

Restoring the Clearihue Courtyard: Native Plant Garden and Study Space



<http://www.hillkeep.ca/bulbs%20camassia.htm>

ES 341 Restoration Project by:

Katie Archer
Josh Dennis
Jenelle Guichon
Tanner Melnychyn
Maya Yamaguchi

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1. Introduction

Josh Dennis

1.1 Problem Identification

The University of Victoria is one of the most beautiful campuses in Canada. Students enjoy an open campus which encircles many different ecosystems giving the campus a rich diversity in both wildlife and plants. However, the University of Victoria has many problems that not only threaten these beautiful ecosystems but student life as well. Using ecological restoration as a tool these problems can be easily dealt with. In this section I will outline the many problems that are becoming more and more obvious with every passing year, and showcase how restoration can be used as a solution.

The University of Victoria is rated as number one in Canada in the comprehensive category in the acclaimed Maclean's magazine (Maclean's, 2013). This means that the University has the most to offer its students. Having this title sets the University high up in the most sought after school to gain admission to, and this produces a problem. The campus is becoming ever more crowded as students from around the country flock to the critically acclaimed University of Victoria. This problem is never more apparent when trying to find study spaces; they are becoming incredibly hard to find. Walking into studying hotspots, such as the library, can be an unpleasant experience when it takes up to 20 minutes to find a decent study spot. To lessen the burden created by more students coming to this university, creating more places to study is essential. If there were more areas where students could go and avoid these busy hotspots, the problem would cease to be so. Having a place to study where you can sit, relax, and enjoy a beautiful view could be very attractive for people who want to distress while putting their nose to the grindstone. Using restoration could provide such a place; incorporating a study space with a beautiful garden could achieve a stress relieving oasis while providing the necessary hardware to get some homework done. With or without restoration, the University needs to find a solution to the overcrowding problem in study hotspots; why not kill two birds with one stone and

incorporate a practical study space with a restoration project that can address the many ecological and cultural problems also affecting the university.

Invasive plants are one of these ecological problems affecting the campus. Invasive plants, especially English ivy, are out competing many native species. These pesky plants have a direct impact on ecosystem quality. They compete with native plants for space and nutrients, alter food webs, and can eventually alter the physical environment (Pimental et al., 2004). For example, English ivy grows so veraciously that it simply coats the forest floor of the Douglas fir ecosystem as well as many of the gardens around campus; this prevents many plants from growing which in turn affects many local species of wildlife that depend on native plants for survival (Pimental et al., 2004). Invasive plants are also becoming a problem for other restoration activities like removing poison hemlock, which is a very toxic plant. It has become a tricky issue, because the plant has become an important habitat for the swallowtail butterfly. This is especially troublesome, as this butterfly has become threatened in our local ecosystem. By promoting a traditional native ecosystem the problem where threatened species are becoming dependant on highly invasive plant species can be lessened, which would allow for the continuation of removal efforts of plants such as poison hemlock. Also, promoting native ecosystems would provide a platform for species that were extirpated, such as the Western Bluebird, and more than 100 species that are locally “at risk” to recover their populations and continue to survive well into the future (GOERT, 2003). Apart from the 100 species that are “at risk,” Garry Oak ecosystems, which are found here on campus, are endangered with less than 5 percent remaining in near-wild condition (GOERT, 2003). This ecosystem is important because it provides habitat for more plant species than any other terrestrial ecosystem in Canada (GOERT, 2003). Thus, restorative activities must be set in place to save these precious ecosystems and deal with the invasive species problem.

Associated with the above problems is that students of Uvic have lost touch with the beauty of local ecosystems. Garry oak ecosystems are stunningly beautiful, as a walk through Uplands park would illustrate, but students have become accustomed to eye-catching exotic plants that are scattered all over the Uvic grounds. Students need to reconnect to the natural wonders that have grown here for thousands of years so that restoring the endangered Garry Oak ecosystem will be

well-accepted, and not contested like in the case of English Hawthorn, where this invasive is widely accepted in the community but is a hazard to the fragile Garry Oak ecosystem. Intrinsic value needs to be restored into our local ecosystems because many individuals have forgotten that, or have not been educated on, these ecosystems are endangered and are home to many beautiful organisms that are currently “at risk”. In this technology dominated age, the significance of nature in the average person’s life is diminishing. Our society is becoming more and more disembedded from nature with each generation, so we need to actively reintroduce the importance of nature back into our society. Using restoration coupled with a practical use for students is a mechanism that can be instilled to re-introduce and educate the student body on importance of native ecosystems such as the Garry Oak ecosystem.

Incorporating a study space with a restorative garden is the mechanism that will link students back to the importance and beauty of local ecosystems. The region that the University of Victoria is located on is rich with history and is deeply linked to the local ecosystems. To further engage students to appreciate the local ecosystems in which the university is nestled in, the traditional history of the university could be used. The university is set upon the homeland of the indigenous Coast Salish people who cultivated and inhabited this land long before Europeans came. After colonization, the indigenous culture that was so imbedded in this land began to vanish. This cultural identity is continuously diminishing, as students from around the world come to study at the university; incorporating this dwindling knowledge base could further spark student interest with the landscape. Reconnecting people with the cultural knowledge of the local environment will solidify the importance of preserving native ecosystems because the beauty factor only goes so far in today’s society. Additionally, involving a cultural aspect to this restoration project reconfirms how restoration can be used as a vehicle to solve multiple problems. Furthermore, cultural and ecological restoration can promote environmental stewardship so that students can regain a broader respect for the environment. The main aspect of the Coast Salish culture that we would like to incorporate within this study space and restorative garden is Traditional food knowledge of local edible plants. Traditional food knowledge is a vital component of indigenous life and important for food security. What better way to fuel the brain for a long period of studying than with delicious edible plants? Also, who doesn’t want to be like Les Stroud in *Survivorman* and learn to live off the land? Educating students on how to identify

and use traditional food sources can be an effective method in re-connecting and engaging the student body with the knowledge of UVic's cultural and ecological background, as well as promoting environmental stewardship.

