NALMS Shoreland Protection Position

Jessica Converse, M.E.S., Olympia, WA, USA

Introduction

Lakes are recognized worldwide for the immeasurable value they offer our planet. More than aesthetically pleasing, lakes provide habitat to a rich variety of species as well as water for drinking, agriculture, and recreation. Unfortunately, the quality of water supporting such ecosystem services continues to deteriorate (Jiménez Cisneros et al., 2014; United States Environmental Protection Agency, 2012). As a result of shoreland development, lake ecosystems are increasingly stressed by altered hydrologic regimes and nutrient over-enrichment (Conway & Lathrop, 2005; Dodson et al., 2007). Ecosystem disturbances allow for the increased colonization of invasive species and the proliferation of harmful cyanobacteria blooms (Jiménez Cisneros et al., 2014). Furthermore, lakes and tributaries without "living" shorelands are less resilient to the effects of climate change as they no longer have the natural ability to absorb and dissipate storm energy nor do they have access to their historical floodplains (Dodd, 2018). Protection of lake shorelands is critical to ensuring that lakes and humans can adapt to meet the demands of our changing world.

Lake shorelands play an essential role in the ecological health of inland aquatic systems. Often described as encompassing an area 250 feet upland of the lake's mean water level and into the shallow waters or *littoral zone*, lake shorelands provide water bodies with a natural vegetative barrier that balances water flow, soil stability, and nutrient regulation. As such, protection of lake shorelands would include the maintenance or restoration of the natural condition of this area. This area is increasingly altered by human development allowing for

nutrient over-enrichment or “eutrophication” resulting in the degradation and loss of high-quality lakes (Leech et al., 2018), release of greenhouse gases (Beaulieu et al., 2019) and prevalence of toxic, algal blooms (Paerl, 2017). In the United States alone, 71% of lakes were considered moderately to highly disturbed (United States Environmental Protection Agency, 2012). Shoreline alteration was found to be a more influential indicator of ecological stress than that of eutrophication and acidification (Whittier et al., 2002). Consequently, habitat loss in freshwater environments has resulted in the loss of biodiversity at twice the rate of loss of land or ocean vertebrates (Tickner et al., 2020). Decisive action must be taken now if we hope to protect and restore these ecosystems.

Legislation to protect coastal shorelines already exists in most areas bordering the Pacific, Atlantic and Great Lakes regions and for similar reasons (e.g., shoreline stability, pollution mitigation, and habitat protection). It is necessary that shoreline protections be extended to inland surface waters to protect freshwater resources and secure water reliability. Actions to slow and reverse shoreland deterioration will be more successful if addressed in earlier stages of decline rather than for lakes that have significantly deteriorated in water quality. While voluntary compliance with lake shoreland protection and restoration efforts is encouraged, state and provincial regulation would be most effective at ensuring specific criteria are met and maintained. Furthermore, creating healthy lakes programs that implement best management practices (BMPs) which increase infiltration, stabilize banks, curb sediment and nutrient loading from stormwater runoff will not only restore water quality but will provide lake communities with adaptive tools helping them become more resilient to climate change.

Lake shoreland protection not only improves water quality but can prevent harm incurred by increased flooding due to climate change (Magee et al., 2019). Shoreline erosion often occurs

when native vegetation is replaced with turfgrasses and other non-native plants that are not well-suited to the stresses of the lakeshore. Historically, hard armoring (e.g., bulkheads, seawalls, dikes, revetments, tide-gates) has been used to prevent erosion along both coastal and lake shorelines from wind waves, seasonal water-level fluctuations and vessel traffic (Bilkovic et al., 2019). Although the negative impacts of shoreline armoring on lake ecosystems are numerous (Chhor et al., 2020; Dugan, 2006; Patrick et al., 2015), it offers a temporary sense of security for human communities, and may be further employed unless mandated otherwise. Furthermore, hard shoreline armoring is expensive, and it is likely that this structural cost will be embedded in construction costs, allowing only those who can afford increased housing prices to remain in place (Gould & Lewis, 2018). Devastating lake ecosystems to provide shorefront property is an environmental justice issue that can be remedied by other more resilient and equitable tactics. Identifying vulnerable lake waterbodies impacted by current and projected climate stressors will be central to this goal.

