EXECUTIVE SUMMARY: Social and Economic Attitudes toward Conservation Practices in the Bad River Basin of South Dakota

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BACKGROUND

The Bad River is a stream that originates in the Badlands, South Dakota near Wall. It flows east for approximately 100 miles before emptying into the Missouri River (Lake Sharpe) at Fort Pierre. (See Figures 1 and 2.) The Bad River Basin consists of approximately two thirds rangeland and one third crop land (Thelen, 2004:3). The lower one third of the Bad River Basin has been documented to discharge over three million tons of sediment into Lake Sharpe. (USDA Soil Conservation Service and USDA Forest Service 1994:1). Sediment discharged into the Missouri River has negative economic impacts, affecting the power generation of the Oahe Damn, sport fishing, recreation, and tourism (Thelen, 2004). For example, the sport fishery in this reach of the Missouri River in the 1980s contributed about $2.5 million annually to the city of Pierre's economy, but only when it was not impaired by turbidity from the Bad River. When the Bad River is carrying heavy loads of sediment the value of sport fishing essentially goes to zero (South Dakota Game, Fish and Parks, 1985).

Figure 1 about here (Bad River in SD)
Figure 2 about here (Bad River Basin)

To reduce sediment loading, the South Dakota Bad River Water Quality project (BRWQ) was initiated in 1990 and continued through 2004. Over this 15 year period, approximately 9 million dollars were provided by the United States Department of Agriculture and by the Environmental Protection Agency.[10] Project activities focused on the implementation of

[10] Co-operating agencies in the Project were the American Creek Conservation District, the Haakon County Conservation District, the Jones County Conservation District, the South Dakota Department of Agriculture Division of Conservation, the South Dakota Department of Environment and Natural Resources, the South Dakota

conservation practices on farms and ranches principally located in Stanley and Jones Counties of South Dakota[11].

THE CURRENT STUDY

The purpose of the current study was to assess the effectiveness of the BRWQ project. Entitled Conservation Effects Assessment Project (CEAP), this study is a multi-year, multi-disciplinary and multi-agency research project which utilizes soil assessment, range land health assessments, historical producer data, current producer surveys, watershed stream gauges, and water quality data collected at state monitoring sites to evaluate the effectiveness of locally defined conservation practices on range health[12]. The research project team includes scientists from the departments of Animal and Range Science, Biology and Microbiology, Civil and Environmental Engineering, Economics, Natural Resource Management, Plant Science, and Sociology and Rural Studies.

THE HUMAN COMPONENT OF THE PROJECTS

The evaluation of the BRWQ projects was designed to include not only the effects of the projects themselves in terms of the reduction of the flow of sediment within the lower Bad River basin, but also on the participants in the projects. The human component was divided into two parts: a) the attitudinal assessment component and b) the economic assessment component.

Cooperative Extension Service, the Stanley County Conservation District, the USDA Soil Conservation Service, and the USDA Forest Service.

[11] This $9 million dollar estimate was derived from an analysis of the records of the Project. It includes all aspects of Phase II and III of the project, from the original research in the area, to administrative costs, to the cost of the implementation of the conservation practices. Unfortunately, the costs associated with Phase I are not available.

[12] Funding for this research is from CEAP grant "Conservation Practices Assessment of the Lower Bad River Basin" from USDA / CSREES with matching funds from the South Dakota Agricultural Experiment Station.

The economic assessment component involved an inventory of the specific projects sponsored by the government agencies, an estimate of the investment in those projects, and an assessment of the economic consequences of those projects. The economic aspect of the evaluation will be addressed in a separate report.

THE ATTITUDINAL ASSESSMENT

There were two goals for the attitudinal assessments. The first was a description of the current conservation attitudes of participants in the original projects. The second was an estimate of attitudinal changes, if they existed, that were the result of participation in the BRWQ Project.

The existing records[13] suggest seventy-one producers or agencies had entered into contractual arrangements with governmental agencies between 1995 and 2004 as a part of the Bad River Water Quality Projects. These seventy-one producers or agencies were the population whose attitudes and values concerning the BRWQ Projects were assessed.

To address the current attitudes of the participants[14], a self-administered mailed survey procedure was employed. Every participant that could be located was contacted about the study and sent a questionnaire specifically developed for this purpose. To maximize their willingness to complete and return the questionnaire, Dillman's survey method as described in his MAIL AND INTERNET SURVEYS, 2nd Edition (2000) was employed.

However, the procedures of the original BRWQ Project created a problem with the goal of producing an estimate of changes in the conservation attitudes of the participants since no assessment of their attitudes had been conducted prior to the projects. For that reason, an

[13] Unfortunately, some of the records had been shredded in "house-cleaning" conducted by some agencies in the years after the projects had been completed.

[14] From this point on, the term *participant* will refer to a producer or an agency that had signed a contract with any of the agencies supporting a Bad River Water Quality project.

indirect strategy was developed relying of the fact that the overwhelming majority of the participants lived in Stanley County, South Dakota, with a few others living in Jones County, South Dakota. A comparison group was created consisting of farmers and ranchers who lived in both counties. Given the relative small size of the number of farmers and ranchers in both counties, all of the producers in both counties were included in the study. Thus, we did not sample. As with the participants, a self-administered mailed survey procedure was used with the producer residents[15] of both counties. A list of all of the farmers and ranchers in both counties was purchased from a professional survey support organization.[16] A questionnaire was sent to all producers in both counties.