The final issue is the university's goal to work towards as becoming a "zero-waste institution." Currently, the use of restoration to continue to promote sustainability on campus is not taken advantage of. The university needs to broaden its approach to sustainability, which can be done through the implementation of restoration activities such as restorative gardening. Incorporating composting systems, as well as implementing permaculture techniques, such as sheet mulching, could pave the way for how future gardens are refurbished. Sheet mulching is also low cost, and incorporates recycled materials, such as cardboard, so the university can make reuse cardboard, instead of recycling it. Additionally, implementing a composting system will save the university from purchasing topsoil to feed the new garden.

Our project aims to solve the above issues by designing a project that focuses around engaging students in restoring a garden back to a native Garry Oak ecosystem via incorporating study spaces. In addition to study spaces, this project aims to further student engagement by educating on traditional food systems of the Coast Salish people, thus reconnecting students to the local Garry Oak ecosystem.

1.2 Site Description

Finding a site for this project has not been easy; the site needs to be big enough to address all the above problems but small enough to be economically feasible. Ideas ranged from large rooftop greenhouses that were geared towards powered workstations where students could use their computers to a simple collection of picnic tables surrounded by a garden. Unfortunately, the rooftop greenhouse was shot down with a quick conversation with an architect. Through email conversations with the Dean, the location was eventually chosen. The site that best fits with our project is the courtyard of the Clearihue building.

Restoring the garden within courtyard of the Clearihue Building can address all of these problems. There is a garden that is already established in the courtyard, so there would be no

need to start from scratch, which would be expensive and labour intensive. The pre-existing garden located within the Clearihue Building courtyard can be easily modified into a native ecosystem. According to the grounds department, the garden is overdue for a renovation; many of the plants currently in the courtyard were planted 50 years ago, when the building was constructed. Walking through the garden clearly expresses the need for a renovation. The garden is in terrible condition and rarely visited by students. These factors present a great opportunity to enhance the use of this space and to transform it into a more functioning area of campus.

A large benefit that comes with the Clearihue building is that the entrance ways into the courtyard provide enough shelter to limit wind exposure. Having a protected area is essential for a study area which would attract more students. When researching project locations. The problem of deer was a detrimental factor in location choice because deer ravage newly planted gardens. This threat is eliminated because deer rarely enter the courtyard. Another factor to consider was pollination. The location needed to be accessible for native pollinators such as birds and bees, and from our observations, the courtyard may keep out deer but pollinators are a plenty.

One of the main focal points in this project, the study space, required a large enough area in addition to the gardens. The courtyard is large enough to accommodate numerous study areas, as well as an extensive plant garden. The Clearihue Building is also in a centralized location, close to the library and cafeterias, so students have easy access to the building. Installing a study area in the courtyard is an efficient way to draw student attention to the garden. The garden is also currently maintained by the grounds department, so no additional caretaking needs to be implemented. The building is also located right next to the Indigenous Studies building, so the theme to preserve the indigenous culture of the area is present and would be easy to continue the theme into the garden of the Clearihue building. All these features make the Clearihue building perfect to educate the student body on traditional indigenous food systems, restore a traditional garden that resembles what the Coast Salish people would have seen thousands of years ago, and finally, provide more study areas that the university desperately needs.



Figure 1.1: Current pathway into Clearihue Courtyard



Figure 1.2 & 1.3: Magnolia tree, proposed study space



Figure 1.4: Proposed camas garden

1.3 Brief Cultural Background

The land the University is built upon was traditionally the territory of the Coast Salish people. The Coast Salish people frequented the area around UVic to harvest, hunt, and fish (Turner, 2001). Virtually all native trees, shrubs, and herbaceous plants in the area were traditionally utilized by the Coast Salish peoples as food, material or medicine (Turner, 2001). The traditional knowledge associated with these plants are dwindling faster than the ecosystem that the plants are part of. Developing a garden focused around restoring the diminishing ecosystems native to this area could not only preserve local productivity and ecosystem resilience, but also aid the recovery of a culture, through revitalizing the use of Coast Salish traditional knowledge.

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1. 4 Goals and Objectives

Jenelle Guichon

According to the *Ecological Restoration for Protected Areas: Principles, Guidelines, and Best Practices* document, (WCPA-IUCN Ecological Restoration Taskforce, 2004) restoration projects must be effective, efficient, and engaging to maximize success. Restoration of the Clearihue courtyard will satisfy these principles, via the completion of our set goals. The goals and objectives of our restoration project are designed to address a range of ecological and social challenges at the University of Victoria. By restoring the overgrown and largely unused courtyard in the Clearihue building to a more practical and ecologically functioning system, we will address these concerns and thus improve upon a variety of challenges. These challenges are identified in the previous section. We identify four specific goals to be achieved through restoring and renovating the Clearihue courtyard over the course of the next four years. The four goals are to be reached in the foreseeable future; within the four phases we implement our project. The goals are also intended to have a long-term effect, which will be ensured through consistent maintenance and use of the restored site.

The four goals are as follows:

1. Improve the ecological integrity of five gardens currently in the Clearihue courtyard through removing invasive species and transplanting a variety of native plants.
2. Provide substantial study space in the courtyard to accommodate the growing student population.
3. Educate and engage students on native ecosystems, including the medicinal and edible properties of native plants.
4. Promote environmental sustainability on campus through a comprehensive composting system in the courtyard.

Each is discussed in further detail below.

Objectives:

1. Improve Ecological Integrity:

The existing Clearihue gardens face a variety of ecological challenges. These challenges include: the presence of invasive English Ivy, which outcompetes other species for nutrients and sunlight, plant overgrowth, which impedes other plants' chance for survival, and the abundance of dead plants in the gardens, which hinder live plants requirement for space. Overall, the gardens' current states can be significantly improved through simple restoration practices. Our goal to improve ecological integrity will be achieved through removing invasive plants from the gardens and replacing them with native plants, designed with local ecosystems in mind. In overgrown areas, we will remove any abundance and replace with native plants. Effectively, over the course of 4 phases, our goal is to improve upon ecological integrity by establishing five diverse, native, and ecologically functional gardens within the courtyard. This goal will satisfy the "effective" principle (IUCN, 2012) by instilling ecological integrity on the site, through the establishment of native ecosystems.

