UBC Social Ecological Economic Development Studies (SEEDS) Student Report

A Research Design and Methodology for Assessing the Sustainability of the UBC Food System: Indicators of Sustainability of the UBC Food System

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ABSTRACT

While the University of British Columbia and its Campus Sustainability Office are at the forefront of sustainable development projects, they have yet to assess the sustainability of the UBC Food System. In this paper we map the current state of the UBC food system and present a continuum model of seven indicators of food system sustainability that we think adequately address the social, environmental and economic issues that arise in the development of a more sustainable food system. These seven indicators are the affordability of food, the presence of an effective consumer advocacy group, consumer satisfaction, the percentage of UBC Food Services and AMS Food and Beverage employees and management that are UBC students, the percentage of food waste composted and recycled, the percentage of locally-produced food entering the UBC food system, and a cost-benefit analysis of UBC Food Services and AMS Food Beverage. As these seven indicators overlap and conflict with one another, we stress that it is necessary for all indicators to be valued equally [redacted] in order to move forward on the continuum from a stage of low sustainability to a stage of high sustainability.

We propose a methodology that requires close communication between food providers, local suppliers, and consumers on campus. The implementation of the food system sustainability indicators needs to be carried out on a continuous basis over the next five years. It is therefore essential that one long-standing food system sustainability committee be established to work on this project. [redacted]

INTRODUCTION

The University of British Columbia is at the forefront of sustainability policy planning and is the first university in Canada to implement a sustainable development policy. In 1998, UBC established a campus sustainability office to implement programs using indicators to assess and improve the ecological, economical and social sustainability of UBC. One indicator of sustainability that the sustainability office has put forth is percentage reduction in core energy and water use on campus. The goal of this Ecotrek initiative is to reduce core energy use on campus by thirty percent and water use in core facilities by 45 % through upgrades to the university's mechanical and electrical infrastructure. Electrek, a lighting upgrade program, involves another indicator based on the percentage reduction in UBC's annual electricity use. It expects to reduce electricity use by 7% annually. WasteFree focuses on a third indicator, percent decrease in the use of disposable cups on campus. Happy Hour, in which coffee is free, and customer rebates for using personal mugs at food outlets on campus are two initiatives that promote the use of personal mugs and reduce waste from disposable cups. The SEED initiative has been created to bring together students, faculty and staff specifically

to address sustainability needs on campus. This program will generate more indicators in the future out of issues that arise, such as finding alternatives to pesticide use, developing a campus shuttle system and investigating wastewater treatment alternatives.[1] Although the sustainability office has implemented many policies to increase campus sustainability, it has yet to address the sustainability of the UBC food system. [redacted]

PROBLEM DEFINITION

Our group set out to assess the current UBC Food System, with a final goal to recommend a research design and methodology that could be used to ensure this food system is operating in the most sustainable way. We first had to define what was meant to be a sustainable and an unsustainable system.

Our group had difficulty agreeing on a definition of a sustainable food system. Two of our group members thought that economic prosperity was the most important thing to establish in a sustainable food system, since we live in a consumer-driven capitalist society and profitable businesses reflect societies wants needs and concerns***)***. They believed that this encompasses social equality since consumers have equal rights to "vote with their dollars" and support the products and services that they wish to. Other group members disagreed with the importance of economic prosperity because environmental resources are often neglected in traditional accounting methods and consumers may not see the long-term impact of their choices since they are so far

removed from the land. These group members argued that consumers are unable to make informed decisions about the foods they buy because they lack the knowledge and their decisions are often driven by short-term needs instead of consideration for long-term sustainability. We also discussed the issue of our food supply and whether or not a sustainable system needed to be as local as possible. We found many reasons to support a local food system, such as promoting a sense of community and supporting the local economy, but we also found reasons [redacted] would be impractical, for reasons such as reduced variety due to seasonal availability of crops.

