

Collaborative learning towards sustainable agricultural landscapes in Muddy Creek Watershed, Oregon

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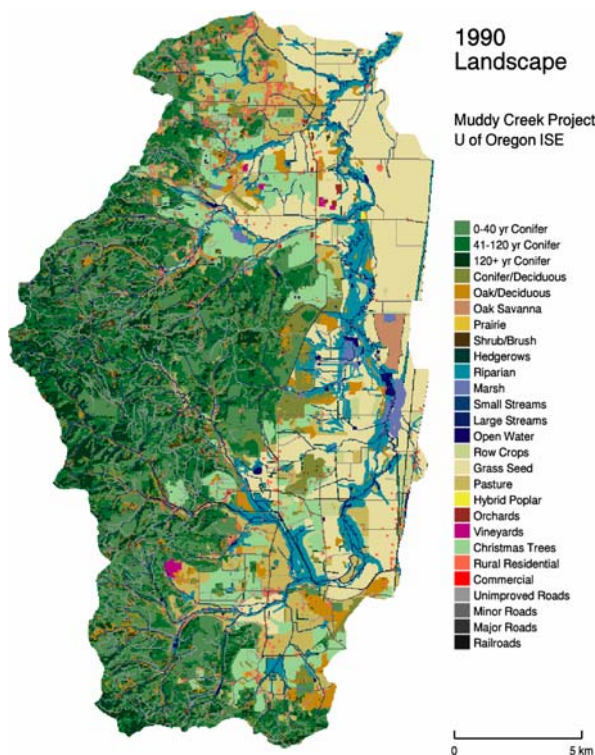
EXECUTIVE SUMMARY

Agency professionals and university researchers often lack specific knowledge of practices currently used by landowners to meet environmental goals, and have difficulty engaging private landowners and managers in exploring ways to broaden their participation in practices that promote healthy watersheds. Our objectives for this project in the Muddy Creek Watershed, Oregon, were:

- 1) to educate watershed residents about existing watershed management practices that enhance water quality and quantity,
- 2) to build a culture of watershed stewardship,
- 3) to both expand the use of existing practices and explore additional practices that are likely to be effective in enhancing water quality,
- 4) to use the results of this project to inform undergraduate and graduate students at OSU in the Land Use planning course (GEO 423) and GEO 452, Principles and Practice of Rural and Resource Planning
- 5) to encourage students from rural areas, as well as ethnic and cultural minorities and other underrepresented groups to consider careers in geography, GI Science, biological sciences, and other fields in which members of these groups are not traditionally represented, and,
- 6) to leverage additional funding for continued education and research on sustainable farm and forest practices in partnership with local schools.

Background

Several authors have stressed the importance of hands-on conservation education for children (Rivas and Owen 1999, Kontos 2001, Pandey 2002, Young 2002), focusing on the inherent love of nature in the child and on the child's ability to learn and change in response to environmental education. Connecting across generations in passing on local knowledge, recognizing and valuing existing sustainable practices, and involving residents in design and implementation of new practices are important for guiding the



community as a whole towards better watershed management. Hulse et al. (2000) worked with landowners in the Muddy Creek Watershed (Figure 1) to design alternative futures for the watershed. Others working in the Willamette Valley region (Lamy et al. 2002, Hulse et al. 2003) developed modeling tools and databases to assist in restoration planning. However, these projects were conducted at a very different scale from that proposed here. The focus of this project was to actively engage landowners in planning at the farm scale. This project provided fine-scale information about landowner practices and a foundation of common experience on which to build future projects.

Figure 1. The Muddy Creek Watershed

Accomplishments

Project activities included field trips and site visits, landowner and land manager interviews, student presentations, publications, and restoration projects. These activities provided opportunities for ten watershed residents (including six landowners, two private forest managers, two US Fish and Wildlife Service employees), as well as Oregon State University faculty, and forty middle school (grades 6-8) students to learn from each other. The K-8 students incorporated elements from the interviews and site visits into individual books written and illustrated by each of the students on their own, as well as a composite book produced by the class as a whole entitled “Stories of Sustainability”. Students also worked in groups to prepare and present posters at the OSU Extension 4-H Wildlife Stewards Summit at Lincoln School on April 26, 2007 and on the OSU campus at the OSU Ag Day May 8, 2007 in the booth staffed by the Minorities in Agricultural and Natural Resources Research and Science. With the assistance of the project PI, Lincoln K-8 students also participated in two restoration projects, one at the Finley Wildlife Refuge, the other on a Century Farm in the Muddy Creek watershed. The first project involved growing and planting 300 individual plants of an endangered species, Nelson’s checkermallow (*Sidalcea nelsoniana*) at the Wildlife Refuge. This experiment in rare plant restoration was conducted with the assistance of the Institute for Applied Ecology. The second restoration project was the design and planting of a riparian buffer consisting of 40 native shrubs and trees along Beaver Creek (a tributary of Muddy Creek) on the property of one of the landowners who participated in our class interviews.

