Argonne NATIONAL LABORATORY

GIS MAPPING AND ANALYSIS HELP QUANTIFY BENEFITS OF **GREEN INFRASTRUCTURE**

Argonne's water management strategy includes the use of green infrastructure across the site. Green infrastructure is a method of storm-water management that mimics natural systems to infiltrate and clean storm water at its source.

Argonne has implemented green infrastructure by building rain gardens and bioswales and converting turf grass to prairie grass. These assets complement Argonne's wetland, woodland, and prairie habitats. Green infrastructure benefits include natural filtration, storm-water diversion, erosion control, ecosystem support, and greenhouse gas emission reduction.

A rain garden is a depression of porous soil that has a thick layer of native plantings with large root systems. Rain gardens collect storm water for natural filtration and decrease the amount of water that needs to be treated at a wastewater treatment plant. Bioswales function similarly to rain gardens; however, they are usually long and thin and in a location that is chosen to transport water as it drains from a specific building or parking lot.

Native plants are a key ingredient in green infrastructure. They have adapted to the physical and biotic features of the local area and can even adjust to changes in climate, soils, and water systems. Some native plants are selected for specific locations because they have deep roots that condition soils for rapid storm-water absorption. They are also efficient at adsorbing atmospheric carbon.

Argonne staff survey rain garden outside Building 440, Center for Nanoscale Materials.

Argonne also uses prairie grasses as part of the lab's storm-water green infrastructure efforts. Prairie grasses adsorb carbon at an even higher rate than other plants, thereby building organic soils. They also resist erosion because their cover can resist water and wind.

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In fiscal year 2017, Argonne surveyed the site's existing green infrastructure with a global positioning system (GPS), and plotted the information in a geographic information system (GIS). Argonne then used GIS to analyze and quantify the benefits of the green infrastructure. Argonne has 9 distinct rain gardens and 11 distinct bioswales. These green infrastructure assets were installed as part of large building projects and to address localized storm-water and habitat needs.

Native plantings typically found in bioswales and rain gardens do not require regular mowing. Green infrastructure has allowed Argonne to remove 533,791 square feet of land from the mowing schedule.

The lack of mowing in these areas results in a reduction of 123 pounds of carbon dioxide annually from lawn mowers. In addition, Argonne's green infrastructure diverts approximately 22,581,000 gallons of storm water from the sewer system annually.

Once native plants are established, they need very little care beyond labor, fertilizer, and water, which saves fiscal resources. Proactive efforts to maintain green infrastructure installations are critical in the first few years to establish their root systems. The laboratory's Natural Resources Manager oversees long-term stewardship, and skilled contractors are engaged on an as-needed basis.

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