

Background:

Traditional Ecological Knowledge (TEK) is an evolving subset of Indigenous and local knowledge acquired through direct contact with the environment. It is passed on orally through cultural traditions such as arts, crafts, and ceremonies (Martin, 2010). TEK has proven effective in various environments, including Australia (Brown, 2018) and Chile (Acuna and Tironi, 2022).The Bronx River spans twenty-three miles, from the Kensico Dam in Westchester to the East River in the South Bronx. Before Henry Hudson’s arrival, it was home to the Native American Tribes Siwanoy (east bank) and Weekguasegeeks (west bank), along with abundant local flora and fauna. In the late 17th and early 18th centuries, settlers such as Jonas Bronc and Thomas Pell acquired land along the river through treaties. By the early 1700s, twelve mills used its flow for power.The 18th and 19th centuries saw the decline of Indigenous groups and the rise of industry. As mills closed and industry grew, the Bronx River became a dumping ground for waste. Once a drinking source and vibrant ecosystem, it later become an “open sewer.” Early restoration began during the Progressive Era but waned mid-20th century with further urbanization. Efforts resumed in the 1970s, and while progress has been made, the river still suffers from poor water quality, droughts, and low biodiversity (Scarsdale Historical Society, 2024).



Historic Pelham

Research Objectives:

Motivation:

Being New York City’s only freshwater flowing river, the Bronx River has become a vital greenspace and recreational area for adjacent communities. Through this literature-focused research, we aim to provide additional suggestions on sustainable water and environmental management based on analysis of TEK.

Research Questions:

- How has the Bronx River changed throughout colonization and industrialisation?
- How can the integration of Traditional Ecological Knowledge into modern Western management efforts help protect, remediate and reclaim the Bronx River in NYC?

Methods:

- I. Literature review: research and reading on TEK and history of Bronx River
- II. Site visit (museum): Visit National Museum of the American Indian to get comprehensive understanding of relationship between Native American and environment
- III. ArcGIS: Develop Story Map based using available data
- IV. Data Collection and Analysis: Drought and water quality data was obtained using USGS and NYC Open Source Datasets.
- V. Statistical Analysis: Graphical depiction and interpretation of the analyzed data

Study Area and Data:



New York Botanical Garden Bifold

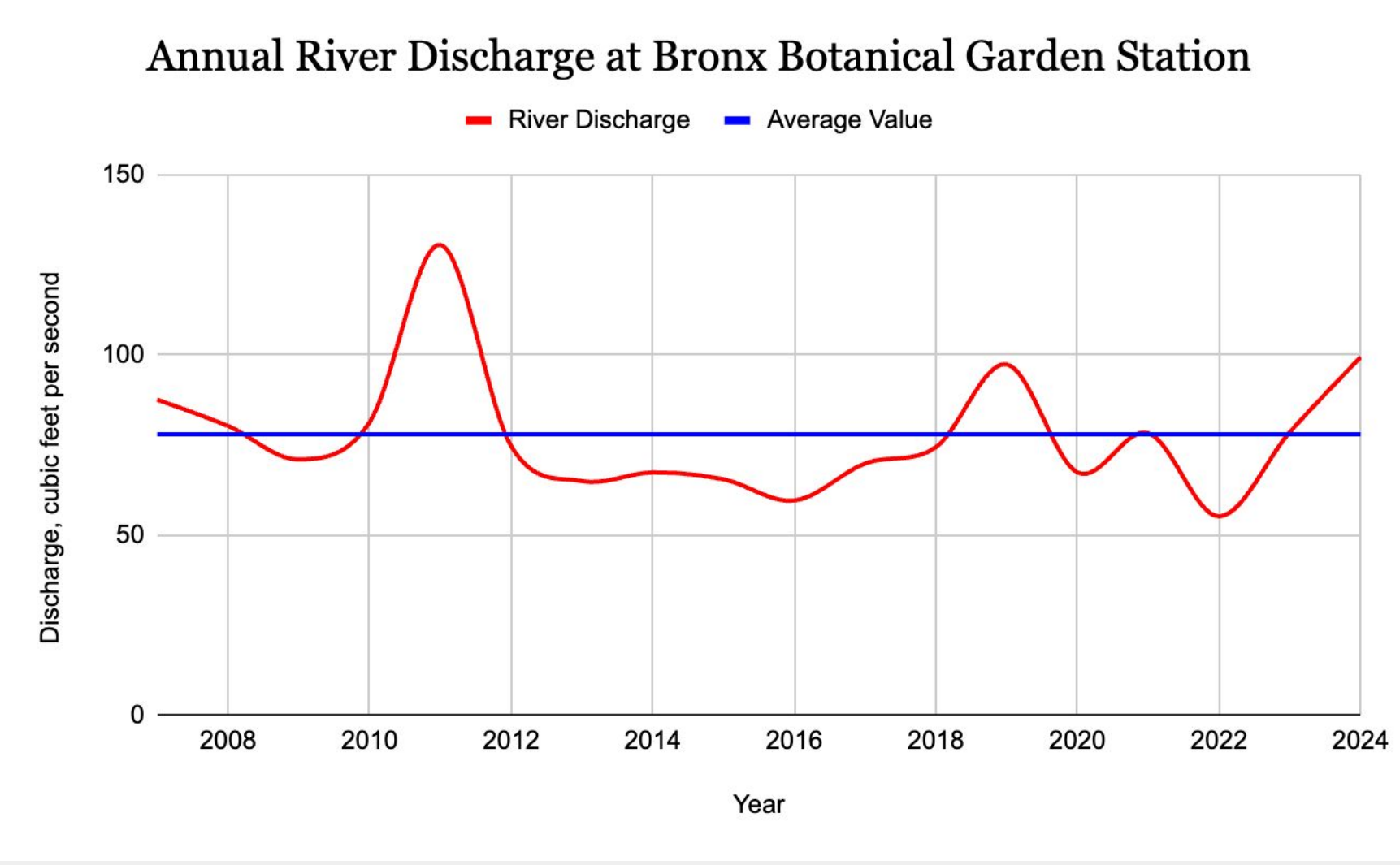


Two Study areas are (1) The Bronx Botanical Gardens (USGS-01302020) and (2) 233rd and Bronx River (BR1)



