

Beyond city limits: Infrastructural regionalism in rural Montana, USA

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Abstract: Regional infrastructures are a main object of governance questions in urban contexts, yet similar phenomena in rural areas are underexplored. Rural public institutions serve small populations dispersed across large geographic areas, making regional collaborations a common antidote to inherent challenges in rural governance. This paper engages with the nascent dialogue surrounding infrastructural regionalism to interpret the governance and political dimensions of the regional approach to rural infrastructure development. We use qualitative methods to analyze a rural regional water system in Montana, USA that will deliver drinking water across a 31,000-square-kilometer agricultural region via 480 kilometers of networked pipelines. We find two key characteristics of the institution's rural context and regional scope are at tension, leaving the geographic extent of the pipeline, and ultimately the spatiality of the region, uncertain. Namely, a set of centrifugal forces that result from unruly hyperlocal politics contrast a centripetal energy that results from the process of building the political capital needed to make the project possible. By revealing the unique governance pressures facing rural regional infrastructure governance we counterbalance the urban bias in infrastructure and regional studies and contribute to ongoing debates in rural policy and public service provision.

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1.0 Introduction

Rural regions are by definition ‘institutionally thin’ (Amin & Thrift, 1994). Not only are there fewer businesses, organizations, and governance collaborations than might be found in a bustling city-region, but rural institutions typically rely on a constrained set of capacities to carry out their duties (Flora et al., 2016). Small, rural towns might be generally characterized by strong social networks, but other resources critical to good governance such as knowledge, revenue, and human capital can be desperately thin for rural local governments (ibid.). Given this context, making efficient use of limited resources is a recurring theme in the conversation surrounding rural public service and infrastructure provision.

The economies of scale that inhere in regional approaches are thus an attractive solution to fundamental problems of rural governance. As such, regional approaches are commonplace across many domains of rural policy, including economic development, public services such as emergency response and education, and, increasingly, networked built infrastructure. The regional approach offers capacity-constrained institutions an opportunity to pool resources, scale up, solve problems at a greater-than-local scale, and achieve ends a single municipality might not on their own (Huning et al., 2011; Lu, 2011; Smith et al., 2019). A growing body of literature examines the unique challenges and opportunities associated with regional governance in a rural setting (Breen, 2016; Lu, 2011; Vodden et al., 2019), yet regional approaches to physical infrastructure development in low-population areas present an underexplored set of material, territorial, social, and governance complexities.

This paper contributes to a nascent scholarly dialogue about infrastructural regionalism (Addie et al., 2020; Glass et al., 2019) through an analysis of rural infrastructural regionalism that draws on a case study of a rural regional water system (RRWS) in Montana, USA. While regional infrastructure studies have heretofore focused exclusively on metropolitan regions, this paper redirects the conversation to the rural arena. By focusing on how regional governance is constructed in and complicated by a region defined by remoteness and low populations, we demonstrate that, in rural settings, infrastructural regionalism involves unique challenges and may create different outcomes than city-regional infrastructure governance.

To contextualize our case study we begin with an overview that links rural political and economic change in the Global North and contemporary challenges in rural public service provision to the case for utility regionalization. This conceptual framework informs our interpretation of the Central Montana Regional Water Authority (CMRWA), a proposed RRWS

in an agricultural region with a history of water hardship. Section three provides our methods and a brief history of CMRWA. We draw on themes in CMRWA's history to articulate the uniquely-rural challenges and opportunities that result from the organization's regional scale. We conclude the paper with a discussion of the inherent contradictions of rural infrastructural regionalism, suggesting that the challenges and opportunities of our example translate into dual centrifugal and centripetal forces that leave the future social, economic, and political form of the Central Montana region in question. We emphasize that informal, idiosyncratic local-scale processes become a determinate, centrifugal force in delineating not only the geographic extent of the regional pipeline, but, potentially, in the production of new regional space.

2.0 Regional Water Infrastructures in Rural Geographies

Infrastructures are often constructed and governed at a regional scale, making them an apt lens to explore fundamental questions of the region (Addie et al., 2020; Glass et al., 2019)—a scale which is at once economically functional and politically problematic (Paasi et al., 2018). As early as the 1930s, geographers recognized countervailing cultural tendencies inherent in the regional idea, identifying centripetal (uniting) and centrifugal (dividing) social forces (Colby, 1933). Building on this foundation, contemporary geographers approach the region as a contested, evolving imaginary, rather than a spatially-fixed set of boundaries (Allen et al., 2012; Addie et al., 2020). Regional infrastructure networks add a material dimension to this abstract set of dynamics, demarcating the spatial dimensions of a region's political form as it exists at one point in time, traversing and connecting multiple government jurisdictions (Addie et al., 2020; Glass et al., 2019; Anand et al., 2018). Yet these themes in the regional studies and critical infrastructure studies literature have been primarily developed in an urban context, leaving the fundamentals of infrastructural-regional formations in non-urban geographies underexplored.

Interpreting the spatial expanse of economic activity surrounding large populations centers is a chief concern of regional studies (Allen et al., 2012), as is examining institutional responses to regionalized socioeconomic activity (Amin & Thrift, 1994). The built environment is also captured as a staple of the urban condition, with much theory devoted to infrastructure's role in (re)making urban subjects and space (Graham & Marvin, 2001; Harvey, 1985; Kaika, 2005). In an explicit gesture toward an otherwise tacit motif in the critical infrastructure literature, Gupta (2018, p. 66, emphasis added) writes, "In a rapidly urbanizing world, we should remember that urban dwellers *are more dependent than their rural counterparts* on the infrastructures that deliver them food, water, electricity, natural gas, gasoline, and sanitation." If infrastructures are the famously overlooked technologies of daily life (Gupta, 2018; Howe et al., 2016), perhaps the infrastructures that inhabit rural space are the most invisible of all.

