

The UBC Food System Project: Summary 2011

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THE UBC FOOD SYSTEM PROJECT -UBCFSP-

SUMMARY REPORT 2011

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- Synthesize the findings of 2011 LFS 450 students;
- Work with UBCFSP partners and collaborators to plan and ideally implement food system related initiatives;
- Conduct meetings with UBCFSP partners to gather input for the next iteration of the UBCFSP
- Draft scenarios for the 2011-2012 year;

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INTRODUCTION:

The University of British Columbia Food System Project (UBCFSP) is a collaborative, community-based action research project initiated jointly in 2001 between the UBC Faculty of Land and Food Systems and the UBC Campus Sustainability Social Ecological Economic Development Studies (SEEDS) Program. The Project involves multiple partners and collaborators, including: UBC Food Services (UBCFS), AMS Food and Beverage Department (AMSFBD), UBC Waste Management (UBCWM), Centre for Sustainable Food Systems at UBC Farm, UBC Campus and Community Planning (C&CP), Sauder School of Business classes, UBC Building Operations, Alma Mater Society (AMS), UBC Campus Sustainability (CS), and the Faculty of Land and Food Systems students and teaching team.

The UBCFSP is part of the Land and Food Systems (LFS) 450 Land, Food and Community (LFC) III course, a capstone course required for many 4th year Faculty of Land and Food System students. The project commenced ten years ago and has involved 11 generations of LFS 450 students, with over 1,625 students (205 LFS 450 groups, four Sauder School of Business groups, and one Global Resource Systems group) to date.

Main Goals of the UBCFSP:

- 1) To move the UBC campus food system towards sustainability, by:
 - a) Facilitating a shared vision of a sustainable food system among project partners (key food system actors)
 - b) Coordinating project partners and other key campus food systems actors in their efforts to improve the campus food system
 - c) Creating Campus as a Learning Lab projects (scenarios) as a vehicle to address opportunities to improve the UBC food system
- 2) To positively impact the movement towards the sustainability of the larger BC, Canadian, North American and World food systems, by:
 - a) Leading as a model for best practices for sustainable food systems
 - b) Using UBC's leverage to influence the supply chain and broader sustainability practices
- 3) To offer students hands-on learning opportunities in a multi-disciplinary project with potential for positive impact on ecological and human health

METHODOLOGY AND PROCEDURES:

METHODOLOGICAL PERSPECTIVE:

Community Based Action Research (CBAR) serves as the methodological perspective in the UBCFSP. CBAR can be defined as an "inquiry or investigation that provides people with the means to take systematic action to resolve specific problems"; it enables "people (a) to investigate systematically their problems and issues, (b) to formulate powerful and sophisticated accounts of their situations, and (c) to devise plans to deal with the problems at hand" (Stringer, 1999). The tasks of CBAR are to capture participants' pluralistic voices and to situate their experiences within larger contexts. The goals of CBAR are to produce knowledge through open discourse, produce action and change, and to give research back to the community in which it originated. The process of CBAR is an iterative one, whereby research is conducted through a "look, think, act" routine, which involves a "constant process of observation, reflection and action" (Stringer, 1999).

The significance of CBAR in the UBCFSP is manifold. The Project Coordinator applies basic principles of CBAR such as consensus building, and inclusiveness when meeting with partners to

identify challenges in various areas of operations, and develop corresponding tasks needed to address them in drafting project scenarios. Furthermore, she strives to build consensus among project partners in identifying challenges and next steps of action. She makes every effort to collaboratively implement solutions. Students and members of the teaching team are able to participate in an already established collaborative process, where they can work with project partners to assist them in issues that affect them, and ultimately develop tools that will help address some of the challenges identified by participants.

METHODS OF DATA COLLECTION:

Methods of data collection that have been used by LFS 450 students throughout the project's duration have ranged from conducting reviews of literature, secondary sources, interviews and focus groups, to administering questionnaires and engaging in participant observation methods.

Methods of data collection varied amongst groups and scenarios. All groups were given the opportunity to obtain information from invited class speakers, who gave presentations and spent class time discussing and answering questions. Guest speakers throughout the term included representatives from UBC Food Services, AMS Food and Beverage Department, UBC Sustainability Office, UBC Centre for Sustainable Food Systems at UBC Farm, School of Community and Regional Planning, and the Alma Mater Society. All students were required to review a selection of previous related LFS 450 group papers, required course readings (resources selected on an ongoing basis throughout the term and posted on the course website (Vista), and review summaries of project findings from previous years. Other methods of data collection included questionnaires, focus groups, interviews, participant observation, secondary data analysis, and literature reviews. Interviews were held with various UBCFSP partners and collaborators, students, faculty, and staff, as well as a selection of off-campus participants – ranging from food distributors, producers, retailers, and chefs.

PROJECT DESIGN:

The Project Coordinator works with the principal investigator and primary project partners in planning the annual student project. Project themes are selected based upon previous work and input from stakeholder meetings. LFS 450 students are assigned to groups of six to eight students. These groups are primarily responsible for conducting research, planning initiatives and implementing actions. The LFS 450 teaching team primarily acts as resource persons and facilitators to help the student groups with their work. Other UBCFSP stakeholders are involved mainly as resource persons, reviewing and giving input on student work and in implementing proposed findings and action plans. At the end of the student projects, the coordinator works with project partners to implement recommendations.

SUMMARY REPORT OBJECTIVE:

The purpose of this paper is to provide a summary of the 2011 iteration of the project. Specifically, this paper consists of an overview of central group tasks, findings and recommendations, as well as some central outcomes that emerged from group work and meetings with stakeholders.

OVERVIEW OF 2011:

2011 marked the 11th iteration of the UBCFSP. The class consisted of 75 students who were divided into 8 groups to work on one of 8 scenarios listed below in Table 1. This year, the project piloted a new partnership with the Think & Eat Green @ School project, and as a result offered two associated project scenarios. The Project Coordinator worked closely with project partners and other food system actors to develop a series of scenarios that met the needs of food system stakeholders, fulfilled the learning objectives of the class and were a manageable workload for students in a three-credit course. Each scenario contained a background and problem

statement, a set of recommended tasks needed to address the problem, recommended resources and people to help groups begin their work.

Table 1: List of 2011 scenarios

Scenario 1: Product Triple Bottom Line Assessment with a Life Cycle Assessment
Scenario 2: Developing Sustainable Food Procurement Policy*
Scenario 3: Waste behaviours in UBC Food Services Residence Dining Halls
Scenario 4: Education Programs in the LFS Orchard Garden and Agora Cafe Farm
Scenario 5: Engagement of U. Hill Secondary Students at the UBC
Scenario 6: Designing a Formal Proposal for a LFS Community Kitchen
Scenario 7: Designing a UBC Farm Pilot Food Processing Center
Scenario 8: Designing the AMS New SUB Root Cellar

*Due to a reduced class enrolment, one scenario could not be accommodated by the LFS 450 course. Scenario 2 was not carried out in 2011.

Based upon assigned scenarios, student groups were required to carry out their assignment and produce a 30 page report and a 15 minute PowerPoint presentation to share their findings. All groups were asked to complete the following tasks:

- 1) Provide reflections on the project Vision Statement, which outlines collectively agreed upon principles that should guide our transition towards a sustainable UBC food system;
- 2) Provide reflections and expand if necessary on the problem statement assigned to them;
- 3) Develop new and/or refine proposed research designs, campaigns, and action plans from previous years;
- 4) Engage in data collection and develop action plans for implementation, and
- 5) Provide recommendations to appropriate project partners, collaborators and other relevant food system actors regarding next steps.

2011 CENTRAL OBJECTIVES, FINDINGS AND RECOMMENDATIONS

In the following section, specific scenario objectives are identified, and key findings and recommendations are summarized from 11 group reports. For more information on specific findings please see the original student reports that can be found on the UBC Campus Sustainability website: <http://www.sustain.ubc.ca/seedslibrary/>

SCENARIO 1:

TRIPLE BOTTOM LINE ASSESSMENT

Community Partner: UBC Food Services, AMS Food and Beverage Department

LFS 450 Groups: Group 1

BACKGROUND

In a food system faced with spiralling food prices, resource shortages, rising fuel costs, climate change, environmental degradation, and an array of health problems from high obesity rates to food disease outbreaks, the ways in which the food and hospitality sectors produce, process, distribute, package, select and dispose of food contribute to, and are affected by, these challenges. UBC campus food operations are beginning to respond to these challenges. Both the UBC Alma Mater Society Food and Beverage Department (AMSFBD) and UBC Food Services (UBCFs) have taken proactive roles in addressing their contribution to the problems at hand. Both groups have increased procurement of local foods, and foods produced in more environmentally and people friendly ways. The UBCFS and AMSFBD continue to be committed to decreasing the environmental impact of their food operations to the best of their ability. [UBCFSP Scenarios 2011].