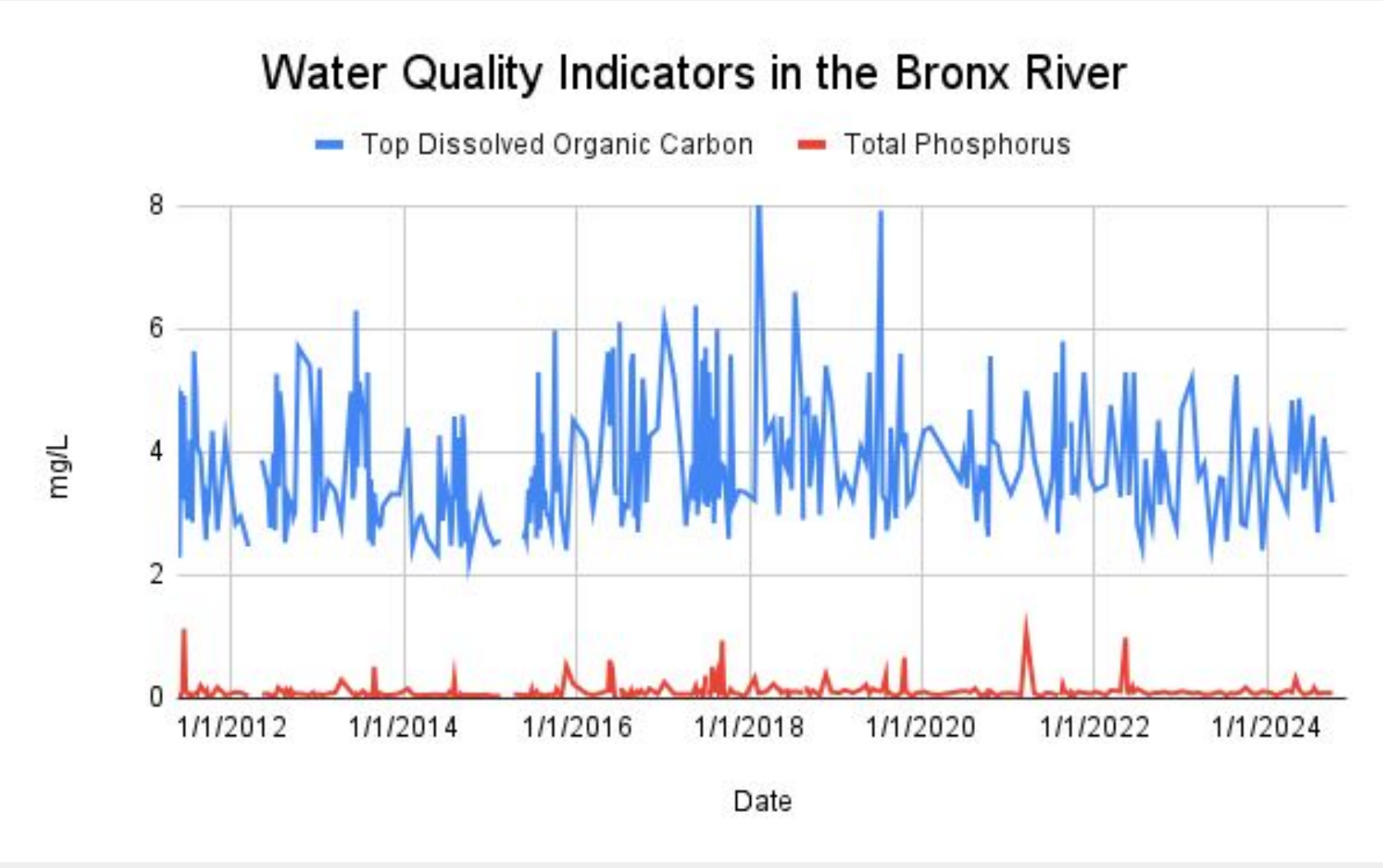
NYC Parks

Results and Observations:



Source: USGS

A notable drought occurred from 2012- 2018. Droughts can increase pollution susceptibility and decrease surface dissolved oxygen, hurting wildlife