Contemporary debates in regional and infrastructure studies are thus fraught with an assumption that the dialectic between regional imaginaries and infrastructural forms is an urban phenomenon. As a result, nonmetropolitan space is all but ignored in contemporary regional planning visions that prioritize metropolitan regions and megaregions (Schafran, 2014; Glass, 2015). Rural space and place are more often represented in relation to urban needs rather than examined in their own right (Cantor, 2020; Vodden et al., 2019). Yet, because of the different social, political, and economic dynamics present in rural regions, there is a need to ensure that Addie and colleagues' (2020) call to see like an infrastructural region steps beyond merely replicating the essentialized urban subject in new conceptions of the infrastructure-region dialectic. The literature has yet to examine manifestations of infrastructural regionalism beyond the city.

A few rural and resource geographers have recently applied concepts from regional studies to analyze regional water and infrastructure governance to rural contexts (Breen, 2016; Vodden et al., 2019). This paper advances this conversation, while also contributing a rural example to the burgeoning dialogue on infrastructural regionalism. Our literature review begins by demarcating the position of rural regions of the Global North in the contemporary political economic order to contextualize rural-regional infrastructure governance. Then, we review unique considerations of regional public water systems in rural geographies as a basis for our case study.

2.1 Distinguishing the rural

Rural regions hold a distinct position in the broader political economy in comparison to urban regions. Rural regions are often characterized by dispersed settlement patterns, under-resourced public institutions, natural resource extraction, isolation, and a shared identity of being 'rural' (Woods, 2005). But they are also peripheral in the context of global capitalism in that rural regions are generally home to export-dominant, poorly-diversified economies where more capital flows outward than inward (Wallerstein, 2004). In the global economic theatre, peripheral regions play a crucial role in the spatial expansion of capital, providing new 'underdeveloped' frontiers for resource, labor, and value extraction (Harvey, 2001; Wallerstein, 2004). Through this process, peripheral economies of both the Global North and the Global South are characterized by a high level of value leakage and political-economic dependencies on core regions.

Peripheral regions often produce natural resource-based primary products ('food and fiber,' as the mantra goes; but rural areas also notably produce energy, minerals, timber, and tourism for

core consumer markets) (Freudenburg, 1992; Mueller, 2019). This niche makes rural economies simultaneously poorly positioned to be competitive on a basis of product differentiation and highly vulnerable to macro market fluctuations—fostering dependencies both on their physical resource endowments and on global markets (ibid.). By the 1990s, structural shifts in the global economy precipitated unique impacts in rural areas of the Global North. These shifts are generally characterized by (1) declining labor demands in the primary and secondary sectors due to productivity gains from automation and mechanization, (2) spatial shifts in demand for raw materials toward lower-cost regions (especially in the Global South), (3) the geographic concentration of economic opportunity in the emerging knowledge-based economy in metropolitan areas and (4) neoliberal policy reform, particularly regarding welfare, public service provision, market deregulation, international trade, corporate competition, and governance cascade (Halseth, 2016; Marsden et al., 1990; Woods, 2005). The fallout from these shifts, and their differentiated effect on rural geographies are referred to as rural restructuring (Marsden et al., 1990).

Aftershocks of rural restructuring continue to shape rural communities of the Global North. After enjoying a post-World War II boom in primary production and industrialization, many peripheral regions are in the midst of transitioning to a post-industrial future, where they lack a production base (Goetz et al., 2018; Halseth, 2016). Elsewhere, baseline industries require so few workers that once-thriving population centers lack viability. Outmigration, a ‘graying’ workforce, anemic public and private financial capital, and low household wealth are widespread issues in contemporary rural geographies of the Global North (Argent, 2017; Edelman, 2019; Flora et al., 2016). These features generally point to communities that must rely on internal capacities to respond to uncertainty and exogenous fluctuations (Wilson, 2012).

2.2 Regional approaches to rural challenges

Social, political, and economic conditions in contemporary rural communities dictate unique features of rural governance and public institutions. In particular, rural public service delivery and infrastructural development is challenged by rural restructuring and, simply, by geography. While neoliberal policy reform shifted governance responsibility to lower-levels of government across both rural and urban space, rural geographies with limited capacity for added administrative and regulatory responsibilities experienced particularly acute effects (Halseth, 2016). With outmigration of industry and residents, rural tax bases and local financial capital suffer (Flora et al., 2016). Furthermore, depopulation poses practical challenges for governance in that fewer residents remain to carry out local civic duties (Syssner, 2020). For example, Winchester (2019) compared population data with NGO tax records in the US to find that there

are four times fewer adults for each volunteer role in rural regions versus urban and suburban regions.

Public institutions in rural regions are also economically inefficient in that they must provide services to small populations spread over large areas—a phenomenon so ubiquitous it earned the name the ‘social cost of space’ (Anderson, 1950; Kraenzel, 1955). Urban planners and city-regionalists are familiar with the cost differentials in public service delivery between high-density core neighborhoods and low-density suburbs (Trindade et al., 2019). In isolated regions, where the distance between households may span miles, cost-per-user rates may reach untenable extremes—*rising* as new users are added in a diseconomy of scale (Anderson, 1950).

