

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

UBC Food System Project Scenario 5: LFS Garden

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University of British Columbia

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Group 1

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Abstract

This paper examines urban agriculture in the context of the University of British Columbia (UBC) community. An edible food garden has previously been created on the south side of the MacMillan building. In order for the garden to be a viable source of food for the use of the Agricultural Science Undergraduate Society (AGUS) and Agora Café, the garden should be expanded to the west side of the building. Consultations with stake-holders were carried out to determine how the garden should be managed. In collaboration with other Scenario 5 groups, consultations were carried out with members of Agora and the AGUS to determine their produce needs and were carried out with a member from Friends of the Farm to determine past volunteer plans. In addition, meetings were conducted with Land and Food Systems (LFS) staff member Martin Hilmer, Jeff Nulty from UBC Plant Operations (Plant Ops), and Nick Gallant from UBC Waste Management to discuss various aspects of the garden. From these consultations, a preliminary business plan was created for the use of the garden. The proposal includes: a possible planting and harvesting plan, a distribution plan, a management plan including a list of proposed committee members for the management of the garden, a proposed method of composting, possible education opportunities and education tools, proposed infrastructure, and an estimated list of tools and their cost. From this we created an estimated budget that would be required to create the garden.

Introduction

This paper explores the steps needed to expand and maintain the emerging LFS Garden at the UBC MacMillan building and gives a business proposal outlining how these steps may be implemented. Given the scope of this project, as a group, we felt it would be most beneficial to focus on our areas of interest and accumulated wisdom. Therefore, while we have touched on all

aspects of the business proposal, we feel it would be premature to create a detailed work plan at this time. Nevertheless, we have worked diligently to create a thorough foundation on which a detailed work plan can be established by future groups who will implement the next steps of this project.

History of the LFS Garden

The LFS Garden began in early 2007 as Landscape Architecture (LARC) class project (Richer, Rojas & Project Partners, 2008). The LARC class designed a plan for a courtyard and food garden at the south side of the MacMillan building; this was implemented in the spring and summer with the help of volunteers, staff, and directed studies student, Lin Steedman (Richer *et al.*, 2008). The initial vision for the LFS Garden was to serve as a demonstration site for organic urban agriculture, local food production and closed-loop systems (Steedman, 2007). In doing so, the garden would successfully highlight all aspects of sustainability including social, economic and ecological (Steedman, 2007).

Past Recommendations

There were several valuable recommendations that resulted from the directed studies report. These included: creating a closed-loop system using composted waste from Agora Café and the AGUS Wednesday night barbeques, forming a student-run committee to maintain the existing garden, expanding the garden to the west side of MacMillan, making signs for the garden, creating a UBC Farm demonstration plot to draw people to the farm, installing a pathway in the garden, and carrying out additional soil testing as well as doing additional research into what other universities have done.

Problem Definition

Outlining the Challenge

The steadily increasing world population is putting more and more stress on our food systems (Richer *et al.*, 2008). More people than ever are living in cities and rapidly expanding into precious agricultural land and consequently shrinking the space available to produce food (Richer *et al.*, 2008). Urban agriculture is a worthwhile method to help ease the stress on our current food systems by producing food within cities in community, school, rooftop or patio gardens (Halweil & Nierenberg, 2007).

The Importance of the LFS Garden to UBC as a Community of Learners

Many universities, including UBC, have already begun practicing urban agriculture. UBC is a community of learners which prides itself on world-class research, hands-on learning, and campus sustainability. Therefore, the LFS Garden can greatly contribute to creating and maintaining a sustainable UBC food system by providing food for the LFS community and can also serve as an educational and demonstration site for local, organic, urban agriculture (Richer *et al.*, 2008).

Outlining Potential Obstacles

In order to achieve these goals, it is inevitable that challenges will arise and consequently require creative solutions. Some challenges facing the LFS garden include: deciding which crops can be harvested from September to April while students are at UBC, determining how to use produce that is ready for harvest in the summer months, establishing low maintenance perennial and annual food crops, maintaining the garden throughout the entire year and designing an expansion garden that will be permanent (Richer *et al.*, 2008).

Vision Statement

Despite our very different backgrounds, as a group we agree with the “Vision Statement for a Sustainable UBC Food System.” As per our discussion, we believe the LFS garden will greatly contribute to the sustainability of the UBC campus, since locally grown foods have invaluable benefits on a social and ecological level.

Methods

This scenario on the LFS Garden is part the UBC Food System Project, which is a community-based action research project involving partners and collaborators from across the UBC campus that has the goal of improving the sustainability of the UBC food system (Richer *et al.*, 2008). To create both this report and the business proposal, our group conducted background research on two main topics; first, urban agriculture at other universities and second, understanding which crops can be grown in British Columbia during each season and different composting techniques. In addition, we critically reviewed the paper written by Lin Steedman.

Our Group’s Researching Initiatives

Members of our group took measurements of the garden plot in order to accurately create a layout plan. A soil analysis was conducted by Pacific Soil Analysis in Richmond, BC (See Appendix C), the results of which were used in deciding which crops might be most appropriate. One of our group members, with expertise in British Columbian gardening, formed a distinct production and harvesting plan and created a layout plan for the expansion of the garden.

