Food & Water Security

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Dr. Joanne Taylor is an environmental anthropologist and political ecologist and received her PhD from the University of British Columbia Okanagan in the Department of Community, Culture, and Global Studies. Funded by the Social Sciences and Humanities Research Council of Canada (SSHRC), Dr. Taylor's doctoral research investigated food security and food sovereignty in the traditional lands of the Ktunaxa First Nation and the Creston Valley of British Columbia during catastrophic climate change and the renegotiation of the bilateral Columbia River Treaty.

Joanne is currently a SSHRC Post-Doctoral Fellow at the University of British Columbia Okanagan in the Department of Economics, Political Science, and Philosophy. Her research focuses on agricultural adaptation to climate change in the Cariboo and



Figure CS-6. Photo of Joanne Taylor, course author. Source: Joanne Taylor, <u>CC-BY-NC-SA</u>

Okanagan Regions of British Columbia. This research project resides at the intersections of food, climate change, and water in the inter-disciplinary fields of environmental anthropology and food security, with a focus on the complex and myriad ways food security and food sovereignty are defined globally, nationally, regionally, and locally.

Specifically, she has been interested in the historical, material, and discursive realms of food procurement and its relationship to culture. Her more recent research trajectory examines these topics during critical climate change but from the related theoretical framework of political ecology with a particular focus on how irrigation and agriculture interlock. She investigates how irrigation water matters as agriculturalists adapt to climate change-induced drought and flooding in the Okanagan and Cariboo regions of BC. She employs a methodological assemblage of archives, hydrological engineering data, and qualitative research that combines to (re)-imagine a transformation of the regulatory environment in which water is allocated and controlled. This research reflects a more urgent social reality at the nexus of food security climate change, and water systems.

Joanne lives in Kelowna, BC with her family and enjoys skiing, hiking, yoga, gardening, cooking, and traveling within British Columbia.

About Adaptation Learning Network

Welcome to the Adaptation Learning Network (ALN). This course is one of <u>ten courses</u> developed for working professionals. These courses are designed for people who are addressing climate adaptation risks and impacts in their communities and jobs.

WHY DOES THIS MATTER?

Climate change adaptation requires expertise from many perspectives. The ALN is committed to connecting people, professional interests, and regions to advance skills, knowledge and solutions.



JOIN THE NETWORK

To join the network, <u>sign up for our monthly newsletter</u> <u>here</u>, and follow us on social media (<u>Twitter</u>, <u>LinkedIn</u>) to get adaptation news and hear about our latest course offerings and events.

LEARN MORE

To learn more about the Adaptation Learning Network read this 5-minute introduction.

Welcome Message and Course Introduction

Welcome to Food and Water Security Course!

Now that we have the course basics section completed, it's time to really get started in the course! In this video, Dr. Joanne Taylor, the course author and instructor of "Food and Water Security" provides an overview of the course's structure, content, and expectations. Note that this video is typical of the Course Videos. You may turn on close captioning using the CC button in the media player. Additional information, including the transcript and references to any images will be available as applicable below the video.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=33</u>

Video Transcript: <u>FWSMod0-1.1-Course-Introduction_v2</u>

Course Outline

Overview

Food security is one of the most pressing dilemmas of our time. Around the globe, approximately 2 billion people experience some form of food deprivation each day. One in ten people suffer from some form of food insecurity in Canada. This has led scholars to question why food insecurity exists in an ostensibly food secure country. The literature on food security and climate change has also grown exponentially over the past several decades in large part as a response to world events such as the Green Revolution and other forms of industrial agricultural development since the 1970s. Despite the advances in research and technology, we still possess inadequate knowledge of the dynamics causing the onset of food insecurity, and significant disagreement persists among scholars concerning the best way to ameliorate food insecurity.

Drawing upon the food security literature and current events in the media, this survey course will prompt learners to build a new understanding of food security, water shortages in agricultural production, and climate change challenges in agriculture. We will introduce policy tools and case studies illustrating the effects that climate change has on agriculture which will be useful and applicable to individual cross-disciplinary learning.