OBJECTIVE

The student group was asked to conduct a triple bottom line assessment on a selection of common ingredients and to recommend a product or series of products that are the most sustainable option assuming that the given ingredient will continue to be used.

CENTRAL FINDINGS

Sugar was chosen as the focus of the triple bottom line assessment through stakeholder interviews with the ultimate goal of informing more sustainable sugar procurement on the UBC Campus. "The UBC Sustainable Purchasing Guide- Version 2" published by the UBC Supply Management and the Campus Sustainability office (2010) states that sustainable procurement considers best value, product life cycle, social and ethical impacts of the products considered for purchase and the overall necessity of the product. A triple bottom line assessment looks at the economic, social and environmental impacts of purchases from a local and global perspective [Group 1, 2011].

ENVIRONMENTAL ASSESSMENT:

Sugar Beets

- Sugar beets are a crop specifically bred for its high sugar content. It is grown in temperate climates such as Canada and processed to make sugar [Group 1, 2011].
- Roger's Sugar is located in Alberta where most Canadian sugar beets are grown. There is no commercial organic production of sugar beets in Canada as it is difficult to suppress weeds (Burnett *et al*, 2003). According to Burnett *et al* (2003) it is possible to get a good yield of sugar beets in an organic system if good practices are employed [Group 1, 2011].
- Sugar beets are rotated in a four year cycle to decrease disease pressure. Annual beet harvest disturbs the soil and fields are often left bare without cover crops to decrease erosion and CO₂ release (Chauddhary, 2009) [Group 1, 2011].
- Nitrogen fertilizers are used and often in excess to encourage increased crop yields. Irrigation is necessary for production in Alberta. Sugar beet production in Canada is highly mechanized requiring fossil fuel inputs (Burnett *et al*, 2003) [Group 1, 2011].

Sugar Cane

- Sugar cane is a fast growing grass native to the tropics. It is a perennial crop, which is replanted every four years [Group 1, 2011].
- Herbicide weed suppression is necessary in the first 3-4 months of production or until the sugar cane has grown tall enough to shade out other plants (Burnett et al, 2003). Fungicides are used to decrease risk of fungal infections. Sugar cane usually requires nitrogen, potassium and phosphorus fertilizers, which are often applied in, excess (Augustburg et al, 2000). Additionally, sugar cane requires extensive irrigation. Ditch irrigation is often used which has high water losses. Since sugar cane is often grown in arid sub-tropical areas, water tends to be a precious resource (Gujja et al, 2009; Clay, 2009) [Group 1, 2011].
- Sugar cane harvest is either mechanized or done by hand. If harvested by hand, the fields are burned to eliminate excess foliage, resulting in huge CO₂ emissions and loss of potential in-puts of soil organic matter. This practice is in the process of being outlawed in Brazil, which is a major sugar cane producing region in the world [Group 1, 2011].
- Organic sugarcane is usually small-scale production. Typically, intercropping (growing another crop with the sugar cane) is practiced to decrease disease risks. Organic fertilizers and animal manure are used to nourish the crops. Organic sugar cane farmers are more likely to incorporate animals in the farming system, which helps to decrease disease and soil imbalances and may help improve household food security (Gujja et al, 2009; Clay, 2009; Augustburger et al, 2000) [Group 1, 2011].
- *Conclusion:* Both sugar beet and cane sugar production are environmentally damaging. Organic sugar cane production appears to be a more environmentally sound option.

Processing

- 90% of Canada's sugar comes from sugar cane grown in South America, Central America and Australia. Sugarcane is partially refined before coming to Canada. Initial processing of sugar cane results in 70% juice and 30% pulp. The pulp is typically burned as fuel for the processing facility. The sugar cane juice is purified with CO₂ and lime and is evaporated yielding sugar crystals. In Canada, second processing of the raw sugar takes place in a series of energy intensive purification and evaporation steps [Group 1, 2011].
- Sugar beets are refined in Alberta where they are grown. Sugar beet pulp is used as animal feed [Group 1, 2011].
- *Conclusion:* Processing of sugar beets and sugar cane are similar with similar energy use requirements.

Transportation

- In 2008, Canada imported by boat about 831,213 tonnes of raw sugar from South America resulting in 154,138,356 kg CO₂ emissions as estimated using the Hamburg Sud Liner Services Carbon Footprint Calculator. This is equivalent to 190 kg of CO₂ emissions per tonne of sugar. There are secondary processing centers in Vancouver, British Columbia, Toronto, Ontario and Montreal, Quebec. From these centers, refined sugar would be distributed to the surrounding areas by truck [Group 1, 2011].
- Domestic transportation of sugar beet sugar from processing in Alberta to the British Columbian consumer is estimated to accrue 1,236 km and result in 331 kg CO₂ emissions per tonne of sugar, assuming trucking transport [Group 1, 2011].
- *Conclusion:* It appears there are fewer CO₂ emissions associated with shipping raw sugar from Central America than with trucking sugar from Alberta.

SOCIAL ASSESSMENT:

Worker Conditions:

- Sugar cane production must produce sugar at a price that is competitive on the global market. In many areas of production, the price barely covers the cost of production. This results in low wages, and difficult working conditions. In Brazil, a major sugar cane producing country, a majority of sugar cane workers live below the poverty line (Macedo, 2007). Rocka et al (2010) did a study in Brazil that showed that manual workers report respiratory problems secondary to dust exposure and injury resulting from repetitive movements. The study also

showed that 33% of machine workers reported machine related accidents and 31% reported mental fatigue from working 10 hour days for 11 day stretches at a time (Rocka et al, 2010) [Group 1, 2011].

- Fair-Trade International Certification is a way to help assure that standards factoring in social wellbeing of producers are met for all certified products (Fair-Trade International, 2004). Under the Fair-Trade certification, there are general standards and sugar specific standards for production and pricing (Fair Trade International, 2004). Worker conditions are held to standards set by the International Labor Organization, while trade standards help protect farmers from shifting market prices. The fair-trade system also adds a premium to product prices to supply farmers with funds for development [Group 1, 2011].
- Canadian sugar beet farmers are represented by the National Farmer Union (NFU) and other organizations, which help them, address social, economic and political issues that arise (NFU Website, 2011).
- *Conclusion:* Canadian sources sugar and fair-trade sugar help assure a better standard of living for sugar producers.

Human Health:

- Obesity is a health epidemic in North America and is associated with an increased risk of heart disease, stroke and cancer and is responsible for an annual health care costs of up to 150 billion dollars per year in the US (Volkow et al, 2011) [Group 1, 2011].
- Granulated, brown and powdered sugar are calorie dense and offer few micronutrients. In North America, it is recommended to minimize sugar consumption to help limit excess calories in the diet, which may help counter obesity [Group 1, 2011].
- *Conclusion:* Limit sugar use and dietary intake.

ECONOMIC ANALYSIS

- In Canada Rodgers/Lantic is the major supplier of sugar in Canada. Redpath Sugar is the next largest sugar producer in Canada but they do not sell sugar in bulk. Both the AMS FBD and UBCFS purchase the majority of their sugar from Rodgers Sugar. 61% of the sugar purchased by the AMS is granulated sugar. 31% of UBC Food Services sugar purchase is Golden Sugar [Group 1, 2011].
- The average price UBC pays for Rodgers conventional white sugar is \$29.60 per 20kg bag. Horizon, a Burnaby, BC based distributor, sells Coco Camino fair-trade unrefined cane sugar for \$50 per 20 kg bag. International Sugar Inc. offers organic sugar at \$65 per 20 kg bag + shipping [Group 1, 2011].
- According to Sadler (2010) the price of sugar is expected to rise 30% from 2010-2011, which may be motivation to decrease the total amount of sugar purchased by UBC food providers [Group 1, 2011].
- While it may not be economically possible to replace all sugar used with organic fair-trade sugar, it can be introduced in a select product or at select food outlets accompanied by a strong marketing campaign. A successful example is Ethical Bean Coffee's fair-trade doughnut made from completely fair-trade ingredients. The doughnuts are available at UBC Food Service resident dining halls. UBCFS is pursuing making their popular Ponderosa Cake an in house produced fair-trade product as well. For the AMS to make a fair-trade sugar cookie at Blue Chip cookies it is estimated that the increased price would be about \$0.05 per cookie [Group 1, 2011].
- *Conclusion:* Fair-trade and organic sugar options are significantly more expensive than the conventional version. It may be advantageous to highlight the special sugar in a 100% fair-trade product.

RECOMMENDATIONS:

To AMS FOOD AND BEVERAGE DEPARTMENT AND UBD FOOD SERVICES:

- Work with distributors and wholesalers to negotiate the best price possible for organic fair-trade sugar and begin to purchase as able. Integrate organic fair-trade sugar into food products sold in your food outlets as widely as possible.
- Market products made with organic fair-trade sugar to help raise awareness of the importance of fair-trade products. Train staff about fair-trade products so that they can educate consumers.
- Explore ways to decrease the amount of sugar used in products to help increase the nutritional value of the products offered and to decrease overall environmental impacts of sugar purchased at UBC. Fruit can successfully partially substitute sugar in many baking recipes.

