



PURDUE UNIVERSITY

National Water Quality Initiative Watershed Forum Report Roaring River watershed – Wilkesboro, North Carolina



Prepared January 2019 by:

Emily M. Usher, Dr. Sarah P. Church, Dr. Linda S. Prokopy

Natural Resources Social Science Lab
Department of Forestry and Natural Resources
Purdue University

The Natural Resources Social Science Lab studies how human interactions with the environment impact natural resources. Our research, teaching, and engagement activities focus on how to best motivate farmers, stakeholders, and citizens of all kinds to participate in more environmentally friendly behaviors and practices. For more information, please go to <https://www.purdue.edu/fnr/prokopy>

Recommended Citation:

Usher, E. M., Church, S. P., and Prokopy, L.S. (2018). *National Water Quality Initiative Watershed Forum Report – Roaring River Watershed, Wilkesboro, North Carolina*. West Lafayette: Purdue University.

Acknowledgments

This report was made possible with funding from the United States Department of Agriculture-Natural Resources Conservation Service. We thank the Wilkes County Soil and Water Conservation District for helping with local logistics and giving us a watershed tour.

Table of Contents

Executive Summary	1
1 Introduction	2
1.1 Project Overview	2
1.2 Background	2
1.2.1 National Water Quality Initiative	2
1.2.2 East and Middle Prong of Roaring River watersheds	2
2 Methods	4
2.1 Stakeholder Forum	4
2.1.1 Development	4
2.1.2 Data Collection	4
2.1.3 Analysis	6
2.2 Interagency Partner Interviews	6
2.2.1 Data Collection	7
2.2.2 Analysis	7
3 Results	8
3.1 Stakeholder Forum	8
3.1.1 Demographics	8
3.1.2 Watershed Priorities	8
3.1.3 Resource Needs	16
3.1.4 Elements of Successful Outreach and Education	25
3.2 Interagency Partner Interviews	28
3.2.1 North Carolina Department of Environmental Quality	28
3.2.2 US EPA Region 4	28
4 Recommendations	29
4.1 NRCS	29
4.2 Wilkes County SWCD	30
5 Updates: Roaring River watershed	31
6 References	32
Appendix A: Survey Methods	A-1
Appendix B: Watershed Priorities - Additional Methods	B-1
Appendix C: Facilitator Guide	C-1
Appendix D: Interview Guide	D-1

List of Tables

Table 1. Forum activities and objectives	4
Table 2. Stakeholder type	8
Table 3. Gender	8
Table 4. Participant age	8
Table 5. Watershed resident	8
Table 6. Priority Family 1 Framework: Stakeholder Needs and Knowledge	9
Table 7. Priority Family 2 Framework: Communication and Engagement	11
Table 8. Priority Family 3 Framework: Measurement and Flexibility	13
Table 9. Priority framework summary	15
Table A-1. Survey questions used in forum activities	A-1
Table A-2. Response rate	A-2
Table A-3. Respondent stakeholder type	A-2

Table B-1. Priority by categories B-1

List of Figures

Figure 1. East and Middle Prong of the Roaring River watershed map..... 3
Figure 2. Example display of resource needs activity..... 5
Figure 3. Mind map for Discussion Group 1 16
Figure 4. Mind map for Discussion Group 2 19
Figure 5. Mind map for Discussion Group 3 21
Figure 6. Combined group resource needs..... 24
Figure A-1. Roaring River watershed survey A-3
Figure B-1. Open discussion display of high and low watershed priorities..... B-2
Figure B-2. Watershed priorities instruction sheet B-5
Figure B-3. Watershed priority datasheet B-6

Acronyms

BMP	Best Management Practice
CTIC	Conservation Technology Information Center
CV	Consensus priority
DP	Distinguishing priority
EQIP	Environmental Quality Incentive Program
NCDEQ	North Carolina Department of Environmental Quality
NRCS	Natural Resources Conservation Service
NRSS	Natural Resources Social Science
NWQI	National Water Quality Initiative
PN	Priority number
PV	Priority Value
SWCD	Soil and Water Conservation District
US EPA	United States Environmental Protection Agency

Executive Summary

The Conservation Technology Information Center contracted the Natural Resources Social Science (NRSS) Lab at Purdue University to inform improvements to Natural Resources Conservation Service's (NRCS) ability to implement small watershed projects and effectively communicate watershed related information. The NRSS team hosted a forum with local stakeholders from the Roaring River watershed in Wilkes County, North Carolina to gather input on watershed project design, marketing, delivery, and implementation associated with the National Water Quality Initiative (NWQI), an NRCS supported watershed improvement program. Additionally, the NRSS team interviewed representatives from state and federal agency partners working with NRCS to investigate the interagency perspective of NWQI. The following document provides recommendations based on data gathered from the watershed forum and interviews with agency partners:

Forum

The Roaring River watershed forum included three activities that focused on 1) watershed priorities, 2) resource needs, and 3) successful watershed outreach and education strategies.

Watershed priorities

Participants ranked priorities related to successful watershed management and explained their rationale for priority decisions. Using factor analysis in PQMethod software (v. 2.35) and qualitative analysis in MS Excel, forum participants identified three distinct priority narratives, including *1) Stakeholder Needs and Knowledge, 2) Communication and Engagement, and 3) Measurement and Flexibility.*

Resource needs

Participants listed resources needed for successful watershed management, discussed their rationale for each need, and then assembled resources into broad categories of needs. Through analysis in NVivo (v. 12), the researchers identified six broad categories of resources needed for successful watershed management including *1) Policy and Legislation, 2) Funding, 3) Personnel, 4) Community Engagement, and 5) Monitoring and Evaluation.*

Successful watershed outreach and education

Participants engaged in a facilitated discussion related to recipients, content, and delivery of watershed outreach and education. Through analysis in NVivo (v. 12), the researchers identified three primary stakeholder groups, highlighted the need for tailored outreach material, and emphasized the importance of personal interactions for successful outreach and education in watershed management.

Interviews

An NRSS researcher conducted interviews with representatives from the North Carolina Department of Environmental Quality (NCDEQ) and the United States Environmental Protection Agency Region 4 to gather information about the role of partnering agencies in the NWQI, strengths and challenges associated with the NWQI, and elements of successful watershed management and outreach. Both US EPA Region 4 and NCDEQ representatives praised the NWQI's targeted approach to watershed management and suggested improving interagency coordination related to sharing location data of best management practices and the selection of NWQI watersheds.

Recommendations

Through a synthesis of data gathered from the three activities of the Roaring River watershed forum and interviews with agency partners, the NRSS research team developed the following agency-wide recommendations for NRCS and watershed specific recommendations for Wilkes Soil and Water Conservation District (SWCD). The following agency-wide and watershed specific recommendations aim to inform improvements to the successful design, marketing, delivery, and implementation of NWQI and other NRCS supported watershed projects:

NRCS:

1. Increase staff in NWQI watersheds to support technical needs of watershed improvement.
2. Support staff efforts to build and maintain working relationships with landowners and producers.
3. Increase coordination with NCDEQ to ensure water quality monitoring and improve priority watershed selection.

Wilkes SWCD:

1. Increase communication regarding water quality and project progress.
2. Promote forestry related NRCS programs and establish relationships with forest landowners.
3. Host an interagency open house.
4. Create tailored messaging for outreach and education targets.

1 Introduction

1.1 Project Overview

The Natural Resources Social Science (NRSS) Lab at Purdue University was contracted by the Conservation Technology Information Center (CTIC) to investigate how to improve the Natural Resources Conservation Service's (NRCS's) ability to 1) implement watershed management projects and 2) effectively communicate watershed related information. The NRSS team conducted a forum in North Carolina's Roaring River watershed to gather information from local stakeholders on watershed project design, marketing, delivery, and implementation associated with the NRCS's National Water Quality Initiative (NWQI). In addition to the forum, the NRSS research team gathered information from agency partners working with NRCS toward the common goal of improving watershed health.

The forum included three interactive activities with local stakeholders aimed to identify 1) watershed priorities, 2) resource needs, and 3) elements of successful watershed outreach and education. Interviews investigated the regional perspective of agency collaborators regarding NWQI's strengths and weaknesses, as well as successful watershed management, outreach, and education strategies.

This report provides the following information:

- Brief overview of the NWQI
- Current conditions in the Roaring River watershed
- Methods and results from the Roaring River watershed forum conducted in Wilkes County, NC
- Methods and results from interviews conducted with representatives from the North Carolina Department of Environmental Quality (NCDEQ) and the United States Environmental Protection Agency (US EPA)
- Recommendations to inform implementation and outreach efforts for NWQI and other NRCS supported watershed projects

1.2 Background

1.2.1 National Water Quality Initiative

Created by NRCS to identify impaired watersheds and address water quality issues in targeted watersheds, the NWQI provides technical and financial assistance to accelerate voluntary adoption of best management practices (BMPs) on agricultural land. The NWQI uses a collaborative approach to watershed management and works with local resource managers, state water quality agencies, EPA, and other partners to improve impaired watersheds across the United States. Additionally, the initiative provides monitoring and assessment resources to track water quality improvement over time in targeted watersheds. To receive the NWQI funding, resource managers in selected watersheds develop an area-wide conservation planning document, i.e., "watershed assessment." This document includes watershed characterization, water quality impairment assessment, identification of critical acres, and an outreach plan for agricultural producers in the identified critical acres. The NWQI also aims to enhance agricultural productivity by improving soil health and reducing erosion, nutrient runoff, and input costs.

1.2.2 East and Middle Prong of Roaring River watersheds

The two watersheds of interest, East Prong and Middle Prong of the Roaring River (Figure 1), are part of the Yadkin-Pee Dee River Basin and are currently on the 303(d) list of impaired waterways due to elevated levels of fecal coliform. Located in Wilkes County, North Carolina, the Roaring River's East (HUC-030401010405) and Middle (HUC - 030401010404) Prong watersheds include a drainage area of 128 square miles and represent 13.2% of the total county landmass. These adjacent watersheds include a state park (Stone Mountain State Park), state-owned game land (Thurmond Chatham Game Land), and a mix of agriculture and forestlands with homesteads scattered between the communities of Traphill and Roaring River, NC (Figure 1).

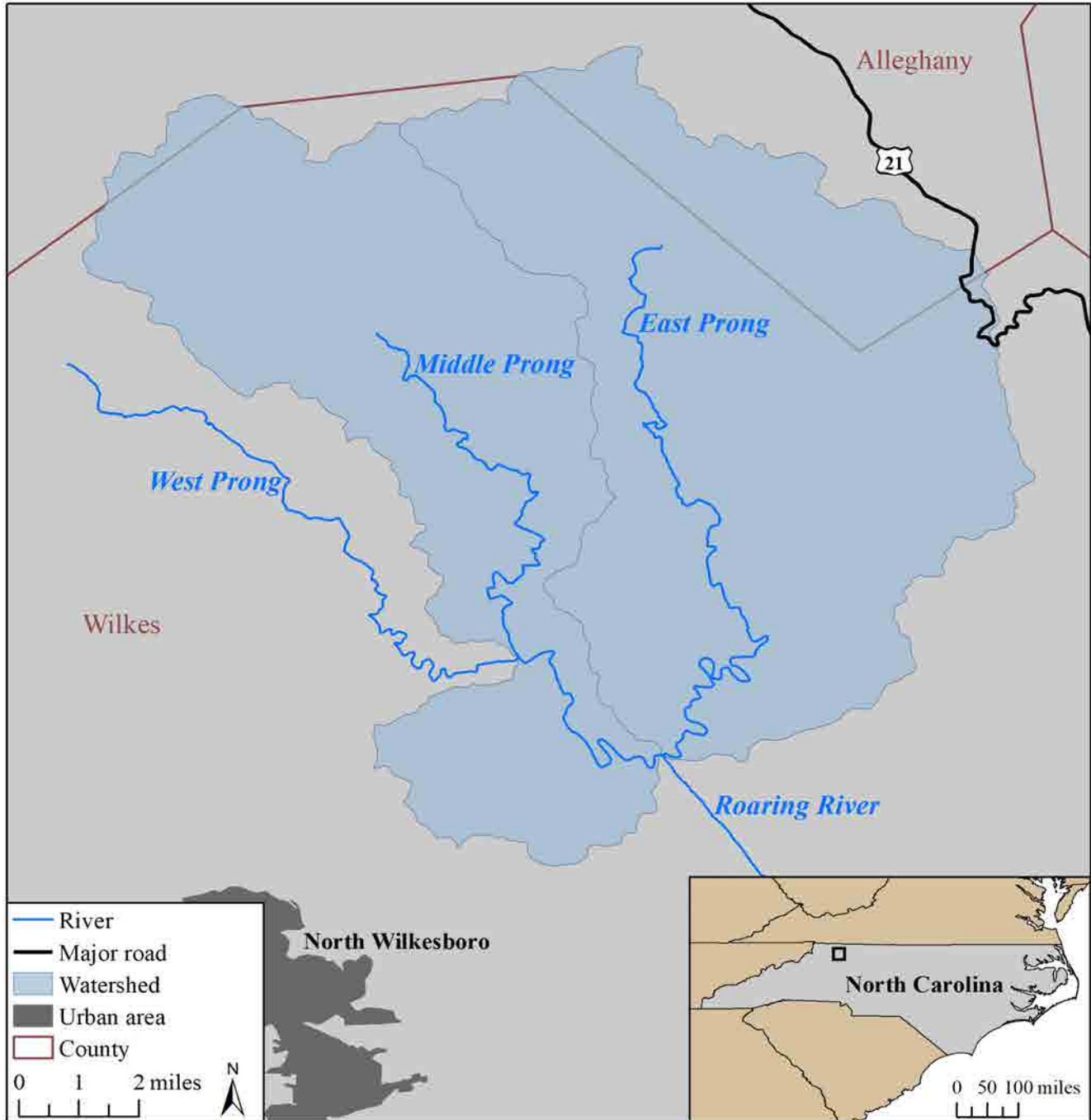
Through the watershed assessment for the East and Middle Prong of the Roaring River (Wilkes National Water Quality Initiative; East and Middle Prong of Roaring River, 2018), five major water quality concerns were identified, including:

- forestry and associated timber harvesting practices,
- livestock access to surface waters,

- cropland management (erosion control and nutrient management),
- poultry operations, and
- streambank and streambed destabilization.

