A Place at the Well: The Imperative for Farmer Inclusion in Water Conservation Policy Design

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Abstract

Achieving cleaner water for rural and suburban communities in a sustainable way requires approaches tailored to the unique socioeconomic, ecological, and historic contexts embedded in a particular community and place. Water quality trading (WQT) is a payment for ecosystem services style policy that is currently popular across North America as a mechanism to reduce water pollution from rural communities. Yet this approach is failing to generate markets with enough trades to measurably improve waterways. Some failures are attributed to poor program design and others to stakeholder communities who are averse to the premise or morality of WQT. However, rural communities are not homogenous and many are in fact amenable to payment for ecosystem services policies such as WQT. Although our case study identified Tennessee watersheds as “feasible” locations, we present evidence that the typical program design parameters would fail, despite having a willing population of farmers. We argue that identifying amenable communities or feasible locations simplifies the agency of stakeholders and is ultimately insufficient to make ecosystem services programs work unless the design and implementation phases of the programs include local stakeholders. [water quality, agriculture, payment for ecosystem services, policy, economics]

Introduction

Protecting clean water, whether working on issues of access, reducing pollution, or protecting unper- turbed aquatic ecosystems, is a key priority for 21st century conservation. Globally, agriculture accounts for 70 percent of water extraction worldwide and is a major contributor to water pollution through soil erosion and run-off from nutrients, agrochemicals, and pharmaceutical inputs (Mateo-Sagasta et al. 2017). Farmers and ranchers have a particularly complex relationship with water, because they rely on it for both personal and livelihood well-being. Often receiving the brunt of blame irrespective of local pollution sources, they are targets for new policies and regulations intended to improve water quality. They are also recruited for participation in voluntary clean water initiatives. Compounding farmers’ issues with water, rural areas in the United States experience less access to reliably safe drinking water and generally smaller tax bases to update and improve infrastructure than the rest of the nation, making rural communities key regions of focus for water quality and conservation (Allaire et al. 2018).

Water quality trading (WQT) is among the most popular policies designed to tackle these complex water issues in rural areas. Following policy-kin carbon trading and REDD+, WQT is a market-driven, ecosystem-services style policy mechanism that emerged in the 1990s. However, in the last decade WQT has grown in popularity among local, regional, and state governments (Fisher-Vanden and Olmstead 2013). The premise of WQT is similar to carbon trading, where a state or local governing body creates a market to connect individuals with lower costs for reducing water pollution to other individuals, as well as public and private entities, that have high costs for reducing water pollution. Our research was part of a multi-disciplinary collaboration to study the feasibility of WQT policy in Tennessee (Clark et al. 2018). We aimed to understand whether or not agricultural producers would be open to participating in WQT, and what, if any, terms they would propose for their participation. Growing critiques from the literature on financializing water (Bayliss 2014; Wells et al. 2019; Wutich and Beresford 2019) have joined wider critiques on ecosystem services and markets to question their validity as drivers of conservation goals (Bekessy et al. 2018; Jesse et al. 2017; Schröter et al. 2014). Despite these known criticisms
and our own reservations regarding the long-term viability and ethics of such programs, WQT policies continue to multiply, sometimes in ways that are harmful to rural stakeholders (O’Connell et al. 2017; Schnegg and Kiaka 2019). Accordingly, the aim of our research is to understand if this type of policy could be feasible in an East and Middle Tennessee context, and if so, under what parameters.

Our primary finding is that WQT would be unfeasible in Tennessee, corroborating many other studies (Motallebi et al. 2016; Paolisso and Maloney 2000; Stephenson and Shabman 2017; Wainger and Shortle 2013), in large part because nearly half of farmers were rendered ineligible because they had already implemented the practices that WQT targets for adoption, similar to farmers in North Carolina (O’Connell et al. 2017). Our secondary findings are more complex and unexpected, indicating that there is greater receptiveness to WQT in Tennessee than has been documented elsewhere, but such participation would be contingent upon a much narrower set of parameters than commonly designed WQT programs. Accordingly, in this paper, we aim to address this gap in understanding—between a more receptive population and policy parameters that are so broad that the individuals they are intended to reach find them unfeasible or undesirable. Although stakeholder consultation is recognized as beneficial to market-based ecosystem services approaches (Cleaver and de Koning 2015; Schnegg and Kiaka 2019), it is often not prioritized (Challies et al. 2017; Hauck et al. 2013). Stakeholder participation in program design has been scant for the nearly one hundred WQT initiatives underway in North America today. While our study focuses on WQT in particular, our findings are relevant to water policy initiatives premised in ecosystem services more generally.

