Bronx River Alliance Education

WALKING THE BRONX RIVER

Best For Grades:
3-8

NYS Science Learning Standards:
3-LS4-3, 3-LS4-4
4-LS1-1, 4-ESS1-1
4-ESS2-1, 4-ESS3-2
5-LS2-1, 5-ESS2-1
5-ESS2-2, 5-ESS3-1

MS-LS2-1, MS-LS2-3
MS-LS2-2, MS-LS2-5
MS-LS1-4, MS-LS1-5
MS-ESS3-4

Skills:
Observation, verbal communication, physical fitness

OBJECTIVE:

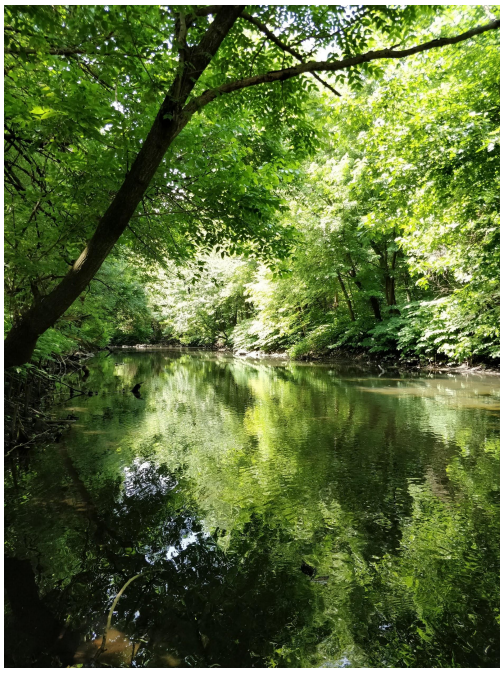
This outdoor experience teaches students all about the qualities and benefits of an urban floodplain forest. Students will know where the Bronx River and its forest floodplains are located. Students will understand the key components and interactions in this forest floodplain ecosystem and the importance of the forest and floodplain to the health of the Bronx River. Students will understand why a floodplain is important, and be able to explain the benefits of this restoration project.

MATERIALS:

For Alliance Staff: Laminated leaves, map of Bronx River Forest
For Teachers & Parents: Comfortable and sturdy shoes, long pants, bug spray, water, hat

ACTIVITY SUMMARY:

Students will take a 90 minute walk, with several stops, along the Bronx River Forest Floodplain Trail (between Burke Bridge and Kazimiroff Boulevard) to explore this restored area and make observations about the river, forest, floodplain and nearby urban development and their interconnectedness.



Information for Teachers and Parents:

- The trail is mostly flat. There are a few inclines and large steps.
- There is a high likelihood of mud on the trail. Alliance staff will do their best to avoid muddy areas, but it is strongly advised that participants wear shoes that can get wet and dirty.
- The hike includes multiple stops and breaks. Participants should eat breakfast in the morning to ensure energy.

BACKGROUND INFORMATION:

Overview

The Bronx River Forest is one of the oldest forests in New York City and a remnant of the magnificent hardwood forest that once blanketed the region. Located in a wide, flat section of the Bronx River Valley, the forest is also one of the last functioning floodplains along the river and in all of New York City.

The Bronx River Forest includes tulip poplars, red maple, red oak, American sycamore, and American beech. For centuries, the river and forest have served as a bird migration route and are home to a wide variety of other wildlife including heron, muskrat, beaver, and turtle.

Bronx River Forest History

By the late 1700s, substantial European immigrant settlements began to arise in the Bronx, particularly along the river, where the land was the most fertile and the energy of the river could be harnessed to power mills. In the 1860s, the area west of the Bronx River Forest, now known as Norwood, became an enclave for French immigrants. Charley Mangin owned a restaurant there known as “French Charley”—now the name of the parkhouse and playground next to the Allerton Ballfields.