The questionnaires of the participants and the producer-residents were identical except for the additional questions on the participant questionnaires that specifically addressed their implementation of actual Bad River projects. [17]

The survey of both participants and residents was conducted in the spring of 2011, from March through April. The procedure consisted of four contacts. First, an introductory letter was sent introducing the research team, describing the project, and explaining the importance of the assessment. Approximately two weeks later, a survey packet was sent to the potential respondents. It contained a cover letter reminding the potential respondent about the study, a questionnaire, and an addressed stamped return mail envelope. Two weeks later, a reminder postcard was mailed to both populations. About two weeks later, another complete survey packet containing a new cover letter, a replacement questionnaire, and an addressed stamped return mail envelope was mailed to all individuals or organizations that had not responded.

[15] From this point on, the term *resident* will refer to a producer in either Stanley or Jones County that had not participated in any Bad River Water Quality project.
[16] Survey Sampling International. See reference section for address.
[17] Anyone interested in obtaining a copy of either questionnaire should contact the senior author.

Given our special interest in the participants (as opposed to the residents), an additional step was employed in their survey that was not used with the residents. Phone calls were made to all who had not returned the completed questionnaire after the first mailing and reminder post card. After calling[18] and explaining the study, a replacement questionnaire was mailed to each potential respondent.

While we had started with seventy one names in our population, we ultimately ended up with only fifty-six names since fifteen had to be removed from the list; ten had died, one was in a nursing home too old to fill out the questionnaire, one returned the questionnaire claiming he was unfamiliar with the project, one of the organizations was managed by a person who was a participant, and two participants had moved and could not be located. After conducting the survey, we eventually ended up with twenty seven completed questionnaires, for a response rate slightly less than fifty percent (48.2%).

While we were relatively successful in obtaining completed questionnaires from the participants, we were slightly less successful with the survey of resident-producers in Stanley and Jones Counties. The addresses for some potential respondents were incorrect. While we were able to find correct addresses for some of these, we could not for all. Many other potential respondents simply did not respond. Several questionnaires were returned not completed with the explanation from the potential respondents that while they did live in one of the two counties, they did not live in the Bad River Basin and thus had no knowledge of the Bad River Water Quality Projects. We removed the names of those for whom we did not have a good address and of those who returned the questionnaire but who did not live in the Bad River Basin. After these names were removed, we ended up with a list of 107 resident producers in Stanley County and

[18] There were several potential respondents who would immediately hang up after he or she answered the phone.

145 resident producers in Jones County. A total of 96 resident producers completed the survey for a response rate of 38.1%.

Overall, survey questionnaires were sent to 308 potential respondents including 56 BRWQ participants and 252 resident producers in Stanley and Jones counties. A total of 123 producers, 27 BRWQ participants and 96 resident producers, responded to the survey with returned and answered questionnaires, for a total useable response rate of 39.9%.

Survey results in terms of attitude assessment by participant and resident producers are presented in the next section. Due to the complexity of questionnaire design, some items were asked of all respondents, while other items were only asked of major subsets of respondents. Thus the number of potential respondents is reported at the bottom of each table. Data reported in each table are the number of and percent distribution of responses to each item.

RESULTS OF THE ATTITUDE ASSESSMENT

RESULTS BASED ON JOINT QUESTIONS

Perceptions of Water Quality in the Bad River Basin and in Lake Sharpe

There were three sets of questions dealing with water quality in the Bad River and in Lake Sharpe that appeared on both questionnaires. The first sought perceptions about water quality. The second dealt with perceived changes in water quality over the last fifteen years. The third focused on attitudes toward the water quality problems. Key findings from the data presented in Table 1 are:

1. Most respondents (92% of participants and 80% of resident producers) perceived soil erosion is a problem in the Bad River basin.[19] Further, they both agreed (76% vs. 77.5%) that sediment is causing a problem in upper Lake Sharpe.
2. The two samples differed in terms of whether soil erosion is being controlled. Less than half of participants agreed it was being controlled while fully three out of four residents agreed it was (44.4% vs. 75.3%).
3. There was a substantial degree of agreement (but not unanimity) between the two when they were asked about the types of problems caused by sediment in Lake Sharpe. Listed from the highest to lowest number of chosen responses were that the sediment threatens fishing (44.4% vs. 52.1%), threatens tourism on Lake Sharpe (40.7% vs. 31.2%), threatens wildlife habitat (33.3% vs. 38.5%), and reduces electricity production from the Oahe Dam (18.5% vs. 18.8%).
4. Participants were far less likely to accept the statement that soil erosion can be controlled. Fewer than half of the participants, as opposed to three out of four of the residents, agreed it could be controlled (48.0% vs. 75.2%).
5. Generally, neither group indicated that soil erosion into the Bad River Basin had increased in the last 15 years. Very few indicated it had gotten worse (18.6% vs. 15.1%), a substantial minority indicated it had decreased (29.6% vs. 40.9%), and another substantial minority indicated it was about the same (29.6% vs. 22.6%). The remainder did not know.
6. Not surprisingly, the responses to the question about changes in sediment in the Bad River in the last 15 years mirrored the answers to the question about soil erosion. Few

[19] In subsequent descriptions, the first percentage will be that of the participant and the second will be that of the resident.

indicated there was more (18.6% vs. 12.9%), a substantial minority indicated there was less (29.6% vs. 31.1%), and another substantial minority indicated it was about the same (22.2% vs. 21.6%).