A general consensus within our group reflected the importance to meet and maintain a balance between ecological, social, and economic issues. To resolve these issues we decided to choose a group of indicators that reflected all of these concerns, and give them each equal importance. We decided that economic prosperity was important, but only if environmental impact was taken into account as well, so we chose to have an indicator of economic success 1) a cost-benefit analysis of UBC Food Services, and AMS Food Beverage, as well as an indicator of environmental impact 2) the percentage of food waste composted and recycled. Our third indicator 3) the percentage of locally-produced food entering the UBC food system, reflects our belief in the sustainability benefits of local food, while our 4th indicator 4) consumer satisfaction, ensures that we do not neglect the aspect of the consumer-driven economy in which we live. We decided that 5) the affordability of food was another important indicator since we believe that consumers have the right to access food and should be able to participate in the food system as empowered consumers, not driven by financial desperation. Because we believe that

informed choices enable consumers to make decisions in their long-term interests, we also chose an indicator that would measure the extent of their opportunity to engage with the food system and learn about it 6) the percentage of UBC Food System employees that are UBC students. Our last indicator 7) the presence of an effective consumer advocacy group, reflects our belief that sustainable systems need to be democratically controlled and representative of their communities [redacted].

To adequately measure the current sustainability of the food system, we set the indicators on a continuum, ranging from completely unsustainable to sustainable (See Appendix B).

In conclusion, the aspects of a sustainable food system which our group considered the most desirable and significant include a focus on local food production, environmental waste reduction, economic prosperity, ensuring the affordability of food, education and empowerment of consumers, and consumer satisfaction.

VALUE ASSUMPTIONS

As a group, we felt that sustainability was not solely for the purpose of an 'environmental' movement, but also one that incorporates a particular level of community involvement. From our underlying weakly anthropocentric view of the system, we recognize the concept that humans are a central part of the ecosystem, but we also see the need to learn to integrate our economic and social lives into the environment in ways that maintain and enhance it, rather than degrade or destroy it. Ultimately, food systems are driven by human choices and thus any attempt to assess their sustainability must acknowledge the social aspects of human behavior that drive them. In order for

sustainable environment and economic initiatives to be successful, they must have the support and input from the community that the food system it is serving. ***Very good***

Within our group we all have different personal values and given the choice would put more weight on certain indicators than others. We decided that the best compromise would be to include a range of equally valued complementary and conflicting indicators [redacted]

MAPPING THE UBC FOOD SYSTEM

To better understand the current state of the UBC Food System, a map indicating boundaries, components, interrelationships, goals and the main linkages with the global, national food and regional food system was created (see Appendix A). We have defined the UBC community boundary as extending to the University Gates, incorporating all food production, retail outlets, and disposal on campus. [redacted]

REVIEW OF LITERATURE ON SUSTAINABILITY

Recent literature on food system sustainability has used qualitative and quantitative indicators to carry out an assessment. Kloppenburg et al. (2000), present such indicators as degree of community participation, sustained environmental health, consumer knowledge of the food system, food grown as locally as possible and profitability of local businesses and farmers. In general, it is very difficult to assess sustainability because many different facets come into play. Qualitative issues such as culture and religion are hard to measure in order to assess their sustainability. Lyle (1994) presents a guideline on how to measure a community by its values and cultural

history. Quantitatively there is literature, such as by Therivel (1996) which has set specific grid guidelines to assess the population, state of the environment and ability of that environment to function with the human intervention. In addition, Mitin et al. (1996) present diagrams showing environmental, economic and social wellbeing, which exhibit a general stance in overall sustainability. In general the available literature is mainly aimed at general sustainability with very broad ways to assess food systems.

FOOD SYSTEM INDICATORS

Affordability of food at UBC

We have chosen to look at the accessibility of food provided at UBC as one of our indicators of sustainability because we feel that in order to create and support a sustainable food system people must have access to food that is affordable. Accessing affordable food is essential for consumers in order to maintain their health and well-being. Empowering people to achieve a decent standard of living allows them to make decisions that are not driven by short-term need and desperation. If people are secure in their health and their food supply they will be better able to make decisions in the best interests of their long-term needs, and thus a sustainable food system.

