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Utilizing Public Involvement As A Driver For Conservation Efforts

Alexander Colling

UTILIZING PUBLIC INVOLVEMENT AS A DRIVER FOR CONSERVATION EFFORTS

by

Alexander Colling

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Capstone Project Facilitator: Jana Lo Bello Miller, Ph.D.
Content Expert: Nathan Meyer, Ph.D.

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CHAPTER ONE

INTRODUCTION

For eons, natural areas and the human species have been closely interwoven. Humans play important roles in the ecosystem services of their habitats worldwide. These impacts are both positive and negative and have caused massive shifts in the flora and fauna around us. At some point in the 19th century, it became apparent that in order to minimize the detriments and maintain the quality of our natural resources, something needed to be done. This instigated creation of the first agencies to oversee and manage our country's vast wild areas. Public lands have been a defining aspect of conservation in the United States. These are lands that are managed for the enjoyment and use of the public for a variety of activities and functions. The presence of public lands has cultivated many traditions and allowed for us as a human species to better understand our habitat. With the conservation decisions made by land managers having so much impact on the public populace using those lands, I have been led to the following question: *How can land managers harness public involvement and understanding to advance conservation efforts?*

I have been enamored by all things wild and natural for as long as I can remember, spending much of my childhood climbing and exploring the ravines and gullies of the Minnesota River Valley. I remember wanting to explore every ravine bottom and creek to figure out what happened to form it and what is occurring now. This unbridled curiosity and adventurous tendency has led me to a passion for natural resource

management and education, where I can offer others a window into the natural world and provide opportunities for the next generation to explore our natural areas as I did.

It was during my undergraduate schooling that I realized the habitat and wildlife management side of natural resource management is only half of the equation. The other half is focused on the human dimensions and our use and abuse of the natural areas around us. This led me to shift my thinking to focus on the roles that humans play in the natural process of the environment. Humans play an integral role in the balance of the ecosystems that we inhabit and interact with. There are very few landscapes on earth that are free of human interference, we must now augment and supplement the natural processes that we disrupted. As natural resource professionals, we have an obligation to manage the land to the best of our ability and maintain the integrity of the natural areas we oversee. This duty comes in many forms, from habitat management to education. Managers must also be effective educators. After all, what good is a management technique if no one understands the rational, mechanics, and intended outcome of the effort? By having the ability to communicate our decisions and process of our management, not only are we thinking more deeply about the outcomes, but we are increasing the knowledge of the public. Not only does the public benefit, communicating conservation efforts with adjacent land managers allows for collaboration and eliminates conflicting efforts. All land managers, whether public or private have the same goal; to preserve and protect our natural resources for the good of the environment.

I am currently the Resource Manager at the Ney Nature Center (NNC), halfway between the Twin Cities and Mankato on the bluffs of the Minnesota River Valley. We are a county park under the care of a non-profit environmental education foundation. We

are surrounded by state and federal lands, and each agency has strong guidance to their management strategies and activities. Being a part of a small staff with not much authoritative guidance or strong direction set by predecessors, I was looking for a way to create a long-term goal and guidance source for our conservation efforts. A small sub-committee of our oversight board has an interest in the restoration and management of the lands and buildings but were functioning with little to no knowledge of management techniques or direction. I wanted to find ways to educate these committee members and better utilize them to set goals and objectives for the management of our land. I also wanted to create opportunities for public involvement in the management for park users to assist in the process.

Since we are managing public land, we should be managing it in a function that suits our stakeholders and park visitors. This is exceedingly important as the purpose of public land is to create and maintain places for the public to appreciate and experience the natural world. By involving the community in every step along the way, we are truly managing the land by the public, for the public. By involving the public in the management process, we are understanding and taking citizen values into account from the beginning. By doing this, we can build better community relations and minimize friction with later decisions. As a smaller agency, NNC can more easily implement procedures and practices towards more thorough and complete public involvement. There are a few procedures in circulation for public involvement for efforts that are in use today, but not many that are aimed at the smaller land management agencies. This is an opportunity for growth and research to better utilize the public to drive decision-making in public lands management.

As our organization grows and evolves, we will be facing bigger and more complex management issues and having an educated public to go to for feedback and values will be invaluable.

In the Fall of 2021, we will begin a large-scale prairie establishment project. Building in public involvement and education will be a large part of the efforts. This is a project that will be years long and will increase our impact exponentially on the flora and fauna of the area. My project will be assessed by applying the techniques and materials developed to gauge public values and opinions in prairie management related to the prairie establishment project. This will provide the NNC staff with a representation of the community's opinion of our past management efforts and depict the values that park visitors and trail users place on the natural areas found within our park. Through this model, I will be able to construct a toolkit for other land managers to develop and adapt to their needs. This will help them better manage their lands and build capacity for public input.

I am looking at developing a workshop and materials to assist land managers in educating and involving the general public in conservation efforts. This will be done to answer the question; How can land managers harness public involvement and understanding to advance conservation efforts? In order to begin answering this question, I had to familiarize myself further with the current practices and protocol in use. This also required a deeper knowledge of what public involvement looked like in the scientific process from surveying, to education to citizen science. I will approach this by developing a guide to implementing public involvement into the management process for use by land managers. This will take the form of a workshop geared toward practical

methodology and use for real-world applications. In the following chapters, I will lay out the research done to develop a deeper understanding of the topic. I will take an extensive look at the existing literature on the intra-field communication, conservation planning, public involvement, and advancing conservation through public participation. I will then lay out the structure of my capstone project, the Public Parallel Natural Areas Management System. Concluding with my reflection and findings from the development of my capstone project.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, I will take a deeper look at the management process and the implementation of public involvement along the way. The goal of this literature review is to examine previous efforts and protocols. The research gap I am hoping to fill through this review lies in the utility of public involvement in the entire management process from inception to monitoring, and to gear the process towards smaller lands managers. Much research and review has been done on the matter of the planning conservation efforts, so my aim is to bring it together and compile a collection of data pertinent to my research question. Through this review I am looking to answer the question; How can land managers harness public involvement and understanding to advance conservation efforts? I broke this question down into the following categories: intra-field communication, conservation planning, public involvement, and finally advancing conservation through public involvement.

