their own.

Sustainability or Resilience Plan

Sustainability or resilience planning looks specifically toward the changes the community needs to make in order to manage its resources over the long term, and to mitigate and prepare for the effects of a changing climate. The Land Information Access Association developed a sustainability assessment tool that can be used to evaluate your comprehensive plan and zoning ordinance and identify potential areas of focus. Sustainability planning may include subjects not normally included in comprehensive planning, such as greenhouse gas reductions, and it may focus more heavily on the health of the community's natural resources and green infrastructure, such as its water management practices and tree canopy. Resilience planning efforts may pair future climate projections with existing conditions to develop a vulnerability assessment that identifies geographic areas of concern. Ideally this information, or at least the key takeaways, will be incorporated in the community's comprehensive plan.

Capital Improvements Plan

A Capital Improvements Plan, or CIP, identifies and prioritizes a community's anticipated public infrastructure needs over the next 6 years. While the tendency is to treat the CIP narrowly as an asset management program or a budget document, it's an important tool to implement priority infrastructure goals from your master plan. Examples of the ways in which a CIP can be used to support resiliency objectives include relocating at-risk roads, acquiring land for flood protection, and incorporating green infrastructure into the municipal stormwater system.

Downtown Development/Corridor/Tourism Plan

Many communities have plans for special districts that focus on economic development. These plans can be a subplan of the Comprehensive Plan focused on improving job opportunities and strengthening businesses in the community or region, often through public investments in community facilities and infrastructure.. Given coastal communities' unique draw for tourism, these plans can support marina and public beach development, as well as historic preservation of marine heritage sites, such as lighthouses.

[SIDEBAR] Plan Integration

Communities typically rely on a "network" of plans that between them outline a community's vision, set goals, and guide local development and policy decisions. However, research has shown that these plans tend not to be coordinated, leading to inefficiencies or conflicting policies. For example, a Hazard Mitigation Plan might recommend restricting development on shorelines, while an economic development plan might incentivize waterfront business expansion. In working toward your coastal resilience goals, an early step would be to explore all of your community's plans to make sure they are in agreement.

Reference: Planning for Resilience in Michigan Handbook

II. Giving the shoreline space to move

What it is and why it supports coastal resilience

The key thing to remember about the natural systems along Great Lakes shorelines is that they are dynamic, meaning they are constantly changing. Although specific shoreline conditions change between seasons and years, the results of these changes are fairly predictable: at some point, shoreline buildings and infrastructure will experience erosion, flooding, wind, and wave damage.

At the same time, the pressures to build along the privately owned lake edge, which accounts for about 80% of Michigan's coastal shoreline, are increasing. This brings the built systems into conflict with the natural systems. Because of the shoreline's dynamic nature, the tools for managing land use along the shoreline call for giving the shoreline space to move, rather than responding by armoring the shoreline to keep it in place, which is doomed to fail over the long term.

This section highlights some resources that communities can use to learn about the unique characteristics of their shoreline, including how much room the lake needs to give it space to move in the future.

Why isn't this already done?

The short answer is: existing and potential economic value.

Because we love the water, we already built things next to it. Those things are valuable because of the investment, and often even more valuable because they are next to the water. Even where we haven't built anything yet, we know from past experience that it would be valuable if we did. It's tricky for regulation to interfere with economic value.

Especially in the case of existing investment, this is a compelling argument for doing nothing. Legal restrictions risk legal challenges. Individuals and communities alike are susceptible to defeatism, the idea that it is too difficult to change what already exists, when they feel that solutions are overwhelming or impractical. Yet a failure to act risks escalating costs and damages down the road, making it even harder to address issues and emergencies. It is a difficult tradeoff to quantify, and the competing interests are fierce.

Developing and adopting fair, thoughtful land use policy and regulation is a slow and challenging process, but the very foundation of land use management is to evenhandedly impose such regulations as are necessary to safeguard public health, safety, and welfare. A conscious shift toward a forward-thinking and solution-oriented mindset can help reframe the concept of "value" to better reflect these fundamental public benefits.

How much space does the lake need?

The first question to consider when contemplating regulations that allow the shoreline space for its natural processes is: How much space does the lake need? This understanding will inform the type of regulation implemented as well as the specific distance from the water's edge that will provide an appropriate amount of protection for the built environment.

The ***Michigan Resilient Coastal Communities Planning Guide***, created by the Michigan Coastal Management Program, provides a comprehensive description of the natural coastal processes that communities experience. For coastal communities to effectively plan for coastal hazards, it's important to start by assessing the conditions that are unique to their coastline. The Guide identifies a number of online tools and data sources that communities can access for this information free of charge, some of which are highlighted here. For more detailed information, visit the Guide.

Great Lakes Water Levels

A recurring shoreline management problem is the temptation to build near the water's edge when levels are low, only to have the investment threatened when levels swing back up again. While there is no long-term predictive tool for Great Lakes water levels, exploring past variation can show a range of possibilities to consider in your planning. Here are two tools that can be helpful:

The Great Lakes Lake Level Viewer is an easy-to-use tool for visualizing potential coastal flooding through a range of water levels. The model is limited to showing calm conditions, so it doesn't account for storms that would increase water levels or wave impacts. However, the tool can serve as a discussion-starter and inform planning for sections of the coast that are prone to flooding.

For an overview of the historical and natural processes at play in Great Lakes water level variation, explore NOAA's Water Levels in the Great Lakes StoryMap.

Coastal Flooding

Flood maps show how likely it is for an area to flood. Any place with a 1% chance or higher chance of experiencing a flood each year is considered to have a high risk. These maps can be used as educational tools to educate property owners about their flood risks and help local officials make decisions about capital improvements and future land use planning. Official flood maps may be found at the FEMA Flood Map Service Center. An Introduction to FEMA Coastal Floodplain Mapping provides additional information unique to coastal flooding.

Coastal Erosion

Unlike water levels, which reach toward land and then recede, erosion is on a consistent landward march. Since the characteristics of the land play a determining factor in whether and how shoreline erosion occurs, knowing where it has occurred in the past can help predict where it may occur in the future.

