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**Examining the use of terms “Conservation”
“Restoration” and “Preservation” between Natural
Resource Professionals and Literature Reviews**

By:

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Examining the use of terms “Conservation” “Restoration” and “Preservation” between Natural Resource Professionals and Literature Reviews

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University of Nebraska, 2010

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ABSTRACT

This thesis will determine if there is a discrepancy between how literature defines conservation, preservation, and restoration, and how natural resource professionals define these terms. Interviews were conducted with six professionals from six different agencies that deal with natural resources. These agencies consisted of both government and non-government groups. In addition to interviewing these professionals regarding how they define the terms, they were asked where their work fits into the context of these terms. The interviewees' responses were then compared with the literature to determine inconsistencies with the use of these terms in the literature and real world settings.

The literature and the interviewees have agreed on the term conservation. There are some different points of view about preservation, some see it as 'no management' and some others see it as keeping things the same or 'static.' Restoration was the term where both the literature and professionals thought of moving an ecosystem from one point of succession or community, to another point on a continuum. The only thing in which they disagree on is the final goal of a restoration project. The literature would suggest restoring the ecosystem to a past historic condition, where the interviewees said to restore it to the best of their abilities and to a functioning ecosystem.

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INTRODUCTION

This project examines the use of the terms conservation, preservation, and restoration, and their importance in the natural resource field. Natural resource professionals need to communicate with each other, and to articulate their intentions to the public. The use of these terms may be a source of many misunderstandings. Such misunderstandings are counterproductive in achieving the goals of preserving and restoring natural resources. One would think the definitions of the terms conservation, preservation, and restoration would be clearer, but the public and scientific literature may use these terms differently than natural resource professionals. For example, conservation is defined as, ‘to stop the degradation of natural resources’ (Young 2000), and Minter and Corley (2007) say that conservation is ‘wise use of resources that are actively managed.’ These terms have concepts connected to them that many professionals do not even think about. This paper examines the context in which the literature defines these words and compares that with the use of the terms by natural resources professionals. My goal is a clearer understanding of these concepts and better communication within the natural resources field.

The terms of conservation, preservation, and restoration are commonly used, and have the chance of being misused in natural resources. For example, the word conservation is used in several contexts:

- Conservation biology, the science of the protection and management of biodiversity
- Conservation movement, to protect plants, animals and their habitats
- Conservation (ethic), an ethic of resource use, allocation, and protection, especially of the natural environment
- Conservationist, a person who advocates for conservation of plants, animals and their habitats
- Habitat conservation, a land management practice that seeks to conserve, protect and restore, habitat areas for wild plants and animals
- Water conservation, reducing the use of water to protect the environment
- Marine conservation, the protection and preservation of ecosystems in oceans and seas

- Soil conservation, management strategies for prevention of soil being eroded from the earth's surface or becoming chemically altered

These definitions taken from a commonly used website, Wikipedia.com, where the general public would look for a quick insight into recent news, or a local issue where these terms would be used by different agencies and organizations. There are members of the public that do not see a difference between conservation and preservation, or that restoration is part of conservation. That is why an examination of these terms is needed.

The common thread among these definitions is they refer to conservation as management and protecting some aspect of natural resources. These definitions of conservation consider their target (the thing being preserved) differently, and that target may range in scale from a small single plant to a large marine ecosystem. Young (2000) defines conservation as: the science of habitat and biodiversity loss: stemming the flow. Another definition of conservation is “the prevention of further degradation rather than a means for increasing resources or natural capital” (Hilderbrand, 2005).

The other side of the spectrum is preservation; preservation is defined by Webster's dictionary as: “the act or process of preserving, or keeping safe; the state of being preserved, or kept from injury, destruction, or decay; security; safety.” When the general public thinks about preservation, what comes to mind is what the National Wilderness Preserves is all about, the philosophy of keeping nature isolated from negative human activities. This is one of the highest levels of land protection in the United States; it is part of the ‘National Wilderness Preservation System (NWPS)’. Human management is highly restricted on federal lands in the National Wilderness System; nature is allowed to “run free.” (Wilderness.net) There is limited human management in these areas and little human introduced disturbance, i.e. roads, vehicles, or bicycles. This level of protection is not necessarily intended when literature or natural resource professionals refer to preservation, but simply protecting the resource in the current state it's in.