Much of the Bronx River Forest north of Kazimiroff was an active floodplain. Imagine a floodplain as a bathtub with a sponge at the bottom. A floodplain absorbs and filters the river’s overflow during periods of heavy precipitation. A **floodplain** is a wide, shallow area that surrounds a river. By providing an area for excess water to collect and by releasing this water slowly, floodplains mitigate flooding in nearby areas, improve water quality, and increase the river’s flow during dry periods. They also support a diverse community of plants and animals that have adapted to the river’s periodic flooding, such as sycamores, red winged blackbirds, and muskrats on the Bronx River.

Development in the Bronx has affected the health of the river and the functioning of the Bronx River Forest floodplain. However, the challenges are being met by a host of dedicated organizations and individuals, and improvements have been made.

Challenges

Throughout the history of New York City, the forest and river have offered residents a peaceful refuge from the busy city. However, today the Bronx River and the few remaining forests along its

banks are recovering from decades of abuse and neglect. Most of the original forest has been cut down for wood and development activity. The river is constricted by roads and train tracks, degraded by litter and illegal dumping, and made rigid by concrete walls and rock.

A constant challenge to efforts to restore the river is upstream and upslope storm water management in the landscape. Paved and concrete surfaces cause storm water to rush directly into the river, without first being absorbed by the land—a process that both filters the water and slows down its flow. Without this filtering process, pollutants flow directly into the river, and the intensity and frequency of floods increases erosion of the riverbank. This eroded sediment is deposited downstream, smothering habitat in the stream channel and covering riverside paths. Japanese knotweed, an invasive plant, thrives in areas of sediment deposition, and these large, leafy plants crowd out the native plants that have survived excessive silting. Further, sediment that builds up on the banks prevents floodwaters from being able to spread out across the floodplain.

Turning the Tide

The Natural Resources Group of the New York City Department of Parks & Recreation (NRG) re-constructed sections of the Bronx River Forest floodplain and river channel in 2005 with funding from the New York State Clean Air/Clean Water Bond Act. The project has restored the important functions of the floodplain by removing sediment deposits on the banks, increased its ability to store and filter floodwater, and enhanced native habitat. Pathways and boardwalks throughout the forest provide people with the chance to enjoy one of New York City's most valuable natural treasures.

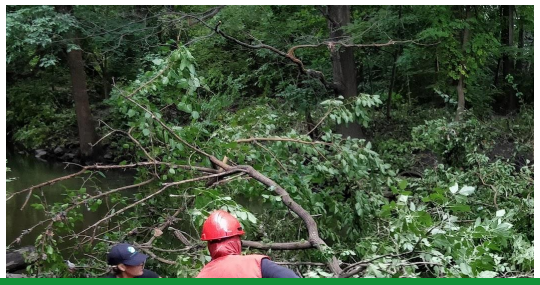
History of Organizational Involvement in the Bronx River Forest

Bronx Council on Environmental Quality (BCEQ) brought the idea for floodplain restoration to the Bronx River Working Group (precursor to the Bronx River Alliance). BRWG identified this as a priority project, and NRG led the Floodplain Restoration implementation.

Continued Ecological Restoration and Management

The Bronx River Conservation Crew continues to work in the Bronx River Forest regularly to perform activities such as:

- Upland restoration: plantings, invasive species removal, habitat enhancement, run-off control, and monitoring (water quality, soil, vegetation);



- In-water restoration: bank stabilization, erosion control, and aquatic habitat improvement (fish, birds, amphibians, mammals);
- Education: collaborates with the Alliance Education Program to involve youth in these projects, to help them learn about job opportunities, the importance of the urban environment to them, and to help create future stewards of the river;
- Outreach: collaborates with the Outreach and Education Programs to involve the community in projects along the river and provide safe access.

Other groups such as Bronx River Restoration, Neighborhood Initiatives Development Corporation, and the Mosholu Preservation Corporation have contributed countless hours to the improvement of the Bronx River Forest over the years.

