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How water quality improvement efforts influence urban–agricultural relationships

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Abstract

Urban and agricultural communities are interdependent but often differ on approaches for improving water quality impaired by nutrient runoff waterbodies worldwide. Current water quality governance involves an overlapping array of policy tools implemented by governments, civil society organizations, and corporate supply chains. The choice of regulatory and voluntary tools is likely to influence many dimensions of the relationship between urban and agricultural actors. These relationships then influence future conditions for collective decision-making since many actors participate for multiple years in water quality improvement. In this policy analysis, we draw on our professional experiences and research, as well as academic and practitioner literatures, to investigate how different types of water quality interventions influence urban-agricultural relationships, specifically examining policy tools on a regulatory to voluntary spectrum. Interactions between farmers and other rural agricultural interests on one hand, and urban residents and their stormwater managers and wastewater treatment plants on the other, influence dynamics relevant for water quality improvement. We suggest that the selection of policy tools within complex governance contexts influence urban–agricultural relationships through financial exchange, political coalitions, knowledge exchange, interpersonal relationships, and shared sense of place. Policy tools that provide a means to build relationships and engage with people's emotions and identities have potential to influence personal and community change and adaptive capacity, while processes such as lawsuits can catalyze structural change. Engaging these relationships is particularly critical given the need to move out of polarized positions to solve collective problems.

Keywords Water quality policy · Regulatory and voluntary approaches · Urban–rural divide · Agriculture · Collaboration

Abbreviations

BMP	Best management practice
CWA	Clean Water Act
OECD	Organization on Economic Cooperation and Development
NPS	Nonpoint source pollution
EPA	U.S. Environmental Protection Agency
NPDES	National Pollutant Discharge Elimination System
TMDL	Total Maximum Daily Load
DMWW	Des Moines Water Works
WLEB	Western lake erie basin
EQIP	Environmental Quality Incentives Program
CSP	Conservation Stewardship Program
CRP	Conservation Reserve Program
MAEAP	Michigan Agriculture Environmental Assurance Program

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Introduction

Watershed health is a community endeavor, where the actions of people and organizations with different land use priorities (e.g., residential, agricultural, industrial) influence the health of the entire system (City of Portland 2005; Elzufon 2015; NYS 2009). Many urban areas in the U.S. have worked to improve water quality by implementing stormwater best management practices (BMPs), such as bioswales or pervious pavement, that reduce the amount of stormwater entering the sanitation system while also filtering pollutants (EPA 2010). Homeowners in rural and urban places have taken individual and collective action to change behavior (e.g., use less fertilizer on lawns) or implement BMPs on

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their own property (e.g., rain gardens) (Busse et al. 2015; Chini et al. 2017; Church 2015; Dhakal and Chevalier 2016; EPA 2003; Gao et al. 2018). Nutrient loss from agricultural land, similarly, has long been an issue for water quality, where farmers' voluntary adoption of conservation measures (e.g., reduced tillage, cover crops) has been encouraged (e.g., USDA NRCS n.d.; USDA 2019). Conservation organizations, watershed planners, university extension educators, and researchers continue to engage communities to mitigate water pollution in order to improve watershed health and downstream water quality. Despite efforts by many cities, urban residents, and farmers, water quality problems persist. Too often, the persistence of water quality problems becomes a point of tension in a watershed, with urban interests blaming water quality problems on agricultural communities/stakeholders, and vice versa (e.g. Gasteyer 2008; Hu and Morton 2011). For example, a baby's death led small town residents to fight agricultural industries due to concerns about groundwater nitrate pollution (Marcotty 2018). A study in Wisconsin found that interviewees (people involved with or knowledge of the Lake Wausau management) felt municipalities were overly burdened to reduce phosphorus, stating agriculture should also be implicated in water quality problems. This same study noted that lake users and individual farmers were perceived to have little power in lake management as compared to "big ag" (Floress et al. 2019). Other research has found tensions surrounding perceptions that non-farmers do not understand the complexities of farming and the realities of making a living while also protecting the environment, and thus some farmers seek to prove they are good stewards of the land (and water) (e.g., Church and Prokopy 2017; Moore et al. 2008; see also Graddy-Lovelace 2020 for a farm policy analysis on farmer/non-farmer mutual responsibility).

In this paper, we refer to this tension as an urban–agricultural divide. While we recognize that conflicts surrounding water quality are not simple and that urban–agricultural relationships are complex, here we examine dynamics between agricultural actors whose incomes/identities are tied directly to agricultural production and non-agricultural actors whose incomes/identities are not directly tied to agriculture. Following the United States Department of Agriculture Economic Research Service, we define "urban" as residential non-agricultural land uses in urban and rural areas, and "agricultural" as cropland, grassland pasture and range, and forest-use land (Bigelow and Borchers 2017); we conceptualize these land uses as linked to their associated stakeholders/actors. We recognize that urban areas can include agricultural uses and that rural areas are complex and include actors and uses outside of the agriculture sector. We also recognize that people's own conceptualizations of the places they live in differ, including whether they live in "urban," "suburban," or "rural" communities. These conceptualizations may or may not adhere to population-based definitions set forth by the U.S. Census (see Ratcliffe et al. 2016; U.S. Census Bureau n.d.). Indeed, much of the literature refers to "urban–rural divides" that are based more upon population density than land use or occupation. While we are primarily interested in the tension between urban and agricultural actors, we also use these terms—urban and rural—due to a rich literature surrounding these community dynamics and their overlap with our research interest.

One persistent problem in addressing water quality problems is the need to identify and address the pollution source, which can cause or exacerbate tensions between urban and agricultural watershed residents. Divides often exist at the spatial and social boundaries between urban and agricultural stakeholders over the sources of water quality problems and approaches for addressing them. Through our combined work to understand farmer decision-making surrounding adoption of conservation practices that can help mitigate nonpoint source runoff into waterways, we often find farmers and urban stormwater managers shift blame to the other (Floress et al. 2019; Ranjan et al. 2019). Water quality concerns can also be a major source of tension between urban and agricultural communities. Nutrient runoff from agriculture contributes to blue-green algae blooms that can threaten drinking water, fisheries, recreation and industrial uses both locally and downstream, while livestock manure can spread pathogens such as *E. coli* in surface and groundwater. Tensions are sometimes exacerbated by uncertainty or failures of regulation or policy tools (Wardropper et al. 2017). Here, we examine common tensions that range from negative attitudes toward the other (potentially inhibiting water quality protective behaviors) to reactions such as litigation. Throughout this manuscript, we use the cases listed in Table 1 to illustrate different urban–agricultural relationship outcomes and policy tools.[1] The cases exemplify potential/existing water pollution tensions across urban and agricultural stakeholder groups with opportunities for positive or negative influence on urban–agricultural relationships. It is important to note that not every urban–agricultural tension will fit every example.

