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Developing An Effective Proposal For A Natural Habitat Restoration In The School Yard

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DEVELOPING AN EFFECTIVE PROPOSAL FOR A NATURAL HABITAT RESTORATION IN THE SCHOOL YARD

by

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CHAPTER ONE

Introduction

Introduction and Project Question

Living and teaching in a city in central Texas has many perks. It's a city that is not too big, and not too small. It has everything I could ask for in terms of food and entertainment, including many local businesses that are blossoming and making Waco a special place. We have a large park near the Brazos river called Cameron Park with great hiking, mountain biking, and gathering areas for friends and family. Something Waco is missing however, is the historic tallgrass prairie native to the area. Being an environmental science teacher for students aged three to ten, it can be difficult to explain how important a prairie ecosystem is without an example nearby.

A tallgrass prairie is a type of prairie that receives more than 50 cm of precipitation a year and has soil characterized by high levels of clay or loam (Park & Allaby, 2013). It is said that natural prairies are one of the scarcest ecosystems found in the United States, due to the ease at which they were transformed into farmland (Samson & Knopf, 1996). For this reason, I will be creating a proposal to restore some of our school's backyard into a prairie, such as one that would be found in our ecoregion known as the Blackland Prairie. My research questions are: How does one prepare an effective

proposal for restoring a natural ecosystem, and what are the benefits of the close proximity of natural habitats to students and other stakeholders?

In this chapter I will discuss how I came to love nature and how my journey has led me to become a teacher that wants my students love and appreciate nature. I will also discuss why I think this project will be beneficial to stakeholders (including the environment).

Personal Journey

The journey that led me to my capstone project started as a child while visiting my extended family in Grayson, Louisiana in the early 1990s. My mother's grandparents were farmers and loggers on this land, which is still a part of our family to this day. Growing up visiting this land as a child from the suburbs was a strange experience. Feeling so deeply connected to the wildness of the rural land while knowing that I was just a visitor was difficult. When I would return home to Dallas, I'd certainly feel more of a cowboy than my friends did. This lead to many days and evenings exploring the local creek, building "houses" in the short, clay creek walls, complete with ladder and lookout perch in a nearby tree.

I loved being outdoors, but a new interest in sports (or perhaps a compelling pull to follow my friends) changed how I spent my time in nature; from then on, it was the well-groomed grasses and sand on the baseball diamond for me. My only real connection to the outdoors was through sports. Given my experience, moving to organized sports rather than spending time in nature is the story of many suburbanite children, where sports fields can become a dominating scene, and it can be difficult to avoid devoting

oneself to sports. This was my story until high school, where interests changed from sports to guitar and garage bands. Sure, there were bonfires, camping trips with friends, and other various outdoor activities, but it was not until my sophomore year of college at Baylor University in 2011 when Mother Nature reached her gentle hand back out to me and I changed my major from pre-pharmacy to environmental health science.

Truth be told, I thought the job prospects were high in this growing field, and I enjoyed the chemistry and biology courses I had taken earlier in college. Little did I know that I would most enjoy the environmental science aspects of the major. After I graduated in 2013, I worked for six months in the Baylor biology department as a laboratory technician for a large study involving a series of 12 experimental streams at our local wetlands. After that short term job, I took on the challenge of teaching fourth through sixth graders at a local public Montessori school, with the hopes of eventually becoming the environmental science teacher for the campus. Two years later, my dream came true and I became the environmental science teacher for students in pre-kindergarten (age 3) to 3rd grade.

I had never worked with kids this young before, some of them still developing their language skills, and their fine motor skills still a work in progress. However, I quickly realized that with students this young, I did not have to worry about them not getting their hands dirty *enough*, like I sometimes did with my reluctant older students. The natural world was still a wild place to be explored to this younger crowd of students I had, and I want to be able to bring this same sense of exploration to our students at our current location.

A large portion of our schoolyard is just an open field with Bermuda grass. There are trees lining the property line of our school, but as our school used to be a middle school, a large area was turned into a football/soccer field in addition to a couple of baseball and softball backstops. While I love that our school has many recreation options for our students, the vast majority of this 6+ acre back schoolyard is unused. Since the current Bermuda grass offers sparse habitat options, wildlife is difficult to see. This makes a birding trip quite dull for my excited students, binoculars in hand. Their bird spotting tool usually ends up as a nasal cavity inspector, the students disappointed with the bird population. Frustrated, we tended to simply view the common European Starlings, House Sparrows, and White-winged Doves with our bare eyes.

Fast-forward to my summer 2017 coursework. It was my first time to Minnesota, and I was first taking my Environment and Society class, followed by Minnesota Biomes. While I learned much from the Environment and Society course, I was floored by the Biomes class. I had never experienced a prairie as I did in that course. Sure, I had seen grassy fields, but I assumed they were devoid of life besides grasshoppers and ants. When our professor took us to search for different forbs and grasses in the prairie, I was struck by how extreme the biodiversity was. I had no clue there were so many different kinds of grasses and wildflowers in a healthy tallgrass prairie.

After my interest in prairies was sparked, I was able to determine that the county that I live in was once a tallgrass prairie, as well. Sure there would be differences in flora species, but many of the central ideas I learned about Minnesota prairies would be directly applicable to our native tallgrass prairie, deemed the Blackland Prairie ecoregion.