7. The respondents were asked if they were concerned about sediment in the Bad River. The over whelming majority of both groups were concerned although the intensity of their concern varied. Few were "very concerned" (26.0% vs. 15.1%) with many more "somewhat concerned" (51.8% vs. 46.2%). Very few indicated they were not very concerned (14.8% vs. 21.5%) or not concerned at all (3.7% vs 6.5%).

8. The responses to the question about their concern with the sediment in upper Lake Sharpe were similar to their responses about their concern sediment in the Bad River. Most were concerned, but not overly so. About a third (30.8% vs. 15.6%) were "very concerned" and another four in ten were somewhat concerned (38.5% vs. 48.8%). The rest were not very concerned or not concerned at all.

9. Following up on their concern about the sediment, the respondents were asked two questions. First, they were asked if something should be done about sediment in upper Lake Sharpe. A majority of both types of respondents agreed something should be done, although there was a slight difference between the two groups. The participants were much more likely than the residents to accept something should be done (78.3% vs. 66.2%).

   Second, they were asked if they had implemented land management practices to reduce soil erosion or improve water quality. The overwhelming majority had implemented such practices and there was little difference between the two groups in their agreement (91.0% vs. 86.8%).

Table 1: Responses to Water Quality Questions, By Respondent Status (Participant versus Resident) [20] [21]

Current State of Water Quality	Participant % (#)	Resident % (#)
a. Soil erosion a problem in Bad River basin		
Yes	92.3% (24)	80.0% (72)
No	7.7% (02)	17.8% (16)
Don't Know	00% (00)	02.2% (02)
b. Sediment causing problems in upper Lake Sharpe		
Yes	76.0% (19)	77.5% (62)
No	16.0% (04)	16.2% (13)
Don't Know	08.0% (02)	06.3% (05)
c. Soil erosion is being controlled in Bad River basin		
Yes	44.4% (08)	75.3% (61)
No	56.6% (10)	24.7% (20)
d. Types of problems caused by sediment in upper Lake Sharpe		
Threatens fishing	44.4% (12)	52.1% (50)
Threatens tourism on Lake Sharpe	40.7% (11)	31.2% (30)
Threatens wildlife habitat	33.3% (09)	38.5% (37)
Reduces electricity production	18.5% (05)	18.8% (18)
None of the above	26.0% (07)	17.7% (17)

[20] All 123 respondents, 27 participants and 96 resident producers, were asked to respond to all except the last item in table 1. There were some non-responses to each item. The percentage distributions are based on the number of completed responses of participants and resident producers per item. For the last item (k) on "implementing land management practices in the Bad River basin in the past 15 years", the number of potential respondents was 22 participants and 54 resident producers.

[21] Generally speaking, percentages based on a N of less than 50 are suspect. Percentages are provided here only to provide a gross comparison with the answers provided by the resident-producers. Respondents not providing a response were excluded from the calculations of percentages.

Table 1 (Con't): Responses to Water Quality Questions, By Respondent Status (Participant versus Resident)

Perceived Change in Water Quality	Participant % (#)	Resident % (#)
e. Soil erosion can be controlled in the Bad River Basin:		
Yes	48.0% (12)	75.2% (64)
No	44.0% (11)	22.6% (19)
Don't know	8.0% (02)	1.2% (01)
f. Change in soil erosion in Bad River basin in the last 15 years:		
More	18.6% (05)	15.1% (14)
Less	29.6% (08)	40.9% (38)
About the same	29.6% (08)	22.6% (21)
Don't know	22.2% (06)	21.5% (20)
g. Change in sediment in Bad River in last 15 years:		
More	18.6% (05)	12.9% (12)
Less	29.6% (08)	31.1% (29)
About the same	22.2% (06)	21.6% (20)
Don't Know	29.6% (08)	34.4% (32)
h. Your concern about sediment in Bad River:		
Very concerned	26.0% (07)	15.1% (14)
Somewhat concerned	51.8% (14)	46.2% (43)
Not very concerned	14.8% (04)	21.5% (20)
Not at all concerned	03.7% (01)	06.5% (06)
Don't know	03.7% (01)	10.7% (10)

Table 1 (Con't): Responses to Water Quality Questions, By Respondent Status (Participant versus Resident)