**Water Quality Trading & Leveraging Markets to Solve Environmental Problems**

Water Quality Trading is a style of policy similar to carbon trading. Its premise is that a governing body creates a market where individuals can sell their water pollution reductions in units as “credits” to public and private entities who have higher costs for water pollution reductions. Trading policy is appealing to rural areas precisely because it is offering a plan for improving water quality at a lower cost by targeting agricultural nutrient runoff through voluntary market-based credit trading. Rural regions in the United States, especially Appalachia, tribal lands, Alaska Native communities, and US-Mexico border communities, have the least dependable access to clean water and wastewater treatment facilities (EPA 2020). Likewise, these areas struggle more with installation and technology improvements to water treatment facilities, because they are often too expensive to be feasible (Cole and Grossman 2018). The costs of purifying drinking water and limiting wastewater pollution in rural communities is often untenable in many parts of the country due to low population levels and low tax revenue (EPA 2020). Making matters more difficult, these areas often have a great number of agricultural operations, which are one of the largest sources of water pollution in the United States. In addition, they are among the most difficult sources of water pollution to eliminate because farm pollution can be diffuse and variable. Similarly, even when WQT is implemented to address drinking water issues for suburban and urban areas, it still depends on the participation of rural actors to meet pollution reduction goals (Motallebi et al. 2016; Shortle 2017).

As part of a wider literature that critiques the grounds that market-based solutions can provide lasting environmental improvements in water infrastructure and conservation, Hoag (2019) critiques how “engineers generate a type of water that is locally emplaced but unfamiliar to local people in Lesotho.” These issues of misfit, or mis-design can lead to friction between stakeholders and government (Wells et al. 2019), or even policies that contradict themselves in classic gaps between policy and praxis that can become a source of conflict rather than initiating improvements or development (Schnegg and Kiaka 2019) The issue of assumed farmer participation by policy makers at the policy development phase, followed by limited participation or rejection by farmers at the policy implementation phase, has been nearly universal (Hoag et al. 2017; Tabaichount et al. 2019). Over the last decade, WQT has experienced continued favor and growth among local and regional governance bodies in the United States and Canada (Ribaudo and Savage 2014; Shortle 2017). Six years ago, Fisher-Vanden and Olmstead documented over 70 markets in North America (2013), and many have been established since that time. These studies note that only a few of the many markets have achieved reliable trading (Stephenson and Shabman 2017). This research shows that low participation and higher than predicted trading costs or “wedges” caused by values placed on land and participation by individuals in rural communities...
expected to create and sell the credits is one prevailing reason for the failure of these programs to succeed (Fang et al. 2005; Motallebi et al. 2016). King predicted this issue for WQT well over a decade ago observing,

In watersheds where agricultural sources are significant, it is usually assumed that they [farmers] will be the primary suppliers of WQT credits. However, the willingness of farmers to supply WQT credits depends in critical ways on how it might affect their ability to continue receiving agricultural subsidies and green payments and to fend off future environmental regulations. The main problems farmers face here (although they do not refer to them in these terms) are what in environmental trading circles have become known as baseline/additionality issues (King 2005:73).

The viable implementation of WQT programs has proven to be a moving target with few bulls eyes to report (Shortle 2017). Despite enticing projections of cost efficiency in setting up markets (e.g., a recent phosphorus trading program in two sub-watersheds in the northern Lake Okeechobee watershed was estimated to have net cost savings of $34.9 million per year Corrales et al. 2017), the markets with the most trades indicate costs ranging between 35 percent (Fang et al. 2005) and 201 percent greater than their original estimates (Hoag et al. 2017; Stephenson and Shabman 2017). Studies also offer a lengthy list of additional barriers including market structure, specific program rules, risk perception, and developing trusted relationships among stakeholders through intensive education and outreach as important factors to the realization of environmental and economic benefits in a market-based program (Corrales et al. 2017). The combined low rates of successfully trading markets and long list of factors for successful implementation are why Hoag et al. (2017) have argued that successful situations should be considered “virtual policy utopias.” In examining why few trades have transpired in already existing water quality programs, they highlight the rare occurrence of appropriate environments (these include physical, economic, and institutional conditions). The locations where all three conditions are met are so rare that only 5 percent of watersheds currently listed as nutrient impaired across the United States provide a viable physical environment for trading nitrogen and only 13 percent are suitable for phosphorus (Hoag et al. 2017).