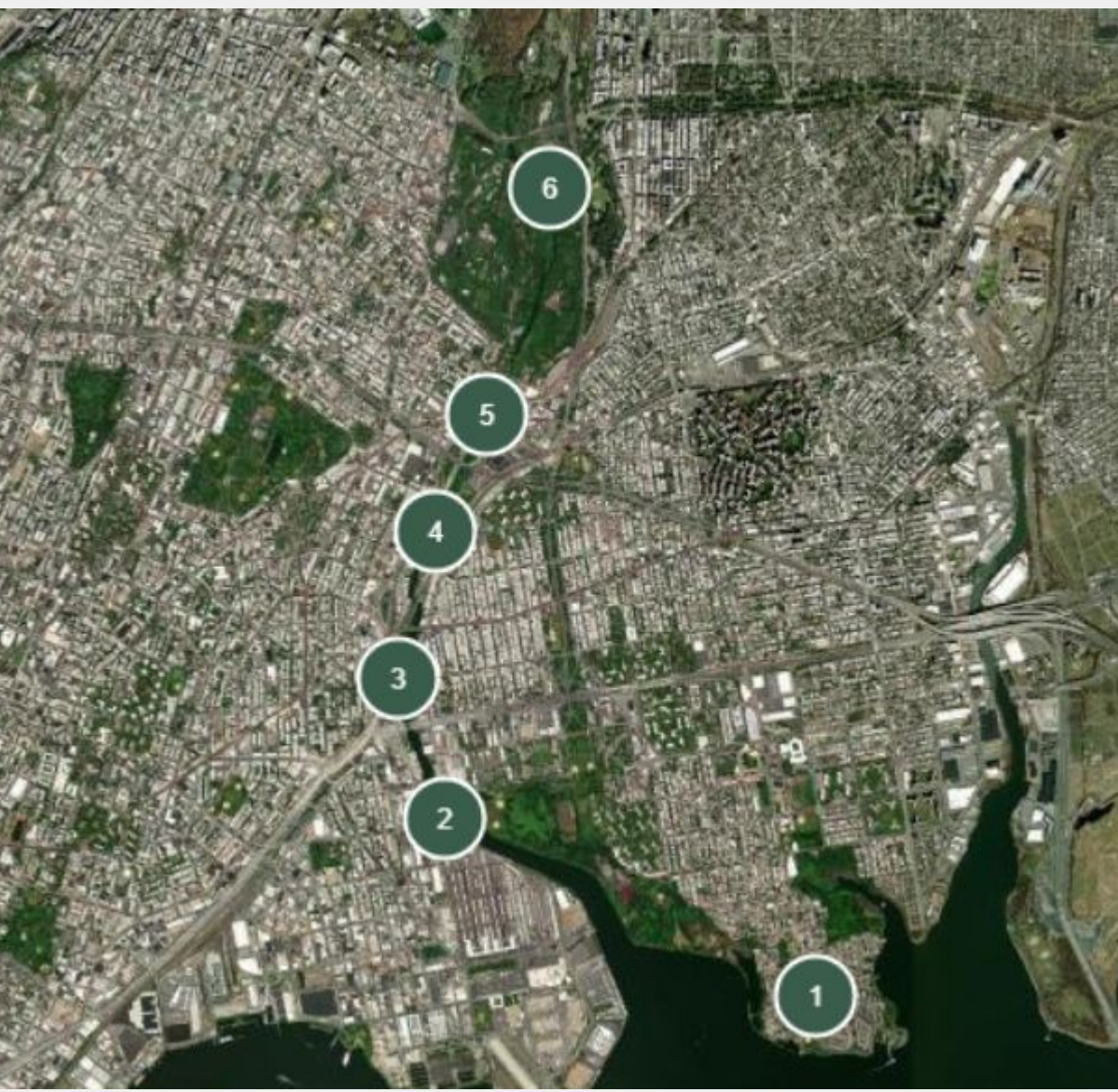


Source: NYC Open Data

Top Dissolved Organic Carbon and Total Phosphorus are above recommendations for drinking water

Discussion and Limitations:

- Traditional Ecological Knowledge (TEK) offers sustainable, long-term insights rooted in Indigenous practices.
- Poor water quality indicators increased during periods of drought and levels continue to exceed the recommended for drinking water.
- The Siwanoy and Weekguasegeeks tribal communities lived sustainably along the river for centuries, showing the value of TEK in managing ecosystems. In Australia, TEK helped interpret mangrove loss in the Maroochy River-revealing long-term impacts of colonization that remote sensing alone couldn’t capture. Similarly, TEK can guide more holistic and culturally grounded solutions for the Bronx River.
- TEK is not recorded in the traditional sense, thus interviews and questionnaires with Indigenous groups would be required.