Protection of lake shorelands requires regionally specific management practices because lakes are as individual as the people around them. Lake morphology, geology, deposition of sediment, and water level fluctuation vary nationwide. Data gathered across heterogenous regions by local lake managers can help provide a framework for policymakers and researchers to address the unique and most immediate areas requiring attention. Additionally, by including in such assessments the social vulnerabilities of all community water users, local lake managers can ensure that equity issues surrounding current and future demands on water for drinking, recreation, and cultural purposes are not ignored. Furthermore, intentional effort must be made to ensure that the diversity of the community is reflected in the committees responsible for lake management, policy development and public outreach. Socially equitable and environmentally

just actions must combat gentrification, minimize pollutant exposure, ensure affordable housing, and provide public access to lakes. This further underscores the importance of supporting watershed-wide issues with funding appropriations specific to lake systems; lakes support the people, and we support the lakes.

NALMS Position on Shoreland Protection

- NALMS supports changes in the implementation of US EPA CWA policy to fully support waterbody management on an equal basis with the currently emphasized point-source and watershed controls. This can be accomplished through the restoration of Section 314 funding that should be enhanced with Healthy Lakes programming and environmental justice objectives.
- It is NALMS position that lake shorelands should be managed in a way that prioritizes the protection of its undeveloped condition. If shorelands have been altered, actions should be taken to restore shorelands to a heavily vegetated condition.
- It is NALMS position that protection and restoration of lake shoreland be prioritized with the goal of providing healthy lake water quality for the health and security of all community members.
- NALMS supports opportunities to identify and coordinate lake shoreland management with community partners at every step of the process.

Primary Objectives / Best Management Practices:

While lakes and reservoirs vary based on regionally specific characteristics, the biogeochemical processes influencing lake environments are widely understood. The following

shoreland management criteria are suggestions based on the universal effects they have on lake water quality. As such, they should be prioritized in the creation of local and state shoreland protection ordinances:

1. To effectively improve and safeguard the quality of public waters, lake shorelands should include a series of contiguous buffers that are protected from further development and encompass the littoral zone, shoreline, and provide a natural woodland area further upland. Existing dwellings and land uses should be screened as viewed from the water ensuring that the scenic beauty and essential ecosystem processes of the shoreline are maintained.
2. Purchasing the development rights through permanent conservation easements should be considered in undeveloped areas to minimize intensive residential and commercial development to protect lake watershed and shoreland areas.
3. A construction permitting process should be enacted and coordinated between regional agencies in accordance with environmental regulations to ensure further development of the shoreland is limited. Meeting with building contractors to provide education about the local shoreland ordinance is strongly encouraged.
4. Regular inspection and maintenance of all septic tanks installed around the shoreland, regardless of installation date, should be required to limit pollution of the waterbody from nutrients.
5. Restoration of lake shoreland must be actively pursued and includes but is not limited to the installation of:

a. Woody habitat structures, also known as “fish sticks,” throughout the littoral zone; utilizing whole trees grouped together, fish sticks mimic undeveloped shorelines that would otherwise provide fallen trees offering shelter, breeding areas, and longer, more resilient food chains for birds, fish, and other aquatic organisms

b. Brush, trees, and diverse ground cover restored heavily throughout designated shoreland areas

c. Runoff diversions that allow water to infiltrate the soil

d. Rock infiltration and rain gardens that provide filtration around dwellings before polluted runoff reaches lake water bodies

6. No chemicals, including pesticides, herbicides, or fertilizers of any kind, should be applied to ground, turf, or established vegetation unless applied by those licensed and/or permitted by the local jurisdictional authority.

7. Regional climate projections must be factored into local shoreland ordinances allowing lake communities to best prepare for the probability of increased precipitation, flooding and/or drought. Providing rivers access to floodplains through the restriction and/or transfer of dwellings outside flood prone areas is highly encouraged.

8. Lake monitoring should be included in all management/restoration efforts. Adaptive management requires data to ascertain the lake’s response to such actions, provide future modeling, and an accurate assessment of the program itself. Regular monitoring will also afford lake managers timely information on their lakes as they respond to current and unprecedented climatic shifts.

9. Property values will increase as lake water quality improves. It is imperative that the inflation of real estate values and/or rental prices be mitigated so that housing remains affordable to current residents.