Intra-field communication

Due to the patchwork of land ownership across the nation, interagency collaboration has become a norm in conservation today. With so many agencies focusing on diverse issues and managers becoming specialized to their lands, the need for multiple perspectives has grown. Awareness and monitoring have advanced to the point where multiple expertise are needed to manage lands. This is the advantage of collaboration. What issue may be plaguing one property may be controlled and managed in another, thus calling for effective communication and collaboration between managers. This calls

for a streamlined pathway for professionals to share ideas and techniques across differing landscapes and experiences. Alone, a manager can shape their lands to the goals of their agency but collaborate with adjacent lands and now there is a larger, unified conservation goal across boundaries and governmental levels.

The first step to creating collaboration between professionals is to develop a common baseline of knowledge. In the past, this came out of agency directives and academic schooling. It has become increasingly apparent that college education is no longer enough or comprehensive to all settings. In a 2012 article from the Natural Areas Journal, Brian Roussart reflects on this dilemma and describes the efforts of the Milwaukee County Parks/University of Wisconsin Extension's Natural Areas Program to form the next generation of natural resource managers to be better prepared for the future of the field (Roussart, 2012). The program is equal parts internship and collegiate course. Interns are trained in almost every facet of natural resource management and in disciplines outside of the norm to create the most well-rounded skill sets. Another effort has been made to build a central set of skills for managers in Florida. In a partnership between The Nature Conservancy and Valencia Community College and various other agencies, a curriculum was devised for current natural resource managers to continue their education and learn new techniques. The curriculum was designed by conservation professionals for conservation professionals, which helps to close the preparation gap. The overarching goal of the Natural Areas Training Academy was to create continuing education opportunities and a common base of knowledge for managers in Florida. The academy consists of a series of workshops on varying topics (Colverson &

Demetropoulos, 2010). This is a possibility for modeling public involvement opportunities that may be useful at NNC.

Collaboration can come in many different forms, from technique tips to interagency projects. One of the most pressing modes of collaboration in the literature is the pathway between managers and scientists (Wilson & Lantz, 2000; Fabian et al., 2019; Seavy & Howell,2010). This type of collaboration is paramount to moving conservation along. Experiments and biological research projects are conducted by biologists and researchers in academia, and then the data is published with the hope that it will influence management. Though many came from the same educational background, the nature of the roles differs in scope and focus, thus diverging to different aspects of natural resource management. Today, scientists are often focused on the species level or on specific aspects, whereas managers are focused on the interrelationships and the larger picture. Both are of importance, so bringing them together on a common plane is the missing link (Wilson & Lantz, 2000). There is a plethora of literature on this initiative. Wilson and Lantz (2000) took a critical look at the issues and possible solutions to the disconnect. In the article they also proposed a framework for creating teams of scientists and managers to accomplish the conservation goals. They highlighted the issue of the science-management disconnect; scientists design research projects to answer their questions and fulfill their objectives, and then the findings are published and read by managers to little use. The research findings fall short because they predated the management decisions, and thus have no correlation to the management needs (Wilson & Lantz, 2000). This issue has been documented by many (Barrows, 2007; Seavy, 2008; Fabian et al., 2019), with many suggestions for mending the break. Wilson and Lantz (2000) propose that for

teams to be successful all involved parties should participate in all phases from inception to assessment. This they say will require compromise from all parties to better work collaboratively, thus possibly resulting in a shift of how the duties of each party performs their job.

Internationally, this disconnect has been studied in Switzerland. The researchers in this study surveyed Swiss professionals to determine their preferred avenues of information acquisition (Fabian et. al., 2019). They surveyed professionals to gauge the importance and use of nineteen modes. They found that experience and personal methods (discussion with colleagues, communication with experts, and field excursions) ranked highest in both categories, while informal sources (YouTube and other audiovisual media) and international journals ranked lowest (Fabian et.al., 2019, Fig.1). Other trends revealed that time constraints and online sources played a role in the knowledge seeking processes of many. Especially for younger professionals, a lack of time played a role in the reason why formal sources were not used more often. This led the authors to suggest an increase in the importance of online and more succinct sources. To alleviate this issue and streamline the science to management progression, the system will have to be flexible and adapt to the uses and utility of managers by providing easier more manageable information at the speed and convenience of digital sources. One available tool for communicating between managers and from researchers to managers, is through online interactive tools such as Conservation Evidence. Through the website, issues are categorized, and findings are extracted from research past and present. Tools such as these allow managers to get right to the important information and consume more useful evidence in shorter times. In a paper from 2010, Seavy and Howell examined

methods for improving the passage of information from researchers to decision makers. They were looking at the paradigm shift of experience-based management to evidence-based management. This shift was being driven by the importance of conveying scientific data and results from the scientists to the managers and decision makers in the most effective routes possible. They used a survey questionnaire to gather information from respondents, the questionnaire consisted of a series of 24 methods and asked the participants to rank the method in importance to decision making and availability (Seavy & Howell, 2010). This method of survey could be redirected to gauge public perceptions. The findings of Seavy and Howell (2010) are very similar to those of the Swiss study; personal interactions rated highest in importance but at less availability and peer reviewed and syntheses were important and available but should be geared toward practical use as well as readability for managers.

