

Mohawk River Basin Research Initiative 2014-2016

In 2009 the New York Ocean and Great Lakes Ecosystem Council issued a report entitled *“Our Waters, Our Communities, Our Futures”* which recommended an ecosystem-based management approach to watershed planning as a means to best manage natural resources and human activities for a sustainable future. In response to this report, the New York State Department of Environmental Conservation (DEC) initiated a focused effort targeted at conserving, preserving, and restoring the environmental quality of the Mohawk River and its watershed while at the same time helping to manage the resources of the region for a sustainable future. The Mohawk River Basin Program was established to achieve these goals. Furthering the management goals of the Mohawk River Basin Program, under direction from Governor Andrew Cuomo in 2012, a multi-agency *“Mighty Waters Working Group”* was established, creating a partnership between the Department of Environmental Conservation (DEC), the Department of State (DOS) and Congressman Paul Tonko’s Mighty Waters Conference. The goal of the working group is to promote community revitalization, environmental sustainability, and flood-hazard risk reduction in the Mohawk River Watershed. The success of these programs requires the involvement of stakeholders and creation of partnerships with established programs and organizations throughout the watershed.

At the heart of these partnerships is the Mohawk River Basin Action Agenda. Developed by the DEC and its partners, the Mohawk River Basin Action Agenda (http://www.dec.ny.gov/docs/water_pdf/mohawkactagenda.pdf) provides the guiding principles and management goals necessary to promote unified coordination of environmental and cultural resource management in the Mohawk River Basin. The Mohawk River Basin Action Agenda contains a series of goals and objectives within five core management areas which serve as benchmarks by which ecosystem-based management activities for the basin have been defined. These five areas are as follows:

1. Fish, Wildlife and Habitats
2. Water Quality
3. Flood Hazard Risk Reduction
4. Community Planning and Revitalization
5. Working Landscapes, Land Use and Open Space

While the Action Agenda serves as a management document for the basin, providing specific guidance within the watershed, information gaps exist preventing its implementation in certain areas. Understanding this limitation the DEC’s Mohawk River Basin Program and its partners at Union College, Cornell University’s Water Resources Institute, and the United States Geological Survey hosted a day long workshop on the Union College campus in Schenectady, New York on March 20th, 2014. This workshop brought together over 50 regional experts from academia, government, non-profit, and private organizations to identify specific research needs and

address filling data gaps in the Mohawk River Basin. The overall purpose of the workshop was to compile the opinions of these diverse experts into a “Research Initiative” document.

The results of the workshop are presented in the pages that follow. This document, which we refer to as the “Mohawk River Basin Research Initiative” now provides the most important areas of research needed throughout the Mohawk River Basin to help further the collective accomplishment of goals in the Mohawk River Basin Action Agenda. The Research Initiative is an important next step in moving forward in the Mohawk River Basin by directing and establishing a broad spectrum of primary and applied research themes for each of the goals of the Action Agenda. In turn this document will provide the tools necessary to best manage and focus funding and resources in the Mohawk River Basin. The research initiative is meant as a complimentary document to the Mohawk River Basin Action Agenda. The Mohawk River Basin Program hopes researchers working in the Mohawk River Basin will find this document useful in directing their research.

Mohawk River Basin Research Priorities 2014-2016

Fish, Wildlife, and Habitats

The conservation of fish and wildlife resources in the Mohawk River Basin is dependent upon maintaining and (or) improving the quality of riverine (and terrestrial) habitat. Habitat protection, enhancement, and restoration in the basin will require increased knowledge and understanding of: 1) the current status of aquatic (and terrestrial) ecosystems, 2) the effects of climate change, invasive species, and changing land use on important natural resources, and 3) the relations between key resources and the physical, chemical, and biological factors which affect them. Improving public understanding and awareness of interrelated resources and the economic value of such resources is also important to the conservation efforts in the Mohawk Basin.

Research areas (not ordered by priority)

- Inventory, monitor, and assess the condition of important fish, wildlife, and habitat resources; define functional relationships between these resources (e.g., species population, community, ecosystem) and key drivers/stressors (e.g., temperature, discharge, water quality) at the basin, river, tributary, or reach levels. Such efforts may include process-oriented research on trophic (energy) pathways, food webs, and important interactions.
- Produce an economic valuation of species, assemblages, and ecosystems (ecosystem services) that are important to sporting, recreation, and subsistence.
- Survey, classify, and inventory the quality of habitats within the Mohawk River Basin. Prioritize those in need of either protection (high-quality and threatened) or restoration

(impaired). Reference condition areas may be identified and used in long term monitoring programs.