Implementing sustainable food practices in farming, transportation, processing, packaging and recycling will only be effective if consumers can still afford to buy these products. If there is a large increase in price to accommodate sustainable practices, consumers will chose to buy cheaper foods that do not support these initiatives thus failing to support their local food system.

This indicator can be measured by assessing consumers' monthly financial resources for food and comparing it to the monthly cost of eating from food outlets on

campus. We have chosen to define our consumers as being composed only of UBC students, as we know that they are the majority of the population that lives and eats on campus. There were 39,421 students at UBC during the 2002-2003 academic year as compared to the 9 079 full-time faculty and non-faculty staff members [redacted]

We also believe students to be the most vulnerable to changes in the food system because they have the lowest incomes and generally do not hold positions of power in the food system since they are younger and are usually unable to take on full-time employment. [redacted]

The amount of income that UBC students have to spend on food can be calculated by examining data from institutions like the BC government student loan program, which collects statistical information about the cost of being a student in BC. This can be supplemented by information from consumer satisfaction surveys that would ask students to estimate the amount of income they have to spend on food each month. To estimate the cost of eating nutritious food on campus, a similar approach can be taken to that of Dietitians of Canada who priced the cost of a "Nutritious Food Basket", as defined by Health Canada. The content of their food basket was designed to reflect "average food

purchasing patterns, meet nutrition requirements and be palatable and economical". ([redacted])[3] We recommend that a food basket be determined based on these four requirements for UBC students. Once the content of this basket is determined, it can be scaled by quantity to reflect the different "family" types at UBC.

Presence and effectiveness of a Consumer advocacy group

We will examine the extent to which students are empowered to make their voices heard and give input into the design and operation of their food system by the presence and effectiveness of a consumer advocacy group. UBC students need to be directly involved in the food system so that their ideas about sustainability can be voiced and their support gained for future endeavors to make the UBC food system more sustainable.

UBC students may all have very diverse ideas about what it means to have a sustainable food system, and they will need to reach some kind of consensus in order to move forward as a cohesive community. This was discovered at the Michael Fields Agricultural Institute[4], who explored this issue with a group of 125 people from the alternative farm/food community in the upper Midwest of the United States. ([redacted]) For some people the ethical issues of food production may be important, while others may value the availability of healthy, locally produced food. Still, other consumers may think that a spiritual and sacred bond with the land is most important to them. It is very important in a democratic society to allow people's voices to be heard and to encourage them to be empowered in their communities. Having an advocacy group will allow UBC students to speak directly with people who are controlling their food system and give them the opportunity to voice their own opinions.

A consumer advocacy group should represent the opinions of the students and should therefore be comprised of student representatives from various faculties, programs, and years. The members of this group should be able to sit on committees with local food providers such as the AMS and UBC Food Services as well as the executive committee from the sustainability office and the UBC senate. This would create channels of communication between food service providers and the students, allowing for a better exchange of ideas. The existence of this kind of group and the communication channels it creates would be the first step towards a sustainable system. The effectiveness of this group, as determined by positive feedback from its members, and the attainment of any defined goals would indicate a further step towards sustainability.

Percentage of food system employees that are UBC students

Aside from UBC students participating in the food system as consumers, it is also important that they be involved in a way that educates them about the food system and allows them to make informed decisions. Many modern communities find that they are too disconnected from their own food systems and they therefore focus only on their immediate short-term needs, without thinking about the long-term consequences of their actions.[5] By participating in the food system the community gains the knowledge of food practices, a type of education that will enable them to participate as informed community members within their own food systems.[4] A consequence of this, consumers understand the implications of their participation in the food system at a local, national, and global level and on a short-term and long-term basis.[6] This will help them to make informed decisions with respect to their local food system.

Consumer satisfaction

In order to assess the sustainability of the UBC food system it is important to gather feedback from the people who interact with it. Consumers expect a certain level of quality, accessibility, and value in the products that they buy. It is important that consumers have access to foods of high quality and good variety so that they can choose foods that maintain their health and make choices that are appropriate for their preferences. Consumer satisfaction within the food system can be measured through a consumer satisfaction survey.

