

2003 UBC FOOD SYSTEM COLLABORATIVE PROJECT: SUMMARY OF FINDINGS

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The UBC Food Systems Project is a collaborative project between the students and Teaching Team of AGSC 450 at the Faculty of Agricultural Sciences, Social Ecological Economic Development Studies (UBC SEEDS) program of the UBC Campus Sustainability Office, UBC Food and Beverage Services, UBC Alma Mater Society Food Services, and UBC Waste Management.

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AGSC 450 Students:

The students of the Land, Food and Community III course (AGSC 450), who are helping to lay the groundwork for a sustainable food system on the UBC campus. Building upon the work of the AGSC 450 students from 2002, twenty working teams brought diverse perspectives, knowledge and enthusiasm to their work, and outlined a vision that is both innovative and groundbreaking. We hope that their work influences the future of UBC.

The author of this report, Kristina Bouris, is an M.Sc. student in the School of Community and Regional Planning. She was hired by the UBC Sustainability Office to work collaboratively with the above stakeholders to synthesise and summarize the findings of the second year of the project.

EXECUTIVE SUMMARY

The University of British Columbia Food System Project (UBCFSP) is a collaborative effort among the UBC Faculty of Agriculture, Agricultural Sciences 450 students, the Campus Sustainability Office (CSO), UBC Farm, UBC Food and Beverage Services, Alma Mater Society Food Services and UBC Waste Management. The aim of the UBCFSP is to explore opportunities for creating a more sustainable UBC food system by identifying policy alternatives, barriers and opportunities that influence the current food system, and making recommendations to relevant UBCFSP partners. The UBCFSP is an action research project by design; Agricultural Sciences students are responsible for designing and conducting the research projects in collaboration with the UBCFSP partners.

2003 was the second year of the UBCFSP. Following an exploratory case-based approach in 2002, the 2003 students were asked to propose a research design and methodology for assessing the sustainability of the UBC Food System. The purpose was not to carry out the assessment, but rather recommend a series of principles, procedures, indicators, system maps and a conceptual model that would guide the future research. In total, 151 students, working in 20 groups, contributed to this year's research. The purpose of this paper is to summarize their major findings with the aim of informing stakeholder discussions and plans for Year Three.

Findings:

In many ways, the UBC food system represents a microcosm of the global food system, a system that is increasingly perceived as unsustainable in social, economic and ecological terms. Generally, the UBC food system is considered to comprise the catered food services within the main gates and includes all the processes involved in food production, processing, packaging, transportation, marketing, preparation, consumption, and waste disposal or recycling, as well as the economic, social and ecological inputs and outputs at each step. The UBCFSP partners make up the major components of the food system, and are influenced by factors both inside and outside the boundaries.

The eight following attributes stood out as central objectives to be attained for the UBC food system to become sustainable:

- waste reduction and recycling
- affordability of nutritious food
- consumer awareness of and participation in sustainable food system activities on campus
- profitability of food service outlets
- locally-produced food
- personal acceptability/ satisfaction
- student employment
- nutritional quality of food

These attributes directly informed the use or derivation of sustainability indicators. Economic, social, and environmental sustainability indicators included:

- amount of waste recycled and composted
- price of nutritious meals
- revenue of food outlets
- distance food travels
- amount of locally-produced food entering the UBC food system
- consumer awareness of sustainable food system initiatives
- availability of culturally diverse meals consumer satisfaction
- level of student employment in UBC food system
- nutritional value of food available

Individually and collectively, the attributes and indicators formed the basis for the development of a continuum-based conceptual model of UBC food system sustainability. The strongest models were highly visual, had clearly defined increments, and emphasized the interrelationship among food system attributes.

The attributes and indicators also had a direct influence on the proposed data collection methods and research designs. The proposed methods focused on the measurement of indicators, and fell under the broad categories of observation, surveys, interviews and the analysis of secondary data. Most groups proposed the annual monitoring of indicators, beginning next year. Agricultural Sciences 450 students would play a central role, in collaboration with UBCFSP partners and other students.

Recommendations to the UBCFSP on ways to further study the UBC food system:

- Initiate the annual monitoring of food system indicators under the direction of a stakeholder committee, and with the support of CSO-hired staff
- Raise awareness of general sustainability issues and existing campus sustainability programs
- Increase collaboration with UBCFSP stakeholders, including students, to enhance UBCFSP planning efforts and build links between existing programs
- Initiate specific food system projects/ management strategies aimed at increasing the sustainability of the UBC Food System (e.g. composting education, changing food outlet hours, "buy local" campaign)

The strengths of this year's project included the further conceptualisation of a sustainable UBC food system, the definition of the system's attributes and the students' enthusiasm. The primary challenges were due to the labour disruption and subsequent cancellation of classes, which likely affected the integration with the course curriculum and overall completeness of the research design proposals.

INTRODUCTION

In 1997, the University of British Columbia became the first Canadian university to establish and begin the implementation of a university-wide sustainable development policy and, since that time, has made several notable achievements in the area of ecological sustainability. These achievements include initiatives addressing the reduction of paper use, the conservation of energy and the promotion of sustainable transportation. Food had been left out of the sustainability initiatives until 2001, when the Faculty of Agricultural Sciences and the Social, Ecological, Economic Development Studies program (SEEDS) initiated the UBC Food System Project (UBCFSP). The UBCFSP is a collaborative effort between the faculty, Agricultural Sciences 450 (Land, Food and Community III) students, the Campus Sustainability Office's (CSO) SEEDS program, UBC Farm, UBC Food and Beverage Services, Alma Mater Society (AMS) Food Services and UBC Waste Management (hereafter referred to as the UBCFSP partners).

The aim of the UBCFSP is to explore the opportunities for creating a sustainable food system at UBC and within the broader region by,

1. Assessing a wide range of food policy alternatives that address issues of sustainable agricultural production, food security and safety, and the health of human communities
2. Identifying barriers and opportunities to sustainable agricultural production, food security and safety, and the health of human communities, with the intent of at least partially addressing them on the UBC campus (Brunetti, 2002)

The UBCFSP has been incorporated into the curriculum of Agricultural Sciences 450, the required capstone course for all students in the Faculty of Agricultural Sciences. Since the UBCFSP's inception in January 2002, over 270 students have helped to lay the groundwork for an assessment of the sustainability of the UBC Food System by developing indicators, proposing assessment methodology and undertaking a preliminary assessment of components of the UBC Food System. The UBCFSP is an action research project by design. The primary participants in the campus' food system- the students- are responsible for designing and conducting the research projects in collaboration with the UBCFSP partners and the guidance of the AGSC450 teaching team. For the students, the objective of the team-based project is to demonstrate the achievement of AGSC 450 Learning Objectives, and to link the theoretical concepts and issues introduced in the course to a 'real-life' case study. The ultimate goal of the UBCFSP is to provide recommendations to the UBCFSP partners on changes needed to move the food system towards sustainability. Details of the project can be found in Brunetti, A. & Rojas, A, 2003: The Sustainability of UBC Food System. Collaborative Project II: AGSC 450. Land, Food & Community III, Spring 2003. Online at: http://www.webct.ubc.ca/SCRIPT/agsc_450/scripts/serve_home.

Year One: Exploration

2002 was the first year of the UBCFSP study. The project was intended to be exploratory and, as such, was "purposefully broad" (Brunetti, 2002). The project followed an exploratory case-based approach and students were asked to provide a preliminary assessment of the sustainability (social, ecological and economic) of one aspect of the UBC food system. As part of the assessment, the groups also proposed research methods, indicators and made recommendations to the UBCFSP partners. In the end, the class created 17 reports, each highlighting a different area of the UBC food system and subsystems. Topics ranged from a commodity chain analysis of the UBC cinnamon bun to an analysis of the sustainability of Place Vanier cafeteria. A full summary and synopsis of results is presented in Brunetti (2002).

Year Two: Modeling UBC Food System Sustainability

Year Two began with an ambitious plan. Based on the results of the first year's projects, the teaching team and UBCFSP partners identified eight different case-based projects that would explore food system sustainability in greater depth. Unfortunately, a labour dispute affecting the teaching assistants led to the cancellation of classes at a critical period of the semester, and this year's chapter of the UBC Food System Project was dramatically scaled back. Yet, in the end, the scaling-back may have been a blessing in disguise.

As a result of the labour dispute, instead of working on the eight different projects that were originally prepared, all the students worked on the same case. The students were asked, in groups, to propose a research design and methodology for assessing the sustainability of the UBC Food System. The purpose was not to carry out the assessment, but rather recommend a series of principles, procedures, indicators and a model that would guide the research. See Appendix A for a full case description.