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Scenario 2 “Developing Sustainable Food Procurement Policy” was not carried out in the 2011 project cycle.

SCENARIO 3:

WASTE BEHAVIOUR IN UBC FOOD SERVICES RESIDENCE DINING HALLS

Community Partner: UBC Food Services

LFS 450 Groups: Group 3

BACKGROUND

Today human waste is greatly affecting the environment. Modern packaging, processing, distribution and the fast-food culture have greatly increased the amount of waste that the food system produces. Waste is not often the focus of discussion when talking about food, but it plays a critical role in our food system. Understanding waste systems is indispensable to understanding the food system. The management at UBC Food Services (UBCFS) understands this. They have been working hard to improve UBC Food Services' food procurement, policies and practices. UBC has recently completed a waste audit, which included a comprehensive selection of UBCFS facilities. UBCFS has already begun focussing on reducing packaging, eliminating to-go containers and decreasing the number of trips their suppliers make to campus [UBCFSP Scenarios 2011].

OBJECTIVE

The student group was asked to look at the staff pre-consumer and student post-consumer behaviour surrounding waste sorting and disposal in the residences dining halls at Place Vanier and Totem. The group was asked to produce a brief and effective guide to proper waste disposal practices.

CENTRAL FINDINGS

LITERATURE REVIEW:

A literature review was conducted to gain an understanding of current waste disposal practices.

- Non-sustainable methods of waste disposal include landfills and open dumps. Open dumps have negative impacts on air, water and soil and decrease the quality of life of neighbouring communities [Group 3, 2011].
- Some identified successful landfill waste diversion tactics are summarized below:
 - Germany requires that manufacturers make packaging reusable or recyclable (Rousso & Shah, 1994) [Group 3, 2011].
 - Sweden incinerates 46.7% of its household waste to produce energy. This results in less landfilled waste and less methane emissions (Canadian Urban Institute, 2006) [Group 3, 2011].
 - The City of Vancouver (2011), British Columbia uses Residential Drop Off (RDO) areas for materials such as scrap metal, cardboard, paper, batteries, used oil, tires and propane

tanks. The City of Vancouver (2011) has also issued disposal bands limiting the items that can be landfilled including corrugated cardboard, paper, recyclable containers, organic waste and hazardous materials [Group 3, 2011].

- The 2011 UBC Waste Audit showed that 95% of UBC's organic waste could be diverted from the landfill. Across the campus 56% of waste is directed to landfills with the other 44% being recycled (Giratalla, 2011). Improper waste sorting and subsequent contamination of recycling or compost often result in these items being landfilled [Group 3, 2011].

PRE-CONSUMER KITCHEN WASTE BEHAVIOUR: PLACE VANIER AND TOTEM RESIDENCE KITCHENS

The following details the Group 3's findings around in-kitchen waste sorting practices at Place Vanier and Totem residence dining halls.

- Compostable food waste is separated from other solid wastes and sent for composting in the UBC in-vessel composter [Group 3, 2011].
- Clean soft plastics are recycled by UBC Waste Management, while dirty soft plastics are landfilled. Some desirable hard plastic products are sold to a local liquidation store, while other hard plastic products are recycled. Head Chef at the Place Vanier Dining hall, Steve Golob, (personal communication, 2011) collects the common 4-gallon plastic pails used for ingredient packaging and gives them to community member/group that can reuse them for other purposes. Metal cans are cleaned and separated for recycling by UBC Waste management. Clean cardboard is collected and recycled [Group 3, 2011].
- The current kitchen designs at Place Vanier and Totem dining halls do not allow for under counter waste bins. Composting containers are often located away from workstations. Golob (personal communication, 2011) suggested future kitchens be designed with under counter organic waste disposal areas and that future waste bin systems be designed to roll out to the loading dock [Group 3, 2011].

POST-CONSUMER WASTE BEHAVIOUR: PLACE VANIER AND TOTEM RESIDENCE KITCHENS

The following details Group 3's findings around consumer waste sorting behaviour at Place Vanier and Totem residence dining halls.

- Each resident hall has a three bin waste sorting system including landfilled waste, recyclables and compost.
- Group 3 observed students sorting waste in the dining halls and felt that the students were accurate and consistent in their sorting behaviour. Based on observation, Group 3 felt the signage directed waste sorting in a very clear manner. Chef Steve Golob of Place Vanier (personal communication, 2011) feels that students have become better at sorting their waste. The recent UBC waste audit confirmed this observation reporting that about 75% of organic food waste was diverted from the landfill at Totem Park and Place Vanier residence (UBC Waste Audit 2011).
- At the beginning of the school year, UBCFS hired students to monitor waste sorting. As per Chaz Barker, the Assistant Manager at Place Vanier, (personal communication, 2011) this was effective, but expensive.
- Despite improving waste sorting practices, it is felt that inconsistency in waste signage across the UBC campus may be a limiting factor to waste sorting behaviour. UBC Campus Sustainability has launched a project to integrate waste disposal systems across the UBC Campus.

WASTE REDUCTION

Eco-to-go Program

- UBC Food Services now offers a reusable take-out container program. Students in residence access the program free of charge. Students are issued a card, which they exchange for a reusable container with their meal. They can exchange a dirty container for a card or a new container at any time. Students are not charged for damaged containers, but they must pay

to replace lost or stolen containers. Additionally, the program offers a \$0.15 discount to anyone with a to-go container. Additionally, participants are issued stamps with each meal that enables them to enter a larger prize draw. Group 3 observed that many students were using the eco-to-go program [Group 3, 2010].

- The program is not used in all other outlets across campus and there is limited marketing for the program in the dining halls. In order for the program to be expanded, it should be marketed more broadly to increase awareness of the program [Group 3, 2011].

Composting

- The in-vessel composter at UBC must compost organic materials and paper in very specific ratios. If there is left over paper products, these are diverted to either recycling or landfill waste streams.

Barriers

- UBC Food Service managers are committed to being a zero waste site. The biggest barriers to being a zero-waste campus are the cost of waste handling, the waste sorting behaviour of consumers and inconsistent signage across campus. According to Victoria Wakefield, UBCFS Purchasing Manager, it is very expensive to set up and maintain proper waste disposal systems. This is a major barrier to increasing the long-term sustainability of waste diversion programs [Group 3, 2011].

EDUCATIONAL MATERIALS:

The students developed an instructional waste sorting pamphlet targeted at incoming UBC students. The pamphlet details what waste products can be composted, which can be recycled and which must be landfilled.

RECOMMENDATIONS:

To UBC STUDENT HOUSING:

- Include the waste sorting and disposal pamphlet (student report available on UBC CIRCLE) designed by the student group in the student welcome package that explains how to properly sort waste in the three bin system.

To UBC FOOD SERVICES:

- Expand the eco-to-go lunch box program to other UBCFS food outlets and across campus.
- Increase advertising for the program. Potential marketing methods include broadcast email through UBC FYI student newsletter, including a pamphlet in student welcome packages and a poster/logo at each food outlet that carries the eco-to-go program.
- Integrate the waste bin signage with the signage across the campus. Work with UBC Campus Sustainability to inform their design for consistent signage across campus.
- Work with other key UBC players to encourage and support a zero-waste campus.
- Design and install compost and recycling bins for the Totem and Place Vanier dining hall kitchens.
- Consider designing a video about proper waste sorting that can be played in the residence dining halls.

To CAMPUS SUSTAINABILITY:

- Work with UBC Food Services to design effective waste signage and implement consistent signage across the campus.
- Encourage UBC Imagine day to incorporate waste sorting activities with all students new to UBC. Introduce the integrated signage and waste sorting pamphlets to students in this day.

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SCENARIO 4:

EDUCATION PROGRAMS IN THE LFS ORCHARD GARDEN & AGORA CAFE

Community Partner: LFS Orchard Garden, Agora Café, Think & Eat Green @ School
LFS 450 Groups: Groups 5, 6 and 7

BACKGROUND

The Faculty of Land and Food Systems has teamed up with the Faculty of Education in the implementation of the Think & Eat Green @ School project. Together with other project stakeholders, they are in the process of implementing an outdoor classroom, teaching and learning garden in conjunction with the LFS Orchard Garden (LFSOG). Eventually, the project will provide a space and the resources for garden-based teacher professional development. At present a one week long Summer Institute has been envisioned as a means to explore and address pedagogical, curricular, and practical concerns of student teachers and practicing teachers. The Summer Institute will have full involvement of the Vancouver School Board and school teachers with the intention of integrating food production at school, food consumption, preparation and procurement as well as environmental and health impacts of the school food system, into pedagogy and curriculum. The education institute aims to teach the teachers about garden-based education across the elementary and secondary curriculum. The workshops can focus on educating the student teachers on important urban gardening topics and providing garden education strategies for teachers to employ with their students.