One helpful resource is the Great Lakes Shorelines Through Time Coastal Change Viewer, created by Michigan Technological University. This web-based viewer allows users to view and compare aerial photography of shoreline and bluff line locations collected at intervals over the past 80 years. While this tool does not predict where the shoreline will be in the future, it is a powerful tool to illustrate to the community where the coastline could be.

Portions of the Michigan shoreline are identified as High Risk Erosion Areas (HREAs) and are regulated by the state of Michigan, which requires permits for construction in these areas. Local units of government may adopt a zoning ordinance in HREAs to administer permitting in their jurisdiction.

III. A Natural Border

What it is and why it supports coastal resilience

The characteristics of a shoreline are formed by the interaction between the water's force and motion, and the land's material (sand, pebbles, bedrock, vegetation) and arrangement (slope). These are constantly working together to reach an equilibrium that allows the material to best receive, absorb, and dissipate the energy of the water. Once again, change is the constant: the water's force and motion are dynamic, and the land's material and arrangement continually adapts to them, so this equilibrium is in an uninterrupted state of rebalance. A "natural border" between land and water refers to a shoreline where both the material and the arrangement remain relatively free of human alteration.

Natural shorelines support coastal resilience by allowing the process of rebalance between the water's force and the land's accommodation of it to proceed unhindered. In a sense, the land is an active partner here, offering up responses that range from reconfiguring its shape to sprouting up vegetation, depending on conditions. The Resilient Coastal Communities Planning Guide and the Building Coastal Resilience video series (especially part 2) describe how waves and currents move beach sediments over time. Wetlands dissipate great quantities of energy while also providing unique habitats and improving water quality.

Why isn't this already done?

The short answer is: a philosophical prioritization of engineered processes over natural ones.

In at least all of recent recorded history, humans have reshaped our environment as we've seen fit. This has largely been accomplished through an "engineering approach" that focuses on human inputs like research, design, feasibility, and implementation, and considers non-human inputs only to the extent that they constrain or assist the human efforts.

This approach is not intended to co-operate with natural processes but rather to overcome them as necessary. In the coastal context, we have surmounted innumerable types of physical obstacles to attain access to water, a critical resource for settlement. However, the magnitude, dynamic unpredictability, and continuous nature of the water's force on coastal development has cast doubt on the affordability of maintaining this approach.

"Nature-based solutions"[2] and "green infrastructure" are two terms that refer to alignment of human goals with processes that are occurring in the natural world independently of human investment. A body of research beginning in the late 1990s demonstrates the effectiveness of this approach[3], and its applications have been increasing over time. As the benefits of conserving and restoring natural systems and designing new systems to mimic their processes are increasingly measured and quantified, it becomes possible to encourage or require a preference for this approach over the engineering approach.

The pendulum is swinging ever so slightly away from exclusively recognizing and valuing human intervention. Mounting evidence of the successful outcomes resulting from protecting and restoring natural processes offers legal support for a regulatory framework that requires it.

What are the shoreline types along the Great Lakes coast?

The tools in this Compendium support the specific and varied geological characteristics of your community's shoreline, which shape your unique coastal processes, which in turn affect how to manage them. Here are the six typical Michigan shoreline types described in the Planning Guide: [insert map?]

Elevated: bluffs and banks

Elevated shorelines have a steeply-sloped drop between the water's edge and the adjacent land. The material consists of a range of sediment sizes left by deposits from the last glaciation, and the relatively low amount of sand means that the beach between the bottom ("toe") of the bluff and the water's edge is narrow. In these areas, the elevation change creates distance that protects buildings from flooding. However, the narrow beach means that wave energy is received primarily on the toe of the bluff. Erosion occurs from the bottom up, putting structures at the top of the bluff at risk.

Sandy beaches and dunes

Sandy beaches tend to have shallow slopes and are typically fed by sandbars close to shore. These shoreline types are especially responsive to water and wind energy, which means that they are especially unstable for building purposes. The shallow slope means that changes in the water level can affect dramatically large swaths of land, causing flooding concerns. Sand is light and mobile, making it an unsteady building surface and also susceptible to erosion. Because sandy soil drains well, any contamination on land is swiftly carried into the waterbody.

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[2] NOAA Ocean Service, "What are nature-based solutions?" https://oceanservice.noaa.gov/facts/nature-based.html Retrieved March 25, 2025

[3] NOAA Office for Coastal Management Digital Coast, "Green Infrastructure Effectiveness Database." https://coast.noaa.gov/gisearch/#/ Updated March 17, 2025; retrieved March 25, 2025

Coarse sediment beaches

Made up of gravel or cobble, these heavier materials mean that the beach remains relatively stable over time, and are less susceptible to erosion than sandy beaches. They are often steeply sloped, with relatively deep water near the shoreline. A steeper slope mitigates flooding by preventing rising water levels from traveling inland.

Bedrock

Bedrock coasts reflect wave energy, resisting erosion unless the rock type is soft. The elevation and slope are highly variable, depending on the shape of the rock. A shallow slope near the water's edge may still leave it susceptible to flooding.

Wetlands

Wetland coasts are covered in mud, silt, and vegetation. They absorb and dissipate wave energy as the root structure of the plants holds the coastal material in place. These areas are wide and flat, making them exceptionally prone to flooding. The vegetation, which is adapted to periodic inundation, helps mitigate this flooding risk both by forming a physical barrier, and by soaking up water and releasing it into the air through the evapotranspiration process. The soft surface makes these areas unsuitable to build on without extensive mitigation, but they can form an excellent natural protective buffer between water and development.

Artificial / armored

These shorelines have been "hardened" over time with structures intended to prevent flooding and erosion, indicating that development is in the direct path of one of these conditions. "Armoring" refers collectively to the installation of seawalls, revetments, bulkheads, riprap, and other structures that replace the natural shoreline. In the past, shoreline armoring was viewed as an effective strategy for safeguarding coastal properties and infrastructure, offering immediate, visible protection and providing a sense of security for concerned homeowners, businesses, and municipalities. Early technical guidance on coastal engineering, such as the US Army Corps of Engineers's Shore Protection Manual (SPM) published in 1973, detailed methods and designs for constructing various armoring structures.