Who This Course Is For

This course examines the inter-dynamics of food security, water, and climate change through a **social sciences perspective**. It is designed for professionals and specialists from a variety of sectors, along with academics. Individuals seeking to understand the effects of climate change on our food supply and its social ramifications would especially benefit from taking this course, including (but not limited to):

- Agriculturalists: industrial producers' associations, small-scale farmers, market gardeners, fisheries and
 livestock professionals
- Agrologists
- Agricultural economists
- Environmentalists and related environmental fields
- Educators and researchers
- Rural development managers
- Policy makers
- Concerned citizens and community leaders

Course Learning Outcomes

By the end of this survey course, learners will:

- Have a working knowledge of food security and food insecurity related concepts and definitions
- Be able to explain the effects of climate change on the hydrological cycle
- Be able to identify the impacts of climate change on agriculture, food security, and food insecurity
- Have reflected upon, and be able to illustrate practical examples of what we can do as individuals and communities, and communities of nations to adapt to a new food-future

What You Will Learn

In this four-module course, we begin by defining food security, food insecurity, water security, and Indigenous food sovereignty. We examine the various definitions including community food security and ask who is food secure and food insecure, locally and globally. In the second module, we investigate water and its critical contribution to agriculture and food security while examining the importance of precipitation and irrigation locally and globally where global warming is causing growing water scarcities. In the third module, we ask what the local and global impacts of climate change are likely to have on food security and investigate agricultural adaptation to climate change here in the Okanagan. In the fourth and final module, we end the course by critically analyzing what we can do as individuals, communities, individual nations, and as a community of nations during catastrophic climate change.

How You Will Learn (Learning Activities)

Each week participants will be expected to contribute to various classroom activities and discussions on relevant topics. This includes:

- Review assigned content, which may include:
 - course web pages
 - online articles and news stories
 - course-based interactive videos
 - publicly available
- Engage in learning activities
 - complete pre-tests, post-tests and assignments as applicable
 - contribute to class discussions
 - work through interactive videos
 - write weekly reflections on readings, and participate in group discussions in our class room

How you will be assessed

Note: Information about facilitated course offerings can be found at <u>https://catalog.ok.ubc.ca/browse/epp/</u> <u>courses/food-and-water-security</u>

In order to receive a Letter of Completion, learners are expected to:

- complete course surveys/questionnaires
- complete self-checks (questions that check understanding and knowledge, may be in the form of a quiz or "graded" survey) and any assignments associated with modules
- contribute to group discussions as indicated in each module; and
- complete weekly guided reflections as a final assignment at the end of the course online

Course Learning Activities & Weekly Activity Structure

Food and Water Security is an instructor-facilitated course with the following learning activity types:

- 1. Knowledge acquisition by viewing/reading through the following content resources:
 - Mini-lectures delivered by the course creator, who is also the instructor in this course.
 - Curated readings, which include materials developed by the instructor and external articles (e.g., news sources, journal articles, web pages from reliable sources).
 - Curated videos from selected organizations and individuals (publicly available via social media channels or organizational websites).
 - Optional video and reading sources.
- 2. Embedded self-assessments: graded surveys/mini-quizzes woven into the content to check your understanding.
- 3. Substantive Question/Answer Discussion: A weekly discussion topic that engages you in a dialogue with your colleagues. Typically, the discussion will require you to have read/viewed particular content, undertake a small activity and contribute a short discussion post. You will be asked to discuss module topics further with your colleagues, incorporating additional ideas from the readings.
- 4. Module reflection: a weekly assignment that prompts you to reflect back upon each module content and then, and summarize your key understandings in a final submitted reflection.

We've designed this course with a particular activity pattern in mind as illustrated in Figure GS-8 below:



Figure GS-8. Idealised weekly activity structure. Source: UBC Okanagan CPE, <u>CC-BY-4.0</u>

Each module launches with a brief overview, followed by the first content block. It is important to complete this first content block prior to Thursday as this content will serve as the background for the weekly discussion. We recommend you focus on the second content block in the latter half of the week for deeper understandings of key theories and activities.

Weekly Discussions - Substantive Question & Answer

Overview:

The discussions are in many ways the heart of this course – they are your opportunity to engage with and learn from your colleagues. To facilitate this process, we are using a "Substantive Question & Answer" approach. The word **Substantive** comes from the root word **Substance** – getting to the core or important aspect of the subject being discussed. Substantive questions relate to the content, and help others achieve the learning outcomes of the module. Substantive answers/responses to your colleagues' contributions help others learn, build upon what others have said and may challenge others to think about a subject more deeply or in a different way.

Please note that text communications are quite delicate at times – we do not have the normal facial and body expression and cues that demonstrate our mood or tone. In addition, the learners in this course come from diverse backgrounds and contexts. Please remember this and be respectful of your fellow classmates in all your communications.