By surveying students about their perception of affordability of food on campus this will also serve to confirm or refute the information we receive regarding the amount of income that students have to spend on food. This is important because there may be discrepancy between the estimated amount of money that students have to spend on food and the actual amount that they have. It could also reveal how community members make their decisions about food and how much of a factor cost is and whether they feel able to think about the long-term consequences of their choices.

Percentage of food waste composted and recycled

In assessing the environmental sustainability of the UBC food system, the percentage of food waste that is diverted from the landfill through composting and recycling is a rich and telling indicator. Currently, 35% of all waste on campus is food waste, made up of organic food scraps and food packaging. In 2001/2002, this amounted to 1731 tonnes of food waste generated on campus, of which less than 4% was recycled or composted.[7]

In our view, there is a clear need for increased composting and recycling practices within the UBC food system in order for it to be sustainable. The current campus recycling system is close to capacity and a large scale composting system has yet to be installed. Most food packaging cannot be recycled within the current blue bin system, and composting facilities are not widely available or marked for student use.[7] The majority of our food wastes continue to go directly to the landfill, thereby burning fossil fuels in transport and incurring dumping costs. Of even greater concern is that by dumping wastes off campus rather than cycling them within, the UBC food system operates as less of a closed system than it has the potential to be (see Map of UBC Food System in Appendix A).

The percentage of food waste composted and recycled on campus as opposed to being disposed at the landfill is a relatively easy and inexpensive indicator to measure. UBC Waste Management currently keeps track of the UBC Solid Waste Stream on an annual basis and estimates the percentage of total wastes diverted from the landfill. Food wastes are not currently given a distinct category within the UBC Solid Waste Stream, but could be measured separately in the future by similar methods. [redacted]

Percentage of locally-produced food entering the UBC food system

A move towards a more localized or proximate food system, where food is grown, harvested, marketed and sold as close to UBC as possible, is important as it enhances social, economic and environmental sustainability. Socially, it promotes a sense of community, bringing people closer to the land and the farming practices used to produce their food. By supporting the concept of a foodshed, an alternative, more localized flow

of food, the UBC Food System can be restructured to be based on closer relationships between producers and consumers [6]. As UBC students, faculty and staff develop closer relationships to farmers, they have more of a say in the way their food is produced, allowing their demands for more environmentally friendly farming practices to be heard. Economically, a proximate food system supports local farmers and the local economy. It favours a moral economy, as market relations are driven by more than just profit.[8] Finally, relying on proximate food sources reduces the amount of fossil fuels burned in transport of food from farm to consumer.

The two main food providers on campus, UBC Food Services, and AMS Food and Beverage, currently purchase less than 5% of their food directly from local farmers.[9] Two small residences, St. John's College and Green College, have recently been associated with UBC Farm to purchase their seasonal produce from the UBC Farm.[10] However, the UBC Food System as a whole remains largely non-localized and reliant on wholesalers to secure food from local, regional and global sources. Consumers at UBC are unaware of where their food comes from and feel no connection or responsibility to support the farmers or farming practices used to produce their food.

In the foodshed analysis, precise boundaries of what is "local" or "proximate" are rarely made[8] and thus in evaluating the UBC food system, we will not initially put strict limitations on "local" until we have an idea of what is feasible in pursuing "food grown, harvested, marketed, and sold as close as possible to UBC". Rather than a bioregional approach, priority will be put on supporting our BC and Canadian economy, while at the same time reducing transport distances for food.

While measuring the percentage of locally-produced food entering the food system at UBC is a challenging task, it has been made easier by the work of Johnson and Stevenson (1998)[11] who studied the feasibility of sustained marketing relationships between universities and local producers at 14 universities and colleges in the US. The recommendations presented in their report and the documented successes of the universities and colleges involved in converting to more localized food systems[12] are a valuable resource that can be relied upon in implementing this indicator.