In the East and Middle Prong of Roaring River watershed, Wilkes County Soil and Water Conservation District (SWCD) manages the NWQI and receives additional support from NRCS staff as well as the North Carolina Foundation for Soil and Water Conservation.

Figure 1. East and Middle Prong of the Roaring River watershed map



2 Methods

This section provides brief methods for forum and interviews conducted by NRSS lab and approved by Purdue University Institutional Review Board. Further methods details can be found in Appendices A, B, C and D.

2.1 Stakeholder Forum

2.1.1 Development

The NRSS research team worked with Wilkes County SWCD to gather a contextual understanding of the watersheds and develop a list of diverse stakeholders to invite to the forum. Wilkes County SWCD sent initial invitations via mail approximately one month before the forum. The NRSS team sent a reminder via mail or email approximately two weeks before the forum. The reminder included a brief survey and information about the forum. The survey gathered respondents' stakeholder type (e.g., producer, landowner, community member, SWCD staff) as well as their awareness of and involvement in local watershed management. Through four open-ended survey questions, recipients were asked to describe their watershed priorities and identify resources needed for successful watershed management. Survey development, methods, and analyses conducted are included in Appendix A.

The Roaring River watershed forum was conducted on January 30th from 10:00 am to 3:00 pm (Table 1).

Table 1. Forum activities and objectives

Activity	Objective
Introduction	An NRSS facilitator oriented the participants to the project team, project objectives, forum goals, and the forum's agenda.
Identify watershed priorities	Participants ranked priority statements for watershed management then discussed the rationale for their ranking.
Lunch	Participants were provided food and an opportunity to network with fellow participants.
Identify resource needs	Participants listed resource needs for watershed management then organized them into broad categories.
Identify elements of successful outreach and education	Participants discussed elements needed for successful outreach and education in their watershed.
Conclusion	An NRSS facilitator thanked participants for their attendance.

2.1.2 Data Collection

The following section describes methods for forum activities where data was collected.

Introduction

The NRSS facilitator introduced participants to the project and the project team. The project team included two NRSS lab staff, two CTIC staff, three WaterComm staff, and one NRCS staff. The facilitator then provided an overview of the forum agenda and a broad summary of watershed management and NWQI. Contact information including, name, email/ mailing address were collected but not used for any analysis.

Identify Watershed Priorities

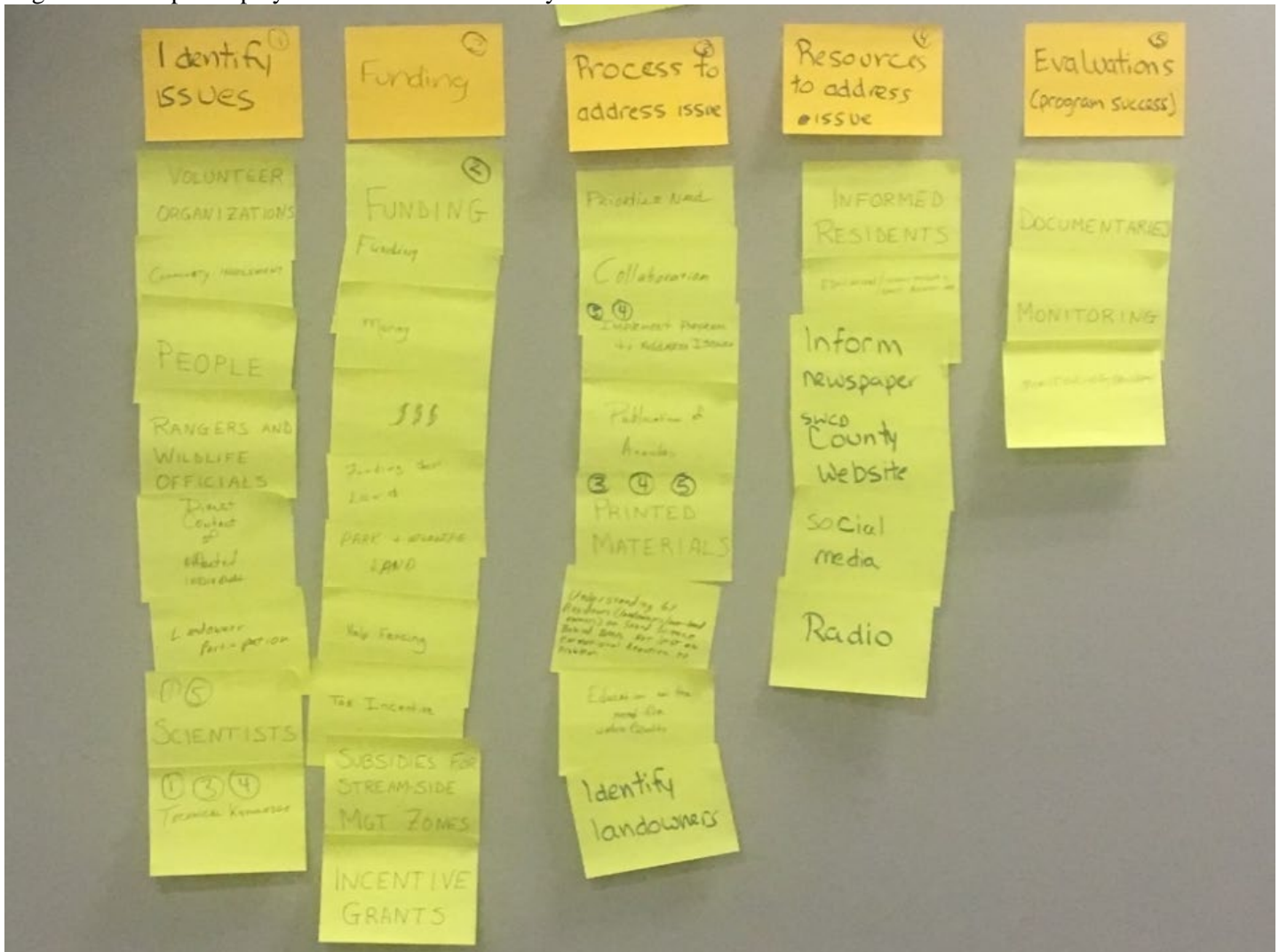
Forum participants engaged in a ranking exercise based on Q Methodology (Brown 1993) to identify watershed priorities from 36 predetermined priority statements (see Appendix B, Table B-1 for list of statements). The 36 statements were developed to represent a wide range of watershed priorities. Facilitators instructed forum participants to record the order of their watershed priorities from most disagree (-5) to most agree (5) on a provided datasheet (Appendix B, Figure B-3). Participants also reported demographic information, including their primary role in the watershed (i.e., stakeholder type), conservation practices currently in use on their property, years of experience with watershed management, years lived in the Roaring River watershed as well as their birth year and gender. The datasheets were collected by the research team and were input into PQMethod software (v. 2.35) at a later date.

Then, in an open discussion with all forum participants lasting approximately 15 minutes, the facilitator asked volunteers to share their rationale for selecting their top watershed priorities. Participants were then assigned to three small groups. NRSS researchers assigned predetermined groups to integrate different stakeholder types within each group. In the small groups, participants shared their highest and lowest watershed priorities and their ranking rationale. Members of CTIC facilitated two small group discussions, an NRSS researcher facilitated one, and WaterComm staff took notes of each discussion. Large and small group discussions were noted and recorded. TranscribeMe, an audio transcription service, was used to transcribe audio recordings.

Identify Resource Needs

Forum participants listed resources needed to achieve successful watershed management. Researchers provided each group with 10 examples of resource needs derived from the survey (Appendix A). Participants wrote resources needed for successful watershed management on 5x7 inch sticky notes. Participants displayed each written resource need (including the 10 provided by the facilitators) in front of their small group. The small group facilitator prompted participants (see Appendix C for facilitator guide) to explain their rationale for resource needs they contributed, then collectively assembled resource needs into broad categories. The facilitator then documented the broad categories and displayed them on a different colored sticky note (Figure 2). After the forum, NRSS team collected all 5x7 sticky notes from each group. Group discussions were noted and recorded. Audio recordings were transcribed by TranscribeMe, an audio transcription service.

Figure 2. Example display of resource needs activity



Identify Elements of Successful Outreach and Education

In the same small groups, participants engaged in a facilitated discussion on elements of effective outreach and education. Small group facilitators provided each group seven examples of elements needed for successful watershed outreach and education derived from the survey (Appendix A) then documented the discussion on a flip chart. Facilitators guided (Appendix C) participants to gather further information related to recipients, content, and delivery of watershed outreach and education. The discussions were noted and recorded. Audio recordings were transcribed by TranscribeMe, an audio transcription service.

2.1.3 Analysis

The following section describes the analysis methods for the forum activities where data was collected.

Identify Watershed Priorities

This activity used both quantitative and qualitative analyses, described below.

Quantitative

An NRSS researcher conducted a factor analysis using principal component method with Varimax rotation on the participants' ranked priorities via PQMethod software (v. 2.35). The software aggregated participants by similarly ranked priorities and identified the following:

- Priority family: participants with similar priority rankings.
- Priority framework: output that provided priority values (PV), distinguishing priorities (DP), and consensus priorities (CP) for each priority family.
 - Priority value (PV): Value assigned to each watershed priority based on priority rankings within each priority family. These values reflect family attitudes toward each priority. PVs range from -5, (low priority), to 5 (high priority).
 - Distinguishing priorities (DP): Uniquely ranked priorities from each priority framework. These priorities highlight distinct viewpoints that differentiate priority families from each other.
 - Consensus priorities (CP): Similarly ranked priorities across all priority frameworks. These priorities highlight broad agreement across all priority families.

Qualitative analysis

An NRSS researcher then developed a priority narrative to describe priorities and compare differences and similarities for each priority family. Narratives were created by organizing participants' rationale from the discussion transcriptions by priority and priority rank (MS Excel) as well as the priority framework, analyzed through PQMethod (v. 2.35). Participants' comments were not identified on the transcription relative to their datasheet; therefore, the comments could not be attributed to a specific priority family. Finally, the researcher developed a name describing each narrative based on high-ranked priorities (see Appendix B, Table B-1 for additional detail).

Identify Resource Needs

The broad categories and resource needs identified by participants were used as codes and subcodes, respectively, to organize the discussion. An NRSS researcher reviewed all transcriptions and assigned codes in NVivo (v. 12). Then, for each discussion group, the NRSS researcher developed a conceptual diagram (i.e., mind map) of the resources needed for successful watershed management based on the transcribed small group discussions. The mind maps were then synthesized by identifying reoccurring themes across all three discussion groups.

Identify Elements of Successful Outreach and Education

An NRSS researcher developed codes in NVivo (v. 12) based on reoccurring themes for each of the facilitated discussion topics: recipients, content, and delivery.

2.2 Interagency Partner Interviews

The following section describes data collection and analysis methods used to investigate the perspective of federal and state agency partners (US EPA and NCDEQ) relative to their role within the NWQI, the strengths and challenges associated with the NWQI, and elements of successful watershed management and outreach.

2.2.1 Data Collection

An NRSS researcher interviewed representatives from NCDEQ and EPA Region 4. The interviewees were identified through a conversation with a US EPA employee who recommended appropriate representatives. A request to participate was emailed to potential interviewees. The interview with NCDEQ was conducted in-person, recorded, and transcribed in January 2018. The interview with representatives from US EPA Region 4 was conducted over telephone and was not recorded, at their request, in February 2018. The researcher took interview notes that were later validated by US EPA. The interview guide developed for these interviews can be found in Appendix D.

2.2.2 Analysis

The transcripts and notes were summarized by three topics:

- Agency role in the NWQI
- Strength and challenges associated with the NWQI
- Key elements for successful watershed management and outreach

3 Results

3.1 Stakeholder Forum

3.1.1 Demographics

A total of 26 stakeholders participated in the forum. Most participants identified as a producer or landowner (Table 2) and male (Table 3). Participants reported a mean age of 55.1 years old (Table 4) and roughly half the forum participants reported living in the watershed (Table 5)

Table 2. Stakeholder type

Stakeholder Type	Frequency (n)	%
Producer or Landowner	10	38.5
SWCD Staff	3	11.5
SWCD Supervisor	3	11.5
NRCS	2	7.7
Community member	1	3.8
Local govt staff	1	3.8
NGO	1	3.8
*Other	5	19.2
<i>*Other includes one of the following: NC Farm Bureau staff, NC Forest Service staff, NC Department of Agriculture Regional Agronomist, NC state government staff and a consulting forester</i>		

Table 3. Gender

Gender	Frequency (n)	%
Male	22	84.6
Female	4	15.4

Table 4. Participant age

Mean age (SD)	Median	n
56.1 (15.1)	58.5	24

Table 5. Watershed resident

Resident	n	%	Years Mean (SD)
Yes	12	46.2	40.6 (24.8)
No	14	53.8	

3.1.2 Watershed Priorities

A total of 19 participants' ranked priorities were considered complete for analysis (Appendix B). Three participants were not included in any priority family because their ranked priorities were dissimilar to the three priority families and each other's; therefore, they were not considered their own priority family. The remaining 16 participants' ranked priorities are presented in the following three narratives:

- Priority Family 1: Stakeholder Needs and Knowledge (six participants)
- Priority Family 2: Communication and Public Engagement (seven participants)
- Priority Family 3: Measurement and Flexibility (three participants)

Each priority given to participants was numbered (Appendix B, Table B-1). These priority numbers (PNs) are added to the following section for reference in parentheses, for example "(PN4)" refers to priority number 4, "A watershed plan is necessary."