The informal, but well-accepted set of guidelines for communications online are called "Netiquette" – Network Etiquette. Please take a few moments to review <u>Communicating Online: Netiquette (Links to an external site)</u>.

The logistics:

To prepare for a discussion you are expected to have reviewed the "Content 1" component of the module by the time the you post your original contribution. The structure of the discussion is as follows:

- The discussion will open for your contribution on Thursday morning, 9 AM (Pacific).
- · The instructor will add an introductory message, and outline expectations.
- You are expected to add an original post of approximately 150 words by Thursday, 11:59 PM. Typically you are asked to comment on a specific aspect of the module and to develop a question related to the module content that your colleagues will answer.
- At a minimum, you will be expected to reply substantively to at least on other class member's original posts, and respond to any questions asked of you.
- The Discussion will close on the Saturday evening, 11:59 PM.Pacific.

MODULE 1: FOOD SECURITY AND

Module Description

In the first module, we define the concept of food and what it means to individuals. We then explore food security and food insecurity meanings and definitions and the ramifications of living with food deprivation not only for western populations but also Indigenous communities. We also investigate the concept of food sovereignty as well as Indigenous food sovereignty.

Learning Outcomes

By the end of this module, you will:

- 1. Develop your own working definition of food and connect it to the concepts in this course.
- 2. Become familiar with food security definitions and concepts and how they are expressed in various Community Food Security policies.
- 3. Understand Indigenous Food Sovereignty frameworks.
- 4. Identify the factors leading to food insecurity and deprivation globally and locally.
- 5. Connect your own personal experiences of food security and food insecurity.

How to proceed with Module 1

Content Section 1

- Read: Module One Overview (this page)
- Watch Mini Lecture: Instructor Overview of Module One.
- Complete Grocery List Activity
- Read page and watch video: What is Food?
- Watch Mini Lecture: Food Security and Food Sovereignty Concepts
- Read Food Security: A Quebec Case Study
- Watch Mini Lecture: What is Food Insecurity
- Watch YouTube video: Food Insecurity What is Community Food Security/Insecurity?
- Read: Community Food Security Deep Dive
- Discussion

Content Section 2

• Read and Watch: What is Indigenous Food Sovereignty? plus, Interview with Dawn Morrison

- Watch Mini Lecture: What is Indigenous Food Insecurity?
- \circ $\,$ Watch Video: What is Food Insecurity in Canada with Dr. Valerie Tarasuk
- Complete Discussion
- Write: Guided Reflection

Instructor Overview of Module 1 (Mini-Lecture)

This video provides an overview of the topic and approach we will use in Module 1, Food Security and Insecurity.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=45</u>

Video Transcript: <u>FWSMod1-1.2-Module1Overview_transcript_Taylor_v2</u>

Food Concepts - Your Grocery List Activity

Exercises

Module 1 provides a foundational understanding of the definitions and concepts associated with food security and food insecurity that will help us better connect the influences that climate change can have on our food supply. Before we delve into those concepts, we need to all understand the most basic concept:

What is FOOD?

To begin, please grab a receipt from a recent grocery shopping trip and select five to seven items that you consider food, and answer, to the best of your ability the following questions:

- 1. Is the item imported, or local?
- 2. Where is the item from (as close as you can determine)?
- 3. How do you think the item was produced?
- 4. Do you believe it is nutritious, safe, healthy?
- 5. Do you believe it is affordable?
- 6. Was it grown in a way that was considerate of the environment?

Food Concepts - What is Food (Video)

The video embedded below is part of the "Food for Thought" video series, hosted by "It's Good, Canada (Links to an external site)", an initiative of the Canadian Centre for Food Integrity (Links to an external site). This video will guide you in understanding the most foundational aspect of food security – what is food? Throughout this course, we will be thinking about some of the things the speaker discusses in the video: climate change, chemical agriculture, cultural preferences, food insecurity, and whether Indigenous food security is considered in industrial food production.

Note that in the video, the speakers discuss "safe food". Do not confuse this with "Food Security"

Following this video, I provide a number of extra videos and readings for your own interest. These are not required readings for the course however, they do provide more knowledge in this area.

As you watch the video, keep in mind your grocery list and some of the questions I ask you to answer for each item you choose in your list. We'll pick up on the concepts in the Discussion portion of this Module – your Substantive Questions and Answers of which you will be required to submit one of each.

Enjoy!