Cost-benefit analysis of UBC Food Services and AMS Food and Beverage

Carrying out a cost-benefit analysis of the cash flow, profitability, and several other ratios will illustrate the consistency and the potential for UBC to continue its food system at a break-even level. The rational for doing a cost-benefit analysis of each of the individual firms as well as the UBC Food System as a whole is that the analysis will make it obvious whether or not to continue the operation of any particular food outlet in an economic sense. If the firm is losing money by continuing to operate, it may be a better decision to stop and use more funds towards a more profitable sector. However, if the store is experiencing positive cash flows and if the store has high contribution margins, it is obviously better to continue its operation.

Generally what is involved in a simple cost benefit analysis is a set of data from each sector of the UBC Food System which shows all of the sources of revenue, costs, debts, expenses, and funding so that the current condition of the businesses can be seen. With these values, dollar values such as the contribution margin, the current ratio, the cash flow, the break-even analysis, and the general profitability of each sector can be seen. The creation of a balance sheet and income statement will tell us how much more

income we are making than the costs to operate, the ability to pay current liabilities over current assets, the general flow of cash into the business, and whether or not the business can break even in terms of costs and benefits.[13]

In order to measure these values for the statements needed for cost-benefit analysis it is necessary to approach the individual firms and request information regarding the efficiency of the operation of the firm. This may be difficult as much of the information may be kept confidential and secret to outside personnel. However, in order to carry out effective analysis of the economic sustainability of the food systems, this information is a must. Given this information, it is then simple to calculate and figure out the potential and the current standings of the UBC Food System in economic terms.

If the food system as a whole is breaking even in terms of costs and benefits, in other words, if the system is neither gaining money nor losing money, it can be considered to be sustainable. If the system as a whole is losing money due to its operation expenses, it is unsustainable. Further more, if the system is breaking even but only due to funds from UBC and other sponsors such as banks, it cannot be considered fully self-sustaining, but can be regarded as sustainable in order to operate. In other words, it will be midway on the continuum of sustainability.

DISCUSSION ON INDICATORS

Many of the indicators go hand in hand, while others conflict with each other. For example, consumer satisfaction may reflect students' food preferences and "average food purchasing patterns" which are needed to create the content of the food basket in assessing affordability. These same issues will be at the forefront of consumer advocacy group discussion. Other indicators may work against each other, such as the effect that

the percentage of locally produced food entering the UBC food system has on the costs and benefits to the major food outlets on campus as well as the affordability and satisfaction of consumers. Because of the intricate relationships between indicators, close communication between all sectors of the food system will be essential

CONCEPTUAL DEFINITION OF FOOD SYSTEM SUSTAINABILITY

The conceptual definition of the UBC Food System Sustainability (see Appendix B) shows three stages along the continuum of food system sustainability. In order for the food system to be considered sustainable, all indicators must have move away from stage one and be nearing stage three. The food system is not sustainable if only certain indicators have reached stage three while others remain at stage one. In other words, all indicators are of equal importance and must be addressed.

The three stages on the continuum may appear to be vaguely defined for some indicators. This is because we expect to develop more realistic, quantitative goals over the course of the five year project as the UBC food system is studied in greater detail. For example, we chose not to measure affordability as percentage of income spent on food with reference to the poverty level because the majority of consumers within the UBC food system are students who do live below the poverty line as defined by income. A more realistic continuum for affordability could be based on a future survey that assesses student expenditures on food compared to the cost of eating. Similarly, the percentage goals listed on the conceptual diagram for food waste diverted, local food and student employees in the food system are based on research findings from unrelated projects, and will be adjusted over the course of the 5 year UBC Food System

Sustainability project as the UBC Food System is studied and understood in greater detail.

