Patagonia Steppe Restoration in Parque Patagonia, Chile

ER 390 Report
Professor: Valentine Schaefer
Written by: Marlo Shaw
December 2016
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1.0 Abstract
This report is purposed to evaluate the grasslands restoration strategies and global volunteer program at Parque Patagonia in the Aysen region of Chile. These evaluations are informed by academic literature and personal experience and are used to advocate recommendations to improve the effectiveness of Conservation Patagonia’s grassland restoration strategies and the comprehensiveness of their global volunteer program. The Chacabuco Valley, located in the future Parque Patagonia, was purchased by Conservation Patagonia in 2004 and has been undergoing grasslands restoration ever since. More than ten years later the park staff and their volunteers have removed more than 30,000 domestic sheep, 3,800 cattle and 650 kilometers of fencing from the land. Restoration efforts in the park continue as teams of staff and volunteers remove invasive species, monitor species at risk, restore natural migration patterns and maintain the remaining livestock. In this report information was recorded during the participation of Parque Patagonia’s three-week volunteer program. This program has been successful in implementing holistic restoration strategies that strive for economic, cultural, social, and ecological sustainability while simultaneously creating a global pool of ambassadors for Conservation Patagonia. The program faces some challenges in the relaying of information to its volunteers and researchers and improving the social license of this project among locals. Parque Patagonia’s restoration strategies could potentially be improved to ensure an even more effective use of resources and provide more opportunities for scientific exploration, community engagement, and safer volunteer work.

2.0 Introduction
More than half of our earth’s grasslands (4.5 million km²) have suffered from nearly a century of abuse from intensive agriculture, animal husbandry, resource exploration, resource extraction, commercial forestry, and urbanization (Henwood, 2010). This degradation has raised concerns about loss of the ecosystem services that this biome provides: water retention, carbon storage, biological diversity, and cultural resources (medicines and traditional foods) (Henwood, 2010). Conservation Patagonia is a non-profit organization that has taken on a role as an international leader in grasslands protection and restoration through their acquisition of large tracks of land in the Patagonia region of Chile and Argentina (Patagonia, 2016). In their
first ten years as an organization, Conservation Patagonia has boldly undertaken the largest grasslands restoration project in the world located in the Chucabuco Valley in the South of Chile. They have created a strong team of local knowledge holders and scientists to inform the grasslands restoration strategies to be implemented by their global volunteer program (Saucedo & Meneses, 2008). This report is purposed to review three of Conservation Patagonia’s current grasslands restoration strategies that volunteers participate in: fence removal after the relieving the land of livestock, care for remaining livestock, and invasive species removal. Information obtained through personal experience and interactions with staff at Parque Patagonia, supplemented with extensive literature review, will contribute to the development of recommendations and discussion around the future of the park, it’s volunteer program, and the effectiveness of it’s restoration strategies.

3.0 Conservation Patagonia

In response to widespread grasslands degradation there has been significant growth in demand for the research, restoration and protection the world’s grassland ecosystems in the past 15 years (Henwood, 2010). Unfortunately, even with this increased interest, only %4 of the biome is protected globally (Henwood, 2010). This is a deficit from the widely agreed upon suggested minimum area of %10 of protected area for viable ecosystems. A response to this disparity in area protected has been the popularization of private protected areas that are funded by varying types of non-governmental organizations and charities (Saporiti, 2008).

Conservation Patagonia is an excellent example of a private initiative targeting the protection and restoration of the Patagonian Steppe ecosystem in Chile and Argentina through private land acquisition (Saucedo & Meneses, 2008). Typically, areas chosen for conservation are evaluated with consideration of several factors including ecosystem type, ecological value, and connectivity with existing protected areas (Patagonia, 2016). After the land is acquired, typically through purchase from private landowners, the land is further evaluated and the necessary, project specific, facilities are built. Conservation Patagonia takes a holistic approach to ecosystem protection, including important components such as community engagement,
tourism promotion, education and scientific evaluation. The final goal of Conservation Patagonia’s projects are to negotiate a transition of land ownership towards the public sector. The land acts as a donation to the Federal Government from Conservation Patagonia with the agreed assurance of as a national park. The insurance of protection under National Park status will give the land a higher standard of protection and provide other intrinsic benefits such as tourism and economic growth in the area (Muir, 1901). Conservation Patagonia, and other similar initiatives, are especially valuable considering the current lack of sufficient distribution and diversity of protected areas in Chile and the austerity of their regulations (Saporiti, 2008; Holmes, 2014)