Coming back from summer break energized and excited me to share what I had learned with my students, I saw a new vision for our schoolyard; a restored tallgrass prairie habitat, right in our backyard, giving our students a glimpse of what all of Waco would have looked like hundreds of years ago. This is important in building a sense of place for a child, where belonging is important to building active citizens.

Project Rationale

My capstone final product will be a proposal to the administration of my school as well as the groundskeepers of our district. It is important that I have a well thought out product to present to those that will make the final decision on the execution of the project, and to ensure that maximum buy-in occurs from stakeholders. I will highlight the benefits of having our own miniature nature preserve for student learning, student health (both mental and physical), as well as positive habitat changes, including savings of time and money on landscape management. In the coming chapters I will also explain why having a natural habitat is important to teachers who will have another outdoor learning area available for lessons in all subjects. Other benefits will include community and parent involvement opportunities, as completing the project will be done with the assistance of volunteers.

After the prairie restoration is complete, the community will have access to a new outdoor learning environment, as school-yards remain open and available for public use after school hours. Environmentally, a restored prairie ecosystem will have many benefits, including, but not limited to, habitat restoration for organisms, decreased runoff due to deeply rooted native flora, increased pollinator visitation, soil improvement, a

reduction in fertilizer use (improving watershed health), even reducing the effects of climate change to be discussed in Chapter Two.

Significance of the Capstone Project for Teachers

My capstone project will provide teachers with a template with which to write their own grant to create a natural habitat restoration in their schoolyard. While much of my capstone covers elementary aged students, there is no reason why teachers or non-traditional educators of all ages can not use my project as a starting point for their own projects. My capstone is available in a free digital format, making it easily accessible to an educator with an internet connection. This ease of access will assist in creating a more widespread dialogue amongst educators.

One vision I have is that my project will be used nationwide to assist in creating small scale nature preserves located on the schoolyard. As more and more people are living further away from wild places and turning to urban areas as their residences, this wildscale issue must be addressed. While I will focus on prairie preserves, my project can be modified to accommodate all kinds of habitats, some easier than others. For example, a coastal school yard could create a wetlands habitat, or a coniferous forest could be implemented. Of course different habitat restorations will take varying amounts of time to be realized and completed, but the benefits of having a natural habitat in close proximity to educational environments will be well documented in the coming chapters.

Summary

The region of Texas that I live in was historically a tallgrass prairie ecosystem called the Blackland Prairie. There is only a small amount of this prairie left due to

agricultural practices and turning prairies into sports fields. At my school we have a large area of land that is not utilized by students, even for play. My capstone research question is How does one prepare an effective proposal for restoring a natural ecosystem, and what are the benefits of the close proximity of natural habitats to students and other stakeholders? In Chapter Two I will highlight and review literature to support my project and ensure that my proposal will have a strong foundation of factual evidence of the benefits of restoring a landscape to its original state. I will connect the literature review to my capstone project in chapter three as well as provide a detailed explanation of my project. In chapter four I will discuss the conclusions that I have come to and reflect on the project as a whole, describing the strengths and weaknesses of my project.

CHAPTER TWO

Literature Review

Introduction

In this chapter, I will review the literature surrounding my research questions: How does one prepare an effective proposal for restoring a natural ecosystem, and what are the benefits of the close proximity of natural habitats to students and other stakeholders?

I start by discussing the characteristics of an effective proposal since it is important to know what is expected before beginning any project proposal. I then discuss the benefits of a restored prairie environment to stakeholders, from the benefits the community will receive from a restored habitat, to how nature can make the lives of teachers a little bit easier. Third, I discuss the current research on the benefits of outdoor education. Lastly, I explore the literature involving the benefits of a restored prairie ecosystem on the environment.

All four of these subsections will assist someone wanting to create their own habitat restoration project proposal. This literature review will be useful to the educator (formal environmental educator, or not) that wants to expose their students to more natural areas and would like to restore a landscape surrounding their schoolyard to its original habitat. While I do not expect that everyone who uses my project as a tool to help

them write their own proposal to be in a prairie ecosystem, I do think my literature review is broad enough to include the benefits of all kinds of natural systems to students, and the strategies for writing an effective proposal are universal.

The Effective Proposal

There are two goals of a proposal: to define the proposed project, and to persuade those who will be decision makers of a project that the project is a good idea and should be completed (Nickson, 2012, p. 7). In order to effectively communicate the purpose of a project, certain precautions must be taken in order to avoid failure of the proposal. On the other hand, certain ideas can be presented to help to persuade the stakeholders that a project will be successful. In this section, I will give an overview of the characteristics of a proposal that make it a stronger candidate for success. This section is first because it is important to know what makes a proposal strong before gathering research for the project.

Chapin and Leshner (2004) state that the most important aspect of writing a proposal of any type is to know your audience. It is critical to know how your audience will react to your proposal, to know their priorities, to know how they think, and to know what they expect. Once you have figured out your audience, you can tailor your proposal to most effectively communicate your goals.

For example, if you are writing a proposal to a school administration board, then you must be sure to include how your proposed project will affect them and their own stakeholders (students, staff, district, community) (Chapin & Leshner, 2004, pp. 61-64). To identify stakeholders, the writer of the proposal must examine who will be impacted

by the project. Not only must the humans impacted be identified, Roeder (2013) states that one must think of the human resources that will be needed from before the project begins (planning and designing the project) to closing out the project (executing the plan). These people must be incorporated in the proposal to make sure everyone will be fully invested in the project, as well as knowing their expected roles (p. 3).