OBJECTIVE

Student groups were asked to develop a set of workshops to be offered to an interdisciplinary group of student teachers over the course of the weeklong education institute.

CENTRAL FINDINGS

The local and global context portrayed by Group 7 can be summarized as follows: growing awareness of the lack of sustainability of the global food system increasingly fuels the movement to re-localize food and to reduce the many food miles accrued between farm and plate. It is important to buy local foods in a face-to-face supply system in which the consumer can meet the farmer to ensure the quality of the production process and the product (Get Local, 2008). This is evidenced by the success of the many community gardens seen across Vancouver, BC. The success of this urban agriculture movement has in turn increased the push for more school

garden. School gardens are seen as a way to encourage the youth to reconnect and engage with the natural world [Group 7, 2011].

LITERATURE REVIEW:

Literature reviews were conducted to inform the understanding of the scenario context and to compile information about what is already known about garden based education. The results are summarized below.

- According to Desmond et al. (2004), the benefits of garden based education include increased academic performance, individual development, improved nutrition, increased ecological awareness, exposure to ecological implications of actions in the food system and creating links between school, child and community [Group 6, 2011]. Ozer (2009) also suggests that academic performance, healthy eating habits and exercise can be increased when children are involved with school gardens [Group 7, 2011]. Raffan et al (2010) add that the sense of belonging to nature can result from participating in school gardens. These principles and values are important to instil in the youth to move towards sustainability [Group 6, 2011].
- In a survey of teachers designed and implemented by Abaquin et al (2010) and an LFS 350 Group, it was found that the top barriers to outdoor education include 1) weather, 2) student safety and 3) lack of knowledge/confidence in working in the outdoors environment. Group 6 (2011) points out that weather and safety can be addressed by proper design of an outdoor classroom space and teachers can be trained to do outdoor education through workshops such as the proposed Summer Institute [Group 6, 2010].
- Group 5 drew on the book *Designing Surveys: a guide to decisions and procedures* (1996) by Ronald Czaja and Johnny Blair to guide the design and development of the teacher survey. The authors suggest the following [Group 5, 2011]:
 - Survey questions cannot be vague, or include digressions. Each survey question should be stand-alone and not require further explanation. Each question should be single pointed such that a responder cannot have two different answers based on interpretation of the question. It is important to use simple, universal language. Questions should not be leading. Finally, open-ended questions can be very difficult to analyze (Czaja & Blair, 1996).
 - Potential survey participants tend to decline to participate after reading the introduction or within the first few question of the survey. It is important to make the survey appeal to the participant and to make it simple to complete (Czaja & Blair, 1996).

STAKEHOLDER INTERVIEWS:

Results of the stakeholder interviews are summarized below.

- Involving the sense of touch and smell can engage participants in the learning process. Encouraging critical thinking in lesson plans can help participants apply their knowledge and benefit more from lessons [Group 7, 2011].
- Covering basic topics in nutrition such as nutrition label reading and learning about product ingredients is useful information for student teachers [Group 7, 2011]. *It is assumed, this applies to garden topics as well such as planting, starting seeds and building and maintaining a worm bin.*
- According to project stakeholders, main barriers to the implementation of outdoor education are lack of funding and lack of experienced garden instructors [Group 7, 2011].
- In terms of survey development, it was felt the survey should include both primary and secondary curriculum based workshop topics from which teachers could choose. Stakeholders agreed that free enrolment in the Summer Institute would be an excellent prize incentive to participate in the survey [Group 5, 2011].
- The draft survey was trialed on LFS 450 students and feedback was incorporated into the final design of the survey [Group 5, 2011].

LESSON PLAN RESOURCES:

The following are a list of useful resources that the student groups identified.

- The UBC Cropedia was used to determine what produce is available from the LFS Orchard Garden
- "Turning the Earth: A month-by-month guide to your school garden" (Cruickshank, 2007)
- "Worms eat our garbage: Classroom activities for a better environment" by Mary Appelhof (1997)

EDUCATION MATERIALS

WORKSHOP LESSON PLANS

The groups worked together to assure there would not be overlap in the workshops developed. The following is a summary of the developed workshops. Full outlines can be found in the full student reports.

Lesson: Vermiculture Composting

Developed by Group 6, 2011

Target audience: primary and secondary school teachers

The lesson includes the following components:

- Information on worm anatomy, nutrient cycling, the value of compost, how to incorporate compost into the garden, what to feed worms, maintenance and trouble shooting
- Demonstration of how to set up a worm bin
- Handouts and supporting information were developed to support the workshop

Lesson: Garlic Planting

Developed by Group 6, 2011

Target audience: primary and secondary school teachers

The lesson includes the following components:

- Gardening basics
- Information on the garlic growth cycle, planting techniques, water needs, spacing, soil type, soil amendments and harvesting
- Planting demonstration and participation
- Connecting garlic to aspects of education such as history, folklore and writing and science
- Handouts and supporting information were developed to support the workshop

Lesson: Local food system and food security

Developed by Group 7, 2011

Target audience: high school students

The lesson includes the following components:

- Questions prompting critical thinking and discussion around food systems, consumer purchasing choices and food quality
- Mapping food miles on a world map
- Sensory testing of LFS OG foods and/or field trip to UBC Farm

TEACHER SURVEY

Developed by Group 5, 2011

A survey was developed to assess the types of workshops that teachers would like to attend in the summer institute. The survey includes:

- An introduction describing the Think & Eat Green @ School project
- Questions around participant demographic information

- Questions regarding presence and use of school gardens at the participant's school
- Questions around curriculum offered at participants' school
- List of workshop topics from which participants can indicate their interest. Topic areas include: academic subjects, garden management and skill acquisition
- Inquiry if participant plans to attend the summer institute

RECOMMENDATIONS:

TO THE PLANNERS OF THE SUMMER INSTITUTE:

- Use the developed lesson plans to inform the summer institute workshop topics and curriculum.
- Hire professionals to deliver the workshops, as they will offer depth of knowledge and familiarity with the subject area [Group 6, 2011]. *Staff from the UBC Farm or LFS Orchard Garden should be considered to lead the workshops.*
- Use lesson plans from "Turning the Earth" (Cruikshank, 2007) as examples of lesson plans that teachers can use. Offer workshop participants classroom based lesson ideas that connect to the garden.
- Review, if necessary revise and implement the survey developed to assess teacher preferences for potential summer institute workshop topics. Assure that the survey meets UBC Ethics requirements for the Think & Eat Green @ School project [Group 5, 2011].

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SCENARIO 5:

ENGAGEMENT OF U. HILL SECONDARY STUDENTS AT THE UBC FARM

Community Partner: Center for Sustainable food systems at the UBC Farm, University Hill Secondary School, Think & Eat Green @ School,
LFS 450 Groups: Group 8 and Group 9

BACKGROUND

In 2012, University Hill Secondary School (U. Hill) will be moving to a new building located directly adjacent to the UBC Farm. Mark Bomford, Director of the Center for Sustainable Food Systems - UBC Farm, and Mr. Mark Pearmain, Principal of U. Hill Secondary, want to take advantage of the new proximity by collaborating to create unique education opportunities for the U. Hill students surrounding sustainable food systems. This partnership opportunity will enhance the UBC vision to "be a leader in fostering student, faculty, staff, and alumni engagement within the wider community" (UBC Website, 2010). This goal also directly ties in with the "UBC / Vancouver School Board (VSB) Educational Prospectus for the University Hill Family of Schools" which calls for the University Hill family of schools to be further embedded into the larger UBC campus and faculties across UBC. This opportunity arises in conjunction with the Faculty of Land and Food Systems' Think & Eat Green @ School project, which aims to collaboratively address the critical issues of regional food security, food system sustainability, and institutional adaptations to climate change within the context of Vancouver schools. Mrs. Walker is a Foods and Cafeteria Training course instructor at U. Hill Secondary and is already involved in sustainable food initiatives at the school.

OBJECTIVE

Student groups were asked to facilitate a connection between the UBC Farm and U. Hill Secondary by developing and documenting the U. Hill students' understanding and interest in the UBC Farm and food system issues. Student groups were asked to make curriculum recommendations and develop lesson plans based on their research and findings for Mrs. Walker's Foods and Cafeteria Training classes.