One of Conservation Patagonia’s most ambitious and contentious projects is located in the central region of Patagonia in the Chucabuco Valley (Saucedo & Meneses, 2008). Their efforts in this valley have utilized a global network of volunteers and staff to implement what is currently the largest grasslands restoration project in the world. This private protected area has been named the future *Parque Patagonia* by Conservation Patagonia. This land is destined to become a tourism hub for the central Patagonia region (Jones, 2012). It will also act as a key connecting landmass between multiple existing protected areas, which will likely facilitate better migration patterns for the several large range native fauna (Saporiti, 2008).

*Image 1: Map indicating the location of Parque Patagonia. Image taken from Google Maps.*
4.0 Site Location and Extent

Currently, Parque Patagonia is a 200,000-acre property located in the Aysen Province and the XI region in South Chile (Saporiti, 2008). This is the least populous region in all of Chile (Holmes, 2014). The nearest Chilean community is the small town of Cochrane with a population of under 3,000 people (Jones, 2012). The most popular way to access Parque Patagonia is by leaving from the region’s tourist hub, Coyhaique. Coyhaique is a community that is located 330 km and an eight and a half hour drive from the park on the north to south highway called the Carretera Austral. Today the highway is gravel, windy, and narrow, but greatly exceeds the quality of access to this region that existed before the 1980s (Jones, 2012). The park exists at a highway exit located at the confluence of the Baker and Chacabuco Rivers. The park headquarters are situated about in the Chacabuco valley. It’s coordinates are roughly Latitude: -47.117432, Longitude -72.486107. This valley was strategically chosen because it is a key piece of land that connects several existing protected areas in the region (Saporiti, 2008). The Eastern side of the park reaches the Argentinian boarder. On the Northern side it borders Reserva Nacional Lago Jeinemeni. On the Southern side it borders Lago Chocrane which reaches into argentina. On the Western Side it borders another protected area called Reserva Nacional Lago Cochrane Tamango o. Together these adjacent protected areas take up 450,000 acres of land. If Parque patagonia is amalgimated, the total land protected would add up to 650,000 acres, comparable to that of Yosemite National Park (Patagonia, 2016).

5.0 Site Ecology

Patagonia’s grasslands consist of a complex mosaic of vegetation assemblages, soil types and fauna relationships. These ecosystems exist in a varied biogeoclimatic environment because of the long history of several glaciations and volcanically active periods coupled with the rugged, diverse terrain of the andes. Parque Patagonia is situated in a transitional ecotone between the arid steppe of Argentine Patagonia and the temperate southern beech forests of Chilean Patagonia. This complexity, met with limited resources for detailed baseline studies, makes studying these grasslands challenging. This report will focus only on the Patagonian Steppe Ecosystem.
5.1 Climate
The climate in the Steppe ecosystems of Parque Patagonia is characterized by a cold-dry semiarid climate resulting in 100-400mm/year of precipitation (Anchorena & Cingolani, 2002). It is unique to have such a dry climate just 200 miles from the ocean but the Andes Mountains create a rain shadow on much of the park, disrupting the flow of moisture as it flows east. In the summers (December to February) the temperatures can get as high as 21-27°C and as low as 10°C (World Weather Online, 2016). The winters are long and windy in Patagonia and the temperature plunges to an average of -2°C in the coldest months (World Weather Online, 2016).

5.2 Soils
The four most dominant soils in the Patagonia steppes are aridisols, entisols, mollisols and andisols (Chartier, Rostagno, & Roid, 2009). Both aridosoles and entisols are light in colour and low in nutrients and are typical of most desert environments. Mollisols are dark in colour and can be high in nutrients. Andisols are formed from volcanic ash. More than half of the topsoil in
the ecotone is considered coarse textured and sandy (Anchorena & Cingolani, 2002). On a micro scale, these soils tend to me more heterogeneous the drier the climate is (Cesa & Paruelo, 2011). Also on a micro scale, the soils in this ecotone typically have sharp localized changes in salinity, texture, and susceptibility to erosion (Chartier, Rostagno, & Roid, 2009). The degradation, compression and erosion of these soils are partly due to the harsh Patagonian winds and over a century of intense livestock traffic in the Chucabuco Valley.