Artificial shorelines carry a continuous burden of maintenance and replacement. They are guaranteed to periodically fail, and are likely to occasionally be inadequate. Armoring replaces the existing natural shoreline material with a hard surface that reflects wave energy back into the water. Hardening structures are generally installed on a property-by-property basis, so reflected energy reaches the edges of the structure and performs its erosive activity there. This causes the armoring to loosen and eventually detach. It also distributes the erosive effect onto neighboring property,

Armoring creates a steep (often vertical) slope that prevents water from traveling inward, but only as long as the lake level remains below the top elevation of the structure.

Although armoring is sometimes referred to as “shoreline protection,” this term is inaccurate. Artificial shorelines remove, disturb, and interrupt natural shorelines. They disrupt ongoing coastal processes in a piecemeal fashion, causing effects on not only adjacent properties but throughout the coastal ecosystem. Often, they exacerbate on other properties the problems they purport to solve on the property where they are installed—the very outcome that planning and zoning are designed to prevent wherever possible. Armoring incurs a permanent cost by replacing existing coastal processes with a human management burden. This cost should be considered alongside the value of existing at-risk development, and certainly when considering the potential value of future development..

IV. Coastal Solutions Guide

What tools does a community have to make that happen?

How zoning affects private property

The Michigan Zoning Enabling Act (MZEA, Public Act 110 of 2006) gives municipalities the authority to regulate the development and use of land through the adoption of zoning ordinances. This includes the regulation of land along the Great Lakes' coastlines to the Ordinary High Water Mark (OHWM). For lands lakeward of the OHWM, the State has regulatory authority through Part 325 of the National Resources and Environmental Protection Act.

A zoning ordinance contains standards for the development and use of private property within the jurisdiction. The MZEA says that all zoning regulations must be based upon a plan to guide the community's development. This plan, called a master plan or comprehensive plan, is authorized by the Michigan Planning and Enabling Act (MPEA, Public Act 33 of 2008) and created by the planning commission. The planning commission then has an advisory role in any changes proposed to the zoning ordinance, which is adopted and amended by the municipality's legislative body as all ordinances are.

All ordinances are uses of the government's police power: its fundamental ability to impose requirements that are necessary for the public's health, safety, and welfare. Zoning ordinances are a special case of this power dealing specifically with land use. They restrict the otherwise free use of property where such free use does not promote public health, safety, or welfare.

Government is always seeking to strike a balance between a person's "freedom to" do what they want, and that person's "freedom from" being harmed by their neighbor doing the same. The purpose of zoning regulations is, in effect, to restrict the otherwise free use of property, so pushback from property owners who are focused on this "freedom to" is a common obstacle to implementing them. This is why ordinances are supported by data documenting the intended benefits to the public health, safety, and welfare. Public engagement processes make these tradeoffs widely known, broadening the conversation to include those who are helped by the "freedom from." Restrictions can't be so severe that they result in a property where no reasonable use is available at all. In that case, a court may find that the municipality has "taken" the property and must pay compensation to the property owner.

Districts

A shoreline zoning district is the most comprehensive approach to regulating the coastline. This is a set of regulations that defines the use, intensity, and function of development in a specific area of a

community, which is shown on the zoning map. This approach would usually apply to a group of properties with similar uses and shoreline characteristics. A shoreline district may "bundle" more than one of the zoning standards presented in this compendium.

Overlays

An overlay zone (or district) is a mapped area that introduces an additional standard or regulation over areas that are larger than a zoning district. Overlay zones can help provide consistent management of land use and development along shorelines that encompass multiple "base" zoning districts with different uses or characteristics. They may also bundle one or more standards. An overlay zone may be defined by proximity to a natural feature, for example a bluff, wetland, or floodplain.

Site development standards

Development standards are requirements that apply to the development of each parcel. They may apply based on the district that the parcel is in; they may be based on the qualities of the parcel; or they may apply to all parcels in the community. Setbacks, impervious surface standards, and greenbelt requirements are all examples of development standards.

Permit review of state-designated lands

The State of Michigan regulates property within mapped High Risk Erosion Areas (HREAs), Flood Risk Areas and Environmental Areas. The Michigan Natural Resources and Environmental Protection Act allows a municipality to assume regulation of land use within these state-designated areas if their zoning ordinance is determined to adequately prevent property damage or damage to the resources in these designated areas. Approval of the municipality's zoning ordinance by the Department of Environment, Great Lakes and Energy is required to administer permitting in these areas.

Each of these types of tools is implemented by amending the zoning ordinance.

Tool options guide

See Tool Options Chart - For Steering Committee Review

V. Compendium of Zoning Solutions

Creating and adopting zoning regulations

For the coastal zoning tools highlighted in this Compendium, there are common tasks that will be necessary to create a zoning ordinance amendment. A zoning ordinance consists of text and a map, and either or both may be amended.

Text Amendments

Text amendments change the language of the zoning ordinance. They are necessary to add new zoning techniques, add new uses to zoning districts, bring standards up to date, or implement a change in procedure. For many of the zoning tools highlighted in this Compendium, a text amendment should include:

- ☐ *Check for supporting documentation in the Comprehensive Plan.* Determine if the comprehensive plan 1) identifies the protection of the shoreline as a priority and 2) includes recommendations that would support the proposed zoning change. If not, consider amending the comprehensive plan to add these priorities.
- ☐ *Add definitions of any new or uncommon terms used in the text amendment to the Definitions section of the ordinance.* Clear definitions for terms are vital for users to interpret the requirements. They help apply requirements that are found in other parts of the ordinance, but do not include regulatory language.
- ☐ *Review the General Provisions of the ordinance.* The General Provisions are regulations that apply to all uses, buildings, and structures within districts. Examples include accessory buildings, fences, and decks. Some communities also include off-street parking, landscaping, access management, and natural features regulations that apply to all zoning districts, although many cover these requirements in separate ordinances or a dedicated "site development standards" section in the zoning ordinance.
- ☐ *If amending a zoning district, check to make sure the district's intent statement aligns with the proposed changes.* The intent statement should reference comprehensive plan goals or recommendations, including those from the Zoning Plan.
- ☐ *If new or revised uses are proposed for a zoning district, add these to the Permitted Principal Use or Special Land Use list.* Make sure that any uncommon terms are defined in the Definition section.
- ☐ *If setbacks or other dimensional standards are proposed for a zoning district, add these to the district's lot area and bulk requirements.* These are sometimes contained in a Schedule of Regulations chart that includes all zoning districts within the municipality. Typical requirements include lot size, height, setbacks, lot coverage, and density (floor area or number of dwelling units).