Source: Esri World Imagery

- Legend:
- 1.Clason Point
 - 2.Hunts Point
 - 3.Concrete Plant Park
 - 4.Starlight Park
 - 5.The Bronx River Art Center
 - 6.Bronx Zoo

Conclusions:

- Indigenous communities were able to practice sustainability by living in harmony with the river, but colonization, industrialization, and urbanization drastically disrupted the Bronx River Ecosystem
- There is a major gap in data regarding both TEK and the Bronx River Ecosystem
- Current restoration efforts undertaken by the Bronx River Alliance, government agencies, and local organizations to restore the Bronx River Ecosystem could greatly benefit through integration of TEK would greatly benefit these efforts

References:

About the Bronx River. (2025). Mit.edu. https://web.mit.edu/nature/archive/student_projects/cgrass/river_history.htm

Acuna, V., & Tironi, M. (2022). Extractivist droughts: Indigenous hydrosocial endurance in Quilagua, Chile. *The Extractive Industries and Society*, 9(101027), 101027. <https://doi.org/10.1016/j.exis.2021.101027>

Beavers. (n.d.). Wwn.nyc.gov. <https://www.nyc.gov/site/wildlifeny/animals/beavers.page>

Bronx River - DEP. (n.d.). Wwn.nyc.gov. <https://www.nyc.gov/site/dep/water/bronx-river.page>

BRONX RIVER AT NY BOTANICAL GARDEN AT BRONX NY. (2021). Usgs.gov. <https://waterdata.usgs.gov/monitoring-location/USGS-01302020#data?period=coninuous-00065-0&period=P7D>

Bronx River History. (2025). Thirteen.org. <https://www.thirteen.org/edonline/studentstake/water/BronxRiver/bronxriverhistory.htm>

Bronx River Park 233rd Street Bikeway Reconstruction : NYC Parks. (2015). Nycgovparks.org. <https://www.nycgovparks.org/planning-and-building/capital-project-tracker/project/6158>

Brown, M. I., Pearce, T., Leon, J., Sidle, R., & Wilson, R. (2018). Using remote sensing and traditional ecological knowledge (TEK) to understand mangrove change on the Maroochy River, Queensland, Australia. *Applied Geography*, 94, 71–83. <https://doi.org/10.1016/j.apgeog.2018.03.006>

Concrete Plant Park Highlights : NYC Parks. (2017). Nycgovparks.org. <https://www.nycgovparks.org/parks/concrete-plant-park/history>

–Finewood, M. H., Diamond Ebanks Holloman, Luebke, M. A., & Leach, S. (2023). The Bronx River and Environmental Justice Through the Lens of a Watershed. *Case Studies in the Environment*, 7(1). <https://doi.org/10.1525/cse.2023.1824941>

Harbor Water Quality | NYC Open Data. (2015, January 29). Data.cityofnewyork.us. https://data.cityofnewyork.us/Environment/Harbor-Water-Quality/Suag-f49n/about_data

History on the Half-Shell: The Story of New York City and Its Oysters. (n.d.). The New York Public Library. <https://www.nypl.org/blog/2011/06/01/history-half-shell-intertwined-story-new-york-city-and-its-oysters>

Martin, J. F., Roy, E. D., Diemont, S. A. W., & Ferguson, B. G. (2010). Traditional Ecological Knowledge (TEK): Ideas, inspiration, and designs for ecological engineering. *Ecological Engineering*, 34(7), 839–849. <https://doi.org/10.1016/j.ecoeng.2010.04.001>

Press Releases : NYC Parks. (2021). Nycgovparks.org. <https://www.nycgovparks.org/news/press-releases?id=21827>

The story of how the Bronx got its name. (2022, September 23). Ephemeral New York. <https://ephemeralnewyork.wordpress.com/2022/09/23/the-story-of-how-the-bronx-got-its-name/>

Topping, L. (2018). *Scarsdale Historical Society*: Scarsdale Historical Society. <https://www.scarsdalehistoricalsociety.org/bronx-river>

Tribal Council of the Siwanoy Nation - Tribal History. (n.d.). Wwn.siwanoyation.org. <https://www.siwanoyation.org/tribal-history>

<https://www.nycgovparks.org/parks/concrete-plant-park/history>