Specifically, students were asked to:

- Define the characteristics of a sustainable food system at UBC
- Develop a continuum-based model, ranging from 'unsustainable' to 'sustainable' that will help to indicate progress towards a sustainable food system
- Construct a conceptual map of UBC's food system
- Review and propose sustainability indicators (at least one each of ecological, social and economic) that would help measure the state of UBC's food system
- Propose a research design, including data collection, for assessing the sustainability of UBC's food system
- Provide recommendations to UBC Food System Project stakeholders for opportunities to further study the UBC food system

In addition to these items, the groups were also asked to identify their underlying value assumption(s) with respect to sustainability and the food system. The purpose of this request was to provide a brief argumentation in favour of the ethical principles that informed the group's analysis. The statement of values provided interesting insight into the discussions that arose during the group process, as well as the differing interpretations and applications of the 'sustainable food system' concept.

The results were to be presented in a paper (no longer than 15 pages, plus appendices), a 10-minute oral presentation, as well as in website format. In total, the overall project accounted for 55% of the students' final grade.

Purpose of this paper

In total, 20 different group papers were prepared by AGSC450 in 2003. This amounted to over 500 pages of data, figures, models, and possibilities that lay the conceptual groundwork for future years of the UBCFSP. The purpose of this report is to synthesize the voluminous amount of data and present a summary of the major findings for UBCFSP stakeholders. The aim is to inform collaborative discussions and decisions about Year Three of the UBCFSP.

Specifically, the report includes:

1. Methodology and Procedures (p.7)
2. Overview of Problem Definition: Why Study the Sustainability of the UBC Food System? (p. 8, Table 1)
3. Overview of UBC Food System Map (p.8)
4. Overview of the Attributes of a Sustainable UBC Food System (p. 9, Table 2)
5. Overview of UBC Food System Indicators (p. 10, Table 3)
6. Overview of Sustainable UBC Food System Model (p.11)
7. Overview of Proposed Research Methods (p. 14, Table 4)
8. Overview of Recommendations (p. 17, Table 5)
9. Overview of Project Strengths and Weaknesses (p.17)

Summarizing the findings of 20 projects was no easy task, particularly when the assignment called for multiple components such as definitions, models, indicators and maps. The risk in aggregating the information is that the work of individual groups will be lost or over-generalised. On the other hand, a synthesis of results is necessary in order to move towards a set of agreed upon principles and indicators that form the basis of the UBC food system project. In the spirit of action research, the major findings are explained by using direct excerpts from the students' work, wherever possible. For the most part, the excerpts and examples used represent the highest quality work from the group papers.

1. METHODOLOGY AND PROCEDURES

Community- Based Action Research

As a methodology, the UBCFSP is grounded in community-based action research, a collaborative approach to research that "provides people with the means to take systemic action to resolve specific problems" (Stringer, 1999: 17). Action research is grounded in principles including open communication, participation, inclusion, relationship-building and capacity-building (see Stringer, 1999). Typical of many action research projects, community members (in this case, students and other UBCFSP stakeholders) are involved in designing and conducting the research in the UBCFSP. As a result, local needs, knowledge, values and perspectives are incorporated into the process, and participants acquire new knowledge, skills and capacity.

Action research is an explicitly iterative process, whereby researchers are continually revisiting and reviewing their research activities through a "constant process of observation, reflection and action" (Stringer, 1999:19). This summary paper represents an important step in this routine, as it provides the opportunity to synthesise and reflect upon major findings.

AGSC450 explicitly follows a cooperative learning model, with the emphasis on collaborative group work. At the beginning of the semester, the students were assigned to a group of 6-7 people with whom they worked on several presentations and in-class discussions. These same groups were used for the UBC Food System Project report.

Literature Review

In developing the research framework, students relied heavily on references that were made available to them through the course readings and webCT site. The AGSC450 course readings provided background and theoretical foundation for the assignment, particularly with relation to the principles and vision for sustainable food systems. Through the AGSC450 webCT site, students had access to UBCFS partner websites and resources, and a list of web links related to sustainability indicators, agroecology and food systems. They also had access to student cases from Year One of the UBCFSP, and a number of groups cited the earlier findings. The webCT references were intended to facilitate the students' research and, most importantly, to reduce the need for unnecessary student meetings with individual food system partners.

Many groups consulted external sources in their discussion of sustainability indicators and research methodology, particularly web-based resources. The work spanned a continuum of complexity, substance and quality. In general, however, more background research was needed in these areas in order to strengthen the students' conceptualisation of sustainability indicators and the methods by which these indicators might be measured.

Presentations

Because of the labour disruptions, three three-hour classes intended to introduce the UBCFSP were cancelled. These classes would have further introduced the concept of visioning a sustainable food system, conceptual mapping, as well as presentations by UBC Food and Beverage Services, AMS Food Services and the Campus Sustainability Office. Undoubtedly, the information from these presentations would have strengthened the students' knowledge

base and clarified some of the stakeholders' roles and expectations. In the absence of this information, however, students relied on the resources available to them, including the knowledge of members of the teaching team.

2. OVERVIEW OF PROBLEM DEFINITION: WHY STUDY THE SUSTAINABILITY OF THE UBC FOOD SYSTEM?

The UBCFSP was initiated in the context of a growing awareness of issues confronting the current food system. Students identified and explained a number of issues that encouraged the assessment of the sustainability of UBC's food system. A summary of these issues are presented in Table 1.

Table 1. Overview of Problem Definition

<p>Why Study the Sustainability of the UBC Food System?</p> <ul style="list-style-type: none">• On-going efforts by the CSO's efforts to incorporate social, ecological and economic sustainability into teaching, research, and operations across campus.• "The UBC student body has increased by over 5,000 in the last four years and this kind of population growth will intensify the pressure on the system". (Group 11)• Declining profitability of some UBC food service outlets. (Group 4)• Reliance on food that travels long distances and therefore depends on fossil fuels. (Group 9)• Perception that healthy food is not being provided at a reasonable cost by food outlets. (Group 11)• Reliance on multinational suppliers for some food products (e.g. beverage companies)• Significant amounts of solid waste are taken away annually, 70% of which is compostable (UBC Waste Management, 2003). (Group 11)• "Such a large system can have a widespread impact on local, national, and global ecosystems... Therefore, it is important for such a system to maintain a level of sustainability that will allow it to function far into the future". (Group 12)• Spatial and psychological distance between food producers and consumers. (Group 3)• Perception that many members of the UBC community are unaware of food system sustainability issues. (Group 3)
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3. OVERVIEW OF UBC FOOD SYSTEM MAP

In order to clarify the system under study, students were asked to create a map of the UBC Food System. The map would serve as a graphic representation of the existing boundaries, components, interrelationship, goals and main linkages with the global, national and regional food systems.

Component parts

- Component activities include all processes in food production, processing, packaging, transportation, marketing, preparation and consumption of the food, and waste disposal or recycling, as well as the social, economic and ecological inputs and outputs at each step
- Major stakeholders include Faculty of Agricultural Sciences, CSO, UBC Food and Beverage Services, AMS Food Services, UBC Farm, UBC Waste Management, Residences, and UBC administration
- Other components include domestic food preparation, regional food production, international and national food production, transportation systems, global trade, government policies at all levels, health services, cultural institutions, community organizations, outside food outlets ("competition"), and on-campus residents (non-students)
- The role and relative importance of some stakeholders was not always represented accurately. For example, several groups overemphasized UBC Farm's contribution to on-campus food outlets, and the CSO's role in the campus food system.

- The maps emphasised catered food outlets. Non-catered food outlets, such as food brought from home, local grocery stores, community gardens and natural food co-op were absent from the majority of maps.

Boundaries

- Geographically, most groups defined the system's boundaries as the University Gates (thereby excluding services such as University Village). A minority viewed the system as extending eastward to Blanca Avenue and southward to Marine Drive.
- "UBC food system is analogous to a semi-permeable membrane. The system permits and, indeed, requires, the movement of people and products across the boundaries, such as energy, water, greenhouse gas production and food brought from home". (Group 12)
- The system is also bounded by legal, economic and ecological boundaries. (Group 14)

Interrelationships

- The final maps fluctuated between the descriptive and the normative, between the way it *is* and the way it *could be*.
- The major interrelationships among the components are best described by the maps themselves. Two strong examples are presented in Appendix B.

4. OVERVIEW OF THE ATTRIBUTES OF A SUSTAINABLE UBC FOOD SYSTEM

As a starting point, students were asked to develop a conceptual definition of a sustainable food system. The very concept of sustainability is controversial, complex and contested. While most groups acknowledged the controversy, they also explored and proposed certain fundamental attributes that would embody a proposed sustainable food system. Common to most definitions was the integration of social, economic and ecological factors. In broad terms,

Our group believes that a sustainable food system... would be one that is economically viable, and that meets the community's needs for safe and nutritious foods, while conserving or enhancing its natural resources and environmental quality. (Group 9)

In spite of this vision, the sustainability of the UBC food system was seen by many as an *objective*, rather than an *achievement*.