The priority family narratives are described below by the priorities with high and low PVs and DPs (Tables 6,7 and-8), CPs are discussed and the priority framework for each family is summarized in Table 9.

Priority Family 1: Stakeholder Needs and Knowledge Narrative

This priority family included a total of six participants who self-identified as NRCS staff, SWCD staff, foresters, and non-profit staff. This family emphasized addressing stakeholder concerns (PN10, PN2), community outreach (PN15, PN25), watershed planning (PN4) and agency collaboration (PN28) for successful watershed management (Table 6).

Table 6. Priority Family 1 Framework: Stakeholder Needs and Knowledge

Priority Narrative 1: Stakeholder Needs and Knowledge				
PN	Priority	PV	DP	CP
High				
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	5	x	
15	A strong working relationship between producers/landowners and watershed managers is important.	4		x
4	A watershed plan is necessary.	4		
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	3	x	
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	3		
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	3		
Low				
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3		
1	Landowners/producers should know what best management practices are and why they should be used.	-3		
30	The watershed should have a user-friendly website that contains watershed information.	-3		
9	Only local organizations should be involved.	-4		x
36	The watershed needs to be in an impaired or degraded state.	-4		
35	Producers/landowners/businesses should be required to adopt best management practices.	-5	x	
Additional DPs				
27	Negative effects of watershed management on downstream stakeholders should be minimized.	2	x	
6	Management should be done at a small geographic scale.	1	x	
5	Land and water should have species diversity.	-2	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The “x” indicates the DP and CPs identified by the PQMethod software.

PN=Priority number

PV=Priority value

DP=Distinguishing priority

CP=Consensus priority

Stakeholder Concerns

This priority family recognized that agricultural businesses operate on a thin bottom line. They believed local concerns should be a top priority for resource managers (PN2) and that watershed management should not affect the livelihoods of those in the watershed or downstream (PN27, PN10). When discussing potential impacts of watershed management on the livelihoods of producers in their community, one participant remarked:

“...These types of programs put people out of business. It’s not perfect... It’s got to be for the producers whether it’s forestry, poultry, beef, or whatever. It’s got to benefit their bottom line. They’ve got to come out ahead by doing these practices rather than costing them money if you want their cooperation.”

Related to prioritizing stakeholder needs, this family opposed regulations related to mandatory adoption of BMPs (PN35). Citing potential impacts of regulating farming operations, one participant shared:

“I have a problem with making adoption a requirement unless you’re willing to foot the bill...the power of Soil and Water Districts have always been about voluntary conservation. I really believe in the carrot instead of the stick.”

Community Outreach

This family also emphasized the importance for watershed managers to be integrated in the community, so they can understand local needs and develop a watershed plan that garners community support. They suggested strong working relationships could increase community support by showing producers and landowners that watershed management can improve farm operations, as opposed to a regulatory threat (PN25). Speaking to the importance of strong working relationships, one participant said:

“You’ve got to have a good relationship with your producers or landowners and have one-on-one interactions with them. You could have people that want to work with you, we’ve got that and are lucky to have it. I think it’s important to have people [local watershed managers] going out to visit and trying to help, not be the authority. Give them the carrot to do this, but don’t get the stick out and beat him.”

Watershed Planning

Participants also identified a watershed plan as a key component for successful watershed management (PN4), and highlighted the need to identify problems, formulate strategies, and achieve water quality goals. However, they did not want to include an evaluation of potential climate change impacts in their watershed plan (PN32) and cautioned against politicizing environmental issues; for example:

“...The climate’s always changed and going to change as long as time lasts. There’s nothing you can do about it, but if I was going to push the issue I’d want to put money towards environmental problems instead of just pushing a political issue.”

Agency Collaboration

They also highlighted the importance of interagency collaboration and supported agency coordination of information and resources (PN28). After discussing a water quality concern, a participant emphasized the need for partnering agencies to have open communication to address resource concerns as they occur; for example:

“Something needs to be in place that will automatically make that connection so that the right person can get out there to address that [water quality] issue, instead of maybe two, three weeks later.”

Other Priorities

Finally, this family preferred to maintain a healthy watershed rather than fix one that is impaired and believed that watershed management should be done at a small geographic scale (PN36, PN6). This family did not prioritize species diversity, online access to watershed information, or producer and landowner understanding of BMPs for successful watershed management (PN1, PN5, PN30).

Priority Family 2: Communication and Engagement Narrative

This priority family included a total of seven participants who self-identified as SWCD staff, SWCD supervisors, NRCS staff, community members, producers or landowner, and a state government employee. This family suggested that community outreach (PN11, PN15), a public understanding of healthy watershed benefits (PN7, PN12), diverse communication (PN14), and available technical and financial assistance (PN3) should be emphasized for successful watershed management (Table 7).

Table 7. Priority Family 2 Framework: Communication and Engagement

Priority Narrative 2: Communication and Engagement				
PN	Priority	PV	DP	CP
High				
11	Watershed managers should actively engage with the community.	5	x	
7	Students (elementary through college) should understand the importance of soil and water conservation.	4	x	
12	The public needs to understand how a healthy and balanced watershed can benefit them.	4	x	
14	Watershed information should be communicated using diverse methods and reach a broad public audience.	3	x	
15	A strong working relationship between producers/landowners and watershed managers is important.	3		x
3	Technical and/or financial assistance for those who qualify is necessary.	3		x
Low				
29	Watershed managers should focus on water quality issues over water quantity issues.	-3		
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3		
20	Communicating about soil health is more effective than communicating about water quality.	-3		
6	Management should be done at a small geographic scale.	-4	x	
36	The watershed needs to be in an impaired or degraded state.	-4		
9	Only local organizations should be involved.	-5		x
Additional DPs				
13	Funding should be budgeted specifically for outreach and communication.	2	x	
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	0	x	
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	-2	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The “x” indicates the DP and CPs identified by the PQMethod software.

PN=Priority number

PV=Priority value

DP=Distinguishing priority

CP=Consensus priority

Outreach

This family emphasized the importance for watershed managers to actively engage with their community (PN11). Participants believed that engaging the entire community (agricultural and non-agricultural) can build broad political support, influence local elected officials, and leverage local resources; for example:

“...at the local level you can be creative and flexible as long as your county commissioners are educated to the importance of it and you've got that political support...there's a lot of value in that and the local people need to understand that they have that as a strength.”

More so than the other priority families, this family prioritized the idea of allocating funding specifically for outreach to landowners, producers, and the broader community (PN13); for example:

“Give staff resources to do direct outreach like we used to do, do it well, go in with a team of people. Have your extension there at the meeting, your forester, your parks all singing from the same page. But these guys are so locked into data entry on the computers, and spending money that they aren't getting that time.”

Knowledge/Education

With the belief that broad political support in their local community can impact the success of watershed management, this family stressed the importance of educating the public (including students) about the benefits of soil and water conservation, and a healthy watershed (PN14, PN12, PN7). For example:

“...cost-share program's come under threat every year because people don't understand the importance of it. Something we all struggle with is how to share that story and make sure everybody understands the value of doing conservation.”

Communicate Impairments

Participants also emphasized the importance of communicating the interconnected relationship between water quality, water quantity, and soil health related issues (PN29, PN20). Illustrating the relationship between water quantity and water quality, one participant stressed the importance of both:

“If you don't get the quantity right, you'll never get the quality right...we do have a water quantity cost-share program now in North Carolina, but we didn't for many years. If they couldn't point to that direct water quality tie, you weren't eligible for funding even though by working on water quantity, you are going to improve water quality.”

Other Priorities

Finally, this family believed watershed management should be done on a large scale (PN6). A participant described watershed management as regional scale:

“Start with the Roaring River watershed, as you gain some success in that area you look to [other tributaries] and move on down. Then you look at the quality of the water after they have come together in the Yadkin River and then you go on downstream.... you just follow the natural progression until you have cleaned up the whole system. I mean, that should be the ultimate goal.”

This family had a neutral attitude towards incorporating local experience and knowledge into watershed planning (PN25), put a low priority on interagency collaboration and evaluating climate change impacts in their watershed (PN28, PN32). Finally, they agree that a watershed does not need to be impaired to receive management attention (PN36).

Priority Family 3: Measurement and Flexibility Narrative

The third priority family consisted of three total participants who identified as local government staff, SWCD staff, and a producer or landowner. This family’s participants emphasized flexible watershed planning (PN26, PN32) measurably cleaner water (PN34), outreach (PN15, PN25) and agency coordination (PN28) as important components of successful watershed management (Table 8).

Table 8. Priority Family 3 Framework: Measurement and Flexibility

Priority Narrative 3: Measurement and Flexibility				
PN	Priority	PV	DP	CP
High				
26	There should be a flexible plan that allows for changes in management over time.	5	x	
34	Measurably cleaner water should be an outcome.	4	x	
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	4		
15	A strong working relationship between producers/landowners and watershed managers is important.	3		x
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	3		
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	3	x	
Low				
27	Negative effects of watershed management on downstream stakeholders should be minimized.	-3		
7	Students (elementary through college) should understand the importance of soil and water conservation.	-3		
35	Producers/landowners/businesses should be required to adopt best management practices.	-3		
10	No stakeholders’ livelihoods should be jeopardized due to watershed management activities.	-4	x	
20	Communicating about soil health is more effective than communicating about water quality.	-4		
9	Only local organizations should be involved.	-5		x
Additional DPs				
29	Watershed managers should focus on water quality issues over water quantity issues.	2	x	
4	A watershed plan is necessary.	0	x	
36	The watershed needs to be in an impaired or degraded state.	0	x	
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	-2	x	

Notes: Priorities are ordered by PV. The priority categories are provided in Appendix B Table B-1. The “x” indicates the DP and CPs identified by the PQMethod software.

PN=Priority number

PV=Priority value

DP=Distinguishing priority

CP=Consensus priority

Watershed Planning and Biological Integrity

This family is defined by a belief that watershed management should be flexible, address water quality and quantity issues and allow for future change (PN26, PN32, PN29). They also suggested measurably cleaner water as the goal of watershed management (PN34). One participant described water quality as the ultimate measure of success:

“It boils down to your water. Test your water. If you improve it, it’s a success. If you don’t, you’re spinning your wheels. Bottom line.”

Outreach and Agency Coordination

Participants in this family agreed that local, state, and federal agencies should share resources, managers should seek out local knowledge and build strong relationships with producers and landowners (PN28, PN25). Highlighting the value of local knowledge and experience, a local resource manager described his experience working in this area and how local knowledge and experience can be beneficial:

“I’m not from this county, so when I came here, if it wasn’t for the [watershed coordinator] and the SWCD board of [directors] saying, ‘Hey, this is so and so, you should go to the farm.’ Then I’d be in the dark because [I cover] five counties.”

Other Priorities

Although this family agreed that adopting BMPs should remain voluntary (PN35), they put a low priority on specifically addressing local concerns (PN2) and accept that watershed management may impact livelihoods in their community and downstream (PN10, PN27).

Educating students was not a priority for this family (PN7), but they did emphasize that soil health is related to water quality and both are both important to successful watershed management (PN20). One participant highlighted the related nature of soil and water:

“...if you do really well on your soil, the water will be better. If the soil is in good shape, you don't have the mud running into the streams.”

Although this family prioritized watershed planning and biological integrity they were neutral towards the need for a watershed plan and the idea that watershed management should only focus on impaired watersheds (PN4, PN36).

Consensus Priorities

Outreach

All three priority families agreed that outreach is a necessity for successful watershed management and one-on-one interactions are important for building strong relationships between producers, landowners, and watershed managers (PN15, PN16). The quote below suggests relationships are the foundation for successful watershed management in this watershed:

“I think that's where it all starts. It's having some people on the ground, communicating with the landowners and producers, see what they're doing and see if they can change things.”

Financial Assistance and Agency Collaboration

Another priority highlighted by this family suggested that both technical and financial assistance is needed for successful watershed management (PN3). Acknowledging the financial risks associated with adopting BMPs, one participant stressed the need for financial assistance:

“Without cost-share you won't get much participation. Especially when you're talking about agriculture when a good year is when you break even and you've got this half-a-million-dollar stream project you've got to do. If I can't get some major money for that, I'm not going to do it.”

Another participant discussed how financial commitment can be a barrier to BMP adoption, and described how financial assistance can mitigate those risks:

“It isn't all about the money...most farmers would say ‘we're all about water quality, we don't do anything intentionally to ruin the water. But we're all looking for help, [with] systems and everything,’ so it is somewhat about money. We can't afford to do it if we don't have any [money].”

Participants also agreed that local organizations need the support of state and federal agency partners (PN9). The importance of state and federal involvement in local organizations is demonstrated by the following simple quote:

“If they're not here, we can't do it.”

Priority framework summary

Summary of priority framework for each priority family.