2. Provide Study Space:

Through personal experience, we believe the students of UVic face a great shortage of access to study space. Specifically, we face a lack of study space in natural environments, which provides significant benefits to both health and learning capabilities (Cooper, 1999). Our project aims to improve on this front by installing tables and chairs in the restored Clearihue courtyard, thus providing students' space for studying or socializing in a natural and healthy environment. In addition to installing new tables, we will also remove the degraded wood from the current benches, and replace with new wood. These actions will result in increased study space for the student population.

3. Educate Students on Native Ecosystems:

UVic boasts a diverse demographic of students originating from different regions; as a result, a large portion of students lack a significant connection to place. Additionally, many students, regardless of their origins, lack a meaningful understanding of local and native ecosystems. By restoring the Clearihue courtyard with native ecosystems in mind, combined with engaging students through the proposed study space, we seek to contribute to students' understanding of native plants on southern Vancouver Island. By restoring the Clearihue courtyard to include miniature local ecosystems, we are providing a venue for UVic students to become more knowledgeable about and engaged with local and native ecosystems. We will use signage, describing the plants names and historical uses by Indigenous groups, to educate students and faculty about local ecosystems. Considerable engagement with the community is recognized to be a significant factor in the success of any restoration project (IUCN, 2012), and thus, by engaging the population of UVic, the Clearihue gardens will receive support that fosters its maintenance. Furthermore, our project intends to engage the community through the medicinal and edible *use* of plants, not simply from their presence. Our gardens will include edible and medicinal plants to be used by students, which will motivate learning about these plants and ecosystems. We believe that engagement is fundamental in the success of building connections and relationships with the places we live; by engaging the student population, we hope to motivate further restoration and conservation of local ecosystems in Southern Vancouver Island.

4. Promote Environmental Sustainability:

The University of Victoria is currently working towards becoming a “zero-waste institution” (University of Victoria, n.d.). Our project will work towards achieving this goal through making the Clearihue courtyard a zero-waste, sustainable environment. The concept of “Zero Waste” is based around minimizing the resources we use, and the amount of end products that we dispose of at the landfill (University of Victoria, n.d.). We will achieve this goal through a variety of tactics. First, our sheet-mulching technique to rid the gardens of English Ivy will use recycled cardboard from UVic's residence recycling program. Furthermore, we will install multiple

compost bins in the courtyard, in addition to the already existing recycling bins. The compost will then be reused on campus, either in the Clearihue gardens, or other places on campus, as fertilizer. This will significantly reduce landfill waste, as approximately 20 percent of landfill waste is made up of food scraps that could be composted (U.S. Environmental Protection Agency, 2013). By using recycled products, and diverting food waste from the landfill to be reused as compost, we are actively working towards becoming a zero-waste institution and promoting environmental sustainability within the courtyard. This aspect of our project also contributes to the “efficiency” principle (IUCN, 2012) by ensuring minimal cost.

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2. Methods

2.1 Actions to Achieve Restoration Goals

Katie Archer

Our Clearihue courtyard design aims to create a series of small native plant gardens that meet the goals of this project—to improve the ecological quality of the Clerihue courtyard, provide study space, educate students about native plants and their traditional uses, and promote environmental sustainability—over a four year period. We have broken up the project into four phases, each will establish different themed native plant gardens within the courtyard. Phases include the planting of the following gardens: A pine garden in phase 1; a Garry Oak ecosystem garden in phase 2; a berry patch and camas garden in phase 3; and a tree garden in phase 4. Phase 1 will also include the installation of tables for student study space. Each stage will be completed with the installation of information plaques for each of the plants in the garden; these information plaques will help students engage with the uses and cultural significance of each plant. The installation and maintenance of the new garden design will be done by the university grounds maintenance staff with some help from environmental studies students and volunteers.

Assessment of soil health will be necessary for all gardens because they have been subject to invasive species and neglect for some years; to offset costs of fertilizers for gardens needing abatement, compost and sheet mulching will be used as primary treatments. The procedure for sheet mulching is as follows: First, cut down all undesired species, then spread a thin layer of compost and water the whole area. Layer cardboard over the entire area with edges overlapping by at least six inches to completely block light from reaching the soil and plants below. Cover with another thin layer of compost, then 8-12 inches of weed and seed free material such as straw, leaves, wood shavings, sawdust, or pine needles. Water the whole area again, then top with 2 inches of compost and 2 inches of straw; water whole area again (Hermenway, n.d.). This sheet mulch will be left to decompose until the following year, producing plant-free soil ready for planting. Non-native plants will be removed from all gardens in order to comply to our native plant theme with the exception of the existing magnolia tree located in the round island garden on the Eastern end of the courtyard (marked on map in Appendix C) which will be kept for its aesthetic value and because magnolia trees do not transplant well. All of the plants that have

been chosen to be planted in these gardens are useful in some way; they may produce food, be made into a tea, or have some other traditional use. Eating and drinking tea from these plants will be our way of engaging students with the plants' values.

In phase 1 a pine garden will be established along the South side of the courtyard. This area is extremely overgrown with both exotic and native species. The first step will be to remove all non-native species and thin out overcrowded native species by transplanting to give individual plants the room they need to thrive. The area will then be sheet mulched over the winter holidays as described above and left to decompose for 5 months. Soil will then be tested and adjusted if necessary to promote success of new plants. The pine garden will have three layers of vegetation to optimize its appearance and growing conditions for its plants: a shrub layer, a fern layer, and an open area of earth blanketed by a layer of pine needles. There are two existing pine trees in the middle of the garden which will remain where they are, and the open area will surround their bases, covered with fallen pine needles and trailing blackberry with scattered ferns. On the East end of this pine garden licorice ferns will be planted on rocks amongst planted sword ferns. Closest to the building, a shrub layer will be planted that contains Saskatoon berry, red flowering currant, salal, ocean spray, and Nootka rose. To increase student accessibility, a narrow stepping stone path through the garden will be placed to allow access to the food growing on the plants near the back of the garden such as berries, rose hips, and current leaves for tea. Also included in Phase 1, are preparations for the Garry Oak garden which will be planted the following year. For this, the blanket of ivy currently covering the garden bed will be cut down and pulled out, this will require a great deal of labour so professors from the environmental studies department may be recruited to include an ivy pull for their students in their curriculums. Sheet mulching will then be implemented, this sheet mulch will be left to decompose until the following year when the plant-free soil it produces will be used to plant in during the second phase.