5.3 Vegetation
The Patagonian steppe vegetation is characterized by a small number of key species including various species of Fescues and Mulinum (Cesa & Paruelo, 2011). There are a few iconic, hardy, thorny shrubs that most people associate with this ecosystem including the Berberis microphylla, an evergreen shrub with a sweet, beep blue berry (Franzese, 2016). Other typical plants include Chuquiraga avellanedae and Lycium chilense and tuft grasses like stipa setigera and Festuca gracillima.

5.4 Fauna
The fauna typical of the Steppe grasslands of Parque Patagonia create a complex web of relationships that drive many ecological processes including vegetation suppression (Travaini, Zapata, Bustamante, & Pedrana, 2015). Most important for the context of this report are the natural grazers of the Patagonia Steppe, the Guanacos (Lama guanicoe) (Holmegren, 2002). The guanaco is a wild relative of the domesticated llama and shares many behavioural and physical attributes with others in this genus (Saporiti, 2008). Guanacos are so important because they were the dominant grazers on the landscape before the domestication of sheep in Chile and Argentina (Lopez, Brizuela, Willems, Aguias, Siffredi, & Bran, 2013). They roamed the valleys, spreading nutrients through defecation, controlling vegetation through grazing, and providing food for both the pumas and indigenous peoples (Travaini, Zapata, Bustmante, Pedrana, Zanon, & Rodriguez, 2015; Franzese, 2016; Mendez, Barberena, & Delaunay, 2013). The Gaunaco has palate for %75 of the hardy plant species in the Patagonia Steppe, making it’s diet a unique contributor to ecosystem heterogeneity (Kropfl, Cecchi, Villasuso, & Distel, 2011). Other
notable keystone species of the Patagonia steppe ecosystems include Urocyon cinereoargenteus (grey fox), Athene cunicularia (burrowing owl), Puma concolor (cougar) and the Vultur gryphus (Andean condor) (Patagonia, 2016).

Image 3: Photo of Guanaco Grazing by park headquarters. Photo taken by Marlo Shaw

6.0 Site history
In Chacabuco Valley there has been almost a century of intense livestock ranching on the land (Saucedo & Meneses, 2008). This ranching lifestyle was lead primarily by single males who lived in small estancias on several properties carved throughout the valley (Franzese, 2016). They would hire people to hunt the Puma who threatened their livestock (Patagonia, 2016). The livestock ranching was so widespread that is exploited much of the guanaco’s naturally available resources (Jones, 2012). The fencing in the valley restricted the migration of many of the animals including guanacos and Nandus (Saporiti, 2008). The intense grazing by sheep had put so much pressure on the vegetation in the valley that the vegetation assemblages begun to change and over grazed areas were invaded by alien species; consequentially warranting the need for ecological restoration (Holmegren, 2002).
Image 4: Photo of Parque Patagonia. The headquarters are located near the large popular trees. Photo taken from the Parque Patagonia website.

7.0 Global volunteer program

In the summer of 2015 Conservation Patagonia received almost 1,500 applications for volunteering in the restoration efforts at Parque Patagonia. These applicants are vetted according to their demographics, language skills, backcountry camping experience, volunteering experience and knowledge of ecology (Patagonia, 2016). Once the applicants are chosen they are split into teams of twelve. Each team spends about 3 weeks at the park, with less than one week between each group. The time spent at the park is comprised of three sets of five 6 to 8 hour workdays with two days off filled with local hikes, sightseeing, and some educational presentations by staff. This mixture of work and exploration is purposed to give the volunteers a chance to connect to the Parque Patagonia as a unique conservation project, build an understanding of grasslands restoration, and foster an appreciation for the intense beauty of the Patagonian landscape.

Image 5: Photo of our volunteer team and Don Jose our host for weeks one and two. Photo taken by Marlo Shaw
8.0 Goals and Objectives

8.1 Goal one: Evaluating Conservation Patagonia’s restoration strategies for the Patagonia Steppe ecosystem

Objective: Complete the volunteer program and participate in various components of grasslands restoration and reflect on those experiences to inform recommendations for improvement.