Table 9. Priority framework summary

PN	Priority	Priority Family (PVs)		
		1	2	3
1	Landowners/producers should know what best management practices are and why they should be used.	-3 ^D	0	0
2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.	3 ^D	1 ^D	-2 ^D
3	Technical and/or financial assistance for those who qualify is necessary.	2 ^C	3 ^C	2 ^C
4	A watershed plan is necessary.	4	2	0 ^D
5	Land and water should have species diversity.	-2 ^D	1	2
6	Management should be done at a small geographic scale.	1 ^D	-4 ^D	-2 ^D
7	Students (elementary through college) should understand the importance of soil and water conservation.	-1 ^D	4 ^D	-3 ^D
8	Conservation practices should be adopted on more acres.	0 ^D	2 ^D	-2 ^D
9	Only local organizations should be involved.	-4 ^C	-5 ^C	-5 ^C
10	No stakeholders' livelihoods should be jeopardized due to watershed management activities.	5 ^D	-2 ^D	-4 ^D
11	Watershed managers should actively engage with the community.	2	5 ^D	1
12	The public needs to understand how a healthy and balanced watershed can benefit them.	-1	4 ^D	0
13	Funding should be budgeted specifically for outreach and communication.	0	2 ^D	-1
14	Watershed information should be communicated using diverse methods and reach a broad public audience.	-1	3 ^D	-1
15	A strong working relationship between producers/landowners and watershed managers is important.	4	3	3
16	One-on-one interactions between resource managers and producers/landowners is necessary.	2 ^C	2 ^C	2 ^C
17	Watershed stakeholders need to understand the sources of water resource issues.	0 ^C	0 ^C	1 ^C
18	The watershed planning process should include diverse groups of people working towards a common goal.	0 ^D	-2 ^D	1 ^D
19	A management plan should support activities that include recreation, economic and environmental benefits.	-2	1	0
20	Communicating about soil health is more effective than communicating about water quality.	-1 ^D	-3	-4
21	Water monitoring is necessary.	-1 ^D	1	1
22	Achievable water quality goals and targets should be set to show water quality improvements.	1 ^C	0 ^C	0 ^C
23	The public should be aware of the range of resource issues associated with their watershed.	-2 ^D	-1	1
24	A clear plan for public involvement/engagement should be included in a watershed management plan.	1 ^D	0	-1
25	Watershed managers should seek out and respect local knowledge, perspective, and experience.	3	0 ^D	3
26	There should be a flexible plan that allows for changes in management over time.	1 ^D	-1 ^D	5 ^D
27	Negative effects of watershed management on downstream stakeholders should be minimized.	2 ^D	-1 ^D	-3 ^D
28	Resources and information between local, regional, state, and federal agencies should be coordinated.	3	-2 ^D	4
29	Watershed managers should focus on water quality issues over water quantity issues.	-2 ^D	-3 ^D	2 ^D
30	The watershed should have a user-friendly website that contains watershed information.	-3	0 ^D	-2
31	Watershed management should benefit my community and communities downstream of my watershed.	1 ^C	-1 ^C	-1 ^C
32	Watershed management should include an evaluation of the impact of climate change on future quality and quantity in my watershed.	-3	-3	3 ^D
33	Community members should take an active role in watershed management.	0 ^C	-1 ^C	-1 ^C
34	Measurably cleaner water should be an outcome.	0	1	4 ^D
35	Producers/landowners/businesses should be required to adopt best management practices.	-5 ^D	-2	-3
36	The watershed needs to be in an impaired or degraded state.	-4	-4	0 ^D

^D=Distinguishing priority

^C=Consensus priority

PN=Priority number

PV=Priority value

Priority Family 1: Stakeholder Needs and Knowledge

Priority Family 2: Communication and Engagement

Priority Family 3: Measurement and Flexibility

PV Color Key

5	
4	
3	
-3	
-4	
-5	

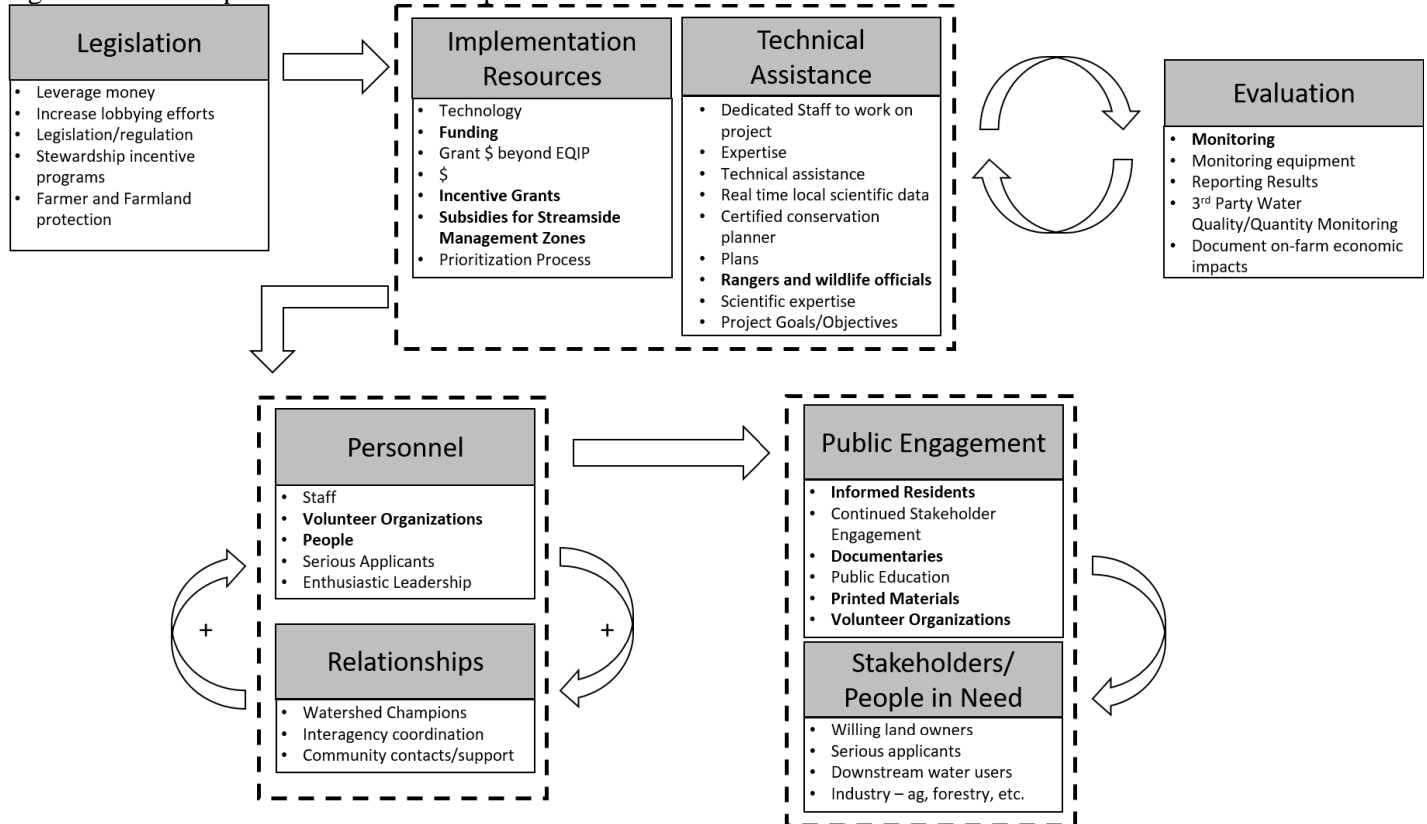
3.1.3 Resource Needs

Discussion Group 1

Group 1 developed eight broad categories of resource needs and identified 44 individual resource needs for successful watershed management (Figure 3). The eight broad categories include: 1) Legislation, 2) Implementation resources, 3) Technical assistance, 4) Evaluation, 5) Personnel, 6) Relationships, 7) Public engagement, and 8) Stakeholders/people in need.

This group believed legislative support should provide technical and financial resources and staff to administer programs and underscored the importance of maintaining relationships within the local community. They believed that enough resources and staff could enable increased community support for watershed management and a broad public understanding of benefits associated with a healthy watershed.

Figure 3. Mind map for Discussion Group 1



Bolded resource needs were provided by survey respondents

Legislation

This group acknowledged the role local, state, and federal legislation have on a local community’s ability to achieve successful watershed management. They highlighted the need for a strong, pro-agriculture voice in state and federal governments to leverage funding and represent agricultural interests to lawmakers.

“I think with legislation, you don’t always think about it, but if you have a group that was trying to get more support, via funding, you could put it in legislation...leverage more money through legislation...”

Often associated with regulation, this group recognized that legislation can have a negative connotation in some agricultural communities. Highlighting the impact pro-agriculture legislation can provide to farming communities, one participant described its potential benefits; for example:

“I know [talk of] legislation makes some people uncomfortable...part of the reason why you would do a watershed plan is to avoid additional land use restrictions. Legislation can be used to provide exemptions and flexibility in the short-term to achieve the long-term goals, like a streamlined permitting process that move quickly through the pipeline, so you can get projects on the ground.”

Implementation Resources and Technical Assistance

Implementation and technical assistance resource needs emphasized the desire for diverse funding sources, modern technology, and a process to prioritize resource concerns. Additionally, this group believed that dedicated staff to develop farm-level conservation plans and assist with BMP implementation is important for successful watershed management.

To ensure funding is available for a variety of resources concerns, this group believed successful watershed management needs additional funding beyond the Environmental Quality Incentives Programs (EQIP). This group also believed a transparent process to prioritize available funding to address a variety of resource concerns is a crucial component of success; for example:

“If farmer A calls for assistance, and farmer B calls for assistance, how do we decide whether we help farmer A or farmer B?...I think we need a prioritization process, so we’re not just willy-nilly looking for money anywhere. Use a targeted approach and use your staff resources wisely.”

Finally, this group believed that innovative technology could provide economic and environmental benefits to the watershed planning and implementation process. For example, the Roaring River watershed recently invested in a drone to help identify resource concerns and report that the tool assisted in identifying watershed impairments.

Evaluation

This category of needs emphasized appropriate water quality monitoring equipment and expertise. Additionally, this group stressed the importance of evaluating economic impacts BMPs can have on a farming operation; for example:

“[You have to consider] the economics of it all...Understand the impacts on farm economics when you’re talking about what conservation practices to install.”

Personnel and Relationships

This group highlighted the importance of strong relationships between resource managers and farmers. This group believed that successful watershed management relies on voluntary adoption of BMPs and in turn, the relationships resource managers have with their community can influence producers’ willingness to adopt. Participants also believed that benefits of strong working relationships between farmers and resource managers can disseminate through peer networks. Discussing the benefits of community contacts and peer-to-peer interactions, one participant explained:

“If you’ve got somebody in the community that’s doing something innovative and it’s working, then other people in the community take that up. It’s just baby steps, but eventually, they’ll start asking questions, and then the door starts to open.”

This needs category also emphasized the importance of a collaborative relationships between local, state, and federal agencies. One participant mentioned their county has benefited from effective collaboration at the local level; for example:

“We’ve talked about the state, federal and local [agencies] all working together. I think at the county level, that’s where you can be the most impactful. I mean, it works well in this county.”

Although this group categorized personnel and relationships as two separate categories, they described the connection between personnel and relationships to be symbiotic and to rely on each other for mutual success. They viewed effective personnel who develop good relationships with producers and landowners as the foundation for stakeholder buy-in as well as a catalyst for public support and project growth; for example:

“Because of the relationships and the work personnel put into it, that’s how it’s grown. Stakeholders saw that other people cared.”

Public Engagement and Stakeholders/People in Need

Personnel and relationships were also seen to be key to community impact. This group believed that personnel and the relationships built within the community directly impact public engagement and stakeholders/people in need. They described public engagement as having three major purposes: 1) educate the community about water quality related issues, 2) highlight water quality improvements, and 3) connect people to available resources.

They recognized that water quality can be a contentious topic and suggested using positive messages, when engaging with the public and stakeholders, to highlight the importance of water quality and avoid blame-shifting. Citing a lack of information as the culprit for blame shifting, a participant who identified as a poultry farmer, described a combative meeting he attended:

“[Poultry] farmers were bashed and bashed and bashed. I sat and listened, then I left...It was a different type of farmer than poultry, they didn’t understand poultry farming and they lacked knowledge.”

This group felt that providing information to those who are eligible for technical and financial assistance is a key role for public engagement. Again, speaking about leveraging existing relationships, one participant described how public engagement plays an essential role in successful watershed management:

“We’ve got two different peoples in need. You’ve got people that need the help, and then you’ve got people that have already completed the project that could help and be the champions in the community to help other people and say ‘Hey, this will work.’”

While this group believed that each category could play a vital role in successful watershed management, they highlighted the importance of directing public engagement efforts to diverse stakeholders. Moreover, they recognized that participation and buy-in of diverse stakeholder groups is an essential component to successful watershed management; for example:

“I think the public is your main piece. You can do anything you want to, but if they don’t come to it, you’re [out of luck].”