Collaborating with other Professionals & Students

We met with and e-mailed various knowledgeable individuals who assisted us in our research and in planning the business proposal. The four scenario five groups worked as a team and collaborated throughout the whole process to share information to avoid duplication and

overburdening our generous contacts. Consent forms were signed by our contacts to enable us to use their names in our report and will be included in the reports of whichever groups met with them. These contacts included: faculty and staff members interested in committee membership to manage the garden, Friends of the Farm who helped maintain the south side garden last year, Agora and AGUS who advised us on what they would like produced in the garden, UBC Plant Ops and UBC Waste Management, who gave us valuable input on planning and maintaining the garden. As well, we met with Ashley Peterson, who has been conducting a directed studies project on the garden this term. With the help from Dr. Art Bomke, we were able to contact Campus and Community Planning to obtain official permission to use the proposed land for the garden. An e-mail was sent to professors in the LFS faculty to determine if there was interest in incorporating the garden into their course curriculum (See Appendix A). So far there have been a few professors that have expressed interest in this. Moreover, an email was sent to students in the LFS faculty to recruit a student manager responsible for managing the garden over the summer and becoming an active member of the committee (See Appendix B). Some members of the other groups helped to get the garden expansion area plowed and planted potatoes in it as a test crop. The four groups together decided on the name of “The Orchard Garden” for the LFS Garden.

Findings

LFS Garden’s Contribution to Urban Agriculture

The garden can be used as a model of urban agriculture for the local community. It can be used as an educational tool for members of the community, demonstrating how to grow nutritious foods locally and sustainably in their neighborhood despite limitations to space,

budget, and labor. As a provider of nutritious and affordable food to the UBC community, the garden can also be used to reinforce the importance of the urban agriculture on a larger scale.

Background Research on Other Universities' Gardens

We researched existing gardens in various universities across North America in order to learn from their experiences and gain new ideas. The universities we found to be most interesting included the University of Alberta, Berea College, UC Santa Cruz, Evergreen State College, Fleming College, Gettysburg College, and the University of Toronto. The following are some interesting points that were obtained through research on other campus food gardens:

- Given that a fridge is not available to store fresh produce, the majority of the food will be sold in the Student Union Building, donated to the Campus Food Bank and other equitable food distribution systems or given to volunteers (University of Alberta).
- Organic food and ornamental species are grown in pots and on land, indoors and outdoors, year-round (University of Toronto).
- Native plants are grown in a six-inch-deep mixture of local organic matter such as peat, manure, compost, and wood shavings (Fleming College)
- Tea beds filled with harvestable teas and herbs (UC Santa Cruz).
- Production of salad greens, herbs, perennials, annuals, honey, and mushrooms, which are sold locally during the fall and spring through wholesale and retail marketing (Berea College). (Note: Similar produce is available from the UBC Farm)
- The building of a rain water collection system at the nearby observatory (Gettysburg College).
- Practice of a strict 5 year crop rotation. Rotation has 4 general crop categories with each category occupying a given space for one growing season. The fifth season is a fallow where no crop is grown. During the fallow weed control, green manuring/cover cropping, pastured poultry is used on the fallow fields to increase nitrogen to rebuild the soil after 4 years of continuous crop production. (Evergreen State College)

Research on Compost Systems

The first system we looked at was **worm bin composting** which uses red wiggler worms to help break down the waste. This type of composting is very suitable for small spaces and indoor composting such as offices and apartments. (City Farmer)

Windrow composting (as suggested by UBC Waste Management) is accomplished by piling organic matter into long rows. These piles are turned to aerate the soil and maintain porosity. This kind of composting is mostly used for composting on a large-scale. It is also not contained and can be much less aesthetically pleasing than other systems. (City Farmer)

Another type of composting process is **sheet composting**. This is a composting method where organic matter is placed directly on the soil as mulch and is let to decay there. In this method, a leguminous green-manure crop is hoed into the ground just before flowering. This method better prevents nutrients from being lost than the other methods. (University of California Agriculture and Natural Resources)

A **single-bin** system is a relatively simple system which is suitable for a smaller amount of compost and can be made from a variety of materials. The estimated cost of this type of system is approximately \$115 from new materials. (Greater Vancouver Regional District)

A **three-bin** composting system has an advantage over a one-bin system as it can have different bins for different stages of decomposition. This system would be ideal for demonstrating several stages of decomposition. It is also well contained and is more aesthetically pleasing than other types of compost systems. In this system, each bin must be at least one square meter in order for internal temperatures to reach adequate levels. Green (nitrogenous) materials and brown (carbon-containing) materials are added in alternating layers. Once the systems are set up, the bins consist of one bin filled with fresh materials, one bin

containing materials that have been turned and one bin containing compost that is ready to use in the garden. The addition of Red Wiggler worms can help to aerate and turn the pile in place. The estimated cost of a system such as this (using new materials) would be approximately \$300. (Greater Vancouver Regional District)

E-mail to Friends of the Farm

Our group sent an e-mail to the secretary of Friends of the Farm (FotF) to learn how they managed the south side garden last year and what their thoughts were on the expansion of the garden. Last year, FotF and Lin Steedman worked together to build and maintain the south side garden. They had most tools and hoses donated and borrowed any missing tools from the UBC Farm when needed. Financially, FotF kept the funds for the garden in their account, to ensure that a UBC account would remain once Lin graduated. We were told there is about \$500 in this account. FotF suggested that a new system should be set up to manage the garden's finances because they need to focus their efforts on the farm rather than the garden. Some challenges they see for the garden are continued student involvement, management over the summer, availability of staff/faculty to create learning experiences, creating and maintaining appropriate signage, and monitoring soil fertility. They support the idea of the garden being a demonstration site for the UBC Farm to draw interest to the farm but are concerned that the garden may be seen as a replacement to the farm in the eyes of the UBC administration. (Secretary, Friends of the Farm, personal communication, March 5, 2008)