- ☐ *If ordinance changes will make existing structures non-conforming, decide if there will be special provisions for altering or adding to non-conforming structures.*

Map Amendments

The zoning map illustrates the geographic location of the districts included in the ordinance. Map amendments change the zoning designation of a parcel or parcels. For many of the zoning tools highlighted in this Compendium, a map amendment should include:

- ☐ *Check to see if the map change is included in the comprehensive plan's Zoning Plan*. If not, consider amending the master plan to support the proposed map changes(s).
- ☐ *If rezoning a parcel or parcels, collect legal descriptions for affected properties*. This information will be necessary for public notice of the zoning changes, as well as for a change to the official zoning map, if approved.
- ☐ *If creating an overlay district, identify all property to be included in the overlay district.* This should include a list of tax parcels and a legal description of the overlay area. This information will be necessary for public notice of the zoning changes, as well as for a change to the official zoning map, if approved.

Amendment Procedure

The MZEA stipulates hearing and notice requirements for the adoption of amendments to a zoning ordinance, including a change to the zoning map due to rezoning of property. An amendment may be initiated by the planning commission, by the elected legislative body, or by an applicant who has some interest in the property affected.

The planning commission makes a recommendation about the amendment, and the elected body officially enacts it. A typical process is:

- ☐ *Draft an ordinance transmittal.* This document describes the changes and provides a rationale for the amendment that references master plan goals or recommendations, including those from the master plan's Zoning Plan.
- ☐ *Request staff review and comment on the transmittal.* Include administering agencies and departments as well as municipal counsel.
- ☐ *Provide public notice of the proposed amendment and associated public hearing*. The MZEA requires this notice to be given at least 15 days before the scheduled public hearing.
- ☐ *Mail notice of map amendments.* For map amendments, notices must be mailed to property owners and occupants of all properties within a 300 foot radius of the of the subject property.
- ☐ *Hold a public hearing*. The planning commission holds a hearing in accordance with the Open Meetings Act to receive comments on the proposed change.

- ☐ *Planning commission recommendation.* Following the public hearing, the planning commission votes on whether to recommend the proposed change and submits a report to the legislative body with its recommendation. For townships, the proposal and recommendation must also be submitted to the county or regional planning commission for their review and advice, unless the county/regional planning commission has waived that requirement.
- ☐ *Legislative action.* The legislative body may decide to conduct a further hearing before it votes to adopt the amendment as submitted, amend it, or reject it. In townships, once a zoning amendment has been enacted by the township board, it is potentially subject to a voter referendum.
- ☐ *Publication of the amendment.* This must be accomplished within 15 days following adoption. Published notices of amendments may be printed in their entirety, or simply contain a summary of the effect of the amendment. For rezoning, this must include a geographic description of the properties affected.

1. Zoning Tools

Shoreline setback

A shoreline setback defines a minimum distance between the shoreline and development. It is established by a local unit of government through its zoning ordinance.

Why it supports resilience:

Setback requirements that are calibrated to the shoreline's specific conditions help to preserve the natural beach and protect development from the impacts of erosion and flooding. In addition to creating space that allows for natural coastal processes to occur, they serve to protect water quality and natural features along the shoreline by limiting disturbance within the setback area.

How it is used:

Shoreline setbacks require new buildings and additions to be a certain distance away from the shoreline or a fixed reference point, such as the bluff line or the Ordinary High Water Mark (OHWM).In addition limiting the placement of occupied buildings, a shoreline setback can apply to accessory structures, such as seawalls, decks, garages, and septic systems. Since every shoreline has unique characteristics, a coastal engineering study may be necessary to identify a recommended setback line that takes into account likely lake levels, wave impacts, and erosion rate.

Possible obstacles to implementation:

- Setbacks may be viewed as unnecessary restrictions on development potential.

- Setback distances may need to be adjusted in the future to reflect changes in lake levels and erosion.
- In areas with existing development, a shoreline setback may render building non-conforming, which may limit future improvements.
- The cost of a coastal engineering study may compete for scarce public resources.
- Exceptions may be needed to accommodate infrastructure such as stairs and boat launches.

Example:

City of Manistee R1 Low-Density Residential District (Lake Michigan)

SECTION 800 PURPOSE AND INTENT

It is the intent of this District to establish and protect residential areas consisting primarily of low density; single-family neighborhoods designed and maintained promote an attractive, healthy and stable living environment for families, singles and the elderly. In portions of the district near Lake Michigan, this district is intended to protect the Lake Michigan shoreline environment while enabling sustainable enjoyment of this unique feature of the community."

SECTION 803 DIMENSIONAL STANDARDS.

Within the R-1 District, the following dimensional standards shall apply:

C. Yard and Setback Requirements - The following requirements shall apply to every parcel, building or structure.

4. Waterfront Yard: The minimum setback shall not be less than one hundred (100) feet from the ordinary high water mark, provided such setback shall not apply to walkways, boat docks, boat slips, boat launches and boat houses. Provided, further that the waterfront setback shall not be less than the setbacks required by the Department of Natural Resources in a High Risk Erosion Control area.

Tasks for implementing this tool:

- Determine if the comprehensive plan 1) identifies the protection of the shoreline as a priority and 2) includes recommendations that would support the adoption of a shoreline setback requirement. If not, consider amending the comprehensive plan to add these priorities.
- Engage with the community about the potential change (see Community Engagement Approaches).
- If possible, conduct an engineering study to determine the most appropriate minimum setback distance based on current and historical conditions of the shoreline and projected rescission (i.e., erosion) rate. Otherwise, use GIS and historical data to identify an appropriate setback distance (see How much space does the lake need? for available data tools).
- Determine whether to add the requirement as a general zoning provision that applies to all properties with shoreline frontage, or as an overlay district (see Shoreline Overlay Tool)

- Identify any special limitations for the area between the shoreline and the minimum building setback distance, such as natural features protection, parking limitations, armoring prohibition, septic tank placement, invasive species prohibition, etc.
- Identify if there will be special provisions for additions onto structures that are non-conforming due to the addition of a shoreline setback.
- Draft the proposed ordinance amendment (see Text Amendment Checklist).
- Submit the proposed amendment for consideration (see Amendment Procedure Checklist).