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=50</u>

For more information on this topic (optional resources)

Reading resources:

Food and the Anthropocene
 https://www.thelancet.com/commissions/EAT

Note the Commission Report:
 "Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems."
 (Free registration required to view)

Video Resources:

If you have time, please watch the following documentary. This is not required but provides a lot of food for thought.

- <u>Wasted: The Story of Food Waste</u> 1:07:43 Anthony Bourdain, and other celebrity chefs, help solve the problem of food waste as one-third of all food grown for human consumption ends up in the garbage.
- Just Eat It! (Knowledge Network)

Food Security - Food Security & Food Sovereignty Concepts (Mini-lecture)

Please view the following mini-lecture, "Food Security", paying special attention to the latter half which discusses the genesis of the Food Sovereignty movement. This mini lecture will provide a foundation for the food sovereignty concepts discussed in the next activity – a Quebec case study. These food sovereignty concepts lay the foundation for further exploration in the later learning block of this module.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=53</u>

Video Transcript: <u>FWSMod1-1.3-Foodsecurity_transcript_Taylor_v2</u>

Food Security - A Quebec Case Study (Reading)

The expected time commitment for this activity: 20 minutes

Reading: <u>Working Together to Build Sustainable Food Systems: A View from Quebec (Links to an external site)</u> (April 30, 2020).

Source Organization: Food Secure Canada (Links to an external site)

This article gives a food sovereignty perspective that I believe could help achieve food security. I have based my doctoral research on this theoretical framework and although we do not have time to delve into the many concepts of Food Sovereignty in this course, it is a concept that I believe is important for achieving food security since it addresses social justice issues such as equality for small scale food producers, community resiliency, gender equality, climate change and ecosystem resiliency, and Indigenous Peoples' for food sovereignty.

There are many other links to articles and if you wish to read them, please do so but the above article is required reading and a guided question in your Reflections activity will be posted that is based on this article.

Food Insecurity - What is Food Insecurity (Mini-lecture)

Food security is one of the most pressing challenges of our time with over one in ten people in Canada suffering from some form of food insecurity. My research findings suggest that a significant number of Canadian households are food insecure, and given the current configuration of farming practices, contradictory federal policies, climate change impacts, unresolved Indigenous issues, and water management challenges, Canada is at significant risk of higher rates of food insecurity in the future in light of climate change. My research findings suggest that the current renaissance in agricultural adaptation practices provides a viable solution to food insecurity and I hope, to eradicating food insecurity in the future. Please listen to this mini-lecture which provides a brief summary of the meaning of food insecurity.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=60</u>

Video Transcript: <u>FWSMod1-1.4- Food-Insecurity_transcript_v2</u>

Food Insecurity - What is Community Food Security/Insecurity? (YouTube)

YouTube video: "What is Community Food Security?"

total time: 4 minutes

This video offers a description of what Community Food Security is and a short description of Food Insecurity.



A YouTube element has been excluded from this version of the text. You can view it online h <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=63</u>

Food Insecurity - Community Security Deep Dive (Reading)

Required Reading: Community Food Security.

Anticipated Time Commitment: 10 Minutes

Source: Taylor Dissertation (2019). This excerpt is from page 98 to 107.

Taylor, Joanne. 2020. "Food Security and Food Sovereignty in the Creston Valley of British Columbia." Electronic Theses and Dissertations (ETDs) 2008+. T, University of British Columbia. doi:http://dx.doi.org/10.14288/ 1.0390002.



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Community food security is another important concept that is even more applicable to Canadians and those of us who live in agricultural and horticultural regions like the Okanagan. The preceding 4" video on Community Food Security articulates the key points of what a person describes as food security. Presented in the following text are the tenets of community food security extracted from my doctoral research which takes into consideration much more than simply what is included in the United Nations Declaration on Food Security. Please pay attention to what some of these additional considerations are, compared to the simple definition of food security the UNFAO provides.

Although the B.C. government temporarily opted out of measuring food insecurity in 2013 and 2014 (Tarasuk et al. 2015:8), statistics from other participating provinces indicate high rates of persistent food insecurity (Tarasuk et al. 2015, 2016). What is clear is that up-to-date, evidence-based statistics are imperative if efforts to mitigate food insecurity are to be taken seriously by the provincial governments. At the community level, Wakefield et al. (2012:1411) conducted a full examination of community food assistance in the Toronto and Hamilton areas and found 31 community agencies that address community food security indicating the inadequate mandates or declarations at the federal level that addresses food security.

