

Ava Gillery, Aiden Martinez, Nikyra Wheaton, Tyuana Tomazzoli

Dr. Jaqueline Shea

CODES 120

1 November 2024

Lack of Biodiversity in the Lower Mississippi River

According to the United Nations, biodiversity is defined as “the variety of life on Earth, in all its forms”. In the Lower Mississippi River, however, there isn’t much variety due to the decline in biodiversity and in the native species that live there, such as paddlefish. Interactions between human affairs, oil companies, and invasive animal species put the biological variability of the Lower Mississippi River at an increasing risk if no work is done against them.

When it comes to focusing on defining systems and trying to figure out what the specific classifying drivers are, there are many different perspectives available. This is because human activities can affect biodiversity in the lower range of the Mississippi River through various means. When it comes to animals, like fish and birds, it is easy to affect the Mississippi and influence changes. For example, pollution from industrial activities can contaminate water sources, which can then impact the animals that rely on these sources. Invasive species can be introduced through travel and agricultural activities as well, disturbing the local ecosystem. Other human activities that contribute to habitat loss include urban



Example of agricultural runoff that is carrying potential pollutants from the farm to the Mississippi River (Newcomer)

development, infrastructure and agriculture experiments. For example, wetland damage drainage from farming or construction can lead to the reduction of natural habitats for wildlife.

Additionally, in the context of rivers, the alteration between dams and water flow to dams and levees can change the natural dynamics, affecting different species that rely on the specific habitat. Even among those trying to make things better, operational outcomes in biodiversity management are compromised by inconsistent logic and lack of clarity in key terms such as sustainability, environmental quality and resilience. The interaction between animals and human activities, especially those from specific companies, can create a complex challenge for maintaining biodiversity and the river.

Though human activity is arguably the primary cause, there are many different drivers for a lack of biodiversity. Whether that be because of toxic chemicals, animal waste, human waste,

or something else, native species

are continuing to die out, which

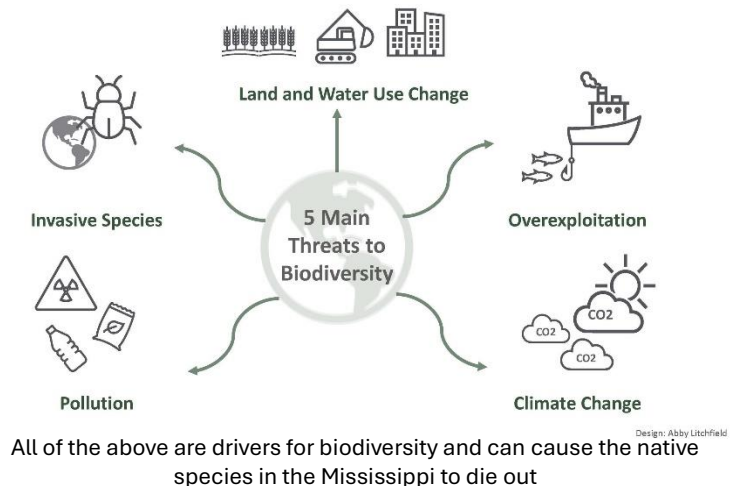
causes the biodiversity of bodies

of water, such as the Mississippi

River, to decrease. Studies have

demonstrated many of these

causes in action. For example, in



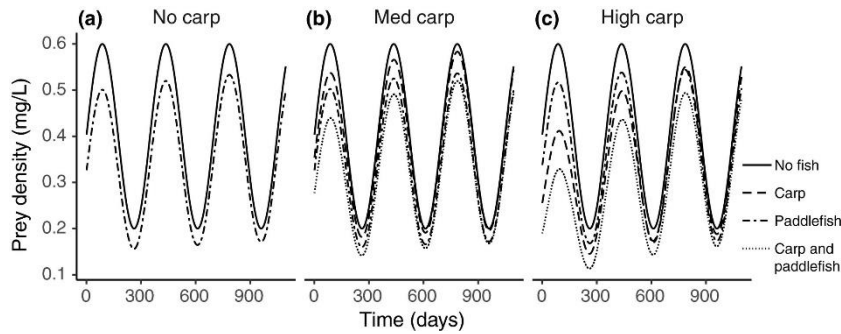
“Modeling bioenergetic and population-level impacts of invasive bigheaded carps

(*Hypophthalmichthys* spp.) on native paddlefish (*Polyodon spathula*) in backwaters of the lower

Mississippi River” by Nicole Kinlock, Adam Laybourn, Catherine Murphy, Jan Hoover and

Nicholas Friedenber, researchers explored how invasive species affect the native species living

in an area. They used bioenergetic models of silver and bighead carp and observed that the