An ecosystem that's not functioning and needs improvement is usually what the subject of restoration is. The goal is restoring the function of said ecosystem until it needs little maintained. Restoration is defined by Webster's dictionary as: “bringing back to a former position or condition.” Young (2000) defines restoration as “the science of habitat and biodiversity recovery.”

The potential problem with these definitions is that most professionals have a mental image of their goals and the way they are going to apply their knowledge to their field. This paper examined the natural resource literature. Interviews were conducted with several individuals employed by state and federal agencies, and non-government organizations (NGO's). I then compared their use of these terms with the literature and amongst themselves. These are, of course, individual points of view that may not exactly reflect the positions of their agencies. The goal of the paper is to understand how the use of these terms could vary between natural resources professionals. If there are differences, do they reflect the background and mission statements of the agencies, or simply personal differences.

The objectives are:

1. Define terms and know how they are different.
2. Examine how natural resource professionals' definitions relate to literature definitions.
3. Evaluate the implications and consequences of the use of these terms for communication among natural resource professionals or with the public.

METHODS

For the literature review, several papers and scientific journals on the subjects of conservation, preservation, and restoration, were examined to evaluate the way these sources defined these terms and how that compares with the definitions that the natural resource professionals had stated.

Individuals were chosen for interviews because their work deals directly with issues that are related to natural resources, in particular habitat for wildlife and ecosystems management (See Appendix 1). Interviews of individuals from the field of natural resources were conducted in person and by phone for those that lived outside the Lincoln, Nebraska area.

The interview subjects were asked to describe the work they do, and then to place their work into the categories of conservation, restoration, or preservation. They were asked to define the three terms and consider how they used in the terms when discussing natural resources. The interviews were compared to the definitions gathered from the literature review and also

compared with each of the other natural resource professionals' interviews (See Appendix 2 for interview question).

LITERATURE REVIEW

“Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher "standard of living" is worth its cost in things natural, wild, and free.

For us of in the minority, the opportunity to see geese is more important than television, and the chance to find a pasque-flower is a right as inalienable as free speech.” --Aldo Leopold

Looking at papers and journals on the subjects of conservation, preservation, and restoration produced some interesting results. As the quote above points out, the need for action is growing, but are these three key terms understood uniformly across the literature and natural resource field? Does their use articulate clear management strategies and goals to the general public?

Many have said that Leopold is the father of land ethics. However, there were two earlier individuals that epitomize Americans thought about the natural world: Gifford Pinchot and John Muir brought the use of the terms to more of a public forum.

The discussion of which management tool is best for natural resources has gone back to John Muir and Gifford Pinchot and their battle of the Hetch Hetchy Valley in Yosemite National Park (Muir, 1873). Pinchot saw conservation as a means of managing the nation's natural resources for long-term sustainable commercial use. The idea of "forestry as tree farming," was one of the ideals that he held. Pinchot thought that you could use timber out of the National Forests without destroying the long-term viability of the forests (Meyer, 1997). Muir, on the other hand, saw nature as valuable for its spiritual and transcendental qualities. “Nature provides "places for rest, inspiration, and prayers." Muir often encouraged city dwellers to experience nature for its spiritual nourishment” (Meyer, 1997).

In the late 60's, Garrett Hardin published his paper ‘The Tragedy of the Commons’. In the paper, he talked about how if there was a natural resource that was not owned privately, the public would unknowingly abuse the resource. Most commons (i.e., oceans, public land, and open range) are open to the public and in some case they can be used for profit (Hardin, 1968).

In the earlier years, first part of the twentieth century, there were no limits to what people could and could not do on these commons, but Hardin's argument is that there needs to be some management to prevent the collapse of these ecosystems. Hardin doesn't say he is for conservation, but he argues that what is needed for the commons to succeed is management and restriction which into the category of conservation.

Minteer and Corley (2007) stated that "conservation is active management, wise/sustainable use, and the maintenance of ecosystem health." Minteer and Corley (2007) were investigating what management tool, conservation or preservation was best for the Chattahoochee National Forest. They polled fifteen individuals in academia and fifteen people living in the area. The people in their study defined preservation as a "hands off" approach (i.e., no management), and no use or passive use of the resource in order to prevent environmental change (Minteer & Corley, 2007).