Objective: Review the literature on grasslands restoration projects in similar regions and compare strategies with those being implemented at Parque Patagonia to inform recommendations for improvement.

8.2 Goal two: Create a deeper understanding of the eco-cultural impacts of this project and it’s global volunteer program on the region

Objective: Draw from experience and literature review to inform recommendations on how Conservation Patagonia could improve their social license in the Chacabuco Valley.
9.0 Methods

9.1 Week one: Fence Removal

*Image 6: Photo of the fence after it was taken apart. Photo taken my Marlo Shaw*

*Accessing commuter site:* The team of volunteers set up camp at a location known as puesto bano, a small estancia located beside a small air strip just under 15 km east from the Chilean boarder on a road called x-83. We arrived there by tractor, truck and bus. The tractor held all of our backcountry camping gear and food rations for the week, the truck was kept on site for emergencies, the bus was used to transport the volunteers from park headquarters to the commuter site.

*Accessing fence removal sites:*

Site One

On day one and two we accessed site one with a tractor, the site was approximately 2 km eastbound on x-83 and then 300 m North into an open field.
Site Two
On Days three and four we accessed site two by foot by heading westward from puesto bano approximately 2.5 km.

Site Three
On days five and six we accessed the next fenced area by foot again. This site was just some 400 meters west of site two.

Techniques:
1) A leading team of two would cut the top clasps on the fence to release the barbed wire and coil the barbed wire up in a uniformed way.
2) A following team of three or four would be responsible for cutting, threading, and coiling the several other clean wires.
3) A following team of two or three would pick up the smaller pieces of wood taken off of the fence and the coiled wire back to one location to be picked up by park staff and be reused for other projects.
4) A team of 2 or three would dig out the large poles of the fence and carry them back to the chosen location for pick up.

9.2 Week two: Sheep Vaccination
Accessing commuter site: The team of volunteers set up camp at a location known as puesto bano, a small estancia located beside a small air strip just under 15 km east from the Chilean boarder on a road called x-83. We arrived there by tractor, truck and bus. The tractor held all of our backcountry camping gear and food rations for the week, the truck was kept on site for emergencies, the bus was used to transport the volunteers from park headquarters to the commuter site.
Techniques:

1) Separating sheep: The sheep were separated by sex by the gauchos and their dogs. They would then herd about 25 sheep into a separate holding pen to be vaccinated.

2) Flipping sheep: The volunteers would handle the sheep and turn them onto their backs, holding up the sheep’s front legs. To successfully turn the sheep over we held the head at an extreme angle, encouraging the sheep to submit to the maneuver.

3) Vaccinating sheep: Once overturned, the veterinary team would be called over to give the sheep two injections.

4) Docking: If it was found that the sheep had been missed in the previous docking screening, it would be lifted up on a ledge, the tail was then removed and the wound was sprayed by aerosol antibiotics.

5) Marking sheep: Once the sheep was vaccinated and docked, the volunteer holding the sheep would call over one of the gauchos to mark the sheep with a paint marker to indicate that it had been processed.

Image 7: Volunteer holding sheep while vet injects the vaccine inside the thy of the sheep. Photo taken by Marlo Shaw
9.3 Week three: Invasive species Removal

Accessing site: To access the commuter site during this week we were transported by bus and truck. The equipment was taken to the location in three trucks and the volunteers were moved in a small bus. The commuter camp was set up where the Estero Tulin crosses road x-83. This is almost 6 km east of the Cerratera Austral. The camp was set up on the south of the highway, near a pool in the stream where we could access clean drinking water.

Image 8: Volunteer removing the seed heads from a thistle plant. Photo taken by Marlo Shaw

Technique:

1) The volunteers would leave the camp on foot on road x-83 towards the West.
2) We would divide into equal teams on each side of the road.
3) Each team was tasked to sweep the sides of the road with a 3-meter extension on each side of the road for invasive species.
4) Instead of removing the whole plant and disturbing the soil we removed the seed heads from each plant and put them in woven bags.

5) The bags were then to be returned to park headquarters and buried by heavy machinery.

6) This technique continued on for 5 days, and as a team of 12 we completed all 6km up to the Cerratera Astral.

Notes: The invasive species that we were targeting were *Cirsium arvense* (Canadian Thistle), *(Verbascum thapsus)* Mullen, and *Conium maculatum* (Poison Hemlock).

9.4 Literature Review
The literature review was conducted by using several sources of information. Some academic articles were found through the University of Victoria library website and Google scholar. Some grasslands restoration reports were found through government websites. One document was given to me by the wildlife staff at Parque Patagonia and was then translated to English by an online translator. All of this information was then reviewed and summarized in a way that suits the discussion of this report.

10.0 Results
10.1 Week one: Fence Removal
*Date:* January 25th to January 29th

*Weather:* Every workday during this week it was hot and clear with temperatures around 20 degrees Celsius.

*Tools:* Large wire cutters, hand held wire cutters, leather gloves, gators, sturdy hiking boots, shovels, safety glasses, and a tractor
Safety: Sunscreen for protection for the intense UV rays, Safety goggles for high-tension wire, gloves for protection against scrapes, first aid kit for injuries, water for hydration in the heat.

Team Members: The volunteer team consisted of 12 members and 2 leaders. The 12 members were of varying ages, ethnicities and genders. One of our leaders was an American male and the other was a Chilean woman.

Number of hours contributed: ~35 hours per person on a 12-person team. 420 hours total. 
Amount of fence removed: ~ 4 kilometers

10.2 Week Two: Sheep Vaccination
Date: February 1\textsuperscript{st} - 5\textsuperscript{th}

Weather: The weather was very hot and dry during this week as well. Temperatures were often at a high of 20-25 degrees Celsius with clear skies.

Safety: Sunscreen, first aid kit, jumpers, buckets of water (to wet down the soil so that it doesn’t get kicked up by the sheep)

Tools: paint markers, two injection guns, and antibiotics, vaccinations

Number of sheep vaccinated: ~ 300

10.3 Week Three: Invasive Species Removal
Tools: hand clippers, gloves, woven fiber bags, water, sunscreen, safety reflective vests

Weather: The weather during with week was still very hot and dry with highs on most days around 25 degrees Celsius.
Number of bags collected: ~120
Area Covered: 36,000 m²

Images 9 and 10: maps at different scales showing the area covered by volunteers removing invasive species. Images taken from Google maps.
11.0 Discussion

11.1 Fence removal and grazing regimes

When the land in the Chacabuco Valley was purchased by Conservation Patagonia there was about 650 kilometers of fencing that had to be removed in order to return natural grazing and migration patterns for the guanaco (Saucedo & Meneses, 2008). Volunteers have been involved in the removal of this fence for more than ten years now. Our volunteer group was purposed to remove the last 4 kilometers of fence that bordered the location where the existing sheep in the valley are being held.

The rational behind removing the fences in the Chacabuco valley is based on both aesthetics of the park as well as ecological principles (Patagonia, 2016). The remaining buildings and standing posts of the fence were taking out of the valley to return he landscape to a visually pleasing wild landscape. The removal of the wiring and fencing between the standing posts will reduce the number of guanaco that get caught on the fence and encourage more free movement between grazing areas. This way the pressure on ecosystem through grazing and trampling will be more evenly distributed throughout the valley. More free movement of grazers will mean healthier vegetation and more resources for the guanaco, giving them opportunities to build healthy populations again (Kropfl, Cecchi, Villasuso, & Distel, 2011). With freer movement the guanaco will also be able to better spread fertilizers and seeds in the landscape to increase soil and vegetation diversity (Cesa & Paruelo, 2011).

11.2 Continued livestock care

Conservation Patagonia has decided to keep 300 sheep on its property in order to feed the staff, visitors, and volunteers at the park. In the past, volunteers have been involved in the docking and tagging of these sheep. Our volunteer group was involved in sorting the sheep and ensuring that each sheep was given two injections for the protection against diseases. Part of this exercise included spending time with peoples in the Chacabuco valley that are living a traditional gaucho lifestyle. Part of our daily routine while living at the estancia was witnessing
the slaughter of several sheep each afternoon to be cooked by the volunteers at our camp and the park headquarters.