Meeting with Martin Hilmer (Staff Member)

The scenario five groups met with Martin Hilmer, a staff member who is willing to be on the committee, to get his ideas and recommendations for the garden. Martin believes that the garden should be mainly student run, with the other committee members (Martin and Art

Bomke) available to periodically fill in the gaps when needed and provide knowledgeable advice. Martin indicated that the faculty member, Shannon Cowan, might be interested in supervising directed studies students who choose to work on the garden. He said we would be able to use the storage space under the stairs and he may be able to find some tools that we could use. Some suggestions Martin has for the garden is that we need a well defined fence and a clear theme (for aesthetic appeal). Martin also thinks raised beds are a good idea and encouraged us to contact Ingrid Hoff at the Botanical Gardens to get plants donated. He firmly believes that we should try to do something slightly different than the UBC Farm and grow mini fruits and edible flowers. Martin likes the idea of having the garden as a “rest area” for the south end of campus, like the Rose Garden at the north end. He suggests having benches (possibly made out of recycled milk crates and hopefully paid for by donors) placed around the garden as places to observe and relax. Martin also thought someone might be willing to donate money to the garden if it was named in their honor. It was in this meeting with Martin where the idea was sparked to apply for the graduating students’ gift for the garden.

Meeting with Jeff Nulty (UBC Plant Operations)

Another scenario five group met with Jeff Nulty and provided us with notes from the meeting. Prior to meeting Jeff, Brenda Sawada from the UBC Sustainability Office explained that Jeff cares a great deal about sustainability and would therefore be a very useful contact. Similarly to Jeff, Brenda stressed the importance of physically defining the garden. Jeff felt it is important that campus planning is involved before we invest energy and resources into the garden. He also suggested talking to CUPE 116 as they are a major community stakeholder that should be kept in the loop. As for garden design, Jeff says that a rectangular boundary would be most aesthetically appealing and organic shapes could be used within the garden. While Plant

Ops cannot donate hedging for our fence or share tools with us, Jeff suggested using fruit bushes or a simple wattle fence. He also suggested leaving a 6 foot border around the garden, large enough to get a lawn mower through, and leaving the apple trees out of the current garden. Jeff insisted that we inform Plant Ops if we want to plant more fruit trees. Plant Ops can donate woodchips (which can be packed deep to prevent weeds) for a pathway as they generate them themselves; Jeff said that we should talk to Grazyna Rougeau about obtaining them. Bark mulch would not be appropriate to use as it has been shown to leech; however, bark mulch used in UBC's Storm the Wall, is composted so it is safe to use. Jeff said we could talk to UBC Properties to get lumber donated for the raised beds. In the future, Jeff is willing to be a contact for the committee specifically in regards to garden design.

Interview with Sophia Baker-French (Agora)

An Interview was conducted with Sophia Baker-French from Agora to determine the produce needs of Agora during the school term. From the garden, Agora would like to receive tomatoes, lettuce, kale, chard, winter squash, parsley, rosemary, thyme, sage and cilantro. Ideally, they would order weekly, with the first order made at approximately the third week in September. Agora would like to know what is available from the garden ahead of time so that the menu can be planned accordingly. Preferably, an order could be placed on Friday and Agora could receive their order on Monday. Depending on the dish, some items from the garden could be easily substituted if the specific crop is unavailable. The garden would have to check with members of Agora to determine whether a substitution can be made in such a case.

A dedicated garden liaison volunteer position was considered unnecessary as Agora's inventory manager may be able to attend garden committee meetings if they were held on a monthly basis. Once a decision has been made regarding the produce pricing, Agora can

determine which items they can afford to purchase from the garden. Since Agora runs at cost, it was felt that they could best benefit from the garden if it too was run at cost (i.e. through volunteers instead of paid positions) and therefore sold produce at affordable prices.

Interview with Pearl Yip (AGUS)

An Interview was conducted with Pearl Yip, the president of the AGUS, to determine their produce needs from the garden. Pearl explained that the produce requirement for the menu for the AGUS BBQs varies from week to week, with the exception of onions and garlic which would be very useful crops for the garden to grow. Green peas and corn would also be valuable as volunteers could freeze these vegetables in the AGUS freezer. The maximum spending budget for the BBQ was determined to be \$500 and therefore crops grown at the LFS garden could help to lower the weekly costs while also promoting organic, local produce.

Currently the AGUS composts organic waste using the green bins provided by UBC Waste Management located in MacMillan. If the LFS garden had its own compost system, the AGUS would be keen to save its compost for use in the garden.

The AGUS menu is planned two weeks in advance. Subsequent to this, an order could be placed with the garden and delivered on Tuesdays. If a crop is unavailable for any reason, the AGUS is very flexible and could purchase their produce from elsewhere if needed. The AGUS would be willing to create a garden liaison position that could attend meetings and interact with the garden.

Interview with Nick Gallant (UBC Waste Management)

An interview was conducted with Nick Gallant from UBC Waste Management to determine strategies for composting weeds from the garden and raw organic waste from Agora and the AGUS. It was decided that the LFS garden should not rely on the use of the south

campus in-vessel composting facility as it is at capacity and there is not enough fertilizer for the garden. In addition, UBC Waste Management does not have a license to sell fertilizer and therefore cannot provide fertilizer for the garden; the garden should therefore have its own system. Nick suggested several types of compost systems that could be used for the garden. These included Windrow composting or building a compost bin. He suggested that we avoid using plastic bins as they are not very big and would most likely not be sufficient for the size of the garden. He suggested using materials that can be found at the Material Recovery Facility.