CENTRAL FINDINGS

Student groups placed this scenario in a social global context. The following is a summary of their findings:

The Childhood Obesity Foundation (2011) estimates that 26% of Canadian children are overweight or obese and the Canadian Heart and Stroke Foundation (2011) tells us that each day 30% of North American children eat at a fast food restaurant. About 90% of people with diabetes have type 2 diabetes, which is preventable through good nutrition and adequate exercise (CHSF, 2011) [Group 9, 2011]. There is a disconnect between humans, the food system, and the natural world. Schei (2010) says, "one generation from now most people in the U.S. will have spent more time in the virtual world than in nature." Young people spend six to eight hours a day, five days a week at school. Outdoor experiential learning must be nurtured within the school environment. "What they do not know, they will not protect. And what they do not protect, they will lose" (Schei, 2010) [Group 9, 2011]

LITERATURE REVIEW

Students performed literature reviews to gain an understanding of related projects and information that already exists to help develop and support their project plan and recommendations. The results of these literature reviews follow:

- Farm to school programs are popular way to educate students about food and food production [Group 8, 2011]. Farm to school programs are designed to connect students to local farms to support local agriculture, provide educational opportunities and improve the nutrition of the students (Izumi, et. al. 2006 & Joshi et. al., 2008). This is done through including farm foods in cafeterias and incorporating the themes into curriculum and field trips. It was felt that this project has many similarities to farm-to-school projects [Group 9, 2011]. A Los Angeles farm-to-school program has had success in addressing dietary health issues and increasing awareness of local agriculture (UC Davis, 2006). Graham et al. (2005) studied California school principal's attitudes towards school gardens and found that school principals strongly felt that school gardens are effective for teaching academic curriculum [Group 8, 2011].
- In a study by Morris & Zidenber-Cherr (2002) it was found that students maintained positive preferences towards vegetables longer if they were exposed to vegetable gardening activities and nutrition education rather than to nutrition theory alone [Group 9]. From another study, McAleese & Rankin (2007) show that elementary students consumed more Vitamin A and C and fibre through consumption of fruits and vegetables after a garden was incorporated at their school [Group 8, 2011].
- According to McAleese & Rankin (2007) and Sobel (2004) place based education and hands on learning are positively correlated to student learning, positive attitudes towards the environment and healthy eating habits [Group 8, 2011]. Similarly, in a study of the effectiveness of agricultural curriculum, Glassman (2006) found that hands on learning improved agricultural literacy scores [Group 9, 2011]. Graham & Zindenber-Cherr (2005) also showed that gardens can enhance academic learning, while Banshu-Mooney (2003) shows that gardens can be used as an outdoor laboratory to teach ecology, biodiversity and how to grow foods.
- In the Province of British Columbia, each grade and course has specific Prescribed Learning Outcomes (PLOs) that are mandated by the Province of British Columbia. It is up to individual teachers how they will achieve the outcomes in their classes. There are many PLOs for Secondary School courses that can be met by incorporating the UBC Farm [Group 9, 2011]. For a full list of the PLOs, visit the BC Ministry of Education website <http://www.bced.gov.bc.ca/irp/welcome.php>. Some of the relevant PLOs for Mrs. Walker's classes are listed in the full group papers, but are not summarized here.
- The Vancouver School Board (2007) states the aim of the Food and Nutrition courses offered in the district are to help students develop knowledge, skills, and attitudes that will have immediate and future applications in their lives on a local and global level [Group 8, 2011].

STAKEHOLDER INTERVIEWS:

Stakeholder interviews were carried out to assess stakeholder needs and expectations and to gain feedback on project progress [Group 8, 2011]. The results of stakeholder interviews are summarized below.

U. Hill Students and Mrs. Walker, U. Hill Foods teacher

The groups spent time observing and interacting with Mrs. Walker's Cafeteria Training 11/12 class to gain an understanding of the student's experiences and perspectives on farming and food. Mrs. Walker identified this group as the most appropriate group to work with. It was noted that the Cafeteria Training classes prepare foods that are sold between class periods.

- Mrs. Walker's (personal communication, 2011) classes cover topics such as kitchen equipment, measurements, baking, vegetables, proteins and staple foods, dairy, fruit, preservation, food guide, local food, planning a pantry, nutrient and lifestyle diseases, and foods around the world [Group 9, 2011]. She does not offer a lesson plan on food systems [Group 8, 2011]. It was determined that any new lesson plans should work with Mrs. Walker's current curriculum and class configuration. The classes are 1.5 hours in length [Group 10, 2011]. Mrs. Walker (personal communication, 2011) suggested education themes that would fit with her planned curriculum. Some suggestions include units on vegetables, local/seasonal foods, fruit,

Halloween party, food from around the world (global food system), and healthy eating and nutrition [Group 8, 2011].

- The grade 10 students were familiar with the functions of a farm, the products produced by farms and many of the students had been to the UBC Farm. On the other hand, the grade 11/12 class did not have extensive knowledge of farms and farm products and few had visited UBC Farm. Grade 10 students were very interested in using UBC Farm produce in their cooking classes and the grade 11/12 students were interested in attending classes at the UBC Farm [Group 8, 2011].
- U. Hill classes do not have a large budget to purchase food. This is a barrier to purchasing UBC Farm foods for the courses as UBC Farm produce is more expensive than food items typically purchased for the classes (Walker, personal communication, 2011) [Group 9, 2011].

UBC Farm

- The UBC Farm hosts many education programs, which can be used as a model for interaction with U. Hill secondary students. Potential activities include tours of the farm and composting facilities, volunteering, harvesting, fundraising [Group 9, 2011]. According to Mark Bomford, the director of the UBC Farm (personal communication, 2011), the UBC Farm can incorporate learning objectives into educational tours that can be provided at a cost to U. Hill classes. Bomford offered to provide the first year free of cost to encourage the relationship between the Farm and U. Hill. Additionally, the UBC Farm can match conventional prices for a limited amount of food products to supply Mrs. Walker's classes in order to encourage use of the UBC Farm products (Bomford, personal communication, 2011) [Group 8, 2011].
- Other ways Bomford (personal communication, 2011) visualizes potential interaction with the U. Hill students is through use of a donated plot of land on the UBC Farm, on which U. Hill students or classes can grow their own food. U. Hill students are also invited to come to UBC Farm to volunteer (Bomford, personal communication, 2011). Bomford (personal communication, 2011) is interested in having as many different classes and courses come out to the UBC Farm as possible. For example, the forest could be used on a lesson about biodiversity in a science course [Group 8, 2011].

Stakeholder Consensus

- It was agreed that a farm to school program is not feasible between the UBC Farm, U. Hill Secondary as the growing season does not correlate with the school year, and the U. Hill classes cannot afford to purchase all the produce used from the UBC Farm. However, it was agreed that a small amount of select produce could be used in Mrs. Walker's cooking classes, as this would highlight UBC Farm produce without being prohibitively expensive [Group 8, 2011].
- It was felt that food system and agriculture curriculum would be most effectively taught by the UBC Farm staff that have extensive knowledge in the area [Group 8, 2011].

IDENTIFIED RESOURCES:

The following are a list of resources that the student groups identified and used to support their recommended lesson plans:

- *FoodShare*. Toronto's Field to Table Schools program is working towards developing and integrating food systems curriculum into education. <http://www.foodshare.net/school02.htm>
- *Teacher Gram: Sustainable Agriculture Guides for Secondary Schools*. A resource that includes food systems curriculum http://lifecyclesproject.ca/resources/teacher_gram.php
- *French Fries and the Food System*. Year-round curriculum designed to be delivered on a farm that connects youth age 14-16 with farming and food. Available at the UBC Education Library.
- *Turning the Earth: a month-by-month guide to your school garden*. Published by the Vancouver School Board, 2007. Available at the UBC Education Library.
- *Setting up and Running a School Garden: a manual for teachers, parents and communities*. Published by: Food and Agriculture Organization of the United Nations, 2005.

- Lifecycles: Growing Schools Program. Lifecycles is a food advocacy organization in Victoria, BC that helps schools establish gardens through workshops. http://lifecyclesproject.ca/initiatives/growing_schools/
- School Year Gardens: A Toolkit for High Schools to Grow Food from September to June. Published by the Richmond Fruit Tree Project, BC, Canada, 2007. <http://www.phabc.org/modules.php?name=Farmtoschool&pa=viewdoc&cid=6>
- Farm to School Salad Bar in BC. Information and resources on how to start a farm to school program. Sponsored by the Public Health Association of BC (PHABC). <http://www.phabc.org/modules.php?name=Farmtoschool>
- Foodshare- Toronto Salad Bar Program. A food security organization that works to establish salad bars in schools. http://www.foodshare.net/toolbox_salad01.htm
- National Farm to School Web-Site of the United States. Resource on existing farm to school programs across the US. <http://www.farmtoschool.org/index.php>
- Center for Ecoliteracy. The Center offers books, teaching guides, professional development seminars, a sustainability leadership academy, keynote presentations, and consulting services. <http://www.ecoliteracy.org/>
- BC Environmental Farm Plan. A fact sheet detailing how biodiversity can benefit farm productivity and contribute to long term sustainability. http://www.al.gov.bc.ca/resmgmt/EnviroFarmPlanning/EFP_Refguide/2010_Documents/07_Bio_diversity.pdf
- Agriculture in the classroom. Provides agriculturally focused lesson plans (USDA, 2010) <http://www.agclassroom.org>

EDUCATION MATERIALS

Based on the student research, investigations and findings described above, the students developed and implemented the following plans.