10. Educational workshops incorporating diverse stakeholders to emphasize partnerships and exchange lessons among researchers, managers, and stakeholder groups should be offered to provide adaptive management tools throughout the ordinance process.

11. Cultural and ecosystem characterization studies should be completed by community stakeholders and incorporated into lake management strategies to ensure that a complete assessment of protection areas and measures have been identified. (An example of such includes the Lake Superior Manoomin study completed by The Wild Rice Initiative and NOAA in 2020)

Challenges Associated with Lake Shoreland Protection

Protection standards for water quality throughout North America are largely aimed at limiting pollutant discharges into water bodies, regulating quality standards for surface waters, and protecting the public from harmful contaminants. The Clean Water and Safe Drinking Water Acts enacted by the United States and Canada and the National Waters Law (*La Ley de Aguas Nacionales*) of Mexico provide guidance on managing pollutants, but amendments to (Washington Department of Ecology, 2020), lack of enforcement of (McCulligh, 2018), or protections excluding communities of color (Human Rights Watch, 2016; Morales, 2019) refute the efficacy of clean water standards.

Having a minimum level of protection at the federal level specifically for lake shorelands is necessary to ensure effective water quality management. Additionally, this affords protection to lake shorelands that cross state boundaries. Furthermore, as has occurred across North America, environmental regulation and deregulation at the federal level encourages the same at subordinate levels of government. Some states enact stronger legislation beyond federal minimums while others deregulate when administrative conditions allow for such reversals. For example, in 2020 the United States redefined “Waters of the United States" (WOTUS) which excluded many wetlands, stormwater fed streams, and other waterbodies from federal regulatory oversight (United States Environmental Protection Agency, 2021). This has allowed states the ability to amend water pollution control laws providing shortsighted agricultural exemptions. This ultimately puts critical shoreland habitat at risk of development as authorized protections and regulation developed by states and federal partners in such areas will no longer be permitted. The WOTUS ruling was overturned in the succeeding executive administration, demonstrating yet again the tenuous protection given to waterbodies.

State legislation may change or be repealed leaving the region devoid of oversight and relying upon voluntary action alone (e.g., Vermont Shoreland Protection Act, USA, 1970, 1975, 2003, 2014). While smaller lakes, ponds, reservoirs, and the ephemeral streams connecting them may be viewed as less productive in comparison to the Great Lakes of North America, they still harbor sensitive endemic species that have been or will become extirpated by water pollution (Svoboda & Gottgens, 2016). Likewise, when cutbacks to federal and state budgets occur, lake shoreland protection programs not mandated by law are subject to elimination, as transpired with the highly effective LakeSmart program in Maine in 2011 (In 2012, LakeSmart was revived, relying more heavily on local lake associations to administer the program).

Model Lake Shoreland Protection Programs and Legislation

It is crucial to the success of national water policy that healthy lakes programs are employed at the local, state, and regional levels empowering bottom-up decision-making processes and stakeholder engagement for land-use practices within their respective watersheds. State-run healthy lakes programs can be incredibly effective at surface water management and shoreland protection as exemplified by LakeSmart (Maine, USA), Healthy Lakes & Rivers (Wisconsin, USA), and Watersheds Canada, to name a few. By working at the grassroots level, local communities and cooperating state organizations can offer workshops, grants, and design support to build the capacity of state watershed groups. Effective programs have several practices in common and often succeed because of public engagement, community collaboration on habitat restoration projects, and comprehensive legislative planning.

The State of Wisconsin (USA) created their Healthy Lakes & Rivers initiative to assist state partners in becoming more effective at lakeshore habitat restoration and water quality enhancement. The initiative was based on stakeholder input, strategic planning processes, and driven by the EPA's National Lakes Assessments which identified habitat loss as a major stressor for declining lake health. This program offers property owners and professionals training, assistance and a streamlined grant application process to employ BMP's that restore habitat, as well as control runoff and erosion around lakeshores (Goggin & Toshner, 2016). The Wisconsin Healthy Lakes & Rivers initiative employs a streamlined and less bureaucratic grant application process through the Wisconsin Department of Natural Resources (WDNR), allowing local agencies to fund and manage lakes according to locally specific criteria. In 2020 alone, 173,000 square feet of area was restored across 622 properties and 30 counties.