Discussion

As our capstone course in the Land and Food faculty core classes, AGSC 450 has challenged us in many ways while connecting the ideas taught throughout the past four years. First, we faced challenges such as uncertainty about land availability, given the possibility of the garden plot being zoned for new buildings in the future. Initially the chance that the garden may not come to fruition made it more challenging for the team to engage in the project and develop enthusiasm. However, as we received confirmations from faculty members and Campus and Community Planning and work on the site began, we became increasingly motivated and focused our energy on creating a detailed production and harvesting plan.

It was also particularly difficult to work on creating the initial plan for the LFS garden given the fact that the majority of us are fourth year students graduating this year. With such a strong emphasis put on stewardship and making the garden a sustainable, functioning plot of land, we believe that it would be more logical to begin this project in AGSC350; this would give students the opportunity to follow up on the garden and maintain their interest and participation over a longer time frame.

As a group, we also discussed the initial challenge of working on the same scenario along with three other groups. Due to the large number of teams working on scenario five, we had a meeting where we agreed that the best way to tackle this project would be to collaborate. Therefore, each team could focus their energy towards topics they are most interested and knowledgeable in. In doing so, our group felt empowered to produce a report (within a larger project) which showcased our main strengths and interests (production, harvesting, and education). Initially, this project seemed overwhelming and too broad but, as we began to narrow our focus through guidance from the teaching team, we realized that we could assist future classes by laying the foundation for a realistic implementation plan.

The Business Proposal

Planting & Harvesting Plan, Infrastructure and Layout (Refer to Appendix D for diagrams)

This proposal describes a comprehensive plan for the LFS Orchard Garden on the southwest side of the MacMillan building. The garden is designed around Permaculture principles to take advantage of the sunny aspect and slope of the site and to create year-round production focusing on shoulder seasons to align with the availability of volunteer labour. The garden is a no-dig system based on continual harvest of rotating annuals and perennial crops, relying on over wintering varieties and on soil fertility maintained by surface application of compost and mulch which help build soil ecology and maintain water and nutrient cycles.

Recognizing that the garden will be built and maintained primarily by volunteers, the elements in the garden are designed so that individual projects can be undertaken by groups of volunteers and the garden can be built in stages. The first stage would involve sheet mulching the whole space and building annual beds, perpetual harvest beds, herb spirals, and the amphitheatre. Perennial elements will be added next as the season advances, as perennials such

as asparagus and rhubarb are planted from crowns in the cold season. Raspberry canes and the kiwi trellises are planted in warmer seasons, and fruit trees are added as season and resources allow. The largest single labour need is for the cob wall which will enclose the garden. Cobbing can take place at any time of the year – cob placed in wet weather will simply take longer to cure. Therefore, the cobbing can take place as an ongoing project and it is suggested that several cob workshops be planned throughout the year to build the wall and the cob bench in the sitting garden, so that a large number of students and other members of the UBC community can be involved in the construction and learn about cobbing. The wall section on the northwest side would be the highest priority because this would allow for the building of glasshouses against that wall, an important element for season extension and for raising starts.

Techniques

Several techniques which are common in Permaculture are employed in this plan. A list of references for Permaculture techniques is included in the bibliography of this paper for reference purposes during future, more detailed planning and construction. The particular techniques which are of great importance for this plan are:

Sheet mulching: Sheet mulching is a no-dig method of building raised beds for annual and perennial intensive production. First a layer of high-carbon, dense material is laid over the existing soil and any standing weeds. The soil should have been well-watered or the sheet mulching begun after a rain. Cardboard is an excellent material for this use, as is straw, jute, coffee sacks, or any other natural fibre. It is preferable to use materials which would otherwise end up in a landfill. Next a layer of wood chips, small twigs, leaves, or prunings is added to provide a loose, carbon-rich layer to encourage good aeration and provide prime habitat for soil organisms. Lastly, this layer is covered with a deep layer of finished compost into which seeds

or starts are planted. The surface of the soil will be covered with a thick layer of mulch around crop plants to keep out competitors. The lower layers choke out existing weeds and allow soil structure and ecology to establish itself from the bottom up.

Guilds: Plant guilds are a replication of forest ecology which take advantage of vertical and horizontal layering in producing food crops. A tree crop forms the keystone of the planting, capturing and distributing rainwater, building a leaf litter layer and supporting soil structure. Shrub crops such as blueberries, sea buckthorn, blackberry, autumn olive, or other shrub-layer perennials form the next layer, beginning to produce fruit much faster than the tree fruits and providing habitat for pollinators and other beneficial organisms. Herb layer crops are edible and medicinal perennials or self-seeding annuals that also have soil conditioning and water conservation values. Examples are yarrow, comfrey, nettles, Echinacea, bush beans, brassicas, perennial onion, lovage, etc. Ground covers are edibles and medicinals which protect soil, accumulate soil nutrients, conserve water by shading the soil, and discourage pests. Examples are melons and squashes, chamomile, red and white clovers, creeping thymes, parsley, etc. Root crops and vine crops form additional layers, growing down into the soil and climbing up taller plants to add extra food and medicine crops to the planting. Symbiotic soil fungi are also an important part of guild plantings, and may also be edible and medicinal.

Keyhole Beds: Part of no-dig raised bed production, keyhole beds are round beds with a defined, permanent path for working which minimize the amount of space given over to paths and prevents the need to ever walk in the beds, thus ensuring that soil structure remains undisturbed. When sheet-mulching, paths are left without the compost layer so that the cardboard, chips, and surface mulch keep paths from becoming weedy and the composted beds become raised around the paths. Keyholes are placed so that every part of the bed can be

reached for working without needing to walk or lean on the soil.