Conservation Planning

The planning process is where the effort is brought from vision to action. In this section we will move through the process to the point where it is ready for public review. Planning conservation efforts is a time consuming and multi-faceted process. This starts with developing a scope of work and requires the thorough consideration and collaboration of many people as shown in the previous section. The hope is to add in a public aspect to the planning process.

The first step to any land management plan is to be familiar with the landscape and the condition and natural history of the land. This can be done through a few methods; by walking the land, looking at historical data, and comparing the surrounding lands. In this section, I will discuss the usefulness of historical data to understanding the

current condition and biota. There are two major forces that drive change in environments across time; climate change and human presence (Frelich & Reich, 2009; Wohl et al., 2017). These factors have drastically changed the landscape and the communities living on the land. In the paper by Frelich and Reich (2009), they discuss the impact of climate change on the Boundary Waters Canoe Area Wilderness (BWCAW) in Minnesota. The BWCAW along with the Quetico Provincial Park make up one of the purest examples of untouched wilderness in North America. But due to many factors, it is especially vulnerable to climate change (Frelich & Reich, 2009). Frelich and Reich examined four factors that are driving change within the BWCAW: fire (or lack of), climate warming, invasive species, and deer browsing. These factors are not unique to the BWCAW, they are drivers through much of the Midwest and across the country. These causes are either directly or indirectly connected to human activity in some part. Understanding these factors and their impacts on the land is key to managing the land to its fullest potential. Frelich and Reich conclude that many of these natural processes have been modified by humans, and that the best course of action is to restore the natural order or manage the areas as close to natural occurrence as possible (Frelich & Reich, 2009). Forests are not the only landscape altered by human activity. In a 2017 paper; Wohl, Lininger, and Baron analyzed the effect that humans have had on the freshwater ecosystems of the United States. Humans have been shaping the environment to their utility for millennia, whether that be for food or infrastructure. The authors point out the impact that human activity has had in adapting waterways and the habitats they held. They have been channelized, dammed, and diverted to better serve the needs of society, whether that be for lumber transport, energy, or development (Wohl et al., 2017).

Understanding the human activity in a certain area and the use of natural resources that occurred there is a huge indicator of the condition and causes of environmental function. This understanding will help to guide decision making to revert or supplement the missing pieces.

Often, the most important step is having a standard format for planning conservation efforts. By standardizing the planning process, it gives a framework for decision making along the way (Decker et al., 2012). In Human Dimensions of Wildlife Management, the editors presented multiple models of processes for wildlife management. They designed the "Manager's Model" to help analyze the issues at hand for any given initiative (Decker et al., 2012). By modeling the process, it makes the process easier to follow and guide decisions. One model may not work for all cases and agencies but developing a standardized format for planning would allow for faster more effective collaboration and continuation of management.

Also, modeling helps to guide goal setting. The backbone of any effort is a set of overarching goals, sometimes set by the agency and sometimes set by the manager. These goals are what sets direction and serve as a target for the ensuing management. Goal setting is an exhaustive process that serves as the pivotal point in any project or undertaking, pulling agency mission, scope and purpose all together to guide the direction of not only the agency but physical and anthropological impact that will be left on the land. In a paper by B.L. Driver, the Benefits-Based Management approach is examined and described. This approach aims to determine the benefits of a natural area to the public, to guide management of resources based on use and perceived value. Driver developed an implementation guide for using the approach in areas of outdoor recreation

use (Driver, 1996). While the paper is over 20 years old, the basic process for developing directives remains the same today. The process detailed in the paper clearly shows the multiplicity of sources for developing goals, especially the use of public opinion. Once a general direction is determined, there remains much to consider while creating a comprehensive goal set. There are few ecosystems in the world that are homogenous in make-up of flora and fauna. If there were, management of the natural world would be a simple and plain endeavor. In a single plot of land, there are uncountable interactions and symbiotic relationships. What may seem like the best course of management for the community in focus could be detrimental to another occupying the same area. Conflicting goals are bound to come to focus when determining the specific techniques. This is what creates the cyclical progression of decision making. This dilemma is examined and discussed at different levels by Mark Schwartz in his 1994 paper. Schwartz describes three maxims of modern conservation: the species preservation maxim, the community composition maxim, and the natural process maxim. Each maxim or school of thought is or has been widely accepted as a paradigm of conservation in the United States at some point. Through the analysis, Schwartz lays out scenarios and instances of each and the goal of the management. His point is that no matter the angle taken; the goal is conflicting with another effort. This is seen so often in today's conservation efforts (Schwartz, 1994; Wilson, 2009). What Schwartz proposes is that management actions must be adaptable because the natural world is not necessarily in an equilibrium, meaning that what may be the historically native vegetation may not be the most successful option. Sometimes this conflict is exceedingly difficult to avoid and priorities must be set depending on the goal at hand. This is the focus of a paper written

by Wilson, Carwardine, and Possingham in 2009. Their paper focuses on the process of setting conservation priorities. This comes at a time where funds are scarce, and threats are abundant (Wilson et. al., 2009). Land managers and agencies are having to prioritize some efforts over others in order to maintain the highest level of biodiversity and functionality. They break this prioritization process down into three main considerations: assets, threats, and costs. These are the main three considerations when setting priorities.

Once goals are set and actionable steps are developed, the process can proceed to implementation. This does not signify the end of the planning stage; throughout the actual management action there will be roadblocks and issues that arise. This necessitates the ability to adapt management actions and reevaluate efficacy. Adaptive management is a popular approach in natural resource management. Adaptive management came out of the need for solutions issues out of complex management efforts. The basis of adaptive management is to learn from actions to reduce consequences and maximize intended impact (Organ et al., 2012). Adaptive management's strength comes in the "iterative stepwise process" in which each cycle builds on the current knowledge and the ability to continue evaluating efficacy and increasing knowledge as more is learned about the natural processes in the management units. A large part of the adaptive management process is the situational analysis through stakeholder engagement. But this public involvement comes with limits that are paramount to effective management (Organ et al., 2012). After developing the initial phases of any plan, the need for public involvement becomes apparent for public education and input, as well as maintaining agency transparency.