Attitudes toward Water Quality Problems	Participant % (#)	Resident % (#)
i. Your concern about sediment in upper Lake Sharpe:		
Very concerned	30.8% (08)	15.6% (14)
Somewhat concerned	38.5% (10)	48.8% (44)
Not very concerned	23.1% (06)	15.6% (14)
Not at all concerned	03.8% (01)	06.7% (06)
Don't know	03.8% (01)	13.3% (12)
j. Something should be done about sediment in upper Lake Sharpe:		
Yes	78.3% (18)	66.2% (49)
No	17.4% (04)	31.1% (23)
Don't Know	04.3% (01)	02.7% (02)
k. Have implemented land management practices in last 15 years to reduce soil erosion or improve water quality:		
Yes	91.0% (20)	86.8% (46)
No	09.0% (02)	13.2% (07)

Potential Solutions to the Sediment Challenges

Both participants and residents were then asked to respond to questions about possible solutions to the sediment issues in the Bad River and in Lake Sharpe. Key findings from the results presented in Table 2 are:

1. Respondents were asked about possible ways to respond to water quality issues in the Bad River basin. The most frequently chosen option by both types of respondents was the implementation of soil erosion control practices on uplands (48.0% vs. 49.5%).

Installing catch basins on Bad River tributaries was the second most preferred option of both (28.0% vs. 30.5%), followed by the reduction through dredging or controlled flush (24.0% vs. 20.0%).

2. A majority of respondents would support regulations to protect water quality if developed by local officials and state officials (57.0% vs. 59.8%). However, very few respondents would support user fees or taxes even if they were confident funds would be used to reduce soil erosion and lake sediment (16.0% vs. 20.8%).
3. Most respondents would implement conservation practices knowing there were neither net losses nor net gains in farm income (85.0% vs. 87.8%). Not surprisingly, that willingness increased for both if there were financial advantages (100.0% vs. 92.0%).
4. When asked about the specific types of incentives they preferred, the most frequently chosen by both was cost sharing (64.7% vs. 70.2%). The second most frequently chosen was tax credits (43.8% vs. 45.9%) followed by loans (30.0% vs. 25.0%).

Table 2: Possible Responses to Water Quality Challenges in Bad River and upper Lake Sharpe, By Respondent Status (Participant versus Resident)

Water Quality Items [22]	Participant % (#)	Resident % (#)
a. Best way to address sediment in upper Lake Sharpe[23]		
Implement soil erosion practices on uplands	48.0% (12)	49.5% (47)
Installing catch basins on Bad River tributaries	28.0% (07)	30.5% (29)
Dredging or controlled flush	24.0% (06)	20.0% (19)
b. Would support regulations to protect water quality if developed by local officials and state officials:		
Yes	57.0% (12)	59.8% (49)
No	43.0% (09)	40.2% (33)
c. Would support additional tax or user fee if confident funds would be used to reduce soil erosion and lake sediment:		
Yes	16.0% (04)	20.8% (19)
No	56.0% (14)	46.2% (42)
Don't know	28.0% (07)	33.0% (30)
d. Would implement conservation practices knowing there were neither net losses nor net gains in farm income:		
Yes	85.0% (17)	87.8% (43)
No	15.0% (03)	12.2% (06)

[22] All respondents (27 participants and 96 resident producers) were asked questions related to items (a,b,c) related to regulations, taxes, and best ways to reduce sediment (items b,c, and a). However, only 25 participants and 95 residents provided answers to any of these three items. For items related to implementing conservation practices (items d,e,f) 22 participants and 54 resident producers were queried. There was some non-response to most questions.

[23] Since respondents could provide more than one answer, these percentages are not additive. They represent the proportion of respondents giving this particular answer.

Table 2 (Con't): Possible Responses to Water Quality Challenges in Bad River and upper Lake Sharpe, By Respondent Status (Participant versus Resident)

Water Quality Items	Participant % (#)	Resident % (#)
e. Would implement conservation practices if there were financial advantages to practices		
Yes	100% (20)	92.0% (46)
No	00.0% (00)	08.0% (04)
f. Additional Incentives needed for implementation of currently financially advantageous practices:		
Cost share		
Yes	64.7% (11)	70.2% (33)
No	00.0% (00)	04.3% (02)
Don't know	35.3% (06)	25.5% (12)
Tax credits		
Yes	43.8% (07)	45.9% (17)
No	18.8% (03)	05.4% (02)
Don't know	37.5% (06)	48.6% (18)
Loans		
Yes	30.0% (03)	25.0% (08)
No	40.0% (04)	21.9% (07)
Don't know	30.0% (03)	53.1% (17)

Finally respondents were asked to rank the most influential factors (from a list of five major factors) in their decisions to implement land management and conservation practices on their farm or ranch. As can be seen in the results reported in Table 3, there was great similarity between the two groups; the rank order was the same. Practices proven to improve sustainability was the most important factor, followed by practices proven to improve profitability, then cost share availability, the costs of implementing practices, and finally tax credit availability.