LESSON PLANS:

The developed lesson plans were designed to be adaptable and to meet several of the provincial PLOs as well as the VSB learning objectives [Group 8, 2011]. The following summarizes the planned lesson plans. For full lesson plans, please see the group reports.

Apples 1- Biodiversity:

Developed by Group 9

- In class theory- biodiversity among food crops by way of apple varieties, pollinators role in agriculture, connection food to farms, identify factors affecting the foods available in the food market
- Activities: Field Trip to UBC Farm Heritage Apple Orchard, taste apple varieties, discuss pesticides, visit bee hives

Apples 2- Food Safety

Developed by Group 9

- In class theory- sources of food-borne illnesses with example of apple cider, pasteurization,
- Activities: student presentations, make apple cider, practice food safe skills

Apples 3- Health Recipes

Developed by Group 9

- In class theory- nutrition through Eating Well with Canada's Food Guide relating to apples (dietary fiber, vitamins and minerals)
- Activities: work with different varieties of apples for healthy apple recipes. Some suggested recipes include: apple and cranberry crumble, apple spiced muffin, whole wheat apple pie, apple chips,

Pumpkins 1- Lifecycle:

Developed by Group 9

- In class theory: soil science and the three sisters planting system

- Activities: lecture by farm staff, harvest pumpkins/plant seeds

Pumpkins 2- Menu planning:

Developed by Group 9

- In class theory: nutrition of three sisters crops, meal planning strategies
- Activities: pumpkin recipe research and preparation, nutritional videos

Pumpkins 3- Lifecycle:

Developed by Group 9

- In class theory: composting process
- Activities: Meal preparation based on planned meals, composting

Chickens and Eggs 1- Animal Husbandry:

Developed by Group 9

- In class theory: nutrient cycling and food production, understand different methods of animal husbandry
- Activities: Field trip to UBC Farm to see and learn about the chickens, meal preparation with chicken

Spring Planting Lesson:

Developed by Group 8

- In class theory: food production from ground to plate, the process of making compost, plant diversity and seed saving,
- Activities: composting student organic waste at the UBC Farm with a lecture on composting, seed diversity trivia and discussion with UBC Farm staff, a tour of the UBC Farm fields with discussion of the plant lifecycle

STUDENT SURVEY:

A draft of a student survey was developed to gauge U. Hill student understanding and interest in UBC Farm for future use if desired by the Think and Eat Green team [Group 9, 2011].

RECOMMENDATIONS:

TO MRS. WALKER AND THE UBC FARM:

- Have at least two classes visit the UBC Farm in the 2011-2012 school year [Group 9, 2011].
- Incorporate the developed lesson plans into the U. Hill class curriculum [Group 8, 2011].
- Highlight UBC Farm produce in the cooking classes and incorporate lessons around the produce [Group 8, 2011].

TO U. HILL SECONDARY SCHOOL PRINCIPAL:

- Monitor student volunteer hours at UBC Farm in order to encourage participation and interaction at the UBC Farm [Group 9, 2011].
- Encourage other U. Hill teachers to incorporate the UBC Farm into their course curriculum and where possible to organize field trips to the UBC Farm [Group 9, 2011].
- Pursue development of the rooftop garden at the new U. Hill Secondary location and use the garden in the core curriculum at the school [Group 9, 2011].
- Encourage other teachers besides Mrs. Walker to involve the UBC Farm in their curriculum. Use the prepared list of potential connections between the UBC Farm and other courses and the template letter to facilitate the start of the conversation with these teachers [Group 8, 2011].
- Continue to pursue developing strong connections between the UBC Farm and U. Hill Secondary School.

TO DIRECTOR OF THE CENTER FOR SUSTAINABLE FOOD SYSTEMS AT THE UBC FARM:

- Work with Mrs. Walker and Mr. Pairmain to deliver food system education to U. Hill students. Oversee the development of UBC Farm educational programs that can be offered to the U. Hill Secondary Students [Group 8, 2011].
- Provide specific food crops to Mrs. Walker's course at subsidized prices to encourage student exposure to local produce and crops.
- Continue to pursue developing strong connections between the UBC Farm and U. Hill Secondary School.

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SCENARIO 6:

DESIGNING A FORMAL PROPOSAL FOR A LFS COMMUNITY KITCHEN

Community Partner: LFS Orchard Garden, Agora Café, AgUS, Faculty of Land and Food Systems
LFS 450 Groups: Group 4

BACKGROUND

The stated vision of the Faculty of Land and Food Systems' is to be a leader in integrated research and education that addresses global issues surrounding health and sustainable land and food systems. This is reflected not only in the academics that the faculty pursues, but also in the extracurricular activities of the associated undergraduate student groups including the LFS Orchard Garden, Agora Café and the Agricultural Students Undergraduate Society (AgUS). All of these groups lead student activities that focus on food and food systems and many of these activities require extensive use of kitchen facilities. These activities include Agora's daily menu offerings, AgUS's weekly community dinners, the annual faculty Fall Harvest Community Dinner and the LFS Orchard Garden's produce sales. The groups currently carry out their activities with makeshift camping-like kitchen equipment, as the MacMillan building does not have kitchen facilities. Recently, there has been an increase in interest among LFS faculty and staff to develop a kitchen design in order to help attract donors and solicit funding for a kitchen. [UBCFSP Scenarios 2011].

OBJECTIVE

Students were asked to put together a formal proposal for a kitchen in the MacMillan building which can serve the LFS community.

CENTRAL FINDINGS

Explanations

NEEDS ASSESSMENT:

- According to Alvin Tejuco (personal communication, 2011), Agora Café manager, and Jill Middlemiss (personal communication, 2011), President of the AgUS, more space for food preparation and food storage are needed. This will allow Agora to expand its menu and more efficiently prepare foods served at the café and it will allow the AgUS to work more efficiently [Group 4, 2011].
- All menu items at Agora Café are prepared using hot plates, a microwave, a 1.5 x 2 x 3 foot conventional oven and electric soup pots. According to Tejuco (personal communication, 2011), Agora needs stoves and ovens to improve the capacity, efficiency and food safety of their cooking operations [Group 4, 2011].
- The AgUS lacks a proper food preparation facility. Typically, they prepare meals on the student tables located in the student lounge. This has potential negative implications for food safety. There are no sinks in which the AgUS can wash vegetables or dishes during food preparation. At present, the group uses a three bucket system outside, which is inconvenient and cold in the winter months. In addition to improved food preparation facilities, the AgUS needs more flat ware for students to use (Middlemiss, personal communication, 2011) [Group 4, 2011].

KITCHEN DESIGN

- Important concepts to consider in a kitchen design include workflow and decreasing potential for cross contamination. Important elements of a kitchen include food prep area, cooking area, dry good storage, refrigeration units, frozen food storage, receiving area, and dish cleaning area [Group 4, 2011].
- According to Stephen Gagnon (personal communication, 2011), a professional kitchen designer, the proposed kitchen space in MacMillan room 66 requires major modifications including [Group 4, 2011]:
 - Raising the ceiling to install ventilation system over the stove, filter system and air conditioning (HSE, 2011)
 - Installing floor drainage with built in floor traps
 - Putting in a fire suppression system including fume hoods, smoke detectors, fire alarms, sprinklers, chemical agents and extinguishers
 - Adding electrical re-wiring to support high voltage equipment
 - Installing new energy saving lighting systems to assure a well-lit working environment
 - Laying anti-slip tile flooring
 - Re-painting of walls
 - Screen coverings for the windows
 - Closing off access to the women's bathroom. The stair well area leading to the women's bathroom could be used for dry storage and would require wire racks
- An alternative to using room 66 would be to expand Agora Café. According to Jurgen Pehlke, Operations Manager, (personal communication, 2011), this would be more cost efficient as Agora already has floor drains installed. Jurgen (personal communication, 2011) estimates this could be done in 4 months. Tejuco (personal communication, 2011) feels expanding Agora would not be ideal, as it would then be used by the AgUS and other organizations.
- Another alternative is to use the space outside of room 66, next to the AgUS offices for the cooking and dish-cleaning area as the ceilings are already taller and there are water pipes already present. Room 66 could be used for the other functions of the kitchen and room 62 could be used as dry storage (Tejuco and Middlemiss, personal communication, 2011). Both Tejuco and Middlemiss (personal communication, 2011) agree that this space would be ideal [Group 4, 2011].

RECOMMENDED EQUIPMENT

Based on the needs assessment, the group researched kitchen equipment and developed the following recommendations. Further details can be found in the full student report [Group 4, 2011].