Regional approaches can be used to counter such challenges to rural public service delivery (see Table 1). Like metro-regions, rural places are subject to several forces that point toward (or hinder) regional governance, described in Foster’s (1997) typology as: natural resource, macroeconomic, centrality, growth, social, fiscal, equity, political, legal, and historical ‘impulses.’ⁱ Each impulse may manifest with proregional (centripetal) or antiregional (centrifugal) effects (ibid.). While much of Foster’s framework can be applied to the periphery, the prominence of and relations between each impulse may be distinct. For example, resource development associated with primary production intertwines natural resource and macroeconomic regional impulses (e.g., the regional climate in southern British Columbia favors vigorous trees, making timber production a key regional industry). In a post-restructuring context, the fiscal and growth impulses for “declining jurisdictions...to band together” produces obvious efficiencies for extremely small towns that struggle to achieve economies of scale (Foster, 1997, p. 379). City-regionalization often involves political motives to avoid cross-jurisdictional competition. Yet in the countryside, the political impulse for regionalization may instead be driven by a desire to “present a united front” in building “greater clout with higher governments” (Foster, 1997, p. 381). Lu (2011) describes how ad hoc regional collaborations build political clout with newfound access to political influence not available to individual small-town governments, but also require a degree of centripetal, unifying energy at the regional scale to be tenable.

[TABLE 1: Factors that challenge rural public service delivery]

Due to such regional impulses, rural economic development projects and other collaborative initiatives have a history of taking shape at regional scales. Perhaps the most famous example of a regional-scale rural development intervention in the Global North is the Tennessee Valley Authority, which aimed to mobilize the rural labor force to produce infrastructure projects of enormous proportions in the 1930s (Scott, 2006). Today, bottom-up regional collaborations

take shape to allow under-resourced rural institutions to pool resources and share services (Lu, 2011; McFarlane & Harris, 2018; Smith et al., 2019; Vigier et al., 2006). In sum, regional-scale collaborations are a commonplace and common-sense response to many sets of rural issues, creating an important opportunity for scholars and policy analysts to enrich the broader critical conversation around regionalism.

2.3 Regional governance in rural drinking water provision

A 2019 report estimates 2.6 million Americans lack sufficient access to clean water in their homes (US Water Alliance & Dig Deep, 2019). Of the 150,000 public water systems in the US, 94% serve fewer than 500 people, making small drinking water system performance in rural regions important to achieving national drinking water goals (Environmental Protection Agency, 2016). Drinking water contamination in peripheral regions may be an environmental legacy of a region's industrial past (Jackson-Smith et al., 2018). Many rural public water systems in North America incur safe drinking water infractions, but the local institutions that govern public water systems are poorly positioned to respond for the reasons described in the previous section (Environmental Protection Agency, 2016; McFarlane & Harris, 2018).

Drinking water provision exemplifies contemporary challenges in rural public service governance. Water and wastewater system development is one of the most expensive capital improvements a municipality undertakes, and, the per capita cost of infrastructure development is high in low population towns (Syssner, 2020). Rural municipalities might rely on bonds, loans, and grants to finance local waterworks development (American Water Works Association, 2011), but municipalities in the US generally receive little federal support in this endeavor. Private capital and public-private partnerships are likely to be available to rural municipalities only in specific industrial contexts (e.g., Smith & Haggerty, 2020), since rural water systems serve low-demand markets by definition. Regional collaborations, on the other hand, might lack basic public finance mechanisms such as bond issuance, but they benefit from other policy and grant programs specifically designed for regional water institutions (Knutson, 2004; White et al., 2005). Such fiscal opportunities could become increasingly salient as top-down policy prescriptions push for rural water utility regionalization on a basis of economic efficiency (e.g., Environmental Protection Agency, 2016).

Achieving economies of scale is a persistent justification for water utility regionalization (Beecher et al., 1996; Environmental Protection Agency, 2016). In a rural context, scaling up is conceived with regard to both financial and less-tangible resources, such as labor and knowledge capital (McFarlane & Harris, 2018). For example, several rural water utilities may staff a single skilled water operator as this position requires a high degree of technical

knowledge, is difficult to fill in remote communities, and could require higher compensation than a single small town can afford (McFarlane & Harris, 2018; Minnes et al., 2018).

Regional approaches may be an antidote to rural capacity shortfalls, but they are hardly a panacea. Transitioning from local to regional governance structures likely requires institutional reform and consolidation of decision-making power, which could serve to exclude rather than bring in local actors (Dobbin, 2020; Leibovitz, 2003). For example, Breen (2016) and Minnes et al. (2018) studied regional solutions to drinking water governance in rural Canada and found that regional governance was impeded by resistance from local practitioners and was implemented unevenly. Unlike urban built environments that may effectively regionalize via connecting low-density suburban jurisdictions (Relph, 2012; Trindade et al., 2019), rural settlements and their utilities are distantly separated—making the friction of distance an issue of practical concern. In sum, the literature reviewed here suggests that fundamental territorial, political, and economic problems of the rural context could become barriers to the application of regional approaches to water infrastructure governance.