Earthbag construction: This is a natural building technique similar to sandbagging, but much more permanent. Bags of any durable material (nylon is common, either new or as discarded animal feed bags, as are coffee bags and other natural materials) are filled with a damp mixture of sand, soil, and clay as they are laid in place. The bags are densely packed and then tamped with a heavy, flat implement to create a compacted earth structure with a flattened top. Barbed wire is laid on top of each course of bags before the next course is laid on top to make sure bags don't slide off each other. When the wall is finished, it is plastered with an earthen plaster to create a weatherproof stressed-skin which gives the wall its strength.

Cob construction: This is a natural building technique using a mix of sand, clay, and straw that is formed into "blobs" and stacked into walls, the balls of cob being sculpted together into one massive structure as the wall is built. The finished wall is plastered with earthen plaster to create permanent, weatherproof walls that have high thermal mass and insulating properties.

Elements

Cob wall: Constructed of sand, clay, and straw, a cob wall has the benefits of insulation and thermal mass which helps the garden take advantage of solar thermal energy during low seasons. By collecting and holding solar energy, the cob wall helps warm the soil and create a sun trap which allows for extended seasons and earlier spring perennial production.

Compost system: A three-bin aerobic compost system is proposed which opens on the building side (northeast side) for easy disposal of compost from the MacMillan building, and opens inside the garden to facilitate transfer of compost from the far left (north) bin to the centre bin as it matures, and to the far right (south) bin to finish. For more details, see the "Research on Compost" section above and "Waste Management" section below.

Perpetual Harvest Beds: These are raised beds for perpetual harvest of salad greens and can be covered with poly tunnels in coldest seasons if necessary. Beds are harvested and reseeded in sequence, with soil fertility maintained by surface application of compost and mulch and root systems left intact as greens are harvested.

Herb Spirals: These are hilled, mixed plantings of perennial and self-seeding annual herbs. Plants with highest water needs are planted at the bottom, those with least water needs at the top, and stones are used to help maintain the vertical structure and warm the soil to maintain year-round harvest.

Fig Tree Guilds: These are mixed plantings of fruits and herbs for casual picking. They allow people using the public space of the garden to pick fruits and engage with the garden on an informal level.

Glasshouses: Cob-foundation glasshouses can be used for seed starting and season extension purposes. They can be placed on the south wall to take best advantage of thermal mass qualities of the cob wall. Passive solar heating will warm soil inside glasshouses, making individual pots unnecessary.

Kiwi Trellis: Kiwi trellis with picnic tables underneath can be included for shaded sitting and casual fruit picking. Kiwi vines make heavy, woody stems which require a solid trellis with deeply sunk posts.

Rhubarb: Keyhole beds can be used for perennial rhubarb production.

Asparagus: Perennial beds can be used for asparagus and should be placed against the wall to take advantage of thermal mass properties of the cob wall to facilitate early/extended production.

Herb Lawn: This is a meadow planting of low-growing perennial herbs which tolerate

foot traffic and do not require mowing (e.g.: Perennial chamomile, elfin thyme, Irish moss, red clover, etc).

Fruit Trees: These would allow for casual picking and a yearly harvest for freezing, preserving, etc. Trees suitable for growing would be heritage, low-maintenance varieties of plums, apricots, apples, pears. Their roots stabilize soil and hold water, and the leaves are highly valuable as mulch for annual and perennial beds.

Herb Border: This would be a border of edible, drought tolerant and low maintenance herbs to define amphitheatre space and create visual interest and encourage the public to engage with the garden. It would attract pollinators and beneficial insects. Preferred plants would include lavender, rosemary, alpine strawberry, California poppy, white sage, anise hyssop, German chamomile, purple coneflower, calendula, and other perennial and self-seeding annual herbs.

Amphitheatre & Table: Terraced seating would create a social space and an outdoor classroom. This provides a focal point for garden and draws the public through to the centre where the whole garden is visible. Terraces are constructed with earthbag retaining walls and planted as herb lawn (as above) which do not require mowing. A permanent outdoor table would be available for studying, socializing, etc.

Annual Vegetable Beds: These are sheet-mulched raised beds for rotating annual polycrop systems. They should be grouped in sets of four to facilitate repetition of crop rotations, or for experimenting with different cropping systems for comparison. The soil fertility is maintained through surface application of compost and mulch, leaving root systems intact after harvesting (except with root crops), and through reapplication of unwanted vegetable matter as green mulch.

Bamboo grove & Herb Border: The hilled planting of non-running bamboo species would create visual separation of the social space from production garden, while still allowing look-through and provides shading for the sitting garden during hot weather. Bamboo canes are valuable as stakes and poles for use in the garden, and leaves are valuable as mulch. The border would comprise of perennial and self-seeding annual herbs as above.

Herb Lawn: This would be a low-maintenance, drought-resistant meadow of low-growing herbs which act as soil cover and tolerate foot traffic, as above. A mulched path down the middle would guide the heaviest flow-through traffic, with the herb lawn for sitting.

Cob Bench: This would be used for socializing and to help slow foot traffic and direct visitors in a circular pattern into the garden instead of just through it.

Tea Spiral: This would be a hilled, architectural planting of mixed herb species designed to be picked fresh or dried for teas. The hill is built up with sand and a stone path provides stability, surfaced with compost and planted. A surface application of compost and mulch maintains soil fertility and structure.