Table 3: Relative Importance of Factors Influencing Land Management or Conservation Practices, By Respondent Status (Participant versus Resident)[24]

Average importance of factors considered most influential in decisions to implement land management or conservation practices[25]

	Participant Ranking	Resident Ranking
Proven to improve sustainability	1.9	1.6
Proven to improve profit	2.2	2.9
Cost share availability	2.8	3.1
Cost of implementing practice	3.3	3.4
Tax credit availability	4.1	3.9

Impacts of Implemented Land Management Practices to Reduce Soil Erosion and Improve Water Quality

As noted earlier, both questionnaires contained an item asking if the producer had implemented land management practices designed to reduce soil erosion to improve water quality. Those who had implemented such practices were then asked about the consequences of the implementation of those practices for crop production or livestock production. Presented in Table 4 are the responses of those items. There was a difference between the two groups when asked about the impacts on crop production. More participants reported increased yields (46.6% vs. 65.9%) than reported no impact on yields (26.7% vs. 22.7%), or decreased yields (26.7% vs. 11.4%).

[24] This section of the survey was completed by 22 participants and 54 resident producers that actively farm or ranch in the Bad River basin.

[25] The average importance was estimated by multiplying the number of times respondents gave a specific ranking by that ranking, and dividing the resultant by the number of respondents. The ranking system was from 1 = "most influential" to 5 = "least influential" factor

There was more agreement for the responses concerning the impacts on livestock production. A majority of both reported no impacts (58.8% vs. 52.4%), a small number of both reported decreased production (11.8% vs. 4.8%), and a substantial minority of both reported increased production (the totals for those reporting increased production were 29.4% vs. 42.8%).

Table 4: Percent Responses to Items about Impacts of Changes in Land Management Practices, By Respondent Status[26]

Consequences of Implementation of Changes in Land Management Practices	Participant % (#)	Resident % (#)
Impact on crop production		
Had no impact	26.7% (04)	22.7% (10)
Decreased yields	26.7% (04)	11.4% (05)
Increased yields	46.6% (07)	65.9% (29)
Impact on livestock production		
Had no impact	58.8% (10)	52.4% (21)
Decreased yields	11.8% (02)	04.8% (02)
Increased yields	29.4% (05)	42.8% (19)

RESULTS BASED ON PARTICIPANT ONLY QUESTIONS

Satisfaction with Individual Projects

An important topic in which we were interested was the degree to which participants considered the BRWQ projects successful. We addressed this question in two ways. The first was to ask these participants about the projects, whether the projects were still being maintained, and the degree of satisfaction each participant had with his or her projects. Presented in Table 5 is information useful in addressing those questions based on reports from the 23 producer participants that responded to this series of questions. It is important to note that these are not all of the projects which were implemented since some of those who had originally contracted for the projects are deceased, some could not be located, and some declined to answer the survey.

[26] Respondents who are currently farmers or ranchers and who have implemented land management practices to reduce soil erosion or improve water quality. A total of 22 participants and 51 resident producers provided responses to the impact items in table 4, although not all BRWQ participants or resident producers provided responses for every item.

But these answers provide insight into the types of projects that were implemented, whether they are still being maintained, and whether the participants were satisfied with the projects.[27]

A total of 98 practices across 15 different project categories were adopted by the 23 reporting participants. The practices most frequently implemented were the installation of pipelines and water tanks. The most infrequently implemented were wildlife habitat development, the installation of riparian vegetation, and the use of water spreaders. The projects with the highest number of participants were related to water delivery (pipelines, water tanks, wells, livestock ponds) or grazing management (cross fencing, deferred grazing, proper grazing use, and planned grazing systems).

Over-all, the participants seemed pleased with the practices since more than half of the practices were still being maintained. In fact, in only one case – water spreaders -- were there as few as one half of the practices still being maintained. The reported satisfaction with the practices support the conclusion the producers were pleased with them. For every practice except one – water spreaders – the average satisfaction score was between satisfied and very satisfied[28]. For several items the average score exceeded 4.5, which meant most producers reported they were not just satisfied, they were "very satisfied".

[27] See Appendix A for a description of these projects.

[28] The possible answers to the satisfaction question were 1 = being very dissatisfied, 2 = dissatisfied, 3= neutral, 4 = satisfied, and 5 = very satisfied.

Table 5. Bad River Water Quality Projects, by Current Maintenance and Degree of Satisfaction Reported by 23 Producer Participants**.**

Rank	**Name of Practices**	**Implemented (number of producers)**	**Maintained (number of producers)**	**Satisfaction Mean 1 – 5 scale**
1	Pipelines*	11	8	4.11
2	Water Tanks	11	9	4.00
3	Cross fencing*	10	7	4.11
4	Proper grazing use	9	7	4.11
5	Deferred grazing*	8	5	4.14
6	Livestock pond	8	6	4.38
7	Wells	8	7	4.12
8	Planned Grazing System	7	5	4.28
9	Livestock windbreak shelters	7	4	4.57
10	Windbreak structure	6	5	4.83
11	Creek crossing*	4	4	4.33
12	Erosion control structure	3	3	4.67
13	Water spreader	2	1	3.50
14	Wildlife habitat development	2	2	4.50
15	Riparian vegetation	2	2	5.00

*One or two participants did not report their "satisfaction level" for the practice adopted.

Satisfaction with the Bad River Water Quality Project

The second way we addressed the perceived success of the Bad River Water Quality Project was to ask the participants directly their assessment of the Project. However, we were sensitive of the fact that the project had begun more than a decade ago, that the degree of participation varied greatly, and that some of the participants might not have known their individual projects

were part of a larger project. For those reasons, we were careful in formulating the questions to take these concerns into account.