Shoreline district

A shoreline district is a type of zoning district that regulates land use and development along coastlines. It is structured like a residential or commercial zoning district. A shoreline district is different from a shoreline overlay district, which provides regulations that span an existing zoning district or districts.

Why it supports resilience:

A shoreline zoning district can include a comprehensive set of requirements for the unique needs of shoreline properties, including protection from erosion, flooding, and rising lake levels. It also highlights the special character of properties along the coast.

How it is used:

This tool requires an amendment to the zoning ordinance to add a new zoning district. Shoreline districts will typically include a list of allowable uses and special land uses and area, height and placement requirements, similar to other zoning districts. A shoreline district may address shoreline-specific natural features and view protections, and it may restrict shoreline hardening.

Possible obstacles to implementation:

- Creating a new district is an intensive process that must include a planning element.
- Monitoring compliance may be challenging.
- Conditions may shift faster than regulations can be updated.

Example:

Garfield Township (Mackinac County) Great Lakes Shoreland District (Lake Huron) - Section 3.14

The Great Lakes Shoreland District is “intended to protect the fragile ecosystem in the coastal area, while at the same time permitting residential and recreational development and limiting other uses that are compatible with the area. Any development in the Great Lakes Shoreland District must be

accomplished in a manner that preserves the qualities found within the Lake Michigan coastline as well as protecting any endangered species."

See also: Fruitland Township's Lake Michigan Shoreline District (Lake Michigan)

Tasks for implementing this tool:

- Determine if the comprehensive plan recommends the creation of a shoreline zoning district and includes the potential location of the new district. If not, amend the comprehensive plan to add these priorities.
- Engage the community about the potential change (see Community Engagement Approaches).
- Use GIS and historical data to determine what parcels would benefit most from being included in a shoreline zoning district.
- Review the principal and accessory uses allowed by right in the current zoning district and determine which of these should be included in the shoreline district. If special land uses are proposed, list these and link to the related review standards and approval process (usually in a different section of the ordinance)
- Identify requirements for development in the district, such as a shoreline setback, natural features protection, parking limitations, armoring prohibition, septic tank placement, etc. If building form or viewshed restrictions are to be included, create diagrams to illustrate the regulations.
- Draft the proposed ordinance amendment (see Text Amendment Checklist).
- Submit the proposed amendment for consideration (see Amendment Procedure Checklist)

Bluff Protection Overlay

Bluffs are steep slopes, often adjacent to a body of water, that have been formed by erosion over time. Communities can protect bluffs from construction impacts by including special setback provisions in the zoning ordinance or including these areas in a natural features overlay zone (see Natural Features Overlay Tool). The state of Michigan regulates construction on bluffs which are in High Risk Erosion Areas. In those areas, the municipality can assume authority for regulating HREAs (see the Permit review of state-designated lands in Section IV).

Why it supports resilience

A bluff protection ordinance can minimize the impacts of erosion, undermining, slumping, or collapse of the bluff on existing and proposed development and protect the adjacent water body from excess sedimentation.

How it is used

Bluff protection ordinances typically provide setback requirements for the top of the bluff, as well as limits on structures and activities on the face (slope) and at the toe of the bluff.

Possible obstacles to implementation

- Not all bluff protections are good solutions (i.e. seawalls) so the regulations need to be carefully considered.
- Sufficient requirements to protect bluffs require periodic review with the dynamically changing conditions of shorelines.

Example

Emmet County Shoreline Bluff Protection Zone (Lake Michigan) – Zoning Ordinance 15-1

This regulation defines the Shoreline Bluff Protection Zone as an area between the top of the bluff and the toe of the bluff for land along Lake Michigan. Site plan approval is required before any type of excavation or construction in the zone. The ordinance lays out standards related to preservation of native vegetation, limitation of construction area, and placement and slope of driveways. As part of the site plan, an applicant may be asked to submit an environmental impact statement to help the planning commission reach a decision.

Tasks for implementing this tool:

- Determine if the comprehensive plan identifies the protection of the bluffs as a priority and includes recommendations that would support the proposed zoning change. If not, amend the comprehensive plan to add these priorities.
- Engage the community about the potential change (see Community Engagement Approaches).
- Conduct an inventory of the shoreline using aerial photographs and US Geological Survey topographic maps to identify bluffs most at risk of erosion due to slope and underlying geology, in addition to the status of current structures and potential development parcels.
- Using data from your inventory, determine what types of regulations will be most protective.
- Identify all shoreline parcels to be subject to the bluff protection provisions and determine whether to add the requirement as part of an overlay district or general zoning provision that applies to all properties with shoreline frontage.
- Identify where to add the bluff protection provisions. This may be in a chart, or it may warrant a separate section. The advantage of doing a separate section is that any special limitations between the shoreline and the setback distance, such as natural features protection, parking limitations, armoring prohibition, septic tank placement, etc., may be listed out..
- Determine the appropriate review process, either through a site plan or construction permit.

- Draft the proposed ordinance amendment (see Text Amendment Checklist).
- Submit the proposed amendment for consideration (see Amendment Procedure Checklist).

Planned Unit Development (PUD)

A planned unit development (PUD) provision on the zoning ordinance identifies conditions that must be met before a PUD zoning district or PUD site plan may be approved for a property. The requirements for PUDs are found in the Michigan Zoning Enabling Act (Sec. 125.3503).

Why it supports resilience:

The purpose of a PUD zoning, according to the MZEA, is to "achieve integration of the proposed land development project with the characteristics of the project area." PUDs allow for flexible site design that can address the unique characteristics and challenges of the coastal environment. They.are often used to "cluster" or group buildings on a site to preserve natural features and open space.

How it is used:

The local unit's zoning ordinance identifies the standards and conditions for approval of a PUD, which could result in either a rezoning of a parcel to a special PUD zoning district or as an overlay zone that allows flexibility in site development if certain conditions are met. Many communities require applicants for PUDs to demonstrate that their development provides a substantial benefit to the community. These benefits are often defined by the community, and could include coastal health and resilience.