Fruit Trees: The fruit trees are for casual picking and harvesting for preserves and freezing. These create a permeable border between the sitting garden and the production area, allowing visitors to see into the production garden as well as inviting casual picking of fruit and leading visitors toward the raspberry canes and into the garden.

Raspberry Canes: Again, the raspberries are for casual picking, freezing, and preserves. The canes are trained along wires with deep-sunk posts, tied and pruned small for ease of picking.

Three Sisters: This represents the traditional planting of corn, winter squashes and climbing beans. Corn is planted in the centres of hills, and beans and squash are planted around

the hills once the corn is established. The squash leaves shade the soil, prevent weeds, create mulch, and discourage pests especially rodents. The beans fix nitrogen and make it available for the corn, while the corn provides structure for beans to climb. Stalks and leaves are returned as mulch and organic matter for the soil.

Distribution Plan

The main purpose of the LFS garden is to provide food for the local community. The bulk of the produce will be sold to Agora and the AGUS, as they are the main beneficiaries of the garden. Please refer to the interviews with these two groups in the “Findings” section for specifics. Some of the produce may be used as an incentive to gather volunteers to maintain the garden. Since the LFS garden may be seen as a stopping point on the south end of campus it will be a great way for the UBC community to interact with urban agriculture. A great way to get people involved and interested in the garden is for them to taste a sample of what is available. This may draw attention to the garden and perhaps build a strong community which may ultimately prevent this space from being used for a new building. There is a proposed classroom seating in this garden, which will allow sampling of produce during class, much like the sampling of wine in wine science classes.

Management Plan

The management of the garden will be overseen by the committee which will consist of faculty member Art Bomke (), staff member Martin Hilmer (), and a student manager who will be recruited by email (Refer to Appendix B). The student manager will coordinate volunteers to maintain the garden. Volunteers may come from AGSC classes or be anyone else who wants to help out. Friends of the Farm may also help for work parties. Incentives for working in the garden could be in the

form of course credits or produce from the garden. Further detail for the management of the garden can be elaborated on for next year's class.

Resources Needed

There is still a lot of work to be done regarding the donation of tools and supplies. Any shortfall in supplies will need to be purchased (such as seeds and any tools that we cannot get donated). As we are working on a tight budget the following are ways to save money:

- The city provides free compost for gardens on public land, which could be used until the garden's own compost system is established
- Salvaging materials from campus such as leaves for mulching, cardboard for layering, wood for signage
- Donated woodchips from Plant Ops for pathway
- Donated wood from UBC Properties for signage and raised beds
- May be able to find donated tools/hoses
- Donated plants from Botanical Garden

Education Tools (Signage)

We would like to propose specific signage for the garden which can serve to provide a summary of the vision and goals of the garden (See Figure 1). The signage can also identify crops and provide nutritional information. It can provide visitors information about ideal growing conditions for the plants, such as suitable weather and soil types. With over 70,000 man-made chemicals used to preserve or add flavors, consumers are becoming more aware of and more skeptical about the food safety claims made by the food manufacturers (Small Farm Training Center, 2004). Signage would therefore give visitors a practical guide of how to grow foods in their own backyard, patio or rooftop, without the uncertainty and fear of consuming artificial chemicals that have potentially adverse consequences to human health (See Figure 2). By way of example, a draft proposal of a tomato signage could be as follows:

Varieties:

- There are many types of tomatoes: cherry, medium sized, large, paste and unusual.
- Read the details on the seed packages carefully; some tomatoes are classified as “determinate” meaning that they can only grow to a maximum size.
- “Indeterminate” tomatoes in contrast, do not have a maximum growth, and could yield increasingly more during the growing season.

Growing information:

Soil

- Tomatoes prefer well-drained soil, with neutral pH.
- Plant the tomatoes in a raised bed about 6 inches high, thereby establishing a well-drained tomato garden.

Water

- Water the plant slowly and deeply, promoting a strong root system.
- Throughout the growing process, mulching is essential in producing a high yield.
- Using organic compost around the base of the plant would help prevent water loss to the soil, while helping to prevent weeds.
- Too much water would result in soggy soil, preventing the roots from getting the air they require.

Light

- They need full exposure to strong light for at least five hours each day.

Temperature

- Tomatoes are best grown between 55 and 85 degrees Fahrenheit. The plants can be severely damaged under prolonged cold conditions or moderate exposure to frost. However, they can withstand high temperatures up to 93°F.

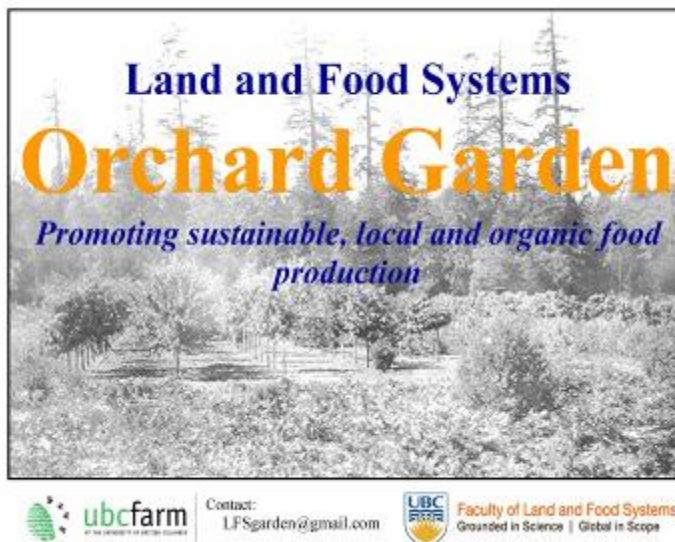


Figure 1. Proposed main Orchard Garden sign created by another scenario 5 group.