Public Involvement

Society and the environment have always been tightly woven together in the human experience. As society evolves and develops, so does their use of the natural world. Throughout history, humans have exploited and used different aspects of the natural world, whether for protection and shelter or sport. As a result, there has always been a drive to preserve and manage these resources, and as uses shifted so did the management objectives (Dixon et al., 2019). From agency land acquisitions to monitoring the ecological processes, the method of protecting our natural world has changed and improved. This change, in many cases has been driven and championed by citizen efforts.

Concerned and passionate citizenry has been an essential part of our governmental process since the beginning of our country. Wildlife management in the United States today is done through the North American Model of Wildlife Management. This functions on the basis that wildlife and the habitat is managed as a public resource for the use of the public through efforts of state agencies (Peterson & Rodriguez, 2012). This centers on the Public Trust Doctrine, that wildlife is not owned by any one person but instead is in trust of the government for the benefit of the public (Decker et al., 2012). This legal standing allows for agencies to manage the wildlife and its habitats to the conservation of resources for present and future generations. This also means that public perception and support is a key step in the management process. This has led to a whole sub-focus in natural resource management called Human Dimensions (HD). Human dimensions of wildlife management is equal parts conservation and social science. This focus is relatively new in the field and was born out of a need to understand the coupled

human and natural systems (CHANS) (Liu et al., 2007). These interactions are innumerous and occur in almost every species and habitat. To begin involving these studies in traditional management is paramount to the success of the efforts. In their chapter of *The Wildlife Techniques Manual*, Peterson and Rodriquez discuss the shifting models of HD. From the client model to the stakeholder model and now the citizen model, the authors explain that conditions have advanced past the point where stakeholder groups can come together to solve the issues, now it is up to each and every citizen to understand their role in the conservation conversation. Many are not personally invested in the management of natural resources but have indirect impacts. One of the impacts mentioned is the implementation of sales and excise taxes and other funding sources (Peterson & Rodriguez, 2012). These nontraditional funding sources have had a profound impact on the ability of agencies to maximize efforts for game and non-game conservation. Many citizens have a conscious, vested interest in the success of efforts. As for the rest of the public, education is a gateway to engaging youth and adults alike in learning about the natural world around them.

Environmental education (EE) in the United States is a pursuit that was began by the writers and naturalists of the 1800s and evolving into a growing discipline in today's educational sphere. Environmental education as an activity has a long history but is a relatively new discipline in the educational curricula. As such, the impacts and benefits are still being studied. EE has the potential to open many doors for many people, not only to careers and hobbies, but also increasing awareness. EE transcends the genre of science education and is truly trans-disciplinary in scope and content. The basic purpose of EE is to educate humans about their habitat and their impacts on all habitats.

As presented by Sousa et al. in their 2016 paper, EE can be successfully used to draw attention to habitats in peril. In Portugal, the project "Ponds for Life" uses pond habitats to teach about the importance of conservation for biodiversity (Sousa et al., 2016). The program is aimed at high school students and consists of adoption of a local pond, surveying of biota, and activities guided by project staff. These methods were used in an effort to familiarize students with the organisms in their pond and to provide direct interactions with the natural world. They noted that the direct investigation was a key to the program, as technology has created more capacity for virtual learning but has distanced the students from the natural world at the same time (Sousa et al., 2016). Through pre- and post- surveys, they saw the values towards ponds and the organisms found within increased significantly. Through the program, they found that the success was attributed to long term learning as opposed to one-time events, this allowed for greater comprehension and permanence of the knowledge. They also deduced that the format promoted more hands-on learning and therefore improved the learning and impact of the curriculum (Sousa et al., 2016). Another example of utilizing programming to boost knowledge of specific ecosystems is found in Italy. The beechwood forest of Monte Cimino has been revered by the local people for millennia. The tract in focus is one of the only stands in the area to have been free of commercial logging for the last 70 years (Ziaco et al., 2012). This has allowed for an old-growth forest to mature and created a unique ecosystem. The area has been used almost exclusively for recreation and has become an attraction to the region. In 2007, construction of an educational trail began. The goal of this trail was to educate visitors to their surroundings and raise awareness of the forest type (Ziaco et al., 2012). The trail is lined with interpretive

panels. The panels are broken into three categories; description (ecology, processes, and history), indicator (species, succession phases, and focal points), and admonishing (rules, contact and emergency info). Interpretive signage allows for greater spread of educational materials as it can be read at any time and at a self-guided pace. This is especially helpful in rural and remote areas where educational staff are not readily available. Another strength of this method is the availability of information at the site of different management units, the public can be informed of the silvicultural practices used to manage the old-growth forest. Ecotourism has grown worldwide and is pulling more people to natural areas. This brings many opportunities for environmental education to grow. I found a gap in the literature in the use of pointed education to inform of the specific management activities. This gap is one that I hope to fill in the next chapter and in my project.

Advancing Conservation

Once a relationship has been built between managers and the public, the efforts can begin to make larger advances. With the public on board with management actions and involved in an active capacity, the opportunities are endless. The main opportunities I will be examining in this section are public/private collaboration efforts, citizen task forces and committees, and volunteer stewardship opportunities.