We identified the impracticality of UBC ever becoming completely sustainable. This is due to the fact that in order to feed the population of over 40,000 at UBC, we would require a large area of land, an infrastructure for processing wastes, and an impractical amount of capital. Furthermore, we identified the difficulty in ensuring a steady and reliable supply of acceptable foods within the local community as a large stumbling block. Therefore, our main concern was to ensure that the UBC food system could be as sustainable as possible. (Group 10) [emphasis added]

The majority of groups drew heavily on course readings by Kloppenburg and Lezberg (1996) and Kloppenburg *et al.* (2002), and defined a sustainable UBC food system by the system's *attributes*. The author summarized the students' findings into eight central attributes, listed in Table 2. Inclusion in this list was based on the frequency with which the attribute or a related indicator was mentioned. A more extensive list of proposed attributes, including those found outside the eight attribute categories, is provided in Appendix C. A summary of the students' rationale for each of the eight attributes is provided in Appendix D.

Table 2. Central Attributes of a Sustainable UBC Food System

A sustainable UBC food system would encourage and/or maximize*:

- waste reduction and recycling (17)
- affordability of nutritious food (12)
- consumer awareness of and participation in sustainable food system activities on campus (12)
- profitability of food service outlets (11)
- locally-produced food (11)
- personal acceptability/ satisfaction (6)
- student employment (5)
- nutritional quality of food (5)

**number of groups who mentioned this attribute/indicator in parentheses*

5. OVERVIEW OF UBC FOOD SYSTEM INDICATORS

Section Overview

As part of their assignment, students were asked to develop both a conceptual definition and model, and a set of sustainability indicators for food system sustainability at UBC. The two products are closely related: the model is intended to be a framework that communicates a vision of a sustainable food system, while the indicators are designed to measure the degree to which this vision is being achieved. Ordinarily, the model would be developed before the indicators. In this assignment, the majority of groups had difficulty distinguishing between the attributes of the model and the indicators, and presented products that were often a hybrid of both. For the purposes of this summary, and to reflect the approach taken by many of the groups, the indicators will be summarized first, followed by a summary of the proposed models (see section 6).

Characteristics of Sustainability Indicators

In developing their indicators, students were asked to review the most relevant literature on both qualitative and quantitative indicators, including the current efforts of the CSO. Drawn from the AGSC450 projects, a "good" indicator of food system sustainability has the following characteristics:

- easy to understand, apply and interpret
- usable year after year in order to provide a long-term view of sustainability
- highlights linkages among economic, ecological and social sustainability
- makes use of data that is easily accessible and reliable
- educates and motivate users
- highlights areas for action

Proposed UBC Food System Indicators

Based on their review of sustainability indicators, and definition of the attributes of a sustainable UBC food system, groups were asked to propose at least three food system indicators for UBC, one each from the spheres of social, ecological and economic sustainability. For most groups, the indicators would also form the basis of their proposed food system model.

The students proposed a total of nearly 100 food system indicators, many of them similar, along with a rationale for their choice and preliminary methods that might be used to measure the indicator. The students demonstrated creativity and originality in their suggestions, and provided the basis for a set of wide-ranging food system indicators.

A selection of proposed indicators is presented in Table 3 and reflects the eight sustainable food system attributes listed in Table 2. The indicators were selected for inclusion by the author based on the following criteria: 1) to represent the breadth and diversity of suggestions, 2) to highlight some of the strongest proposals for sustainability indicators. For an overview of the complete range of indicators, please refer to Appendix E.

Table 3. A Selection and Summary of Proposed UBC Food System Indicators

Sphere of Sustainability			Attribute	Examples of proposed indicators
Ecol	Soc.	Econ		
★		★	Waste Reduction (Composting/Recycling)	-# of compost bins on campus -% or weight of campus waste that is composted or recycled -% campus-produced compost used to produce food for UBCFSP
	★	★	Affordability	-# nutritious meals available for less than \$5 - % of average UBC students' income spent on food over time
	★	★	Profitability (of food service outlets)	-annual revenue of food outlets -proportion of food outlet profits reinvested in UBC - annual change in consumer frequency and consumption by patrons of the UBC Food System versus the competition
★		★	Locally-produced food	- food miles: kilometres food travels from field to table - % of locally-produced food entering the UBC food system
	★		Consumer awareness of and participation in a sustainable food system	-% UBC community members who are aware of food system sustainability initiatives -# of volunteers with campus food initiatives -# of visitors to UBC Farm
	★	★	Personal acceptability	-# food service outlets offering culturally diverse meals (Asian, Indian, vegetarian, etc.) -consumer satisfaction
	★	★	Student employment	-total # students employed at food service outlets
	★		Nutritional quality	-# of food service meals that meet National Research Council (NRC)'s Recommended Dietary Allowances

Missing from most papers was a discussion of the limitations of the use of specific indicators. For example, the "food mileage" indicator hints at the ecological impact related to food transportation, but does not reveal anything about food production. Likewise, the use of "number of affordable meals under \$5" as an indicator could directly undermine the "amount of revenue generated" indicator for profitability. A critical analysis of the proposed indicators may reveal and resolve some of these contradictions in the future.

6. OVERVIEW OF SUSTAINABLE UBC FOOD SYSTEM MODEL

The students were asked to create conceptual definition and model, of food system sustainability for UBC that would graphically communicate a vision of a sustainable UBC food system. The model would also serve as an agreed-upon framework to guide future efforts, and measure progress along the path towards sustainability. In other words, as explained in the assignment description, the model would function like a “thermometer”, allowing us to take the “temperature” of the degree of progress towards the sustainability of the entire UBC Food System.

Recognizing that sustainability is a process, and not necessarily an end product, it was recommended that the model take the form of a continuum. The continuum would feature “sustainable food system” at one end, “unsustainable food system” at the other end, and incremental points in between. Each group took a different approach to the continuum, and the results were presented both textually and graphically. Those groups who received the highest marks presented models that clearly outlined the characteristics of and criteria for each point along the continuum.

For most groups, this model built directly upon their proposed indicators. In general, the groups took a two-step approach to developing an overall model: 1) develop a continuum of sustainability for each indicator/attribute, and 2) integrate the individual continua into an overall conceptual model. To reflect this approach, the major findings are presented here in two steps: the Sustainability Continuum and Conceptual Model of UBC Food System Sustainability.

The Sustainability Continuum

The majority of groups developed a sustainability continuum, which ranged from “sustainable” to “unsustainable”, for each of their individual indicators. These individual continua could be considered as sub-models of the larger model.

The proposed continua varied greatly in subject, depth, detail and quality. Summarizing and synthesizing the disparate results proved to be a challenge. As an alternative, the author has selected one continua from each of the eight attributes in order to provide readers with an sample of the diversity of findings (Appendix F). Each of the examples was selected to represent the diversity and strengths of the student work. Two examples are shown below: the sustainability continuum for food affordability (Figure 1) and for consumer awareness (Figure 2).

In summary:

- Both quantitative and qualitative measures were used along the continua to identify the criteria for sustainability
- Percentages should be used in their relative sense; 100% is not necessarily the ultimate measure of sustainability (e.g., Group 11 felt that if 80% (not 100%) of food came from local sources, then this would indicate a sustainable UBC food system)
- The incremental values of any continuum are specific to a certain time and place
- Except for one group, most of the incremental values were arbitrary and not based on outside research
- Specific incremental values for each continua will need to be established by consulting relevant literature and stakeholders

Figure 1. Sustainability Continuum (Waste Reduction): Group 18

Indicator: % compostable waste

Unsustainable	1 – No wastes produced at UBC are composted
	2 – 1-20% of compostable wastes produced at UBC are composted
	3 – 21-40% of compostable wastes produced at UBC are composted
	4 – 41-60% of compostable wastes produced at UBC are composted
	5 – 61-80% of compostable wastes produced at UBC are composted
	6 – 81-100% of compostable wastes produced at UBC are composted
Sustainable	7 – 81-100% of compostable wastes produced at UBC are composted plus, the methane emissions are being collected and used as a biogas

Figure 2. Sustainability Continuum (Locally-produced Food): Group 11

Indicator: % local food

Unsustainable		Intermediate		Sustainable	
Local	Imported	Local	Imported	Local	Imported
< 20%	>80%	50%	50%	>80%	<20%

"We decided that [in a sustainable UBC food system], a certain percentage of food should be produced locally (about 80%) and a small amount can be imported (20%)."

Conceptual Model of UBC Food System Sustainability

There is a need for an overall model that depicts the inter-relationship of the individual indicators or attributes and, as a result, communicates the state of sustainability of the entire system. As mentioned previously, the majority of groups had trouble distinguishing the characteristics of models, continua and the more detailed indicators. In general, the particular usefulness of the overall models proposed by the groups lies in the framework, rather than the details.