This paper examines such issues using a rural regional water system (RRWS) case study. In the Western US and Canada, this emergent infrastructural form often involves long distance pipelines spanning up to 1,600 km end-to-end and containing as much as 11,000 km of networked pipes (Knutson, 2004; Langford et al., 2012; Normand, 2020; Smith & Haggerty, 2020). RRWS traverse several jurisdictions as they connect individual rural towns to one another and to a shared water source (Knutson, 2004), making for complex governance and social dimensions. Infrastructure projects of this scale easily cost hundreds of millions to billions of dollars, and RRWS projects receive direct financial support from federal and state governments due to this significant capital need (Knutson, 2004; Normand, 2020; Steinhoff, 2008). Through this process new pathways for multi-scalar political connections are built (Steinhoff, 2008), suggesting that regional approaches to water infrastructure development may bolster a rural region's political capital as is documented with regard to other forms of rural, regional governance (Lu, 2011), but could also precipitate unequal power-sharing due the involvement of several localities (Minnes et al., 2018; Leibovitz, 2003).

The remainder of this paper employs a RRWS example from Montana, USA to document the governance and political complexity associated with infrastructural regionalism in a rural setting. The case study project is a proposal that is not yet constructed but has been a political and governance reality for two decades. In the spirit of analyzing both infrastructures (Anand et al., 2018; Howe et al., 2016) and regions (Allen et al., 2012; Addie et al., 2020) as *processes* constantly in flux, we examine this RRWS as a case of rural infrastructural regionalism because in its home region of Central Montana it is institutionalized as such.

3.0 Rural Infrastructural Regionalism in Montana, USA

In this section we employ the example of the Central Montana Regional Water Authority (CMRWA) to illustrate how fundamental conditions of the rural context interact with regional-scale public infrastructure governance. This section begins with a description of our methods. We then discuss the institution and the region in question, analyzing the logics behind the regional approach to rural infrastructure development. In the final subsection we use themes in CMRWA's history to explore the challenges and opportunities associated with the organization's regional scale and rural context.

3.1 Methods

This case study relies on a review of public documents supplemented with key-informant interviews and participant observation. Roughly 1,000 pages of planning and governing documents associated with the CMRWA project were read and reviewed in detail. Reviewed documents include: meeting minute records, organizational bylaws, CMRWA's central planning documents, environmental monitoring and planning documents (e.g., the Environmental Assessment), growth and capital improvement plans for local communities within the region, state and federal legislation, public testimony, and legislative hearings. Also included in this review are newspaper articles dating to 2003 and CMRWA's website and marketing content. All documents were thematically coded using a constant comparative method in addition to being read for their basic content (Corbin & Strauss, 2008). The coding scheme focused on themes in rural institutional capacity (Flora et al., 2016; Wilson, 2012) and rural regional governance (Breen, 2016; Lu, 2011), and our approach also allowed for emergent themes. Data from this content review informed an internal memo narrating the institutional history of CMRWA that was member-checked using informational interviews.

Two sets of semi-structured key informant interviews also inform this project (total n=32). First, 27 interviews were conducted in February 2020 with municipal leaders across Central Montana to understand public water system governance in rural towns. We use this dataset to inform our characterization of local-scale dynamics that influence community (non)participation in the regional effort. Second, five informational, semi-structured interviews were conducted in summer 2020 with six informants involved in the CMRWA project to corroborate and expand upon document review findings. Examples of questions asked of participants include: *What can CMRWA do as a regional organization that an individual town cannot?* (adapted from Lu, 2011) and *If CMRWA were to accomplish its mission, how would the region be changed?* Interview transcripts were analyzed and coded using the same approach as the document review.

We use participant observation to understand CMRWA's current governance processes. We observed nine CMRWA monthly meetings, taking note of meeting content, stakeholders in attendance, and interpersonal dynamics in decision making. Regular meeting attendance offered opportunities to ask clarifying questions, built rapport, and gain insight from informal exchanges. Finally, findings reported in this case study were member-checked for veracity with a CMRWA founder who remains deeply involved in the project today.

3.2 Central Montana and its Regional Water Authority

On December 28, 2020, proponents of the Central Montana Regional Water Authority (CMRWA) cheered when authorization for a \$56.6 million appropriation for their project passed as part of the US Congress' omnibus spending bill. While their rider was diminutive against the backdrop of the \$900 billion bill, CMRWA board members and project leaders worked toward this moment—gaining Congressional authorization and a federal cost-share commitment for their \$87 million project—for two nearly decades.

The organization proposes a large-scale, centralized distribution system to bring water to a region with a longstanding history of water hardship. The CMRWA system would link over a dozen small towns and several individual rural households to a single wellsite via more than 480 kilometers of pipeline (see Figure 1). The system would connect into established infrastructures to provide domestic drinking water to an estimated 6,000 people over a 31,000 square kilometer region. The substantial capital cost of this project relies on external support from the State of Montana and the US federal government. As such, the organization's history can be broadly characterized as a twenty-year pursuit of fiscal appropriations and lawmakers' attention. CMRWA's persistence literally paid off with congressional authorization of their requested appropriation in 2020.

Like much of the state, Central Montana is arid. The landscape is archetypal of the American West's iconic Great Plains: bucolic, austere, isolated, and golden-brown eleven months out of the year. Cattle ranching and dryland farming are central to the region's economy and identity, reflected in the local cowboy-hat-and-denim dress code and in colonial placenames such as "Ryegate", "Golden Valley", and "Wheatland". Since 2000, Central Montana's population has decreased by 6% (US Department of Commerce, 2019). The population density in the region is 0.74 people per square kilometer, meaning for every resident there is roughly 1.3 square kilometers of land area (ibid). The open space is taken up largely with agricultural land uses, and farm labor remains the second largest form of employment despite being dislodged from the top spot by the service sector in the late 1980s (US Department of Commerce, 2020)—a

familiar fate in post-restructuring rural geographies. Median household income in the core CMRWA counties ranges from 66% - 75% of the national average, and Central Montana's per capita income is 82% of national per capita income (ibid.)ⁱⁱ.