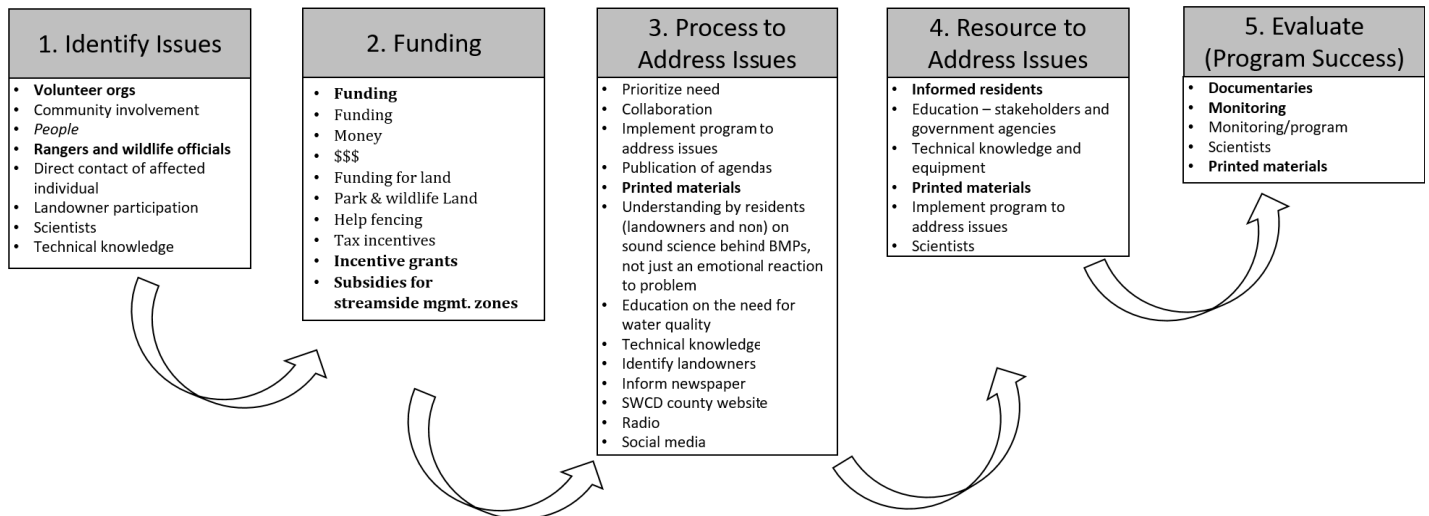
Discussion Group 2

Group 2 identified five broad categories with 42 individual resources needed for successful watershed management (Figure 4). The five broad categories described below include: 1) Identify issues, 2) Funding, 3) Process to address issues, 4) Resources to address issues, and 5) Evaluate (program success).

This group used a systematic approach to identify needs for a successful watershed management project. They believed the first step for successful watershed management is to identify water quality concerns, followed by the second step, secure funding to address the identified issues. With clear project objectives and secured funding, the next step is to develop a process to address issues identified in step one. With a process in place, the fourth step is to make the public aware of resources available to address water quality concerns. This group believed that program evaluation is the last step for successful watershed management. One participant summed up the process by saying:

“You have a problem, you seek money, you tell people what it is you want to do, and then you tell them what it is you have to do [to get it done], then you tell them how you’re going to evaluate what you’ve done.”

Figure 4. Mind map for Discussion Group 2



Bolded resource needs were provided by survey respondents

1. Identify Issues

This group believed the first step to determine resource needs for successful watershed management is to identify resource concerns affecting water quality in the watershed; for example:

“First of all, before you can get any money, you need to have an issue or problem...you need to have some reason to tell people what you need.”

The group emphasized the importance of data driven information and incorporating technical skills and knowledge in this stage of the process. In addition to technical experts, this group also thought it is important to have an open line of communication with landowners, producers or others who have potential to impact water quality.

2. Funding

Funding was also identified as an essential resource needed to improve water quality. This group suggested using cost-share programs as an incentive for producers/landowners to encourage BMP adoption.

While discussing the option of purchasing property to protect water quality and mitigate development pressures, one participant proposed soliciting agencies, preservation groups, or land trusts from outside the watershed who may be interested in purchasing property with the explicit purpose of land conservation and protection. A participant explains:

“The headwater of one of the streams is protected [in a state park]. If they could increase that a little because, especially in the areas up there that are prone to development of houses, roads and everything that comes with that. If that was protected at an earlier point, they might prevent some of that down the road.”

3. Process to Address Issues

A major component of this needs category included the importance of prioritizing watershed needs. This group believed that a process to prioritize needs could address immediate resource concerns through developing a system to rank the importance of additional resource needs in their watershed. One participant explained:

“Which ones are the problems we are dealing with? We’ll have to address it and decide what’s first, second, third, and how you’re going to do that. There’ll be different methods to address different issues.”

This group also believed that prioritizing resource concerns could help create a plan to inform larger goals of watershed management; for example:

“It would be helpful to know what you’re going to work on. [Without priorities] it’s like trying to build a house without a plan.”

Public awareness was another important aspect of this resource needs category. This group emphasized the importance for those who are eligible to be aware of available funding opportunities. Suggestions for outreach included the SWCD website, radio, newspaper, and social media. One participant explained:

“The only thing we can do is let people know that we have money to address these kinds of issues. If they apply, we move forward. If they don’t apply, we sit still.”

4. Resources to Address Issues

According to this group, the next step is to identify resources to address issues that were identified, funded, and prioritized in the previous steps. This group highlighted the importance of technical knowledge and appropriate equipment to accomplish these goals; for example:

“Technical knowledge is needed to identify the issue, but you’re also going to have the knowledge to solve the problems.”

This group also recognized the importance of collaborating and partnering with agencies and universities for technical assistance; for example:

“That’s where some of the agencies and colleges might have the knowledge to be that resource. I think that comes in to help guide you on that scientific side of things and help understand what you’re learning in the first place.”

5. Evaluate Program Success

The final step is an evaluation of the watershed management project. This includes working with scientists to gather data that shows the efficacy of efforts to improve water quality. This group emphasized that this crucial step can justify project investments to funders and the broad watershed community; for example:

“If you do everything right, your scientific evaluation is going to prove to them. I mean, if somebody’s opinion is ‘the water looks better’ but is it?”

Finally, this group believed it is easier to maintain a healthy watershed than to restore one that is impaired. To address this, the group suggested establishing a monitoring protocol to identify water quality impairments before they become a larger issue. By doing so, water quality investments and benefits would be protected; for example:

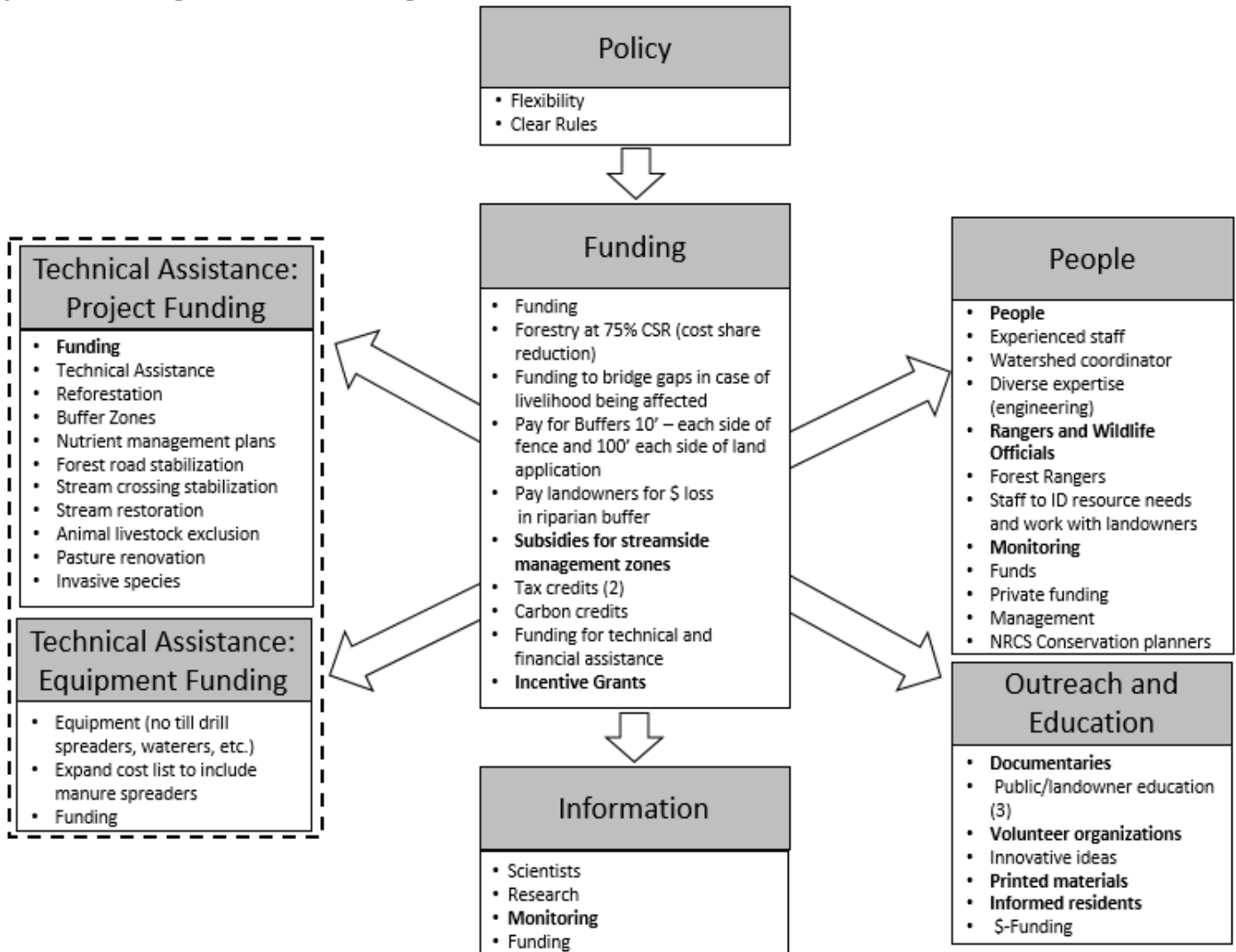
“An ounce of prevention is usually worth a pound of cure. It’s a little late on these, but [we should] protect it before it has a problem.”

Discussion Group 3

Group 3 identified seven major categories and included 49 individual resources needed for successful watershed management (Figure 5). The seven categories included: 1) Policy, 2) Funding, 3) Technical assistance for projects, 4) Technical assistance for equipment, 5) Information, 6) People, and 7) Outreach and education.

This group believed clear and flexible policies should be in place to provide technical and financial assistance for project and equipment needs of producers and landowners in the watershed. Additionally, the group felt that funding should cover costs for staff to inform landowners, producers, and the public about the watershed and watershed management.

Figure 5. Mind map for Discussion Group 3



Bolded resource needs were provided by survey respondents

Policy

This group emphasized the importance of transparent and flexible policies associated with watershed management. The group felt as though flexible policies can ensure interested producers are eligible to participate in various watershed management programs, for example:

“A lot of these programs are best suited for a certain area and maybe things could be a little more flexible to better serve more farmers because everybody has a different situation.”

Funding

Due to the amount of forestland in the watershed, this group discussed ways to maintain forest cover and reduce forestry related contributions to water quality impairments. This group suggested alternative models (i.e., tax credits and carbon credits) that incentivize landowners to maintain forest cover on their property.

This group underscored the importance of a balance between technical and financial assistance. While technical assistance provides boots-on-the-ground services for producers, the group felt it is important for NRCS to fund positions that provide technical assistance. Participants suggested these two types of funding work together to support the same objective of reducing barriers to BMP adoption. Highlighting the interconnected relationship between the two types of funding, one participant explained:

“If you get a lot of financial assistance money and you don’t have the money to pay the staff, your financial assistance isn’t going to go as far. You really need a good balance.”

Additionally, this group discussed reaching out to non-agency organizations and the importance of diversified funding sources. One participant suggested corporate organizations as potential collaborators and sources of funding:

“Try to think outside of who typically comes to the table when you’re looking for money. It may not always be from a government authority or non-profits. It might actually be from manufacturing business. Maybe have them come to the table.”

Technical Assistance: Equipment and Project Funding

This group placed a high priority on the need for technical assistance and emphasized the importance of managing financial risks associated with farm equipment costs (equipment funding). When discussing consequences of out-of-date equipment, a SWCD staff participant described how inadequate equipment could have unintended impacts to water quality:

“I don’t have adequate manure spreading equipment’ – I hear that a lot. [The problem is] how it is land applied. It’s thrown into the creek instead of away from the creek. They can’t control it as well. Everything they have is 25 years old, and it’s rusted out. They need a new manure spreader.”

Another producer discussed the need for additional on-farm infrastructure and the impacts financial assistance can have on a farming operation:

“If you make the farmer buy the new equipment, it would be a burden on the farmer to do it. If they had some kind of financial assistance, even a tax write-off, it would help the farmer buy better equipment.”

In addition to mitigating costs of capital investments, this group identified a need for assistance with BMP implementation. While many BMPs are funded to reduce on-farm contributions to water quality impairments, participants discussed the need for on-farm technical assistance; for example:

“The no-till drill, spreaders, and stuff are a purchase of equipment and capital investment, and the rest of the stuff [we need] is more manpower.”

Information

This needs category focused on the importance of gathering information to quantify water quality impairments and identify potential sources of impairment. This group believed access to this information could inform a plan to address impairments that could achieve water quality goals.

This group suggested increasing in-stream monitoring to quantify specific impairments and identify sources of impairment. A SWCD staff member in the group discussed how this information could be used to target areas, direct program adaptation, and increase the likelihood of improving water quality:

“In our [watershed assessment], that’s the one thing we asked for was to do a baseline on the 288 [stream] segments. Work for three years, then test again. Do I need the money to shift to the middle or to the east? But without lab tests...we don’t know what fecal [levels are] because I can’t look at it.”