Overall efforts on the Muddy Creek collaborative learning project met the first five project objectives (as noted below, and described further in the body of this report) and initiated ongoing efforts to partner with local schools to address objective 6.

Objectives 1 and 2- During 2006-2007, all participants were engaged in community-building activities in support of place-based, experiential learning at Inavale K-8 school (in spring 2007) and Lincoln K-8 Schools (in 2007-2008) in Corvallis, Oregon. Not only did the ten watershed residents who participated in the project learn from each other about existing watershed management practices that enhance water quality and quantity, the OSU faculty, teachers and students involved in the project learned about existing management practices as well. We learned that several landowners in the Muddy Creek watershed are already involved in exemplary efforts towards watershed stewardship, and that this is a rich landscape in which to build upon existing efforts.

Objective 3- Through activities supported by this grant, we were able to assist in planting a riparian buffer using native trees and shrubs along Beaver Creek on the property of one of the landowner participants. Students also helped plant (and monitor the success of plantings) of the rare and endangered *Sidalcea nelsoniana*, a native wildflower that serves as an important host plant for the Fenders blue butterfly, on another landowner's property, and assisted in establishing an experiment concerning the establishment of plantings of *S. nelsoniana* at the Finley Wildlife Refuge. These efforts were reported on by the Gazette-Times, the local newspaper (see attached newspaper article, Appendix 1).

Objective 4 - Project co-PI Gosnell conducted a field trip to the Muddy Creek watershed with her Principles and Practice of Rural and Resource Planning course, and will be able to use material from the project in future lectures in GEO 423 and 452.

Objective 5 - During our wrap-up sessions with students at Lincoln K-8 school, specific efforts were made to encourage student participants to consider careers in geography, Geographic Information Science, and social and biological sciences.

Objective 6 - We are participating in meetings to explore the possibility of building on this project to use the former Inavale School site as a collaborative facility for research and K-20 education in partnership with local schools.

Outcomes and evaluations

Students, Oregon State University faculty members, school district personnel, and landowners, were all highly positive about the outcomes of the project. Evaluations of student learning (self evaluations as well as those conducted by educators and through review of products produced during the project) indicated that most students felt they had gained knowledge about farms, forests, and wildlife refuges, as well as learning speaking, listening, and presentation skills. They had a positive experience in the class and appreciated the opportunity to participate in place-based, integrative education in their

watershed. The OSU participants were also positive about the valuable opportunities to meet landowners, learn about the history of the watershed and families in the region, and the decision-making processes used to manage land in the Muddy Creek Watershed. Finally, landowner and land manager participants interviewed at the final meeting June 12 were very positive about the project, and several participated in a follow-up meeting June 14 to pursue potential involvement in future collaborative efforts between OSU and the Corvallis school district.

PROJECT ACTIVITIES AND RESULTS

Activities

Although the project was initially intended to be conducted at Inavale K-8 School, Inavale School was closed due to low enrollment in spring 2006, delaying the start of the project. However, we moved the project to Lincoln School, a school at which many of the former Inavale students enrolled and which also has a relatively diverse student body including English language learners and a relatively high proportion of students of racial, ethnic and cultural minorities when compared to other school in Corvallis. Teachers Lori Greenfield and Paul Bradley, in collaboration with co-PIs Santelmann and Gosnell assisted students in the Lincoln K-8 middle school in conducting class activities and especially in planning and conducting interviews. Mark Meyers assisted in preparation of maps and air photos used in interviews. Santelmann also accompanied the class on site visits to properties in the Muddy Creek Watershed and assisted in restoration projects.