The project description is the section of the proposal where your audience will spend the largest amount of time. Here, the audience will try to understand your project and gain understanding as to how the project will affect them and their stakeholders. The description will contain the how and why of your project (Chapin & Leshner, 2004, p. 63). It is not necessary to make yourself seem like a genius here, rather, it is more important to make sure that your proposal is simple, clear, comprehensible, and impactful in a single reading (Seeman, 2015). A proposal writer must understand that the intended audience may not be an expert in the field of the project, so Nickson (2012) gives us suggestions for when communicating with a decision panel:

-Answer the question that was asked in a clear way, not the one you wish had been asked

-Leave out extra information that was not asked for or is not relevant

-Summarize long answers to make sure the meaning is not lost

-Use diagrams and figures to save time and make your meaning easier to understand

-Make benefits to your audience clear

-Use supporting evidence to make yourself more credible

-Use plain language to avoid misunderstandings

Using these strategies on a proposal will help to make it more effective, and hopefully mean that your project will be accepted by those who are making the final decisions. Specifically, for my project I will need to discuss the benefits of a restored ecosystem to my stakeholders, which is the next section of this chapter.

Stakeholder Benefits of a Restored Natural Environment

Identified stakeholders must understand why a restored ecosystem would be a benefit to them. For the intended purposes of my proposal, my stakeholders include the local community, the students, the teachers and staff, as well as district administration, including the groundskeepers. This section will discuss the positive impacts of a restored ecosystem for stakeholders, some of whom will have decision making power on determining if the project will move forward or not.

Wolf (2008) states that around 85 percent of people are now living in urban areas, and that cities that contain natural areas are becoming more and more important. Being in nature has positive mental, physical, and social benefits. Wolf (2008) continues and explains that when natural areas are located near residents (a restored prairie habitat, for example), communities report increased interaction between individuals, within small groups of people, and even between neighborhoods. When communities come together to participate in the restoration of natural habitats within their community, social interactions from healthy food generation to developing intergenerational relationships occur. Stronger involvement in the community leads to higher levels of organization and improved livelihood for residents (Westphal, 2003). In other words, nature connects

people even in an urban setting. Including how a prairie restoration will involve the public around our schoolyard and bring benefits to our community will help to make the project more appealing to stakeholders.

Several authors (Louv, 2008; Fägerstam & Samuelsson, 2014; Kennard, 2007) identified in the review of the research for this capstone project describe benefits related to teaching outdoors. This section of the Chapter Two explores the positive effects of nature on student mental health located during the review of the research literature. According to Berman, Jonides, and Kaplan (2008), a student that is more emotionally regulated due to their time in nature will be more receptive to learning new information. That is to say since nature has a calming effect and is a positive factor in keeping emotions of people of all ages at a more stable state, then learning will be more likely to take place when a student has been around nature.

While researchers have found evidence that secluded natural areas (far from the city) do a better job of increasing cognitive function after spending time there, they also report that exposure to any natural areas (gardens, urban parks, restored ecosystems in cities) will contribute to higher brain functioning (Berman et al., 2008). This means that if lessons are taught outdoors, or perhaps after students have just returned from being in nature, then recall of information will be higher.

Time in nature has even been shown to reduce attention deficit symptoms in children of a wide variety of ages and backgrounds (Kuo & Taylor, 2004). Even counselors should utilize time in an outdoor setting, as time in nature has been shown to improve the mood of those with depression, enhance self-esteem, reduce anxiety, and

improve interpersonal skills in all humans ranging in age from young children to the elderly (Greenleaf, Bryant, & Pollock, 2014). A restored natural environment not only allows for more engaging lessons for teachers, but it also helps to reduce disruptive behaviors in their students, increasing learning outcomes for the class.

Another benefit to a restored prairie ecosystem would be reduced manpower and costs for maintenance crews. When an airport decided to implement controlled burning of grasslands around the runways, they discovered that the natural grassland ecosystem controlled weeds and required less cutting. The machinery required for maintaining a groomed non-native grass also polluted the air more than the prescribed burns did (Controlled burning improves airport grasses, 1997).

To summarize, a restored ecosystem will have many positive benefits for stakeholders. The community around the schoolyard prairie will be able to reap the benefits of the natural area by coming together and strengthening community bonds. The teachers will have a natural area available for lessons and could see the positives of classroom management when students have more time in natural spaces. The school district will see advantages due to lower maintenance costs and have worker availability elsewhere. Next I will discuss in further detail how having a natural ecosystem close to a learning environment can help to improve educational outcomes for students.

Educational Benefits of Outdoor Education and a Restored Natural Habitat

It is well documented (Louv, 2008; Lieberman & Hoody, 1998) that nature-based education has positive impact on standardized test scores. This subtopic will provide evidence for how working outdoors can have a positive academic effect on subjects like

language arts, mathematics, and science. It is important to include the educational benefits of restoring a natural ecosystem in a proposal to stakeholders, especially when those stakeholders are involved with an academic institution.