This policy review examines the dynamics of different water quality improvement policy tools in bridging or exacerbating urban–agricultural divides. Watershed improvement efforts often involve bringing farmers into dialogue or formal agreements with urban water managers, residents, and community leaders. We categorize different mechanisms by which water quality improvement

[1] We use Schneider and Ingram's (1990) use of policy tools as "tools or instruments through which governments seek to influence citizen behavior and achieve policy purposes" (511).

Table 1 Water resource management examples with potential to influence urban–agricultural relationships

Federal Farm Bill cost-share programs: These programs fund part of the cost for conservation adoption in rural and urban areas (USDA 2019)

New York Watershed Agreement: State funding implements watershed programs in urban and agricultural areas (Budrock 1997)

Eagle Creek Watershed Alliance: Upstream agricultural land uses contributed to atrazine impairment in the reservoir providing drinking water to urban residents. Watershed planning spanned urban and agricultural stakeholders (Tedesco et al. 2005; Hack et al. 2008)

Clear Choices Clean Water Campaign and *Healthy Shorelines Initiative:* Non-governmental organizations utilized US EPA 319 funds to develop and implement education campaigns throughout entire watershed spanning urban and agricultural land uses (Busse et al. 2015)

Common Ground Common Water: Educational film utilized urban and agricultural stakeholder voices to highlight common water issues and solutions (Church 2018)

Indian Creek Watershed project: Federal, State, corporate, and NGO funded watershed conservation program with farmer-led decision-making, cost-share programs, data sharing, and public meetings. Although primarily an agricultural program, the project reached local communities and federal decision-makers (Church and Prokopy 2017)

Shared sense of place: A study in Colorado and Wyoming showed that landowners' place identity and conservation ethic related to their perceptions that conservation easements were needed to protect land in their communities (Cross et al. 2011)

Wisconsin runoff regulations: State regulations require croplands and pasture to comply with agricultural performance standards (WDNR 2020)

Willamette Partnership: The Willamette Partnership facilitates water quality trading programs that span urban and agricultural areas (Willamette Partnership 2015)

Michigan Agriculture Environmental Assurance Program (MAEAP): A program that certifies farms with verified best management practices. Certified farms receive a MAEAP certification sign. The signage is a visible link to the non-farming public that certified farms have adopted conservation practices (Stuart et al. 2014)

Lake Wausau Association: Residents living near Lake Wausau, an impoundment on the Wisconsin River located in the middle of urban Wausau, organized a lake management plan to reduce phosphorus contributions to the lake that came from a number of sources including upstream agricultural production (Floress et al. 2019)

Tabor to the River program: Municipal program used local landmarks to highlight shared resource concerns to protect local water resources. The program focused on urban residents (Church 2015)

City of Toledo drinking water: A media campaign that blamed agriculture for unhealthy water quality in Toledo's drinking water source (Toledo Blade 2019a)

Oregon's Watershed Councils: Several case studies highlight this model for successful watershed collaboration across urban and working landscapes (Clark 2001; Habron 2003; ODFW n.d.)

Des Moines Water Works: The city's water utility sued upstream agricultural drainage districts for Clean Water Act violations (Canning and Stillwell 2018; Pfannenstiel and Eller 2018)

Note: Examples are listed in the order they initially appear in this manuscript

efforts may influence urban–agricultural relationships with a focus on rural agriculture. We also unpack the concept of the "urban–rural divide" to build a nuanced understanding of urban–agricultural relationships, as we draw upon rural–urban literature and examples. Here, we focus less on divides and more on relationships between non-agricultural actors and agricultural actors. We draw on diverse literatures as well as examples from water quality improvement efforts in the U.S. to ask: *When addressing watershed problems that span urban-agricultural boundaries, how does the choice of water quality policy instrument influence urban-agricultural relationships?* In the following pages, we explore the complex relationship between urban and agricultural contexts. We then examine how different policy tools influence urban–agricultural relationships—both positively and negatively—and make a call for further research in this realm. We conclude with policy recommendations and a call to action to bridge urban, agricultural, and political divides to more effectively address pressing water quality issues.

Urban–rural and agricultural-nonagricultural relationships

Rural people and places are more connected to urban ones than ever before (Lichter and Brown 2011). For example, rural land and homes are increasingly owned by urban residents (Browder 2002; Stedman et al. 2006) and new infrastructure and technologies have made living, traveling, and working between rural and urban places more convenient and possible (Brown and Schafft 2011). Despite increasingly fluid boundaries, urban and rural residents' attitudes and values towards natural resource concerns often diverge. Assumptions that rural residents have lower levels of environmental concern than urban residents have persisted for decades (Lowe and Pinhey 1982; Van Liere and Dunlap 1980), although this assumption has also been contested (Arcury and Christianson 1993; Berenguer et al. 2005). As Freudenberg (1991) suggests, these discrepancies could be the result of varying methodologies and whether the focus of the research is on local or broad environmental issues. Howley et al. (2014) found that although farmers and the "general public" in Ireland had similar levels of concern over the environment as a whole, the public reported more importance of recreational access and wildlife habitat in the countryside than farmers reported. Salka (2001) found that while urban or rural location is a significant predictor of environmental attitudes or voting patterns, location is much less important once other demographic variables like political party affiliation and employment in resource dependent industries are considered. It is also well-documented that farmers are not a monolithic group with regard to environmental attitudes and behaviors (Prokopy et al. 2019). Broadly, scholars have suggested that conflict over environmental goals is essentially an urban–rural conflict, as an urban majority imposes their values (and subsequent policies) on the rural minority (Freshwater and Deavers 1992).