We first asked if they recalled the Bad River Water Quality Project. If they had, we asked follow up questions about the BRWQ Project. The data presented in Table 6 are based on the responses of the 25 producer participants who reported recalling the project. The first three items sought their assessment as to whether the Project reduced erosion and sediment, improved crop and livestock productivity, and improved wildlife habitat and fishery conditions. The responses for all three were remarkable similar. Very few (if any) gave "No" responses. The rest were evenly divided between the "Yes" and "Don't Know" responses.

They were asked if the Project had influenced their farm and ranch practices. Almost two in three (62.5%) answered it had.

When asked to give an overall assessment about the Bad River Water Quality Project, respondents gave a somewhat somber assessment. First, almost a third (29.1%) reported that soil erosion in the Black River and into upper Lake Sharpe cannot be stopped. As for the impact of the Project itself, only about one in six (16.7%) reported that the Project had made substantial and permanent improvement. Another one third reported there had been improvements (25.0% small improvements and 12.5% substantial improvements) but that they had only been temporary.

Turning to their personal experiences with the project, their responses portray a very different tone. Almost half (47.4%) reported they were very satisfied and that their personal project had satisfied all the goals of the project. Almost half again (47.4%) reported they were only somewhat satisfied, and that their project had accomplished only some of its goals. Only one person of the 19 expressed any dissatisfaction at all.

The same very positive tone was evident in the response to the question about future Bad River projects. Almost half (45.5%) were definitely interested in taking part in future projects and another four in ten (41.0%) were somewhat interested. Again, only one producer had no interest at all.

Table 6: Participant Assessment of the Bad River Water Quality Project [29]

Assessment Item	Percent (#) Responding
Reduced erosion and sediment on Bad River and upper Lake Sharpe:	
Yes	48.0% (12)
No	12.0% (03)
Don't know	40.0% (10)
Improved crop and livestock production in Bad River basin	
Yes	48.0% (12)
No	04.0% (01)
Don't know	48.0% (12)
Improved wildlife habitat and fishery conditions	
Yes	52.0% (13)
No	00.0% (00)
Don't know	48.0% (12)
Influenced your farm and ranch practices	
Yes	62.5% (15)
No	25.0% (06)
Not applicable	12.5% (03)
If yes, briefly describe[30]	12.5% (03)

[29] The assessment of the BRWQ project reported in this table was completed by 25 participant respondents. Some items were answered by fewer than 25 participants.

[30] A few descriptions were provided on how the BRWQ project influenced their farm and ranch practices. These comments included greater emphasis on controlled grazing, no till farming, and providing shelter and livestock control.

Table 6 (Con't): Participant Assessment of the Bad River Water Quality Project

Assessment Item	Percent (#) Responding
Global assessment about sediment in Bad River basin:	
Soil erosion into the River and sediment in upper Lake Sharpe cannot be stopped	29.1% (07)
BRWQP made small but only temporary improvement	25.0% (06)
BRWQP made substantial but only temporary improvement	12.5% (03)
BRWQP made substantial and permanent improvement	16.7% (04)
None of the above	16.7% (04)
Extent satisfied with projects completed on your farm/ranch:*	
Very satisfied; accomplished all the goals	47.4% (09)
Only somewhat satisfied; accomplished most of the goals	47.4% (09)
Somewhat dissatisfied; accomplished only some of the goals	05.2% (01)
Very dissatisfied; accomplished none of the goals	00.0% (00)
Would like to take part in future water quality projects in Bad River basin:	
Definitely	45.5% (10)
Somewhat interested	41.0% (09)
Not interested	04.5% (01)
Don't know	09.0% (02)

ABOUT THEIR FARMING AND RANCHING

To be able to put their answers in context, we asked questions of both participants and resident-operators about their operations. We first asked if they currently farm or ranch in the Bad River Basin. Those who were not active producers were encouraged to skip to the end of the questionnaires. Presented in Table 7 are the responses of "active producers" to items about the nature of their farming or ranching operations. Most producers considered their operation as a farm or ranch operated with family help. While the majority of both groups owned their land,

participants were far more likely to own it than residents (77.5% vs. 51.9%). As for livestocks, participants either had no beef cattle or had modest herds, while the number of cattle in the herds of residents was more varied, ranging from no cattle to 300 or more. No one in either group owned sheep or buffalo.