Keeping the these sheep in Chacabuco Valley is just as important for the nutritional diversity and food security of it’s patrons as it is for the social license for this conservation project (Jones, 2012). It is important that Conservation Patagonia keep this small flock of sheep to preserve the existing connections with gauchos in the area. The estancia at Puesto Bano is an integral learning tool for volunteers and visitors to better understand what the land and the lifestyles of the people who lived there looked like before it was purchased (SER, 2011; Higgs, 2003). This small flock of sheep is also providing economic opportunities for a few individuals in the area. Even though the continued husbandry of livestock is not typical for grasslands restoration strategies this component of Conservation Patagonia’s restoration strategy makes their efforts truly holistic in covering the economic, cultural, social, and ecological struggles of landscape restoration (Savory & Parsons, 1980).

11.3 Invasive species removal
Like many other restoration projects before them Conservation Patagonia has utilized it’s volunteer staff to remove some of the invasive species that have colonized disturbed spaces on the property (Saucedo & Meneses, 2008). The park is currently battling primarily with Mullen, Common Thistle, and Poison hemlock. In the year before our visit to the park, there was a large fire that disturbed the natural succession of an area of land beside the access road. Our volunteer team was tasked to remove the seed heads from the invasive species that bordered the first 6 kilometers of the access road. We targeted the species that were within 3 meters from the road. We completed this task, consequentially producing more than 100 bags full of seeds that were to be buried underground by parks staff.

The Society of Ecological Restoration (SER) identifies the removal in invasive species as one of the primary goals of ecological restoration (SER, 2004). This is important primarily for the continued health of the native species and the processes that have adapted to their presence
The rational behind removing the invasive species that are near roadsides is to ensure that the seeds were not transported by vehicle deeper into the park. In the case of the poison hemlock and the common thistle, the removal of these species could also make the stay of the park patrons more enjoyable as the thistle can be quite spinney and the poison hemlock is very toxic to humans (SER, 2011).

12.0 Challenges / recommendations

12.1 Utilization of sheep

Challenge: Even though Conservation Patagonia is settling a large example for the region in how the removal of grazing livestock can restore the health of the ecosystem, much of the available grasslands in this region are still being used to raise livestock (Lopez, Brizuela, Willems, Aguias, Siffredi, & Bran, 2013). This issue will likely persist and continue to contribute to the desertification and degradation of these lands (Lopez, Brizuela, Willems, Aguias, Siffredi, & Bran, 2013).

Recommendation: The sheep that are still being held at Parque Patagonia could be used in experiments in different locations within the park to determine the carrying capacity of the ecosystem (Savory & Parsons, 1980). For this reason, the existing sheep could be a huge scientific resource in finding how to raise livestock sustainability in the Patagonia Steppe ecosystem. Grasslands restoration projects in the past have experimented with controlled numbers of livestock and different grazing patterns to see if the herding of domestic grazers on the landscape can in fact mimic natural processes (Savory & Parsons, 1980). Some of these experiments have been successful in reversing desertification by use of domestic grazing (Savory & Parsons, 1980). This kind of information would not only help Conservation Patagonia meet their restoration goals it could help other land owners in the region increase the sustainability of their livestock production.
12.2 Site specific invasive removal

**Challenge:** The invasive species the Parque Patagonia is currently targeting for removal are very hardy and have large seed banks. The control of these species is a large undertaking that will likely take decades to gain headway on (SER, 2004).

**Recommendation:** While the rational behind roadside removal of invasive species is sound, site-specific invasive species removal may be more useful for ecosystem value (Kropfl, Cecchi, Villasuso, & Distel, 2011). If the park was able to identify critical habitat that is in urgent need of invasive removal this may be a more valuable place to allocate resources. Another option would be to targeted areas that do not have a high density of invasive species yet to monitor more heavily in order ensure that it does not get colonized in the near future. Choosing more strategic locations for invasive species removal may make the use of Conservation Patagonia’s resources more efficient in improving ecosystem function.

12.3 Availability of information

**Challenge:** Writing this report was limited by the available formal information about the effectiveness of the restoration strategies at Parque Patagonia. The staff was knowledgeable about the different strategies and their observed effectiveness and some of this knowledge was shared with the volunteers during our stay. However, documented restoration strategies are not available on the Internet.

**Recommendations:** Conservation Patagonia would benefit in publishing some of their management strategies and recorded finding on their website. The sharing of this information can better inform grasslands restoration projects around the world as well as give researchers opportunities to utilize the work they have done.

12.4 Social License at Parque Pataognia

**Challenge:** The creation of Parque Patagonia has been contentious since Conservation Patagonia purchased the land in Chacabuco Valley (Holmes, 2014). Much of this has to do with
the socio-economic differences between the landowners and the people associated with the Conservation Patagonia (Holmes, 2014). Some Chileans are also concerned about the implications of a foreign company owning such as large piece of land in their country (Bantle, 2010). Other locals haven’t visited the park because it isn’t very well advertised and the facilities resemble those that you would find in a North American National park, not a Chilean national park (Bantle, 2010). According to one park staff member, Parque Patagonia has also struggled to get many Chilean volunteers to apply to help volunteer at the park.

![Image 11: Photo of the park headquarters displaying the advances architecture typical of that found in North American National Parks. Photo taken from Google Earth](image)

**Recommendations:** Involving Chileans in the process of creating and maintaining this park is integral to improve the social license of Conservation Patagonia. These partnerships could be facilitated with better incentive programs for Chileans to come and work or volunteer at the park (Serenari, Peterson, Wallace, & Stowhas, 2016). Conservation Patagonia will have to continue to expand their educational programs and continue to invite community members to events in the park. Incentivizing local tour groups from urban areas to come and visit the park may also instill a better understanding of what Conservation Patagonia’s intentions are (Serenari, Peterson, Wallace, & Stowhas, 2016).
12.5 Volunteer debriefing

**Challenge:** Volunteer debriefing on the tasks to be completed was often short and informal. Many of the participants in my volunteer group did not have very much background knowledge in the principles of ecology. Consequentially, there was some confusion about the rational behind some of our activities, especially the removal of invasive species. Our volunteer leader did not have an ecology background either so these conversations were informal and informed by volunteer members who had some knowledge. In addition to this, the volunteers were handling poison hemlock for an entire week without being fully aware of the severity of its toxicity.

**Recommendations:** Conservation Patagonia should consider requiring a more formal volunteer debriefing. Giving the volunteers more knowledge about the task they are completing and why they are important for reaching the park staff’s goals for grasslands restoration. In addition to this, volunteers should be better briefed about the risks and hazards of the work. More specifically, Conservation Patagonia should consider revising their techniques in the removal of poison hemlock to better accommodate the safety of the volunteers.

*Photo 12: Photo of a dense patch of poison hemlock near the estancia where we were staying.*
13.0 Conclusion

The work that Conservation Patagonia is doing in the Chucabuco Valley is an example of holistic grasslands restoration that is ambitious in both scale and restoration goals (Saucedo & Meneses, 2008). There are many different strategies that are being utilized to achieve the goal of improved ecosystem health such as fence removal and invasive species control. They utilize the remaining sheep on their property as a source for food and cultural preservation. These strategies are not without challenges, some of which may be addressed with the allocation of more resources towards staff for volunteer education, community engagement, and research. The involvement of a global program of volunteers in the restoration at Parque Patagonia provides invaluable connections to the land and the culture through experience and learning (SER, 2011). This kind of intentional pedagogy is an essential part of focal restoration where education and connection to land can foster feelings of ownership and duty in teaching others (Higgs, 2003). In successfully nurturing these connections, Conservation Patagonia is producing their own globally distributed ambassadors that will continue to attempt to improve the social license of the creating of Parque Patagonia for years to come.

14.0 Acknowledgments

I would like to acknowledge that this report is written for the University of Victoria, an institution that is situated on unceded Lekwungen territory. I understand that my education would not be made possible without the ongoing colonization of those lands. I would like to thank Dr. Val Schaefer, my supervisor and professor, for supporting my enthusiasm for this project. I would like to thank the staff and volunteers at Conservation Patagonia for their tireless effort towards making Parque Patagonia a reality, especially Ben Wilcox, Paula Herrera and Christian. I would also like to thank my traveling partner, Jake Mentz for all of his support and guidance during our trip to Patagonia. Lastly, I would like to thank my Grandparents for helping to make my trip to Patagonia a possibility, I am so grateful for your support and enthusiasm for adventure and travel.
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