Flora and Fauna

Some native trees that make up the riparian woodland ecosystem of the Bronx River Forest include cottonwood, red osier dogwood, American sycamore, red maple, silver maple, river birch, pussy willow, black willow, pin oak, swamp white oak, box elder, grey birch, American beech, witch hazel, tulip poplar, and magnolia.

Some common native animals include mallards, northern cardinals, great egrets, crayfish, leeches, sunfish, a diverse array of pollinators including ruby-throated hummingbirds and monarch butterflies (seasonally), opossums, eastern chipmunks, eastern gray squirrels, and migratory birds including warblers, tanagers, and orioles (spring and fall.)

PROCEDURE

Route: From Burke Avenue west to Burke Avenue Bridge, south on west trail to Kazimiroff Boulevard, to East Trail then return to Burke Avenue. Total Distance: 1.10 miles. Note that route may vary based on trail conditions. Alliance staff walk the route 1-2 days before events to check conditions.

You can review the route on this map: https://arcg.is/1iuWTv0

1. Arrival

   The group meets at Burke Avenue and Bronx Park East. We gather at the entrance to Bronx Park and talk about the history and background of the Bronx River. Safety rules are reviewed, including:

   a. When required, students must walk in single file
   b. No going off-trail
   c. Use “inside voices” to avoid scaring wildlife
   d. Do not touch any plant or animal unless specifically instructed to do so by Alliance staff
   e. Do not pick flowers, leaves, or fruits off trees (save it for the animals!)
   f. Do not litter!

   2. We divide the class into small groups. Each group receives a laminated leaf and the students are encouraged to find a matching leaf.

Sample Talking Points/Highlights of Walk

1. The Bronx River’s Context and History

Context: Where are we?

- Remind students that they are on the Bronx River, which begins near the Kensico Reservoir in Valhalla, NY (Westchester County), down into the Bronx and empties into the East River, which is confluent with the Long Island Sound at Throgs Neck. This connects the Bronx River to the New York-New Jersey Harbor Estuary.
- In Bronx County, the river flows for eight miles through Muskrat Cove, Bronx Park, the New York Botanical Garden (NYBG), the Bronx Zoo, West Farms, Starlight Park, Concrete Plant Park, Hunts Point and Soundview. Standing on Burke Bridge, you are just north of the New York Botanical Garden, which also contains part of the Bronx River Forest.
- The forest is one of the oldest in NYC—a remnant of the old-growth hardwood forest found before European settlement in the area. It has taken a long time for this forest to grow; some of the trees are well over 100 years old! Although we can replant trees in areas where they have been cut down, we can never replace the fragile ecosystem of an old growth forest once it has been destroyed. Most of these forests have been cut because of development, and they are endangered ecosystems.
- Students are standing on the original roadbed of the Bronx River Parkway. The road was altered in the late 1940’s to its current configuration.

Bronx River Forest History Notes

- The Bronx River once wound through floodplain forests, wetlands, beaver ponds, and bedrock ravines, and ended in an expanse of salt marsh at the East River. Many of these features were lost as the river was straightened and filled to make way for development and highways, and dammed to provide waterpower to small industry or for other uses.
- A mill and canal were once located in the Bronx River Forest, for example, and three dams exist downstream today.
- Construction of a dam near the Snuff Mill, in what is now the New York Botanical Garden, increased flooding upstream.
- The "modern" configuration of the Bronx River Parkway, finished in the 1940's, filled over 10 acres of floodplain through the center of the forest.
- At its worst, the Bronx River was treated as an open sewer, but the degraded water quality of the river improved with better regulations in the late 1990's. River habitat continued to degrade, however, with high sediment loads from upstream, frequent flash floods after storms, and loss of adjacent woody vegetation.
- Paving and development throughout the watershed also reduced water infiltration through the soil to the groundwater and channel, thus lowering seasonal water levels in the river and reducing habitat.
- For more information about the Bronx River Parkway visit this website: http://www.westchesterarchives.com/BRPR/BRPRHome.html.

In the last 30 years, major steps have been taken to restore the river and its resources. The Bronx River Alliance now works in conjunction with the NRG and many partner organizations to plan and implement the ecological restoration and management of the area.