[FIGURE 1: Proposed extent of the CMRWA pipeline system.]

CAPTION: "Data sources: Great West Engineering, Montana State Library Clearinghouse. Data downloaded February/March 2021. Map by Grete Gansauer and Zachary S. Miller."

CMRWA's incorporation in 2004 was chiefly motivated by a shared history of water hardship across Central Montana, including collective experiences of both poor water quality and insufficient supply. Water quantity and quality issues exist at a regional scale as a result of the region's physical geography and also as a result of environmental legacies of its industrial past (Jackson-Smith et al., 2018). Agriculture and mining histories coupled with a past fuel spill from a defunct railroad cause drinking water contamination in several small towns which at times violates Safe Drinking Water Act standards. Even when tap water technically passes muster, locals complain of putrid odors, clothes turning orange in the wash, calcified appliances, and out-of-town visitors getting sick. Water quantity is also a chief concern in Central Montana. According to interviews and newspaper articles, the municipal water source for the town of Melstone (population ~100), the Musselshell River, has a habit of running occasionally running dry, forcing the town to rely on bottled water and what is left in their storage tank (Thackeray, 2004).

The CMRWA project was initiated by councilmen (use of this gendered term is intentional), mayors, and public works directors from various small towns across Central Montana who simply needed better waterⁱⁱⁱ. In Central Montana, secure access to groundwater is coveted because surface water sources such as the Musselshell River are rare, seasonally ephemeral, and legally appropriated. Roughly a kilometer beneath the surface, the vast and deep Madison Aquifer is imagined as a savior to the region's longstanding water issues, but small towns face financial, legal, and geological barriers to accessing it. Until 2019, only one settlement in Central Montana (Lewistown, the largest in the region at 6,000 residents) obtained municipal water from the Madison Aquifer via a nearby artesian spring. A key feature of the CMRWA proposal is that it promises access to "good, clean, plentiful" Madison Aquifer water (CMRWA, 2012, p. 1), allowing small towns to overcome geographic bad luck.

Capital improvements to municipal waterworks are also financially out of reach for many small communities in Central Montana. Investing in costly infrastructures to tap new source water or install advanced filtration systems incurs multimillion-dollar capital costs that small communities of 50 to 200 residents are not poised to absorb without external assistance. Some

public water systems in Central Montana are not associated with municipalities; they may be administered by unincorporated settlements that share a communal water supply. Unincorporated rural settlements lack standard fiscal tools used by municipalities for infrastructure development such as bond issuance and the ability to collect rate payments from users, putting these communities in a disadvantaged position. Thus, by developing infrastructure at a regional scale, CMRWA allows individual small towns new opportunities for capital improvements and an avenue to scale-up public water services that typically suffer from the social cost of space (Anderson, 1950; Kraenzel, 1955).

Proponents also justify the CMRWA project as part-and-parcel to a regional economic development strategy. Brochures and media publications hail the regional water system for providing short-run jobs during its construction and attracting businesses and new residents in the long run, and lawmakers tout these benefits in their arguments. Central Montana's regional economic development corporation includes CMRWA in their long-range economic development plan for Central Montana, and lauds the water system's potential job creation and quality of life benefits. While informants do not go so far as to blame the region's demographic and economic stagnation on 'bad' water, as Interviewee 1 puts it, "bad water will definitely keep [new residents] away". Interviewee 4 illustrates the regional water system's connection to region-wide economic aspirations and attitudes:

Well I sense, and this is an intangible, but I definitely sense that there's a greater (sigh) ...that there's hope. Hope for the future, hope for more business, hope for commercial enterprises coming in. Because that's one of the first questions that's asked when somebody is going to relocate a plant or something. In addition to the transportation corridors and other amenities, [they ask] what's the water like? Well, if the water is really good then that automatically ratchets up the area's ability compete with other areas and puts [Central Montana] towards the top of somebody's list.

To sum, the justification for CMRWA's regional approach is two-fold: first, the scale of the problems— both water issues and communities' limited capacity for infrastructure development— affect the Central Montana region broadly. Second, the project was justified to the public and to policy makers as part-and-parcel of a regional economic development strategy to help the region overcome its marginalized position. This statement from the CMRWA chairman to the US House of Representatives succinctly characterizes the explicit themes in the project's justification:

It is obvious that the residents, institutions and businesses of this region face significant deficiencies with the existing water supplies. These deficiencies impact the health and

safety of residents across this region of Montana. The deficiencies with the water supplies also have a significant economic impact on these communities which have Median Household Incomes [sic] among the lowest in Montana...An adequate quantity of safe drinking water is a basic human need that most Americans take for granted. Please support our efforts to secure a system that will deliver that same promise to our citizens.

CMRWA's history demarcates the unique motivations of a *rural* regional water system in comparison with regionalized urban waterworks. Bustling metro-zones often seek regionalization of water utilities as a result of growth; a sprawling built environment eventually necessitates conjoined transmission lines as a practicality or to meet growing demand (Ashton, 2006; Trindade et al., 2019). But in a rural context regionalization is instead sought as an antidote to public service and economic *underperformance*. The regional infrastructural formation here is a response to a lack of growth; it is not motivated by a need to accommodate expansion, nor is it a response to extant conditions of functional built or economic interconnectivity (Ashton, 2006). Dispersed settlements in Central Montana struggled to provide reliable clean water to their residents for nearly a century, leading them to look toward regionalization despite impracticalities of scale. In the next section, we examine the effects of the regional-scale approach to infrastructure development in a rural setting through an exploration of themes in CMRWA's history.