Possible obstacles to implementation:

- Communities may resist cluster developments due to concerns about changes in neighborhood character and incompatibility with adjoining uses.
- Planning and coordinating clustered developments can require significant capacity from the local unit to ensure that the public benefit is adequate to compensate for the zoning flexibility, and that the benefit is realized.
- Planned Unit Developments require significant upfront investment from the developer.

Example

Casco Township Planned Unit Development (Lake Michigan) - Section 16.01

The intent of this Chapter is to permit coordinated development on larger sites in order to achieve most or all of the following:

5. Protect and preserve natural resources, such as Lake Michigan, the Black River, and natural features, including but not limited to: soils, topography, wetlands, woodlands, steep slopes, dunes, natural habitat, streams, rivers, and lake views.

Tasks for implementing this tool:

- Identify benefits and/or conditions that support the creation of a PUD in the comprehensive plan and include the desired features in the Zoning Plan.
- Engage the community about the potential change (see Community Engagement Approaches).
- If a new PUD ordinance is proposed to be added, determine whether it will be treated as a zoning district or an overlay zone.
- Identify any special requirements for the PUD, as well as any zoning requirements that are not subject to flexibility.
- Identify an appropriate review and approval process, either through rezoning (legislative) or site plan or permit (administrative) approval.
- Draft the proposed ordinance amendment (see Text Amendment Checklist).
- Submit the proposed amendment for consideration (see Amendment Procedure Checklist).

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2. Land Development Standards

Land Divisions

The Michigan Land Division Act governs how land may be subdivided into smaller parcels for development, sale, or other uses. It regulates the number and timing of metes and bounds splits and the process for platted subdivisions of land. Local units of government may adopt a land division ordinance to require compliance with local zoning regulations or development standards and set up a process for review and approval.

Why it supports resilience:

Reviewing land divisions and developing standards specific to shoreline concerns can help prevent overdevelopment in coastal areas and protect natural features such as dunes, wetlands, and vegetated zones. Deeper lots encourage development further inland, reducing the risk of damage from erosion and flooding.

How it is used:

Local governments can adopt a review process for all parcels undergoing land division and include development standards that align with zoning ordinances. They can ensure that new lots meet requirements for size, shape, access, and compatibility with the surrounding area. These standards may be incorporated into a shoreline district or overlay zone.

Possible obstacles to implementation:

- Smaller communities or those lacking resources may find it difficult to implement and enforce land division standards.
- Land available to implement long lots may be limited by existing development, including roads.
- Requiring longer lots may result in fewer parcels that receive the economic benefit of shoreline proximity.

Example

Hampton Township Land Division Ordinance (Lake Huron) - Ordinance No. 54:

"The purpose of this ordinance is to implement the provisions of the State Land Division Act (1967 PA 288, as amended, formerly known as the Subdivision Control Act), to prevent the creation of parcels of property which do not comply with the applicable ordinances and said Act, to minimize potential boundary disputes, to maintain orderly development of the community, and otherwise provide for the health, safety, and welfare of the residents and property owners of the Township by establishing reasonable standards for prior review and approval of land divisions within the Township."

Fruitland Township Lake Michigan Shoreline District - Section 6.01a

The Site Development Standards for the district include a Lot Compliance standard: "No waterfront lot or parcel shall be created unless said lot or parcel meets the minimum lot width, area, and dimensional standards and requirements of this district, in addition to the above-mentioned lake front requirements."

Tasks for implementing this tool:

- If a new land division ordinance is proposed to be created, determine the desired review and approval process that ensures compliance with zoning and development standards.
- Identify development standards that must be applied in addition to those required by the state Land Division Act. Examples could include greater depth for shoreline-fronting properties to allow for future building relocation, driveway placement limitations or septic system setbacks.
- Draft the proposed ordinance.

- Submit the proposed amendment for consideration (see Amendment Procedure Checklist).

[Additional Tools to be added here. See Tool Options Chart for proposed list of tools].

VI. Getting It Done

This is hard but it can be done

[Looking to Steering Committee for especially compelling case studies]

Community engagement approaches

Community engagement is the link that connects decision-makers' actions to the priorities of residents, businesses, visitors, and other stakeholders. In most cases, the formal activity is initiated by the decision-makers, because they are the ones with the official responsibility—community engagement is a request for help and advice in carrying out the leadership responsibilities that they have taken on.

Standard approaches to community engagement have often taken the following format: leaders invite "the public" to participate; they deliver information, usually about a problem, to the self-selected group; and then ask participants to state their preferences about what the leaders should do in response to that problem. This approach makes sense, but its effectiveness is limited. The leaders and staff tasked with these activities often report low participation, participation by the same few people across all issues and events, and receiving suggestions that are difficult to implement with the resources available.

Two strategies to break through these impasses of apathy and stagnation are storytelling and stewardship. Storytelling uses the brain's natural affinity for narrative to engage emotions as well as logic. By presenting decisions about the future as shaping the community's story, rather than as selecting a correct answer, there is more room for connection and cooperation. Moving out of the "agree/disagree" framework allows for co-creation. The idea of stewardship places the participants inside the story as a caretaker from the beginning. It puts to use research by environmental communicators showing that people want to know what they can do, how it will help, what others are doing, and how they are faring. In many cases, engagement asks "what should we do?" when that is

already known; the real question is "how can we marshal our resources to do what we already know should be done?"

The following community engagement tools lend themselves to coastal decision-making.

Beach walks

Beach walks are an engagement technique that takes place on the coast itself. Their content may vary, depending on the needs of the project or process the engagement is supporting: the key feature is the location.

Why it supports resilience

Beach walks support resilience by connecting people physically with the resource that the event is intended to benefit. This connection helps spur positive action, and it increases people's familiarity with the resource so that they can offer more tailored feedback.

How it is used

Beach walks can be used for a variety of purposes. For example, they may be educational in nature; they may be used to gather information about people's experiences on the coast; or they may be designed to take feedback on a proposed project.

Possible obstacles to implementation

Logistics and communications can present obstacles to a successful beach walk. Care should be taken to ensure that the activities are as physically accessible as possible. Communications should include written materials such as signs, since the lack of amplification may make it difficult to hear a speaker.