As mentioned above, collaboration is paramount in conservation. Whether between professionals or across public/private boundaries, there is much opportunity for advancing conservation efforts. In his report, Robert Comer (2004) discussed the development and use of collaborative conservation in federal land management (Comer,

2004). Conservation groups have been involved in conservation efforts for years, working with government agencies and privately. The guidance for this type of public involvement has roots in the National Environmental Policy Act (NEPA) and Federal Advisory Committee Act (FACA) along with many other legislations and regulations. These non-government conservation groups play an important role in the process as they can make progress that traditional government agencies are unable to. This includes but is not limited to: building consensus in citizen, environmental, and commercial groups; lobby legislators; supplement funding sources; and provide feedback to guide decision making (Comer, 2004; Koehler & Kootz, 2008). These are all functions that managers do not have the ability and flexibility to fulfill. By having groups to do the leg work, efforts can reach farther and maximize their impact. The motivators behind these conservation groups differ, from hunting interests to animal rights and beyond. Understanding a certain group's motivators and agenda is key to managing resources fairly and efficiently. There is a downside to this though, as Comer points out that issues can arise when these groups are given too much power and responsibility. He warns that boundaries must be set and made clear, otherwise these groups may begin to assume too much authority. Comer pointed out the dilemma of involving non-federal or governmental individuals in decision making on federally owned public land (Comer, 2004). Koehler and Koontz (2008) attempted to understand these groups by taking a look at the factors behind participation of citizens in conservation issues through the lens of watershed management. Watershed management groups are numerous and found in nearly every watershed across the United States (Koehler & Koontz, 2008). They surveyed members of watershed groups in Ohio to understand what drove people to participate in their local

group. In large part they found that the major factors influencing participation in groups were sex and occupation, males and environmentally related occupations were the highest. They also found that groups that were government-based had the highest participation, possibly due to the increased technical resources (Koehler & Koontz, 2008). Another important finding was that many members did not participate at all, instead receiving mailings and paying dues to support the cause through financial and social means. This provides a challenge to managers and agencies to find ways to foster greater participation in conservation. They also pointed out that involvement from all interested parties may not be possible either, the general public may not be equipped to effectively collaborate on environmental issues (Koehler & Koontz, 2008).

Finding avenues for active public participation is key to advancing conservation efforts on lands both public and private. An emerging avenue in public involvement lies in citizen science; the use of citizens to collect data and assist research (Cohn, 2008; Bela et al., 2016; Ries & Oberhauser, 2015). Citizen science projects have been in place for decades, with topics from all disciplines and fields. Citizen science projects are often born out of a need for large data sets and the interest of the public in ongoing research. This is ideal for researchers to lessen the load of lengthy field seasons and foster public buy-in to the research project. Many citizen science projects have resulted in real findings and advanced scientific knowledge. One such example is in the conservation efforts on monarch butterflies by citizen scientists across the country each fall. These efforts result in roughly 72,000 hours of research done by citizen scientists, across dozens of projects (Ries & Oberhauser, 2015). In their report Ries and Oberhauser (2015) quantify the work done by citizen scientists on monarch initiatives. They quantified the

amount of time spent by volunteers on these projects and found that there was a considerable amount of work being done by citizen scientists. They did an exhaustive literature search for peer-reviewed papers and reports on the topic of monarchs or their ecology and found 503 existed. Of these, only 88 utilized data from citizen science projects (Ries & Oberhauser, 2015). These publications are growing in number and the data is being used more by researchers. The current projects provide data that would otherwise take field crews many seasons to collect in short spans by citizen scientists. Citizen science has provided a pathway for public involvement in scientific studies, but there is still some field work that must be done by highly trained staff (Cohn, 2008). Cohn cites ecologist Brian Mitchell as saying that data collection methods written for citizen scientists must be easy enough for the general public to follow to ensure that the data received is reliable and valid. This may mean that instead of creating exhaustive species inventories, citizen scientists are directed to identify key species. In a study by Bela et al. (2016) they investigated the possibility of learning from citizen science projects. They examined the effect the project had on the individuals involved, citizen scientists learned ecological processes and gained a deeper understanding of the natural world. The researchers also learned the interests of the public and advanced their research. The reasonings for citizens to participate in projects and what they can gain is an important focus for researchers designing protocols. In many of the studies Bela and associates examined, a goal of public empowerment was stated. Using citizen science in detection and monitoring efforts is not only a great way to increase the traffic of the lands, but also is a surefire way to involve the public in an incredibly valuable way. Providing hands on projects for the public to complete also provides experiential learning

opportunities and firsthand knowledge of the impact of conservation activities. This is important for increasing awareness and support for conservation efforts but also encourages citizens to partake in efforts on their own lands.

In the Midwest, easement and reserve programs have been at the forefront of the effort to increase habitat and populations of wildlife. Promoting and providing opportunities for the public to take part in conservation efforts on public lands is a good way to get citizens interested and supportive of efforts. The next step is to equip landowners with the tools and knowledge to create high quality habitat on their own lands. This is done to increase the reach of conservation off of public lands and onto private. In Southern Minnesota, a large group of these landowners are agriculturalists. While farmers and ranchers often have a vested interest in the quality of the environment and soil, they often need incentives. In the 1930s and 40s programs like the Agricultural Conservation Program, Soil Bank Program, and the Set-Aside Acres Program assisted in removing lands from agricultural practice and planting in grasses and forbs for wildlife habitat (Warner et al., 2012). Setting aside lands for habitat minimized the impacts of extensive farming and maintained habitat for wildlife in otherwise barren landscapes. One of the most beneficial programs is the Conservation Reserve Program (CRP), under which lands are returned to their natural state to protect sensitive areas and increase the amount of habitat for wildlife nationwide. The benefit of CRP lands to owners is the consistent land rental and cost-sharing of plantings and management actions. This is a great way to expand public land management techniques and initiatives outside of property boundaries. There are many different easement and assistance programs available to private landowners through state and local governments. The struggle with

easement and reserve programs is retention, many programs have 10-15-year contract periods. Maintaining these lands and convincing landowners to increase their set aside is often a matter of involving the landowners in management decisions and presenting the benefits to the landowners (Farmer et al., 2017). Farmer and his coauthors examined the factors in landowner satisfaction and participation in easement programs, they found there are three main motivation factors: environmental, financial, and residential. They found that landowners who enrolled in programs to conserve the environment and maintain ecosystem services were more likely to enroll and remain enrolled as opposed to landowners that were focused on using their lands for financial gain or residence (Farmer et al., 2017). They also found that landowners with more acreage enrolled were more likely to pursue active management of their lands. These findings are important lessons for agencies and managers to keep in mind when interacting with landowners adjacent to public lands.