The ten watershed residents/stakeholders involved included five landowners involved in the production of agricultural or forest products, one of the teachers of the Lincoln school class, two local representatives of private forests, and two USFWS personnel from Finley Wildlife Refuge.

Students first participated in landowner-led site visits to properties in the Muddy Creek watershed, and then interviewed the landowners and/or land managers in the classroom (Figure 2 and 3). Interview questions are listed in Appendix 2. In addition, students met with three landowners during follow-up site visits to show their buddy classes these same properties or to record data on their native plantings.

Field trips

Students dedicated Wednesdays to studies in the field, conducting numerous field trips to locations in and around the Muddy creek watershed. On the field trips, students kept field journals and generated several products related to this project during the course of the year. They prepared final field journal pages which were displayed in downtown Corvallis on Earth Day for the Procession of the Species celebration, and produced posters to present at the OSU Extension 4-H Wildlife Stewards Summit (Fig. 4 and 5) and produced books for themselves to keep as well as a collaborative book, "Stories of Sustainability," which they worked on together as a class.

Student-led interviews

Figures 2 and 3. Students interviewing USFWS employee.



Students interviewed several landowners and land managers of properties in the Muddy Creek Watershed. Students began by role playing a mock interview with students from the class as subjects. Students then conducted an initial interview with a land manager for a local forest who has substantial experience in working with K-12 school groups, and

provided feedback on the process. Further interviews were then conducted by groups of students supervised by the PI and teachers. Each group of four to six students focused on one of five themes (History and Community, Agricultural and Forestry Practices, Stewardship Practices, Constraints and Difficulties, Decision Making).



Landowners sat at a table, and were provided with aerial photographs of their property to use in answering the questions. The student groups then interviewed each of the participating landowners and land managers to ask the questions concerning their theme, taking notes and summarizing them following each interview. Breaks between interviews allowed students to interact informally with landowners

as well. The landowner interviews were the topic of one of the poster presentations, and provided information used in many of the pages in the student books. Recorded transcripts of the interviews will be summarized for project publications. Interview questions are listed in Appendix 1. Transcripts of the interviews are being reviewed over

the summer, and summaries of landowner responses will be used in project publications after review by the landowner participants.

Restoration projects

Students participated in two restoration projects, one at the Finley Wildlife Refuge, the other on a Century Farm in the Muddy Creek watershed. The first project involved growing and planting an endangered species, Nelson’s checkermallow (*Sidalcea nelsoniana*) at the Wildlife Refuge, with the assistance of the Institute for Applied Ecology. The second project was the design and planting of a riparian buffer consisting of 40 native shrubs and trees along Beaver Creek (a tributary of Muddy Creek) on the property of one of the landowners who participated in our class interviews.

Students successfully grew 300 individuals of Nelson’s checkermallow from seed in a small greenhouse at Lincoln School, and planted them in a wet prairie site at Finley Wildlife Refuge with no mortality (Figure 4). They also assisted the Institute for Applied Ecology in counting leaves and flowering in these plants.



The second restoration project completed by the students was the establishment of 100 m length riparian buffer along Beaver Creek, again with no mortality of the native trees and shrubs planted

Figure 4. Students planting *S. nelsoniana* at Finley Wildlife Refuge

Presentations and student publications

Students prepared posters and presented their work at the 4-H Wildlife Summit held in April 26, 2007 at Lincoln K-8 school. Several of these posters were displayed at OSU Ag Day, May 8, 2007. Individual color pages from field journal entries were displayed during the Earth Day celebration “Procession of the Species” in downtown Corvallis. Students have prepared a coloring book from their own drawings and writings that will be published and distributed to children. The project co-PIs will use the transcripts of the

landowner interviews and the writings produced by the students to prepare several publications from the project. One publication will target educators interested in developing similar place based, experiential learning curricula. Another will target the journal “Children’s Geographies” and report on the student learning and writings, and a third will focus on the collaborative learning process, summarizing project outcomes and discussing what we have learned about land management and decision-making by participants in this project for the Muddy Creek Watershed in Oregon.

Figures 5 and 6. Posters produced by Lincoln K-8 students on display at the 4-H Wildlife Stewards Summit in April 2007.



Figure 7. Oregon State University students at a farm in Muddy Creek Watershed with project co-PI Hannah Gosnell.