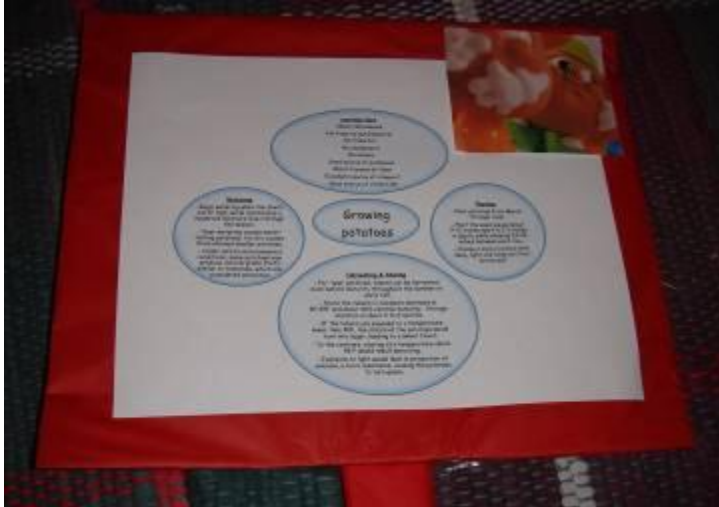


Figure 2. Sample sign for growing potatoes created by our group.

Waste Management

As briefly mentioned earlier, it was felt that a three-bin compost system would be the best option for the garden considering the large capacity needs. A three-bin system would allow for the bin to be used as an education tool as it demonstrates several stages in the composting processes. It is also one of the more aesthetically pleasing types of composting systems which could help contribute to the longevity and community support of the garden. Compared to other contained models, the three-bin system has reasonable start-up costs and requires a minimal amount of labour to maintain operations.

The bin would be accessible from outside the garden so that waste materials can be directly placed into the bins without much hassle. Appropriate signage would be presented on the outside of the bin, making it very clear which materials could be placed in the bins from the garden and which materials would be more suitable to be picked up by waste management for the in-vessel composter. The compost system should also contain thermometers to monitor the microbial activity in the bins and serve as a teaching tool.

Ideally the bins should be made from recycled wood materials. Wood allows moisture to evaporate easily. Alternatively the bins could be made from metal or plastic, however, these materials allow moisture to collect in the compost and promote the growth of anaerobic bacteria which is undesirable as it leads to odors and lowers the efficiency at which the materials are broken down.

Budget

Summer Volunteer Coordinator Wages (16wks x 20hrs/wk x \$15/hr)	4800
Tools (Rakes, spades, etc.)	550
Fertilizer/Compost/Wood Chips	500
Wood for Raised Beds	0 (hopefully donated or salvaged)
Irrigation (hoses, soaker hoses, etc.)	300
Seeds	350
Signage (wood/paint/paper/lamination)	500
Miscellaneous (supplies for committee meetings, educational material, etc.)	400
Total (\$)	7400

This budget provides a very rough estimate of costs and it will change depending on what materials can be donated or salvaged. The seeds and potentially some initial start-up compost are the two things we definitely would need to spend money on. We would ideally be able to get the following donated: tools (from UBC Farm or Martin Hilmer, as he said he might be able to track some down), fertilizer (from UBC Farm), wood chips (from UBC Plant Ops), wood for signs and raised beds (from UBC properties or salvaged from dumpsters – see Figure 3), and irrigation hoses (from UBC Farm). The paid position for a summer worker would only be feasible if we received a grant from the Graduating Students Fund, which a few members from other groups applied for.



Figure 3. Hayfa salvaging wood for signage from the dumpster.

It is important to note that while we understand the importance of a detailed budget as a part of this business proposal, as a team of groups working on this project, our focus was on creating a comprehensive and viable garden plan including the layout, production, harvesting, management, and UBC/Community education. We felt a detailed budget could not be constructed at this stage of planning; therefore, our budget is a general outline to be further expanded on by other groups and those working on the garden in the future.

Garden Expansion

As the garden is still in its preliminary stage of development, it is difficult to foresee the opportunities and constraints available for garden expansion purposes. Physical constraints include the size of garden space available, and the need to preserve the historic apple trees. Other constraints would be continued stewardship as a larger plot would undoubtedly require more resources. On the other hand, expansion in terms of educational opportunities should be explored further. For example, the garden could become a learning centre for students outside of the LFS faculty, local community members, and even visiting members of the international community.

Educational Opportunities

Creating a Linkage between the Garden, LFS Curriculum & the UBC Community

The garden should be perceived as a “living laboratory” not only for students on campus, but also for students from either elementary schools or high schools in the community. There are many UBC courses that could use the garden as a part of their laboratory work and therefore infuse in-classroom learning, with hands-on, problem based lessons. For example, BIOL 140 can clearly use the LFS garden to introduce the students to the concept of an ecosystem, as well as outline the connection between plants, foods, the environment and other living organisms. Other courses that could potentially include the garden in the curriculum are as follows: lab portions of BIOL 209 (Non-vascular plants), BIOL 210 (Vascular plants), and BIOL 343 (Plants & People), as well as BIOL 317 (Weed Science). There are many classes in our own faculty that could incorporate the garden such as all of the AGSC classes as well as many of the AGRO courses. The Science One program available at UBC may also be able to include the garden into their curriculum as they encourage field trips.