Agencies at regional and municipal levels have stepped forward to fill the policy vacuum, due to the lack of a single federal ministry's comprehensive food security policy, such as Toronto Public Health (TPH). TPH states that food security is still the most common term used among those who work to meet the needs of individuals, households, and communities. However, they also insist that the definition should go beyond food quantity and quality to include the four "A's" as proposed by Mustafa Koc (2013). These "A's" are: availability, which emphasizes having sufficient food for all people at all times; accessibility, which means having physical and economic access to food at all times; acceptability, which stresses access to culturally and symbolically acceptable foods, produced in ways that do not compromise dignity, cultural traditions, or self-respect of human rights; and adequacy, which is defined by having access to food that is nutritious and safe, including being produced in environmentally sustainable ways. A sustainable food system is defined as one that meets basic human needs, without compromising future generations' ability to meet those needs (Toronto Public Health 2006). Another way to frame these four concepts, – plus universality – is looking at the five basic and essential questions provided by Toronto Public Health (2006) in Table 4.2.

Table 4.3 – Definitions of Food Security (Toronto Public Health, 2006) Joanne Taylor

QUESTION:	ANSWER:			
Who should get the food?	Everyone/all people	(UNIVERSALITY)		
When?	At all times/sustained access (Availability)	(STABILITY)		
How?	Through normal food channels/not from emergency food assistance programs (Accessibility)			
How much food?	Enough for a healthy active life (Adequacy)	(QUANTITY)		
What kind of food? Safe and nutritious Culturally appropriate What kind of food? Produced in environmentally sustainable ways that promote strong communities (Acceptability)		(QUALITY)		

By addressing the above questions in Table 4.3 (Taylor 2016), food security acts as a canopy term that advocates for equity in all aspects of food security. As the table indicates, all people should be able to access food in a dignified manner at all times for a healthy, active life. It also stresses that food should be safe and nutritious and produced in an environmentally sustainable way that promotes healthy communities.

Of course, the context in which these questions are answered can be quite complex and inextricably intertwined and may rely upon specific geographic factors and conceptual starting points. For example, a global food security framework would analyze the ability of national and international global food producers and systems to meet the Earth's seven billion inhabitants' dietary needs. This analysis needs to also take into consideration threats to the sustainability of food provisionings such as genetic modification, corporate dominance, and threats to bio-diversity, topics addressed in the next section (Toronto Public Health 2006).

	Quantity How much food		Quality What kind of food	
Universality All people, and equal access for	Enough For an active healthy life to meet dietary	Safe Nutritious: nutritionally adequate	Produced in an environmentally sustainable way: In a sustainable food	
Stability Available <u>at all</u> <u>times</u> , secure Dignity	needs	Appropriate: culturally appropriate and	production system	
Produced in a manner that promotes human dignity, in socially acceptable ways without the need to resort to emergency food providers		meeting food preferences	Promoting strong communities: produced in ways that promote community economic and social development	

Household and Individual Food Security

Community Food Security

Figure 4.3 – Common Components of Food Security Definitions (Toronto Public Health, 2006).

Figure 4.3 shows how the concept of food security evolved to answer five specific questions. The above table explains that if all people have equal access at all times, through a dignified manner, in socially acceptable ways, and without the need to resort to emergency food provisioning centers, then the quantity and quality of nutritious food based on nutritionally adequate food – reached in a safe, nutritious, and culturally appropriate way – food security can be achieved for an active and healthy lifestyle. In this way, food security can contribute to economically secure and socially well-developed communities.

In the 1980s, analyses of food security began to include the concept of stability of "assured food" access as an essential component. Essentially, this concept mirrored the idea of food security as a fundamental 'right' stemming from the 1974 Rome FAO World Food Conference's Declaration on the Eradication of Hunger and Malnutrition (Koc 2013). As a consequence, for the last two decades households and individuals were analyzed primarily within the context of experiences of hunger, and to a lesser degree, how experiences of the quantity and quality of diets were perceived to be compromised. This analysis has ultimately led to the identification of the numbers of food insecure individuals or vulnerability to food insecurity (Toronto Public Health 2006).

In the early 1990s, much research was conducted with low-income women in upstate New York by Radimer et al. (1992), who stated that experiences of household food insecurity might have four aspects:

- Quantitative (not enough food).
- Qualitative (reliance on inexpensive non-nutritious food).
- Psychological (anxiety about food supply or stress associated with trying to meet daily food needs).
- Social (having to acquire food through socially unacceptable means such as charitable assistance, buying food on credit, and in some cases, stealing).