Along with increasing competition for limited freshwater resources, a divide between urban and agricultural stakeholders has also been shown to extend to conflicts over pollutant sources, how to address water quality concerns, and whether the watershed level is the appropriate scale to implement water resource protection measures (Sabatier et al. 2005). While awareness exists among urban and agricultural actors that their own residential and occupational practices can contribute to water degradation (Hite et al. 2002; Hu and Morton 2011; Kaplowitz and Witter 2008; Ward and Lowe 1994), each group also tends to be critical of the effects of the other groups' practices on water quality (Bruening and Martin 1992; Gutman 2007; Kaplowitz and Witter 2008; Paolisso and Maloney 2000; Ranjan et al. 2019). In terms of agriculture, as this sector has industrialized and intensified, public perceptions of farmers have become more complex. For example, pollution from farms has become more of a concern, the economic role of agriculture within local industries has become less important, and rural land use change toward amenity and recreation uses have intensified (e.g., Butt 2013; Cabot et al. 2004; Caldwell 1998; Smithers et al. 2005; Ward et al. 1995). Increasing pressure to change public policy to address environmental degradation from a public whose livelihoods do not depend on agriculture (e.g., Freshwater and Deavers 1992) was noted decades ago, but this problem has yet to be addressed.

Meanwhile, farmers sometimes feel that they are stewards of the land who receive a disproportionate share of the blame for poor water quality (Lichtenberg and Zimmerman 1999; Michel-Guillou and Moser 2006; Floress et al. 2009; Paolisso and Maloney 2000). Additionally, questions about who should pay for efforts to address water quality are relevant (Grigg 1999; Hite et al. 2002)—should farmers pay to mitigate their own pollution or should the public pay because agricultural outputs are a common good? Thus, there is an apparent disconnect between efforts of non-agricultural actors and efforts of the agricultural community that we contend may contribute to blame shifting and subsequent inaction (e.g., Ranjan et al. 2019).

The "urban–rural divide" is descriptive of a more complex set of issues than simply where people live. Residents with occupations related to agriculture, as well as residents with nonagricultural jobs, may view farming differently within rural areas. For example, most rural residents are not employed by the agricultural sector, and the rise of exurban amenity buyers and second homeowners has increased an "old countryside—new countryside" dynamic (e.g., Abrams et al. 2012; Jackson-Smith 2003; McCarthy 2008). "Rural" and "urban," therefore, do not just refer to housing densities, but also to identities, experiences, and expectations.

Scholars argue that the consideration of the cross-scale and cross-level nature of human-environmental systems is increasingly important (e.g., Cash et al. 2006). When tackling environmental issues, there is a tendency for social actors to overlook relevant scale and level interactions, there is often a mismatch between human institutions and biogeophysical problems, and different social actors perceive and value scales differently. Water governance similarly contains multiple competing scales and levels (e.g., spatial, temporal, administrative, institutional, etc.) (Daniell and Barreteau 2014). Thus, we contend that consciously building urban–agricultural coalitions of multiple types of stakeholders to address water quality issues is essential for effectively and sustainably protecting water resources (Cash et al. 2006; Morton and Brown 2011; Daniell and Barreteau 2014).

Water quality policy tools

Water quality problems are addressed using a variety of policy tools. However, how policy tool implementation triggers transactions across urban–agricultural stakeholders or potentially impacts urban–agricultural relationships is not well understood. Watershed improvement efforts often involve bringing multiple stakeholders together, including farmers, non-farming rural residents, urban water managers, and community leaders into discussions to address local water quality concerns (Lubell et al. 2002). Such efforts to address water quality can be individual or collective. Individual actions, behaviors, and attitudes can be influenced by collective action—a group working together to achieve a common goal (Prokopy et al. 2014)—and vice versa. Collaborative watershed groups, for example, are collective efforts, but their goal is often to influence the attitudes and behaviors of individuals within the targeted watershed. Collective efforts can be catalyzed by events that are both intentional (including government and non-government action) and unintentional (including disasters and incidental actions by governments or non-governmental organizations) (Prokopy et al. 2014).

The behaviors that public policies intend to address are on a spectrum from highly regulated to highly voluntary (e.g., Flora 2004). In comparison with other Organization on Economic Cooperation and Development (OECD) countries, the U.S. is mostly on the voluntary incentives end of the spectrum in terms of nonpoint source pollution (NPS), while countries like Australia rely more heavily on regulation (Secchi and Mcdonald 2019). The choice of policy instrument impacts a set of political, economic, and interpersonal relationships, and scholars are increasingly examining the sociology and politics of public policy instrumentation (Lascoumes and Le Galès 2007; Wardropper et al. 2015).

Table 2 shows our analysis of specific water quality policy tools intended to influence behavior, ranging from regulatory to voluntary approaches, including: requirements; water quality trading; incentives; certification; education/outreach; values/norms; total daily maximum load planning; and collaborative partnerships. We compare these typologies through the lens of five urban–agricultural relationship outcomes. It is through these outcomes that we contend policy tools influence urban–agricultural relationships, including: financial exchange; political coalitions; knowledge exchange; interpersonal relationships; and shared sense of place. The tools and urban–agricultural relationships described here are not intended to cover every possible case. Rather, the impetus of this policy review was formed during a multistate research team meeting. In this meeting, we discussed themes coming from our separate research projects, literature about urban and agricultural blame shifting for water quality issues, and the ways in which our work and other literature reflected other types of polarizing issues in the U.S. Each author contributed cases from their published or unpublished work, along with examples from the literature, to exemplify specific themes linking the policy tools literature to the ways in which relationships were affected. This framework is not an exhaustive review of all the papers addressing urban–agricultural relationships. In the following section, through examples, we describe each urban–agricultural relationship outcome and policy tool in detail.

Urban–agricultural relationship outcomes and policy tools

In this section, we review literature and provide examples of the influence of each policy instrument or process on urban–agricultural relationships (Table 2).

Urban–agricultural relationship outcomes

We begin by describing, through examples, five urban–agricultural relationship outcomes we contend can be influenced by policy tools. We describe these outcomes first, to provide an understanding of policy tools we exemplify later.

Financial exchange

Financial relationships refer to the transfer of funding from urban to agricultural (or vice versa) stakeholders to address water quality issues. For instance, financial incentives from the U.S. Farm Bill transfer funds from largely urban taxpayers to farmers, such as the estimated $1.8 billion per year paid to landowners under the Conservation Reserve Program (USDA FSA 2012). Another example is the New York Watershed Agreement, through which funding from the State of New York and New York City implement watershed protection and partnerships programs in both urban and agricultural areas (Budrock 1997).

