



Removing Alabama's Aging Dam Infrastructure to Enhance Biodiversity and Public Safety

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The incredible variety of life on earth supports both healthy ecosystems and a healthy economy. When we think about the most biodiverse places on earth, tropical rainforests may come to mind. Yet, the southeastern United States, and especially Alabama, is an [incredibly biodiverse region](#), particularly in regards to rivers and streams. However, compared to other regions, the southeast lacks biodiversity protection and is rapidly losing biodiversity—and faces concurrent economic risks.

Aquatic organisms depend on the physical complexity of rivers and streams. Dam removal can maintain or restore this natural physical structure. However, not all dams are equal. Some cause harm by remaining in place, while others provide benefits. Alabama—currently the only state in the nation without one—should prioritize the development of a Dam Safety Program. Steps toward creating such a program would include developing a statewide dam inventory, which could be used to identify dams that should be prioritized for removal.

Freshwater Ecosystems' Connectivity

Freshwater ecosystems face a multitude of threats including pollution, non-native species introduction, and alteration from dams or impoundments (structures used to accumulate water stores). However, compared to terrestrial ecosystems like forests, grasslands, and deserts, less research and conservation actions focus on freshwater ecosystems. Freshwater organisms, therefore, are less likely to be included in protected areas.

It is difficult to protect freshwater ecosystems because they are highly connected to one another—land uses upstream, for example, will affect downstream ecosystems. Because of this high connectivity, freshwater ecosystems require larger areas to be protected in order for conservation policies to achieve their intended effects, compared to terrestrial ecosystems that may be more self-contained. In addition to this challenge, freshwater ecosystems' connectivity also represents a benefit: restoring disconnected systems to their natural levels of connectivity can allow aquatic organisms to re-colonize areas in which they were previously lost.

Ecosystems and Dams

Dams are used to generate hydropower, store water, and protect riverside communities from flooding. However, they interrupt the physical connectivity of rivers and streams. Natural rivers and streams typically alternate between slow-flowing pools and faster-flowing rocky areas. Some organisms are better adapted to pools, while others are better adapted to fast flow. This physical diversity supports a high level of biodiversity. When dams homogenize slow- and fast-flow systems, they cause rivers and streams to become more similar to lakes and ponds, depriving some organisms of their preferred habitat type. Dams also reduce population

connectivity by preventing movement of fish, even when they include fish passageways. As a result, when dams are built, many organisms are no longer able to survive in areas where they previously thrived.

In addition to their environmental impacts, aging dams can be financially costly and pose risks to public safety, according to the [2022 Infrastructure Report Card released by the American Society of Civil Engineers \(ASCE\)](#). Removing aged dams can therefore improve public safety and prevent financial losses while restoring the physical structure and diversity of flowing water ecosystems.

Policy Recommendations

Dam removal is not a clear-cut solution in every situation. Removal can have harmful short-term impacts, like causing sediment buildup that smothers critical “primary producers” like algae and plants. If the sediment contains contaminants, these may pollute the ecosystem they are released into. Pre-removal studies should therefore be conducted to determine whether contaminants are present.

Freshwater conservation biologist Michael Gangloff posited that [it may benefit biodiversity conservation to leave a small dam in place](#), even if the dam is no longer functional. Small dams can create habitats for mollusks, many of which play important ecological roles but are threatened or endangered in Alabama. Intact dams seem to support mollusks more effectively than breached or damaged dams, so the latter should be prioritized for removal. Removing breached dams may also be more economically feasible than removing intact dams, and breached dams are already more likely to pose environmental and safety hazards when they are not properly maintained or removed.

Alabama is the only state that does not have a Dam Safety Program to inspect dams, educate the public, and manage a database of the condition of the state’s dams. The Alabama Safe Dam Coalition Technical Committee proposed an advisory pilot study to provide information and guidance to the legislature to aid in the formation of a Dam Safety Program, but this study has yet to be approved.

The pilot study would focus on improving the dam inventory and assessing dam safety in three Alabama counties. To assess biodiversity impacts in addition to safety, the study should inventory the number and status of dams and conduct soil studies to determine where contaminants are present. This information would enable the identification of dams that should be removed based on benefits to public safety and biodiversity conservation. Dams could then be categorized according to a three-tiered system that maximized public safety and benefits to ecosystems without causing undue financial or environmental harm:

- First priority: Dams that pose a high hazard (i.e., failure would likely result in the loss of life or significant economic loss), high potential biodiversity benefit (does not support mollusks, would enhance connectivity, and are unlikely to harbor contaminated sediments), or both
- Second priority: Small, breached dams
- Not recommended for removal: Small, intact, non-functioning dams that may support mollusk populations, and dams that are found to contain contaminated sediments

While functional dams may benefit communities, aging and/or non-functional dams may threaten public safety, property, and biodiversity. Moving forward on a pilot study is a necessary first step to effectively protect the people, ecosystems, and economy of Alabama.

Research and data for this brief are drawn from sources including the [American Society of Civil Engineers' 2022 Report Card for Alabama's Infrastructure](#) and the author's own expertise.