Two different types of models are presented in this section, to represent the strongest efforts. Figures 3 (Group 9) and 4 (Group 11) present a variation on an AMOEBA model, a model that has been developed to pictorially represent sustainability indicators (Ten Brink, 1991). For example, Figure 3 presents six continuum-spokes that are delineated in percentage increments (1= unsustainable, 10 =sustainable). Each continuum represents one of the six attributes or indicators used to assess the sustainability of the food system. As the indicators are monitored over time, and plotted along the spoke-like continua, the shape of the AMOEBA changes. Similarly, Figure 4 demonstrates the interrelationship of these indicators to each other the spheres of sustainability. The advantage of the AMOEBA approach is that it is a highly visual approach to encapsulating sustainability; The AMOEBA model incorporates both indicator measurements, the attributes of a sustainable food system, and a graphically demonstrates the interrelationship among the attributes.

Figure 3. Conceptual Model of UBC Food System Sustainability: Group 9

UBC FOOD SUSTAINABILITY SYSTEM

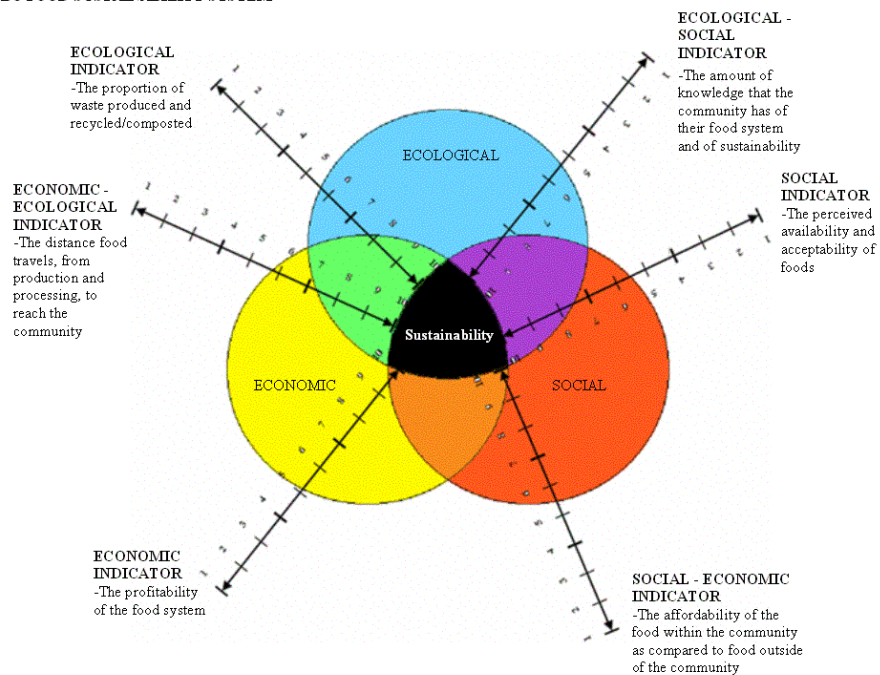
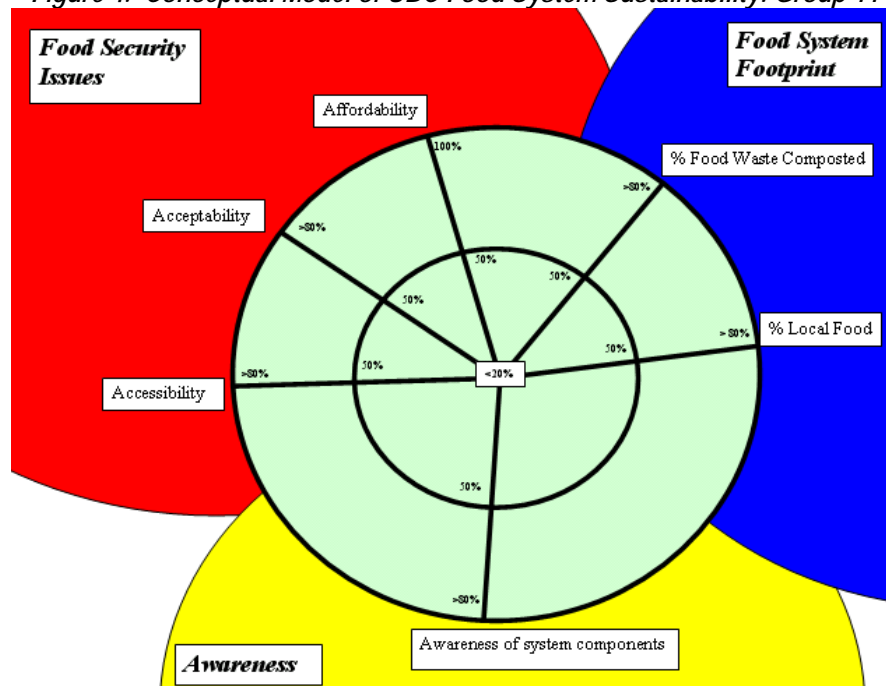


Figure 4. Conceptual Model of UBC Food System Sustainability: Group 11



7. RESEARCH DESIGN

The intent of this year's UBCFSP was to lay the groundwork for research in future AGSC450 classes. As such, the students were asked to propose a broad-scale methodology for assessing the sustainability of the UBC food system. The proposed research designs varied greatly in scope and depth. The groups that received the highest evaluations provided a detailed research design, one that described not only who would do the research and when it would be done, but also suggested specific a methodology that could be used by the researchers.

The research designs present a good introduction to the quantitative and qualitative methods that could be used to assess the sustainability of the UBC food system. In general, the research designs need to be further developed in order to bring them to a point that where they could be readily implemented and followed. Many of the proposed research designs lacked a timeline as well as a practical consideration of the temporal and financial resources necessary to initiate a monitoring program. There is the need for further clarify or redefine the roles of the major stakeholders, and their level of involvement with the UBCFSP. For example, several groups suggested that the CSO could coordinate the data collection, as well as the data analysis.

The focus of the research design was on measuring individual indicators. Examples of indicators, and corresponding data collection methodologies are found in Table 4 (the indicators are the same as those listed in Table 3).

Data Collection

- 100% of groups included at least two different data collection methods for monitoring their collection of indicators. The proposed methods fell under the broad categories of observation, surveys, interviews (individual and group) and the analysis of secondary data.
- Surveys were proposed for the collection of qualitative data such as personal acceptability and consumer awareness of sustainability issues. The majority of groups were vague about how the survey respondents would be

sampled, although a few identified the specific type of survey (e.g. questionnaires, focus groups, interviews) that should be used. Four groups designed a preliminary questionnaire that could be used in future research.

- Most groups also suggested that secondary data, such as food service receipts and waste management records, could be analysed to provide valuable food system information. This data would be compiled by the appropriate unit and then provided to AGSC450 students for analysis. A few groups suggested that the units themselves, or the CSO, could analyse the data.
- On this last point, most of the secondary data that would be required could likely be obtained from existing sources or records, with the cooperation and permission of the appropriate department (e.g. data to calculate food miles, number of compost bins on campus). In some cases, such as weight of compost returned to UBC food system (Group 2), new measurement systems would need to be implemented.
- Approximately one quarter of the groups proposed a detailed research timeline. It is notable that, of those groups who did, few relied on surveys as their major means of data collection. Surveys, particularly questionnaires, take more time to design, test, distribute and analyse than would be reasonably available in one semester (let alone half a semester).

Table 4. A Selection and Summary of Proposed Research Methods for UBC Food System Indicators

<i>Issue</i>	<i>Example of indicator</i>	<i>Proposed Data Collection Methods</i>
Waste Reduction (Composting and Recycling)	-# of compost bins on campus -% or weight of campus waste composted or recycled -% campus-produced compost used to produce food for UBC	- survey of campus buildings - analysis of Waste Management records -analysis of Waste Management records (new record-keeping methods needed for Waste Management/ individual compost bin users)
Affordability	-# nutritious meals available for less than \$5 - % of average UBC students' income spent on food over a defined period of time	-random menu survey/ nutritional analysis -random questionnaire and comparison of results with StatsCan figures for average student income
Profitability (of food service outlets)	-annual revenue of Food Services -proportion of profits reinvested in UBC campus - annual change in consumer frequency and consumption by patrons of the UBC Food System versus the competition	-analysis of food outlet financial reports -analysis of UBC/ food outlet financial reports - qualitative consumer surveys, quantitative analysis of outlet revenues
Locally-produced food	- food miles: kilometers food travels from field to table - % of locally-produced food entering the UBC food system	-analysis of sales records/ development of computer program for tracking distances -analysis of sales records
Consumer awareness of and participation in a sustainable food system	-% UBC community members who are aware of food system sustainability initiatives -# of volunteers with campus food initiatives -# of visitors to UBC Farm	-random questionnaire/ group interviews -questionnaire, survey of organizations' records - UBC Farm visitor records
Personal Acceptability	-# food service outlets offering culturally diverse meals (Asian, Indian, vegetarian, etc.) -consumer satisfaction	- random menu survey/ comparison with cultural make-up of UBC -random questionnaires and interviews with consumers
Student Employment	-total # students employed at food service outlets	-questionnaires, interviews, survey of employment records
Nutritional quality	-# of food service meals that meet National Research Council (NRC)'s Recommended Dietary Allowances	-nutritional analysis of a sample of meals (following NRC methods)

Proposed Research Timeline

- The majority of groups suggested that research and initiatives begin within the next year and not be restricted to AGSC450 classes (see next section)
- Baseline research needs to be undertaken in order to establish and refine the UBC Food System model. This research could be done in the first year, or on an on-going basis with UBCFSP partners.
- The UBCFSP model and indicators would be refined and finalised in 2003-2004.
- The majority of groups proposed that indicators be monitored yearly, beginning in 2004. Most groups suggested that the monitoring end in 2006, however this is likely because the UBCFSP was introduced to the class as a "five-year project".
- New indicators would be added to the research design as new interests and issues arise.
- Results would be disseminated in a "State of the UBC Food System"-style report, either annually or at the completion of the project
- Related-food system sustainability projects would be initiated in 2003-2004, and continue yearly.

