Riparian Protection Guidance for Local Governments Along the Jordan River

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JORDAN RIVER COMMISSION

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Abstract

The Jordan River and its tributaries are keystone riparian areas in the rapidly urbanizing Wasatch Front. Accordingly, local governments in the Jordan River watershed have adopted ordinances to protect riparian areas from development that may endanger their ecological quality. Other governments have expressed interest in adopting riparian protections, but a lack of knowledge and expertise on the subject may deter them from moving forward. For my professional project, I worked with the Jordan River Commission to bridge this gap by providing resources and expertise to interested local governments.

To begin this project, I conducted an inventory of riparian protections in the states of Utah, Arizona, and Nevada as well as a literature review concerning best practices for riparian areas in local jurisdictions. Additionally, I interviewed seven planners, engineers, and public lands officials to better understand their experience with riparian protection and the barriers they face when attempting to strengthen or implement regulations. I then analyzed their responses for common ideas and themes.

Less than half of cities in the Jordan River Commission have adopted ordinances with the sole purpose of protecting riparian areas in their jurisdictions. The proportion of cities with these ordinances is even lower within the larger Jordan River watershed. Overall, interviewees expressed a neutral view of riparian protection in their cities. Three main issues dominated discussions of barriers to adopting riparian protections: private property ownership, differing priorities between staff and elected officials, and a lack of resources including personnel, time, and funding.

Based on interview insights and best practices identified across Utah, Nevada, and Arizona, I developed four recommendations for local governments. This project, in addition to creating recommendations and several deliverables, illustrates the need to better prioritize riparian health. By considering these recommendations and utilizing these resources, local governments can transform their intentions to protect riparian areas into action.

Introduction

Riparian areas, or transition zones linking aquatic and upland areas, provide numerous ecosystem services such as filtering pollutants from runoff, stabilizing streambanks, acting as wildlife habitats and migration corridors, providing recreation opportunities, and bolstering real estate values. The Jordan River, flowing northward from Utah Lake to the Great Salt Lake, is a keystone riparian area in the urbanized Wasatch Front. In addition to its role as a host for many species of native wildlife and a destination for migratory birds, the river and its tributaries are an important aesthetic and recreational asset to nearby cities. However, the Jordan River has an extensive history of pollution, dredging, and diversion and is now in the process of being restored. Protection and restoration of this waterway and its tributaries is increasingly paramount as the Utah and Salt Lake Valley face heightened development pressures.

Municipal governments bordering the Jordan River can exercise their legislative authority to protect, enhance, and restore the riparian areas within their jurisdiction. Riparian protection ordinances, or codified guidelines restricting development and behavior within riparian areas, are a common method of protection for these corridors. Some cities along the Jordan River and Great Salt Lake, such as Salt Lake City, Lehi, and West Valley City, have adopted ordinances to protect riparian areas. However, levels of protection vary from one city to another. Other cities, including South Jordan, North Salt Lake, South Salt Lake, and Taylorsville, have expressed interest in adopting riparian protection ordinances. However, a lack of knowledge and expertise on the subject may deter municipalities from adopting this mode of protection.

The Jordan River Commission is a cooperative organization created to provide both technical expertise and a forum for responsible development to communities along the Jordan River. As a governmental entity whose efforts are funded by grants or private donations, the commission facilitates the collaboration of different jurisdictions and levels of government whose actions impact the river. Although the commission has no regulatory or maintenance authority for the Jordan River, they build the capacity of member governments and agencies to protect and restore the corridor. The Interlocal Cooperation Agreement by which the commission was founded includes seven concerns for the commission, including: multiple uses of the river and river corridor, communication and coordination, resource utilization and protection, recreation access, responsible economic development, funding for the acquisition of critical habitat and open space, and ongoing planning for the Jordan River Blueprint study area. The Jordan River Commission has adopted both a Strategic Plan (2015) and Blueprint Jordan River (last updated 2022), two guiding technical documents that influence the planning and development of the corridor.