Louv (2008) describes how at Hotchkiss Elementary school in Dallas (about 2 hours north of my location), fourth grade students in an environment-based or place-based education program scored 13 percent higher on tests when compared to their peers in a traditional classroom . While schools may see the benefits of outdoor education on the physical, mental, and social well-being of children, and Evans (2011) notes that many educational systems are leery to adopt more outdoor learning opportunities due to some educators being skeptical at the true effectiveness and benefits of educating students outdoors. This subtopic of the literature review will further explore the benefits of outdoor education on student academic performance.

To see the benefits of nature in education, one does not have to even be teaching about the environment to see academic benefits. Lieberman and Hoody (1998), of the State Education and Environment Roundtable (SEER) saw many benefits of conducting multidisciplinary lessons in the schoolyard surrounding an academic campus. These benefits included better test scores in standardized tests in subjects like math, reading, writing, science, and social studies; reduced classroom behavior issues and classroom management problems. SEER even saw increased engagement and enthusiasm in student learning; and greater pride and ownership in accomplishments. The SEER continues and explains that while creating a generic curriculum for the United States to use would be very helpful for instructors, it would also be difficult due to the variety of ecosystems

present, it is important for schools to use their available natural areas to teach in. Lieberman and Hoody (1998) state that teaching in a student's immediate surroundings allows students to feel connected not only to the environment around them, it also helps to teach lessons about the ecosystem in which they are living. Lieberman and Hoody continue and explain that place-based learning also encourages students to think about themselves as a member of their community, both in ecological and socio-cultural manners.

For the language arts, Lieberman and Hoody report that students in environmental education programs perform at a higher level than traditional classroom counterparts. The authors attribute this higher level of performance because the students in the environmental programs are learning and reading about things that interest them and make them feel connected to their community. What this means for the educator, then, is that students must be interested in the subject matter in which they are reading, writing, or speaking about. If interest is shown, then learners will make more of an effort to understand and to be understood says Lieberman and Hoody (1998). Therefore, environmental educators reported higher competence in language arts skills when the topics were about a student's community (Lieberman & Hoody, 1998).

Similarly, a study (Fägerstam et al., 2014) of junior high students in Sweden compared the academic achievement of a traditional mathematics classroom and a mathematics classroom that was conducted partially outside. The study results reported that one of four math lessons a week were conducted outdoors and used a more collaborative, hands-on teaching method than would be traditionally done indoors. The

study concluded that the class that was conducted partially outdoors had a higher level of mathematical skill improvement than the traditional class. The results of outdoor mathematics education are not limited to older students, however, as we will see next.

Kennard (2007) suggests that early childhood mathematics skills can be greatly strengthened by doing activities outdoors. For example, allowing students to count items of their choice that were found outdoors, letting students compare the weights of different items outside, and finding patterns in nature (leaves, flowers, and shells, for example), are excellent ways to facilitate grown in mathematical concepts for younger students who are still in a concrete stage of operational development (Kennard, 2007). The use of manipulatives meets the child where they are developmentally.

There is a clear academic connection between outdoor education and science curriculum. Students perform better on science tests when the curriculum is supplemented with outdoor experiences. Rios and Brewer (2014) suggest that a student is more likely to make lasting connections to scientific concepts when they are connected to outdoor activities with a concrete, hands-on approach. Carrier, Tugurian, and Thomson (2013) explain that even with clear connections to higher scientific (and other academic subjects) achievement and outdoor education, it is still found that outdoor activities are declining and difficult for teachers to carry out.

Carrier, et al. (2013) state that there are many barriers to getting students outdoors, including a perceived lack of time, student fears of the outdoors, fear of student injury (and ensuing legal issues), lack of innovative instruction, and lack of teacher confidence in science. These barriers are present in many academic settings around the

world and they suggest that the issues can be mitigated by adequate teacher training in outdoor education, more preparation time, and communicating to students the benefits of outdoor education. These are not the only benefits of having a natural ecosystem located in close proximity to students, there are also environmental benefits which will be discussed next.

Environmental Benefits of a Restored Natural Ecosystem

This section will discuss how restoring an environment to as close to its original state as possible will help to improve the health of the land. It is important to discuss that this project is not just a cosmetic change to the land, and that restoring the ecosystem will have a long reach on many different aspects of the environment.

Tallgrass prairies once dominated the central part of North America. The 60-million-hectare ecosystem ranged from Manitoba to southern Texas (Samson & Knopf, 1996, p. 39). Due to the fertility of the soil and the relatively easy task (due to small amounts of trees and other barriers to farming) of turning the prairies into agricultural fields, the North American tallgrass prairies began to see their demise at the start of the 19th century (Noah Fierer et al., 2013). Today they are considered one of the most endangered ecosystems on the planet (Samson & Knopf, 1996).

According to Cox (2015), when prairie soils were tilled for agricultural use, the roots of the native grasses and forbs (herbaceous flowering plants besides grasses) were destroyed. The deep roots of these plants were holding the soil in place, keeping wind and rain from eroding the topsoil away. When the prairies were destroyed, this led to an estimated half of the topsoil being washed away, down the Mississippi river to the Gulf

of Mexico, leading to the large dead zones that are problematic to this day (Cox, 2015). Hirsh, Mabry, Schulte, and Liebman (2013) estimated that if farmers would replace 10% of their crops with deeply rooted native grasses and forbs, then there would be a reduction in erosion at a rate of nearly 95 percent. Planting the perennial forbs and grasses in areas where water flows during a rain event is the most effective erosion deterrent (Hirsh et al., 2013). Planting native grasses and forbs helps to keep the topsoil in place, making the plants a cost saving mechanism, as well, since it is estimated that we currently lose 125 billion dollars of topsoil a year (Cox, 2015).

