

Resources for Minnesota's Coastal Communities

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The Minnesota Department of Natural Resources (MNDNR) is providing this list of select resources and tools that are appropriate for community level planning and management related to coastal hazards and mitigation. Please note that many of these resources are not specific to Minnesota's shoreline and that inclusion in this list is not any endorsement.

Natural Hazards for Coastal Properties

Data & Imagery Resources

Coastal Imagery Viewer

Author(s): National Oceanic and Atmospheric Administration (NOAA)

Interactive map to identify oblique aerial imagery collected by NOAA along the nation's coastal areas.

https://geodesy.noaa.gov/storm_archive/coastal/viewer/index.html

Digital Coast Data

Author(s): NOAA

Provides access to available NOAA data for coastal communities.

<https://coast.noaa.gov/digitalcoast/data/home.html>

Earth Explorer

Author(s): U.S. Geological Survey (USGS)

Portal to access aerial and satellite imagery collected by USGS and map products.

<https://earthexplorer.usgs.gov/>

Great Lakes Oblique Imagery

Author(s): U.S. Army Corps of Engineers

Oblique aerial imagery across the Great Lakes coastal area collected by U.S. Army Corps of Engineers.

<https://greatlakes.erc.dren.mil/>

Minnesota Geospatial Commons

Author(s): Minnesota Geospatial Commons

Central hub for publically available GIS data from Minnesota state agencies..

<https://gisdata.mn.gov/>

United States Interagency Elevation Inventory

Author(s): NOAA and USGS

Inventory of elevation datasets across the U.S.

<https://coast.noaa.gov/inventory/>

Erosion and Shoreline Processes

Living on the Coast

Author(s): US Army Corps of Engineers & University of Wisconsin Sea Grant Institute; 2003

Overview of natural shoreline processes ranging from storm surges to erosion.

<https://publications.aqua.wisc.edu/product/living-on-the-coast-protecting-investments-in-shore-property-on-the-great-lakes/>

NOAA Shoreline Website

Author(s): NOAA

Guide to understanding various shoreline processes and methods for mapping and analysis change.

<https://shoreline.noaa.gov/apps/index.html>

Flooding

An Introduction to FEMA Coastal Floodplain Mapping

Author(s): Federal Emergency Management Administration (FEMA)

Website that explains how FEMA maps coastal floodplains and provides a tutorial for using FEMA floodplain maps for coastal management decisions

<https://fema.maps.arcgis.com/apps/MapSeries/index.html?appid=89d2e393f2c64d7cae07264f4d00c19d>

Coastal Flood Risk Resources

Author(s): FEMA

Overview of different resources available from FEMA and other agencies on coastal flood risks.

<https://www.fema.gov/coastal-flood-risk-resources>

Flood Map Service Center

Author(s): FEMA

Interactive online viewer to search for flood maps based on location. Provides access to digital flood maps where available.

<https://msc.fema.gov/portal/search>

Floodplain Management

Author(s): MNDNR

Official webpage for the Floodplain Management division of MNDNR. Includes information about regulations, maps, technical assistance, training, and mitigation.

https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/index.html

Great Lakes Coastal Flood Study

Author(s): FEMA

Official webpage for FEMA's Great Lakes Coastal Flood Study, an ongoing process of updating coastal flood hazard information.

<http://www.greatlakescoast.org/>

Lake Levels

Lake Level Viewer

Author(s): NOAA

Interactive map viewer that shows how changes in lake level across the Great Lakes might potentially impact the shoreline. You can raise or drop lake levels by up to 6 feet and see how higher or lower lake levels will affect your shore.

<https://coast.noaa.gov/llv/>

Find Your Local Tides and Currents

Author(s): NOAA National Ocean Service

Interactive map of the location of all tidal and current gauges in the U.S.

<https://tidesandcurrents.noaa.gov/gmap3/index.shtml?type=VerifiedData®ion=>

The Great Lakes Dashboard

Author(s): NOAA & US Army Corps of Engineers

Viewer that shows monthly averages of water levels in all of the Great Lakes.

https://www.glerl.noaa.gov/data/dashboard/GLD_HTML5.html

Water Levels Forecast

Author(s): US Army Corps of Engineers Detroit District

Overview of weekly and monthly lake level conditions across the Great Lakes.