3.3 Challenges and opportunities associated with the regional scale

CMRWA's regional scale of operation produces a number of social and political effects that extend beyond the project's pragmatic motivations. While CMRWA elevates the stature of Central Montana's longstanding water issues to the federal stage, the effects of the organization's large scale are diffuse within the region itself. We characterize the effects of CMRWA's regional scale broadly in two categories, challenges and opportunities, highlighting the inherent tensions of rural infrastructural regionalism.

3.3.1 Challenges

In its 480-plus km reach, the CMRWA pipeline will touch six counties, over a dozen small towns, and hundreds of individual rural households—effectively distributing water over a 31,000 square-kilometer region. The simple fact that the CMRWA proposal connects multiple settlements and local governments also means that it interacts with a spectrum of local idiosyncrasies. Each town along the pipeline comes with its own local politics, suite of local leaders, relationships among those leaders, and history of (overcoming) water hardship.

Community perspectives on the CMRWA project run the gamut from enthusiastic support to apathy to disdain across the region (see Figure 2). The divergent local scale dynamics result in a highly uneven geography of engagement, which has a splintering effect on the cohesiveness of the regional idea.

Meeting records indicate that community participation was more broadly representative early in CMRWA's history than it is today. At the outset, board members from seven communities regularly attended meetings and participated in project planning and decision making. However, current project leadership hinges CMRWA's long-term champions from the towns of Harlowton and Roundup—places that grapple with particularly pernicious water quality problems and incidentally harbor larger populations than other Central Montana communities.

While representatives from Harlowton and Roundup are project stalwarts, engagement by residents from elsewhere in Central Montana has waxed and waned over the years. Towns that started as ardent CMRWA partners have since lost interest or pulled back from CMRWA for various hyperlocal reasons. For example, the town of Hobson, home of CMRWA's founding chairman, voted to reject the installation of networked water infrastructure in their municipality—meaning that even if the CMRWA pipeline were to reach town, there would be no municipal water distribution system to receive it. Interviewee 12 also reports a disagreement with other CMRWA members influenced the former chairman's departure. As Hobson continues to grapple with contamination in their water supply, local leadership prioritizes their capacity on local efforts and is no longer active with CMRWA, but the town remains included in project plans. Interviewee 2 noted the pivotal role of local leadership in determining the footprint of the pipeline:

The northern tier of the project would serve Hobson and Moore. Hobson was really interested early on when they had some leadership. They have since lost interest. Moore has not really made any long-term interest in the project. So I think there's a fairly high possibility that the northern tier of this project will never happen... But they're facing a lot of water quality issues up there as well. Moore has got high iron, Hobson has high nitrates in their individual wells. So that might change with leadership changes.

[FIGURE 2: Individual towns' engagement with the CMRWA project across Central Montana]
CAPTION: "Characterizations were developed using meeting minute records and interview data. Population numbers from the US Department of Commerce (2019), except as adjusted based on the recommendations of participants. Map by the authors."

Leadership capacity and the opportunity costs associated with civic engagement are serious concerns for rural communities where governance is typically performed by a handful of volunteers. Local informants from across Central Montana joke about the revolving door of small-town governance that doesn't leave residents with much choice but to serve. Interviewee 7 says, "[The town council] voted me in unexpectedly. The [town clerk] called me up and said on such and such a date you have to get sworn in, and I'm like, I didn't run!" Capacity challenges are exacerbated in extremely small communities, where leadership transition or lack of leadership capacity can be a barrier to their participation in regional governance, and where a single person carries significant influence. For example, after the two representatives from Broadview passed away and the single board member from Lavina moved, Interviewee 6 says, "no one else was willing to step up." Representatives from neither Lavina nor Broadview have been engaged in the project's governance since. Interviewee 6 describes that this is likely because CMRWA's bylaws assign default representation to town mayors—a local leader who is, by definition, already deeply involved in local civic affairs and likely quite busy as a result.

The geographic span of rural, regional infrastructure also poses practical barriers to participation. Volunteer board members regularly drive two hours one way (longer in wintery conditions) and 225 km round trip to attend monthly board meetings. While sixteen years of meeting records indicate that many volunteers faithfully show up, members of the public rarely do. Some board members from small, isolated communities stopped attending meetings due to the impracticalities of attendance, and as a result effectively abdicated their community's position on the CMRWA board. For example, while the representative from Melstone, one of the farthest flung towns, technically holds a board seat, that member has not attended a CMRWA meeting in years due to the drive.

On the other hand, the opportunities made possible by CMRWA's regional scale attract other settlements to join. One community, Shawmut, expresses enthusiastic desire to join the project. Shawmut is in the process of creating a special water district around their unincorporated community in order to be able to hook up to the CMRWA pipeline, collect water payments from households, and potentially invest in networked water infrastructure in the future. Interviews and meeting minutes indicate that changing the legal status of their community was directly provoked by a desire to hook up to the CMRWA waterlines. Whether the CMRWA pipeline reaches Shawmut or not, the community will have access to new fiscal opportunities for capital improvements due to their special district status.