Although many view WQT as a potentially important tool for states with rural regions to manage water pollutants, challenges are also widely recognized, leading some to argue that expectations of gains from WQT should be tempered (Nguyen et al. 2013). Recent studies support these tempered expectations, suggesting that even when WQT programs are implemented, trades are rare and contested in practice (Fisher-Vanden and Olmstead 2013; O’Connell et al. 2017; Ribaudo and Gottlieb 2011; Ribaudo and Savage 2014; Sneeringer 2013; Stephenson and Shabman 2017). Outside of the program baselines and trading models, low trading rates have also been attributed to a lack of trust or familiarity with program administrators as well as uncertainty (Breetz et al. 2005; Shortle 2013). O’Connell et al. (2017) argued that increases in neither trust nor familiarity were likely to influence farmers’ decisions to participate in trading in North Carolina. Farmers’ participation in implementing best management practices and willingness to trade are key to the successful implementation of WQT (O’Connell and Osmond 2018). In Virginia, Stephenson and Shabman 2017 attribute this to design features and incentives present in multiple overlapping regulatory programs. In Jordan Lake Watershed, O’Connell et al. 2017 found that farmers were unwilling or unlikely to participate in WQT due to perceived long-term risks, short-term rewards, and morality-based objections in addition to relationships with development and industry. Through the same study of farmers’ perceptions in Jordan Lake, Motallebi et al. 2016 found that the large adoption premium for the program, which was more than double the cost of purchasing credits hindered the feasibility of WQT. Additionally, Motallebi et al. 2016 analyzes data collected on the combined impact of barriers to the implementation of WQT, including baseline, transaction cost, trading ratio, and trading cost and argue a WQT program will not address nutrient management needs in Jordan Lake Watershed.

Thus, surmising from the existent literature two take-aways: (1) WQT trading is a policy that is ever growing in popularity from the policy perspective, because it decentralizes complicated and expensive water pollution issues into private markets; and (2) while there is interdisciplinary disagreement over why the markets are failing to achieve trades, there is fairly wide spread agreement that they are struggling to impact water quality across most studies and sites. It was informed with these conclusions that we embarked on research in Tennessee. Based on findings
from previous studies, we expected that we would find disinterested stakeholders and be investigating the local specifics of why WQT would yet again, not work. Instead, we were thoroughly surprised in our findings, which indicate the policy, with some serious constraints, would likely be welcome in the watersheds we studied. However, farmers’ knowledge of the limitations of their local contexts in addition to other concerns highlighted the complications of implementing WQT without farmer input in policy design. In the following sections, we outline their willingness to participate, highlight their place-based and other concerns, and conclude the article with our recommendations for water quality policy implementation in Tennessee and beyond.

**Stakeholders and Policy Design for Conservation**

While the inclusion of stakeholders in environmental conservation governance has been shown to be beneficial in many instances (Fisher 2009; Folke et al. 2005) and valued even in research that is leading to new conservation initiatives, the primary focus when it comes to stakeholders is participation in policy enactment and programs (Paaavola and Hubacek 2013). One exception comes from Reed et al. who showed that stakeholder inclusion in the policy design phase running scenarios strengthened their outcome modeling and their understanding of potential impacts on ecosystem services and on stakeholders they were hoping would participate in the programs (2013). Similarly, in our Tennessee work, findings demonstrate that WQT as presently designed is unlikely to be implemented. However, our results also indicate openings for stakeholder inclusion and potential ways forward for researchers and policy makers. While the inclusion of stakeholders at the policy design phase is hardly a transformative idea (see Mostashari and Sussman 2005; Pahl-Wostl 2002), we were not able to find any instances where it has been implemented in meaningful ways that extend beyond limited consultation in North American WQT programs.