Phase 2 will begin with a soil test and any necessary fertilizers may be added. The garden should have no or very few weeds thanks to the sheet mulching and should be ready for planting with no further preparation. Plants designated for this garden are from the garry oak ecosystem; two garry oaks will be planted with a ground cover of a mixture of native grasses: Alaska onion grass, western fescue grass, and California oat grass, interspersed with chocolate lily, camas, hooker's onion, fawn lily, and miner's lettuce. The traditional uses of each of these species will

be included on the information plaques that will accompany each plant (see Appendix 2). Also, the garden beds where the berry patch and camas garden will be planted in phase 3 will be prepared during phase 2. These two smaller garden patches currently contain non-native species; these will be transplanted by grounds management or otherwise removed, as they see fit. The soil will be improved and weeds removed by sheet mulching as was done during phase 1.

The following year, phase 3 will begin with soil analysis of the new sites and any fertilizing needed will be added, followed by planting of the berry patch and the camas bed. The species specified for the berry patch include Saskatoon berry, cascade blueberry, salmon berry, wild strawberry, red flowering currant, and salal. The salmonberry used in this berry patch will be sourced from cuttings of the existing salmon berry bushes located on the East end of the courtyard near the arbutus tree. The camas gardens will be planted with a random assortment of blue camas bulbs and a ground cover of Alaska onion grass, western fescue grass, and California oat grass. These species are of special interest in our community, so these gardens offer an opportunity for community involvement: several environmental studies classes at the university study the cultural importance of camas, so professors may be invited to have their students to participate in planting these gardens as part of their curriculum, and local indigenous leaders should be invited to participate as well. This would be beneficial not only because it would take some of the workload off of the campus grounds department, but also because by being physically engaged in the creation of these gardens students will get to develop a sense of place and responsibility on campus while learning from local from members of the First Nations community. In preparation for phase 4, sheet mulching will be done in the garden on the east side of the courtyard, carefully avoiding the native plants that will remain in this garden, which include snow berry, salmon berry, and fireweed in order to remove the exotic bushes which currently dominate the garden on the east side of the courtyard.

Phase 4, the final frontier of this project, will be to transform the neglected garden along the east side of the courtyard into a native tree garden. By growing tree species together, this garden will be the shadiest area of the courtyard, not competing too much for light with the species in the other gardens, but providing a themed space for the appreciation of native trees and shade-loving species. Non-native species will have been removed by the sheet mulching done in phase 3, but some of the garden may still have non-native weeds to remove that were protected

from sheet mulching by growing close to native plants. The first step will be to remove any remaining non-native plants, test the soil, and make any last soil abatements necessary. This garden currently contains some fireweed, snow berry, salmon berry, a big leaf maple, an arbutus tree, and a garry oak tree, all of which are native and will remain where they are. A crabapple, indian plum, bitter cherry, and western hemlock tree will be planted in this garden as well (see Appendix 1). The ground cover will include the mixture of Alaska onion grass, western fescue grass, and California oat grass interspersed with the trees and the berry bushes. The magnolia tree in the island garden and the bushes surrounding it will be left as they are because they would be too labour intensive to remove, and they are healthy and attractive. At this stage, with all of the gardens planted, tables for student study will be installed where indicated in (see Figure 2.1). Finally, with everything in place, let's celebrate! All students, faculty, and local First Nations people should be invited to an event in the newly finished garden with food, music, and speakers.

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2.2 Budget and Timeline

Tanner Melnychyn

Budget Overview

One of the major goals for the Clearihue Courtyard restoration project is to establish a new mini-ecosystem that brings integrity and sustainable features into a local and edible plant based system. We wanted to incorporate a variety of local plant species without compromising cost efficiency and limited environmental impact. That being said, there are still many components of the project that will need to be purchased (total cost list is given below) and so some funding will need to be raised.

We have proposed two methods of raising funds for the project:

1. The University of Victoria

According to the University of Victoria's *Planning and Budget Framework* (2013) approximately 20% of the annual expenditure goes toward University services, specifically including grounds services. The other 80% is focused towards student services and investment (University of Victoria, 2013). Our project proposal could be considered under both of these branches and therefore, we would be eligible to request funding. We also consulted and spoke with some individuals within the ground services of the University. They informed us that the University has a 30-year (or so) updating policy that mandates that certain areas must be restored or kept up to date with the times. The Clearihue Courtyard has exceeded this 30-year margin without being significantly updated.

2. Fundraising by Donations

Considering that the costs of our proposal will be minimized, and that this figure isn't an astronomical amount of money, we brought on the possible idea of raising money through bake sales and donations. Our team would supply the goods needed for the first sale however, other (future) students, particularly in Environmental Studies, would take over in the following years. Our goal is that by generating awareness and support for the cause that other students would be willing to learn and eventually take control of the project. This includes the remainder of the construction phase as well as the maintenance and tending of the garden in the years to come.

This concept tackles two issues at once because it raises money AND creates awareness for the garden.

Proposed Cost-Reducing Methods

To achieve minimal costs we decided that it was essential to do the following:

1. Keep the original garden layout intact:

This includes current pathways, garden beds, light fixtures, irrigation systems, benches (these will be refurbished if needed), and some plant species such as the Garry Oak, Arbutus, Big Leaf Maple, Pine, and Magnolia Trees.

Doing this eliminates the need to pay for the large-machinery and construction crews that would be needed to dismantle the area and start from scratch. This saves us time, money, and more importantly reduces environmental impact.

2. Incorporate the use of recycled materials and tools when possible:

The use of cardboard mulching (a Permaculture technique) is financially and systemically beneficial to our project because it uses recycled materials to kill off invasive plants by blocking their access to sunlight (Hermenway, n.d.). It also insulates the garden beds and promotes the mixture and regeneration of essential nutrients which are important for high quality soil and plant growth (Hermenway, n.d.).

This is cost saving because most of the materials needed to conduct the mulching process are free and highly accessible. The old cardboard and newspapers that are needed for the project can be supplied by the designated recycling bins at the University (such as the ones in the residents buildings). Compost will be purchased in the first stage and produced for free in the succeeding phases.