Similarly, this group believed that understanding each sector’s contribution to water impairments would help direct their limited resources; for example:

“Someone needs to decide what’s impacting the watershed. Need to categorize it. Is it state roads? What are they contributing? What are the farms doing? What are the loggers doing? What is recreation doing?”

People

Recognizing the benefit of collaboration and incorporating diverse expertise into watershed management, this group suggested working with forest rangers and wildlife officials to monitor forestland erosion. One participant emphasized the need to work with diverse groups towards similar goals:

“We need to get them all in together, just like we’re doing here. We need to bring all the different groups together for the purpose of management.”

Finally, this group identified the need for experienced staff, both NRCS and SWCD. One participant suggested creating clear and accessible pathways to get the experience and credentials needed to provide valuable positions across the state:

“The thing that we're hurting for right now is conservation planners across the state. A lot of the NRCS experience has retired and new people that are coming in, don't have experience with conservation planning. [NRCS] could make it more accessible to become a conservation planner.”

Combined Groups

The following section details overall resource needs that participants identified across each discussion group.

Resources needed for successful watershed management identified by forum participants include the following major themes (Figure 6): 1) Policy/legislation, 2) Monitoring and evaluation, 3) Personnel, 4) Funding, and 5) Community engagement.

Forum participants identified the need for increased political engagement to establish a strong pro-agriculture voice and provide flexible enrollment qualifications. Additionally, they believed increased political engagement can leverage diverse funding to support watershed management, increase staff, and grow community engagement efforts. Finally, participants also identified the need for water quality monitoring and project evaluation.

Figure 6. Combined group resource needs

Policy/Legislation	Funding	Personnel	Community Engagement	Monitoring and Evaluation
<ul style="list-style-type: none"> • Leverage funding • Increase lobbying efforts for pro agriculture legislation/regulation • Stewardship incentive programs • Farmer and Farmland protection • Flexible and transparent rules 	<p>Application</p> <ul style="list-style-type: none"> • Project specific funding • Equipment funding • Prioritization process <p>Diversify funding sources</p> <ul style="list-style-type: none"> • Corporate partnerships • Non-profit partnerships • Funding beyond EQIP 	<ul style="list-style-type: none"> • Long-term staff • Experienced staff • Diverse expertise • Enthusiastic leadership • Watershed Coordinator • Conservation Planner 	<ul style="list-style-type: none"> • Watershed Champions • Community support • Volunteer organizations • Landowner and general public education • Willing landowners • Industry • Downstream water users 	<ul style="list-style-type: none"> • Monitoring • Share results • Scientists • Documented on-farm economic impacts • Interagency coordination • 3rd Party water quality/quantity monitoring

Policy/Legislation

Participants highlighted the importance of increased engagement in agricultural policy development at the local, state, and federal levels. Participants believed that an established pro-agriculture voice in governing bodies could give producers a political voice, work towards clear and flexible regulations, and leverage funding for agricultural related initiatives.

Funding

Participants underscored the importance of stable funding for technical and financial assistance and suggested leveraging relationships in the community to pursue diverse funding sources. Participants also highlighted the need for a transparent process to prioritize available funding.

Personnel

Participants identified the need for long-term staff to provide diverse expertise in the watershed and believed enthusiastic leadership is important to relationship development. Participants believed that personnel play a key role in increasing BMP adoption and the overall success of watershed management.

Community Engagement

Participants recognized the necessity of an engaged community who cares about watershed health and who is willing to contribute to its improvement. Participants reiterated that enthusiastic leadership and effective personnel can foster this type of community engagement.

Monitoring and Evaluation

Finally, participants expressed the need for water quality monitoring resources (expertise and equipment) to evaluate the success of watershed management. They felt that with monitoring and evaluation results managers could adapt programs, increase the likelihood of watershed management success, and gain a better understanding the economic impacts of BMP adoption.

3.1.4 Elements of Successful Outreach and Education

Recipients

Forum participants identified three stakeholder groups as targets for outreach and education, including 1) potential practice adopters, 2) general public, and 3) local legislative leadership.

Potential practice adopters

Participants primarily discussed increasing outreach to agricultural producers and trade organizations (e.g., cattlemen's association), as successful watershed management is contingent on buy-in from these stakeholder groups. They suggested targeting regional industries (e.g., livestock production, forestry industries) and highlighted the importance of working across industry supply chains to raise awareness of sector-specific BMPs; for example:

“Industry has to get behind us. It's a lot easier for them to say [to their contractors or buyers], ‘You need to go to this meeting.’ They'll go to the meeting because they're afraid they'll get cut out [if they don't go]. Or, the guy down the road is going to know something they don't. It wouldn't hurt their employees to start monitoring water quality.”

General public

Participants identified the general public as essential targets for outreach and education. The general public included a wide variety of resource users including homeowners, outdoor recreationists, school children and educators, as well as others who benefit from a healthy watershed. This stakeholder group also encompassed those who may not be aware of their impact or what they can do to improve their watershed.

Elected officials and community leaders

This stakeholder group included county planners and commissioners, school superintendents, and other elected or appointed officials. Forum participants identified this group as an important target for outreach and education because of the power and influence they have in the community. Participants felt that well informed officials and community leaders could garner public support and influence public opinion at a local level.

Content

Sector-specific impacts and BMP awareness

Participants believed the fundamental message to each stakeholder group should be similar, but tailored to address the specific interests of each group. They agreed that stakeholder groups can be unaware of their contribution to the watershed. It is important for each message to communicate the benefits of a healthy watershed, what impacts watershed health, and what can be done to improve it; for example:

“The first thing is you have to show whoever it is you're making the presentation for how [improving water quality] benefits them.... You make a specific presentation to the Cattlemen, you go to the building contractors and you make a presentation to them, and it's a specific presentation to address their situations.”

Participants also suggested other examples including a targeted message to homeowners that promotes methods of proper disposal of household waste, and a message to contractors or industries that raises awareness of sector-specific BMPs and regulations related to water quality.

Where to find available resources

Forum participants highlighted the importance of potential adopters to be aware of, and know where to find available resources. To increase producer and landowner awareness of cost-share programs available through state and federal agencies, a forum participant suggested hosting an “interagency open house” to facilitate connections, build relationships, and show potential adopters where to find information about available resources.

Promote the value of a healthy watershed

Forum participants recognized the importance of educating the general public about the benefits of a healthy watershed and believed promoting those benefits could build broad public support. Participants suggested organizing interactive events to showcase the watershed, such as fishing competitions and river floats. One participant explained:

“Something that has worked in urban areas is a one-day River Festival. The state park could be the venue and [you could] talk about what a watershed is, have your bluegrass bands playing and raise a little local money. [If you] get people out using the river, they will see the value of the river in their life.”

Delivery

Personal interactions

When targeting potential adopters, forum participants acknowledged that one-on-one interactions between NRCS and producers have proven to be an effective method to increase enrollment in cost-share programs; for example:

“One avenue that we’ve used here is just personal contact with people we’ve known in the watershed for years. We know all the things they need on their farms, and it gives us an opportunity to get out there and get them their cost-share. We give them a phone call or a visit and just ask them what they need on their farms. They’ll open up to us because we have that relationship with them, have had for years. A lot of folks won’t go to a meeting, they won’t go to a community function, and some of them are skeptical of the government. Those many, many years of personal contact and farm visits do a whole lot for us.”

Participants believed that one-on-one interactions between NRCS and producers can have an impact on peer-to-peer interactions as well. As resource managers develop working relationships with producers enrolled in cost-share programs, participants noticed that enrolled producers often became a resource for peer-to-peer information sharing. As unenrolled producers learn from the experiences of enrolled producers, their willingness to enroll may increase; for example:

“So us going through landowners that trust us, those landowners, what they say to [unenrolled landowners] and what he sees on their farms, brings them in. It may take a year to do, but when they see it and hear good things about it from their neighbors, the guys they know and trust, well, then they’ll come back [to us].”

Promote success stories

Participants agreed that promoting a positive message through success stories is central to successful education and outreach. Success stories are important for the general public and local legislative and community leaders in order to maintain a solid base of public support, but also important for producers and landowners who are actively working to improve watershed health. Highlighting the tourism economy in the county, participants stressed the importance of positive messaging for the local community and tourists alike; for example:

“Tourism is a big thing in this county and we don’t want to be talking about how bad our rivers are if we want people to come and participate...so we talked about putting displays in public buildings where [the public] can learn what a good, pristine river or stream is and how important it is to have those. We don’t want to just talk about the negative parts because tourism is important here in this county. We don’t want to talk about all our streams being bad. So we thought we’d take the positive approach and show good qualities that we should strive to have.”

BMP Farm tours

Forum participants discussed how potential adopters, the general public, and legislative and community leaders can all benefit from a tailored farm tour, specific to their interests. These types of events could be an interactive opportunity to show potential adopters BMPs in action, the general public how a farm operations works, and community leaders the importance of continued support of agriculture and watershed management projects. One participant explained:

“Get the producers out there to see BMPs in action, so they’re not scared of them. Get the [public] out there so they can do an ‘ask-the-farmer’ kind of day, so they feel more comfortable about where their food comes from. Then get your legislators, leadership out there, they’re the ones that will eventually write the checks.”

Social media engagement

Although participants acknowledged that social media does not reach the entire target audience in the watershed, they agreed that it is an excellent platform to reach a broad younger audience as well as a new generation of producers who may be looking for additional resources or information; for example:

“A lot of the reason I’m involved with some of the younger farmers in this county is Facebook. They’ll get in some kind of group like there’s one about regenerative farming. You’ve got someone who really cares about regenerative farming and they need information because they may be first-generation farmers.”

Integrate conservation programming into the existing school curriculum

The current conservation education program used to educate school children is an independent program, not included in the existing curriculum. Forum participants supported integrating soil and water conservation ethics into the current school curriculum. To facilitate this process, one participant suggested partnering with local educators to create a conservation curriculum that aligns with state education requirements:

“I would love to see somebody coordinate what we put out for [education programs] to meet what the state wants taught, so we’re not wasting that teacher’s time out of the classroom, and we’re meeting the goal that they need.”

This type of education could reinforce conservation ethics for future generations and expose parents to information as well; for example:

“The teachers need to know what to tell their students. We could even have classes drawn up to where students have to participate and realize what needs to be done in the county to keep our soil and our water safe.”

3.2 Interagency Partner Interviews

In January and February of 2018, an NRSS researcher interviewed representatives from NCDEQ and US EPA Region 4 to investigate their role in NWQI, NRCS's role as a local partner in watershed management, and resources needed for successful watershed management and outreach (Appendix D for interview guide).

3.2.1 North Carolina Department of Environmental Quality

NCDEQ's role in NWQI includes coordinating priority watershed site selection with NRCS, contributing 319 funds, and managing water quality monitoring in targeted watersheds. NCDEQ acknowledged that the NWQI's focus on targeted watersheds works towards the common goal to improve water quality and leverage funding for targeted watersheds. Additionally, NCDEQ sees potential to improve interagency relationships within the framework of NWQI. NCDEQ also reported the watershed assessment as another beneficial element of the NWQI, as it can be used to leverage federal funds.

Challenges associated with the NWQI include lack of transparency regarding locations of implemented BMPs in targeted watersheds. NCDEQ reported water quality monitoring as their primary role in the NWQI and stressed the importance of accurately placed monitoring sites. To show a measurable change in water quality over time and quantify the impact of BMPs in NWQI watersheds, location data is needed. The reported lack of BMP location data inhibits their ability to effectively monitor water quality and measure impacts of the NWQI. Another reported challenge is a lack of coordination between NRCS and NCDEQ regarding site selection of NWQI watersheds. While NCDEQ reports improved coordination, they emphasized the importance of working with NRCS to ensure selected watersheds are eligible for access to federal funds.

NCDEQ believes that successful watershed management depends on citizens and producers taking ownership of the watershed, understanding watershed benefits, and being aware of how their actions impact the watershed. To accomplish this, federal, state, and local agencies need to put forth a coordinated effort to distribute technical services, promote available resources, and ensure the public is receiving a consistent message from all agencies involved.

3.2.2 US EPA Region 4

Reported by representatives from US EPA Region 4, their primary role in NWQI is to reduce agriculturally based water impairments by facilitating intentional placement of technical and financial resources in high priority watersheds. The US EPA works to develop strong interagency relationships (NCDEQ, NRCS, SWCD) and provides state water quality agencies with technical, programmatic, and administrative support to document water quality improvements.

The US EPA believes the NWQI moves NRCS away from "random acts of conservation" and uses resources from multiple agencies to promote a targeted approach to watershed management. The collaborative nature of the NWQI allows the three agencies (US EPA, NRCS, and NCDEQ) to identify strengths and weaknesses, then highlights areas where additional resources are needed. Furthermore, the non-regulatory nature of NRCS helps to develop trusted working relationships with landowners and allows US EPA and NCDEQ to be a partner in watershed management, as opposed to a regulatory threat. Although the US EPA reports that NRCS has increased multiyear investments and funding consistency in priority watersheds, they cite continuing challenges associated with funding stability and coordination across agencies.

The US EPA Region 4 representatives believe successful watershed management entails documenting water quality improvements and providing evidence that project investments have a positive impact on water quality. Regarding public outreach and communication, the US EPA underscores its importance and requires a public information and education component in the documents needed to receive US EPA funding. Additionally, they emphasized the importance of a tailored outreach plan that communicates intended outcomes of a project. Furthermore, the US EPA believes that specific stakeholder concerns should be addressed and opportunities for meaningful public comment should be made available. Finally, the US EPA stressed the importance of face to face communication and promoting success stories to increase public support.