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Water-Levels/Water-Level-Forecast/>

Reducing Your Coastal Hazard Risks

Adapting to Coastal Hazards

Adapting to a Changing Coast: Options and Resources for Local Officials in Southeastern Wisconsin Coastal Communities

Author(s): Wisconsin Sea Grant; 2017

Guide for communities on Lake Michigan for adapting to a changing coast.

<https://publications.aqua.wisc.edu/product/adapting-to-changing-coast-for-local-officials/>

Climate Adaptation Toolkit for Marine and Coastal Protected Areas

Author(s): Climate Adaptation Knowledge Exchange

Toolkit for management of coastal protected areas for climate related risks. Provides general guidance for making vulnerability assessments, searchable database for adaptation actions, and gives contact information for experts.

<https://www.cakex.org/MPAToolkit>

Great Lakes Coastal Resilience Guide

Author(s): NOAA

Guide for coastal communities around the Great Lakes to become more resilient to coastal hazards and climate change.

<http://www.greatlakesresilience.org/>

Hazard Mitigation Planning Resources

Author(s): FEMA

Provides ideas for communities on reducing risks towards built infrastructure.

<https://www.fema.gov/hazard-mitigation-planning-resources>

Managing Coastal Hazard Risks for Wisconsin's Dynamic Great Lakes Shoreline

Author(s): Wisconsin Coastal Management Program and Association of State Floodplain Managers

Guidance for reducing coastal hazard risks including erosion on the Great Lakes.

https://www.floods.org/ace-files/Projects/ManagingCoastalRisk_WI_2016.pdf

Naturally Resilient Communities

Author(s): Partners including American Planning Association and American Society of Civil Engineers

Overview of nature-based solutions for flooding and erosion that can be selected based on criteria.

<http://nrcsolutions.org/>

Protecting Coastal Investments: Examples of Regulations for Wisconsin's Coastal Communities

Author(s): Wisconsin Sea Grant

Guidance on reviewing and modifying local ordinances for coastal communities to address identified issues.

<https://publications.aqua.wisc.edu/product/protecting-coastal-investments-examples-of-regulations-for-wisconsins-coastal-communities/>

Resilient Great Lakes Coast

Author(s): University of Michigan & Partners

Strategies for coastal communities on the Great Lakes to be more resilient. Access the methods manual.

<http://resilientgreatlakescoast.org/>

Southeastern Wisconsin Coastal Resilience

Author(s): Wisconsin Sea Grant

Guide for communities on Lake Michigan for becoming more resilient to coastal hazards.

<https://sewicoastalresilience.org/>

U.S. Climate Resilience Toolkit

Author(s): United States Global Change Research Program

Guide for communities to identify climate related natural hazards and review resources, tools, and case studies related to building resilience.

<https://toolkit.climate.gov/>

Flood Insurance

National Flood Insurance Program Community Rating System

Author(s): FEMA

Official webpage for the Community Rating System (CRS).

<https://www.fema.gov/national-flood-insurance-program-community-rating-system>

National Flood Insurance Program Information for State & Local Officials

Author(s): FEMA

Page of resources for state & local officials relating to the National Flood Insurance Program.

<https://www.fema.gov/information-state-local-officials>

Funding Sources

Please note that these funding sources are intended for local, state, and tribal governments and, in some cases, non-government organizations.

Benefit-Cost Analysis

Author(s): FEMA

Official webpage for the FEMA Benefit-Cost Analysis method used for Hazard Mitigation Assistance and Public Assistance grants.

<https://www.fema.gov/benefit-cost-analysis>

BWSR Grant Programs

Author(s): Minnesota Board of Water and Soil Resources (BWSR)

Overview of the grant programs offered to local governments through the Board of Water and Soil Resources.

<https://bwsr.state.mn.us/grants>

Clean Water Fund Programs & Grant Profiles

Author(s): BWSR

Grant programs available to local communities sponsored by the Clean Water Fund & Outdoor Heritage Fund.

https://bwsr.state.mn.us/cwf_programs

Disaster Recovery Assistance Program

Author(s): BWSR

Program to assist local governments with the process of recovering from a state or federal disaster.