The State of Washington (USA) implemented several bills to limit the impact of development on more than 28,000 miles of lake, stream, wetland, and marine shorelines. The Shoreline Management Act (1971) was passed with the overarching goal "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines" (*Shoreline Management Act*, 1971). Shorelands are included under the Act, extending protection 200 feet in all directions (as measured horizontally from the ordinary high-water mark) from designated streams, lakes, rivers, and tidal waters, encompassing floodways, contiguous floodplain areas, wetlands, and river deltas. Under the SMA, Shoreline Master Programs (SMPs) are prepared by more than 260 cities and counties to guide shoreline management based on local land-use practices and regulations. Localities are provided with guidance and technical assistance from the Washington State Department of Ecology to meet state shoreline protection objectives. SMPs are reviewed every eight years to assess program efficacy, encouraging adaptive management, and can be amended to include updates such as the "No Net Ecological Loss" inventory requirement in 2003. The Growth Management Act was passed in 1990 and works in tandem with the SMA to accommodate growth while reducing the impact of development on critical aquifer recharge areas and aquatic ecosystems.

Government regulations and amendments to current policy at the local level empower communities to protect water resources further still. While maintenance of septic or on-site sewage systems is not incorporated in Washington's SMA, tri-annual inspections and maintenance of these systems are required by many Washington counties, and mandated upon property transferal (*Chapter 246-272A WAC*, 2005). Regular septic maintenance is cost effective when compared to septic repair or replacement costs. Most importantly, regular septic maintenance reduces nutrient contamination to waterbodies, protecting water quality and public

health (Office of Wastewater U.S. EPA, 2021). In 2019, the State of Maine (USA) adopted a similar amendment to their Mandatory Shoreland Zoning Act stating that wastewater disposal systems within the shoreland zone (250 feet upland edge of freshwater wetland or 75 feet of stream high-water line) will be inspected, repaired, and/or replaced within nine months upon property transferal (*Title 30-A, §4216: Transfers of Shoreland Property*, 2019).

In lieu of legislation, but sometimes included within it [e.g., Canada's Environmental Protection and Enhancement Act (2000), Alberta Land Stewardship Act (2009)], conservation easements are another tool used across North America to permanently limit land-use activities for the sake of its conservation. Often at a lower cost to land trusts and public agencies, landowners enter a contractual agreement with a land trust or government agency to permanently protect the ecological integrity and public benefits provided by their land. In Mexico, non-governmental organizations can be integral to achieving such protections. In 1998, Pronatura México Asociación Civil established the first conservation easement in Mexico, designating four zones of land-use ranging from "multiple uses" to "complete conservation" across 306.74 total hectares. Since then, thousands of hectares have been conserved by easements through Pronatura (Pronatura Sur A.C., 2011), but the scale to which water pollution and withdrawal exists across Mexico requires broad regional and national effort (Llano, 2021; Raúl González Pérez et al., 2018).

The Minnesota Board of Water and Soil Resources' "One Watershed, One Plan" is an inclusive example of shoreland management, conservation easement, and water planning success. In accordance with state law, the One Watershed, One Plan aligns local water planning with a watershed-wide, science-based approach. The plan goes further to advocate for waterbody protection rather than restoration, acknowledging the greater efficacy of water planning to that

aim. The plan builds off existing local government structures, water plan services, and local capacity. Approved watershed plans must: address surface and ground water quality with inclusions for erosion prevention and soil transport; assist groundwater recharge; minimize public capital expenditures needed to correct flooding and water quality issues; identify priority areas for riparian zone management and buffers; promote wetland enhancement; and prioritize habitat protection (Minnesota Board of Water and Soil Resources, 2021).

Lake shoreland protection practices are numerous though not ubiquitous. They are varied yet founded on lake system science and might be most successful when the community is a part of the solution. It is recommended that shoreland protection policies be implemented wherever there are lakes and that they include the aforementioned BMPs. Existing legislation can be improved by including tri-annual septic maintenance around waterbodies as well as prescribing regular lake monitoring practices. Engaging all water users in the development of communal practices will harness our collective power and remind us of the responsibility we all share in caring for our lakes.

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