Political coalitions

When urban and agricultural interests align, they can create powerful and relatively stable coalitions to advance common or compromise interests. A coalition contains people from a variety of positions, including elected officials, bureaucrats, and interest group leaders, who share a belief system and undertake coordinated activity over time (Weible et al. 2011). Coalitions, such as those that advance the Farm Bill, channel significant government funds to food and agricultural programs. Strong coalitions that are either urban or agricultural often prevent dramatic shifts in policy and practice even when the party in office changes. However, this stability can prevent more transformative change. Collaborative watershed planning is designed to foster coalitions in which parties can work out their differences and bring compromise proposals to agency decision-makers and elected officials. Collaborative watershed planning frequently occurs under the umbrella of the Clean Water Act (CWA) or watershed councils. Moreover, the U.S. Environmental Protection Agency (EPA) promotes water protection at the watershed level with coordination between federal, state, and local agencies (EPA 1995). Some coalitions, like the Eagle Creek Watershed Alliance in Indiana, develop watershed plans to guide water quality improvement efforts in that watershed (Tedesco et al. 2005; Hack et al. 2008).

Knowledge exchange

As described by Busse et al. (2015), watershed organizations sometimes seek to provide a variety of opportunities for all types of residents to share knowledge about BMPs for improving water quality and learn about what others in the community are doing to address water quality concerns (e.g., county fair booths, yard/field signs, and demonstrations) (see also Morton and Brown 2011). Prokopy and Floress (2011)

Table 2 Water quality policy tools and urban–agricultural relationship outcomes

Policy tools	Urban–agricultural relationship outcomes				
	Financial exchange	Political coalitions	Knowledge exchange	Interpersonal relationships	Shared sense of place
Regulatory: Requirements	Rural to urban financial transfer (internalizing farm costs)	Potential to be oppositional	Required between polluters and regulators	Monitoring and enforcement from urban to agricultural actors	May deepen negative emotions among the regulated toward nonregulated (perceived inequity)
Voluntary: Water quality trading[a]	Urban to rural financial transfer	Potential to foster coalitions	Requires high level of information exchange	Abatement credit contracts	May foster shared sense of purpose/understanding
Voluntary: incentives	Urban to rural financial transfer	Fosters coalitions that support future funding	May result in information on behavior; rarely water quality improvement data	Typically no effect	Typically no effect
Voluntary: certification	May result in transfer to farmers but not guaranteed	No effect (generally separate from political coalitions)	Technicians and farmers discuss farm management and BMPs; consumers see certification signs	Direct relationship between the technician and farmers; less opportunity for relationships between consumers and farmers	Technicians often from the area where they work and may have empathy for the farmer and concern for the local environment; signs may foster the public's cognitive link to farmers' conservation efforts; farmers may develop water resource protective attitudes
Voluntary: persuasion through education and outreach	Typically no effect	Potential to foster coalitions, with purposeful design	Potential for knowledge exchange, with purposeful design	Typically no opportunity for personal interactions	May foster shared sense of purpose/understanding
Voluntary: persuasion through values/norms	Typically no effect	Typically no effect	Potential for knowledge exchange, with purposeful design	Potential to foster interpersonal relationships, with purposeful design	May foster shared sense of purpose/understanding
Voluntary: persuasion through media	Typically no effect	Potential to be oppositional	Potential to educate the public on BMPs and conservation action	Indirect relationships mediated through the media	May be adversarial and combative, but has potential to foster shared sense of purpose/understanding
Voluntary processes: collaborative partnerships	Collaborative processes may be used for all policy tools. Depending on the process design, collaborative partnerships may entail a range of outcomes described for each policy tool above				
Litigation processes	Lawsuits can be a driver of change or an outcome due to policy tool failure, spanning a range of urban–agricultural relationship outcomes. They can be a mechanism that brings people to the table, can be a part of a solution, or the breakdown of consensus and solution building				

[a]Successful water quality trading programs will have a regulatory driver (e.g., phosphorus concentration rules) or demand from point sources confronted with discharge regulations

describe this as program participation, whereby residents are participants in activities organized by others. Education programs and other tools that might result in knowledge exchange between urban and agricultural actors may raise awareness of local environmental issues. For example, the film *Common Ground, Common Water* increased different stakeholders' awareness of each other's conservation efforts and catalyzed a conversation toward the inclusion of urban and agricultural stakeholders in a watershed planning effort in northwest Indiana (Church 2018; Church and Doyle 2018).

Interpersonal relationships

Interpersonal tools focus on interactions between people and groups. This entails planning for opportunities and processes where different groups interact, subsequently learning from each other and building shared understanding and social networks. Social networks are an important component in addressing natural resource issues (Bodin and Crona 2009; Floress et al. 2011). Social networks facilitate information sharing and access to resources (Floress et al. 2011), and activities fostering network formation provide an arena for social learning to take place. Social aspects of learning can be transformational whereby experience with others allows for observation, interaction and dialogue, and reflection (Kolb 1984; Schon 1984). Some contend that social learning processes can contribute to increased environmentally responsible behavior (see Muro and Jeffrey 2008) (e.g., adoption of water pollution mitigation practices). Social learning is defined as a process that occurs within a social community and entails a shift in individual understanding that leads to new attitudes or beliefs and then permeates to a broader social community (Holden 2008; Reed et al. 2010). For example, the Indian Creek Watershed project in Illinois facilitated a common water protection goal for the watershed community. Farmer leaders discussing their conservation experiences helped residents of a prominent town in the watershed, as well as state and federal agency staff and elected officials, understand how farmers in the watershed were trying to help improve water quality (Church and Prokopy 2017).

Shared sense of place

Shared sense of place refers to the process of creating personal and emotional connections or a shared sense of responsibility in a larger community to a physical place. Through these processes, a shared emotional connection to a particular place may emerge. More than learning from or building social networks, this outcome is related to building bonds between people and place that may support pro-environmental behavior. Cross et al. (2011), for instance, examined conservation easements (voluntary, but legally binding agreements where landowners commit to limiting future development/use of their land for conservation objectives often in return for state and federal tax advantages) as a policy tool available to landowners for protecting the landscapes that provide their community's sense of place. In their mail survey study to respondents in Colorado and Wyoming, the authors found measures for both place identity (sense of belonging and identification with a place) and conservation ethic (sense of responsibility for conserving and protecting land) were significantly and positively related to the perception that land in their community is in need of the protection conservation easements can provide.