3. Encourage and utilize the use of volunteers:

We want to reduce the need for hired hands as much as possible. We believe that if we spread awareness of our project that students will want to get involved and participate because they are supporting a restored system which affects them at a local level. Some hired labour is

unavoidable (such as continual maintenance after the project is completed) but for the most part the materials and man-hours needed can be supplied through donations and voluntary efforts.

The proposal that we have constructed breaks the project down into four different phases. Each phase will be conducted on an annual basis, ensuring that the total amount needed can be split up and financed over a four year period. The total estimated costs per phase are shown below.

Note

The following prices were accumulated from various nurseries within the Victoria city limits and immediate surrounding areas (prices were retrieved from catalogue and over the phone conversation). The nurseries and garden centers we used were: Cannor Nursery, Marigold Nursery, and Home Depot.

Phase 1 Costs:

Plant Type	Unit Price X Amount	Total Price
Trailing Blackberry	\$8.99 X 3	\$35.96
Licorice Fern	\$5.99 X 2	\$11.98
Saskatoon Blackberry	\$8.99 X 3	\$26.97
Red Flowering Currant	\$8.99 X 3	\$26.97
Salal	\$8.90 X 2	\$17.80
Ocean Spray	\$6.49 X 2	\$12.98
Nootka Rose	\$7.99 X 3	\$23.97

Other Materials	Unit Price X Amount	Total Price
3 Section Compost Bin	\$105.99 X 1	\$105.99
Rocks for Pathway	~\$134.99 for the pathway	\$134.99
Compost	\$22.99 X 4	\$91.69

Total Phase 1 Costs: \$489.30

Phase 2 Costs:

Plant Type	Unit Price X Amount	Total Price
Chocolate Lily	\$9.99 X 2 (8 per pack)	\$19.98
Camas	\$8.99 X 4	\$35.96
Hooker's Onion	\$14.99 X 2 (per 4)	\$29.98
Potted Garry Oak	\$45.00 X 2	\$90.00
Fawn Lily	\$8.99 X 1	\$8.99
Miners Lettuce	\$6.84 X 3	\$20.52
Alaskan Onion Grass	\$4.20 X 12 (per seedpack)	\$50.40
Western Fescue Grass	\$4.20 X 12 (per seedpack)	\$50.40
California Oat Grass	\$4.20 X 12 (per seedpack)	\$50.40

Total Phase 2 Costs: \$356.63

Phase 3 Costs:

Berry Garden

Plant Type	Unit Price X Amount	Total Price
Saskatoon Berry	\$8.99 X 2	\$17.98
Red Flowering Currant	\$8.99 X 2	\$17.98
Wild Strawberry	\$6.98 X 4	\$27.92
Salal	\$8.90 X 2	\$17.80

Camas Garden

Plant Type	Unit Price X Amount	Total Price
Blue Camas Bulbs	\$4.99 X 3 (per 5)	\$14.97
Alaskan Onion Grass	\$4.20 X 12 (per seedpack)	\$50.40
Western Fescue Grass	\$4.20 X 12 (per seedpack)	\$50.40
California Oat Grass	\$4.20 X 12 (per seedpack)	\$50.40

Total Phase 3 Costs: \$247.85

Phase 4 Costs:

Plant Type	Unit Price X Amount	Total Price
Pacific Crab Apple	\$34.99 X 1 (sapling)	\$34.99
Indian Plum	\$24.99 X 1	\$24.99
Bitter Cherry	\$19.50 X 1	\$19.50

Western Hemlock Tree	\$25.99 X 1	\$25.99
Alaskan Onion Grass	\$4.20 X 12 (per seedpack)	\$50.40
Western Fescue Grass	\$4.20 X 12 (per seedpack)	\$50.40
California Oat Grass	\$4.20 X 12 (per seedpack)	\$50.40

Other Costs	Unit Price X Amount	Total Price
Garden Signs	\$5.07 X 23	\$116.61
Benches	\$118.30 X 5	\$591.50
Tables	\$640.00 X 1	\$640.00

Total Phase 4 Costs: \$1604.78

Total Estimated Project Cost: \$ 2,698.56

Notes

-Salmon Berries are not included in the plant costs because we will be propagating them from existing plants on site

-Costs are based on 2013 prices and do not include tax.

-Though this project will largely utilize the use of volunteers, hired university grounds crew workers will be needed. The cost for these members is not listed because it is already reflected within university expenditures.

-The total costs listed above only reflects the purchased components of the project. The following list is a summary of other materials that will be used but are virtually free (still may require labour and transportation to retrieve):

Cardboard-University recycling bins

Newspapers-University recycling bins

Straw-Supplied by Blenkinsop farm

Leaves-Gathered in the fall by grounds crew

Shovels and Spades- supplied by grounds crew

Wheelbarrows- supplied by grounds crew

Compost (for phases 2,3, and 4)-supplied by Clearihue compost bin (built in phase 1)

Timeline Overview:

As shown in the Budget section of our proposal, we have broken down the project into four different phases. We decided this would be the best to ensure that each process in restoring the garden would be conducted effectively and efficiently. For example the mulching procedure is one that takes a substantial amount of time (several months to a full year) because the decomposition of plant material cannot happen immediately. Even though this is a lengthy process, it is one that still proves to be beneficial because it is financially cheap to carry out, and it creates a highly rich and nutrient soil that our introduced plants can thrive on.

Another reason why we broke the project down into four (annual) phases is for cost and funding purposes. Our intention for this project is to be as cost-efficient as possible, however, there are still funds that will need to be raised. That being said we found that it is more viable and attractive to the University if the funds requested by them are divided over four years and not all at once. If funding is going to come from fundraising events like a bake sale, more money could be raised due to the available amount of time and student turnover in the four year period. University classes are offered during the summer months, and therefore we could collaborate with professors about devoting tutorials to actively help the garden. These summer classes could also produce volunteers to complete and manage the project. Not only does this take away from hired labour costs, but it also provides the students who are participating with a firsthand experience, knowledge, and feedback on the benefits of a local edible garden.

Timeline:

The first phase of our project is scheduled to begin over the January 10th-12th weekend in 2014. The garden will be officially completed by June 2017, but will require ongoing care and maintenance supplied by the university. Since our timeline is dependent on the different growing seasons and the availability of students, we have decided to conduct each planting phase so that it is in-sync with the Universities summer class schedules from May-June during the years of 2014-2017 (not including the first mulching phase).