“Learning Garden” for children

On weekends, the garden can also serve as a “learning playground” for children in the local communities. With the objective of ensuring that future generations understand where their food comes from, the LFS garden can provide hands-on learning about gardens, ecosystems, and urban agriculture. Volunteers can work interactively with children to explain the essential role plants play in providing us with our healthy whole foods and can also teach basic gardening and harvesting skills. Therefore, the facilitators of the LFS garden can proactively contact elementary schools in the neighborhood, such as University Hill Elementary School, and promote the invaluable educational benefits of the Learning garden. The LFS volunteers can

also offer seminars with parents from the elementary schools during which they can promote the garden as an educational tool for children and encourage parents to take the core principles about healthy eating and urban agriculture back to their homes. We believe that ultimately children's parents and teachers will play a key role in how successful and powerful a learning tool the garden can be for young people. The UBC farm has summer camps that could potentially tie the garden into the program.

Interactive Workshops

Having an appropriate sustainable system to manage the garden is the key; hence, providing workshops is one option to update the knowledge of volunteers and the teaching faculty about how to grow foods and how to maintain the garden for the long term. Suggested workshops might include how to keep the garden lush through the summer without using too much water. Also, a network of school garden facilitators across the country, such as the University of Victoria and the University of Toronto could gather together periodically, sharing their experience of growing, harvesting, and maintaining their respective gardens. The proposed action is as follows: the facilitator of the LFS garden may initiate contact with the gardening experts to host several seminars in the community, and build a network with other similar university gardens around the country.

Recommendations

Immediate Steps to Take

- Create a more “permanent” temporary fence than the caution tape that is currently around the garden until the cob wall can be put up. The following website may be useful in finding an option <http://www.evergreen.ca/en/cg/resources/facts/cg-fact7.pdf>
- Determine what Ashley Peterson had accomplished in her directed studies of the garden and what her recommendations are
- Determine the status of the graduating students' gift, which was applied for

- Follow up on the email to recruit a student manager (this email was sent by another group and they have been checking the responses to it so refer to the other groups' papers for recommendations in this regard)
- Get a group of volunteers together to do some weeding in the south side of the garden
- Determine if the proposed sign for the garden (Figure 1) is accepted by the LFS community, then get a sign made and put up in the garden (could be printed and laminated and put up with the wood our group salvaged, which is being stored by AGUS)
- Potatoes should be ready for harvest in June and will be sold at the UBC Farm market

Future Groups

- Compile information from 2008 scenario five AGSC groups
- Present our layout to Landscape Architecture and Plant Ops for their input and determine the acceptance of the layout with faculty, students and stakeholders on campus
- Come up with a detailed management plan including a volunteer plan and investigate how volunteering for the garden could be incorporated into courses
- Do a detailed budget after determining what supplies can be donated
- Create an account for the garden that is separate from Friends of the Farm
- Maintain a relationship with Campus and Community Planning to ensure the space remains usable for a garden
- Talk to CUPE 116, as suggested by Jeff Nulty
- Begin construction of the garden

Teaching Team

- Provide more volunteer support for the garden (i.e. course credit)
- This project could be offered to the 350 class so that students can follow up with the creation of the garden
- The scenario should include some hands on work in building the garden

Conclusion

Following extensive consultation with relevant stakeholders and a variety of experts regarding the edible food garden on the south side of the MacMillan building, this report proposes a provisional business plan that is designed to satisfy produce needs of the local food

providers in addition to providing educational opportunities for students at UBC. The plan recognizes the need to be cost conscious, while also acknowledging the level of student and staff involvement required on an ongoing basis to make the project a sustainable undertaking. It is comprised of several defined elements, including construction, planting/harvesting, composting, distribution, management, and education, which combined provide the basis of garden that has the potential to offer significant benefits to a broad cross-section of the UBC community.

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Appendix A - Email to Professors in LFS Faculty

March 12, 2008

Dear Land & Food Systems Faculty Members,

We are students from the 2008 AGSC 450 class striving to create a plan for the expansion of the LFS Community Garden located on the South side of the MacMillan building. Our vision for this garden is to create a social space with an opportunity to reduce carbon emissions by offering food to a local food outlet (Agora and AGUS Wednesday BBQs), as well as incorporating a learning component to provide a prospect of applying what is learned in the classroom. The LFS community garden will also allow student to reconnect with the food system.

We would like to present you with the opportunity to use this garden to incorporate into your course curriculum. For example, the garden could provide hands-on experience in pest management applications, or horticultural techniques could be explored using the garden as an example. The garden can also be used for simple field trip purposes illustrating to students the relationship between agriculture and food on the table. If you are interested in incorporating the garden into a classroom project or component, please feel free to email [REDACTED]

The planning of this garden is still in its early phases and any input or feedback that you may have will be greatly appreciated.

Sincerely,

2008 AGSC 450 LFS Garden Planners

Appendix B– Email to LFS Students

Job Title: Garden Manager

Timing of job: Summer * Possible Fall-Winter

Position type: Volunteer

Job location: Orchard Garden – McMillan Building

Job description: Students from the AGSC 450 class are planning to expand the LFS Community Garden. The goal is to create a garden using sustainable practices to be used as a model for urban Agriculture and a space for learning & research. The job will be managing the development of the garden and maintaining an aesthetically pleasing environment. This is a team operation, so it is not entirely up to the manager to control all garden operations. There is a network of resources available to you via the Garden committee. This work could be incorporated into a Directed Studies program.

General duties:

