BOTTOMLAND HARDWOOD FORESTS

Adapting to Hydrologic Change in the Lower Mississippi Alluvial Valley

LATE-SUCCESSIONAL BOTTOMLAND HARDWOOD FORESTS

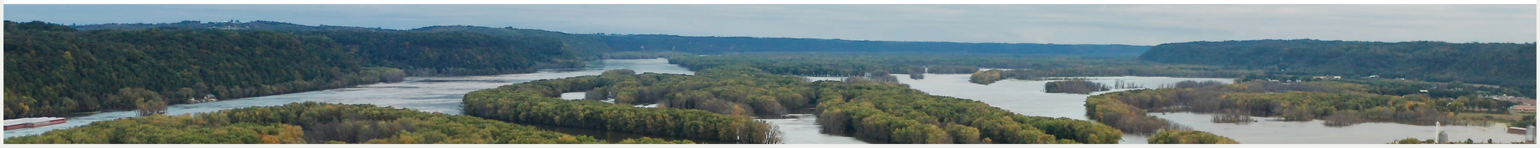
Bottomland hardwood forests are found along major and minor river floodplains in low-lying lands across the southern United States and parts of the Midwest where the ecosystem is driven by hydrology. They are seasonally or permanently inundated or saturated by water and support plant species and associated wildlife that are well-adapted to these conditions. Unfortunately, bottomland hardwood forests within the Southeast have been in decline due to incompatible management practices, altered hydrology, and land conversion. While most all sites provide many ecosystem services, late-successional sites are particularly important due to their extremely diverse stand conditions and the biodiversity they support. In general, late-successional stands can be recognized by their structurally diverse vegetation, deep litter layer, existence of large woody material (e.g. large downed logs), and presence of shade tolerant species (e.g. elm-ash-sugarberry).

HYDROLOGIC CHANGE: PAST, PRESENT, AND FUTURE

Hydrology is a critical part of bottomland systems. Precipitation, groundwater, and river water each relate to geomorphic features and soils, determining tree species distributions. The knowledge of these relationships has formed the foundations for bottomland forestry. However, due to historical land conversion and shifting weather patterns due to climate change, hydrological changes to these systems are affecting forests in ways that are not well understood.

Prior to the 1970s, there were nearly 25 million acres of late successional bottomland hardwood forest in the Mississippi Alluvial Valley alone. Site conversion for agriculture changed the landscape in bottomland forests across the Southeast, converting more than 70 percent of forest. The hydrological changes caused by flood control and other water management practices still affect many bottomland sites today. Altered flooding patterns due to constructed levees, straightened streams, and additional channelizing structures, gave way to new disturbance regimes which resulted in unpredictable forest responses. For example, longer periods of drought conditions favor species that are less tolerant of flooding and more tolerant of shade, while species that need periodic flooding to regenerate do not have the opportunity to do so.

Additionally, a changing climate will bring erratic weather patterns on both sides of the spectrum. Both extreme floods and severe droughts threaten the stability of bottomland ecosystems. As landscape modification continues and the threat of climate change increases, late successional bottomland hardwood sites that rely on historic disturbance regimes will have problems regenerating into future bottomland forests.



MANAGEMENT SUGGESTIONS: HYDROGEOMORPHIC LITERACY

Understanding the hydrology of a site is critical as it determines the success of both restoration and management of wetland sites, including bottomlands. There are **six** site characteristics to take note of when thinking about a site's hydrology.

(1) Site Use History

Knowing what practices, and when they have occurred, on a bottomlands site can be determined by gathering information in several ways. Talking with the landowner, visiting the county deed office to look at maps and tax records, and walking the land are all ways to get this information. Most importantly, taking note of any history of site conversion or flood control activities will inform how to make management decisions.

(2) Topography

The topographic position of a site plays a significant role in determining its hydroperiod. Even slight elevation differences cause changes in drainage class and soil moisture. The use of LiDAR imagery to evaluate topographic variation in bottomland forests can be a beneficial tool to visualize hydrologic flow and can often be obtained from a state's Department of Transportation spatial data portals.

(3) Flood Duration & Water Flow Patterns

Flood duration is a measure of the length of time floodwaters are present within the drainage basin. It is directly related to the size of the drainage basin and runoff characteristics. Knowing how long surface water will stay present is important for determining timing of operations and when regeneration will be most successful.

To track high flood and flow conditions, visit USGS WaterWatch.

(4) Soil Types

Soils found in bottomlands are often hydric but can vary greatly in their origin as they have been deposited by frequent flood events from upstream/upland sites. This leads to variable characteristics across bottomland sites, which is why it is important to know the soil type of the site that you will be working in and not a generalized estimate.

(5) Vegetation Patterns

The tree species growing in both the overstory and the understory can help determine hydrologic characteristics of a site. For example, flood-intolerant regeneration growing under flood-tolerant canopy trees shows that the site might have been historically wetter. Additionally, areas with little vegetation tend to have shorter flood durations than those with extensive vegetation because floodwaters can easily move downstream.

(6) Upland Conditions

Many flood-control practices and other hydrological changes that occur upstream have lasting effects on downstream ecosystems. Taking note of the conditions of upstream water bodies will increase the understanding of the hydrologic system as a whole.

FOR MORE RESOURCES VISIT

https://foreststewardsguild.org/bottomlands-hardwood-management/

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