Policy tools

We highlight nine policy tools here that are prevalent in water resource protection in the U.S. We begin by describing regulatory requirements that provide a foundation for water resource protection efforts. We then describe water quality policy tools we refer to as "voluntary". Voluntary efforts are utilized to implement water quality goals when there is a lack of authority, ability, or capacity to implement an authority-type tool like a regulation. Please see Table 2 for a range of urban–agricultural relationship outcomes for each policy tool.

Regulatory: requirements

Regulatory requirements are authority tools—laws and administrative rules—and often function to create, authorize, and fund other types of policy tools. Laws that primarily address water quality include the CWA (33 U.S.C. §1251 et seq.) and Safe Drinking Water Act (42 U.S.C. §300f et seq. 1974). Additionally, every five years Congress passes an updated Farm Bill that, among other purposes, reauthorizes key conservation programs while allocating program funding. The CWA gives the EPA and each state the authority to set water quality attainment goals, monitor water bodies, and require certain dischargers to reduce pollutant discharges such as nutrients and chemicals. Implementation of the CWA is devolved to each state. The CWA targets point sources of pollution—e.g. industrial and municipal treatment facilities with a pipe releasing effluent—through permitting under the National Pollutant Discharge Elimination System (NPDES). While NPS can come from many dispersed sources, agriculture is the primary source of water quality impairment in U.S. rivers and lakes (EPA 2017). A Total Maximum Daily Load (TMDL) must be developed if a waterbody is found to be impaired through CWA §305(b) state reporting requirements; waterbodies not meeting their designated uses are included on the state's list of impaired waters 303(d) list. A TMDL calculates the maximum amount of the pollutant causing the impairment that can enter a waterbody from both point and NPS, thus spanning urban and agricultural landscapes (EPA n.d.). For example, the Northeast Lakeshore TMDL in Wisconsin allocates pollutant loads among sources, but it has no implementation authority for nonpoint sources except through existing regulations such as Wisconsin NR 151 Runoff Management agricultural performance standards (WDNR 2020). NR 151 sets a maximum limit for cropland and pasture based on a modeled phosphorus index. "A rare political compromise" was developed between farmers, conservationists and urban residents through changes to NR 151 in 2018 that limit manure spreading in areas with shallow soils (Parr 2018). The other federal regulation that shapes water quality action is the Safe Drinking Water Act, which prescribes maximum contaminant levels for household water. These processes entail knowledge exchange between polluters (point and NPS) and state water quality agencies, with the potential for interpersonal relationships between these groups due to monitoring and enforcement.

Compliance with federal water laws can strain municipalities that must pay to treat drinking water supplies—a financial exchange whereby municipalities are burden with water treatment costs that may be caused by agricultural uses. This strain has occasionally resulted in litigation between urban and agricultural actors when agricultural pollutants have proven too burdensome in municipal water systems, thereby potentially deepening resentment and feelings of perceived inequity among actors. For example, the Des Moines Water Works (DMWW) brought a lawsuit against upstream agricultural drainage districts, claiming the districts were in violation of the CWA due to their alleged unpermitted discharge of nitrates into the Raccoon River (Canning and Stillwell 2018). Although the lawsuit was dismissed, it was filed under the basic premise that farmers' voluntary conservation efforts are insufficient to protect water quality.

Increasingly, there are international agreements that set standards for water quality for shared water bodies. For example, U.S.-Canada nutrient targets set through the 2012 Great Lakes Water Quality Agreement aim to cut phosphorus inputs to Lake Erie by 40% by 2030 (see https://binational.net/2012/09/05/2012-glwqa-aqegl/). This overall target forces state level action and interaction among rural and urban actors, leaving it to respective nations, states and provinces to develop policy tools to limit phosphorus inputs (e.g., Kleinman et al. 2015). This is similar to actions that must be taken to adhere to the TMDL process regulated through the CWA in the U.S.

Voluntary: water quality trading

Because the marginal abatement costs for NPS are generally much cheaper than those for point sources, allowing point sources like wastewater treatment plants to trade pollution abatement credits with nonpoint sources like farms is a logical option (Stephenson and Shabman 2011). Indeed, EPA formalized its water quality trading policy in 2003. Trading has the potential to forge improved urban–agricultural relationships through standardized transactions, compared with the potential for litigation. Typical barriers to water quality trading include: (1) avoidance of compliance costs; (2) lack of effective monitoring to measure pollutants (Fisher-Vanden and Olmstead 2013). Moreover, successful water quality trading programs will have a regulatory driver (e.g., phosphorus concentration rules) or demand from point sources confronted with discharge regulations (e.g., Hoag et al. 2017). Overall water quality trading has the potential to foster coalitions between urban and agricultural water stakeholder groups through the process of determining credits and abatement practices. This process requires high levels of information/knowledge exchange between groups. While interpersonal relationships will occur through the contract process, it is possible a shared understanding and shared sense of place between groups may also occur. Financial exchange also occurs between point sources (generally urban) to nonpoint sources (generally agricultural).

There are several examples of water quality trading programs that transfer water nutrient credits to urban areas that must meet nutrient loading limits or water quality goals. For example, wastewater treatment plant operators will buy water quality credits from an aggregator like conservation district or land trust to meet NPDES permit effluent limits. The aggregator then facilitates payment to farmers to implement conservation practices (e.g., cover crops, conservation tillage, and buffers) that reduce nutrient loss from farmland. Water quality trading programs can bring together numerous stakeholders in watersheds, from state agencies, USDA Natural Resources Conservation Service (NRCS), sewer districts, farmers, and more (see EPA 2008, USDA NRCS 2016, and Willamette Partnership 2015 for example projects)—potentially forming political coalitions. A downside to water quality trading is the sometimes high transaction cost of setting up trades. To address this in Wisconsin, legislators, backed by farm groups and some environmental groups, have put forward proposals to create a clearinghouse to facilitate trades that would be run by a private company (Kirwan 2019).

Voluntary: incentives

There is a tremendous public investment in water quality improvement through incentives paid to farmers, watershed groups, wastewater treatment facilities, counties, municipalities, and others. The U.S. relies largely on voluntary participation in incentive programs for agricultural NPS, while municipal stormwater systems have become more regulated over time. Financial incentives come in the form of cost-share payments, grants, reduced taxes, and low-interest loans from federal, state, county, and municipal governments and wastewater utility ratepayers. The main effect of incentives is to transfer funds from predominately urban taxpayers or ratepayers to the sources of water quality pollution in agriculture, urban stormwater, wastewater discharge, and industry—a financial exchange. Most incentive programs require some reporting of behavior change such as fallowing land or installing BMPs like grassed waterways or contour tillage, thus some amount of knowledge exchange about BMPs and land use decision-making may occur. Incentive programs are typically implemented separately for urban and agricultural sectors; thus they do not commonly result in interpersonal relationships or shared sense of place.