Accordingly, the Jordan River Commission can serve as a resource by providing expertise on different aspects of riparian protection to interested communities. The goal of my professional project is to bridge this knowledge gap by creating resources for the commission including model ordinance templates, accompanying explanations on the importance of each element of the ordinance, and guidance for planning tools that incentivize protection. In addition to conducting research on existing ordinances to determine what a model ordinance should consider and contain, one of the key tasks of my professional project involved meeting with personnel and key council members in Utah, Salt Lake, and Davis County municipalities to gauge interest and gain information on challenges with riparian protection in each jurisdiction. With this information, I was able to more effectively tailor the resulting resources to the needs of local governments.

Methods

Tri-State Inventory

I first downloaded 5-year American Community Survey data for 2023 (DP05) for all Census-designated cities and towns in the tri-state study region of Utah, Nevada, and Arizona. With these data, I created a database in which I identified all cities and towns with populations greater than 10,000 for analysis—cities that are first, second, third, and fourth

class according to Utah's municipality classification system (Utah Code 1977). There were 65, 10, and 44 municipalities for Utah, Nevada, and Arizona, respectively.

I identified the municipal code for each municipality through the city/town website or, if needed, through a Google search. I used a keyword string to identify relevant portions of each municipality's general plan. The Boolean string ("riparia" OR "river" OR "stream" OR "watershed" OR "wetland" OR "floodplain") used "riparia" rather than "riparian" to capture multiple forms of the word as well as synonyms that account for differences in terminology between municipalities.

In addition, I distinguished between riparian-adjacent and riparian-specific protection. Riparian-specific protection ordinances include specific strategies and regulations that have the sole purpose of protecting a riparian corridor or corridors within the municipality. Ordinances were counted as riparian-specific if they were part of a chapter dedicated to riparian protection or a subsection on riparia within a larger sensitive lands or geological hazards chapter. Riparian-adjacent protection, on the other hand, refers to ordinances that, while not expressly intending to protect riparian areas, do so indirectly through the regulation of factors that influence the quality of these areas. Examples include ordinances regulating stormwater quality, pollution/trash disposal, and open space.

When searching each city's municipal code, I downloaded portions of the code that included the string's keywords. When downloading these portions, I simultaneously sorted codes into three categories: (1) codes that do not include riparian-adjacent protection, (2) codes that include riparian-adjacent protection, and (3) codes that include both riparian-adjacent protection and riparian-specific protection ordinances.

I organized the downloaded municipal code document fragments into respective sub-folders for each state. Additionally, I recorded information regarding the level of protection within each municipality's municipal code. I used Excel for descriptive analysis, including the number of municipalities with codes and the level of riparian protection (i.e., adjacent codes vs. specific codes).

Literature Review

To identify literature for my review, I conducted keyword searches in Google Scholar and Web of Science. Searches began in both databases with a single keyword string designed to capture articles discussing riparia at the municipal level. Initially, I used the search string: "(riparia* OR river* OR stream*) AND (protect* OR polic* OR strateg*) AND (municipal* OR cit*)." However, because this search string did not yield many relevant results, I used different combinations of the same keywords in both databases to identify literature missed in the first search. Although I reduced the keyword string for subsequent searches, each search used at least one term to reference riparia and another to reference the local or municipal level.

Additionally, I conducted a separate search in both databases using a variety of keywords to identify literature surrounding best practices for riparian buffers, such as "riparia*", "river*," "stream*," "buffer," and "setback." The literature review also draws upon

articles collected and recommended by faculty or professionals who are working on this project or have experience in the field of riparian protection.

Interviews

Because this project aims to help municipal professionals with riparian protections, interviews are required to better understand their experience and the barriers they face when attempting to strengthen or implement protections. I began by applying for Institutional Review Board approval, which required the creation and submission of my interview questions, recruitment materials, and literature review. After doing so, I received approval in mid-October.

After receiving approval, I identified potential interview clients through city websites and referrals from the Jordan River Commission's technical advisory committee. I reached out to and set up interviews with planners, engineers, and public lands officials. My questions gauged their understanding of and appreciation for riparian areas, their satisfaction with the level of protection in their community, the barriers they face when implementing and enforcing protections, and their opinion on and plans for the future. I then analyzed their responses for common ideas and themes shared between interviewees and developed recommendations for cities and the Jordan River Commission based on that information.