METHODOLOGY

The following specific tasks will need to be carried out in the implementation of our suggested indicators for UBC food system:

What	Of/with Whom	Why	When	Where
Survey consumer satisfaction and monthly financial resources for food compared to the cost of eating on campus	Of UBC students, surveys carried out by the Farrell Research Group and by dietetics and home economics students	To assess consumer satisfaction and demands in terms of cost, quality, and accessibility of foods and to determine the price of a realistic nutritious food basket	Starting in Year 1, annually thereafter	On campus
Determine Current UBC demographics through census data or surveys	Of UBC students	To develop a nutritious food basket model for different student demographic groups based on the age, sex and number of family members	Years 1-2	
Create a consumer advocacy group	Of students, both undergraduate and graduate, in conjunction with UBCFS and AMSFB	To create channels of communication between food service providers and the students, allowing for a better exchange of ideas	Created in Year 1	On campus
Interview	UBC farm, UBCFS and AMSFB, UBC food wholesalers, distributors, processors and suppliers	To determine the total percentage of UBC students employed in the UBC food system	Starting in Year 1, annually thereafter	On and off campus
Consult	UBCFS and AMSFB Directors	To determine requirements of foods supplied in terms of quantity, degree of processing	Year 1 of 5 year project	On campus
Obtain financial	From UBCFS and	To carry out a cost-benefit	Annually	With data

data	AMSFB Operations	analysis of the UBC food system		from campus
Connect with	Local farmers	To assess interest in direct marketing relationship with UBC and seasonal/non-seasonal supply capabilities	In years 1 and 2 initially but ongoing throughout five year project	Lower Mainland and Fraser Valley
Educational Campaign – speakers, seminars and workshops	For the UBC community, carried out in conjunction with Farmfolk Cityfolk	To raise awareness about the benefits of buying locally produced food and determine what food sustainability issues students deem important	Years 1 and 2 of 5 year project	On campus, in the SUB, at the UBC Farm
Map sources of food entering the UBC Food System	From UBCFS and AMSFB wholesalers and any farm-direct purchases	To assess the proximity and amount of locally produced food currently entering the UBC food system	Years 1, 2 initially, but ongoing throughout 5 year project	In contact with Wholesalers, distributors off campus and UBCFS and AMSFB directors on campus
Monitor	UBCFS and AMSFB contracts with wholesalers and local farmers	To determine realistic progressive percentage goals for more local food system	On a continuous basis throughout 5 year project	On campus
Investigate alternatives to contractual obligations to wholesalers	Of UBCFS and AMSFB by consulting local farmers and growers associations	To assess the feasibility of sustained marketing relationships with local producers and Community Supported Agriculture Initiatives	Years 1-3	Research on and off campus
Link local farm suppliers to UBC Food System	with UBC Food Services and AMS Food and Beverage Directors and UBC Waste Management	To create a more proximate and closed food system where composted food wastes are returned to farms thus creating a more “closed” nutrient cycle	Years 2-5	By phone and in person on campus and on farms
Review plans for a large scale composting system and on-campus compost collection system	with UBC Waste Management, its Compost Project Committee, as well as Plant Operations, UBC Farm, and UBC Campus	To establish realistic progressive percentage goals for amount of food wastes that can be composted and diverted from the landfill	Years 1-3 or until large scale composting system implemented	On campus

	Sustainability Office			
Develop a precise method of segregating and measuring the quantity of food wastes	with UBC Waste Management, UBCFS and AMSFB	To implement the indicator of measuring the percentage of food wastes within the UBC waste stream vs. those diverted from the landfill by composting and recycling	Years 1-3	On campus