Conclusion

After compiling a small amount of the available studies, I have built a base for the workings of conservation through public involvement. Across these four categories, I have brought together the different aspects of the management process and narrowed the research down to begin answering my original question of how managers can utilize the public to expand the reach and impact of their management actions. Through the research, I have identified a niche in the research to be filled by my project, being the utility of public involvement by smaller public land managers. This provided me with a background to begin designing a guide for the implementation of more specialized protocol for smaller land managers and agencies. After reading each of the studies and

their findings, I took a closer look at their methods of survey and data collection from their subjects. This assisted me in building my own methods for this study.

CHAPTER THREE

PROJECT DESCRIPTION

Introduction

The final project will be presented in the form of a workshop with supplemental materials. The Public Parallel Natural Areas Management System will consist of multiple phases and stages, so the implementation of the project will be a long-term process. Due to the long-range implementation, the assessment will come at many different points. In order to develop the materials and test their capacity for use in the conservation process, I must first develop a way to quantify and qualify the intended audience and stakeholders for my study. This will come in the form of public surveys to determine values and attitudes towards the Ney Nature Center's conservation efforts. The other half will be surveys for current NNC site committee members to examine the efficacy of certain methods used during the study to increase the utility of citizen task forces. This will be done through surveys and informal interviews to collect information and data to inform the efficacy and further use of the management system.

Theoretical framework

This study and ensuing materials will be focused on public education and adult learning and presented as a workshop. The aim of this study is to develop materials and tools for smaller public land managers to utilize in understanding their communities and the people using their lands. This will be done through interaction and learning from and about public involvement and education. As examined in the previous literature review, public involvement can come in many forms and functions. For this study, I will be

focusing on utilizing public education to maximize the impact of communication on the knowledge of management activities. I will also look at the impact of citizen task forces, turning public knowledge into actionable goals and objectives.

Public education, and more specifically adult learning, is the greatest avenue for achieving the desired results of a knowledgeable and well-informed public. Many government lands (local, state, and federal) utilize programming for the purpose of connecting visitors to the natural world and their surroundings. Often, these programs take the form of hikes, demonstrations, or guided activities. This is one of the best avenues for agencies to educate the general public to the features and importance of the various lands. Programming is often aimed at youth with day camps, field trips, weekend programs, and family activities. Alternatively, there are many programs specifically designed for adults and adult learners. One prominent example in Minnesota is the Minnesota Master Naturalist program (MNNat) administered by the University of Minnesota Extension. This program and many other Master Naturalist programs are found in many states across the country. They aim to educate and provide knowledge to adult learners to create knowledgeable natural resource volunteers. This is done in many different modes and methods, but all with the goal of educating adults about their surroundings. In the Minnesota Master Naturalist program, this is done by educating people about the natural history, geology, flora, and fauna of the biome they are in. For the sake of this study, all educational programs aimed at adults will be one-time programs as opposed to the recurring cumulative format of the MNNat program.

Participants and Setting

As a small nature center, the Ney Nature Center (NNC) has a base of frequent park users that utilize the trails and lands on consistent and routine basis. Also, due to its location near a major interstate and proximity to the Twin Cities, St. Peter, and Mankato, there are a large number of visitors from outside the immediate communities of Henderson and Le Sueur. This results in a mix of local and non-local users, some frequent users and some first-time users. There is potential for a varied knowledge bank of citizens. In the immediate area, especially St. Peter and Mankato, there are two higher-education institutions with a plethora of highly educated individuals. Therefore, the number of adult visitors to our park that may have an interest in highly specific, project-centered education is high. The NNC has had much success with community involvement through the nature center's board of directors and various committees and task forces. These board and committee members, both past and present, have come from diverse backgrounds and skill sets, many of which come from outside of the natural resource realm. Designing guidelines for the education of this group and the many other demographics with the goal of creating an informed public, will be the focus of this study. For this specific study, I will be using the Ney Nature Center Site Committee as my citizen task force model and will design practices for implementation in meetings. For the public involvement portions, I will be using program participants and park users to obtain the survey data.

The entire study will be centered around the Ney Nature Center and, more specifically, the grassland establishment project happening within the park. I will be utilizing the grassland for modeling site meetings and programs. The subject of the

prairie establishment project is the last of the remaining farmland from the Ney family farm. It consists of two plots; 18.1 and 30.9 acres have been in corn/soybean rotational cropping since the late 1800s. They have been leased out to a neighboring farmer and the lease expired in Fall of 2020. This made for perfect timing for the prairie establishment to begin in Fall of 2021. The planting will increase the managed amount of grassland within the property by 49 acres and connect with an additional 18 acres to create a larger complex of grasslands. The education on and about the project will occur in and around the plots. Depending on restrictions of gatherings due to COVID19, these educational programs and meetings may take place on virtual platforms.