For example in agriculture, federal Farm Bill programs fund financial and technical assistance for farmers under Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), the Conservation Reserve Program (CRP), and others (see USDA 2019). Contracts are implemented by county conservationists and state NRCS employees trained to work with farmers and crop consultants. Federal databases track practices installed on farms. Although cost-share programs rarely require contact between farmers and other watershed stakeholders, strong bipartisan political coalitions across urban and rural jurisdictions support cost-share programs in the Farm Bill.

Voluntary: certification

One of the challenges in persuading farmers to adopt conservation BMPs to achieve water quality goals has been perceived benefits to the farmer (e.g., Ranjan et al. 2019). Certification programs may alleviate some of that concern through potential financial benefit and through recognition of being part of a conservation program (e.g., shared sense of place). One such certification program is the Michigan Agriculture Environmental Assurance Program (MAEAP), designed to encourage farmers to adopt voluntary BMPs to "prevent or minimize agricultural pollution risks" (see https://maeap.org/). Administered through the state government, the program employs technicians who meet with farmers interested in receiving program qualification verification. The technicians work with each farmer to determine BMPs needed to receive MAEAP verification and certification—thus knowledge exchange, through direct interactions, occur between the technician and the farmer.

Once the BMPs are applied to the land and verified, the farmer receives a sign indicating that the farm is MAEAP certified, which could translate to awareness and cognitive link to the non-agricultural community about efforts farmers are making to protect water quality. Because most farmers produce commodities like conventional corn and soybeans that are indistinguishable in the marketplace, it is not evident that farmers receive a value-added benefit, as they would with, for instance, an organic certification. Indeed, Stuart et al. (2014) noted that while MAEAP can serve as a way to label farms as conservation farms, farmers interviewed for the study were motivated to participate to avoid regulation and receive insurance discounts rather than a desire to improve the environment or because of potential added monetary value. Thus, a financial exchange, the potential for interpersonal relationships, or knowledge exchange between urban actors purchasing certified commodities and farmers is not guaranteed.

Voluntary: persuasion through education, outreach, sermons

There are a variety of mechanisms and mediums through which urban and agricultural water resource stakeholders are purposefully and incidentally exposed to additional information about water quality issues at various scales. Conservation professionals (e.g., university extension, NRCS, non-profits) or concerned citizens (e.g., pastors, activists), often seek to increase public awareness about water quality problems in order to garner resources (e.g., donations, technical or physical assistance), or change policy (e.g., support for candidates with particular agendas). These efforts can build the capacity of groups and individuals to understand water quality issues and solutions across urban and working landscapes (e.g., Schneider and Ingram 1990; Hibbard and Lurie 2006). Commonly, these types of education and outreach campaigns occur through U.S. EPA 319 grant programs (see EPA 2020), however such programs can occur through other means, such as Minnesota's "Clean Water Minnesota" effort (Clean Water Minnesota 2020). The effectiveness of such educational outreach in changing behavior and attitudes appears to be mixed (Busse et al. 2015). Unless capacity building programs are designed to connect stakeholder groups, we see limited potential for buildings relationships between urban and agricultural actors. We see the greatest benefit in the potential of purposefully designed programs to foster a shared sense of purpose toward water resource protection (e.g., shared sense of place).

Voluntary: persuasion through values/norms

It is also important to consider how urban and agricultural water resource stakeholders seek to influence each other through shaping both in- and out-group attitudes, values, and norms related water quality. This includes beliefs about agency and/or responsibility to protect water resources. In other words, how do different social actors perceive who is responsible for, who is benefitting from, and who is harmed by various actions to address water quality? In this way, considering how different groups are advertently and inadvertently socialized to identify with a particular group, learn and internalize what people like them think and do, and how their group relates to other social groups and natural resources is key. The power contexts within which stakeholders operate and how they influence abilities and willingness to participate in decision-making about natural resource management is an important concern with regards to this policy tool, as stakeholder groups frequently have varying levels of access to sources of power and entitlements (Lukasiewicz and Baldwin 2017; Floress et al. 2019). Although explicit examples of urban–agricultural norms building within watersheds is lacking, we contend that such programs could foster a shared sense of purpose and shared sense of place that may increase water protective behaviors (e.g., Church 2015; Church and Prokopy 2017; Morton 2015).

Voluntary: persuasion through media

Another approach to urban–agricultural relationships can be seen through media coverage of water issues as related to agriculture. An adversarial approach is exemplified in the City of Toledo, which suffered a water shutoff for 2 weeks because of Cyanobacteria from algae that had infiltrated the City's water source in 2014. Since that time, media in the City of Toledo has directed its assignation of blame toward farmers in the Western Lake Erie Basin (WLEB). The WLEB, while largely contained in Ohio also extends into Indiana to the south and Michigan, to the north. The algae blooms in Lake Erie are associated with phosphorous runoff that loads nutrients into the water body (EPA 2018). The Toledo Blade, the largest circulation newspaper serving greater Toledo, regularly highlights the role of agriculture in contributing to ongoing algae crisis; for example: "What have we done to prevent another water crisis? Not much, unless you count the annual algae forecasting. We don't have pollution limits on agricultural runoff that flows from the Maumee River watershed into the lake, feeding the algae blooms. We have made no measurable progress toward cutting the amount of phosphorus pouring out into the lake, despite the fact that Ohio signed on to a multistate goal of reducing the levels by 20 percent by next year and 40 percent by 2025 (Toledo Blade 2019a)".

Farm organizations, while voicing frustration at the attacks on agriculture, have attempted to demonstrate good faith through investing in development and outreach of voluntary BMPs to reduce nutrient loading (e.g., Toledo Blade 2019b). As a farmer in the River Raisin watershed in Michigan said at a farmer-led conservation meeting, "We've been vilified in the Toledo Blade. I don't think it's fair, but if we don't act on our own, that may turn to policy and regulations that none of us want" (field notes, May 2018) (see also Grant 2018). In an alternative reality, perhaps the media could produce stories that portray working toward a common goal of water resource protection. However, in this case, relationships between various watershed stakeholders are combative and defensive. Persuasion through the media has the potential to be a forum to exchange knowledge about water protective behaviors that might build a shared understanding and shared sense of place between watershed stakeholder groups. However, journalist norms entail producing stories that are personal, dramatic, and novel (Boykoff and Boykoff 2007) and may thus have a bias toward conflict over collaboration (i.e., drama) in reporting (e.g., Boykoff 2007).