Table 7: Respondent's Operation's, By Status of Respondent (Participant or Resident)

Status of Respondents	Participant	Resident
Active Farming in Bad River Basin[31]		
Yes	22	54
No	5	42
	Active Producers	
	Participant % (#)	Resident % (#)
Nature of the Operation:		
Mainly a farm	13.6% (03)	20.0% (11)
Half farm and half ranch	13.6% (03)	46.3% (24)
Mainly a ranch	72.8% (16)	34.5% (19)
Operating Characteristics:		
Operate it myself	40.9% (09)	35.2% (19)
Operate it with family help	59.1% (13)	46.3% (25)
Operate it with co-owners	00.0% (00)	11.1% (06)
Hire others to help	00.0% (00)	7.4% (04)
Ownership of Operation:		
Own it all	77.5% (17)	51.9% (28)
Own at least 75%; rent the rest	09.0% (02)	14.8% (08)
Own between 50%-75%; rent the rest	04.5% (01)	11.1% (06)
Own between 25%-50%; rent the rest	04.5% (01)	09.3% (05)
Own less than 25%; rent the rest	04.5% (01)	12.7% (07)
Number Livestock		
Beef cattle		
None or not reported	36.4% (08)	33.3% (18)
1-150	40.8% (09)	18.5% (10)
151-300	09.0% (02)	27.8% (15)
300+	13.5% (03)	20.4% (11)
Sheep		
None	100.0% (22)	100.0% (54)
Buffalo		
None	100.0% (22)	100.0% (54)

[31] The data provided in this table are from 22 participants and 54 resident operators reporting active farming or ranching in the Bad River basin.

PERSONAL DEMOGRAPHIC CHARACTERISTICS

Finally, we asked about a few selected personal characteristics. Presented in Table 8 are the responses to items pertaining to age, marital status, educational attainment, and the number of years they have lived on a farm or ranch. In some ways both groups were similar to each other. They had similar marital status and had lived on a form for a similar number of years. In other ways, they were different. Participants were much older; almost eight in ten (79.2%) were 45 years of age or older versus only six in ten (56.9%) for residents. Comparisons of educational attainment are more difficult to characterize. For participants, the more frequent category is high school graduate but the second most prevalent is college graduate or higher. In contrast, the educational attainment of producer residents is more evenly distributed; a third (35.9%) are high school graduates, and close to 30% have some college (28.3%) or are college graduates or higher (29.3%).

It is possible difference in age and in educational attainment are important in understanding differences between the two groups in their attitudes toward water quality and environmental issues. That question is outside the scope of the present report. However, it will be investigated in later reports.

FINAL COMMENTS

This is the first in a projected series of reports on the social science aspects of the South Dakota State University Conservation Effects Assessment Project. Others to follow will include an investigation into the potential attitudinal changes that resulted from participation in the 1990-2005 Bad River Water Quality (BRWQ) projects and an investigation of the economic consequences of those projects. Some of the material from this study has already appeared in a

master's thesis completed by Parvez (2011). These social science reports will ultimately be joined by reports on the assessment of the geographic and biological consequences of the Bad River Water Quality projects.

Table 8: Demographic Characteristics of Respondents, By Status of Respondent (Participant or Resident) [32]

Respondent Demographic Characteristic	Participant % (#)	Resident % (#)
Age:		
29 or less	04.2% (01)	10.8% (10)
30-44	16.7% (04)	32.3% (30)
45-59	62.5% (15)	38.6% (36)
60 and above	16.7% (04)	18.3% (17)
Marital Status:		
Married	95.8% (23)	81.7% (76)
Not Married	04.2% (01)	18.3% (17)
Level of Education:		
Less than a high school education	00.0% (00)	06.5% (06)
High school graduate	58.3% (14)	35.9% (33)
Some post high school training	08.4% (02)	28.3% (26)
College graduate or higher	33.3% (08)	29.3% (27)
Number of years have lived on a farm or ranch:		
0-9	00.0% (00)	00.0% (00)
10-24	09.1% (02)	09.1% (08)
25 or more	90.9% (20)	90.9% (80)

[32] A total of 27 participants and 96 residents were potential respondents to the demographic questions in this table. Not all respondents answered each question.

APPENDIX A: Description of Implemented Bad River Water Quality Projects

Implemented Projects	Description
Creek crossing	Creek crossing are installed in creeks to minimize stream bank erosion by providing a low water crossing for livestock and vehicles.
Cross fencing	Cross fencing are fence lines that divide pastures to allow rotational grazing, fence livestock out of a riparian area, and facilitate the application of conservation practices for soil, water, air, plant, animal, and human resources.
Deferred grazing	Deferred grazing means that the vegetation in a field is not grazed until the seed maturity is complete, or at least nearly complete, and then is grazed.
Erosion control structures	Erosion control structures refer to strategies on slopes designed to control runoff. Two types are often used. The first are diversion channels that cross the slopes to gather surface runoff. The second structure is a drainage channel aligned with the slope and gathers runoff. Both empty runoff into off-site locations.
Livestock ponds	Livestock ponds are constructed in ranges and pastures to serve as reservoirs for animal drinking water.
Livestock windbreak shelters	Livestock windbreak shelters are sets of shrubs and trees designed to protect livestock from northerly winds during the winter and early spring, to provide wildlife habitat, and to protect the working environment in and around the livestock area.
Planned grazing systems	Planned grazing systems are a method of managing a pasture so that it is grazed and then rested in a planned sequence.
Pipelines	Pipelines are small diameter pipes (often eight inches or less) designed to move water from a source of supply to points of use for livestock, wildlife, or recreation.