Results

Municipal Code Inventory

Generally, riparian-related concerns were very prominent in municipal codes across the states of Utah, Nevada, and Arizona. Most (89 percent) of the surveyed municipalities adopted or have pending riparian-adjacent protections. Broken down by state, 91 percent of the 65 Utah municipalities, 100 percent of the 10 Nevada municipalities, and 84 percent of the 44 Arizona municipalities have riparian-adjacent protections.

Across the three states, 20 of 119 municipalities (17 percent) have riparian ordinances that identify specific strategies with the sole purpose of protecting riparian corridors. Out of these 20 municipalities, 13 are in Utah, 3 are in Nevada, and 4 are in Arizona. The strongest riparian protections in municipal codes are found in Utah. Utah has the largest proportion of municipalities with riparian-adjacent protections in their codes, as well as the largest number of cities and towns with riparian-specific ordinances.

The stated purposes for riparian protections include habitat protection, recreation, water quality, and protection against flooding hazards. Riparian-related municipal codes primarily aim to protect riparian areas within municipal jurisdictions. Therefore, very few cities and towns consider the larger riparian or watershed system to which local corridors belong. The city of Tucson, Arizona, for example, has a riparian setback distance unique to regional watercourses extending beyond jurisdictional boundaries.

The Jordan River watershed contains seven of the 13 Utah cities with riparian-specific ordinances. These cities are Salt Lake City, Cottonwood Heights, West Valley City, Lehi, Millcreek, Riverton, and Saratoga Springs. Out of the sixteen cities belonging to the

Jordan River Commission, six, or 38 percent, have these ordinances. Although Cottonwood Heights has a riparian-specific ordinance in place, it is no longer part of the Jordan River Commission and is not included in this count.

Literature Review

Ecology-Based Protection Measures for Riparian Buffers

Ecological conservation strategies for riparian areas often involve the delineation and protection of designated buffer zones. Fixed-width strategies, or strategies that designate the buffer as a single width from a point along the waterway, are conventional due to their ease and simplicity (Majumdar & Avishek, 2025; Richardson et al, 2012). However, these zones can fail to consider the complexities of site-specific characteristics and may therefore be improved upon by variable-width designs that are adapted to site-specific hydrology (Graziano et al, 2022; Majumdar & Avishek, 2025; Tiwari et al, 2016). Currently, fixed-width buffers dominate due to uncertainty surrounding the outcomes of alternative strategies (Richardson et al, 2012).

Numerous ecology-based studies identify best practices for riparian buffer zones, therefore providing a body of guidance for policy makers. For example, Brumberg et al (2021) suggest that buffer length, rather than width, has a greater impact on water quality. Additionally, these buffers should include a development gradient that divides the riparian area into multiple tiers that vary in habitat structure and ecological foundation (Graziano et al, 2022). Without management across different buffer tiers, full recovery of damaged riparian ecosystems is unlikely. However, the benefits of protecting any buffer area outweigh potential negatives, especially when they are located upstream (Feld et al, 2018).

Importance of Legislation and Plans on the Local Level

González et al (2017) divides riparian protection policies into two categories: restrictive and incentive-based. Restrictive policies protect riparian zones from development by preventing activities within a certain distance of the river. Setbacks, for instance, would fall into this category. Incentive-based policies, on the other hand, offer some form of compensation to encourage developers to abandon economic activities in the riparian zone (González et al, 2017). Additionally, cost-sharing, low-cost loans, and tax reductions can be used to encourage riparian-safe practices on private land (National Research Council, 2002).

Local land use planning can also be important in terms of protecting riparian ecosystem services (Dempsey et al, 2017). While ordinances protecting riparian areas are both preventative and inexpensive, restoration plans are needed to protect and enhance water quality in rapidly urbanizing watersheds (Atkinson & Lake, 2020). This is because, despite the increasing popularity of riparian protection policies, extensive damage has been inflicted on these ecosystems. Additionally, even if a large portion of an area is under ordinance protection, missing or weak cooperation among adjacent jurisdictions can lead to a lack of protection and maintenance (Weilert et al, 2018). Therefore, assessment of the effectiveness of ordinances should be part of a municipality's river protection plan (Weilert et al, 2018).

Best Policy Practices for Municipal Governments

There is very little literature surrounding best policy practices for municipal governments seeking to protect riparian areas. Only seventeen articles relating to the topic of municipal riparian protection were identified, six of which discussed specific policy options outside of ecology-based best practices (Dias et al, 2025; González et al, 2017; Ozawa & Yeakley, 2007; Pruetz, 1998; Spurlock, 2019; Yeakley et al, 2006).

Environmental education is one strategy available for use at the municipal level. Targeting education toward the general public encourages society to demand riparian conservation by helping them understand not only the importance of riparian areas, but also what impacts their health (González et al, 2017; Dias et al, 2025). Additionally, education is especially important for staff and policy makers. Because individuals in these roles will be applying riparian protection strategies at the municipal level, they must be informed in order to properly do so (González et al, 2017).

Setbacks and development restrictions are another popular form of riparian protection policy. These restrictive policies are often enshrined in zoning or building codes, designating what kind of development, if any, is allowed within a certain distance of the riparian corridor. Because setbacks and development restrictions are used to designate and protect riparian buffers, they are often used concurrently and interchangeably with the word "buffer" in policies. The transition between ordinances and approved development applications is crucial to effective protection, as the process represents a point in which modifications may occur due to site conditions and therefore alter the final land use outcome (Spurlock, 2019). In a study of riparian vegetation loss in three Oregon cities, Ozawa and Yeakley (2007) found consistently lower loss rates in overlay districts and theorized that the extra concern they require for sensitive resources may influence property owners' behavior. In terms of zoning, Yeakley et al (2006) note that suggestive overlay districts are not as effective as prescriptive districts. Therefore, stronger, more authoritative rules in zoning districts will be more effective than districts who simply encourage protection of the riparian area. However, a key criticism of zoning-based protection is that it is both vulnerable to political changes and does not always lead to its desired impact (Pruetz, 1998). Additionally, because zoning-based protection is chiefly preventative, it must be supplemented with restoration and nature-based solutions in developed municipalities (Dias et al, 2025).

Although not discussed extensively in academic literature, transfer of development rights, also known as a TDR program, is another policy practice available to municipal governments. This strategy involves transferring growth from places where development is less desirable, or sending areas, to places where it would be more desirable, also known as receiving areas (Pruetz, 1998). To do so, communities encourage those who own riparian land to create deed restrictions on their property that ensure the land will only be used for approved, ecologically safe uses such as conservation (Pruetz, 1998). In this process, transferable development rights (TDRs) are created (Pruetz, 1998). After doing so, these sending site owners are compensated by the ability to sell their TDRs to developers in receiving areas (Pruetz, 1998). Developers who purchase these TDRs are allowed to

develop at a higher density. In theory, greater financial revenues from these dense projects encourage developers to use TDRs despite their purchase cost (Pruetz, 1998).

TDR programs can ideally be conducted alongside acquisitions of riparian land, as the government can buy development rights and subsequently resell them (Pruetz, 1998). With the revenue made from these sales, the municipal government can create a self-replenishing fund (Pruetz, 1998). While acquisition may be preferable in a municipality that has a small area of riparian land to protect (Pruetz, 1998), transfer of development rights allows protection to occur even when there is insufficient funding for acquisition.

Conclusion

Considering the importance of municipal governance in riparian protection, there is an extreme lack of academic discussion on best policy practices at this level. The understudied nature of this topic therefore emphasizes the need for greater guidance in municipal riparian policy.

Interviews

Overall, the interviewees expressed a generally neutral view of riparian protection in their cities. Ratings given when interviewees were asked to rate their satisfaction with existing policies averaged to just under 6 out of 10. This is in contrast to how much they valued riparian areas, with all respondents giving very high valuation ratings that averaged to 8.9 out of 10. An overarching sentiment was that the interviewees appreciated the existence of regulations in their cities and felt that they were preferable to a complete lack of protections. However, all but one of the professionals also believed that the protections in place could be improved.

Common barriers faced with riparian protection generally come down to issues with priorities. Three main issues completely dominated discussion of barriers: private property ownership, differing priorities with elected officials, and a lack of resources whether that be personnel, time, or funding (Figure 1).

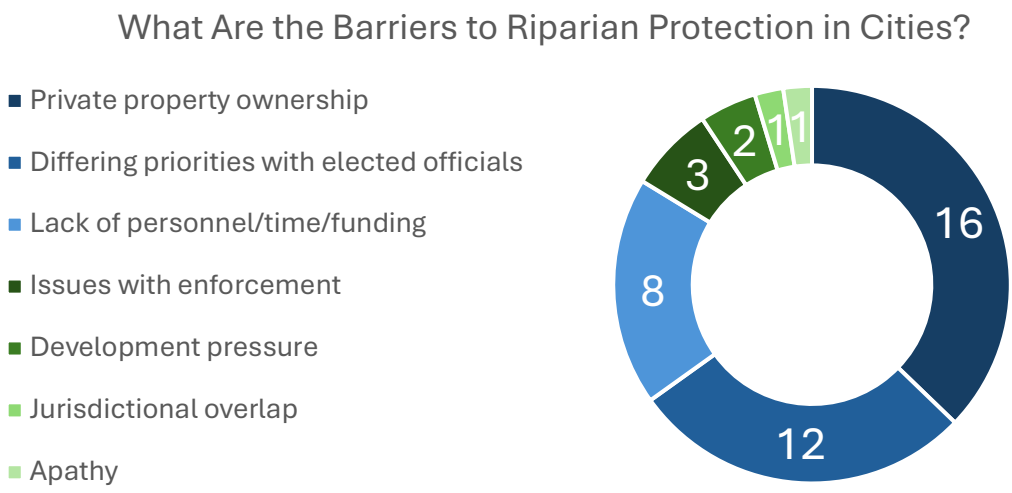

Figure 1: Barriers to riparian protection mentioned by the seven interviewees. Data labels refer to the number of times each barrier was mentioned by any interviewee.

Many interviewees discussed the tension between ecological protection and development pressure, especially in quickly growing cities with political climates that are pro-development and pro-property rights. These two dilemmas materialized into the private property ownership and elected officials categories. Overall, cities struggle to find a balance between the many priorities they must juggle, and riparian protection is often a difficult case to argue when housing availability and economic progress are in question.

When asked how riparian protection in their jurisdictions could be improved, interviewees expressed common goals in addition to a few unique desires. In order, the three most common goals across the interviewees include better ecological health and quality for riparian corridors, acquisition of riparian land by the city to better allow protection efforts and public access, and better education of and support from the community (Figure 2). Additional desires mentioned by one or two interviewees include improved water quality, allowing for the meandering of streams, and more pushback to development and modification.