Phase 1 Procedures:

· January 10th-12th 2014- Mulch the South Section of the Courtyard (see Figure 2.1)

As the founders of this project our group has agreed to volunteer our time so that we can get this project underway. We will collect the material needed for mulching and apply it to the necessary sections. We will allow it to decompose for 5 months.

·February 2014- Host Bake Sale and Finalize the Funds needed for the Project

Request donated baked goods from family, friends, and other willing individuals. Build awareness for the project and ask people to sign up and volunteer. Consult university for extra funds if needed.

·March 2014-After Summer Class Schedule is Posted, Ask Instructors for Designated Class Time Towards Garden Construction And Maintenance

-See Timeline Overview

·May-June 2014

-Volunteers will clear up leftover debris from mulching and put it into constructed compost bin

-Maintenance crew will test soil conditions from mulching procedure

-Volunteers will Incorporate the native plants needed for phase 1 (see phase 1 budget plant list) into the garden

-Maintenance crew will construct pathway in the garden

-Materials for mulching will be gathered and the process will be implemented on the phase 2 area (see figure 2.1)

Phase 2 Procedures:

-Utilize same revenue and volunteer generating techniques as used in phase 1 (over similar time frame but in 2015 year)

•May-June 2015

-Volunteers implement phase 2 plants (see phase 2 budget for plant listings)

-Mulch areas needed for next year in phase 3 using recycled materials and compost from the courtyard compost bin

Phase 3 Procedures:

-Utilize same revenue and volunteer generating techniques as used in previous phases (over similar time frame but in 2016 year)

•May-June 2016

-Implement phase 3 plant species (see phase 3 budget for plant list)

-Replace Benches (see figure 2.1)

-Mulch final area so that it can decompose and be ready for the final planting process.

Phase 4 Procedures:

-Utilize same revenue and volunteer generating techniques as used in previous phases (over similar time frame but in 2017 year).

•May-June 2017 for Construction, June 2017-Ongoing for Maintenance

-Implement phase 4 plant species (see phase 4 budget list for plant list).

-Assess overall process and clean up any debris left over from previous years.

-Install Signs and Tables (see figure 2.1).

-Host a “grand opening” event in the garden that reflects the work of the volunteers and maintenance crew as well as educates also educates newcomers of the benefits of the restored garden.

-UVic grounds crew and environmental students will continue to overlook the garden to keep it healthy. Management techniques such as weeding will be used regularly to get rid of potential

invasive threats. Gardening processes will be used to protect the integrity of the restored system for years to come.

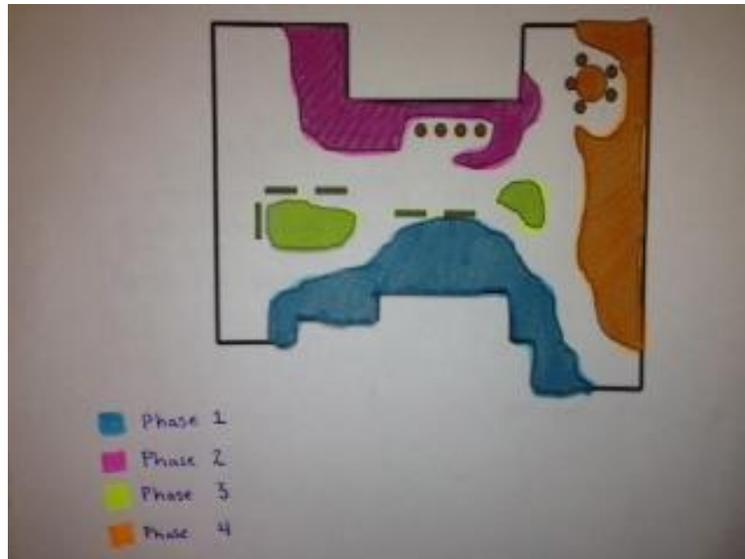


Figure 2.1: Boundaries of Phases

This diagram is colour coded to illustrate the boundaries of each phase. It shows the different areas of the Clearihue Courtyard project that we are going to restore.

References:

- Planning and Budget Framework (2012). In *Budget Framework*. Retrieved November 27, 2013
- Hermenway, T. (n.d.). *How To: The Ultimate, Bomb-proof Sheet Mulch*. Retrieved from <http://www.patternliteracy.com/books/gaias-garden/how-to-the-ultimate-bomb-proof-sheet-mulch>

3. Results and Discussion

Maya Yamaguchi

3.1 Monitoring and Evaluation

In order to critically evaluate the success of restoring the Clearihue courtyard on Uvic's campus, our plan considers monitoring, evaluating, and adapting methods in order to ensure that we meet the goals and objectives of our restoration project. Since we are restoring the garden within Clearihue to a less degraded state, our goal is to not only remove invasive plants, but also to introduce native plant species into the garden. Throughout the course of four phases, our end goal is to have five distinct, native gardens that are diverse and fully functional within the Clearihue courtyard. Our aim is to create a mini Garry Oak ecosystem for phase one, a berry patch and camas garden for phase two, a pine garden for phase three, and a tree garden for phase four. Each phase will focus on a different section of the courtyard that is in need of restoration. Furthermore, we have allotted a time span of four years, where each phase is to be completed within 12 months.

According to the IUCN, effective monitoring and evaluation should include both “conventionally qualified restoration experts and those with an intimate knowledge built from local experience” (IUCN, 2012). Therefore, our plan requires the help of Uvic's Department of Facilities Management, as well as students and volunteers who are familiar with native plant care and the local landscape. Throughout the construction of our monitoring plan, we were very fortunate to have the advice of Peter, one of Uvic's groundskeepers, as well as the advice of Nancy Turner, an ethnobotanist who specializes in the knowledge of traditional land and Indigenous Peoples in Western Canada. Continued communication with both sources will be vital for the success of our project. With the help of Nancy Turner, we collaborated our ideas and composed a native plant list tailored to Victoria's landscape and climate. In addition, by involving the help of students with our restoration plan, it will bring awareness to the study space we are creating. More importantly, the community's engagement in the courtyard will help educate and connect students with the beauty of Victoria's local ecosystems.