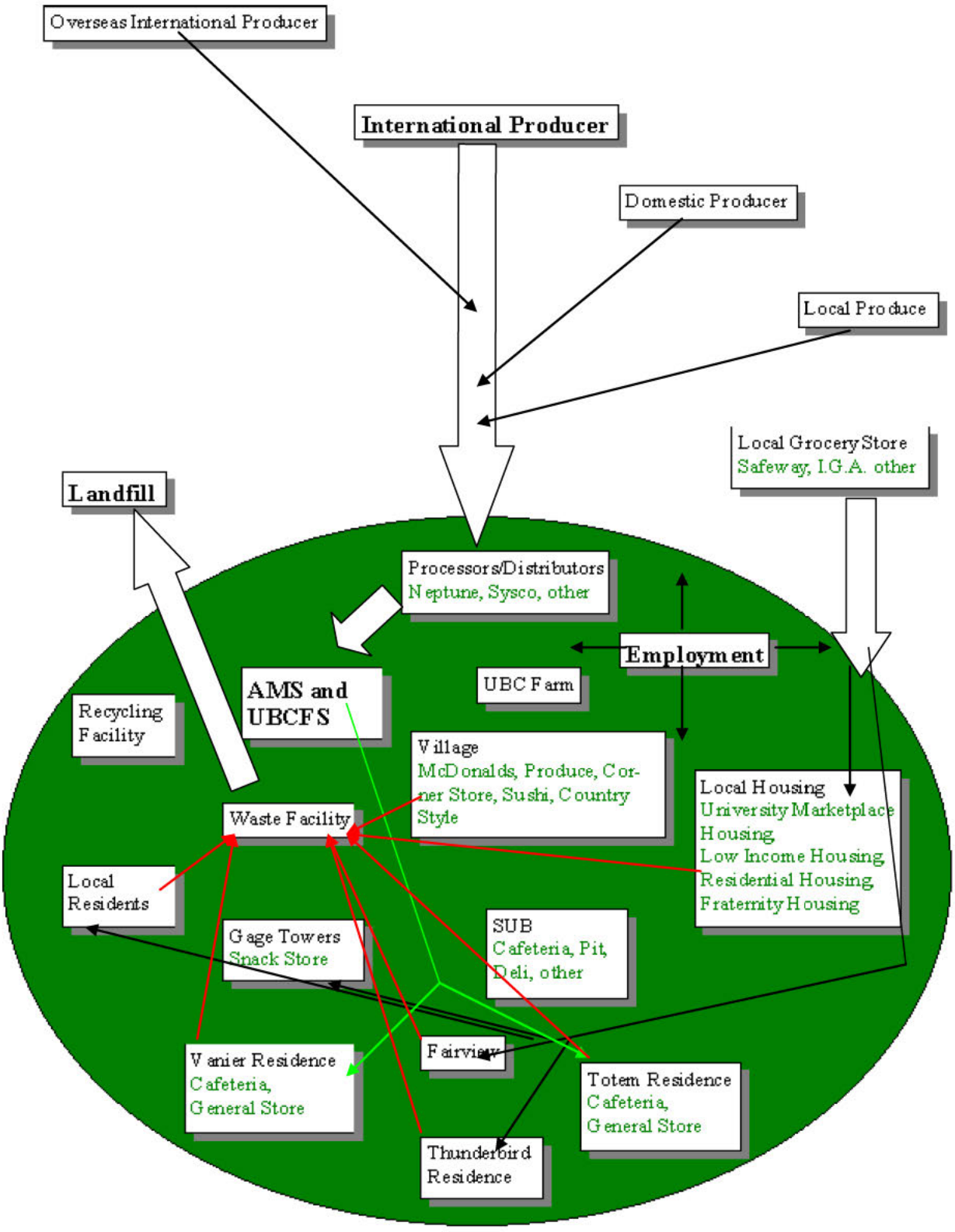
RECOMMENDATIONS AND CONCLUSIONS

In this paper we have presented a continuum model of seven indicators of food system sustainability that we think adequately address the social, environmental and economic issues that arise in the development of a more sustainable food system at UBC. Due to the involved nature of the sustainability assessment, constant communication between all participants within the food system will be vital. We recommend that the UBC Food System be assessed 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. Student participation in this project through undergraduate class work will also be invaluable, but will need to be administered and coordinated, as these projects usually only last for one term, or three months of each year, while the UBC food system operates on a year round basis and requires constant assessment.

This is an ongoing process that must be done from the ground up. For this food system to be sustainable it has to involve the entire food community meaning the people eating, growing, distributing, processing, and of course preparing the food. It is therefore essential to create long-standing channels of communication that allow the voices of all members of the UBC community to be heard, so that together they can create a food

system that measures sustainability through a balance of relevant social, environmental and economic indicators.