**Methodology and Research Location**

**Research Sites**

In this study we collected data in two Tennessee watersheds: the Upper Duck River and Oostanaula Creek. Both watersheds are facing pressures from increasing urban growth and development as well as mixed-use commercial industry with each hosting a variety of business manufacturers and large agricultural corporations. The first settled communities in the Upper Duck River and the Oostanaula Creek watersheds were home to Native Americans. Cherokees (Oostanaula) and Chicksaws (Upper Duck) farmed, hunted, and owned these lands until the U.S. government seized them as part of the Cherokee territory through the Treaty of Hopewell in 1785 and the Chickasaw territories in the Treaties of 1805 and 1806. Both watersheds have small cities, such as Athens and Franklin, which were established in the early 1800s. These watersheds have long histories of agricultural production, especially strong dairying industries, but they have been in continual decline for the last thirty years. For example, Oostanaula Creek farms were the second largest dairy producers in Tennessee a decade ago (Hagen and Walker 2007; NASS 2006), but today the watershed is home to less than a dozen dairies.

The Duck River is one of the most biologically diverse rivers in North America and is the sole water source for approximately 250,000 people, most of them residing in the Upper Duck River watershed. The most significant problems related to water quality in the Duck River watershed include excessive sediment loading due to agricultural run-off, streambank erosion, and loss of riparian buffers; nutrient loading caused by agricultural run-off; excessive amounts of phosphates entering streams; low dissolved oxygen; and high bacteria counts after heavy rains due to failing septic tanks, and run-off from concentrated animal feeding operations and livestock pastures (Army Corps of Engineers 2018:6). Located in Middle Tennessee, south of Nashville, the Upper Duck River watershed is approximately 1182 square miles, includes parts of 10 counties, and empties into the Lower Duck River watershed. There is increasing urban growth in the watershed, and land use consists of 41.7 percent agricultural use (row crops, pasture/hay, managed forest), 54.1 percent deciduous, evergreen and mixed forests, 1.7 percent commercial/residential, 1.3 percent woody/emergent wetlands, 0.6 percent open water, and 0.6 percent other quarries/cleared areas etc. (TDEC 2005).

The Oostanaula Creek watershed, located in East Tennessee and often pronounced Oosta-naa-lee by residents, is smaller than the Upper Duck. It spans only 70 square miles and is predominantly an agricultural land area. The population of the watershed, approximately 13,000 in 2007, was projected to increase steadily along
with existing growth in commercial development (Hagen and Walker 2007), but no recent population census data are available. The waterways in this watershed are impaired by _Escherichia coli_, phosphates, and siltation from municipal point sources, pasture grazing, and livestock in streams (TDEC 2006). Land coverage data for this watershed are not available (Hagen and Walker 2007). The watershed includes parts of the city of Athens, which per square mile has a population density of 976 people and an average housing unit density of 450 (US Census 2000). Immediately outside of Athens, the estimated population density per square mile is 250 people and lowers to 61 people for the remainder of the watershed (Hagen and Walker 2007).

From 2000 to 2007, Athens Public Works awarded close to 100 new commercial construction permits and over 300 new residential permits (Ibid). _E. coli_, phosphates, and siltation from municipal point sources, pasture grazing, and livestock in streams contribute to water quality impairment (TDEC 2006).

**Methods**

Purposive sampling was used to recruit a sample of farmers who would be representative of potential program participants (Bernard 2017; Tongco 2007) by meeting two criteria: adults actively farming and owning or leasing land adjacent to or intersected by streams, creeks, or rivers. Participants were recruited with the assistance of County Extension Offices who provided contact information and, in some cases, contacted farmers in advance to introduce the research project. By using Extension employees to identify farmers who met our sampling criteria, we recognize that our sample may over-represent farmers who were more likely to participate than not. In an effort to minimize this, we requested the inclusion of farmer contacts who met the two criteria above, but to include a mix of individuals who were and were not known for wide participation in conservation programs. Moreover, even if there is an over-representation of conservation minded farmers, that distribution models who is actually most likely to sign up for such a program anyhow, yielding a strong purposive sample for our study of feasibility. Ultimately, we interviewed farmers from many types of agricultural operations, including dairy, _cow/calf_, row-crop, fruit, poultry, timber, specialty livestock, and hobby farms in order to capture farmers’ responses and concerns as they relate to their specific experiences across the two watersheds.