Who will carry out the research?

- Most groups suggested that AGSC450 students carry out the majority of data collection and analysis, in cooperation with the relevant stakeholder group.
- Research would not necessarily be limited to AGSC450. Nearly half the groups (9/20) proposed that groups outside AGSC450 be involved in the food system research. Proposed partners included soil sciences students (soil surveys), AGSC250 students (administration of questionnaires), third and fourth year dietetics students (nutritional analysis), Agricultural Sciences student volunteers, and, especially, UBC Waste Management, CSO, AMS and UBC Food Services staff (collection and analysis of data). This proposal for outside involvement may stem from the recognition of the short timeframe for AGSC450 work on the UBCFSP.
- Curiously, only one group suggested cross-faculty partnerships, where students in other disciplines would carry out research (in this case, the Faculty of Commerce students assisting with economic analysis of food service outlets).

Who should coordinate the UBCFSP?

- Five groups suggested that a committee and/or the CSO could oversee the UBCFSP. The role of this body would be both supervisory and strategic. It would "oversee the timely completion of our proposal plan" (Group 2), as well as to "identify strategies for making the food system more sustainable" (Group 7).
- This committee would also issue an annual report on the state of the UBC Food System (Group 1).
- It is interesting to note that, of the groups who did present a timeline, each also proposed the formation of a committee to oversee the UBCFSP project research. The interpretation is that these students recognized the large amount of work needed to support the present (and future) UBCFSP, beyond the time available in AGSC450.

How would the UBCFSP partners be involved?

- UBCFSP partners, namely the AMS and UBC Food Services and Waste Management, would compile and provide data for analysis by AGSC450 students
- Partners would sit on a committee that would plan and support long-term research projects.
- Curiously, only four groups suggested UBCFSP stakeholders be involved in the creation and establishment of indicators and the UBCFSP model.

Other Research Projects

- Complementary to the monitoring of indicators would be the initiation of specific food system projects/ management strategies aimed at increasing the sustainability of the UBC Food System. A number of groups proposed such projects and included them as part of their research design. Proposed projects include: an expansion of the composting program, a buy local education campaign, linking local farmers to campus food services, creating a consumer advocacy group, investigating the contractual obligations of campus food providers, determining UBC demographics and changing the hours of campus food outlets. Some of these are summarized in the Section 8 and Appendix G.

8. OVERVIEW OF RECOMMENDATIONS FOR FUTURE YEARS

As a culmination of their research design, students were asked to provide final recommendations to the CSO and other food system stakeholders on ways that they might study the UBC Food System. The recommendations range in scope, degree of detail and substance. Many recommendations go beyond simply implementing new research projects; rather, many groups proposed specific initiatives or activities that could be undertaken to facilitate the transition to sustainability. This could be considered evidence this project's success as an action research project, as the lines between traditional research and activism become blurred. The proposed programs and activities would be complementary to efforts to assess the sustainability of UBC's food system, and broaden the research experience available to students.

Table 5 presents a summary of recommendations provided by AGSC450 students. A more detailed list is provided in Appendix G.

Table 5. Summary of Recommendations for the future of UBCFSP

- | |
|---|
| <ul style="list-style-type: none">• Raise awareness of general sustainability issues and existing campus sustainability programs• Expand the UBCFSP's scope to include the entire Lower Mainland region• Initiate the annual monitoring of food system indicators under the direction of a stakeholder committee, and with the support of CSO-hired workers• Increase collaboration with UBCFSP stakeholders, including students, to enhance UBCFSP planning efforts and build links between existing programs• Initiate specific food system projects/ management strategies aimed at increasing the sustainability of the UBC Food System (e.g. composting education, changing food outlet hours, "buy local" campaign) |
|---|

9. STRENGTHS AND WEAKNESSES

The UBCFSP is explicitly designed as an action research project, where the research design and activities are continually reviewed, reflected upon and adapted over time. As a result, the identification of strengths and weaknesses is central to the project's agenda, as it provides a starting point for the next iteration of activities, namely Year Three.

The following list of strengths and weaknesses was compiled based on input from the AGSC450 teaching team in June, 2003. The summary list does not include information from student evaluations or UBCFSP stakeholders, information critical to a wholistic and inclusive assessment of the past year's work. This information should be compiled in the near future.

Strengths

Conceptualisation: The labour dispute created the opportunity for all groups to work on the development of a research methodology for UBCFSP. As a result, a large amount of effort was put into conceptualizing what is meant by a sustainable food system and, most significantly, providing a framework for the study (what to study and why).

Attributes of a Sustainable UBC Food System: Students presented a strong, well-articulated and unified vision of a sustainable food system. This vision integrated social, ecological and economic dimensions, and reinforced the potential for the UBCFSP.

Enthusiasm: Based on initial student comments, student interest in and enthusiasm for the UBCFSP appeared to be high. The opportunity for students to work on an applied and innovative project in their own community sets this assignment apart from those of most university courses.

Growing Regional Awareness: The UBCFSP is a timely project, given the growing awareness of food sustainability and policy issues within the region. For example, the establishment of a new City of Vancouver Sustainability Office, as well as the recent creation of the Lower Mainland Food Policy Council point to opportunities to situate the UBCFSP within a larger regional context.

Leadership: No other Canadian university has undertaken an initiative aimed at enhancing the sustainability of the campus food system. While such undertakings have been implemented at several US universities, the opportunity exists to put UBC on the map in terms of institutional food system leadership.

Weaknesses

Labour Disruption: The cancellation of class for three weeks due to the labour dispute meant that students missed introductory presentations on several topics that would have enhanced their knowledge and skills for this project. These presentations included an introduction to UBC Food Services, AMS Food Services, Campus Sustainability Office, conceptual mapping, system modeling and indicators. While many of the students compensated by turning to the literature, and on-line interaction with the instructors, the presentations would have ensured that all students had the same opportunity to begin the project with the same knowledge base.

Quality of Indicators and Research Methods: In general, these sections require further investigation and refinement before the proposed indicators and research methods can be implemented. It is likely that the cancellation of classes contributed, at least in part, to the weakness of these areas. These areas should be emphasised in future years.

Integration with Course Curriculum: The last six weeks of the semester were devoted to the UBCFSP. Beginning the project earlier in the semester may have enabled a closer integration with the course curriculum. For example, topics that were covered earlier in the semester, such as genetic modification and globalization of the food system, were not mentioned in the students' exploration of the UBCFSP.

Specialisation: The UBCFSP could be linked with other faculties, such as Business and Community and Regional Planning, to augment the knowledge and skills necessary to initiate the UBCFSP.