- Gas stove with six burners and a griddle
- Stainless steel prep tables with storage units or extra refrigerators below
- Commercial frontloading dishwasher
- Stainless steel triple basin sink with spray handle soaker
- Double door freezer
- Double door refrigerator
- Smaller appliances and supplies include standing mixer, commercial electric blender, commercial food processor, professional grade microwave, commercial rice cooker, commercial conveyor toaster, and greaseproof mats.
- Various smaller kitchen equipment

KITCHEN MANAGEMENT:

- A kitchen manager has been proposed to help oversee use of the kitchen space and assure the kitchen meets health and safety standards. The manager should attend AgUS and Agora Café meetings.
- Any party using the kitchen is responsible for cleaning the kitchen after use.

- Initially, the kitchen should be used by the AgUS and Agora Café only. When the operations are established and efficient, other parties could be considered to use the kitchen.

COSTS

The following costs are rough estimates given by Stephan Gagnon (personal communication, 2011). In reality, the prices are likely higher as UBC Plant Operations must do the work. A formal request for the work would need to be put in to Building Operations to receive an estimate on costs.

Plumbing	~\$15,000
Construction	~\$30,000
Electrical	~\$40,000
Floor	~\$10,000
Prep Table	~\$6,000
Prep Pit	~\$8,000
Dish Pit	~\$12,000
Refrigerator	~\$20,000
Freezer	~\$6,000
Stove	~\$4,000
Oven	~\$5,000 – \$20,000
Consultation	~\$30,000
Rough Total	~ \$186,000 – \$200,000

FUNDING

The following are potential sources of funding identified [Group 4, 2011]:

- AMS Innovative Project Fund- A student fund that can be awarded to student groups and projects that improve student life. Maximum value- \$5,000.

RECOMMENDATIONS:

TO LFS ADMINISTRATION:

- A professional commercial kitchen is desperately needed to support the important efforts being made by the LFS student community to increase the sustainability of the campus food system. It is highly recommended that a commercial kitchen be installed in the MacMillan building as soon as possible [Group 4, 2011].
- Pursue finding a donor or other funds to continue the process of designing and building a professional kitchen for the LFS community [Group 4, 2011].
- When funds are secured, hire a professional to help design the kitchen with input from members of the Agora Café management team, the AgUS and LFS faculty and staff [Group 4, 2011].

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SCENARIO 7:

DESIGNING A UBC FARM PILOT FOOD PROCESSING CENTER

Community Partner: UBC Campus Sustainability Office, Center for Sustainable Food Systems at the UBC Farm

LFS 450 Groups: Group 10

BACKGROUND

Many UBC Food System Project stakeholders and LFS 450 student groups have identified the lack of BC grown and processed foods to be a barrier to increased local food system sustainability. The Center for Sustainable Food Systems at UBC Farm has identified a pilot food processing center as an important component of the future Farm Center (a new building that will house research, teaching, and community programs). Additionally, the Campus Sustainability UBC Climate Action Plan and LFS Community members have expressed interest in better understanding the potential benefits and challenges to on-campus food production. Specifically, within UBC's food section of the Climate Action Plan, the CAP- Food Action Team (FAT) agreed the need to "undertake a feasibility assessment for an on-campus food processing facility" (food action #13 in the UBC Climate Action Plan). Many questions have been raised around the environmental impact, the economic feasibility, costs and potential benefits, as well as the social costs and benefits of the proposed facility. In this last year, there has been increased interest in exploring and answering these questions. [UBCFSP 2011 Scenarios]

OBJECTIVE

The student group was asked to conduct a feasibility assessment of an on-campus pilot food processing center and to make a recommendation for or against the implementation of such a facility.

CENTRAL FINDINGS

LITERATURE REVIEW:

The group conducted a literature review to compile information on already existing initiatives similar to the proposed on campus food processing center [Group 10, 2011].

- Cornell University (2010)- Wine and Beer Brewing facilities
 - This is a student research facility with industrial scale equipment
 - The space is rented for research and small scale production
- Michigan State University (2006)- Fruit and Vegetable Processing
 - 4000 sq. foot research facility with small scale equipment
 - Community growers, processors and governmental agencies participate in the use of the facility
 - The space is rented for research and small scale production
- University of Minnesota (2010)- Dairy processing
 - Certified and inspected processing center used for market research
 - Products serve as a source of revenue for the university
 - Product research, development, evaluation and analysis occur at the facility

NEEDS ASSESSMENT:

The group conducted a literature review to compile information on already existing initiatives similar to the proposed on campus food processing center.

- According to the LFS Orchard Garden Coordinator, Jay Baker-French (personal communication, 2011), an on campus food processing facility would help increase demand for local foods to

be processed locally. Alvin Tejuco (personal communication, 2011), the Agora Café Manager, explained that Agora volunteers spend many hours each year preparing and processing local fruits and vegetables for use at the café. A food processing center would be able to do this work much more efficiently. Products in high demand by AMS food outlets and Agora café include cheese, juice, dried and frozen fruits, soy milk and tofu [Group 10, 2011].

- Domestic food safety certification relies in part on the Hazard Analysis and Critical Control Point (HACCP) program which is a program recognized by the World Health Organization and the Food & Agriculture Organization which helps to ensure food safety. Processing centers are required to use the HACCP system by many food distributors and purchasers. HACCP standards should be used at the UBC Farm facility (WHO, 2011) [Group 10, 2011].

TRIPLE BOTTOM LINE ASSESSMENT:

The group conducted a triple bottom line assessment to help assess the feasibility and sustainability of the proposed processing center.

Environmental Analysis

- Local processing of locally grown foods will reduce the transportation miles associated with foods that would otherwise be purchased [Group 10, 2011].
- Food processing in the form of freezing, canning and drying requires energy input [Group 10, 2011]. Since many food products used by food outlets on the UBC campus are processed, processing foods on the UBC campus does not necessarily represent additional energy expenditure, but rather would localize the expenditure. As the facility has not yet been constructed, there is the opportunity to make it more energy efficient and environmentally friendly than food processing centers from which UBC currently purchases food. For example, solar panels could be used to offset the energy required by the plant. Underground refrigeration can help reduce the energy used by refrigeration and freezing units. Fruit and vegetable waste can be composed in the UBC in-vessel composter. Water waste can be recaptured and re-used at the UBC Farm [Group 10, 2011].

Economic Analysis

- Facility start-up costs include facility build out and equipment purchases [Group 10, 2011].
- Facility operational costs include purchase of raw foods, product transportation, packaging materials, equipment and facility maintenance, sanitation, and labour [Group 10, 2011].
- The food products produced by the plant will be value added products with longer shelf life or storage capacity. These products have the potential of being sold at top dollar in the strong niche market for local foods. [Group 10, 2011].
- Product pricing should be based on covering the cost of the facility and production. Economies of scale can be used to produce products that can be sold at reasonable prices. Other avenues for revenue that can be considered to help cover facility costs include renting the facility to community based producers, offering revenue generating workshops on different food preservation techniques including cheese and tofu making, fruit drying and vegetable canning. Additionally, the facility should have a research focus, which should be considered when looking at facility costs [Group 10, 2011].
- Three potential products were identified that the facility could make and a justification for each is provided below:
 - Cheese: Cheese is in high demand by the campus food outlets and milk can be supplied by the UBC Agassiz dairy research center and other farms located in the lower main land. *Cheese is a high revenue product with interesting research and education potential.*
 - Juice: Locally produced fruits and vegetables such as blueberries and carrots can be easily processed into juice. It is unknown the level of demand for juice on campus.
 - Frozen Fruits and Vegetables: Locally grown foods can be frozen during their peak harvest season to preserve the foods for later use. This can help increase the overall consumption of locally produced foods on campus. [Group 10, 2011].

- The products should be promoted under a UBC Farm brand to raise awareness of local food processing and to allow a premium to be charged for products [Group 10, 2011].

Social

- The facility will draw a diverse population of students and community members to the UBC Farm. Research and education should be a primary focus of the facility as it is part of the university community. Local primary and secondary school students can be introduced to other aspects of the food system through educational tours of the facility. UBC Professor Christine Scaman (personal communication, 2011) supports the idea of a processing center and encouraged the center to be considered for incorporation into graduate and undergraduate courses [Group 10, 2011].
- It was found that the processing facility staff would need to give excellent training. It is recommended to involve experienced professionals in the facility design and staff training to assure success of the project [Group 10, 2011].

FACILITY DESIGN

Focus:

- Cheese, fruit and vegetable juice, and frozen fruits and vegetables [Group 10, 2011].

Design:

The building design will include the following elements [Group 10, 2011]:

- Processing center that houses the food processing machinery. A list of proposed equipment is included in the student report.
- Community kitchen and learning area
- Food product storage

RECOMMENDATIONS:

To UBC FARM:

- Peruse implementation of a food processing center at the UBC Farm that strives to decrease environmental impact, that is economically viable and socially engaging [Group 10, 2011].
- Use the information provided to inform the design of the processing center [Group 10, 2011].