In total, 30 participants were recruited, and we completed ethnographic, semi-structured interviews with them in early 2018. Before commencing the study, interview and survey instruments were beta-tested with volunteer farmers who met the sampling criteria but farmed outside the study sites to adjust language and revise for clarity and length. Interviews were conducted on farms or other locations selected by farmers, including homes and offices for off-farm employment. Interviews lasted an average of 60 minutes and were digitally recorded with farmers’ permission. Interviews focused on farmers’ perceptions of current and past conservation practices, local water quality, experience with other conservation programs, WQT programs, and future plans for their land. Following the interview, farmers were asked to complete a confidential survey on a digital tablet using Qualtrics to collect demographic data and answers to a short series of ranking Likert scale questions about their operations and views on environmental stewardship and feelings regarding the possibility of a WQT program in Tennessee. Farmers completed the surveys individually, and, like all interviews, were recorded without farmers’ names or other identifying information and linked to the interviews only by code.

All interviews were transcribed and cross-referenced with demographic variables recorded in the surveys (Lieber and Weisner, 2010) using MaxQDA Plus textual analysis software. We coded interviews inductively and deductively to identify patterns and themes drawn from the interview process and recent literatures on this topic. Survey data were examined in relation to codes to analyze if demographic data and/or operation specific concerns correlated with farmers’ perceptions. This analysis produced a mixed-methods matrix that outlined farmers’ potential participation, concerns, and decision-making processes with attention to both individual contexts and patterned themes for Tennessee farmers regardless of individual specifics.

The farmers we interviewed in both watersheds were generally similar with no discernable demographic differences (Table 1). In brief, participants were largely middle-aged white men, farming mixed operations of crops and livestock. Most individuals had lived in their respective communities for their entire lives, had participated in publicly supported environmental conservation programs in the past, and had pursued formal education beyond high school. All participants described witnessing the decline of the
agricultural sector in their communities and the economic, social, and occupational changes this decline has wrought. Most were full-time farmers and reported agriculture as the primary source of their income.

Farmers’ views on responsibility and stewardship were strong, with 100 percent of farmers agreeing or strongly agreeing that water quality is their responsibility, and nearly 25 percent reporting that they would even be willing to take on the prescribed conservation practices without any trading incentives (Table 2). They also generally had a good impression of the water quality in their watersheds in reply to the question “how serious do you think water quality issues are in your area?” (Table 2). Only 13 percent reported that their water quality might be “somewhat bad”. Several people described examples of poor water quality when they were children and their impression of vastly improved appearances today. This view was upheld by the evidence that most farmers believe that they personally are doing enough to minimize water pollution (Table 2), though they displayed less confidence in their neighbors, with nearly 75 percent of farmers agreeing with the statement that water quality problems are the result “of poor management among only a small group of farmers” (Table 2).

Because WQT is not currently implemented anywhere in Tennessee, we first asked farmers if they were familiar with the policy (most were not), and regardless of their answer, briefed all farmers with the same description (Box 1). Though they qualified their interest with limits of time and the types of practices they were willing to undertake, farmers who participated in our study were largely open to the concept of trading as a policy response to water quality issues and to participating in a WQT program if one develops in Tennessee. Upon hearing about the program, just 6 percent reported that they would not participate while 23 percent of farmers said they would participate, 70 percent said they would maybe participate. By contrast, other studies have recorded immediate rejection rates five times as high (Hoag et al. 2017; O’Connell et al. 2017). In the following sections, we discuss why farmers in Tennessee may be more receptive to WQT, and why as well as the prevailing themes and concerns farmers expressed by those willing to participate, those unwilling to participate, and the majority who signaled they were interested, but unsure in order to illustrate the context and perspectives that shaped their positions and demonstrate why these perspectives belong at the table when conservation policy is being designed.

**Willing to Participate**

Nearly a quarter of research participants indicated that they would be interested in participating in WQT, depending on the parameters of the program, such as indicated in this dialogue:

Interviewer: Based on the description I read, do you think you might be interested in participating in such a program if you had land that was eligible?
Farmer: Yeah.
Interviewer: And hearing about the way that that works where you create a credit through installing management practices, um, do you have concerns about the way that that might work? Anything?
Farmer: Well, you can’t, when you say buffer zone and everything like that, uh, how much of a buffer are you talking? You can’t inhibit the farming. You can’t inhibit the farmer’s ability to make money.
Interviewer: Right
Farmer: to make a profit on it
Interviewer: I believe it would be a 50-foot strip, a 50-foot buffer from the creek bed that could be farmed in anyway or grazed or anything like that. Um, and any other concerns that come to mind?
Farmer: No.
Interviewer: You kind of already answered this one, but do you think that some farmers in the area might be interested?
Interviewee: Any farmer would be interested if the price is right.

Farmers willing to participate also raised questions about the efficacy of the program, as one man asked,

Do you have any data to suggest that there’s any real benefit in a water quality trading program that truly benefits the water quality? . . . I’m not trying to be a doubting Thomas. I just think that there are more urban factors in this problem than rural factors. And so, the process of asking the rural component to handle this problem . . . is probably not the way to go. But you’re not here to push it on me. I’m just asking a question that will probably get back to somebody else.

All of the individuals willing to participate also cited having at least one good experience with a current or previous conservation program and listed such programs as helpful resources to farmers. These experiences were tempered with occasional expressions of distrust of conservation programs, a different “bad” experience with government programs, and concerns
Solidly in the minority, with only two people determining that they would not participate, these farmers reacted strongly against the premise of WQT as a program in distinct departure from their neighbors.

Farmer: “I feel like that’s passing the buck. Let them clean up their own mess. I mean, yeah, some farmer might end up with $500 a year in their pocket or whatever. Let these companies clean up their own mess. I just, (slight pause) I just, don’t agree that they can, we can ask all these people to move to our cities, and then well our cities wastewater treatment plants are overrun, so let’s go out and find the farmers and let them, give them a little bit of money so we can just pollute, pollute, pollute. I just totally disagree with that. I think that that’s a sad scenario to happen. We don’t need that happening in East Tennessee at all in any way. . . . If you’re going to have a big factory to come in, do you not want that factory, when that waste leaves their factory, they should be required, before that waste leaves their factory, to fix it so it is appropriate for that water to go back into the stream. They should be required when it leaves.”

Interviewer: um hum.

Farmer: So, I mean, no, I wouldn’t be, I wouldn’t want any farmer to receive a penny because some factories are able to pollute. That would be a disgraceful penny that that farmer got.

In this statement, the farmer expresses dismay over the morality of the program, calling profits from WQT “disgraceful” and calling on government culpability to regulate business and protect waterways. Though in the minority, these farmers’ responses echoed what O’Connell et al. referred to as “moral logics” to explain their reject of the concept of WQT as a policy, rather than specific program parameters (2016).

**Maybe Willing to Participate**

Most interviewees expressed some uncertainty and indicated that they might be interested in participating, but were unsure. Nonetheless, of the 21 “maybe” responses, only six could be categorized as having a negative reaction to the concept of WQT, while most participants did not offer an indication one way or another. Even those who were neutral or unsure about their own participation generally reviewed the program goals positively,

Interviewer: Ok. Based on this description, do you think you might be interested in participating?

Farmer: Well, it would be something to think about. Yeah.

Interviewer: Okay. So, it would be a maybe?

Farmer: Yes.

Interviewer: Okay. And if so, would you have any concerns about participating in it?

Farmer: I guess the only concern that I would have is, is it going to draw attention? I mean, is federal people going to be inspecting, you know? It’s always just the mentality, the further you can keep a distance from federal people, the better off you are. You know?

Interviewer: So, you might be more open-minded if it were people that were either local or from the state?

Farmer: Right, right.

Interviewer: Either one of those?

Farmer: Yeah

Interviewer: Do you think that other farmers in this area would likely be interested and why or why not?

Farmer: I don’t really see why they would not be interested. I mean everybody wants quality water that they can consume, so anytime you can do your part . . . and if you’re compensated on output costs, input costs, whatever, you know? I don’t see why they wouldn’t.

In his reasoning, this farmer is exhibiting the type of thought positioned in the design of payment for ecosystem services programs where stakeholders are motivated by both compensation and environmental outcomes (Börner et al. 2017). In the case of most farmers who were unsure about their participation, they asked a wide array of questions that raised a multitude of program specific concerns. As primarily lifetime
residents in their communities (Table 1), farmers’ knowledge of water quality issues and community dynamics bolstered their willingness to participate and reduced their expectations that wider scale fixes, such as regulations on the part of the state or prevention on the part of local industry, were going to be sufficient solutions on their own.

Program Feasibility

When asked about the conservation practices that are typically required in water quality programs, farmers in this study mirrored national trends with 80 percent finding riparian grass buffers generally acceptable with the provision that they can be mowed and managed. Planting trees in the riparian buffers was a less acceptable practice with only 50 percent of people willing to take on the practice. Farmers described their resistance due to perceived difficulties in managing the land, they were described as “tiresome to care for”, and disruptive to the grassy open field aesthetic of a well-managed farm that has been shown as a conservation deterrent elsewhere (Burton 2012). Most unpopular for farmers was the practice of fencing off their creeks (if they had livestock). Only 46 percent of those asked being willing to install fences. Those who were unwilling discussed high costs, convenience, habit, ongoing maintenance, “ugly creeks”, and autonomy as reasons that fencing was an undesirable practice. Finally, despite some general concerns about outsiders accessing their property, showing up unannounced, and time commitments involved in annual reporting and inspections, this was generally accepted by all farmers. As one farmer argued, fencing is not always a feasible solution depending on land specificities.

Farmer: Sometimes it’s not just economics, it’s your own personal situation. My residence over yonder has got a creek running from one end to another. It’s probably a mile long, and it does this and this [making a zig zag or curving motion with his hands], do you know what it would take to build a fence that does this and this [again making a curving motion with his hands]? You don’t have enough money [to fence a creek like this].

Interviewer: Yeah.

Farmer: Plus, when it floods, it would wash the fence out.

| N = 30 | Strongly agree (%) | Somewhat agree (%) | Neither agree or disagree (%) | Somewhat disagree (%) | Strongly disagree (%) |
|--------|--------------------|--------------------|------------------------------|-----------------------|-----------------------|
| I am excited this program may come to TN | 13 | 37 | 43 | 0 | 3 |
| I would be willing to take on some of the BMPs but not sell credits to the buyers. They can take care of their own water pollution | 13 | 20 | 63 | 0 | 7 |
| I have reservations about the finances of water quality trading | 10 | 43 | 43 | 3 | 3 |
| I have reservations about the trading relationships in water quality trading | 13 | 47 | 33 | 0 | 10 |
| I think it would be a bad move for TN | 3 | 3 | 63 | 13 | 10 |
| It is my responsibility to help protect local water quality | 63 | 37 | 0 | 0 | 0 |
| Current practices on other farms in my community are sufficient to minimize water pollution | 3 | 47 | 43 | 0 | 0 |
| Current practices on my farm are sufficient to minimize pollution | 43 | 50 | 7 | 0 | 0 |
| Water quality issues from agriculture are the result of poor management among only a small group of farmers, most farmers are doing the right thing | 30 | 43 | 17 | 10 | 0 |
Farmers also held vastly different expectations for the length of their participation in a WQT program than policy makers typically envision. Most operating WQT programs today are modeled on 20–30 year agreements (Shortle 2017; Stephenson and Shabman 2017) and some extend as far as to ask for commitments of perpetuity (NCDEQ 2013). Farmers in our study had a much shorter timeline in mind. When asked how long they would be willing to participate, most suggested 5–10 years as a reasonable length of time. Such a short timeframe would be unlikely to offset the costs of water pollution reductions for trading partners if they had to continually seek out new partners. However, it is possible that programs set up for 5–10 years might create a greater incentive for farmer participation, leading to wider adoption of conservation practices in certain watersheds. This finding highlights a gap between stakeholder expectations and typical WQT policy design that would be more effective to navigate at the design phase of program implementation.

The economics of the program offers another point of question regarding feasibility. Profit was front and center for nearly all participants, with 50 percent estimating that they would sell credits for a profit greater than 20 percent above the cost of implementation. The remaining farmers were also committed to selling for a profit, but were unwilling to name a price, suggesting an even higher bid (Hoag et al. 2017). Although all farmers found the potential profitability of WQT programs appealing, a significant number of interviewees reported reservations regarding the finances of the trading program. Slightly more than half had reservations over the relationships between the buyers and sellers in the trading program (Table 2.). Another third or so of people were uncertain, supporting what has been suggested elsewhere (Breetz et al. 2005; Corrales et al. 2017), that very clear and transparent communication regarding program mechanisms, trading partnerships, and finances, along with education, would be necessary to ensure confidence and ultimately participation.