Monitoring

Our project contains a short-term and a long-term monitoring plan to ensure the continued well-being of our gardens within the Clearihue courtyard. As mentioned above, monitoring for our restoration project will require landscape management and plant care by UVic's Department of Facilities Management.

- Short-term Management:

In regards to short-term monitoring, initial plant species and tree species survival is our main concern. Within the first year of each phase, each plant species will need to develop proper root structure. Short-term monitoring will require watering the gardens twice a week, replacing any dead plants, and ensuring that the gardens are protected from any external threats, such as deer or rabbits. Fortunately, the courtyard is closed-off and surrounded by concrete structures, which makes it less susceptible to animal disturbance.

- Long-term Management:

We have structured our plans for long-term management to include the continuous removal of invasive plant species—in particular, the ever-growing English Ivy. The gardens will be maintained over the long term through pruning and replanting if needed, as well as the removal of any debris that accumulate around the gardens.

- Qualitative and Quantitative Monitoring:

- Data Collection: Quantifiable data of native plant health will be measured by counting the number of species that survive intermittently, and at the end of each phase. Also, methods such as measuring plant height can be documented, and during the winter season, wooden stakes can be used to mark the location of each species to make assessments of survival much more accurate. In regards to tree health, monitoring of individual trees is necessary for assessing the condition and growth in the garden. Good indicators of the overall composition of our garden includes assessment of tree coverage, dominance, and density.

- **Photography:** Photographs (photopoints) of each phase of our project will be documented. We will take pictures of the section under focus before restoration, 6 months into the phase, and after 12 months after planting in order to ensure healthy plant growth. After each phase is completed, bi-annual photos will be taken of each phase at a specific location, at the same time of year. These photos will be a key tool used in the maintenance of the site, and will be used comparatively to illustrate the change of our garden over time.

Evaluating

The success of our restoration project in the Clearihue courtyard depends on implementing our short-term and long-term management plan, and determining whether we have met the goals and objectives of our project. Once our qualitative and quantitative data is collected, we will be able to evaluate the measurements and the photographs in comparison to our project goals and objectives. Moreover, if the collected data is successful, we will be able to observe our restored gardens within the Clearihue courtyard as a healthy and thriving environment, as well as a space used by students from all departments to study. Also, feedback through a survey aimed at UVic students, staff, and faculty will also determine if the project is fully appreciated once restoration of the courtyard is complete.

Adapting

According to the IUCN, it is important to maintain adaptive management over the long-term in order to maximize the chances of success (IUCN, 2012). We have constructed an adaptive management plan, with appropriate actions to be taken, to ensure success in the case that our plan fails to meet our project's goals and objectives. These adaptations are as follows:

- Increased awareness of our restoration project in the Clearihue courtyard will be implemented through campus advertisement. Strategies for increased awareness include the creation of posters, flyers, and even campus activities that will help fund our restoration project (ex. Bake sales).

- Altered timeline extending the allotted time given for each phase, in order to make sure each phase is successfully completed before moving onto the subsequent phase of our project.
- In the case the garden's well-being is in jeopardy, or if the garden is found unhealthy, we may ask UVic's Facilities Management to provide a much more intensive management plan.

References:

Keenleyside, K., Dudley, N., Cairns, S., Hall, C., & Stolton, S. (2012). Principles, Guidelines, and Best Practices. In *IUCN: Ecological Restoration for Protected Areas*. Retrieved November 26, 201.

3.2 Conclusion

The University of Victoria offers a scenic campus rich with biodiversity; however, one area that we truly believe would benefit from ecological restoration is the Clearihue courtyard. Restoring this area would be both culturally and ecologically beneficial in addressing a variety of challenges on campus. Due to the increasing amount of students admitted into the university, overcrowding has become an issue in many of the campus' study hotspots. By restoring the Clearihue courtyard with benches and tables, it would provide much needed study spaces located in the beautiful outdoors. Furthermore, because of the invasive plant species overtaking most of the Clearihue courtyard, many of the native plants are losing in competition for land space and nutrients. Our plan is to remove the invasive plant species that are adversely affecting the courtyard, and restore native plant species in five diverse gardens—one garden in particular would contain a mini Garry Oak ecosystem. Together, constructing a study space and native plant gardens would help educate students about Victoria's local ecosystems and reconnect students with the traditional knowledge of indigenous cultures. Furthermore, our project aims to promote sustainability on campus as the university is working to become a "zero-waste institution." We have planned our project to be as cost efficient as possible, therefore we aim to incorporate composting systems and implement permaculture techniques, such as sheet mulching, into the restoration of the courtyard. Overall, we believe that the restoration of the Clearihue courtyard would target issues of invasive native plant species and overcrowding in popular student study areas, and would provide a study space that engages students with Victoria's native plant species and traditional indigenous plant use.

Appendix

Appendix A: Plant list with garden phase assignments.

Common Name	Latin Name	Phase(s)	Garden(s)
Saskatoon Berry	<i>Amelanchier alnifolia</i>	1 & 3	Pine & Berry
Licorice Fern	<i>Polypodium glycyrrhiza</i>	1	Pine
Red Flowering Currant	<i>Ribes sanguineum</i>	1 & 3	Pine & Berry
Salal	<i>Gaultheria shallon</i>	1 & 3	Pine & Berry
Ocean Spray	<i>Holodiscus discolor</i>	1	Pine
Nootka Rose	<i>Rosa nutkana</i>	1	Pine
Chocolate Lily	<i>Fritillaria affinis</i>	2	Gary Oak
Common Camas	<i>Camassia quamash</i>	2 & 3	Gary Oak & Camas
Hooker's Onion	<i>Allium acuminatum</i>	2	Gary Oak
Garry Oak	<i>Quercus garryana</i>	2	Gary Oak
White Fawn Lily	<i>Erythronium oregonum</i>	2	Gary Oak
Miner's Lettuce	<i>Claytonia perfoliata</i>	2	Gary Oak
Alaska Onion Grass	<i>Melica sabulata</i>	2 & 3	Gary Oak & Camas
Western Fescue	<i>Festuca</i>	2 & 3	Gary Oak & Camas

Grass	<i>occidentalis</i>		
California Oat Grass	<i>Danthonia californica</i>	2 & 3	Gary Oak & Camas
Salmonberry	<i>Rubus spectabilis</i>	3	Berry
Wild Strawberry	<i>Fragaria virginiana</i>	3	Berry
Cascade Blueberry	<i>Vaccinium deliciosum</i>	3	Berry
Snowberry	<i>Symphoricarpos albus</i>	4	Tree
Big Leaf Maple	<i>Acer macrophyllum</i>	4	Tree
Arbutus	<i>Arbutus menziesii</i>	4	Tree
Pacific Crab Apple	<i>Malus fusca</i>	4	Tree
Indian Plum	<i>Oemleria cerasiformis</i>	4	Tree
Bitter Cherry	<i>Prunus emarginata</i>	4	Tree
Western Hemlock	<i>Tsuga heterophylla</i>	4	Tree
Sword Fern	<i>Polystichum munitum</i>	4	Tree
Trailing Blackberry	<i>Rubus ursinus</i>	3	Berry

Appendix B: Plant information plaques.



Saskatoon Berry
(Amelanchier alnifolia)

The leaves of the Saskatoon Berry can be made into tea, and their sweet berries are rich in vitamin B, iron, and copper when they ripen in mid-summer. They were considered a valuable trade item by First Nations peoples of the Okanagan and Fraser Valley.



Licorice Fern (*Polypodium glycyrrhiza*)

The rhizome of the Licorice Fern tastes very sweet and was traditionally chewed raw or put in tea to treat coughs and colds.



Red Flowering Currant
(Ribes sanguineum)

Fresh young Red Flowering Currant leaves may be brewed into herbal tea. The tart berries have are traditionally eaten raw or in fruit cakes.



Salal (*Gaultheria shallon*)

Salal berries are sweet, high in antioxidants, and highly nutritious. They can be eaten fresh or mashed and dried into fruit leathers, this was done by Coast Salish people as a way of preserving them for winter.



Ocean Spray (*Holodiscus discolor*)

The wood of Ocean Spray is very strong and flame resistant. Its wood has been used for making arrows, baskets, and carved cooking utensils.



Nootka Rose (*Rosa nutkana*)

The rose hips of the Nootka Rose are very high in vitamin C and can be eaten fresh or made into tea. They were an important winter food source for First Nations peoples.



Chocolate Lily (*Fritillaria affinis*)

This lily has edible bulbs that were traditionally cooked in pit cooks by local First Nations



Camas (*Camassia quamash*)

These bulbs were once widely cultivated by First Nations groups for their edible bulbs which were cooked in traditional pit cooks.



Hooker's Onion (*Allium acuminatum*)

Flowers and leaves can be eaten in spring and early summer. The bulbs and seeds can also be eaten once cooked.



Garry Oak (*Quercus garryana*)

The acorns from Garry Oak trees have been roasted or steamed for eating, or ground into flour by First Nations peoples. The wood was also made into combs and digging sticks.



White Fawn Lily

(*Erythronium oregonum*)

This beautiful lily grows naturally in Garry Oak meadows where it blooms each spring and dies back each winter.



Miner's Lettuce (*Claytonia perfoliata*)

This plant gets its name because it was eaten as a salad by miners during the gold rush to prevent scurvy; it is a good source of vitamin C, vitamin A, and iron.



Salmonberry (*Rubus spectabilis*)

These tasty berries are ripe and ready for picking when they become soft, though their colour may be yellow, orange, or red. In the springtime a few red shoots may be picked, peeled, and eaten raw, but not too many or there won't be any berries later!



Wild Strawberry (*Fragaria virginiana*)

These berries may be small but they are sweet!



Cascade Blueberry

(*Vaccinium deliciosum*)

Enjoy these mild sweet blueberries, one of our native blueberry varieties.



Snowberry (*Symphoricarpos albus*)

POISONOUS: DO NOT EAT

The long straight stems of snow berry were traditionally made into arrow shafts and fish traps.



Big Leaf Maple (*Acer macrophyllum*)

Big Leaf Maple wood is good for carving, paddles and ladle spoons were often made from this tree. Also, its buds can be eaten in the spring time.



Pacific Crabapple (*Malus fusca*)

The fruits of the Pacific crabapple tree are high in vitamin C! This tree can also grow spines big enough that they were made into fish hooks by some First Nations.



Indian Plum (*Oemleria cerasiformis*)

These berries are edible but often bitter; First Nations traditionally ate them raw or cooked with other, sweeter berries.



Bitter Cherry (*Prunus emarginata*)

Traditionally, a dye has been made from the leaves of the Bitter Cherry tree. Also, the berries can be eaten.



Western Hemlock (*Tsuga heterophylla*)

The branches of Western Hemlock were traditionally tied to kelp as a way of collecting herring eggs for eating by some coastal First Nations people.



Sword Fern (*Polystichum munitum*)

This inedible fern was used in traditional pit cooks to keep food off of the hot rocks that heat the pit, and to cover the top of the pit while food was cooking inside.



Trailing Blackberry (*Rubus ursinus*)

When the leaves are red they can be steeped into a tasty blackberry tea. The berries are small and delicious, and high in vitamin C.

Appendix C: Breakdown of Project tasks:

Josh

- Researched location via discussion with Dean Keller
- Researched feasibility of greenhouse structure through conversing with campus architect David Perry
- Researched and wrote problem identification and site description
- Drew rough copy of map & designed garden restoration concepts
- Helped determine plant list

Maya

- Researched and wrote the monitoring section of the project
- Wrote the project conclusion
- Helped edit pictures taken by Jenelle
- Helped produce rough map copy of project site
- Helped determine plant list

Jenelle

- Developed & wrote project “Goals and Objectives” section
- Took photos of current Clearihue courtyard
- Developed Powerpoint presentation
- Researched plant list names & uses (Appendix)
- Helped determine plant list

Katie

- Helped determine plant list
- Researched plant uses
- Created plant information plaques in Appendix B
- Wrote actions to achieve restoration goals section
- Wrote early group meeting minutes and rough draft of initial objectives for each section

Tanner

- Contacted grounds crew and local nurseries for plant prices and availability
- Constructed Budget and Timeline
- Drew up map and outlined the different phases
- Helped determine Plant list