This is a chart of the projected impact of the invasive species on the native species that the researchers found in their studies

population of native
paddlefish would rapidly
decrease if the non-native
silver and bighead carp were
introduced into their

environment. This experiment

helped to figure out a way to “access the risks posed by other invasive species” as well (Kinlock et al. 1086). However, this experiment won’t work in all areas, especially in the areas of the Lower Mississippi River where there are companies that continuously dump into the river and complicate the causal chain. In “Toxicity of Sediment Collected Upriver and Downriver of Major Cities Along the Lower Mississippi River” by P. V. Winger and P. J. Lasier, the authors explain how companies have been exposing contaminants to the river and said contaminants have been seeping into the sediment of the river. This waste is highly toxic to the animals that live off the Mississippi River. The resulting death of the native animals allows for invasive species to make their home somewhere that is dangerous for the remaining animal and plant life. Since “the Lower Mississippi River is



Death is one of the major affects that water pollution from industrialization have on animals in the Mississippi River

one of the highest priority ecosystems” (Winger and Lasier 213), these companies are starting what may become a catastrophic decline in biological variability not only in the Lower Mississippi, but around the world.

On a broader scale, the current fate of the Mississippi River is a prime example of the concept of the Tragedy of the Commons. This term, coined by Garrett Harden, describes the exploitation and inevitable degradation of a shared natural resource that occurs when numerous

entities seek to exploit such a resource. In

the case of the Mississippi river,

stakeholders (those who are invested in a

resource) such as the Chevron

corporation are in a constant battle with

organizations such as the Missouri

Department of Natural Resources over

the use of the river. However,

stakeholders are not exclusively limited

to human entities, as the wildlife which

inhabits the river are also stakeholders,

and perhaps are the most at risk of exploitation. This is apparent by how invasive species tend to

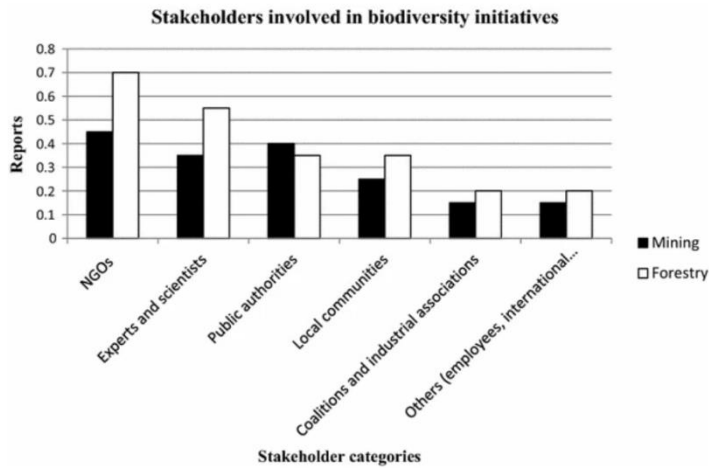
arrive and/or flourish in the river either directly or indirectly due to human activities.



Invasive species like carp are one of the wildlife stakeholders that can flourish in the river due to human activities

Unfortunately, as previously mentioned, efforts on behalf of stakeholders who'd like to improve the issue, such as the government, are not always effective. In the article, "Adapting to Climate Change in the Upper Mississippi River Basin: Exploring Stakeholder Perspectives on River System Management and Flood Risk Reduction", authors Tamsen Reed and Liesa Reys Mason describe the damage caused by flooding in the upper Mississippi, performing an in-depth stakeholder analysis of the pressing issues facing those who live in the northern Mississippi river basin. Mason and Reed describe how competing levels of government fail to address the issue;

preferring to defer the responsibility to other levels of government. This is an example of actors



These are types of stakeholders Boreal discusses and how much they are involved in improving biodiversity

in power not utilizing their position to solve an issue, as many are more concerned with reelection and the holding of power over utilizing their position to assist with the issues they face. In “Managing Biodiversity Through Stakeholder Involvement:

Why, Who, and for What Initiatives?”, Oliver

Boreal discusses how stakeholders can successfully use their position to the benefit of a natural resource, and how private entities can both stay economically competitive while not exploiting the natural resources they use.

If we are to undo the damage done to biodiversity within the Mississippi river, it starts with a move to increase communication and collaboration between stakeholders. When conversations are formed about shared interests, fears, and goals, stakeholders can find common ground amongst each other. For example, corporations such as Chevron can communicate with conservation officials. Although they may share different goals (in the case of Chevron to produce as much capital as possible), they may be able to work together to ensure the perseverance of the river itself. Since both stakeholders require the river to function, they are both incentivized to protect it; shared interests creating common ground and sparking conversations. To directly address the issue of biodiversity, however, education and direct action is necessary. Although not guaranteed to produce lasting results, direct action (river clean ups,

invasive species removal, etc.) can spread awareness on an issue and target ethos of the public, drawing attention to an issue that can be easily ignored or differed onto a different entity.