APPENDIX A: MAP OF THE UBC FOOD SYSTEM



APPENDIX B: CONCEPTUAL DEFINITION OF UBC FOOD SYSTEM SUSTAINABILITY

	Unsustainable → **Sustainable**		
	1	**2**	**3**
Cost-Benefit Analysis of UBC Food Services and AMS Food and Beverage	Costs > Benefits	Costs = Benefits only with the help of subsidies	Costs = Benefits
Affordability	Food income < food costs	Food income = food costs	Food income > food costs
Consumer Advocacy Group	Absent	Present	Present and effective
Percent Food Waste Diverted from Landfill	0%	35%	75%
Percent Local Food	0%	25%	50%
Consumer Satisfaction	Unsatisfied		Satisfied
Percent student employees in food system	0%	25%	50%

Literature Cited

[1] UBC Campus Sustainability Office. 2002. *Annual Report: Progress Towards a Sustainable Campus.* [Online] http://www.sustain.ubc.ca/pdf%27s/annual2002.PDF

[2] UBC Public Affairs. www.publicaffairs.ubc.ca/ubcfacts/index.html#students. Accessed March 27, 2003.

[3] Dietitians of Canada. 2002. The Cost of Eating in BC.

[4] 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.

[5] Leiblein, G, Francis, CH & Torjusen, H. 2001. *Future interconnections among ecological farmers, processors, marketers, and consumers in Hedmark County, Norway: Creating Shared Vision*. Human Ecology Review. 8(1):60-70.

[6] Kloppenburg, J & Lexberg, S. 1996. *Getting it straight before we eat ourselves to death: from food system to foodshed in the 21st century.* Society & Natural Resources, 9:93-96.

[7] UBC Waste Management. 2002. *UBC Waste Management 2001/2002 Annual Report.* [Online] http://www.recycle.ubc.ca/annualreport2002.pdf.

[8] Kloppenburg, J., Hendrickson, J., and Stevenson, G.W. 1996. *Coming into the Foodshed.* Agriculture and Human Values 13:3 (Summer): 33-42.

[9] Chan, V., Francis, G., Lam, J., Racic, H., Sy, H., Treloar, J., Woolley, S. (2002). *Group 5: AMS Food and Beverage Service.* University of British Columbia [Online] http://www.webct.ubc.ca/SCRIPT/agsc_450/scripts/serve_home

[10] Goyal, S., His, S., Law, K., Lu, W., Mulligan, R., Spencer, N., Weatherhead, S., Yin, C. (2002). *Group 16 – UBC Farm: Contributions to a Sustainable Food System.* University of British Columbia [Online] http://www.webct.ubc.ca/SCRIPT/agsc_450/scripts/serve_home

[11] Johnson, Douglas B. and Stevenson, George W. (1998*). Something to Cheer About: National Trends and Prospects for Sustainable Agriculture Products in Food Services Operations and Universities.* The Centre for Integrated Agricultural Systems at the University of Wisconsin-Madison.

[12] Centre for Integrated Agricultural Systems (CIAS) at the University of Wisconsin-Madison. *College Food Project.* [Online] http://www.wisc.edu/cias/research/colgfood/howwork.html.

[13] Wiseman, Kelleen. 2001. *Business Management Handouts.* University of British Columbia FRE 302.

Therivel, R. (1996). *SEA methodology in practice,* chapter 3 in "The practice of Strategic environmental assessment"; ed. Riki Therivel and Maria Rosario Partario, Earthscan Publications Limited, London, U.K.

Lyle, J.T. (1994). *Sustainability in the Neotechnic era,* chapter 1 in "Regenerative design for sustainable development", John Wiley and Sons, Inc., New York.

Mitin, D & Satterthwaite, D (1996). *Sustainable development and cities*, chapter 1 in "Sustainability, the environment and urbanization", ed. Cedric Pugh, Earthscan Publications Limited, London, U.K.