Perhaps the more significant issue for feasibility is our finding that despite general receptiveness, nearly half of farmers who answered “yes” or indicated as a likely “maybe” when asked about their future participation in a WQT program, were actually ineligible. Ineligibility was determined because these farmers had already installed all the suggested conservation practices on their farms that corresponded to the type of farming operation they ran, they had nothing left to reduce. This means that the total number of potential participants is likely to be much lower than the total number of farms in operation in a given watershed, drastically reducing the possibility of recruiting a sufficient number of farmers to ensure that reductions are met through trading if Tennessee reproduces typical WQT programs. Yet, we contend that farmer input into the design of WQT programs could lead to short-term
Conclusion

In this article, we have argued that there is a distinct need for thorough stakeholder involvement, one that anthropologists have pointed out for a while (Chibnik 2011), in water quality policy design. The data we collected in this study illustrate the importance of including local stakeholders in policy design, whether they are farmers, or other identified trading partner groups, in order to construct a program that is feasible for an individual place. Our findings also serve as a reminder to avoid “marginalizing place” (Escobar 2001) and demonstrate the importance of gauging cultures of place and local beliefs in addition to modeling local drainage basins and assessing trading baselines to achieve effective policy design. Although farmers in Tennessee seem amenable to the concepts of payment for ecosystem services and motivated by the dual function of profit and environmental conservation, the reality is that a program implemented following general point-nonpoint source trading parameters in policies across North America would likely fail here.

We have shown that despite general receptiveness to the concept of market-based payment for ecosystem services, significant barriers to reaching a feasible policy remain. As illuminated through ethnographic interviews, the concerns farmers raised over program specifics, reductions in eligibility due to completed conservation works, as well local flooding patterns revealed the complexities of implementation. These incongruities highlight the importance of understanding the practices, history, proclivities, and beliefs of stakeholder community members when designing water quality policy. The specificity of farmers’ knowledge translated into credible concerns in our conversations. These conversations highlighted how much individual watershed contexts shape a program’s potential to succeed or fail. Local knowledge of the landscape allowed farmers to immediately refute costs of participation calculations, demonstrating that their risk, labor, and out of pocket costs would be much higher due to annual flooding of local rivers. Likewise, the success of local Extension and Natural Resources Conservation Services programs’ employees in implementing water quality conservation programs in Tennessee, along with farmers’ strong participation in these existing programs, might have seemed promising for WQT participation. However, it had the effect of making many willing participants ineligible.

However, despite the challenges, we conclude that trading could happen in these watersheds if the trades are limited to public point-sources and an agreement over certain types of conservation practices could be reached. Many farmers are interested in the goals of WQT programs, but only for fairly short (5–10 year) agreements that fall outside the typical parameters of WQT policies. In closing, we would like to suggest that this time discrepancy might in fact be an opportunity, rather than another barrier. Though 5–10 years is not a long time, many of the credit “buyers” in these arrangements are rural wastewater treatment plants and utilities boards that are facing high costs for modernization, insufficient municipal funds, and small and frequently poor tax bases. It is plausible that WQT might function as a bridge for communities in this situation, immediately achieving some reductions for farmers, and providing time for the utilities board or other public works to raise funds for more lasting improvements. In that outcome, the prognosis for the watershed would be quite good, as farmers and the treatment plants would have implemented practices that will deliver lasting reductions in nutrients entering the waterways at a savings for all. We suggest that research into the feasibility of shortened timeframe WQT arrangements from stakeholder, engineering, and policy perspectives could yield a better outcome for all interests.

Although some proponents of ecosystem services arrangements have been advocating that “requirements should include developing a common understanding of [ecosystem services] in a specific context and reaching agreements that consider the interests of all stakeholder groups, especially when many different actors with their different perceptions and needs are involved” (Hauck et al. 2013:20), we believe that this does not go far enough. To achieve successful policy design for water-focused ecosystem services programs, stakeholders (in this case farmers) need to be more than consultants. They need to have an actual role in the policy design, including input on
the terms of their participation; or in other words, farmers too need a place at the well.

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Note

1. There is an additional subset of literature that takes the policy to task on whether or not a functioning market would actually deliver the promised reductions generally (Ribaudo and Savage 2014), and specifically in Tennessee (Loar et al. 2011) but that is outside the scope of this work.

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