Voluntary processes: collaborative partnerships

Collaborative watershed planning processes that engage a diversity of stakeholder groups is a popular approach to water resource management that has seen some success in the development of watershed plans toward improved environmental quality (Hardy and Koontz 2008; Margerum 2008; Moore et al. 2008). Collaborative processes can be instigated in different ways. For example, developing a regulated TMDL can be designed, voluntarily, as a collaborative process, although this is not always the case (e.g., EPA n.d.). Watershed councils are also a model for collaborative watershed planning, which could be a forum and bridge for knowledge exchange and building interpersonal relationships. Well-designed collaborative processes can foster social or interpersonal learning that increases shared understanding, shared sense of place, and watershed action and vision (Bos et al. 2013; Ison et al. 2007; Koontz 2014), including institutional investment in collaborations that could foster political coalitions (e.g., EPA 1995). Social learning is often a core feature of collaborative watershed planning processes. However, not all watersheds are in a position to implement such processes (Floress et al. 2011). Thus, in the absence of a collaborative watershed planning process, offering an avenue for such social learning to take place may translate to a shared understanding of issues and solutions surrounding water resources, while bridging an urban–agriculture divide.

By state statute, watershed councils in Oregon are voluntary and non-regulatory groups that are locally organized with representation from diverse stakeholder groups with water resource interests within the local watershed (Clark 2001; ODFW n.d.). In 2017 there were 88 watershed councils in Oregon spread across the entire state, including urban and rural areas (OWEB 2017). The watershed council structure in Oregon provides a way in which multiple stakeholder groups are represented, from private landowners to government agencies and nongovernmental organizations (Clark 2001; Habron 2003; ODFW n.d.). Watershed councils must develop conservation strategies collectively, with technical and financial assistance available from the

Oregon Watershed Enhancement Board. Research has shown that watershed councils allow for discussions and problem solving among diverse groups; however, landowners remain skeptical about the validity of their voice and ultimate interests of the council before trust is built (Habron 2003; Lurie and Hibbard 2008). Watershed councils can provide an opportunity for discussion amongst different stakeholder groups that builds trust that translates into cooperative partnerships for project implementation and an ability to address property owner concerns (Habron 2003; Hibbard and Lurie 2006; Clark 2001). Hibbard and Lurie (2006) also found that the watershed council structure increases community capacity through council outreach activities that increase technical knowledge.

Litigation processes

Judicial processes such as lawsuits are independent from those mandated by the federal, state or local government and have the potential to influence urban–agricultural relationships. Lawsuits can be a driver of change or an outcome of policy tool failures, and thus we do not consider lawsuits to be a policy tool. One such example is the DMWW lawsuit, which claimed that drainage districts upstream were in violation of the CWA due to their alleged discharge of nitrates into the Racoon River, a source of drinking water for Des Moines' residents downstream (Canning and Stillwell 2018). As described above, the lawsuit was dismissed. Unlike collaborative processes that help foster stakeholder engagement, litigation can result in adversarial relationships between urban–agricultural stakeholders. However, lawsuits have the potential to spur actions that target both urban–agricultural stakeholders. For example, in response to the DMWW lawsuit, the Iowa legislature passed a water quality bill committing $282 million to water quality initiatives (Pfannenstiel and Eller 2018). The bill will provide $156 million in incentives for farmers to adopt a suite of conservation practices. The remaining $126 million will be provided to cities and towns to improve drinking and wastewater facilities.

Discussion

Regulatory to voluntary policy tool continuum

Looking through a lens of urban–agricultural relationships, we described a variety of policy tools that can be used to mitigate nonpoint source runoff into waterways, improve water quality, and influence urban–agricultural relationships. Regulatory requirements can be oppositional and adversarial, yet they can also provide a common ground for urban and agricultural actors to participate in water quality protective actions. While a regulatory approach may reach the producers most reluctant to adopt voluntary practices and thereby improve water quality, efforts to pass new regulations can be divisive. However, regulations can also be part of a process of developing compromise and common ground. Policy change through litigation has the potential for game-changing outcomes such as treating agriculture as point sources or state funding for point and NPS pollution abatement (e.g., Pfannenstiel and Eller 2018). However, lawsuits and the threat of increased regulation can strain relationships.

A voluntary approach to participating in water quality improvement incentive programs is the most common instrument in use in the U.S. (e.g., McDowell et al. 2016; Secchi and Mcdonald 2019; Shortle 2017). Incentives provide substantial taxpayer funding but rarely offer interpersonal or cognitive/emotional connections across urban–agricultural sectors. Voluntary (carrot) approaches can garner higher public support than regulatory (stick) approaches, and the idea of new regulations can polarize responses by decreasing support among people with individualistic worldviews while increasing support among people with communitarian worldviews (Rissman et al. 2017). Educational programs and other persuasive tools may contribute to a community's adaptive capacity due to environmental learning as well as learning about other stakeholder groups (e.g., Hibbard and Lurie 2006); however actual behavior change is difficult to monitor (e.g., Busse et al. 2015; Muro and Jeffrey 2012). Voluntary certification programs are conducive to knowledge exchange and to building understanding and empathy between farmers and the technicians that evaluate farm management and BMP adoption; however, these connections would happen only by chance for the public (e.g., seeing a certification sign on the highway). Water quality trading programs show promise in fostering political coalitions, knowledge exchange, interpersonal relationships, and shared sense of place. However, these exchanges may be limited in scope to the urban and agricultural entities involved in developing abatement credit contracts. In terms of the urban–agricultural relationship outcomes themselves, we suggest that these also form a continuum: from transactional exchanges (e.g., financial exchange and political coalitions), to social learning processes (knowledge exchange), to building emotional connections (e.g., interpersonal relationships, shared sense of place).