In addition to the field trips initiated on the project for students in the Lincoln K-8 class, contacts made through the project allowed co-PI Hannah Gosnell to conduct a field trip for her students to a farm in the Muddy Creek watershed (Figure 7). Future classes will also benefit from connections made on this project.

Project Evaluation

OSU Faculty Learning

Landowner interviews and the field trips and site visits provided several insights into the decision-making processes and land management practices of those involved in this project. From the initial summary and transcription of the interviews, we have noted some of the following preliminary findings:

1) Landowners do not tend to separate out places on their property where they employ special practices for stewardship or conservation and other places in which they produce commodities. Rather, they tend to see all of their property as important both for

production and soil, water, and wildlife conservation. When asked where on their property they used specific practices for conservation or stewardship, several responded, “On 100% of it!”

2) Landowners will emphasize economics as important drivers of decisions when asked questions about factors influencing decision making. However, their actions often include practices that take into account land capability and protect the soil, streams and springs, as well as wildlife habitat. They are more likely to note these reasons for their actions when asked for specific details about features on their property, for example, “Why didn’t you cut these trees over here?” or “why did you restore this area as a wetland?”.

3) Producers in the Muddy Creek Watershed have diverse enterprises that include grass seed production, Christmas trees, timber, grain and vegetable crops, and “agri-tainment” such as corn mazes or hunting opportunities.

4) Producers in the watershed are proud of their western heritage and ties to the land. They are generous in the time they devote to educating children in the community and willing to make extra efforts to encourage projects that may help re-open Inavale school.

Evaluation of Student Learning

Three methods were used in evaluation of student learning on the project. The first was intended to allow evaluation of student learning by comparing essays written before and after the project in response to the prompt, “describe a farm and a forest to someone who has never seen one”. The other two evaluation methods involved direct responses requested from students to self-evaluate their learning, described in more detail below.

The project co-PIs have collected the essays written before and after the project, and will be conducting content analysis and comparisons of the writing over this summer. The results of these comparisons of student writing and projects will be presented in a publication prepared for the journal *Children’s Geographies*.

The first direct evaluation consisted of a take-home assignment in which students were asked to note (a) one thing they learned on the project, (b) one thing they liked about the project, (c) one thing they would like to tell a future student in a similar project, and (d) one thing they would like to tell Principal Investigator Mary Santelmann. The second direct evaluation was conducted in class during the final class meeting that included students, landowners and project PI Santelmann. Students were given three Post-it sticky notes and asked to think about their abilities at the beginning and end of the year, and place their sticky notes on a poster in response to three statements. The position of the notes along a line drawn on the poster indicated their agreement or disagreement on a five-point scale in response to the following statements:

- 1) I know more about farms and forests now
- 2) I am better at talking and listening to adults now
- 3) I am proud of the work we did in our class

Students were overwhelmingly positive about the content learned, with 26 of 40 students strongly agreeing with statement 1, and only 2 disagreeing (Table 1). Of those students

disagreeing, at least one noted that he had come into class late in the year and missed most of the project activities. There was less agreement on statement 2, with only 15 students strongly agreeing and many neutral (about the same now as at the start of the year). The greatest agreement was with statement 3, with which 30 out of 40 students strongly agreed, several more agreed or were neutral, and only two disagreed, again, noting that they had entered the class late in the year.

Evaluation Statement	No	No/Maybe	Maybe	Maybe/Yes	Yes
Learning Content I know more about farms and forests now	2*	3	4	1	30
Interview skills I am better at talking and listening to adults now	7	2	20	1	9
Sense of Achievement I am proud of the work we did in our class	4	1	4	0	26

* Two students responded no to all the statements, and wrote on their note that they had joined the class late in the year (“Was not here most of the year”, and “I wasn’t here all year”). The fact that the class began with 30 students in the fall and had 10 additional students transfer in from home school or other Corvallis middle schools indicates that parents and students valued this place-based, experiential learning curriculum.

In the second direct evaluation of student learning, students responded to four writing prompts in a take-home writing assignment. Of the 40 students in the class, 32 turned in this assignment. Student responses are summarized according to the major themes expressed. The number of students whose answers reflected each of these themes are presented in Tables 2-5. The specific themes common to student responses are identified in the column sub-headings, and the numbers of students whose response fit that theme are listed below. Comments representative of each theme are listed at the end of the table.