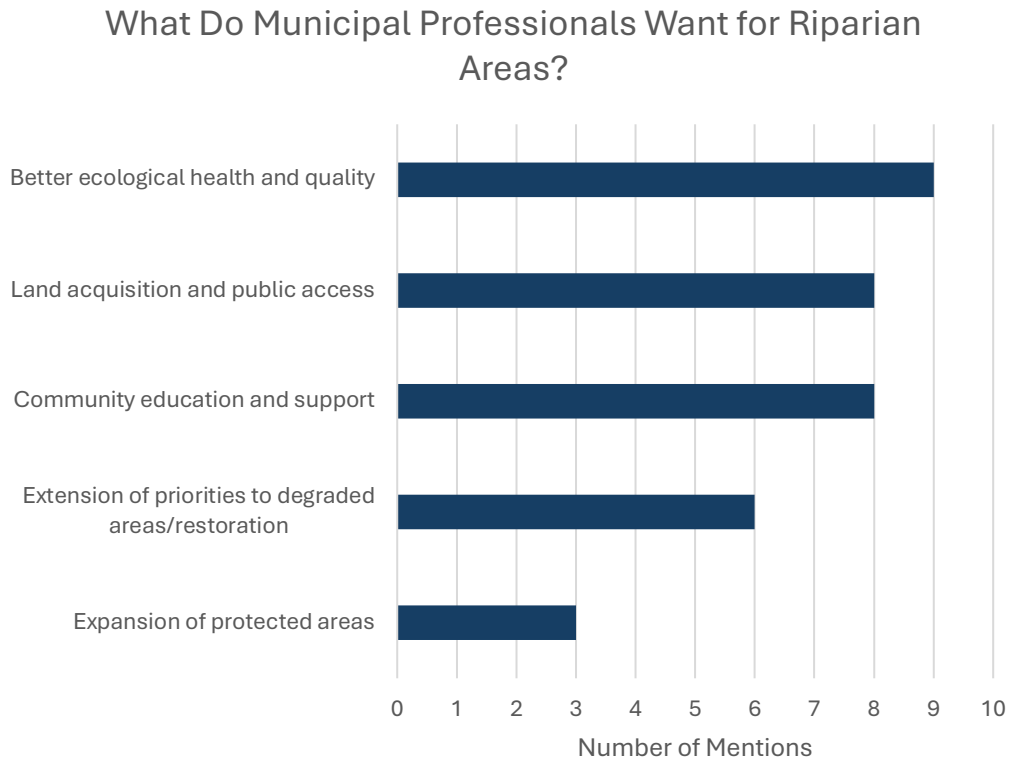

Figure 2: Common goals for riparian areas as mentioned by the seven interviewees. Data labels refer to the number of times each goal was mentioned by any interviewee.

It should be noted that all the professionals who agreed to be interviewed work in cities that have adopted riparian-specific ordinances. Therefore, a key limitation of this project is that I was unable to interview employees in cities that do not have the highest level of riparian protection in place. As a result, this analysis is missing the perspective of those who would need the most assistance with protections.

Recommendations

Based on interview responses and best practices that I have documented across Utah, Nevada, and Arizona, I created four key recommendations for local governments. These recommendations are approved by the Jordan River Commission and provide guidance for governments aiming to protect riparian areas within their jurisdictions. While these recommendations are based on data collected at the municipal level, they can also apply to other local jurisdictions such as counties and townships.

The first is to adopt a riparian general plan element and a riparian protection ordinance. These actions illustrate the government's interest in and mechanism for protecting these sensitive areas, respectively. While general plan elements guide the government's actions in the future and are important for agenda-setting, ordinances provide a level of enforcement that is integral to ensuring that riparian areas are protected in practice.

The second is to focus on restoration rather than just protection. This recommendation is especially important in cities that have already been heavily developed. Interviewees, while supporting the protection of undeveloped areas, expressed frustration that degraded riparian areas were being ignored in comparison. Riparian areas are a system, so all parts of that system should receive equal attention for ideal results.

The third is to acquire land where possible. Interviewees frequently discussed barriers associated with private property ownership along with their desire to enable more public access to riparian areas. When a city owns a large amount of riparian land, as is the case in Salt Lake City, there are fewer barriers to protection actions. Additionally, increased public access may improve residents' connection with riparian areas and increase interest in their protection. Although local governments may struggle to implement this recommendation due to a lack of funding, alternative methods such as conservation easements and purchase of development rights serve a similar function.

The last recommendation is to apply for grants and seek alternative sources of funding. A common barrier to riparian protection is a lack of resources when the city must prioritize other concerns. Therefore, gaining riparian-specific funding will enable protection actions to be taken without requiring them to be at the expense of other priorities.

Deliverables

In addition to interviewing and creating these recommendations, I also created deliverables for the Jordan River Commission. Like the recommendations, these deliverables will serve as resources for interested local governments. Deliverables include a model ordinance template, which local governments can use to model their own riparian protection ordinances or even simply fill in with their own information, guidance for riparian protection strategies that includes definitions of each common strategy and examples of its use, a pitch presentation discussing the importance of riparian protection and the resources available that can be given to interested municipalities, and a library of existing riparian protection ordinances for governments to view. These resources are

consolidated into a single document that will be available on the Jordan River Commission website.

Conclusion

This project, in addition to creating several deliverables for the Jordan River Commission and interested municipalities, emphasizes the need to better prioritize riparian health. The tri-state code inventory illustrated that enforcement mechanisms for riparian protections are rare despite a general knowledge of and desire for riparian health. By directing resources and enforcement power to riparian protection, cities can bridge the disconnect between mere intentions to protect these areas and the concrete actions needed to do so.

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