To conclude, the preservation of biodiversity within the Mississippi river is at constant risk. Human-based entities, such as companies and individuals, are in a unique position of responsibility, as they can both maintain or destroy the area in which they inhabit. Bighead Carp and other invasive species threaten native fish populations, as one rogue fish may eventually destroy an entire region. These reasons and more are why we must work collaboratively to protect the biodiversity of the Mississippi. If we wish to maintain all areas of the river, it is essential for stakeholders to collaborate; creating a healthy, beneficial ecosystem for all.

WORKS CITED

Berrisford, Kate. "5 Main Threats to Biodiversity." *Network for Business Sustainability (NBS)*, 21 July 2021, nbs.net/5-main-threats-to-biodiversity/. Accessed 12 Nov. 2024.

Boiral, Olivier, and Iñaki Heras-Saizarbitoria. "Managing Biodiversity through Stakeholder Involvement: Why, Who, and for What Initiatives?" *Journal of Business Ethics*, vol. 140, no. 3, 30 Apr. 2015, pp. 403–421, link.springer.com/article/10.1007/s10551-015-2668-3, <https://doi.org/10.1007/s10551-015-2668-3>. Accessed 12 Nov. 2024.

DeLong, Don C. "Defining Biodiversity." *Wildlife Society Bulletin (1973-2006)*, vol. 24, no. 4, 1996, pp. 738–749, www.jstor.org/stable/3783168. Accessed 1 Nov. 2024.

Joedredge. "New Invasive Carp Species Makes Home in Mississippi River Basin." *WROK 1440 AM / 96.1 FM*, 13 Dec. 2022, 1440wrok.com/new-invasive-carp-species-makes-home-in-mississippi-river-basin/. Accessed 12 Nov. 2024.

Kinlock, Nicole L., et al. "Modelling Bioenergetic and Population-Level Impacts of Invasive Bigheaded Carps (*Hypophthalmichthys* Spp.) on Native Paddlefish (*Polyodon Spathula*) in Backwaters of the Lower Mississippi River." *Freshwater Biology*, vol. 65, no. 6, 27 Feb. 2020, pp. 1086–1100, onlinelibrary.wiley.com/doi/full/10.1111/fwb.13494, <https://doi.org/10.1111/fwb.13494>. Accessed 12 Nov. 2024.

Newcomer, Eileen. "Pollution on the Mississippi River." *Www.lakeforest.edu*, 2013, www.lakeforest.edu/academics/majors-and-minors/environmental-studies/pollution-on-the-mississippi-river. Accessed 12 Nov. 2024.

Reed, Tamsen, et al. "Adapting to Climate Change in the Upper Mississippi River Basin: Exploring Stakeholder Perspectives on River System Management and Flood Risk Reduction." *Proquest.com*, Jan. 2020, www.proquest.com/docview/2473714608?pq-origsite=primo&sourcetype=Scholarly%20Journals. Accessed 12 Nov. 2024.

Reuter, Michael, et al. "The Nature Conservancy's Approach to Conserving and Rehabilitating Biological Diversity in the Upper Mississippi River System. Tab": *Large Rivers*, vol. 15, no. 1-4, 19 Dec. 2003, pp. 549–560, www.umesc.usgs.gov/documents/publications/2005/reuter_a_nature_conservancy.pdf, <https://doi.org/10.1127/lr/15/2003/549>. Accessed 1 Nov. 2024.

Schneider, Brandon. *Changes in Fish Use and Habitat Diversity Associated with Placement of Three Chevron Dikes in the Middle Mississippi River*. 2012. Southern Illinois University Edwardsville, 2012.

Semer, Claire. "Exploring the Academic Success of Student Veterans in Higher Education." *ProQuest*, vol. 140, no. 3, Feb. 2017, www.proquest.com/docview/1868535627?pq-origsite=primo&sourcetype=Scholarly%20Journals. Accessed 12 Nov. 2024.

Wallace, Ken J. "Values: Drivers for Planning Biodiversity Management." *Environmental Science & Policy*, vol. 17, Mar. 2012, pp. 1–11, www.sciencedirect.com/science/article/pii/S1462901111001912, <https://doi.org/10.1016/j.envsci.2011.12.001>. Accessed 1 Nov. 2024.

Winger, P. V., and P. J. Lasier. "Toxicity of Sediment Collected Upriver and Downriver of Major Cities along the Lower Mississippi River." *Archives of Environmental Contamination and*

Toxicology, vol. 35, no. 2, 1 Aug. 1998, pp. 213–217, <https://doi.org/10.1007/s002449900369>.

Accessed 1 Nov. 2024.

Zinni, Yasmin. “Pollution’s Effects on Animals.” *Sciencing*, 30 Sept. 2021, www.sciencing.com/pollutions-effects-animals-5292091/. Accessed 12 Nov. 2024.