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SCENARIO 8:

DESIGNING THE AMS NEW SUB ROOT CELLAR

Community Partner: AMS Food and Beverage Department (AMSFBD)

LFS 450 Groups: Group 11

BACKGROUND

UBC's Alma Matter Society (AMS) has worked hard to decrease the ecological footprint of UBC's food system through initiatives such as the Lighter Footprint Strategy. The AMSFBD has implemented a "Lighter Foot Print- LOV" label for foods that are local, organic and vegan, they have increased purchases from the UBC Farm, and they have worked to preferentially procure foods grown and processed in British Columbia. Unfortunately, produce and other products from BC are not available year round, due to our limiting the growing season. Many of the varieties of foods grown in BC can be stored in temperature-controlled environments to help extend their shelf life. These foods include, but are not limited to, apples, winter squash, potatoes and onions. The UBC Alma Matter Society (AMS) is in the process of designing the new Student Union Building (SUB) for UBC's Vancouver campus. The AMS Food and Beverage Department has been granted a space in the new SUB for a temperature controlled crop storage room or "Root Cellar" to extend the shelf life of BC produce and increase the volume of local foods they use throughout the year [UBCFSP Scenarios 2011].

OBJECTIVE

The student group was asked to inform the design of the "Root Cellar" for the new AMS SUB.

CENTRAL FINDINGS

The new SUB is aiming to obtain the highest level of the "Leadership in Energy and Environmental Design (LEED) Certification," which will make it a leading sustainable building design in the country. The LEED Certification program awards points for sustainable building sighting, water efficiency, energy savings and atmosphere preservation, materials and resources used, indoor environmental quality, innovation in design and regional priority (Canada Green Building Council, 2010). It is felt that a root cellar fits appropriately in modeling sustainable food storage [Group 11, 2011].

ABOUT ROOT CELLARS:

A root cellar is an underground storage room used to keep fruits and vegetables fresh for extended periods without refrigeration or modified environment storage. It was the system used to store foods before refrigeration. Root cellars are typically underground to help insulate the room from heat. Well-designed root cellars can keep vegetables fresh for up to 8 months (Cavagnaro, 2010). Alternative uses of root cellars include wine cellar and a space for cheese aging. Features of root cellars include [Group 11, 2011]:

- Cool temperatures to reduce micro-organism activity and decrease the release of ethylene gas which causes fruits and vegetables to ripen (Maxwell, 2009)
- Increased humidity to help prevent moisture losses (Maxwell, 2009)
- Ventilated room(s) to allow for fresh air to enter (Maxwell, 2009)
- Reduced exposure to light as light can compromise the quality of some produce (Poole, 2003)

NEEDS ASSESSMENT:

A list of produce most used by the AMS was prepared and includes but is not limited to beets, bok choy, cabbage, carrots, cauliflower, lettuce, mushrooms, onions, peppers, tomatoes, yams and zucchini [Group 11, 2011].

TRIPLE BOTTOM LINE ASSESSMENT:

Economic Assessment:

- The start-up and maintenance costs associated with a root cellar are much less than that of an equivalent refrigeration unit [Group 11, 2011].
- Wholesale purchase of local produce may help decrease the unit price of the produce, assuming no waste associated with long-term storage [Group 11, 2011].
- The cost savings associated with the decreased energy use of not powering a refrigerator can be significant over the lifetime of a root cellar [Group 11, 2011].
- Peak harvest prices of local products are often equal or less expensive than similar products. Even organic products can be found at very competitive prices at peak harvest season.
- Increasing purchases from local farmers can help support the local economy. If farms are selected on the basis of farming practices, this can have a positive overall environmental impact as well.

Environmental Assessment:

- A root cellar allows for increased purchase of local fruits and vegetables during peak harvest season, which will decrease the food-miles associated with purchase of similar the products from distant sources during the off-season [Group 11, 2011].
- The decreased need for refrigeration will offer energy savings and release of chlorofluorocarbons (CFCs) associated with some refrigeration units. CFCs are in part responsible for ozone layer depletion and global warming (Dutt, 1995) [Group 11, 2011].

Social Assessment

- The root cellar can be used for education purposes and can help the SUB to model a more sustainable food system [Group 11, 2011].
- Research on the root cellar can be carried out by UBC students. Research questions could include: What is the net reduction in greenhouse gas emissions as a result of using a root cellar considering decreased transportation, decreased need for refrigeration?; and What are the cost savings per month associated with the root cellar versus a refrigeration unit? [Group 11, 2011].

SEASONAL PURCHASES

The following summarizes Group 11's synthesized recommendations for which produce should be purchased, the season it should be purchased in, the maximum volume of purchase, the product shelf life in the root cellar and the ideal storage conditions of the product. The maximum purchase volume takes into account the monthly demand for the product and the product shelf life to give an estimate for the volume of a one-time purchase during the peak harvest season [Group 11, 2011].

Crop	Maximum Purchase Volume	Purchase season	Shelf life	Storage Humidity	Storage Temperature (F)
Green onion	6952 bunches	spring	1-8 months	95%	36 - 40
Red onion	864 lb.	spring	1-8 months	below 65%	36 - 40
Yellow onion	755 lb.	spring	1-8 months	below 65%	36 - 40
Green pepper	250 lb.	spring, summer	3-5 weeks	95%	41 - 45

Red pepper	421 lb.	spring, summer	3-5 weeks	95%	41 - 45
Peas	9.5 bags	spring/fall	1-2 weeks	95%	32
Yam	105 cases	summer	6-7 months	70%-80%	55 - 60
Cucumber	104 units	summer	10-14 days	90%	45 - 55
Zucchini	41lb	summer	1-2 weeks	below 65%	50 - 60
Garlic	54 lb.	fall	> 6-8 months	below 65%	60 - 65
Winter squash	723 lb.	Fall and winter	4-6 months	below 65%	50 - 60

- Other crops that could be stored in the root cellar include cauliflower, potatoes, beets, cabbage, carrots, and fennel. BC grown potatoes, cabbage and carrots can be found for sale for many months of the year and therefore may be less indicated for storage.

DESIGN

The group used the British Columbia Ministry of Agriculture, Food and Fisheries handbook to develop the following guidelines for the root cellar design.

- The root cellar must be at least 300 square feet to accommodate the above calculated demand.
- A drainage system is necessary to remove accumulated moisture from the humidity of the root cellar (Poole, 2003).
- The cellar must be kept dark and no light should be allowed to enter (Poole, 2003).
- Shelving resistant to damp and cold conditions should be used.

RECOMMENDATIONS:

To AMS FOOD AND BEVERAGE DEPARTMENT:

- Use the findings summarized in the Group 11 report to inform the development of a root cellar that meets LEED certification standards and supports the needs of the AMS.
- Purchase local produce in bulk to increase the amount of locally grown produce used by the AMS FBD. Use the seasonal purchasing suggestions included in the student report.

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ACCOMPLISHMENTS

Please see UBC Food Systems Project Blog <http://blogs.landfood.ubc.ca/foodsystemproject/>

PROCUREMENT:

- UBCFS has now sourced Fair-Trade sugar packets, which are available for all Wescadia catered events and select outlets (The Loop) (Group 1, 2011).
- UBCFS continues to work with distributors and vendors to negotiate the best price possible for other organic fair-trade sugar products to incorporate in other items (Group 1, 2011).
- The first Fair-Trade UBC-made food item was prepared for an annual Fair-Trade day held outside the Bookstore in summer 2011. This is a result of work done by Group 1, 2011 and the transition towards UBC's status as a "Fair-Trade certified campus" (Group 1, 2011).

SOCIAL MARKETING/EDUCATION:

- Proposed Fair-Trade signage marketing strategies were approved and will be implemented.
- Lesson Plans were provided to Think and Eat Green team members for use and implementation (Groups 8, 9).
- The developed "Instructional Waste Sorting Pamphlet" was provided to SHHS for incorporation in the beginning of the year UBC Residences packages (Group 3, 2011).

OTHER:

- The proposal for a root cellar in the New Student Union Building was submitted for review by the AMS New SUB Committee for review.

DEVELOPMENTS BASED ON PROJECTS FROM PAST YEARS:

- Marketing/Education:
 - Annual "Meet your Farmer" event was expanded to an annual "Meet your Maker" event and now includes representatives of other aspects of the food system and more campus partners including Sprouts.
- Marketing/Education:
 - New labels (based on the LOV labels developed in 2008) were developed and implemented. The labels help consumers identify which products are local, produced on campus, vegan/vegetarian, contain UBC Farm products, and more.
- Waste:
 - The "Eco-to-go" program was expanded to all non-franchise UBCFS outlets and will be included in the New Student Union Building.