Terborgh (1974) argued that in order to protect endangered species, "large reserves are needed to preserve natural vegetation formations, animals at the top of the trophic pyramid, and widespread species with sedentary habits and poor colonizing ability." In effect, these areas need to be isolated from human activity which is preservation.

In contrast, Young (2000) emphasized restoration ecology as the future of natural resources management. In his opinion conservation is stopping the loss of habitats and the decline of populations, and while restoration is a technique to enhance and promote them. "This endangered population of 250 individuals has a 50% chance of extinction over the next 100 years', they think, 'Why would we let this population languish at 250 individuals for so long? Let's restore it!" (Young, 2000)

Hilderbrand, Watts, and Randle (2005) took a similar position: conservation traditionally prevents further degradation rather than increasing resources. Their paper talks about recent developments in the concept of restoration and states that people have a misunderstanding of or unrealistic goals for ecological restoration. The public does not realize that these ecosystems took hundreds to thousands of years to form, and humans are not going to get a functional system back in a matter of three – five years (Ehrenfeld, 2000). Hilderbrand et al (2005) and Ehrenfeld (2000) use conservation as 'stopping degradation.' The use of this term sounds negative in their papers because conservation is negative because it doesn't include (according to them) activities

promoting recovery, but what the authors don't mention is how the degradation is stopped, this is done through policies and management plans.

INTERVIEW RESULTS

Six people, each selected from a different organization, were interviewed for this project. They were heads of departments in state and federal agencies: Mark Vrtiska-Nebraska Game and Park Commission and Dennis Schroeder-Natural Resource Conservation Service, a director of a Non-Government Organization, Mark Brohman-Nebraska Environmental Trust, two land managers, Gordon Warrick-Spring Creek Prairie (Audubon) and Chris Helzer-Nature Conservancy, and a program coordinator, Mary Brown-Interior Least Tern and Piping Plover (see appendices 3-8 for more background and full interview of these individuals).

Major differences in terms

The active management of ecosystems was consistently associated with the term conservation in the interviews. Also related to conservation was the idea of balance (and compromise) among diverse interests and stakeholders, keeping natural resources and biodiversity in good health, and requiring managers to keep (conserve) what we have in good condition. Conservation maintains populations by managing both habitats and populations (i.e., hunting regulations). All of these ideas and philosophies would fit into the definition of “protecting the resource at a sustainable level” according to the panel.

All of the interviewees thought of preservation as a hands-off approach in managing natural resources. Some said that it was a static view of the ecosystem, to keep that ecosystem in the same condition that it is currently in. A more dynamic view is that preservation allows an ecosystem to go where succession will “naturally” take it, which is known as self-design in wetland terminology. Besides the lack of management, another aspect of preservation is that in most cases resources cannot be taken out of a preserve. Preservation is safeguarding and protecting the identified resource.

Restoration on the other hand is the shift or repair of an ecosystem that is damaged or not functioning. Restoration involves returning a system to a former state or to a functioning state. There were some arguments within the people interviewed of what endpoint natural resource managers and planners should aim for when doing a restoration, but that discussion is beyond the scope of this thesis. Restoration is a tool used to restore natural processes and the biological

community to a former state. Restoration is obviously constrained, however, by human impacts, laws, etc. The goal in finding a way for natural processes to maintain a system is to more effectively maintain natural plant and animal communities. Helzer said that restoration is not taking an area back to a historic natural state, before anthropogenic sources of alteration i.e. agriculture, due to major changes and other variables, but restoration is moving the ecosystem so it is more resistant, relevant and functional.

The interviewees were asked what they thought the differences were between the three terms. Brohman thought the major differences were the terms preservation and restoration as management goals and the use of adaptive management practices. Restoration can be a radical change to the ecosystem. Conservation and preservation were in some ways opposite approaches to management, and conservation and restoration would be closer to one another relative to preservation.

When Warrick was interviewed he said that restoration involved human management, but conservation, preservation, and restoration are all needed to manage natural resources. An example from Warrick would be agencies are currently preserving the gray wolf (*Canis lupus*) in Yellowstone National Park in order to reintroduce gray wolves because it's listed as an endangered species. If the gray wolf would ever be taken off the list they would be hunted; in this case they would be preserving the species and conserving the individual. Brown said the major difference amongst the terms is how they view humans and their activities that people do in the areas of concern.