REFERENCES

- Brunetti, A. and Rojas, A. 2002. The Sustainability of UBC Food System Collaborative Project II: AGSC 450. Land, Food & Community III, Spring 2003. Retrieved from http://www.webct.ubc.ca/SCRIPT/agsc_450/scripts/serve_home
- Brunetti, A. 2002. *Biting into Sustainability: The 2002 UBC Food System Collaborative Project Report*. University of British Columbia: Campus Sustainability Office.
- Kloppenburg, J. and S. Lezberg. 1996. Getting it Straight Before We Eat Ourselves to Death: From Food System to Foodshed in the 20th Century. *Society and Natural Resources*, 9: 93-96.
- Kloppenburg, J. et al. 2000. Tasting Food, Tasting Sustainability: Defining the Attributes of an Alternative Food System with Competent, Ordinary People. *Human Organization*, 59(2): 177-186
- Stringer, E.T. 1999. *Action Research*. Thousand Oaks, CA: SAGE Publications.
- Ten Brink, B. 1991. The AMOEBAs Approach as a Useful Tool for Establishing Sustainable Development? In Kuik, O. and H. Verbruggen, *In Search of Indicators of Sustainable Development*, pp. 71-87, Dordrech, Netherlands: Kluwer Academic Press.
- UBC Campus Sustainability Office. 2003. *Waste Management Compost Project*. Retrieved on July 6, 2003 from <http://www.recycle.ubc.ca/compost.html>

APPENDIX A

A research design and methodology for assessing the sustainability of UBC Food System: Indicators of the sustainability of the UBC Food System:

Problem:

The assessment of the social, ecological and economic sustainability of the UBC Food System is a very complex task for which there are no ready-made models that can be applied. Our Land, Food & Community III (AGSC 450) class of 2002 began a sustainability assessment research project in collaboration with UBC Food Services, the AMS Food & Beverages Management, the UBC Campus Sustainability Office and SEED, the UBC program responsible for assisting partnerships between staff, students and faculty to develop social, economic and ecological sustainability projects at UBC. Following AGSC 450's first attempt, another small-case study was carried out by one of the teams in Land, Food & Community 1 last term. As a result, we have 18 team reports and websites reporting the findings (www.mywebct.ubc.ca).

Although these studies provide a rich information baseline, they are just the beginning of a project that will span five years. Through these exploratory and preliminary studies, we have established principles of food system sustainability and formed a first impression of the sustainability (or lack of it) of the UBC food system. However, we still lack a big-picture model and a set of agreed upon principles or criteria and indicators that will enable us to evaluate the progress made towards a shared vision of the sustainable future for UBC food system. Establishing general and specific criteria and indicators to evaluate the sustainability of the entire University is a pressing need of the UBC Sustainability Office, and our hope is that this project will contribute to the Office's current efforts.

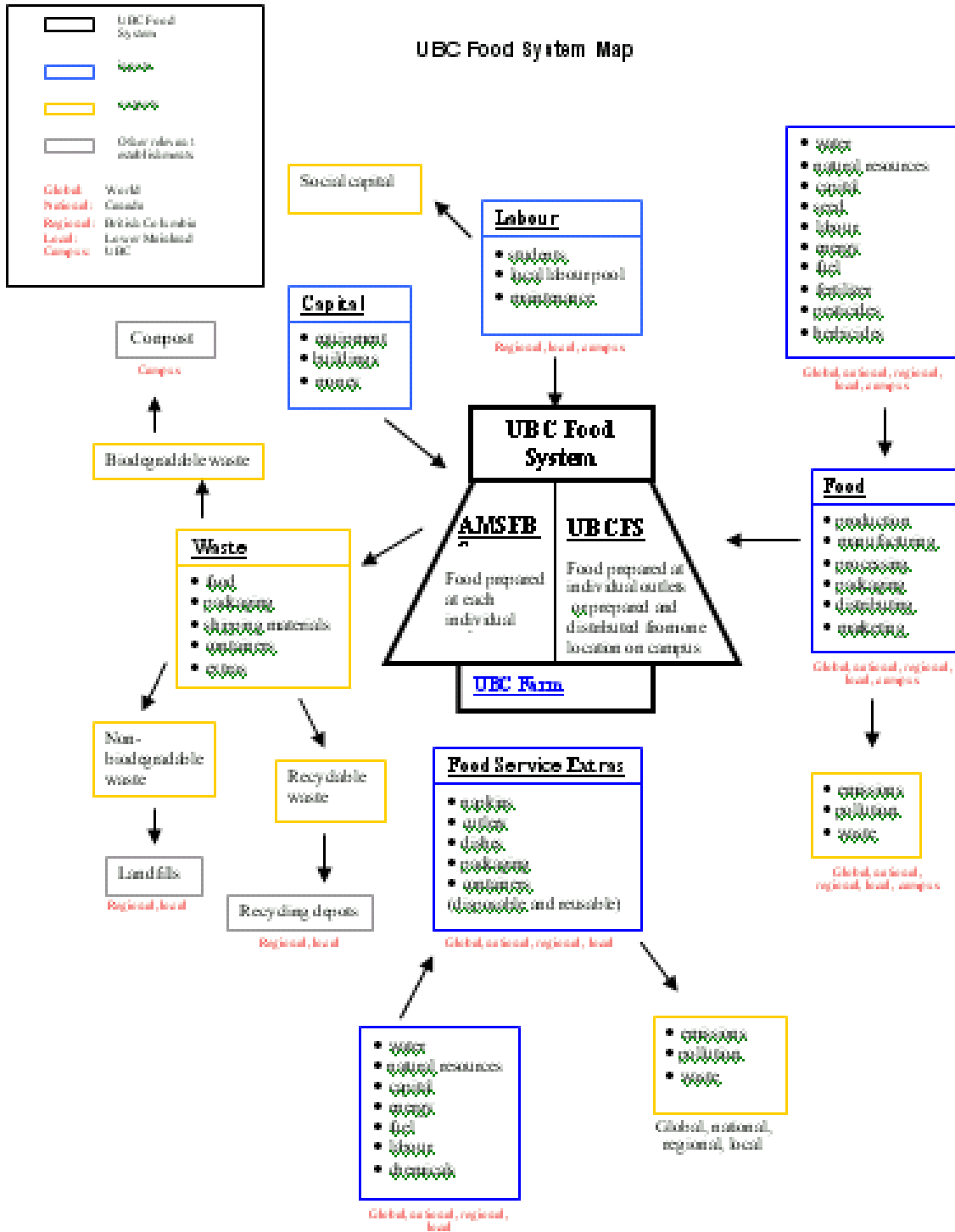
Thus, your team has been given the **General Task** of investigating or designing (if there is not one that can be adapted or applied) a **model to assess the state of UBC's food system sustainability** (socially, ecologically, economically) on a continuum ranging from "Unsustainable" to Sustainable" Your team is also expected to examine what sustainability indicators are needed to determine the overall sustainability of the food system at UBC.

Specific Tasks:

- Adapt or design a model to assess the state of UBC's Food System;
- Provide an appropriate problem definition for the evaluation of the sustainability of the UBC Food System (socially, ecologically, economically) on a continuum ranging from "Unsustainable" to Sustainable. Provide a conceptual definition of the "Sustainable" and "Unsustainable" food system, with defined intermediate stages along the continuum;
- Construct a map of UBC's Food System, indicating boundaries, components, interrelationships, goals and identify the main linkages with the global, national food and regional food systems;
- Investigate and become familiar with UBC's Sustainability Office's efforts to articulate models and indicators for assessing the general, ecological, social and economic sustainability (not just the food system) of UBC's campus;
- Review the most relevant literature on indicators of sustainability (qualitative and quantitative);
- Based on your research, propose *at least* three sustainability indicators that will help measure the state of the UBC's food system (at least one ecological, one economic and one social indicator). These indicators should provide the richest information possible, while at the same time being simple, applicable and user friendly. Provide a rationale for each of your choices;
- Design a research proposal for gathering the data that would be needed to measure your selected indicators (what to study, why to study it, when to study it, where to study it, for whom to study it, and with whom to study it?). Essentially, describe in detail what methods would you follow to carry out an assessment of the sustainability of UBC's food system? Explain how your criteria and indicators of sustainability will assist us in locating the UBC Food System in the 'Sustainable-Unsustainable Model';
- Prepare and present a professional report to UBC's Sustainability Office and to UBC's food service providers.

APPENDIX B

UBC Food System Map: Group 20



APPENDIX C

Overview of the Attributes of a Sustainable UBC Food System (Based on the work of Group 14)

We think that a sustainable UBC Food System would:

- **rely on fewer external inputs** and a greater number of internal inputs (e.g. food from UBC Farm)
- produce little waste and place an **emphasis on renewable resources and recycling** (e.g. reusable mugs and cutlery)
- work to **conserve and enhance natural resources** such as soil (e.g. encourage composting)
- **minimize practices that degrade the environment** (e.g. reduce pesticide use)
- respect wildlife and strive to **protect and promote biodiversity**
- encourage **on-campus food production** (e.g. expand UBC Farm, use green spaces for community gardens)
- offer a variety of **nutritious foods** in order to promote human health (for students, staff, faculty, and residents)
- make use of **locally grown and seasonally** available food
- offer relatively **inexpensive food**
- provide a **sufficient quantity of food** to meet the needs of a growing UBC population
- ensure that all people have **equal access to food** and have appropriate support systems in place to this end
- encourage people to be **aware of their connection** to the System (namely, where and how their food is produced)
- fuel a desire in people to **participate in the production of their food** (e.g. volunteering at the UBC Farm)
- foster in people **an appreciation for the effort required to grow, harvest, process, and market their food**
- emphasize meals that are **centred on families and communities** and that time should be taken to prepare and share them
- be **economically viable** (e.g. support existing food system operations and generate money for the university)
- generate fair and equitable **employment for UBC students**