Native prairies are also excellent habitat for many different organisms. This includes the important bee, which is in many cases the best pollinator of flora in many ecosystems, and certainly bees are the best pollinator on a worldwide scale (Winfree, Bartomeus, & Cariveau, 2011). A study of remnant prairies and prairie restorations revealed that prairies were effective at increasing bee populations and improving bee health by increasing foraging and nesting resources (Tonietto, Ascher, & Larkin, 2017). Lepidoptera (butterflies and moths) that were found in pre-agricultural prairies have been shown to return to restored prairie habitats (Summerville, 2008), making the case that restoring a habitat to its original ecosystem can bring back species that were once lost to a region. Reptile and amphibian populations also benefit from a restored environment due to an increase in their natural habitat (Engbrecht et al., 2009). Bird populations have also seen increases in population due to prairie restorations (Dyke, Schmeling, Starkenburg, Yoo, & Stewart, 2007). Prairie dependent birds that are in danger of extinction include Sprague's Pipit and Le Conte's Sparrow, while other birds are in danger due to habitat

loss include Swainson's Hawk, Short-eared Owl, Painted Bunting, Northern Bobwhite, Mourning Dove, Dickcissel, and Bell's Vireo (Spangler, n.d).

Tilman, Hill, and Lehman (2006) state that restored prairie environments also mitigate some of the carbon overloads in our atmosphere that have led to climate change. Prairie fauna pull carbon out of the atmosphere and incorporate it into the soil. The process of taking carbon out of the atmosphere is known as carbon sequestration. Prairies grasses and perennials remove 4.4 mega grams of carbon per hectare per year (Tilman et al., 2006). With the ever changing climate, prairies can be seen as an important factor in combating the harmful effects of climate change.

Fornara and Tilman (2012) caution that the increasing amounts of nitrogen fertilizers used in agricultural processes can lead to a decrease in plant diversity, allowing more undesirable plants to take over an area. The researchers state that these weedy plants do not have as intense of a root system and will not have the same carbon sequestration benefits. However, if native prairie plants are planted in a region, then the extra nitrogen helps to increase root density, which in turn increases carbon sequestration (Fornara & Tilman, 2012).

In summary, a prairie restoration has many positive effects on the environment, from preventing soil erosion, bringing back wildlife that has been lost due to habitat destruction, to carbon sequestration. I will more fully describe the process of preparing the land for a prairie restoration, as well as the steps needed to create a prairie habitat, especially on the smaller scale, like what would be needed for a schoolyard restoration.

Prairie Restoration Process

When determining where to start with a restoration, site preparation is the most important aspect. John P. Morgan indicates that poor site preparation is the reason why most failures to restore a habitat occur (Packard, Mutel, Society for Ecological Restoration, Conference 1990, & North American Prairie Conference (12th : 1990 : University of, Northern Iowa, (1997), p. 193). First, if the site is overrun by weeds, then it is recommended Packard et al. (1997, p. 194) to use chemical herbicides to rid the area of the difficult to kill weeds. Next the soil must be repeatedly and shallowly tilled to kill any remaining weed seeds that will compete with your native grass and wildflower seeds (Packard et al., 1997, p. 195). Using a seed drill, a specialized tool the plant seeds at the proper spacing and depth, plant your native seeds. A seed drill is not the only method of planting seeds, and is quite expensive. Another method to plant seeds is broadcasting (throwing the seeds or using a broadcaster), but this method is not as effective as using a seed drill (Packard et al., 1997, pp. 208-210). It is important to use native seeds that are from the region you are planting in. There are many native seed providers and your local agricultural department or County Extension Agent will be able to assist and ensure that your seeds will be best for the region.

Weed management is especially important in the first few years of prairie restoration. While the native grasses and wildflowers are creating their deep root systems, there will not be much plant growth above the soil. Therefore, close mowing of the area will kill only fast growing weeds, and should be done every few weeks for the first year of planting (Packard et al., 1997, p. 212). Another important factor in the success of a prairie restoration is adequate water in the first few months of planting. Seeded areas

should receive 1-2 inches of water every few days in the first month to ensure that seeds get enough water to sprout (Packard et al., 1997, p. 211).

At our school yard, we still want our students to be able to play recreational sports such as soccer or football. We do not want our prairie to take over the playing field, and vice versa. In an E-mail correspondence with prairie restoration expert Heather Bass (2017), it was suggested that a walkway or a path be placed around our prairie restoration. This is to prevent the spread of the playing field grass into the prairie restoration. Non-native grasses such as Bermuda grass, Bass says, will quickly overtake a restored prairie. Keep in mind that prairie restoration is difficult. Success is not guaranteed and the process is slow and laborious.

Conclusion

My review of the literature covered information about writing an effective proposal (specifically for an education based purpose), I then highlighted the benefits to stakeholders of having a restored ecosystem in a community, discussed the educational benefits that nature can have on a student, communicated the benefits of restoring an ecosystem back to its original state, and concluded with a preview of the prairie restoration process. While my prairie restoration process was by no means a complete step by step guide, it is a good place to start. Each site will need independent consultation to ensure proper restoration results. In chapter three, I will give an overview of my actual project to be carried out. I will describe the project, including my project format for my powerpoint presentation, how-to guide, and grant proposal. I will summarize ideas from

this literature review and make a connection between my project and what the latest research has to offer.

CHAPTER THREE

Project Description

Introduction

With the shift out of rural areas and into more urban settings, there is a sense of disconnect from nature amongst our younger generations (Wolf, 2008). To address this problem, I propose my project question, which is: How does one prepare an effective proposal for restoring a natural ecosystem, and what are the benefits of the close proximity of natural habitats to students and other stakeholders? The goal of my question is to prepare me to propose and get approval for a prairie restoration at the school where I teach. In this chapter I will provide an overview of the project, give a short review of the literature to support my project ideas, detail the format of my project, and then discuss the steps to take in my project along with a timeline for when the project will be completed. Throughout the chapter, I will also discuss why I think this project is important for the field of environmental education.

Project Overview

My project, to be completed by May of 2018, will be a proposal to my school administrators (and other district administrators, if necessary) to create a prairie restoration on our campus. I will create an actual grant proposal document that will highlight the benefits of having a restored natural ecosystem on our school grounds, as well as discussing the financial costs and process of a prairie restoration. The first section

of the proposal will be a project description and timeline. The second part of the proposal will also include a breakdown of associated costs of creating the prairie restoration, but will also discuss the cost saving benefits of a natural ecosystem that will not require as much groundskeeping. In the third part of the proposal, I will include information supporting a prairie restoration by discussing the benefits to teachers and students of having a natural place located on our campus. There will be information on how restoring an area to its original state will have environmental benefits, such as encouraging the return of birds (Dyke, Schmeling, Starkenburg, Yoo, & Stewart, 2007) and amphibians (Engbrecht et al., 2009). The rise in plant and animal populations will greatly increase the learning opportunities on site.

My project will also include a visual PowerPoint presentation to accompany my proposal. It will be important that I visually represent my proposal to make it as effective as possible. The visual presentation will include graphics to represent costs and savings of the restoration. Since I will be presenting my proposal to school administrators, it will be important to include pictures of students working outdoors, along with research to show the academic, emotional, and social benefits that an outdoor learning area could provide.

My visual presentation will also include a sketch of the processes to take place on our campus. I will locate photographs of similar areas to our school yard that have undergone the prairie restoration process so that our school administrators will have an idea of what our campus will look like during the project. It is important to know why I think this project is important in the first place, so I will next discuss what the research

has said about why natural areas are important to my stakeholders, making sure to include teachers and their students, whom will be the main benefactors of the restored environment.

Lastly, I will include a proposal how-to document that will give teachers advice on how to create a natural habitat (prairie or another type of habitat) at their location (schoolyard or other location). The document will be short and concise while also providing important guidelines to creating an effective proposal. This how-to guide can be seen as a condensed version of my research project, only highlighting the most important and effective suggestions.

Research Theories

There is evidence to support the ideas that having a natural area available for student work time has many important benefits, including social, emotional, and academic improvement (Louv, 2008,; Evans, 2011; Fägerstam & Samuelsson, 2014; Greenleaf, Bryant, & Pollock, 2014). The goal of the eventual prairie restoration would be to see an increase in these measurements (academic, social, emotional) in our students.

While our school has wild places around it, there is a lack of funding for field trips and perceived lack of time by some teachers limits the availability of time spent outdoors. As any teacher could tell you, the weeks leading up to a field trip can be very stressful and there are a lot of things that must be in order before a class can go on the trip, from parental permission slips, scheduling and paying for busses, to funding of the trip itself, are all barriers to a successful field trip. Having a wild place in our own school backyard would greatly increase the likelihood that students would be engaged with

nature. Next I will describe the reasoning behind why my proposal will be in the format it is in.

Project Description

My capstone project question clearly states that my project will be a proposal to school administrators. For that reason, I will now describe what will be involved in the actual prairie restoration and what I envision for our schoolyard restoration. Our school is located on 5+ acres, of which about 1.5 of these can be restored to a prairie environment. In order for the restoration to occur, it will be necessary to first get rid of the existing Bermuda grass, either by chemical means or by solarization, a process where plastic sheeting is placed over the area to trap the sun's energy, killing most unwanted plants. Chemicals will possibly have to be used if the area is very large or if the land is completely overrun by invasive plant species. The land must be slightly tilled or disced to allow the future seeds to take root. My volunteers (likely students and community members) will then plant native grass and forb seeds. These seeds must be planted in October or November to allow them to go through a cold dormant phase, and will begin to sprout in the Spring.

Our campus, located in central Texas, has more than 700 students, ranging in age from 3 to grade 14. We are in a metropolitan area with a population of around 125,000. The area where our school is located has a large poverty problem, and more than 90% of our students receive free and reduced lunches. This is ever more the reason for why I believe it is important to expose our students to nature, as it is likely that many of them will remain in metropolitan areas with limited outdoor activities. While my project is

mostly intended to impact our school's teachers and students, it is important to note that all of our public school campuses are open to the public. A prairie restoration will be a unique environment that more than likely has not been experienced by the community surrounding our school.

Project Format

I have chosen to create a proposal in the form of a word document so that the administrators with the decision power to decide if the project will move forward or not will have all of the information in a clear cut, easy to understand format (Seeman, 2015). Simplicity is important because it is common knowledge that school administrators are busy and their time is valuable. I have also chosen to include a PowerPoint visual because it may help to clear up any misconceptions that my audience may have while I am presenting my proposal. It will be important for each person that I am presenting to to have a physical copy of the proposal, since there will be in depth information regarding the costs and benefits of the project, and I would not want any of the parts of my proposal to be forgotten or misheard. Now that I have discussed what form my project will be in, I will describe the project timeline.

Project Timeline

My plan for the project is to finalize all the steps I will need to take in turning our grassy field into a prairie by the end of January 2018. Next, I will need to finalize all associated costs with the prairie restoration by the end of February, 2018, and all of the needed tools and personnel will need to be assured by the end of March, 2018. I will

create the physical proposal by the end of April, 2018, and have the visual PowerPoint presentation done by May.

My reasoning for completing all of the associated project goals by May, 2018 is so that I can give my proposal to the administrators at my school and hear a decision by the end of the school year (end of May, 2018). Therefore, I could have all summer to gather materials and finalize physical prairie restoration steps and when school comes back into session in August of 2018, I would be able to incorporate the restoration into my environmental science curriculum. I would hopefully be able to start the restoration process in September of 2018, and have the seeds in the ground by November of 2018.

At this time (December, 2017) I am not sure what the available funding sources will be for a project like this. It is likely that there will be open grant opportunities from our district's Education Foundation, with the Parent Teacher Association being another likely source of funding. I must keep in mind, however, that there are many options when it comes to paying for a project, and I may need to look elsewhere (an environmental education group, a restoration organization, etc.) to ensure that the project is successful after the completion of the proposal. Below are my examples of a prairie proposal and the accompanying powerpoint.

Summary

To summarize, my project is to create a proposal to create a prairie restoration in my school's backyard. The proposal will be twofold, part paper proposal, and part visual PowerPoint presentation to make my presentation more effective. My proposal will include information about the benefits of a prairie restoration for stakeholders (school

administrators, school staff involved in maintenance, students, teachers, and local community) and the environment. It will highlight cost saving benefits of a prairie restoration and discuss the reduction in manpower that will be needed to mow and maintain our campuses landscape. I will include a timeline of the planned prairie restoration, so that administrators will know what to expect.

I think this project will be helpful for teachers like me who feel that there is a lack of natural areas for students to explore and connect to. I will have laid out a foundation for which other teachers can use to create a natural ecosystem restoration. My project will also help to guide those that may need a bit of help with the proposal writing stage, making it more likely that schools around the nation will adopt their schoolyard into a natural habitat.

CHAPTER FOUR

Conclusions

Introduction

In this final chapter, I will revisit my research question and reflect on the process of creating my project. My research questions are: How does one prepare an effective proposal for restoring a natural ecosystem, and what are the benefits of the close proximity of natural habitats to students and other stakeholders? I will discuss how this project has helped me grow as a researcher, writer, and a learner. I will highlight the articles and research that inspired and helped me to write my chapters one through three. I will share how I hope my project will be used by others in the future, how I will use my project, and how it contributes to the field of environmental education. Next, I will discuss the limitations of my project. Lastly, I will explore future areas of research that I could go into after this project.

Personal Growth

This capstone project has helped to increase my ability to find relevant and meaningful research for a myriad of topics. I was very nervous that I would not be able to find very much information for parts of my project, especially when I was trying to find academic resources for tips on writing an effective proposal. Using the Hamline University library resources made this part of my research quite easy. I still found that I

was most comfortable with physical articles and books, even though the majority of my sources came from online research databases. I found the hard copies easier because I did not have to wait for articles to load, and did not have to make sure I had the correct access and logins to databases. I realized the great importance of the online resources quickly as it was very easy to find evidence to support a smaller idea instead of having to search for a book in the library.

As a writer, I found the peer editing process to be very important for my growth, both editing someone else's chapters and someone taking the time to edit mine. I felt empowered by the participants to give real, constructive feedback, as this is what I received on my work. The honest comments made my work not only go along at a faster pace, but also made it more enjoyable to know that my peers were agreeing or disagreeing with points in my chapters. I was forced to really consider if I felt the same was as the authors if I was using one of their ideas, and I felt compelled to have more unique ideas myself. I think the peer editing was one of the most valuable tools in this process.

As a learner, the process of my project has been formative in that I have had to think about certain subjects (habitat restoration, grant writing) at a deeper level than I ever have before. In needing my research to be thorough, my approach to research has been more inclusive of different perspectives of environmental education. This strenuous research style will be helpful not only for future projects, but also for my philosophy of environmental education. In this regard, I would say that the most unexpected portion of learning that I had was about the benefits to outdoor education in subjects besides

science/outdoor education. I think that I instinctively knew that learning while outside was important and helpful, but having it be confirmed through solid evidence based research was a pleasant surprise.

Inspiration

There were two pieces of writing that were most influential to my project. The first work is the book *Last Child in the Woods* by Richard Louv (2008). This book was not only a great source of research for my project, but it was inspirational to my wanting to ensure that the students I teach receive quality outdoor time. Louv is not just an impressive researcher, but also an excellent storyteller. *Last Child in the Woods* was the catalyst for my research on how education conducted outdoors has a positive benefit to knowledge retainment and increases testing scores.