APPENDIX A (Continued): Description of Implemented Bad River Water Quality Projects

Implemented Projects	Description
Proper grazing use	Proper grazing use is the control of grazing to limit the removal of foliage of plants so that root growth, forge production, and the general health of the general health of the plants is not adversely affected.
Range seeding	Range seeding refers to the seeding of adapted annual grasses to provide livestock forage, wildlife habitat, weed control, and protection from soil erosion.
Riparian re-vegetation	Riparian re-vegetation refers to efforts to increase native vegetation along the banks of streams or rivers to conserve, protect, and restore soil and water resources.
Tanks	Tanks refer to the strategy of connecting water tanks with pipes to provide water for irrigation or livestock.
Water spreaders	Water spreaders are a series of earthen berms or diversion dikes to spread water from ephemeral streams of small watersheds to irrigate adjacent rangeland.
Wells	Wells refer to the strategy of connecting wells with pipes to provide water for irrigation or livestock.
Wildlife habitat development	Wildlife habitat development refers to programs designed to provide new and replacement habitat types for wildlife and to prevent erosion and sedimentation in adjacent streams and rivers.
Windbreak structures	Windbreak structures are sets of trees and shrubs designed to intercept and drop blowing snow, trap blowing sand and soil, catch spray drift of agriculture chemicals, and reduce and catch pollen drift from agricultural crops.

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FIGURE 1: The Bad River in South Dakota

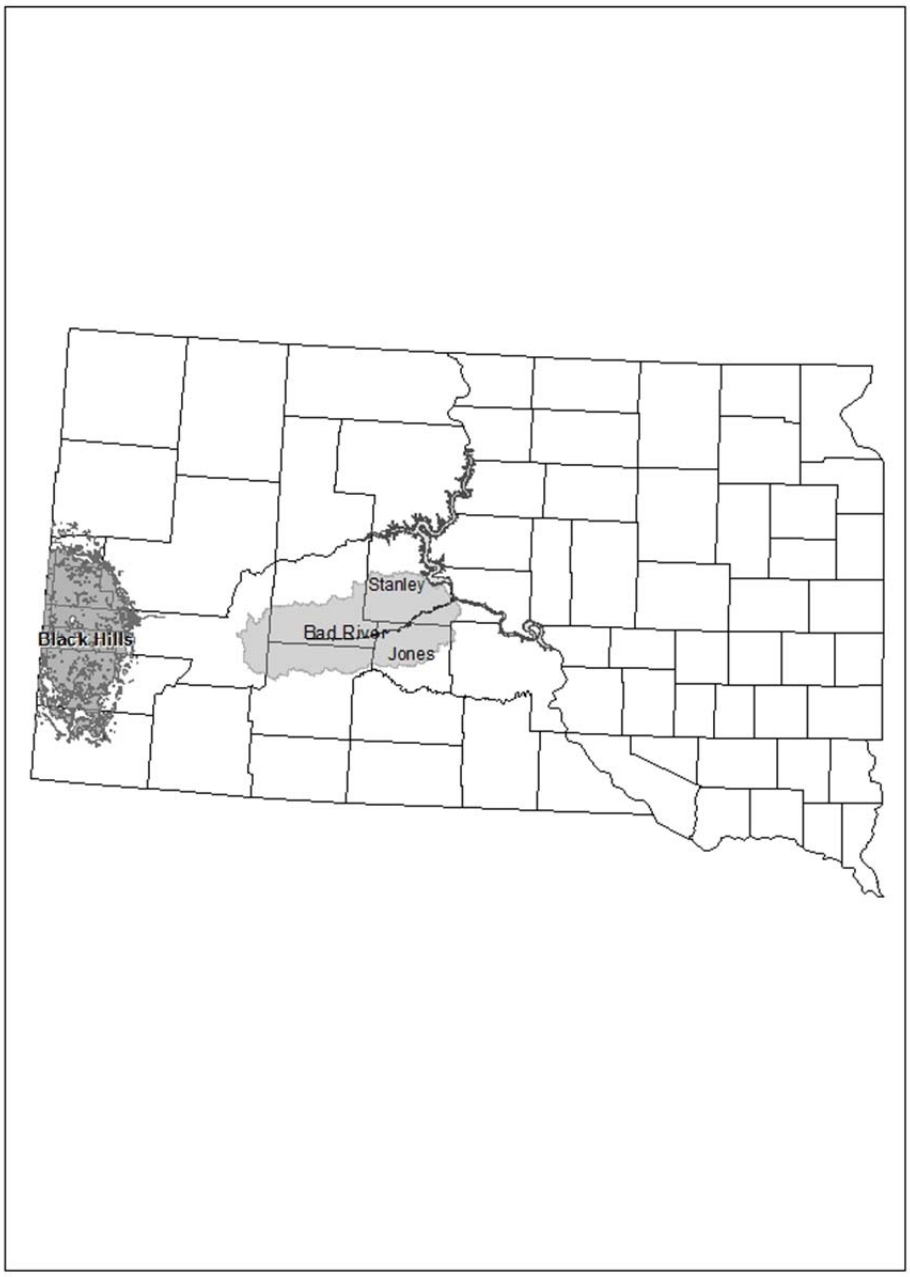

Figure 2: The Bad River Basin