These four dimensions of household food insecurity and the five conceptual components of food security are interconnected. However, the authors of the Toronto Public Health report have identified gaps in these definitions. First, the existence of food-insecure households shows that universal food access is absent. Second, psychological aspects of food insecurity stem from unstable access and the inability of households to have sustained (stable) access to food due to resource (money) constraints, which means adults may experience anxiety. Third, accessing food in ways that respect human dignity is sometimes impossible for food-insecure households who must depend on socially unacceptable ways to meet their dietary needs. Figure 4.2 (Taylor 2016) indicates the flow of experiences and decisions that may take place as resources decrease. Anxiety typically occurs first, which is then followed by compromises in the quality and quantity of food intakes, where quality typically comes at the expense of quantity.



Figure 4.4 - Intrahousehold Food Dynamics Amidst Diminished Resources. Adapted from Hamelin et al. (1999).

It is noted in reports from Hamelin et al. (1999), Kendall et al. (1996), and Radimer et al. (1990) that not all households experience food insecurity in this manner. Instead, perception and response to food insecurity experiences are highly characteristic of experiencing food insecurity (Toronto Public Health 2006).

Although household and community food security remain intricately linked, most recently, there has been a shift in focus towards community-level food security concepts (Toronto Public Health 2006). While the emphasis on household food security primarily focuses on the physical and economic access to food, community food security also concentrates on the importance of the environmental and social aspects of the food provisioning system (Power 2008; Toronto Public Health 2006). This concentration on environmental and social aspects

not only addresses sustainability but can also include social justice, self-reliance, and community economic developmental issues, among all stakeholders in local or regional food systems (Toronto Public Health 2006).

In Canada, the Ontario Public Health Association (2002) has taken a keen interest in community food security. In its 2002 paper, "A Systemic Approach to Community Food Security: A Role for Public Health," a broad definition of terms is based on the Ottawa Charter for Health Promotion which says that the importance and definition of 'social determinants of health" is:

Community food security is a strategy for ensuring secure access to adequate amounts of safe, nutritious, culturally appropriate food for everyone, produced in an environmentally sustainable way, and provided in a manner that promotes human dignity (2).

This last definition combines all aspects of Food Security in Table 4.3 which is expressed in the overlapping of the five Conceptual Components of Food Security proposed by Toronto Public Health (2006:20), four Dimensions of Household Food Insecurity proposed by Radimer et al. (1992), together with the original four A's proposed by Mustafa Koc in Toronto Public Health (2006:25).

Table 4.3 – Historical Definitions of Food Security C	Combined (Taylor 2016).
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Various Food Security Definitions Combined					
Toronto Public Health (2006)	Universality	Quantity	Quality (Nutrition)	Stability	Dignity
Mustafa Koc (2013)	Availability	Adequacy	Acceptability	Accessibility	
Radimer et al. (1992)		Quantitative	Qualitative		Social and Psychological

Table 4.3 intends to indicate the synchronicity of the various theories that are included in the Ottawa Charter for Health Promotion's definition of food security.

In 2013, the UNFAO Committee on World Food Security proposed the most current definition of food security to include the importance of nutrition. Food and nutrition security exists:

when all people at all times have physical, social, and economic access to food, which is safe and consumed in sufficient quantity and quality to meet their dietary needs and food preferences and is supported by an environment of adequate sanitation, health services, and care, allowing for a healthy and active life (UNFAO 2013:50).

In this case, the notion of health is included by the UNFAO in 2013 and resonates with the Ottawa Charter for Health at a time when the state of the western world's health is in sharp decline. This topic echoes with Khoury et al. (2014) and the WHO report (2014). These definitions combined create what I believe to be a concise definition for creating Canadian food security.

Although the concept of Community Food Security is included in the Toronto Public Health Report (2006), the concept interestingly shares more aspects with Food Sovereignty. It indicates a shift in focus by public health authorities to a community level. Within the community-level focus, the goals of physical and economic access to food remain but also includes and acknowledges the importance of economic, environmental, and social aspects of the system (Toronto Public Health 2006). These goals have partly arisen because a focus on food insecurity can no longer solely focus on the individual and household level. It must also include a more socioholistic approach if food security goals are to be realized. Food system sustainability, issues of social justice, self-reliance, community economic development, and an inclusionary, collaborative, and cooperative model between all players in regional and local food systems are some of these social aspects (Toronto Public Health 2006). Based on the Ottawa Charter for Public Health principles, Toronto Public Health (2006) provides the most comprehensive definition of Community Food Security. This definition has identified the critical importance of the "social determinants" of health.