Example

Lake Huron Summer Beach Walk with EGLE

The Michigan Coastal Management Program and the U.S. Army Corps of Engineers collaborated to conduct a series of Beach Walks on eight sites along Lake Michigan, Huron, and Superior coastline. According to MCMP, "the events highlighted the dynamics and effects of the Great Lakes water levels, storm intensities, coastal processes, and coastal hazards at each respective beach site. The intent of the Beach Walks are to increase knowledge of coastal hazards to increase community resilience and provide opportunity for the public to interface with state and federal coastal experts."

Shoreline Resident Guides

Shoreline Resident Guides compile shoreline management information in an easy-to-understand format that residential property owners can use. They may include official regulations like setbacks, as well as best practices like limiting fertilizer application.

Why it supports resilience

Much of the actual, day-to-day management of the shoreline is done by residential property owners. This tool gets information directly into the hands of a group of people who have an enormous cumulative impact on coastal conditions.

How it is used

A Shoreline Resident Guide is most likely to be compiled by a group with particular knowledge about good shoreline practices and an interest in promoting them, such as a local government, a county, or a special interest group. It can be mailed to property owners and made available online. It is also helpful to distribute a Shoreline Resident Guide to private-sector interests such as realtors, landscapers, marine contractors, and lawn care professionals. These groups may integrate the practices into their own businesses and/or pass the resource and knowledge on to their clients.

Possible obstacles to implementation

Getting a Shoreline Resident Guide into the hands of every residential property owner is a big task, and one that has a maintenance component as property ownership changes hands. Since the non-regulatory practices in the guide are optional, achieving compliance may required additional education efforts and, possibly, some kind of incentive.

Example

Living in Sensitive Areas: A Homeowners Guide for Residents of Grand Haven

This toolkit equips homeowners along the coast, in the dunes, in a floodplain, and near wetlands with best management practices for their home and lawn to minimize damage to these ecosystems. Maps are included to show which homes are in each sensitive area.

Charettes

Charrettes are a design-centered, multi-day meeting sequence with feedback loops that are designed to bring a community to enough consensus for action within an established timeframe.

Why it supports resilience

The visual nature and multiple meeting format of charrettes support resilience by illustrating tradeoffs and the physical needs of various interests. Allowing everyone to develop, see, and comment on a proposed solution within a defined timeframe helps manage the complexity that is inherent in coastal management.

How it is used

Charrettes are especially suited to project design, because they result in a professionally vetted illustration. But they can be used to gather information and come to consensus on a variety of issues. A community determines the project goal, secures times and locations, and then brings together an extensive team of professionals and support staff to run the meetings and produce the design products.

Possible obstacles to implementation

Charrettes require extensive preparation and intense management. The up-front costs often appear to be greater than with other engagement techniques. However, they often represent the same amount that would be otherwise be spread over a longer time-frame, and when the time savings are included, may in fact be a better value.

Example

Sustainable Small Harbors Charrettes

Charrettes focused on the design of small harbors and their surrounding areas have been held in more than a half-dozen communities over the past ten years through Michigan Sea Grant. Over the course of three visits, the Sea Grant team collects information, hosts a series of public input opportunities, and presents a summary report with preferred alternatives to the

Visualization

Virtual tools can help illustrate existing and projected damage due to flooding and erosion. These include data tools such as the shoreline and lake level viewers; map-based analyses that show the relationship between future conditions and existing development; and frameworks like the ESRI storymaps that arrange narrative, images, and spatial data in a sequence for users to scroll through.

Why it supports resilience

Visualization tools help overcome the difficulty of making changes to a system that appears to be working today by showing the harm that is in tomorrow's path.

How it is used

Visualization tools are effectively used as part of educational materials. They can clarify and emphasize data findings. They are especially suited to showing possible futures.

Possible obstacles to implementation

Some technical expertise is required to craft compelling and accurate visualizations.

Example

Coastal Hazards of the Western Upper Peninsula Storymap

The Western Upper Peninsula Planning and Development Region produced a comprehensive storymap with visual resources about coastal flooding and erosion alongside contextual information about Lake Superior and the culture and geology of the Keweenaw Peninsula. The tool embeds images, videos, and links to data tools to create a compelling invitation to learn.

Watershed Game

The Watershed Game is a hands-on simulation activity for up to 25 people, created by the Minnesota Sea Grant. It allows complex relationships between actions and conditions in a watershed to be shown in a compressed, experiential format.

Why it supports resilience

The design of the game illustrates the tradeoffs and the effects of decisions made in watershed management. It allows players to consider a wide range of options and to see the results generated by different approaches. The fun aspect of it supports ongoing engagement with watershed issues.

How it is used

Any group with interest in or responsibility for watershed management decisions could play the Watershed Game in order to gain a baseline familiarity with the issues at hand, and to provide a common vocabulary among participants in future conversations.

Possible obstacles to implementation

One trained facilitator is needed to successfully run the Watershed Game.

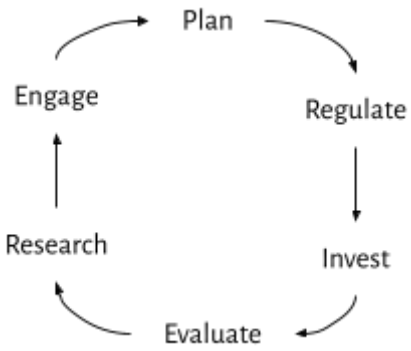
Example

The Michigan Association of Planning and the Michigan Coastal Management Program jointly sponsored a session of the Watershed Game at a Coastal Resilience Summit attended by planners, planning commissioners, and other land use decision-makers.

Planning is the link between engagement and implementation

Community engagement is generally, and ideally, conducted as part of a planning process. Data determines the possible set of actions that a community can take, and engagement findings determine the preferred course. These recommended actions are described and formalized in the plan and then adopted by leadership. As described in Section I, this plan forms the required legal policy basis for regulation, and the purpose of that regulation is to shape investments, property, buildings, and systems so that they avoid harm to public health, safety, and welfare. This chain of processes is what translates community desires and experiences into the community they wish to see around them.

But it bears pointing out that the process doesn't have to start at the beginning, and in fact it rarely does. Often, it is only when something goes awry in the investment phase that we look to see how far upstream a change must be made in order to produce a different outcome. "That should have been regulated" means "we needed to plan for that." And that, in turn, means we needed to research and engage. This is why the "planning process" is often depicted as a cycle. Everything is iterative.