The second work that was inspirational to my research was the article *Metro Nature: Its Functions, Benefits, and Values* by Kathleen Wolf (2008). In this article, Wolf describes the positive benefits that nature has on not just an individual, but also the rest of the community. This article is the reason for including the "community" at large as a stakeholder for a natural habitat restoration in a schoolyard. While it may be obvious that students and teachers would have a positive benefit from a habitat restoration, it may be less clear that the community around the school would receive benefits as well. Wolf's article is what inspired me to expand on this idea.

While I did not create all of the ideas in my project (nor was it expected that I would), I did synthesize my own ideas from the combination of many resources. However, these two had a larger impact than many of the others, and also had a larger

personal impact than just providing sources for my project. In the next section I will describe ways in which my project can and will be used.

Future uses of my project

My hope for this project is that other educators will use my research and or project to help them write their own habitat restoration grant and get their students outdoors more often. Chapter 2 of my project contains valuable research for an educator (formal or not) to justify a project similar to my proposed prairie restoration, but it also provides evidence for teachers in all subjects to do more outdoor education, which would not necessarily require a grant or for someone to purchase any material goods. Teachers could use my project as justification for more outdoor education if there is an administrator who is hesitant to allow it.

Personally, I will use my project to apply for a grant through my district's Education Foundation in the 2018-2019 school year. Every year, the foundation gives away grants that focus on unique classroom or campus projects that promote student unity and collaboration. The pocket prairie project would be a perfect candidate for their foundation and would satisfy their mission. If my grant proposal is not accepted by the Education Foundation, I will use the resources listed on my Habitat Restoration Grant Writing Tips page (Project Learning Tree, Alcoa, Clif Bar, etc.) and apply for grants via alternative sources.

My project adds to the professional field of environmental education by taking largely perceived information, that doing education outdoors is beneficial for many different entities, while also providing suggesting ways to make a grant proposal more

effective. This is helpful because many times these two ideas are separate from each other, especially in the field of education; however, grant writing is a skill that must be practiced and I think this idea is often overlooked. Therefore, my project increases the likelihood that an educator receive funding for their restoration project, thus enlarging the population of students participating in outdoor activities at school.

A limitation of my project is that restoring or creating some habitats are easier said than done. For example, it would be much more difficult to restore a field to a deciduous forest or a marsh than it is to return it to a prairie ecosystem. For that reason, I would say my project falls a little bit short in the aspect. However, I still believe any educator or person wanting to perform a habitat restoration will be able to obtain useful information from my project and research.

Another limitation is that habitat restorations can take a very long time to become stable. For example, a prairie may take 3 to 4 years to become fully established. During this time, the prairie may not be very visually appealing and this could be a deterrent to someone wanting to move forward with a habitat restoration. It must be communicated to the grant committee that the restoration process is a long one and takes a while for the desired results to occur.

While I would hope that all of my project would be useful, I know that most likely bits and pieces of it will be used by educators to get information that is useful to them, and that is a success in my eyes. Even though I hope my project will get accepted by the first grant giver I apply to, I know that reality is not always as easy as that, and I think my project does a good job of being realistic in its expectations. In the next section

I will explore other relevant topics to consider for future projects and conclude with my recommendations for educators who are wanting to pursue a habitat restoration.

Future research or projects and recommendations

The next logical step for a research topic related to a habitat restoration would be to conduct a study of the effectiveness of a schoolyard (or similar) habitat restoration. Perhaps this would include a pre-restoration and post-restoration survey to the students or public around the restoration, where the relative knowledge of the restored habitat is measured. The reporting of this data could be another useful tool to assist teachers in conducting a schoolyard habitat restoration. Another interesting area of research could be to research the effectiveness some may have had with creating multiple ecosystems in a schoolyard. Perhaps these ecosystems could be from different biomes to further assist with the important real and tactile science experiences that parents and educators are expecting for students.

A recommendation I have (and also an encouragement) is to not give up if your grant is not accepted at one funding resource. Perhaps they will give you feedback for why your grant was not accepted. Use this information to adjust your grant proposal and revamp its contents. Make sure that you have thoroughly researched your habitat type so that you are ready to address any questions your granting committee if necessary. Another recommendation would be to take your time and make sure that your campus would be ready for restoration work before applying for a grant that would require extensive land work. Assess your campus for adequate space, proper drainage, and soil type for the type of habitat you are trying to return to. Lastly, I would encourage

educators remember their motivation for a grant before and while completing it. Keep your thoughts on this motivation during the process of the grant so you do not get bogged down by lengthy applications.

Summary

In this final chapter, I have discussed areas where I grew as a researcher, writer, and a learner. I highlighted two works that were influential to my work, one of them I knew from before I even started the project, but both of them will remain a part of my philosophy of environmental education. I concluded by sharing my thoughts about research topics that would branch of the idea of habitat restoration and gave some advice to educators looking to perform their own habitat restoration.

While this project has been challenging, I have learned much and grown as a writer, researcher, and learner. My hope is that my project will be able to assist an educator, formal or not, in their journey to creating a habitat restoration or obtaining a grant. Personally, I look forward to using my research for my own habitat restoration grant and then completing the actual restoration in a way that is conducive to student learning and fostering curiosity.

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