Helzer said that the major differences are that preservation is more passive than conservation and restoration. Preservation is building barriers, real barriers like fences or others such as acquiring land to act as buffering areas, around resources keeping it isolated from surrounding influences. In contrast, conservation is maintaining the health of the current system, and restoration is moving the ecosystem from one point to a more sustainable system, one where it can function on its own with limited human intervention. In a related way, Vrtiska thinks of restoration as a component that usually precedes conservation and/or preservation and preservation is the lack of management compared to conservation.

Schroeder said the difference is that restoration is 'trying' to bring an ecosystem back to what it was, but sometimes that is not possible (i.e., wetlands, and channelized streams). Conservation is the installation of new management practices, i.e. terraces and dams for erosion

control. Preservation is protecting the whole ecosystem as it is. This is difficult to do because we inherently prioritize resources, and sometimes not all resources are accounted for.

How does the interviewees work relate to these terms?

Most of the interviewees work falls into conservation and restoration, only one would say some of what they do would be preservation. Brohman said that most of his work involves conservation and restoration, but he does do some preservation. There is more priority given to projects that have adaptive management plans, which is a key concept in conservation. As for Warrick, he deals more with preservation than with conservation. But Warrick does do some restoration and conservation on the land that he manages. Brown works with conservation, in particular finding a common ground so that humans will be able to appreciate and contribute to conservation. Helzer does much more conservation and restoration as compared to preservation, although the Nature Conservancy's conservation easements might fall into the preservation category. Vrtiska classify the work that he is doing as conservation and restoration. Vrtiska doesn't see how his work could fall into the category of preservation. Schroeder's response was similar to Vrtiska's, except that some of Schroeder's work could fall into preservation, but that is a secondary priority for him.

Discrepancies in use of terms

Brohman says that there is a misuse of that the term preservation and that the public often use conservation and preservation interchangeably, for example at Fontenelle Forest in Omaha. Warrick commented that he has seen groups describe their activities as preservation, while using the resources of that ecosystem for profit. He felt this was contrary to what preservation is trying to do. Brown has not seen any examples of discrepancies, but does think that some people do not see a difference in the terms. For example, landowners might have a loss of income due to land restrictions associated with an endangered species. The landowner does not care if it is conservation or preservation; they lose income regardless. Helzer said discrepancies would happen on regional bases. The example he gave was from Iowa, where reconstruction is the term used when crop lands are converted into prairies, whereas restoration means taking a bad prairie and making it into a good prairie. Vrtiska and Brohman agree there is an interchangeable use of conservation and preservation in the public's view. Schroeder said, "definitely" there are discrepancy in usage of these terms in the natural resource field. There are different goals and objectives across different natural resource disciplines. Funding may ultimately determine the

goals and objectives. The endpoint of a restoration is often determined by how long the money lasts.

Importance of understanding

The importance of understanding these terms were more important to the public than between agencies. Brohman said it is very important for natural resource professionals to get on the same page with similar definitions. Warrick, in contrast, does not think misunderstanding these terms was a major issue in planning or management of natural resources. Brown thinks that common definitions are very important, especially when communicating with the public. Miscommunication or an inconsistent message from natural resource professionals may leave a sour taste with the public. A clearer public understanding of these terms and how natural resources management is practiced today could have a huge impact. All activities require public support, and when natural resource professionals work together there is a better chance to get the public on board. Helzer agrees with Brown in that there has to be public support. But he goes on to say this is not a major challenge. The public needs to know what is going on and the natural resource professionals need to emphasize this. Vrtiska stresses that the terms impact management techniques, and what can or cannot be done in a particular situation. The professionals need to outline what the job/project involves and what the goals are. Schroeder said it is important for understanding, but not mandatory. When the scope of a project increases, for example with both government and private land, shared use of terminology becomes more important.

Conflict with agencies

The interviewees did not think there was any conflict with the use of the terms with or across agencies in Nebraska. According to Brohman, there is general consensus on use of these terms across agencies in Nebraska. This may reflect similar backgrounds for personnel across agencies. Understanding these terms is most important in the planning phase. Warrick doubted that conflict would arise between agencies due to the misuse of these terms. Brown agreed with Warrick, saying that it could lead to conflict but she had not experienced it. Helzer said the National Park Service (NPS) looks at land differently than the agencies covered in this thesis. The NPS does more preservation than restoration and conservation this could be just a differences in what the organizations do, compared to how they define the terms, a representative from the NPS was not interview for this paper so speculation cannot be made. Vrtiska said

misuse of the terms, if it occurred, would not lead to conflict within agencies, but would confuse the public. Schroeder said the potential for conflict exists within the private sector. Conservation groups and agencies are usually more consistent with their message.

DISCUSSION

All of the natural resource professionals defined conservation as involving adaptive management (Brohman, Vrtiska), wise use and sustainability (Warrick, Schroeder), and keeping and ecosystem in good health (Helzer). This matches what Minter & Corley (2007) found in their survey of residents and academia professionals in the Chattahoochee National Forest. The other literature (Young, 2000 and Hilderbrand et al, 2005) had thought that conservation was stopping further loss or degradation. They stated the loss of natural resources, habitat, would have to be managed, which is what the natural resource professionals said as well. Brown said that conservation was a compromise, a win-win for the human component and for natural ecosystems.

In contrast, reactions to the term preservation were more variable. According to the natural resource professionals interviewed preservation is no management (Brohman), hands – off (Warrick), static (Brown), no change and no use of resource (Vrtiska), stopping unnatural and human interference actively (Helzer), and preserving and protecting resources (Schroeder). The literature (Terborgh, 1974) said preservation is a need to set aside some habitat for ecosystems to function properly. What is meant by ‘functioning properly’ is functioning the way in which the communities of biota have evolved through time, hundreds even thousands of years together. For example, the Natural Wilderness Preservation System (NWPS) comes to mind. The NWPS lands have the most restrictions on management and resource extraction of any natural areas in the US. This is what the natural resource professionals are thinking of when they talk about preservation. Minter & Corley (2007) come to the same conclusions as did the interviewees in this paper.

The interviews and the literature (Hilderbrand et al, 2005 and Ehrenfeld, 2000) generally agreed on what was meant for restoration, restoration is: repair an ecosystem (Brohman), move an ecosystem from one point to another, as much as plausible (Warrick), move an ecosystem to a more natural point, free from human management (Helzer), return a habitat to a former state so it is maintained naturally (Brown), move a habitat to a more ‘natural level’ to the best of your

abilities (Vrtiska), and restoring habitat to the best of your abilities (Schroeder). The underlying theme was taking something that is not functioning and trying to restore functioning. The thing the interviewees and the literature did not agree on is to what degree and state do you take the restoration. Should a restoration set a pre-European settlement state as a goal? Or would it be better to emphasize particular ecological functions and lessening human involvement in the long-term? Hilderbrand et al (2005) and Ehrenfeld (2000) talk about how we have the wrong expectations and goals when talking about restoration projects, natural ecosystems took a long time to develop, and it is wrong for humans to think they can accomplish the same results in a half-decade or less.

These three terms were used in a similar way by all the natural resource professionals, and they did not have difficulty related their jobs and perspectives to the terms. Their views were generally consistent with the literature. To be frank, there was more consensus than I expected when starting the project. The interviewees thought the main discrepancy that occurred was when the public used the terms conservation and preservation interchangeably. The interviewees all thought that the major difference between these two terms was the presence or absence of management. This could explain why the public equates these terms; they often have little idea of what natural resources management actually is. All they see is the end result and how these ecosystems will impact them and their livelihood.

Understanding these terms is important, but not as important as setting clear goals and objectives for management. The challenge is getting the public to understand what natural resource professionals are trying to do and why. As stated previously, the public only sees the product. Better communication between professionals and the public will enhance support for the agencies and ultimately benefit the resources.

Neither the literature nor the interviews emphasized conflicts between agencies. The interviews did not think there was any conflict between agencies in the use of these terms; most of them interact with each other and work together. Most of the natural resource professionals have similar backgrounds, especially since the sample was taken from locally. More conflicts may arise at larger scales. Most personnel will hold allegiances to the organization they work for, but all of these agencies and NGOs are trying to help the environment. They differ more in means than ends. A better understanding of these terms may enhance the ability of these professionals to work together, but I did not find it to be a major issue.

CONCLUSION

Conservation, preservation, and restoration as defined by the literature and as discussed by the interviewees were very similar. This is not surprising, because the interviewees have read this or similar material before and they share a similar background in natural resources. The biggest difference between the literature and interviewees regarded the best way to approach restoration. They agree on the definition but sometimes disagree on how to set goals for restoration. Would you set the goal as the historical condition of the ecosystem? Or set the goal of the ecosystem functioning naturally, and make it so it would manage itself and humans would be able to use the resources from that ecosystem at a sustainable level? What tool would you use on a certain project? My conclusion is that when clear management goals and objectives are set and an adaptive or integrated management approach is used, confusion over use of these terms is not likely to be a problem.

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APPENDIX

Appendix 1: List of Interviewees

- Nebraska Environmental Trust (NET): Mark Brohman
mark.brohman@nebraska.gov
- Natural Resource Conservation Service (NRCS): Dennis Schroeder
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Appendix 2: List of Questions

The list of questions that were asked all the individuals are as followed:

1. What do you do? And how does it fit into the natural resource field?
2. What do you think the term conservation means?
3. What do you think the term preservation means?
4. What do you think the term restoration means?
5. What do you think are the major differences among these three terms in your opinion?
6. What area do you think your work fits into?
7. Could your work fall into another category? And justify, please.
8. Have you encountered any discrepancies in your own experience with these terms? How do you think their definition differed from yours?
9. How important is it that natural resources professionals use the same definitions? And could this new found understanding help ecology and natural resources management? Justify, please.
10. Does different use of terms lead to conflict between agencies/organizations in your opinion?

Appendix 3: Mark Brohman Interview

The first person that was interviewed was Mark Brohman; he is the executive director of the Nebraska Environmental Trust (NET), which gets a percentage of the state lottery money. Then NET will divide that money up in the form of grants and pass it on to agencies and projects what are designed to help Nebraska's water, air, and wildlife.

Brohman would define the term conservation as the ethical management of resources, an ongoing practice of management. Conservation would be conserving resources so they are sustainable and never depleted to a critical level.

Preservation would have no management done to it, and if you where to preserve a piece of land, for an example, you will want to isolate it from everything else. The manager of that land is trying to keep the land as "snap shot in time."

Restoration is to repair an ecosystem that is damage, usually by anthropogenic reasons, but to what degree do you restore an ecosystem? Or where in time do you look to restore the ecosystem to. The whole purpose that one would restore an ecosystem is to get it back to a former state. As long as the ecosystem is restored to a functioning system, that is a good thing.

The major differences between preservation and conservation are management goals and the adaptive management plans. When talking about conservation there is always management practices and usually an adaptive management plan that is in place to manipulate the system for whatever the purpose of the natural resource. Restoration is more of a radical change to the ecosystem for a certain management goal already in mind. Conservation and preservation are on the opposite ends of the spectrum, and conservation and restoration are relativity closer to each other on that spectrum.

The work that Brohman tends to do is conservation and preservation. The things that Brohman looks for is the management, projects that have an adaptive management plan is given priority for funds over plans that do not have an adaptive management plan, with the edge going to conservation. Brohman does little work with preservation, due to the lack of management.

Brohman would think that the word preservation is missed used. He thinks that some people unknowingly interchange conservation and preservation, using preservation in the since that you are preserving as ecosystem, but we have stated preservation as preserving the state in a certain period in time, not in a general state.

Brohman thinks it is very important for natural resource professionals to get on the same page; this could be done by having similar definitions.

He has not experienced any discrepancies here in Nebraska, but perhaps in a lager region where people are coming from different backgrounds and educations, most people now come from similar backgrounds. The phase where understanding is the most important is in the planning stage of a management plan.

Appendix 4: Gordon Warrick Interview

Gordon Warrick is the habitat program manager for Spring Creek Prairie (National Audubon Society) in Denton, NE. Gordon use to work for the Fish and Wildlife Service and the Nature Conservancy. What Gordon does is manage the 800 acre tall grass prairie, only 2% of natural prairie is left in the world. What Gordon does is restore tall grass prairie to the best historical point, and trying to keep invasive species to zero.

Warrick would define conservation as the wise use of a resource, and he would include wildlife and plant species as natural resources. Conservation and preservation are two points on a continuum.

Preservation would be the hands off management approach, limited management of the natural resource and/or little extraction of a resource.

Restoration is a tool that is used to move an ecosystem or natural resource from one point on the continuum to another point, to restore an ecosystem/natural resource to restore the natural process or community. Restoration is done to a degree as plausible due to laws, policies, and human occupancy.

Warrick thinks the major different between these terms conservation, preservation, and restoration, is that restoration is a human management tool. All of the concepts are involved when managing natural resources. An example is that the gray wolf (*Canis lupus*) is being preserved in Yellow Stone National Park, but when the wolves are taken off the endangered species act the wolves will be hunted. In this instance you are trying to preserve the species and conserve the individual.

Warrick's work fits into preservation more than conservation, but does do some restoration, i.e. restoring the tall grass prairie, and conservation. The reasoning that he thinks that his work is more preservation is that they do not allow hunting, with will not allow any extract of wildlife.

In working in the field of natural resources for several years Warrick has encountered some discrepancies in the use of the terms. The example that he gave was, that some nature preserves use their resources to make a profit.

Warrick does not think that it is an issue that natural resource professionals use the same definitions when making plans or in the management of a resource.

He is doubtful that the different in the use of terms would lead to conflict with agencies/organization.

Appendix 5: Mary Brown Interview

Mary Brown is the coordinator of the Tern and Plover Partnership. She deals with different agencies and organizations that are in the critical habitat of the Piping Plover (*Charadrius melodus*) and the Interior Least Tern (*Sterna antillarum athalassos*).

Brown said the conservation is the place where all the interests win, to the best degree possible.

Preservation is trying to keep an ecosystem in a static phase. Trying to keep it the same as it is.

Restoration would be returning a habitat to a former state so that the ecosystem can function as a natural resource of ecosystem. Once this has been done the animals and biota will be able to have the necessary means to maintain the ecosystem or find a way where the natural process can maintain the ecosystem.

The differences for Brown were the way the human component plays into the actives of humans.

The category that Brown's work would fall into would be conservation. This is because she molds and modifies the human side to find a common ground. This is done by dealing with the human perception of what the plovers and terns are, and need to survive. Educating people of why these birds should be saved from extinction. Brown is always trying to find ways to address these issues in a real way that most people are relate to and understand.

Brown said that besides conservation she also is involved with some restoration projects. The organization that she works for just started a project. The reason that someone in her position would need to do more than just conservation, is because some of the land is in poor condition for plovers and terns, you can't conserve something that is not there. Brown does little to no work in preservation.

Brown has not experienced any discrepancies in the terms, but some people, not in the natural resource occupation, do not see the differences in the terms definitions or usage. How the perception or impactions affects the person i.e. landowners losing income to land regulation because a tern or plover is using that land does not see the differences in the terms.

Brown thinks it is very important for natural resource professionals use the same definitions. Because they must present a united front to the public, so they do not but a sour taste in the public's mouths. If there were a misunderstanding would a new found understanding help the ecology and management of natural resources? Oh yeah, Brown said, must have the public's support. When natural resource professionals work together there is a better chance to get the public, and if natural resource professionals cannot work together then what's the point in trying to save the resource?

Brown has not experienced any conflict with agencies or organizations due to different usage of the terms conservation, preservation, and restoration.

Appendix 6: Chris Helzer Interview

Chris Helzer is the East Nebraska program director for the Nature Conservancy, and oversees 5,000 acres of Nature Conservancy land doing research, land management, and restoration. The goal that he has is to manage land for biodiversity, wildlife habitat. What he likes about his job is that he can test different “crazy ideas” that some of the government agencies cannot do due to funding issues.

Helzer would define conservation as keeping natural resources and biodiversity in good health. This would be keeping what ecosystems that we have in a good condition.

Preservation would be less active as conservation; this would be keeping the things that would cause unnatural disturbance and other human caused threats to a minimum, this would be done actively, through exclusion.

Helzer would not say that restoration would be to take the ecosystem back to the historic state. But move the ecosystem to state where it will be more resistant and resilient to disturbances and function more naturally and independent of human management.

The major differences in the terms are that, preservation is more passive than the rest, build barriers around the ecosystem that you are going to ‘preserve’. Conservation is maintaining the health of the current system, while restoration is to move to a more sustainable system.

Helzer said that his work deals with conservation and restoration.

As for preservation, Helzer said that his work could to some extent fall under preservation due to some of the conservation easements that have been placed on the land. But for the most part, these easements are not used often.

There have been some discrepancies in the use of these terms for Helzer; restoration means different things in different places. Reconstruction is used to describe projects in Iowa, when they take a crop field and turn it back into a prairie, but when they take a bad prairie and change it into a good prairie then that is a restoration.

The importance of a common usage is important for the public perception because the impression to save the world i.e. preservation compared to conservation so public know what’s going on, and for professionals to understand what is happening in the field of natural resources. Helzer does not think that there is a major challenge in understanding the terms for ecology and management purposes, but does think that it is important.

Different uses of terms does lead to conflict with agencies and/ or organizations sometimes, the park service looks at land differently than other groups i.e. preservation. The forest service is more preservation minded vs. FWS that wants ducks.

Appendix 7: Mark Vrtiska Interview

Mark Vrtiska is the waterfowl program manager for the Nebraska Game and Park Commission (NGPC). He is the agency point person for waterfowl expert, in the biology and ecology, managing populations. They are all natural resources for North America.

Conservation would be maintaining populations through both habitat and other management tools that effect the target population, i.e. hunting regulations on waterfowl.

Preservation for Vrtiska would have a negative spin on the term. It would be protecting something with no change to that resource and there would be no use of the resource.

Restoration is to move a population and its habitat to a 'natural condition or level' to the best of your ability.

The major differences for Vrtiska are that restoration is a component of conservation and preservation, whereas preservation is the lack of management.

The areas where Vrtiska said that his work would fall into would be conservation and restoration. He wants to conserve and restore habitats and the populations that use those habitats.

Vrtiska does not see how his work would fall into preservation.

Vrtiska has experiences some discrepancies in the use of these terms. Some people are using conservation and preservation interchangeable; these people are doing things to maintain a habitat but calling it preservation.

Vrtiska would think when it comes down to understanding these terms in order to help natural resource, it will be needed to get things done, and what things are trying to get accomplished and what you can and can't do on the piece of land. The natural resource professionals will have to line out what the resource job will in tale, and what are they trying to accomplish.

Vrtiska has not experiences a whole lot of conflict between agencies and organizations. What he said would be more of a concern would be leading to more confusing in the public. Not with agencies, but in the public view.

Preservation is more liberal minded and free spirited

Conservation is more 'conservation biology'

Appendix 8: Dennis Schroeder Interview

Dennis Schroeder is the director of the Lower Platte NRD's, and he deals with the Farm Bill, and managing the staff at the office. He also works with landowners and other agencies protecting natural resources in the Lower Platte River Corridor.

Schroeder would define conservation as protecting the natural resource to a sustainable level.

Preservation would be preserving and protecting the identified resource.

Restoration would be restoring a habitat and its other natural resources to the best of their abilities.

Some of the major differences between these terms are that restoration is trying to bring back an ecosystem; sometimes you can't i.e. wetlands, channelized streams. Conservation is installing new practices, i.e. erosion - terraces and dams. Preservation is protection of a whole different direction. This is difficult to do, due to prioritize resources, and sometimes not all of the resources get accounted for.

Schroeder said that what he does is conservation and restoration.

Definitely his work could fall into preservation, but conservation and restoration takes priority. Preservation is a secondary option.

Schroeder has almost definitely counted discrepancies in these terms. It comes from different goals and objectives and who had the money. How far can the money go on a project, will influence how far financial you can restore a piece of land.

It is important for natural resource professionals to use the same definitions. Need 'wall boards' to stay in same area, government vs. private. If you were to take the rainwater basin, a saline wetland, and a river ecosystem, any time you increase the community you will have to be sure to understand the goals and objectives of each of the sub ecosystems and there natural resource professionals, this is critical.

Conflicts that occur between agencies due to different use of terms do happen and there is a split between the private sector and the private organization. Conservation groups are usually unified; there is an allegiance to ones organization.