Ontario Public Health Association's (2002) definition also includes and addresses several other points such as issues of adequate income for consumers and growers, local food production, environmental sustainability, fish

and wildlife habitat protection, and access to nutritional, food-based community economic development, and social cohesion. Many health authorities nation-wide have adopted community food security as a response to the rise in food banks and obesity along with the increase in diabetes rates while environmental concerns were also being tabled for discussion; bio-diversity preservation, the health ramifications of chemical pollutants, and the impact of genetically modified foods on the environment (Toronto Public Health 2006).

This section has outlined the myriad of food security policies at various levels of government, including community initiatives. Even though, as McIntyre et al. (2016) have pointed out in their literature review, the B.C. government has recently shown a concerted effort to implement agricultural programs that are more aligned with food sovereignty principles, it still lacks a comprehensive national food security policy. Moreover, a national food security policy must align with all levels of government, and until the governments expressly declare food security to be a priority in its mandates across all sectors of government, the abysmal conditions of poverty that contribute to food insecurity will unfortunately persist.

What passes as food security policy in Canada is a collection of many disjointed pieces of policy, regulations, programs at various levels of government. Even a cursory review of policy literature reveals that the technocratic, mechanistic, fragmentary, and contradictory view of food substantiates this hypothesis. Furthermore, Martin and Clapp (2015) explain that the financialization of the agricultural regime is firmly placed within the paradigm of neo-liberal and capitalist relations, which support industrialized agriculture. A food policy that prioritizes agriculture production systems that ensures and delivers the highest quality of nutritious food, in the most efficient and environmentally sustainable way and that addresses governance and reconciliation is yet to be developed. If the Canadian government legislated a food security policy according to the definitions of La Vía Campesina (1996b) and the IAAKSTD (2009) then indeed, the definitions of community food security would exist as precursors to attaining food security in Canada.

Module 1 Discussion: Introductions, Grocery List and Substantive Question and Answer

My sincere hope is that we can create a supportive learning environment together in this course by sharing our knowledge and experiences through our planned discussion opportunities. This first discussion will serve a dual purpose – it will enable you to get to know your classmates a little better, while beginning to engage with the course content. Subsequent discussions will focus more tightly on content.

Module 1 Discussion

- 1. For your 150 word post, please include the following:
 - In 2 or 3 sentences, please let us know who you are by sharing your name and, if you are comfortable doing so, your current residence area (city or province is sufficient), your current occupation, and your reasons for taking this course.
 - Select one of the items on your grocery list and comment on what surprised you the most about the item. Did you decide it was food? Why or why not?
 - Post a substantive question that you have about the content of module 1 that your colleagues will be asked to answer.
- 2. Respond to at least two of your colleague's posts in a substantive way.

Indigenous Food Security - Indigenous Food Sovereignty (Reading + Optional Resource)

Reading: "We desperately need to be talking about food sovereignty" (National Observer)

Anticipated time commitment: 5 minutes

We desperately need to be talking about food sovereignty discusses Indigenous food sovereignty and concepts related to colonization, poverty, and food insecurity and the many ways in which Indigenous Peoples are recovering food systems such as regenerative food systems, and dismantling structural racism, in spite of the challenges they face. These concepts have been offered as plausible alternatives to food production and food security which addresses conciliatory Indigenous human rights issues while taking the environment into consideration. Reading this article will provide an understanding of food security and food sovereignty concepts as you consider food security in Canada.

Dawn Morrison is an Indigenous leader in Indigenous Food Security and Indigenous Food Sovereignty and Founder/Curator of the Working Group on Indigenous Food Sovereignty. Dawn is of Secwepemc ancestry and is the Founder/Curator of the Working Group on Indigenous Food Sovereignty. Since 1983 Dawn has worked and studied horticulture, ethnobotany, adult education, and restoration of natural systems in formal institutions, as well as through her own personal and community healing and learning journey. Dawn has consistently organized and held the space over the last 15 years for mobilizing knowledge and networks towards a just transition from the basis of decolonizing food systems in the community, regional and international networks where she has become internationally recognized as a published author. Dawn's work on the Decolonizing Research and Relationships is focused on creating a critical pathway of consciousness, that shines a light on the cross-cultural interface where Indigenous Food Sovereignty meets, social justice, climate change, and regenerative food systems research, action, and policy, planning, and governance. Some of the projects Dawn is leading include Wild Salmon Caravan, Indigenous Food, and Freedom School and, Dismantling Structural Racism in the Food System, and Tsilhqot'in National Government Food Security/Sovereignty Project. Dawn is one of my Indigenous mentors and food sovereignty mentors. She lives in the traditional territory of the Secwepemc Peoples near Kamloops, BC.