4 Recommendations

The NRSS research team developed the following recommendations through the synthesis of the stakeholder forum conducted in Wilkes County, NC on January 30th, 2018 and the interagency partner interviews conducted in early 2018. This section provides recommendations to NRCS and Wilkes County SWCD.

4.1 NRCS

1. Increase NRCS staff in priority watersheds to support the technical needs of NWQI

We recommend NRCS dedicate additional staff resources to NWQI priority watersheds for the duration of targeted funding.

Forum participants believe that staff availability directly impacts successful watershed management and that producers and landowners rely on NRCS for technical and financial assistance to achieve watershed improvement goals. As federal agencies reduce funding for permanent staff, they lose valuable technical expertise. While remaining staff can administer programs, they have less time to provide technical assistance for landowners and producers. With limited staff resources spread across multiple counties, time spent developing and maintaining working relationships suffer.

In the Roaring River watershed, for example, the only NRCS staff is a Soil Conservationist who is responsible for four additional counties. The Wilkes SWCD Watershed Coordinator is a retired NRCS District Conservationist whose position was not filled upon his retirement. Without the support and established rapport of the SWCD's Watershed Coordinator, forum participants agree that NRCS would not have the well-established relationships with landowners and producers they currently have.

2. Build and maintain working relationships with landowners and producers

We recommend NRCS provide resources to support and maintain a position for managing relationship development in the watershed.

Throughout the forum, participants emphasized the value of strong working relationships between producers, landowners, and resource managers in the Roaring River watershed. Participants believed that project success (i.e., voluntary adoption of BMPs) depends on these established relationships.

From his experience as an NRCS District Conservationist, the SWCD's Watershed Coordinator has developed trusted relationships with the community over time. These relationships play an essential role in providing the technical and financial assistance needed to improve water quality in the Roaring River watershed. Currently supported by a year-long grant from the North Carolina Foundation for Soil and Water Conservation, this critical position is in danger of losing funding.

3. Increase coordination with NCDEQ to ensure water quality monitoring and improve priority watershed selection

We recommend NRCS coordinate priority watershed selection with NCDEQ and increase specificity of BMP location data shared with NCDEQ to meet their monitoring needs.

Transparent information exchange between local, state, and federal agencies is important to evaluate the impacts of NWQI in targeted watersheds. While NCDEQ acknowledged the importance of confidentiality in BMP location data, they require more specific information to guide appropriate placement of water quality monitoring resources. Furthermore, increased communication with NCDEQ in priority watershed selection could also increase water quality monitoring resource contributions from NCDEQ.

4.2 Wilkes County SWCD

1. Communicate results and project progress

We recommend Wilkes County SWCD and local NRCS communicate project progress to landowners, producers, and the general public to increase public understanding of watershed impairments and impacts of NWQI funded BMPs have in their watershed.

Throughout the forum, participants expressed the desire for project updates and discussed a lack of understanding of water quality impairments affecting the Roaring River watershed. Although a measurable change in water quality may take years to document, participants conveyed the need for more technical updates.

2. Host an interagency open house

We recommend Wilkes County SWCD and local NRCS organize an event to promote public and private opportunities for diverse types of technical and financial assistance.

Private organizations, as well as local, state, and federal agencies, provide a variety of technical and financial resources to assist landowners and producers in adopting BMPs on private lands. An event that brings organizations and agencies together to promote available technical and financial resources could inform landowners and producers as well as increase interagency collaboration.

During the forum, participants identified an information gap regarding available resources for forest landowners. With forested land as a major land use and timber harvesting practices identified as a water quality concern (Roaring River Watershed Assessment), it is essential for eligible participants to be aware of technical and financial resources available to them.

3. Promote forestry related NRCS programs and establish relationships with forest landowners

We recommend Wilkes County SWCD, and local NRCS develop relationships with forest landowners and distribute information to increase awareness of their eligibility to participate in various cost-share programs.

Technical and financial resources available through NRCS for forestry-related BMPs are largely unknown to foresters and forest landowners in the Roaring River watershed. As forestry is a dominant land use in Wilkes County, increased promotion of forestry-related technical and financial assistance would benefit forest landowners and address water quality issues related to forestry practices.

4. Create tailored messaging for outreach and education targets

We recommend Wilkes County SWCD create tailored outreach material for various groups in the watershed that emphasize their specific interests and involvement in water quality improvement and awareness.

To maintain political and community support of watershed management at the local level, resource managers can work with partner organizations to expand outreach to local industry and educate elected officials on the importance of conservation. Although targeted conservation initiatives are important for successful watershed management, it is also important to maintain a base level of public support for conservation efforts.

5 Updates: Roaring River watershed

In March, 2019, an NRSS researcher returned to Wilkes County to present results of the Roaring River watershed forum outlined in this report. The researcher met with Wilkes County SWCD to discuss forum results and project progress, then presented results to producers and community members at a public meeting. The following is a summary of information discussed during the return visit.

Project Updates

Of the five water quality concerns identified in the Roaring River Watershed Assessment, Wilkes County SWCD indicated that streambank destabilization requires the most immediate attention. To address this resource concern, NWQI currently funds streambank restoration at 75-90% cost-share. Most participants are eligible for 75% cost-share, while only a select few are eligible for 90% cost-share. Due to significant costs associated with stream restoration, Wilkes County SWCD requests NRCS provide 90% cost-share to *all* participants in the Roaring River watershed. To achieve water quality goals, all five resource needs must be addressed. Offering 90% cost-share to all participants will lessen participant's out-of-pocket expense and increase the likelihood of adoption.

Producer participation

Wilkes County SWCD emphasized the importance of relationship building and believe that focusing on one-to-one interactions will result in additional practice adoption. With participation from previously engaged producers, they are hopeful that the initial round of adopters will promote practices and available resources to their peers. Wilkes County SWCD has increased outreach and communication efforts throughout the watershed to promote resources available through NWQI, but have reportedly not engaged many new participants. Although they have experimented with different outreach methods (i.e., radio advertisements for public meetings), their efforts have not resulted in recruiting new participants.

Previous to NWQI, NRCS cost-share funding for forestry-related practices in the Roaring River watershed was highly competitive and not a reliable resource for forest landowners in Wilkes County. As a result, the forestry sector has had limited interaction with NRCS. With the increased availability of cost-share for forestry-related practices, Wilkes County SWCD has increased engagement with forestry contractors and forest landowners to raise awareness of forestry-related resources available through NWQI.

Interagency Collaboration

The Roaring River has been removed from the 303(d) list and is no longer eligible to receive 319 funds from NCDEQ to assist with water quality monitoring. Before the Roaring River was delisted, Wilkes County SWCD was working with NCDEQ to establish BMP effectiveness monitoring, but without access to 319 funds, water quality monitoring can no longer occur in the watershed.

Wilkes County SWCD highlighted the importance of local conservation staff to have strong working relationships with federal and state partners (NCDEQ and state-level NRCS). Wilkes County SWCD believes frequent staff turn-over (in NCDEQ and NRCS) has a negative impact on interagency coordination and potential success of watershed management. If vacant positions are staffed, new employees need time to understand project needs and build relationships with local conservation staff. If positions are not filled, responsibilities are often delegated to multiple people. This situation creates confusion and limits communication between agency staff.

Leveraged Resources

Wilkes County SWCD has developed partnerships with local and regional entities who help support essential staff positions. For example, the watershed coordinator is a part-time position, funding through Wilkes County and the student intern working with the watershed coordinator is the product of a partnership with Appalachian State University. The student intern is from Wilkes County and plans to work for Wilkes County SWCD after their degree is completed. Both of these staff positions are the results of effective partnerships and are essential components for successful watershed management in the Roaring River watershed.

6 References

Brown, S. R. (1993). A primer on Q methodology. *Operant subjectivity*, 16(3/4), 91-138

Wilkes Soil and Water Conservation District. (2018) Wilkes National Water Quality Initiative; East and Middle Prong of Roaring River

“National Water Quality Initiative.” Natural Resources Conservation Service, 2018,
www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/initiatives/?cid=stelprdb1047761

Appendix A: Survey Methods

This appendix describes the development, data collection, analysis, and results of the Roaring River watershed survey (Figure A-1).

Development

The NRSS research team developed a survey to identify stakeholder priorities, suggestions for successful watershed management, and elements of successful watershed outreach and education (Figure A-1). The survey was designed to incorporate stakeholder responses into forum activities.

Data Collection

Wilkes County SWCD provided the NRSS lab mailing and email addresses for stakeholders invited to participate in the watershed forum. Approximately two weeks before the forum the NRSS research team sent a total of 43 surveys (39 mail, 4 email) to invited participants. No survey reminders were sent to those who did not respond.

Respondents who received the email survey were provided a link to take the online version of the survey, administered by Qualtrics, an online survey software (Qualtrics, Provo, UT). Respondents who received the survey via US Postal Service, were provided a pre-stamped and addressed envelope to return the survey to the NRSS lab as well as a link to the online version of the survey. Online and hardcopy versions of the survey were identical.

Additional information collected from the survey include 1) involvement in Roaring River watershed planning, 2) who recipients receive watershed related information from, and 3) preferred method(s) to receive watershed management related information. This information was not used in the forum activities and therefore not included in this report.

Analysis

Survey response rate was calculated by dividing the total number of completed survey responses by the total number of surveys sent. Survey questions incorporated into the forum included four open ended questions (Table A-1). One NRSS researcher analyzed survey responses by identifying emerging themes in MS Excel.

Table A-1. Survey questions used in forum activities

Survey Question (Q#)	Survey Question (text)
Q4	In your opinion, what does successful watershed management look like?
Q5	In your opinion, what resources are needed for successful watershed management implementation?
Q6	In your opinion, what are key elements of successful watershed outreach and communication?
Q7	In your opinion, what resources are necessary for successful watershed outreach and communication?

Results

Of the 43 surveys sent, a total of 7 surveys were completed (4 mail, 3 online), for a final response rate of 16.2% (Table A-2). Most respondents identified as community members (Table A-3).

Table A-2. Response rate

Completed (n)	Sent (n)	Response Rate (%)
7	43	16.2

Table A-3. Respondent stakeholder type

Stakeholder type	Frequency (n)	%
Community member	5	71.4
Producer or landowner	2	28.6

Survey responses to the four open ended questions (Q4, Q5, Q6, and Q7) were incorporated into the watershed priority activity as individual priorities. Derived from Q4, Q5, Q6, Q7 emergent themes, five priorities were incorporated into the watershed priority activity including priority numbers 1, 5, 7, 14 and 30 (Appendix B, Table B-1).

Survey responses to Q5 were incorporated into the resource needs activity as examples. Derived from Q5 emergent themes, 10 resource needs were provided to each group as examples, including:

- Documentaries
- Funding
- Incentive grants
- Informed residents
- Monitoring
- People
- Printed material
- Rangers and wildlife officials
- Subsidies for streamside management zones
- Volunteer organizations

Survey responses to Q6 and Q7 were incorporated into the outreach and education activity as examples. Derived from Q6 and Q7 emergent themes, 7 elements of successful outreach and education were provided to each group as examples, including:

- Signs posted about the watershed
- Videos
- Educate about soil and water conservation
- Listen and work with responsible parties
- Show extremes of watershed management (good and bad)
- User friendly website
- Educate school children and college students

Conclusion

Survey information gathered from recipients and incorporated into the forum include 1) stakeholders' priorities for successful watershed management, 2) resource needs for successful watershed management, 3) elements of a successful watershed outreach and education, and 4) resources needed for successful watershed outreach and communication

The following open ended survey questions were incorporated in the watershed forum activities:

Activity	Survey question(s)	Format in forum
Identify Watershed Priorities	Q4, Q5, Q6, Q7	Priority statement
Identify Resource Needs	Q5	Resource need on 5x7 sticky note
Identify Elements of Successful Watershed Outreach and Education	Q6, Q7	Examples on a pre-populated flip chart

Figure A-1. Roaring River watershed survey

Watershed Management Forum
Your Views on Watershed Management and Communication

Thank you again for helping us understand your perspective on watershed management and your opinions on how NRCS can be an effective local partner. The information you provide will help inform future watershed work as well as funding and technical assistance for local conservation efforts in North Carolina and across the US.

Watershed Management Forum
Your Views on Watershed Management and Communication

General Information

1. Please indicate your primary role in the Roaring River watershed (check one):

<input type="checkbox"/> Community member	<input type="checkbox"/> Producer
<input type="checkbox"/> Local government staff	<input type="checkbox"/> Research scientist
<input type="checkbox"/> Natural Resources Conservation Service staff (NRCS)	<input type="checkbox"/> Soil and Water Conservation District staff (SWCD)
<input type="checkbox"/> Non-governmental organization staff	<input type="checkbox"/> Other: _____

2. Are you aware of watershed planning in the Roaring River watershed?

No, I am not aware of watershed planning in the Roaring River watershed.

Yes, I am aware of watershed planning in the Roaring River watershed, but I am not currently involved.

Yes, I am aware of watershed planning in the Roaring River watershed, and I am currently involved.