CAUTION! Poison ivy grows in abundance along Burke Bridge and elsewhere throughout the forest. Show students how to identify it, remind them to be careful and tell them ways to treat the rash if they come into contact with it.

2. Floodplain Overlook (Old Cricket Field)

Example of a Restored Floodplain

From here, we walk to the northwest end of Burke Bridge for a view of one of the restored floodplains.

- This area was a cricket (type of ballgame) field, which has been relocated to another park to balance recreation and ecological restoration.
- NRG led the restoration of the Bronx River Forest floodplain and river channel (see Background Information). Point out NRG's Forest Floodplain Interpretive Sign illustrating the restoration work. The low-lying, frequently flooded field to your left was reclaimed for the forest. Fill was excavated from the floodplain to re-connect it to the river, and it was planted with floodplain shrubs, trees and grasses, which can have an advantage over exotic species in wetter soils.
- Now as a floodplain, this area will allow the river to naturally flood its banks and improve water quality.
- Demonstration: ask the tallest student in the class to stand next to the trunk of a tree. Then, explain that in the aftermath of Hurricane Ida, said student would have been underwater.

3. Woody Debris: Why don't we clean it up?

From the southwestern side of Burke Bridge, start walking south down the western side of the loop trail. Just south of the entrance to the path, we will start to see fallen woody debris.

- Some debris is good for the forest ecosystem. Fallen dead trees decompose to become part of the nutrient soil. They also act as habitat for snakes, mice, and other animals. Standing dead trees, called snags, are also healthy for the forest ecosystem. They provide habitat for woodpeckers and flying squirrels. There are some good snags on the eastern side of the loop trail.
- In the stream channel, large woody debris can block and slow flow, providing refuge for aquatic life during ravaging floods. Woody debris also provides cover and protection during low flow periods in the river.

4. The Shape of the River

Walk along the bank of the river, stopping frequently at vistas of the river.

- A natural river snakes and curves, carving a path through the floodplain it has created with the sediment it has deposited. In the 1940's, the Bronx River was straightened to make room for the modern Bronx River Parkway. With fewer bends to dissipate flood flow energy, the floodwater moves more quickly, obliterating pools and other channel bedforms that provide habitat to aquatic organisms. In an effort to slow water down, minimize erosion and create diverse habitats, a few techniques were used in the restoration effort:

- Boulder Vanes: These piled rock extensions along the river bank were constructed to create obstructions in the flow path, deflecting flow away from the banks towards the center of the channel, slowing flow to provide fish refuge areas during high flow, and providing shade, hiding spots and pockets of deeper water during low flow. These changes in the river can provide a more heterogeneous habitat to help support a greater diversity of species.
- Coir logs are made from the fibrous material from the husk of the coconut, bound into tight cylindrical logs. These are staked into the banks to stabilize them and reduce erosion. They are planted so water-loving vegetation can grow and help to further stabilize the bank as the coir logs biodegrade over time.

5. Layers of the Forest

A forest is made up of many layers. Starting at the bottom and working up, the main layers of all forest types are the litter, herbaceous/fern, shrub, understory, and canopy. Identify as many layers as you can in the Bronx River Forest. Guiding question for students: *Do you think this is a healthy forest? What qualities appear to you as healthy?*

- Litter: The forest floor is made of decomposing leaves, animal droppings, and dead trees and animals. All of these decay on the forest floor, create new soil and provide nutrients for the plants. Growing out of the forest floor are ferns, grasses, fungi, mosses, lichens, and tree seedlings.
- Herbaceous/Fern: Since this layer is so low to the ground, the leaves must grow and gather sunlight early in the season before the understory and canopy shade this layer.
- Shrub: This easy to access layer provides food for animals which in turn disseminate the seeds in their feces.
- Understory: Bushes, mature shrubs, and small trees and saplings that have adapted to living in the shade of the canopy make up the forest's understory.
- Canopy: Look up and you will see the forest canopy. The mass of entangled branches, twigs, and leaves of the tall and mature trees form it. The crowns of the largest trees get

most of the sunlight and produce most of the tree's food. The canopy creates a protective "umbrella" over the rest of the forest.