- Inventory the distribution and health of populations of species of greatest conservation need (SGCN) as well as entire terrestrial or aquatic ecosystems throughout the watershed.
- Assess the effectiveness of habitat restoration projects on targeted resources and on ancillary processes (emphasis on functional benefits to ecosystems).
- Assess and model the effects of altered hydrology on the health of species populations, communities, or ecosystems in the Mohawk River Basin. This area of research encompasses topics such as characterization of flow-regime features and prediction of future changes in hydrology for the purpose of maintaining healthy species assemblages and entire ecosystems.
- Assess the susceptibility and resiliency of important natural resources (e.g., species populations, communities, ecosystems, water quality, discharge, forest health) in the Mohawk River Basin to the effects of climate change. This may include analysis of adaptation and mitigation strategies and resources.
- Assess and model (mechanistic or predictive) the effects of changing nutrient concentrations and deposition rates for atmospheric pollutants (e.g., NO_x, SO_x, and Hg) on terrestrial and aquatic ecosystems and (or) important species or assemblages within the basin.
- Research the value and costs associated with the effects of invasive species and the best management practices for impeding such species. Track and monitor the movement of invasive species and research methods to reduce bi-directional species introductions and their spread in the Mohawk River.

Water Quality

Protecting and improving water quality within the Mohawk River Basin requires a better understanding of current conditions which include natural sources (such as suspended sediments) and anthropogenic degradation caused by past, present, emerging, and stormwater contaminants. Understanding the extent, persistence, and effects of these contaminants and their sources across the basin will help improve and prioritize restoration activities. Awareness of contaminant risks to human health can be better achieved through improved communication with the public and policy makers.

Research areas (not ordered by priority)

- Identify the occurrence, distribution and effects of past, present, emerging and stormwater contaminants on human health and on aquatic and terrestrial ecosystems. Investigate the effectiveness of mitigation strategies.
- Quantify the sources, and loading, of suspended sediments within tributaries and the main-stem Mohawk River to provide information needed to help control or limit the impacts of excessive sediment loads on natural resources across the basin.
- Identify and assess the effectiveness of public notification systems in the Mohawk River basin relative to public health risks to drinking water supplies and recreation.
- Research and analyze risks to water quality related to agricultural and forested land-use.
- Explore the effects of water withdrawals on water quality in the Mohawk River basin.
- Locate and characterize pristine watershed conditions throughout the Mohawk River basin.

Flooding

Flood hazards in the Mohawk River basin are influenced by watershed and meteorological factors including stream and river channel regulation, flood plain conveyance and constriction, ice jam formation, and storm dynamics. The effects of flooding and efforts to reduce flood hazards can adversely impact important cultural, recreational, economic and environmental assets. Development of strategies to reduce flood risks and improve resiliency after flooding requires investigation of the parameters defining the Mohawk River watershed.

Research areas (not ordered by priority)

- Research the impacts of dams and reservoirs on flood inundation. For example, the effects of water level management or flow constrictions.
- Investigate and analyze the role of flood plains historically in the Mohawk River basin and whether development has impacted flood severity and occurrence. Evaluate the impacts of reconnecting flood plains.
- Research the role of ice dynamics on flooding in the Mohawk River basin.
- Develop agent-based flood modeling with scenarios that allow certain areas to flood in order to protect natural and human resources in others areas. For example, to protect farm fields during harvest, fish spawning habitat in the spring or critical structures all year round by allowing flood inundation in less sensitive areas.
- Identify the sources, transport and deposit of sediment throughout the Mohawk River basin to better understand the role sediment plays on flooding.
- Investigate and inventory flood impacted structures in the Mohawk River basin. Identify those structures which are cases of repetitive loss. Compare and contrast this inventory with flood mitigated structures and those still unresolved.
- Evaluate the use of outreach and educational programs in post flood awareness efforts to reduce community risks/vulnerability to future flood events.