APPENDIX D

Rationale for the Choice of Food Attributes/ Indicators

<i>Issue</i>	<i>Example of indicator</i>	<i>Rationale</i>
Waste Reduction (Composting/Recycling)	<ul style="list-style-type: none"> -# of compost bins on campus -% or weight of campus waste that is composted or recycled -% campus-produced compost used to produce food for UBCFSP 	<ul style="list-style-type: none"> - <i>To completely understand the health of a system, measurements must be taken of both inputs and outputs... we [...] think it is important to consider our outputs by looking at creating a fully sustainable waste management facility that encourages maximum participation from all members of the UBC community. (Group 13)</i> - <i>Completing the nutrient and energy cycling process plays a major role in reducing external inputs and creating a closed ecosystem. A closed ecosystem is highly desirable in the long-term goal of self-sufficiency. (Group 10)</i> - <i>Composting is an important indicator because it has such a great impact on the sustainability of UBC. With additional composting we can eliminate the need to purchase chemical fertilizers, reduce the number of trips made to local waste stations, and decrease the amount of garbage UBC adds to the local landfill. (Group 17)</i>
Affordability	<ul style="list-style-type: none"> -# of food services outlets offering nutritious meals for less than \$5 - percentage of average UBC students' income spent on food over a defined period of time 	<ul style="list-style-type: none"> - <i>Food affordability contributes to food security by allowing people to readily access sufficient, safe, and nutritious food. When the food is too expensive it leads to food insecurity because not everyone has access to it.) A situation of food insecurity is in turn a symptom of an economically unsustainable system. (Group 18)</i> - <i>A critical component of a sustainable food system is food security. Food security is influenced by food prices, which further affects the affordability and accessibility of food. [This is important at UBC] (b)ecause much of the UBC Community is composed of students who have relatively low monetary resources... (Group 9)</i>
Profitability of Food Outlets	<ul style="list-style-type: none"> -annual revenue of Food Services -proportion of profits reinvested in UBC - annual change in consumer frequency and consumption by patrons of the UBC Food System versus the competition 	<ul style="list-style-type: none"> -<i>Profit indicat(es) economic sustainability because a sustainable food system is one in which businesses are profitable, capable of supporting a good standard of living for workers, and able to contribute to the community. (Group 5)</i> - <i>Our group believed that our indicator was the easiest to measure and encompasses the broadest range of economic factors. (Group 9)</i> -<i>While businesses generally use profits as indicators of growth and sustainability, we assume that large profits indicate a lack of investment in research and socially and ecologically sustainable practices... This shows that costs are covered and money is not withheld from other socially and ecologically valuable projects, investment in research, and a margin that allows for adjustments to market shocks and sensitivity. (Group 17)</i>
Locally-produced food	<ul style="list-style-type: none"> - food miles: distance food travels from field to table - % of locally-produced food entering the UBC food system 	<ul style="list-style-type: none"> - <i>A sustainable UBC food system would generate the maximum possible amount of food from areas within the system, such as the UBC Farm; it would derive the majority of imported food from local sources (e.g. within BC) and would minimize or eliminate products imported from global sources. (Group 13)</i> - <i>By having food grown, processed, and prepared on the UBC Campus, or having food travel the shortest distance possible, we believe that the UBC Community will experience a long-term improvement in food quality, reduced losses and energy costs from transport and packaging, and an improvement in consumer confidence related to their food system. (Group 9)</i>

<p>Consumer awareness of and participation in a sustainable food system</p>	<p>-% UBC community members who are aware of food system sustainability initiatives</p> <p>-# of volunteers with campus food initiatives</p> <p>-# of visitors to UBC Farm</p>	<p><i>-Increasing education and accessible information on the UBC food system would be a start in enabling the UBC community to make informed choices to further sustainability...However, it is important to know that education is not the ultimate solution to our food system's sustainability issues, but it will serve as the beginning to help the UBC community become aware of the importance of a sustainable food system. (Group 10)</i></p> <p><i>- If students are unaware of the issues surrounding sustainability, they will be unable to assist in the movement towards sustainability. (Group 13)</i></p> <p><i>-An increase in the number of volunteers [in food initiatives on campus] shows that the awareness of food sustainability issues is increasing and being valued. There is also the implication that the influence of these organizations would increase with the increased community participation. (Group 2)</i></p>
<p>Personal Acceptability/ Satisfaction</p>	<p>-# food service outlets offering culturally diverse meals (Asian, Indian, vegetarian, etc.)</p>	<p><i>- Since many people around the world come to this community, a socially sustainable food system is also the one that respects the cultural manifestations of self and community. (Group 2)</i></p> <p><i>- "A diverse food system invites increased opportunities for people from many cultures and socio-economic backgrounds, and increase participation of consumers"(Kloppenbug, 2000). Such transition will lead to a more sustainable food system as people become involved and responsible in their consumption, preparation, and production of foods. (Group 19)</i></p>
<p>Student Employment</p>	<p>-total # students employed at food service outlets</p>	<p><i>- Economic sustainability can be defined as the profitability and the ability of a system to maintain a decent standard of living for all participants. An economically sustainable food system must not contribute to a radical polarization of wealth since a dramatic concentration of wealth in two hands cannot sustain a desirable standard of living for all". (Group 3)</i></p> <p><i>-This indicator demonstrates to what degree the food system reduces unemployment among the student population. Presumably, this will maintain the flow of monetary resources on campus. (Group 2)</i></p>
<p>Nutritional quality</p>	<p>-# of food service meals that meet National Research Council (NRC)'s Recommended Dietary Allowances</p>	<p><i>- In a sustainable food system, the consumption and production of food should enhance the health of the consumers. (Group 19)</i></p> <p><i>-Clearly, the focus of the UBC campus food system is its consumers: the students, faculty, support staff and visitors that rely on the food offered at campus facilities. The system exists to provide these people with the energy and nutrients that allow them to work and to learn effectively. A healthy balanced diet is important in reducing the risk of many chronic diseases and health problems later in life, such as cardiovascular disease and diabetes. (Group 18)</i></p>

APPENDIX E

*Overview of Proposed UBC Food System Indicators, by Attribute**

<i>Attribute</i>	<i>Indicator</i>
Waste Reduction (Composting/Recycling)	<ul style="list-style-type: none"> • # of blue bins/floor campus-wide • # of composting facilities/food outlet campus-wide • # of composting facilities/ residential unit • proportion of waste recycled to waste generated • % of compostable waste that is composted • % of recycled and recyclable food service extras used in UBCFBS and AMSFS establishments • # of participants in UBCFBS "One Less Cup/Container" program Patron satisfaction with meal options
Affordability	<ul style="list-style-type: none"> • % of nutritious meals that are affordable • price of nutritious food • % of UBC residents' income spent on food
Profitability (of food service outlets)	<ul style="list-style-type: none"> • # customers frequenting food service establishments at UBC vs. "the competition" • revenue of food service outlets • profit and losses of UBC food service outlets • amount of corporate sponsorship
Locally-produced food	<ul style="list-style-type: none"> • % UBC and regionally-produced foods • food miles travelled • amount of food produced on campus • # of food delivery trucks that come to UBC everyday • land area available for food system related activities on campus, including farmers market
Consumer awareness of and participation in a sustainable food system	<ul style="list-style-type: none"> • level of student awareness of food system • level of student participation in food system • awareness of nutritious foods • % UBC community participating directly in UBC Food System
Personal acceptability/satisfaction	<ul style="list-style-type: none"> • # of outlets offering ethnically or culturally diverse meals • convenience to consumers (survey) • methods of payment at food service outlets • hours of operation
Student employment	<ul style="list-style-type: none"> • # of student workers employed • student food service worker wages
Nutritional quality	<ul style="list-style-type: none"> • campus meals that meet nutritional requirements • % deviation from National Research Council's Recommended Dietary Allowances macronutrient ratios for sampled food outlet meals • # of food service outlets where customers can buy a balanced meal and drink for less than \$5

*This is not complete list; similar or identical indicators have been mentioned only once

Proposed indicators outside these attributes:

- | | |
|--|---|
| <ul style="list-style-type: none"> • ecological footprint of campus food services • efficiency of water use • efficiency of energy use • # food outlets selling organic foods • % organic food sold on campus | <ul style="list-style-type: none"> • level of compliance with food safety standards • biodiversity on campus • soil quality on campus • groundwater quality • economic viability of UBC Farm |
|--|---|

APPENDIX F

Examples of Sustainability Continua for Central Sustainable Food System Attributes

Figure 1. Sustainability Continuum (Waste Reduction): Group 10

1. Unsustainable	3. Declining	5. Adequate	7. Progressive	9. Sustainable
No recycling or composting. All wastes dealt with non-locally. Reliance on one-time use packaging.	Non-efficient recycling & composting. All other wastes dealt with non-locally.	Efficient recycling & composting. But all other wastes dealt with non-locally.	Non-efficient recycling & composting. All other wastes dealt with locally.	Efficient recycling & composting. All other wastes dealt with locally. Decrease one-time use packages