<https://bwsr.state.mn.us/drap>

Hazard Mitigation Assistance

Author(s): FEMA

FEMA has three hazard mitigation assistance programs that can benefit local communities: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and Flood Mitigation Assistance (FMA).

<https://www.fema.gov/hazard-mitigation-assistance>

Financial Assistance for Water Projects

Author(s): Minnesota Pollution Control Agency (MPCA)

All of the MPCA grant programs available for protecting water resources in Minnesota.

<https://www.pca.state.mn.us/water/financial-assistance-water-projects>

Flood Hazard Mitigation Grant Assistance

Author(s): MNDNR

Grant program to local governments to provide technical and financial assistance for flood hazard mitigation studies, planning and implementation.

https://www.dnr.state.mn.us/grants/water/flood_hazard.html

Great Lakes Protection Fund: Projects Wanted

Author(s): Great Lakes Protection Fund

Grant program to local coastal communities, non-profits, businesses, and researchers to benefit the Great Lakes basin ecosystem.

<http://glpf.org/get-funding/projects-wanted/>

MNDNR Grants

Author(s): MNDNR

Overview of the available grant programs offered by the MNDNR.

<https://www.dnr.state.mn.us/grants/index.html>

Minnesota's Lake Superior Coastal Program

Author(s): MNDNR

Grant program to local coastal communities, non-profits, and researchers to benefit a variety of management and planning projects.

<https://www.dnr.state.mn.us/waters/lakesuperior/grants.html>

NOAA Coastal Resilience Grants Program

Author(s): NOAA

Grant program that funds projects aimed at increasing the resiliency of coastal communities and ecosystems to extreme weather events and climate conditions.

<https://coast.noaa.gov/resilience-grant/>

Opportunities for Funding

Author(s): Minnesota's Legacy

Overview of available funding opportunities provided by legacy amendments and trust funds established by law including the Clean Water Land and Legacy Amendment and the Environmental and Natural Resources Trust Fund.

<https://www.legacy.mn.gov/opportunities-funding>

Runoff and Stormwater

Minnesota's Stormwater Manual

Author(s): Minnesota Pollution Control Agency

Resource for stormwater managers, providing guidance on regulations and permits, best management practices, and case studies of successful programs.

<https://www.pca.state.mn.us/water/minnesotas-stormwater-manual>

Smarter Building and Infrastructure Design

Hazard-Resilient Smart Growth

Author(s): NOAA

Provides ideas for communities on growing their community in a more resilient way.

<https://coastalsmartgrowth.noaa.gov/resilience.html>

Sustainable Working Waterfronts Toolkit

Author(s): National Working Waterfront Network, NOAA, Sea Grant

Toolkit to emphasize best practices for sustainable and resilient working waterfronts.

<https://nationalworkingwaterfronts.com/toolkit/>

Tackling Barriers to Green Infrastructure

Author(s): Wisconsin Sea Grant

Tool to audit local codes and ordinances to identify barriers to implementing green infrastructure.

<https://publications.aqua.wisc.edu/product/tackling-barriers-to-green-infrastructure-an-audit-of-municipal-codes-and-ordinances/>

Relevant Tools to Assess Economic and Environmental Conditions

C-CAP Atlas

Author(s): NOAA

Coastal Change Analysis Program (C-CAP) that reviews land cover change in coastal areas of U.S.

<https://coast.noaa.gov/ccapatlas/>

Census QuickFacts

Author(s): U.S. Census Bureau

Provides demographic and economic information for U.S. states, counties, and local municipalities.

<https://www.census.gov/quickfacts/fact/table/US/PST045218>

Coastal County Snapshots

Author(s): NOAA

Provides snapshot information about flood risks, wetlands, and the marine economy for U.S. coastal counties.

<https://coast.noaa.gov/snapshots/>

County Explorer

Author(s): National Association of Counties

Provides demographic, economic, environmental, and other indicator information for all U.S. counties.

<https://ce.naco.org/>

Digital Coast Tools

Author(s): NOAA

Overview of tools by NOAA and other agencies that are relevant to coastal managers.