6. Invasive plants

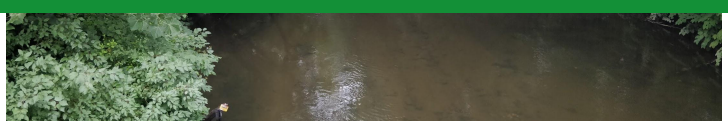
In several areas along this route, Japanese knotweed is the dominant species.

- Invasive plants can typically germinate, grow, flower, and produce abundant seeds rapidly. As a result, they are well adapted to human disturbance and, once established, dominate their surroundings and reduce native plant diversity.
- The most visible invasive species in the Bronx River Forest is Japanese knotweed, a bamboo-like plant that thrives under sediment deposition and drought—conditions in an urban watershed like that of the Bronx River.
- Japanese knotweed grows up to twelve feet high and sends out expansive rhizomes (sprouting underground stems) that can regenerate from fragments buried several feet deep. In the process, knotweed builds up steep and tall riverbanks from trapped sediment and the biomass (plant material) it produces. These altered banks inhibit the growth of more flood-tolerant trees and shrubs closer to the water's edge, such as silver maple, that provide shade, cover, and stability at the toe of the riverbank.
- Japanese knotweed is an exotic native species. In contrast, the sassafras tree is an example of a native species found in the forest.

7. Riparian and Upland Habitat Zones in the Forest: Biodiversity by the Boardwalk

Near the boardwalk overlook is a diverse vegetated area:

- Imagine a cross section of these zones, starting with the river bottom, cutting through the riverbank, the forest floodplain, and the forest uplands. Each of these areas has a wide variety of plant and animal species.
- This is an excellent birding area. Shy wood ducks look for homes on the island at the southern end of the loop trail. They may be seen swimming in the river, or if you look carefully, you may see them perching high up in the island's pin oak trees. Small mammals like gray squirrels and chipmunks forage on shore and muskrats make their dens in the riverbanks. Look for signs of beavers, particularly gnawed branches along the banks. A beaver lodge has been found



along the river in the Bronx Zoo, so keep your eyes open for a round “pile” of sticks that might signify a beaver’s living quarters. Take a closer look for reptiles such as the red-eared slider turtle and garter snakes sunning themselves or a snapping turtle walking along the muddy bottom. Insects such as ground and rove beetles, ants, and termites can be found under debris and in foliage and fungi on rotting logs.

- There are two major species of aquatic vegetation in this part of the river: curly pondweed (invasive) and Eleocharis, which is native. Eleocharis, or common waterweed, resembles a bottlebrush. Damselflies like the ebony jewelwing like to lay their eggs in the plant.
- Flatland/Riparian: Look for key species like skunk cabbage, mayapple, trout lily, and smartweed.
- In the spring, you may see butterflies such as mourning cloaks over winter here as adults, and in the summer, look for the monarch and a variety of swallowtails. Several species of woodpeckers nest in dead trees on the floodplain, including downy and red-bellied woodpeckers and the northern flicker. Amphibians such as the red-backed salamander may be found under logs or rocks.
- Upland (along the staircase leading up to Allerton Ballfields): Look for key species, such as beech and tulip poplar, and white snakeroot. Colorful warblers may be seen in the spring, foraging on insects high in the oaks, beeches, and tulip poplars. Forest birds such as the black-capped chickadee and tufted titmouse nest in holes in older trees. Listen for the “pee-uh-wee” of the eastern wood pewee.

8. Finish Tour or Continue on Second Half of Walk:

- The group should then continue to the Allerton Ballfields, and follow the path to Kazimiroff Boulevard. If conditions allow, the route continues on the east bank of the river. If conditions do not permit, the group will “double-back” and return to Burke Avenue.

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