Collaborative watershed management

A common approach to watershed collaborative processes brings multiple stakeholders from urban, agricultural, and other sectors together to plan for and share information about the watershed. In some cases these groups are able to innovatively shape policy design if they can generate new funding sources that do not rely on state and federal incentive programs. We see processes like collaborative watershed management as key to sustained watershed health and a necessary component of planning processes in watersheds that span urban and agricultural areas. Even non-agricultural watersheds may still place all water pollution blame on agricultural actors; therefore we suggest that relationships between actors and groups would be improved by collaborative planning efforts. Although we acknowledge that collaborative watershed management may not be possible everywhere (e.g., Floress et al. 2009), much research has shown that such processes can build shared understanding, foster social networks, and establish common goals to achieve water quality outcomes (e.g., Bos et al. 2013; Church and Prokopy 2017; Floress et al. 2011; Ison et al. 2007; Koontz 2014); hopefully without undue burden on one stakeholder group (e.g., Schneider and Ingram 1993). Policy design tends to focus on financial and governance relations, while ignoring interpersonal and emotional factors that can contribute to lasting change (e.g., Cheng et al. 2003; Lockwood et al. 2010). We contend that ignoring broader social structures and interpersonal/emotional/sense of place factors can lead to unexpected failures to achieve behavior change. Collaborative processes show promise in building coalitions and fostering collective action, which may also break down inaccurate stereotypes that can lead to "othering" and blame shifting for water quality impairments (e.g. Floress et al. 2009). Moreover, collaborative planning may contribute to a community's adaptive capacity with a changing climate and accompanying water issues (Armitage 2005; Pahl-Wostl 2009; Pahl-Wostl et al. 2007; Pelling and High 2005).

Polycentric policies and future research

The policy tools we highlight here could be described as polycentric. Polycentric governance features "multiple, overlapping jurisdictions at different scales, each with some independent authority over particular issues or functional areas" (Koontz et al. 2015). Multiple tools are used to effect sustained water resource protection in any watershed context. Collaborative approaches to watershed management exemplify a portfolio approach with networked governance, which can entail combining incentive programs, water quality trading, certification, and persuasive campaigns to increase environmental learning, shared understanding, and collective action toward a common goal. Effective policy tools are those that are able to be scaled for specific contexts and planners and policymakers may wish to explicitly consider how financial, knowledge, interpersonal and cognitive/emotional relationships are impacted across multiple scales.

We found that there is a lack of easily identifiable examples of policy tools that describe and discuss efforts to work across urban and agricultural sectors. Many of the programs are focused either upon urban stormwater management or agricultural BMPs; it is rare to find cases that look at the watershed as a whole with programs that specify different components and stakeholder groups that make an impact and can help improve water quality (but see Budrock 1997 and Floress et al. 2019). Even research that examines watersheds that cross urban and agricultural contexts do not necessarily look at differences and similarities between stakeholder groups, or potential bridge building that such watershed programs may support (e.g., Hibbard and Lurie 2006; Lurie and Hibbard 2008). We suggest focusing on urban–agricultural relationships is an important area of research to pursue because, as we illustrate throughout, there continues to be a "divide", blame shifting, and conflict that act as barriers to meaningful change. Moreover, researchers in this realm ought to be diligent in reporting details about specific contexts and methodological differences to ensure comparisons across studies (e.g., Freudenburg 1991)—e.g., uniqueness or generalizability of case studies; researchers' conceptualization and operationalization of urban and of rural and of agriculture; the scale at which the study was conducted as well as the scale of the environmental issue being researched, from local, regional, and beyond; or more generally, specificity of what is being measured.

Conclusions

Watershed health is inherently complex. Social and physical boundaries are fluid and a diversity of actors can negatively impact water quality while simultaneously having a stake in water as a resource and the ecosystem services it provides. We have discussed how urban and agricultural communities are interdependent, yet environmental beliefs and attitudes can differ. At the same time, there has been a shift in the makeup of "rural" residents (e.g., amenity landowners) as well as perceptions of agriculture and farmers in general (e.g., from producers of food to polluters of the environment). We contend that the choice of regulatory and voluntary policy tools can influence relationships between urban and agricultural actors. This is important for many reasons, including how funds are allocated through government programs and how decisions are made toward watershed improvement. Indeed, urban–agricultural relationships matter because they underpin our ability to make progress on water quality. Urban lives and farmer livelihoods interact through agricultural markets and resource flows, including goods, services, pollutants, and finances. We thus suggest that collective action, where all voices are part of water governance actions, and in which positive urban–agricultural relationships can be fostered, may be a long-term strategy for improved watershed health. Careful policy and process decisions can shape future conditions for collective decision-making since many actors participate multiple years in water quality improvement efforts. In this manuscript, we asked: *When addressing watershed problems that span urban-agricultural boundaries, how does the choice of water quality policy instrument influence urban–rural relationships?* We examined this question by drawing from our professional experiences, as well as our own and others' research.

To the extent that there is a policy goal of developing positive urban–agricultural relationships, the choice of policy tool matters. If the only defined goal of a watershed project is to improve water quality, then opportunities to influence urban–agricultural equity, improve interpersonal relationships, and develop a shared sense of purpose/understanding may be lost. We contend opportunities for building shared understanding with the potential to contribute to lasting change and adaptive capacity should not be ignored (Armitage 2005; Pahl-Wostl 2009; Pahl-Wostl et al. 2007; Pelling and High 2005). We suggest a policy approach that integrates multiple tools to improve financial exchange, governance, and interpersonal connections. Moreover, collaborative processes may improve all types of policy tool implementation and such processes may have a more positive influence on positive urban–agricultural outcomes than individual policy tools alone.

If improving urban–agricultural relationships is a goal, and taking what we have learned from our policy tool analysis as a whole, specific policy recommendations include: (1) Incorporate shared identity and social norms into incentive programs; (2) Identify opportunities for exchanges between groups, and focus where relationship building is needed; (3) Recognize limits may exist for relationship building, and in certain cases efforts at collaboration may reinforce power disparities, especially across urban–rural groups with a long history of animosity; (4) Consider purposeful watershed programs that incorporate stories and consideration of different stakeholder groups and landscapes; and (5) Recognize interpersonal relationships and animosity that may occur in the face of lawsuits and the pros and cons of using this option.

In the U.S., water governance encompasses government, civil society, and corporate supply chains, with policy tools that range from regulatory to voluntary and authoritative to collaborative. Although watershed boundaries themselves may not cross urban and agricultural landscapes, policy tools can. We should therefore be cognizant of the opportunities watershed and water quality improvement projects can have on improving urban–agricultural relationships and move toward bridging these divides through thoughtful policy development. This is even more paramount in the U.S. currently, where there is a national political divide and a need move out of polarized positions to solve collective problems (e.g., Pew Research Center 2014).

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