<https://coast.noaa.gov/digitalcoast/tools/>

Digital Shoreline Analysis System (DSAS)

Author(s): USGS

ArcGIS tool to assess changes in historical shoreline.

https://www.usgs.gov/centers/whcmssc/science/digital-shoreline-analysis-system-dsas?qt-science_center_objects=0#qt-science_center_objects

ENOW Explorer

Author(s): NOAA

County level marine economy data for coastal counties across the U.S.

<https://coast.noaa.gov/enowexplorer/#/>

Minnesota Climate Trends

Author(s): MNDNR

Interactive map with recent and historical climate data for Minnesota.

<https://arcgis.dnr.state.mn.us/ewr/climatetrends/>

NWI Wetland Finder

Author(s): MNDNR

Interactive map with the National Wetland Index (NWI) inventory for Minnesota.

<https://arcgis.dnr.state.mn.us/ewr/wetlandfinder/>

Protecting the Shoreline

Natural Shorelines and Vegetation Buffers

Living Shorelines Academy

Author(s): EPA, North Carolina Coastal Federation, Restore America's Estuaries, Southern Environmental Law Center

Guidance for professionals on designing and implementing a living shoreline.

<https://livingshorelinesacademy.org/index.php>

Permits & Regulations Related to Coastal Properties

DNR Water Permits

Author(s): MNDNR

<https://www.dnr.state.mn.us/permits/water/index.html>

Shoreland Management Program

Author(s): MNDNR

https://www.dnr.state.mn.us/waters/watermgmt_section/shoreland/index.html

Permitting Process and Procedures

Author(s): U.S. Army Corps of Engineers St. Paul District

<https://www.mvp.usace.army.mil/Missions/Regulatory/Permitting-Process-Procedures/>

Shoreline Protection and Modification

Ohio Coastal Design Manual

Author(s): Ohio Department of Natural Resources Office of Coastal Management; 2014

Designs specific to Lake Erie, but is a useful manual to understand engineering considerations when designing shoreline protection. Also available as a downloadable PDF from State Library of Ohio.

<http://coastal.ohiodnr.gov/design/introduction>

Systems Approach to Geomorphic Engineering

Author(s): SAGE Partners (including NOAA, FEMA, US Army Corps of Engineers, Coastal States Organization)

A community of practice centered around using geomorphic engineering approaches to coastal community development and shoreline modifications. Has information on current projects.

<http://sagecoast.org/>

Types of Shore Structures

Author(s): Ohio Department of Natural Resources Office of Coastal Management

Provides a useful list and description of shore structures.

<http://coastal.ohiodnr.gov/shorestructures>

Working with Engineers and Contractors

Great Lakes coastal engineering firms and contractors

Author(s): University of Wisconsin Sea Grant Institute

Guidance for homeowners on selecting and working with engineers and contractors.

<https://www.seagrant.wisc.edu/our-work/focus-areas/coastal-processes-and-engineering/resources-for-property-owners/great-lakes-coastal-engineering-firms-and-contractors/>

Working with Engineers and Contractors on Shore Protection Projects

Author(s): Gene Clark, University of Wisconsin Sea Grant Institute

Guidance from a coastal engineer about working with engineers and contractors when tackling shoreline protection.

<https://publications.aqua.wisc.edu/product/working-with-engineers-and-contractors-on-shore-protection-projects/>

Training and Technical Assistance for Communities

Technical Assistance

Minnesota's Lake Superior Coastal Program

Author(s): MNDNR

Minnesota's Coastal Program can provide technical assistance, sponsors training events, and offers funding opportunities.

<https://www.dnr.state.mn.us/waters/lakesuperior/index.html>

Minnesota Sea Grant

Author(s): NOAA and University of Minnesota

Minnesota Sea Grant supports research, outreach and education, and funding to support research and management for Minnesota's coastal area.

<http://www.seagrant.umn.edu/>

Training Programs

Coastal Training Program

Author(s): Lake Superior National Estuarine Research Reserve

Offers training and programs geared towards professionals relevant to coastal management priorities.

<https://lakesuperiorreserve.org/focus-areas/coastal-leadership/>

Digital Coast Training

Author(s): NOAA

Overview of courses, online guides, case studies, and publications addressing coastal issues and management.

<https://coast.noaa.gov/digitalcoast/training/home.html>