A) Land management, work	B) Plants, wildlife, habitat	C) Forest and farms in general	D) Interview skills	E) Geography
14	7	6	4	1
Representative comments: A) “I learned how hard it is to manage sustainable landscapes”; “I learned about management practices like not cutting trees too close to the river” B) “about the variety of habitat”; “about the different plants” C) “I learned a lot about forests and farms, how they work and what people do in them” D) “One of the biggest things I learned was how to interact with the landowners in an interview”; “I learned how to interview people in a calm way”; “different landowners take care of their property differently” E) “Where things were”.				

Table 3. Student responses to prompt: What was one fun or interesting thing about this project?				
A) Field trips	B) Interviews and talking to landowners	C) Everything	D) Restoration projects	E) Drawing and producing coloring book
10	8	7	5	2
Representative comments: A) “It was fun because we got to go on cool field trips”; “Going on the field trips and interviewing landowners. It was really fun working with them and learning so much about their management practices”. B)“We got to have cookies and interact directly with the landowners”; “We got to meet a lot of people, especially important landowners”. C) “Pretty much this entire project was totally fun!” D) and E) “Drawing plants and animals and help restoring”; “...to plant native plants”; “...making the coloring book and going on field trips”.				

Table 4. Student responses to prompt: What would you tell another student who might participate in this type of project?				
A) Behavior	B) Study skills	C) Interview skills	D)Encouragement	E) Tips for success
11	5	3	3	2
Representative comments: A) “Pay attention”; “Listen to the teachers” ; “When the teachers say long pants and closed toe shoes then do it”. B) “Get your work done before you go out and play”; “Find a way to keep track of pens and pencils”. C) “Don’t be shy when talking in front of people because they won’t understand you”; “Make sure to write somewhat detailed notes, because I couldn’t always figure out what my notes were about”. D)“Come here because we go on lots of fun trips”; “You will learn a lot by doing this and at the same time ur gonna have fun!”; “Bear with this and in the end you will be glad you got to learn this”. E) “I learned that hard work can be fun too”.				

Table 5. Student responses to prompt: What message would you like to give to the project leader, Mary Santelmann?			
A) Thank You!	B) Liked the cookies on breaks during interviews	C) Liked and appreciated the project overall	D) Appreciated OSU involvement and attention
32	3	13	3
Representative comments: A) “Thank you so, so much! This year has been an incredible experience thanks to you”; “thank you for letting us plant trees and make the world a better place”. B) “Keep makin good cookies”. C) “I had a great time and I can’t wait to see our finished coloring book”; “I think it worked out fine this year”. D) “Thank you for supporting this program, we really appreciate your efforts. It shows how much you care about our education”; “It was so cool of you to do all of what you did...it was awesome that you helped us in whatever we did”.			

Landowner learning

Evaluation of landowner learning will be conducted through post-project interviews, and summarized in project publications.

Outreach and Information Dissemination

Posters that showcased aspects of the project were presented at a local Earth Day Celebration, the 4-H Wildlife Steward Summits, and OSU Ag Day. One student poster has been selected to be presented at the Benton County Fair. We also intend to present project results at watershed council meetings in the region (such as Mary's River Watershed Council or the Long Tom Watershed Council).

Aerial photographs of their properties were provided to all participating landowners. The OSU faculty involved will produce publications concerning this approach to meeting landowners and working with K-8 students in joint educational activities to promote sustainable watershed management.

A children's coloring book about agriculture and habitat in the Muddy Creek Watershed has been designed by students through this project. The theme is "Stories of Sustainability", and it features simple maps and images of agricultural landscapes with text insets written by the students indicating the specific land use practices for environmental improvements and the distribution and type of wildlife in agricultural land.

Three publications (described in text above) will be prepared for peer-reviewed journal from this project.

Training potential

There were 40 middle school students directly involved in the class activities. In addition, a second "buddy class" of about 30 students in the primary grades also benefited from inclusion on some field trips and follow up events.

We estimate that over 400 K-8 students attended the 4-H Wildlife Summit. About 16 graduate students in the Rural Land Use course in 2007 visited the Muddy Creek watershed and learned about some of the project activities. We expect that similar numbers of students in subsequent years will benefit directly from course material that draws upon the work in this project, and that involvement of landowners will lead to opportunities for undergraduate and graduate students to develop research projects and proposals to follow up on this initial effort.

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