Implementation resources

Every allocation contains a tradeoff. The equitable distribution of resources, especially scarce ones, are a distinct responsibility of the public sector. A dollar spent on a coastal study supporting a new setback is a dollar not spent on the public beach, and it's also hopefully a dollar not spent on removing an abandoned property on the brink of immersion. Capacity and funding are perpetual challenges, and it seems unlikely that there will ever be enough of both to do everything. Acknowledging both the public responsibility and the fundamental limitations allows us to go straight to the next question: "OK then, what CAN we do?"

Existing processes

Master plans, zoning ordinances, hazard mitigation plans, and capital improvement plans are projects in every community, whether coastal or not; park and recreation plans, sustainability plans, and tax increment finance plans like DDA plans are also not necessarily connected to the presence of a coast. But a portion of the investment made in them can be shaped so that it directly benefits shoreline management. Wherever land use, water quality, or infrastructure are discussed, specific and direct attention to coastal issues can be carved out for little to no extra cost.

Funding

Budget allocations; assessments

An assessment is a public funding process to achieve a specific aim that is initiated by the government, rather than by citizens. [I don't know much about whether or how this would be appropriate. Help?]

Millages

Residents have the option of passing a millage to use the public funding process to achieve a specific aim. [has anyone done this?]

Crowdfunding

In some instances, an appeal has been made to collect funding directly, often to pay for a specific project. The Public Space, Community Places program [https://www.patronicity.com/puremichigan] is a partnership between the Michigan Economic Development Corporation and Patronicity that has used crowdfunding and a match to fund over 400 projects, including some along Great Lakes coasts. These can serve public access goals.

Grants

The Michigan Coastal Management Program disburses about $700,000 of funds annually to coastal units of government in partnership with the National Oceanic and Atmospheric Administration. These funds support planning and projects that are focused on healthy ecosystems, preventing damage, creating access, and promoting environmental stewardship. They must be matched by the recipient in cash, in-kind services, or donations.

Michigan Sea Grant has made a dedicated effort to compile and maintain a comprehensive list of funding sources in its Coastal Resilience Resource Hub [https://www.michiganseagrant.org/coastal-resilience-resource-hub/resources/funding/coastal-resilience-funding/]. The Funding landing page [https://www.michiganseagrant.org/coastal-resilience-resource-hub/resources/funding/] also points to other resource compilations.

Free money is, of course, never free. At a minimum, it must be found and secured, and often it must be carefully managed and extensively reported on. In this way, funding is closely tied to capacity.

Capacity

Regions

Michigan's 14 Planning and Development Regions are purposely designed to help address capacity challenges: they "help local governments resolve issues of overlapping services, help fill gaps in services through service sharing arrangements, and help find resources from the federal and state governments to address unmet needs." [4] Ten of the regions serve Michigan's coastal areas.

Michigan's Regional Councils of Government (COGs) provide various services, which may range from administering federal programs to providing direct technical assistance to communities, and they vary widely in staff capacity themselves. However, these formal structures already exist as a mechanism for delivering support to individual communities, as well as to counties. Increasing resources to the regional COGs is a way to increase the capacity of many jurisdictions at once. A dedicated coastal planner at each COG could begin to truly move the needle on helping communities develop the plans, ordinances, and strategies that support wise coastal protection, restoration, and development.

Shared

Communities can also decide independently to consolidate capacity by sharing positions. Especially among adjacent communities that effectively function as a single market, these arrangements allow for greater consistency between jurisdictions. Cost savings and access to more specialized expertise are also benefits.

MEDC technical assistance

The Michigan Economic Development Corporation provides funding that communities engaged in its Redevelopment Ready Communities program may use to contract for technical assistance services from the provider or consultant of their choice. The RRC program focuses on planning and zoning activities.

Where do we go from here?

Community of Coastal Practice

The 272 local jurisdictions and 41 counties in Michigan that abut a Great Lake all face similar challenges. Shared information, efforts, and solutions benefit not only the communities, but the Lakes as well.

[4] Michigan Association of Regions, "About Regions." https://www.miregions.com/aboutregions.asp, retrieved March 27, 2025.

A formalized Community of Coastal Practice would allow communities to learn from each other, pool resources, and achieve economies of scale. More than that, it increases effectiveness within the community by serving the goal outlined by environmental communicators: it helps people act in their own spheres when they know what others are doing and how they are faring. Regular events, communications, and education can help integrate coastal management into more community processes, easing the burden. Support is a soft input, and its benefits are often overlooked—but they can be quite substantial.

The next right thing

The basic requirement of pursuing any improvement is to keep moving toward it. Wherever your community is in its coastal management journey, the same question applies: what's the next right thing we can do? If you are moving toward a goal, keep swimming, and try to keep one eye on connecting this task to the next one. If your efforts have stalled, pick up a small piece of the plan or project to dislodge the stationary momentum without getting overwhelmed. If you've hit a roadblock, reach out—help, a new perspective, and encouragement all defuse barriers. And if you don't know where to start, look around for a problem to solve. There's never any shortage of those, and it puts a sharp focus on the effort.

Further out (for now)

There are coastal land use problems that the tools here will not solve. Planning and zoning are forward-looking tools, more in the realm of prevention than adaptation. But of course they intersect with existing conditions.

A major feature of zoning is that it applies only to new development, allowing what was done under previous regulations to stand relatively undisturbed. The lakes, however, are not a party to this agreement and are not bound by it. They are their own regulating force, and what we build is subject to them on their own terms. Where we are in their right-of-way, they claim eminent domain thoroughly and without due compensation. We are welcome to attempt structures of resistance, for which the lakes exact continuous payment until the day they claim those, too.

None of this fits within our established legal and economic frameworks around development. This is why conversations around concepts like insurance reform and managed retreat are so difficult, unappealing, and downright hostile: they represent a defeat under our own rules. Yet the truth that must be contended with is that the economic boon of the waterfront can, and does, turn to economic loss—both public and private. The less orderly our departure from lakes' right-of-way is, the costlier it will be. And the most orderly departure likely requires the enormous task of adjusting those legal and economic frameworks to account for reality. This is what will make insurance reforms and managed retreat possible. The force of the lakes will make them necessary.