3. If you are involved in watershed planning in the Roaring River watershed, how are you involved?

Watershed Management

4. In your opinion, what does successful watershed management look like?

5. In your opinion, what resources are needed for successful watershed management implementation?

Watershed Communication

6. In your opinion, what are key elements of successful watershed outreach and communication?

7. In your opinion, what resources are necessary for successful watershed outreach and communication?

8. From whom do you receive information about watershed management in the Roaring River watershed? (check all that apply)

<input type="checkbox"/> Extension agent	<input type="checkbox"/> Wilkes SWCD (Soil and Water Conservation District)
<input type="checkbox"/> NC Department of Environmental Quality	<input type="checkbox"/> Your crop advisor
<input type="checkbox"/> NRCS (Natural Resources Conservation Service)	<input type="checkbox"/> Your peers
<input type="checkbox"/> Social media (Facebook, Twitter...)	<input type="checkbox"/> Other: _____

9. Please indicate how you prefer to receive information about watershed management in the Roaring River watershed (check all that apply):

<input type="checkbox"/> Email	<input type="checkbox"/> Phone call
<input type="checkbox"/> Letter	<input type="checkbox"/> Public meeting
<input type="checkbox"/> Newspaper	<input type="checkbox"/> Website
<input type="checkbox"/> Personal conversation	<input type="checkbox"/> Other: _____

Please feel free to let us know any other thoughts or comments you may have about watershed planning, management or communication below.

If you have any questions or concerns regarding this survey or the upcoming forum, please contact Linda Prokopy at (765) 496-0260 or l.prokopy@purdue.edu

This page is intentionally left blank

Appendix B: Watershed Priorities - Additional Methods

Development

The NRSS lab developed 36 priority statements to represent a wide range of watershed priorities for this watershed priority activity. Statement development was informed by two data sources, current literature about successful watershed management (Borisova, Racevskis & Kipp, 2012; Church & Prokopy, 2017; Druschke & Hychka, 2015; Focht, 2002; Osmond et al., 2012; Schall et al., 2018; Steelman & Maguire, 1999) and input from stakeholders in the Roaring River watershed.

Researchers reviewed content that addressed successful planning, design, marketing, and delivery of watershed initiatives. To gather information from watershed stakeholders, researchers incorporated voices of stakeholders in the Roaring River watershed by adapting survey responses to the question, “What does successful watershed management look like?” (see Appendix A for more detail). Each statement was assigned one of 11 priority categories, based on the subject of the priority (Table B-1).

Table B-1. Priority by categories

Priority Category	PN	Priority
Biological Integrity	5	Land and water should have species diversity.
	21	Water monitoring is necessary.
	22	Achievable water quality goals and targets should be set to show water quality improvements.
	29	Watershed managers should focus on water quality issues over water quantity issues.
	34	Measurably cleaner water should be an outcome.
	36	The watershed needs to be in an impaired or degraded state.
Knowledge/Education	1	Landowners/producers should know what best management practices are and why they should be used.
	7	Students (elementary through college) should understand the importance of soil and water conservation.
	12	The public needs to understand how a healthy and balanced watershed can benefit them.
	17	Watershed stakeholders need to understand the sources of water resource issues.
	23	The public should be aware of the range of resource issues associated with their watershed.
Outreach	11	Watershed managers should actively engage with the community.
	13	Funding should be budgeted specifically for outreach and communication.
	15	A strong working relationship between producers/landowners and watershed managers is important.
	16	One-on-one interactions between resource managers and producers/landowners is necessary.
	25	Watershed managers should seek out and respect local knowledge, perspective, and experience.
Watershed Planning	4	A watershed plan is necessary.
	19	A management plan should support activities that include recreation, economic and environmental benefits.
	24	A clear plan for public involvement/engagement should be included in a watershed management plan.
	26	There should be a flexible plan that allows for changes in management over time.
	32	Watershed management should include an evaluation of the impact of climate change.
Stakeholder Concern	2	Addressing concerns of local watershed stakeholders should be the highest priority for resource managers.
	10	No stakeholders’ livelihoods should be jeopardized due to watershed management activities.
	27	Negative effects of watershed management on downstream stakeholders should be minimized.
	31	Watershed management should benefit my community and communities downstream of my watershed.
Communication	14	Watershed information should be communicated using diverse methods and reach a broad public audience.
	20	Communicating about soil health is more effective than communicating about water quality.
	30	The watershed should have a user-friendly website that contains watershed information.
Inclusion	18	The watershed planning process should include diverse groups of people working towards a common goal.
	33	Community members should take an active role in watershed management.
Agency Collaboration	9	Only local organizations should be involved.
	28	Resources and information between local, regional, state, and federal agencies should be coordinated.
Assistance	3	Technical and/or financial assistance for those who qualify is necessary.
	8	Conservation practices should be adopted on more acres.
Regulation	35	Producers/landowners/businesses should be required to adopt best management practices.
Geographic Scale	6	Management should be done at a small geographic scale.

Data Collection

Upon arrival to the forum, NRSS facilitators explained the watershed priority activity and provided participants with additional written instructions (Figure B-2), 36 priority statement cards, a datasheet (Figure B-3), and a list of all 36 priorities for reference. The activity included three stages: 1) ranking, 2) open discussion, and 3) group discussion. Each stage is described below:

Stage 1: Priority ranking

Facilitators instructed participants to read and rank each priority according to how much they believed each statement was necessary for successful watershed management. Each priority statement included the phrase “For successful watershed management in this watershed...” and was then followed by one of the 36 priorities (e.g., “For successful watershed management in this watershed...a watershed plan is necessary”). Participants were given approximately 20 minutes to record their ranked priorities onto the datasheet. Participants ranked priorities on their data sheet by level of agreement with each priority (most disagree = -5 to most agree = 5). Facilitators were available to answer questions as needed.

Stage 2: Open discussion

Each of the 36 priorities were printed on an 8½ x 11 sheet of paper and displayed at the front of the room. After completing stage 1, participants were provided three green stickers and three red stickers then asked to place green stickers on their top three priorities and red stickers on their lowest three priorities. As participants placed green and red stickers on the large priorities, similarities and differences of stakeholders’ ranked priorities were visually displayed (Figure B-1). To initiate the open group discussion, the lead facilitator asked volunteers to share their top priority and explain their rationale to the group. After approximately 10 minutes of open discussion, participants moved into preassigned small groups.

Figure B-1. Open discussion display of high and low watershed priorities



This photo displays high (green stickers) and low (red stickers) priorities. This visual representation of broad agreement and disagreement amongst forum participants was used to facilitate the open group discussion

Stage 3: Small group discussion

Small groups were predetermined by the research team to ensure diversity of stakeholder types in each group. Each group included seven to nine forum participants, a group facilitator (NRSS), and a note taker (WaterComm). For approximately 45 minutes, participants shared their high and low ranked priorities, then discussed rationale for their priority rankings.

At the conclusion of the small group discussion, the NRSS research team collected datasheets from each participant and input them into PQMethod software (v. 2.35) at a later date. Large and small group discussions were recorded and transcribed by TranscribeMe, an audio transcription service.

Analysis

Only completed priority ranking datasheets were included in analysis. Completed datasheets were defined as sheets with all 36 priorities ranked and only ranked once.

Family Selection

An NRSS researcher conducted a factor analysis using principal component method with Varimax rotation in the PQMethod software (v. 2.35) to identify similarities between participants' priority rankings. The NRSS researcher used the following criteria to identify priority families (i.e., factor groups).

- Eigenvalue >1 (according to the Kaiser criterion)
- Participants in each family ≥ 3

The PQMethod software then created a priority framework for each factor selected by the NRSS researcher. Each priority framework included the following:

- Priority value (PV): Value assigned to each watershed priority based on priority rankings within each priority family. These values reflect the participants' attitude in that family toward each priority. PVs range from -5, indicating a low priority, to 5, indicating a high priority.
- Distinguishing priorities (DP): Uniquely ranked priorities from each priority framework. These priorities highlight distinct viewpoints that differentiate the priority families from each other.
- Consensus priorities (CP): Similarly ranked statements in all priority frameworks. These statements highlight broad agreement across all priority families.

Narrative Development

The NRSS researcher reviewed each priority framework and identified relevant DPs from each priority framework. If PQMethod identified a DP that was not a high ($PV \geq 3$) or low priority ($PV \leq -3$), the PV was compared across all priority families.

Additional DPs incorporated into priority narratives include:

- DPs identified in only one priority family,
- Only DPs with the highest and lowest PVs, if identified in all priority families,
- Only when the absolute value of PVs was ≥ 3 compared to other priority families

Reference

- Borisova, T., Racevskis, L., & Kipp, J. (2012). Stakeholder Analysis of a Collaborative Watershed Management Process: A Florida Case Study 1. *JAWRA Journal of the American Water Resources Association*, 48(2), 277-296.
- Church, S. P., & Prokopy, L. S. (2017). The influence of social criteria in mobilizing watershed conservation efforts: A case study of a successful watershed in the Midwestern US. *Land Use Policy*, 61, 353-367.
- Druschke, C. G., & Hychka, K. C. (2015). Manager perspectives on communication and public engagement in ecological restoration project success. *Ecology and Society*, 20(1).
- Focht, W. (2002). Assessment and management of policy conflict in the Illinois river watershed in Oklahoma: an application of Q methodology. *International Journal of Public Administration*, 25(11), 1311-1349.
- Osmond, D., Meals, D., Hoag, D., Arabi, M., Luloff, A., Jennings, G., ... & Line, D. (2012). Improving conservation practices programming to protect water quality in agricultural watersheds: Lessons learned from the National Institute of Food and Agriculture–Conservation Effects Assessment Project. *Journal of Soil and Water Conservation*, 67(5), 122A-127A.
- Schall, D., Lansing, D., Leisnham, P., Shirmohammadi, A., Montas, H., & Hutson, T. (2018). Understanding stakeholder perspectives on agricultural best management practices and environmental change in the Chesapeake Bay: AQ methodology study. *Journal of Rural Studies*, 60, 21-31.
- Steelman, T. A., & Maguire, L. A. (1999). Understanding participant perspectives: Q-methodology in national forest management. *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management*, 18(3), 361-388.

Roaring River Watershed Management Forum

Session One: What is Successful Watershed Management?



In this activity you will be asked to sort 36 cards in order of your agreement with each statement. Each card contains a statement from forum participants and current literature that describes necessary elements for successful watershed management. This activity should take approximately 30 minutes.


1. Read each of the 36 statement cards and consider to what extent you agree or disagree with the statement.
2. Organize the statement cards into 3 piles based on whether you agree, feel neutral or disagree with the statement.
3. Examine the score sheet on the opposite page. Notice there are 36 boxes in 11 columns ranging from *Most Disagree* in column -5 to *Most Agree* in column 5. When complete, you will have sorted your statements into columns that exactly match those on the score sheet.




4. Re-read each statement in your "agree" pile and decide which 1 statement you most strongly agree with.
5. On the score sheet, write the number associated with your chosen statement in the furthest right column, labeled "Most Agree".
6. Continue ranking the remaining statements and transcribe the numbers on the score sheet.

Figure B-3. Watershed priority datasheet

For successful watershed management in this watershed...



The number on the statement card is the number you will write on the score sheet below.



Most Disagree	-5	-4	-3	-2	-1	0	1	2	3	4	5	Most Agree

Score Sheet

Most Disagree	-5	-4	-3	-2	-1	0	1	2	3	4	5	Most Agree

Once you have finalized your ranking, please fill out the questions on the back on the score sheet.

1. Please indicate your primary role in the Roaring River watershed (check one):

<input type="checkbox"/> Community member	<input type="checkbox"/> Producer or landowner
<input type="checkbox"/> Local government staff	<input type="checkbox"/> Research scientist
<input type="checkbox"/> Natural Resources Conservation Service staff (NRCS)	<input type="checkbox"/> Soil and Water Conservation District staff (SWCD)
<input type="checkbox"/> Non-governmental organization staff	<input type="checkbox"/> Other: _____

2. If applicable, please list any conservation practices you currently use on your property:

3. Years of experience with watershed management:.....

4. How many years have you lived in the Roaring River watershed?.....

5. In what year were you born?

6. What is your gender?

Thank you for your time and participation.

Please write down any additional comments below:

This page is intentionally left blank

Appendix C: Facilitator Guide

Identify Watershed Priorities

We will start with a full group activity and discussion. About half an hour before lunch, we will break into small groups. Probing questions to ask in the small groups. Note: some of these may already have been discussed in the open group:

- What is the role of planning in watershed management? Specifically, what is the role of the plan in this watershed?
- What is the best role for NRCS in small watersheds?
- What is the ideal scale for watershed management? (HUC 12, bigger?)
- What is success in watershed management? How can this be measured?
- What elements of successful watershed management were missing from the statements you sorted?

Identify Resource Needs

Lead facilitator will provide the directions for the activity.

- When people bring their post-it notes to your wall, ask them to arrange them with other similar post-its.
- Group the post-its and create labels for the categories.

Ask:

- Does everyone agree that these are necessary categories of resources?
- What resources are missing?
- Which resources are most important?

Activity 3: Identify elements of successful outreach and education

Facilitate a small group discussion using the following questions:

- Who should deliver education and outreach? Who are trusted partners?
- What should education and outreach look like?
- When should it happen?
- What is the role for NRCS in this?

In last 10 minutes

Ask the group to select top 3 things they want to share with the entire group

Appendix D: Interview Guide

1. What is your role in EPA/NCDEQ?
2. What role does EPA/NCDEQ play in NWQI?
3. What role does EPA/NCDEQ play in the Roaring River watershed?
4. What resources does EPA/NCDEQ contribute to NWQI?
5. What resources does NRCS contribute?
 - a. Is anything missing? If so, what additional resources would you like NRCS to contribute?
6. Does NWQI impact interagency collaboration?
7. What is the biggest challenge working with NWQI?
8. What makes NWQI a unique program?
9. What is successful watershed management and what resources are needed to achieve it?
10. What are key elements to a successful watershed outreach/communication plan and what resources are needed to achieve it?