Figure 2. Sustainability Continuum (Affordability): Group 11

Unsustainable	Intermediate	Sustainable
> 80% [of students find food prices] too expensive	50% [of students find food prices] reasonable	>80% [of students find food prices] very affordable

Figure 3. Sustainability Continuum (Profitability of Food Service Outlets): Group 2

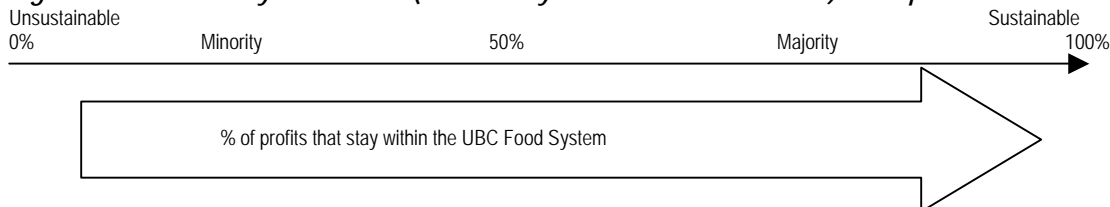


Figure 4. Sustainability Continuum (Locally-produced Food): Group 11

Unsustainable		Intermediate		Sustainable	
Local	Imported	Local	Imported	Local	Imported
< 20%	>80%	50%	50%	>80%	<20%

**We decided that [in a sustainable UBC food system], a certain percentage of food should be produced locally (about 80%) and a small amount can be imported (20%).*

Figure 5. Sustainability Continuum (Student Employment): Group 1

	Unsustainable → Sustainable		
	1	2	3
Percent student employees in food system	0%	25%	50%

Figure 6. Sustainability Continuum (Consumer Awareness/ Participation): Group 2

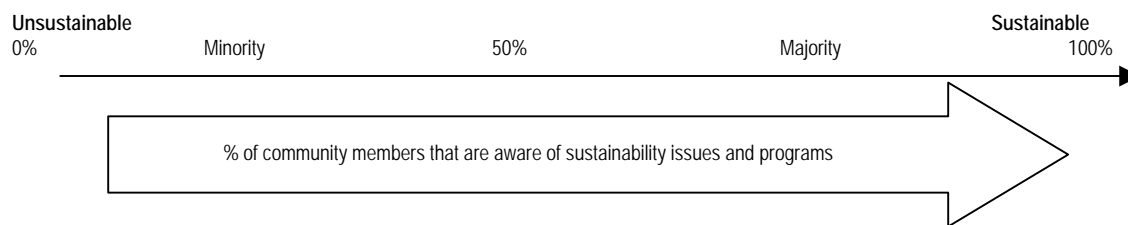


Figure 7. Sustainability Continuum (Personal Acceptability): Group 3

Sustainable	5	Food services offer at least 10* places that serve different varieties (i.e. ethnic, vegetarian, and organic) of healthy, good quality and wholesome food.
Mildly sustainable	4	Food services offer at least 8* places that serve different varieties (i.e. ethnic, vegetarian, and organic) of healthy, good quality and wholesome food.
Neutral	3	Food services offer at least 5* places that serve different varieties (i.e. ethnic, vegetarian, and organic) of healthy, good quality and wholesome food.
Mildly unsustainable	2	Food services offer at least 2* places that serve different varieties (i.e. ethnic, vegetarian, and organic) of food.
Unsustainable	1	Food services offer zero* variety of food.

Figure 8. Sustainability Continuum (Nutritional Quality): Group 18

Unsustainable	1-	sampled food outlet meals deviate 147-170 % from NRC macronutrient ratios
	2-	sampled food outlet meals deviate 118-146 % from NRC macronutrient ratios
	3-	sampled food outlet meals deviate 88-117 % from NRC macronutrient ratios
	4-	sampled food outlet meals deviate 59-87 % from NRC macronutrient ratios
	5-	sampled food outlet meals deviate 30-58 % from NRC macronutrient ratios
	6-	sampled food outlet meals deviate 29-57 % from NRC macronutrient ratios
Sustainable	7-	sampled food outlet meals deviate 0-28 % from NRC macronutrient ratios

**National Research Council macronutrient levels are determined by nutritional analysis*

APPENDIX G

Sample of Recommendations for the Further Study of the UBC Food System

<i>Theme</i>	<i>Specific Recommendation</i>
Raise awareness of general sustainability issues	<ul style="list-style-type: none"> ● Incorporate sustainability awareness [at UBC] in other faculties and courses. (Group 5) ● Create multi-faculty sustainability programs and projects. (Group 5) ● "We...feel that the amount of co-operation between faculties on campus with regards to sustainability issues would be a valuable social indicator of the overall sustainability of the campus. We feel that promoting partnerships between faculties is essential; determining a way to measure the degree of interconnection on campus would make it an ideal candidate for addition to our model". (Group 18) ● Increase sustainability awareness through effective advertising initiatives. (Group 19) ● Market current programs. (Group 7) ● Improve UBC community's awareness of existing and proposed composting program. (Group 2)
Expand the UBCFSP's scope	<ul style="list-style-type: none"> ● "The focus of this project should be expanded to encompass the resources of the entire mainland. We realize that the project was intended to look at just UBC, but UBC uses resources from all over the lower mainland and we believe that this needs to be taken into account". (Group 10)
Undertake monitoring of indicators	<ul style="list-style-type: none"> ● Assess the UBC food system on a continuous basis through one long standing committee comprised of the UBC Sustainability Office, AMS and UBC Food Services representatives, and at least one professor and one graduate student. (Group 1) ● The UBC Sustainability Office should hire more student workers to carry out various research projects focused on assessing the sustainability of the UBCFS. (Group 15) ● Create an indicator database. (Group 7) ● Begin assessing the indicators next year.
Collaborate with food system stakeholders	<ul style="list-style-type: none"> ● Initiate a "World Café" or "Sustainability Circles" in which students, faculty and staff members, as well as volunteers of the UBC Farm, employees of AMS, UBC food services, the Sustainability Office and Waste Management come together and create a community definition of the UBC Food System. (Group 11) ● Interview managers/owners of UBC Food Service outlets on their thoughts of sustainability to determine which areas need improvement (Group 13) ● Develop a program that links UBC Food Services, UBC Farm, SEEDS, UBC Sustainability Office, producers, and consumers together in exchanging information on UBC Food System (Group 13) ● Increase the impact of the UBC Farm by having its food directly contribute to the UBC food system. (Group 16) ● Continue to involve Agricultural Sciences students through newly developed curriculum linking sustainability education and food system development. (Group 19) ● Encourage UBC Food Services components (UBC Food Service, SEEDS, etc) to promote themselves to students. (Group 5) ● Encourage use of resources that are provided inside UBC; such as goods from UBC farm and students as labour (Group 5)

<p>Undertake specific research projects</p>	<ul style="list-style-type: none"> ● Collect data on food products that are produced locally and globally to determine UBC food system's dependency on imported foods (Group 13) ● Compare UBC's waste management and recycling practices to other communities in Vancouver and Universities across Canada (Group 5) ● Conduct profit and sales analysis of UBC food services with the help of UBC Faculty of Commerce (Group 5) ● Monitor popularity of individual food outlets and food items using sales records (Group 5) ● Collect information and data on the costs/profits of UBC Food Services, including a cost-benefit analyses to determine where costs can be lowered and how that can be passed on to the students (Group 13) ● "Develop a research proposal that investigates the acceptance of establishing a local grocery outlet (particularly a produce market) within the UBC campus. This would help to understand the challenges and opportunities that are associated with opening this type of food outlet and how accepting UBC consumers are in purchasing this type of food. This would most likely increase the community support of local agriculture". (Group 15) ● Implement a waste restriction level. A certain percentage of products coming into UBC must have recyclable packaging. If the amount of waste disposed of from a facility exceeds a certain weight or number of bags permitted they will be charged accordingly for excessive disposal. Moneys gained from this charge must then be put back into the waste management program. (Group 16) ● Increase the impact of the UBC Farm by having its food directly contribute to the UBC food system. (Group 16) ● Undertake closer examination of the specific components of the system. "For example, one group could look at the UBC Village, while another group analyzes the AMS Food and Beverage services or the UBC Food Services." (Group 10) ● Survey UBC Food Service outlets to determine waste management practices. (Group 5) ● Monitor change in waste management initiatives by communicating with UBC Waste Management (Group 5)
<p>Seek recognition</p>	<ul style="list-style-type: none"> ● Lobby federal and provincial governments for University awareness and support for taking on such an important holistic analysis of food system inefficiencies (Group 19)