Goals

The goal of this study is to create opportunities and guidelines for managers of smaller or non-government agency lands to increase public involvement in the management process and better utilize the values and perceptions of citizens. In the short term, through educational programming and park user interactions, the aim is to increase knowledge and understanding of the techniques used to manage public lands. This same initiative is applicable across many different regimes and landscapes. No matter the habitat or landscape being managed, the same principles should be able to be used to increase the public understanding. In this specific study, the principles and practices will be developed to assist in grassland management. The long-term goal of this research is that this education and interpretation will culminate in a public invested in the success and longevity of the resources. I will do this through public engagement and the development of efficient citizen task forces. As a result, my hope is that land managers

can build capacity for active public participation in the management process. For the focus of this specific example, of the NNC grassland establishment, through education of the existing site committee and implementation of new task force procedures, a more efficient and productive partnership between citizens and managers will be cultivated. This will ultimately lead to greater direction and input from the community and help with the management actions of the agency.

Evidence

The information and materials will be presented in a workshop format to be presented to nature center administrators, land managers, and other individuals tasked with managing smaller public lands. The major avenue through which this will be done is with model materials and guidelines for public involvement and public relations. The assessment will come in the form of survey and informal interviews with participants from programming and meetings.

Surveys will be used for both the public programming and the task force portions of the study. The surveys will be used to gauge multiple variables and metrics. The survey questions will consist of questions pertaining to the following categories:

- Previous knowledge of specific conservation topic
- Perceptions of management techniques
- Values of presence of resource/habitat
- Importance of management activities
- Level of interest in activity/ willingness to participate at a higher level
- Effectiveness of certain communication strategies

The task force surveys will also include questions pertaining to the effectiveness or efficiency of certain committee management or prompt methods. These surveys will help to gauge public perceptions and opinions of the current management objectives and future management. They will also give insight into the perception of the public toward the agency's track record of management decision making. Survey answers from task force sessions will inform and focus on the effectiveness of the specific techniques used to steer discussion and decision-making during meetings.

Informal interview questions will be used outside of the programs and meetings to get more in-depth feedback and personal opinions on strategies. It will also allow for better exchange of ideas and discourse with participants and task force members. The informal interviews will consist of looser questioning to give way for more candid answers and provide an avenue for individuals to share ideas, comments, or concerns directly to the researcher. The assessment of the various different steps will come at different intervals. Assessment of the efficacy of the process as a whole will likely not come for a long time, so evaluating along the way is important to improving the utility of the steps.

Conclusion

Through the development of my project, I hope to build a system that will serve as a tool for smaller lands managers to maximize public involvement. The resulting project will be a suggested template for designing management efforts, but the true value of the process lies in the flexibility and adaptability. This allows the management stages to be adapted to the conditions of that specific place and time. With the protocols for

assessment developed I can begin building a picture of the values and attitudes of our visitors and community to inform and focus the direction of our management decisions. This will feed into the site committee meetings and provide statistics to guide their input on behalf of the public. The data from site committee members during meetings will help shape the processes and procedures to be included in the final materials. This will provide a model for the use and implementation of citizen task forces in public lands conservation.

CHAPTER FOUR
REFLECTION

Introduction

Throughout the course of the development of my project, there were many lessons learned and growth in my academic and professional experience. At the outset of the capstone process I had decided that I wanted to create a product to aid in the management of natural resources and at the same time educating the public to the use of conservation techniques. I organized this intent into the question: *How can land managers harness public involvement and understanding to advance conservation efforts?* This question resulted in the production of the Public Parallel Natural Areas Management System. In the following chapter, I will revisit and review my capstone process and highlight my major findings. Then I will cast my research into the next phase and explore the future expansion of my project.

Capstone Outcomes

Throughout the process of the research and development of my capstone project, I experienced growth in many different aspects. The largest growth I experienced was in my critical analysis of conservation planning. I gained a deeper understanding of the intricacies of designing conservation efforts while calculating the innumerous effects of the actions. I found that this is not something that can be taught, instead it must be learned through experience and close study of past actions. I had to dissect many studies and look at the landscape as a historical record of the many different actions that had to be taken to result in the ecosystem as it appears today. This was a lesson that I saw reflected in my product, I began seeing each action as a series of smaller decisions that

had to be made in order to determine the best course of action in any conservation activity. In many cases these decisions impacted the use and values (both intrinsic and extrinsic) of the natural world to the public. I was reinforced in the conviction that public lands are managed for the public and by involving the stakeholders in the process of land management, there was a shared responsibility between the stakeholder and the manager to ensure the longevity of the lands. Also, at the onset of the project, I had built a definition of "public" in my mind; people that use a specific land for a variety of activities. I discovered that this definition only described one cohort of the larger population that public lands are being managed for. I found that there are four different "publics" that land managers are working for: participating public, using public, proximity public, and future public. The participating public is the group that will be engaging in the management process, aiding in citizen science initiatives, and will be the most vocal in decision making processes; this group is contributing value to the public land. The using public are "using" the park for a multitude of activities but will likely not engage in management activities; by "using" the park, "take" can be implied meaning that there is a negative benefit to the land making this group noncontributory to the management of the land. Proximity public is made up of members of nearby communities who may never actually set foot on the land but have assigned an intrinsic value to the land by simply knowing that it is there and being managed for the health of the overall ecosystem; this group is also largely noncontributory in nature. The final group, future public, is made up of both currently living individuals and future generations who may enjoy/use and contribute to the future management of the lands. This last group is the intended audience for long term goals and will hopefully be able to

benefit from actions taken in the present. This conceptualization of who we are managing the land for, helped me to come to terms with the scope and importance of proactive management of our public lands.

On a personal level, I experienced immense growth and gained lessons in introspection and personal awareness. I realized at many points along the capstone process that the physical product I end up with at the completion of the semester is only a small piece of the education that was gained. I have gained many skills and tools for critically examining scientific data. I developed a learning process, as well as a deeper understanding of the potential of my ability for original thought.

Major Findings of Literature Review

In the early stages of my literature review, I had set my parameters wide due to my intention to capture literature pertaining to all aspects of the management process. This was helpful in that I pulled in articles from a wide pool of conservation topics and spaces. In the process of consuming this literature, I quickly discovered that the quantity of eligible literature was much more than I could possibly include. This led me to realizing that I should have started with narrower parameters and focused on a deeper investigation into my eventual goal, being public involvement in natural resource management. Despite this oversight, I found many aspects of my literature review to be beneficial to the final product. I had started my literature review with a look into communication between fellow managers and scientists. While this is not a large part of the system I developed, it is immensely important to the success of natural resource management. Managers must use current research to inform their actions and

communicate with colleagues to ensure cohesive management and sharing of information. The last section of my literature review entitled “advancing conservation”, contained the literature that influenced my project the most. This section was looking at current and future opportunities for public involvement in natural resource management both on public and private lands. This is the vein of literature that I would have liked to take a deeper examination of, and likely would have had further impacts on my project. Through the consumption of this literature, I discovered many techniques and processes developed by researchers and agencies to increase public involvement. It also studied the impact of involvement on public attitudes toward conservation efforts. This is a line of research that I will continue to pursue and use to influence my own practice.

Implications on Policy

My project and materials have a great potential to influence policy, especially at smaller public lands. My research has already changed the process for which conservation planning occurs at the Ney Nature Center (NNC). Through the process I developed, I have begun to design management actions and public engagement to the guidelines included in the Public Parallel Natural Areas Management System (PPNAMS). My system has the potential to aid other agencies in the management of their lands. This system was developed as a roadmap and not a one-size-fits-all application, so there is also a possibility for integration into existing processes. Agencies that are concerned with natural resource management are likely to have procedures in place that guide their management activities, but the integration and adoption of certain aspects could bolster the use of public involvement.

Limitations

During the creation of my project, I came upon a few limitations in regard to content and use. Even though the system was not designed to be a rigid guide, there is a certain level of variability that cannot be accounted for. Across geographical and political differences, there is a difference in the needs and required steps that must be included. This can be remedied to a certain point by viewing it as a set of suggested steps that can be rearranged or plucked and used. Natural resource management in nature is rarely linear, with many efforts resulting in undesired outcomes or not meeting quotas. Creating a cyclical workflow is difficult to convey in written materials, instead necessitating managers to be able to mentally conceptualize the progression. Another limitation of my system lies in the assessment of the processes efficacy. Any effort must have clear evaluation and assessment criteria that must be hyper focused and tailored to the effort at hand. These are difficult to create generically. Since conservation efforts are long-term undertakings, there is no great way to gauge the utility of the Public Parallel Natural Areas Management System until the effort is completed, instead each step should be judged individually. One of the largest limitations I experienced in the development of PPNAMS, was the short timeframe for building the stages and materials. In the course of the semester, there was a certain amount of work that could not be completed that would strengthen the system and improve its utility.

Future Opportunities

Currently the Public Parallel Natural Areas Management System (PPNAMS) consists of a 33-stage core with 3 supplemental guideline sheets. This is simply an

overview of the many decisions made by managers and agencies during the management process. I chose each of these stages due to their significance to the natural resource management process as I perceived them. I also developed and included them as I saw their utility in my model of the Ney Nature Center Grassland Establishment. As mentioned above, the emphasis and mechanics of the management process changes across the geographic and political spectrums. Future development of PPNAMS lies in the expansion of more stages to better suit the effort at hand. Due to the time constraints of the semester, I was unable to further develop additional guideline sheets and more detailed stages. There is also potential for the development of procedures for topic such as invasive species monitoring and control, volunteer work, grazing/burning design, and many others. Further information on developing considerations for climate adaptive management activities and developing living documents for grant/funding opportunities are also potential growth areas for my project.

On the research focus of public involvement in conservation, there is a growing interest in the reconnection of the public with the environment. Public involvement in natural resource management has begun to be studied more intensely in recent years. The benefits of citizen science initiatives have been well documented in the literature, so pushing these results out to the managers in charge of the efforts is of the utmost importance. Based on my own findings, I see a need for purpose driven environmental education with the intent to educate the public to the mechanics and reasoning of conservation efforts. Not simply to appease a quota or to fulfill standards, but to educate with a goal of making a tangible impact. I see a need to quantify and qualify the impacts

of public involvement in conservation. Only by having data on the impact of public involvement, can we initiate a change in the management of public lands for the future.

Conclusion

Since the beginning of conservation thought in the United States, the goal of preserving the natural world for future generations has been at the forefront. As educators and natural resource management professionals, it is our conviction to take what was given us by our predecessors and continue the progress before handing it to our successors in the best ways we can. We need not solve every problem, instead manage our public lands to the best of our current science. We have found ways to manage conditions that were unfathomable in the past and those that follow will do the same. At the present, the duty of maintaining ecological health doesn't have to fall only on the shoulders of managers and agencies. There are many roles that the general public can do that assist and alleviate stress on our public lands to support the flora and fauna of our regions. Much of the surface area of the United States is owned by private landowners, therefore the education and support of conservation activities on these lands is advantageous to the flora and fauna of the US. This provides for much more habitat, food, and protection outside of public lands, thus reducing the stressors on the carrying capacity of public lands. Nevertheless, responsible management of public lands is paramount to the longevity of biota on the continent. While this land is owned by governmental units, the biota is held and managed through the Public Trust Doctrine. Meaning that flora and fauna of the United States is owned by the citizenry and cared for by the government. In order for this doctrine to work in its intended purpose, there must

be transparency and trust on the part of both parties (government and citizenry), this balance is often a difficult task. By involving the public in the process of management and decision-making, there is an increase in understanding and near complete transparency. Creating a seamless junction for this involvement was the main focus of my capstone work and my perpetual duty as a public land's manager.

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