In sum, CMRWA interacts with a multitude of localities in highly individualized ways, which challenges the practical coherence of the regional idea. In addition to a friction of distance that frustrates consistent participation, the project's governance history suggests that idiosyncratic,

place-based issues—essentially hyperlocal politics—also affect participation. This underscores known challenges of regional governance: that garnering a broadly representative coalition is difficult (Leibovitz, 2003), and that the costs and benefits of collaboration risk being shared unequally across stakeholders (Minnes et al., 2018).

The CMRWA case exemplifies how such dynamics are exacerbated in a rural context defined by low population densities and small settlements, where physically isolated communities rely on distinct local histories as they build external relationships (Wilson, 2015). The result is that institutional capacity is at times desperately thin (Winchester, 2019). Like other regional and infrastructural formations, as the CMRWA system is built, its material dimensions will ultimately reflect the social and institutional conditions under which it was constructed (Glass et al., 2019; Harvey, 2018). Social relations of the present moment point toward a pipeline that serves some communities and bypasses others. Therefore, the current landscape of regional and local relations that drive community (non)participation in CMRWA could have lasting implications for Central Montana’s future by delineating a highly uneven geography of “good, clean, and plentiful” water access (CMRWA, 2012).

3.3.2 Opportunities

Despite governance challenges, collaborating at a regional scale affords opportunities that would be all but impossible for a single small town acting on its own. We identify access to new fiscal tools and newfound political capital as two key benefits that result from CMRWA’s regional scope.

CMRWA’s estimated \$87 million cost is goliath in comparison to that of a small municipal water system^{iv}. Over 80 percent of CMRWA’s intensive capital need is met by federal and state finance programs that are specific to RRWS in the American West (Knutson, 2004)—a clear advantage of the organization’s regionality in that such programs are closed to individual municipalities. What is more, the federal and state policies that support RRWS development are equipped with more capital than municipal programs since they are designed to accommodate large scale projects (ibid.). The RRWS fiscal model is highly reliant on state and federal grants, while municipal infrastructure finance is highly reliant on debt in the form of bonds and loans (White et al., 2005). Taken together, CMRWA’s financial model—which opens access to high-capacity grant (as opposed to loan) programs—is a key benefit of the institution’s regionality.

This statutory context also means that RRWS such as CMRWA necessarily interact with federal and state fiscal processes differently than municipal public works. As CMRWA proponents navigate this unique policy space they forge relationships with state and federal lawmakers in

the process. Throughout its history, CMRWA advocates for budget appropriations in the Montana State Legislature and in the US Congress, maintaining lobbyists at each level of government and fostering direct relationships between lawmakers and project leaders. At the federal level, CMRWA champions traveled to Washington DC several times to meet with lawmakers and testify before Congress in pursuit of their bill which passed at the end of 2020. State legislators and US Congressional staffers regularly attend CMRWA meetings, and at least three Montana Congressmen made site visits over the years to discuss the project with local leaders.

In 2015, a bottle of brown, salty, smelly Central Montana tap water made its way to the Senate floor. Making his case for CMRWA's bill to the Senate Energy and Natural Resources committee, a Montana Senator used the 'bad water' as a prop and pointed to images of darkened water gushing from a Roundup fire hydrant (Lutey, 2015). Without CMRWA it is unlikely Roundup's poor water quality would be a matter of discussion in the US Senate. This instance exemplifies how CMRWA's engagement at the federal level catapults local water issues into the consciousness of national lawmakers, directing lawmakers' attention to issues of regional concern to Central Montana. With the recent success of their bill, CMRWA is one step closer to translating their political capital into a massive influx of built capital into the region (Flora et al., 2016).

CMRWA accesses a set of fiscal programs specific to RRWS, and in so doing, proponents act as ambassadors for the Central Montana region as they build relationships with decision makers at higher scales of government. The influence with state and federal levels of government that come of CMRWA's institutional context would be all but unattainable for an individual Central Montana town. In this way CMRWA affords fiscal and political advantages because of their regional scale that stand to benefit the region *as a whole*. Regional-national and regional-global connections are typical of city-regions (Allen et al., 2012), but for the isolated communities that inhabit 'empty' spaces on the map easily glossed over by national decision makers, gaining federal political and fiscal access is quite impactful and extraordinary. Indeed, CMRWA's inter-scalar political connections could rewrite the region's future water access and capital endowments.

4.0 Discussion

Key effects of CMRWA's regional scale—namely, the institution's unruly interactions with a spectrum of hyperlocal politics and the bolstered political and economic opportunity CMRWA affords—appear to create dual centrifugal and centripetal forces that are at tension. On the one hand, towns across the region must collaborate at a regional scale to obtain the political

and financial resources necessary for this massive capital improvement project. This process involves collective participation in a shared regional vision, and narrating the project as a region-wide solution. Stakeholders make the project legible to key decision-makers as a problem solver: an efficient solution to overcome both water hardships and economic development barriers endemic to low-population, remote rural areas. Through this collective advocacy, regional stakeholders accumulate shared political capital and the region takes on the corresponding centripetal energy.

On the other hand, a look inside Central Montana reveals a disjointed and idiosyncratic set of local contexts that are weakly associated at the regional scale. Because CMRWA operates in a remote region, its sprawling territory comprises many localities that are otherwise, for the purposes of governance, disconnected. These fundamentally rural characteristics interact with social relations at the local scale to produce a centrifugal effect that frustrates the cohesiveness of CMRWA's regional-infrastructure imaginary. The barriers CMRWA faces are not only unique to the rural condition, but they are amplified in the rural context, where the participation of an entire community in the regional effort may depend on leadership capacity or interpersonal dynamics associated with one individual.

The centripetal and centrifugal energies that arise from CMRWA's opportunities and challenges clearly pose a contradiction, and the possibilities for the political and infrastructural form of the region remains uncertain. But it appears that local-scale dynamics will hold a central role in how this play unfolds. If the physical form of the pipeline will reflect the social relations of the moment in which it is produced, as critical infrastructure scholars attest (Harvey, 2018), then the material dimensions of the CMRWA pipeline will be highly contingent on an unstable set of local-scale dynamics rather than a planned logic of regional water access, risking a mismatch between water need and access at the local level. The effect for Central Montana could be the introduction of competitive (dis)advantages between the communities that have 'good' water and those with 'bad' water. Such a split risks setting localities across the region on divergent development trajectories, creating a new spatiality of settlement in Central Montana, and potentially undermining the regional economic development goals the CMRWA project ostensibly supports. In sum, this example of rural infrastructural regionalism demonstrates that the complexities set to determine the form of the pipeline—and, in turn, a new spatiality of the Central Montana region—are borne of fundamental features of the rural condition.

Our finding that regional collaborations in rural areas may be unstable due to local dynamics has implications for regional-scale rural development interventions. Policy will benefit from a recognition that endogenous dynamics at the local scale influence participation in and tractability of regional planning processes in remote regions. Just as city-regional planning

efforts risk overlooking rural needs (Schafran, 2014), rural-regional planning may need to take extra measures to ensure full geographic representation. Sustained and robust efforts to bolster leadership capacity and facilitate participation, particularly from the least resourced places, will be crucial to fostering centripetal energy for the duration of any regional project. Furthermore, it is notable that the sites of the project's inception (the most populated towns in the region, Harlowton and Roundup) are also currently leadership centers, while other towns' participation has, for various reasons, waned over the years. A regional visioning exercise early in the project's history may have helped build buy-in across localities for the regional effort, forge a direct connection to regional development goals, and lay the foundation for cohesive governance from the start. Even today, a scenario planning exercise might invite stakeholders across the region to imagine collective and desired economic and infrastructural futures, and to visualize and discuss the risk of divergent economic trajectories noted in this paper.

Future research will advance this conversation in scholarship and policy in important ways. More theorization is needed that abandons the assumption of urbanity in critical infrastructure and regional studies, and perhaps, considers the construction of regional space and built environments outside the metropolitan form. Future research can also help clarify the role of infrastructure in creating tensions between local and regional identities. Finally, as climate change invites new imaginations of large-scale technological fixes for the environmental problems facing resource peripheries, continued research and discourse around rural infrastructural regionalism will be crucial to addressing the social, environmental, and political complexity that is sure to accompany such projects.

5.0 Conclusion

The territorial, political, social, and economic dimensions of this regional, infrastructural formation are highly specific to rural space, as compared to urban space. We note that governing infrastructure across a rural region raises a distinct set of concerns in comparison to a metropolitan region. In particular, regionalization of water utilities in rural areas is likely to be sought in response to public service and economic underperformance rather than growth and agglomeration. Yet forging physical connections across regions defined by low population density and a vast territoriality incites a suite of impracticalities and governance complexity. Our case study of a RRWS in Central Montana, USA demonstrates that this regional-infrastructural vision produces both political and economic opportunity as well as challenges with regard to managing a multitude of diverse local-scale dynamics. We suggest that these dynamics translate into dual centripetal and centrifugal effects that underscore the salience of local-scale dynamics and informal processes in the production of new rural-regional space through infrastructure.

The case of CMRWA presents a paradox: while the institution's regional approach mandates some level of cohesiveness across Central Montana, the outcome the organization produces risks being incohesive. This contradiction begs the question, is CMRWA truly a *regional* solution? In the sense that CMRWA produces supra-local connections between multiple towns via a centralized water distribution network, perhaps the answer is yes. But there is a risk that some communities will be excluded from this regional-infrastructure dream, and it remains to be seen if CMRWA will provide a more secure water future to Central Montana as a whole. Thus, the form of the pipeline—and ultimately the form of regional space in Central Montana—remains unfixed.

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Appendix A: Table 1

Table 1. Factors that challenge rural public service delivery

(adapted from Minnes et al., 2018; Flora et al., 2016; McFarlane & Harris, 2018)

- Aging population and workforce
- Outmigration and population decline (leading to both diminished human capital and tax revenue)
- Low demand utility markets; unattractive to private investment
- Pullback of federal investment and downloading of responsibility
- Diseconomies of scale and the ‘social cost of space’
- Capacity limitations (especially knowledge, financial, and labor capacity)
- Degrading infrastructure
- Lack of (re)investment

Endnotes

ⁱ Foster (1997, p. 376) defines regional impulses as “factors that motivate local governments and other interest groups to achieve regional outcomes.”

ⁱⁱ Statistics reported for the Central Montana region were calculated using data associated with Musselshell, Golden Valley, Wheatland, Judith Basin, and Fergus Counties.

ⁱⁱⁱ Project leadership has since grown to include a regular meeting roster of hired engineers, NGO partners, and state and federal agency personnel, in addition to local community leaders.

^{iv} Small towns in Central Montana have recently overhauled their public water systems for costs ranging from \$2 million - \$11 million.