https://www.nationalobserver.com/2020/06/09/features/we-desperately-need-be-talking-about-food-sovereignty_

Digging Deeper Optional Resource: An Interview with Dawn Morrison

If you want to learn more about this important topic, I recommend that you watch this <u>Facebook Live</u> interview with Dawn Morrison, Founder/Curator of the Working Group on Indigenous Food Sovereignty. The interview sheds light on some of the current sociopolitical challenges Indigenous Peoples are facing with food *in*security in the Province of BC.

Dawn Morrison states: "

 A just transition must be a transition out of a mechanistic production paradigm that has mechanized the spirit, morals, and reverence out of our relationship to the land and food. Food sovereignty is the most intimate way in which we interact with the land, Indigenous peoples still observe the cultural and spiritual protocols that connect us to the innate capacity of nature that enables our bodies and nature to heal and regenerate. As LeRoy LittleBear states "we live within very narrow gaps of conditions that make it possible for us to exist in a regenerative life-giving whole. Western science and its linear productionist mathematical models will not save humanity, it will only be the morals and reverence for life that will save us and move us to make a deep and lasting change".

Indigenous Food Security - What is Indigenous Food Insecurity? (Mini-lecture)

Throughout its history, Canada has implemented policies that limited Indigenous People's ability to engage in hunting, fishing, and gathering activities, thereby eroding the food security, food sovereignty, independence, and cultures of many communities. Indeed, food has often been used as a tool of oppression and marginalization: Bison were hunted to near-extinction to force First Nations onto reservations while starvation, poor diets, and malnutrition were common in residential schools. While food has been used as an instrument of colonization, it also has the potential to be a tool for healing and for asserting Indigenous sovereignty.

- concepts like right relations, reciprocity with nature, and fostering a holistic connection with the land as a living community,
- ways to increase community participation in land care and management and how this work strengthens regional food systems and food sovereignty,
- strengthening and recovering traditional food systems, localizing food production, restoring local control, and challenging corporation dominance, and
- treating food as a sacred gift of life to be shared fairly,
- ways that Indigenous food systems and sovereignty can contribute to transforming food systems, both in Canada and globally.

Please keep the above preamble in mind while I discuss some of the alarming statistics that apply to Indigenous food insecurity.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=76</u>

Video Transcript: <u>FWSMod1-1.5 – What is Indigenous Food Insecurity_transcript_v2</u>

Food Security and Insecurity in Canada -Interview with Valerie Tarasuk (YouTube)

The webinar link below, Food insecurity in Canada Latest data from PROOF is a required activity for this course. To engage more deeply with food insecurity in the Canadian context, and to provide a clear and concise summary of all concepts we have discussed in this Module, I ask that you watch the first 25 minutes of the "Who is Food Secure" webinar linked below (but, as always, you may listen to the entire video). We can turn to one of the leading research teams in Canada on this topic, PROOF, an interdisciplinary research team investigating household food insecurity in Canada (I apologize for the quality of this YouTube video but if you can turn up the volume, and bear with the static that is present at times you will gain much insight into food insecurity in Canada).

I ask you to think about how this interview with Dr. Tarasuk links back to the definitions of food, food security, and finally food insecurity, especially listening for any data for Indigenous Food Insecurity. Are statistics provided for Indigenous Food insecurity? How can we glean from this interview, statistics, and assumptions on Indigenous Food Security?

The first 25 " of this video is required viewing. However, I suggest that if you have time to complete the entire video, please do. It is extremely informative. The Guided Reflections questions will also be based on the first part of this YouTube Video.

" Who is Food secure and food insecure, in Canada " YouTube Videos Required for course completion This video is 56 minutes long, and the first 25" is required viewing



A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=79</u>

Module 1 Guided Reflection - What does Food Security mean to you?

Module 1 Guided Reflection

Traditionally, reflections were recorded in a journal and submitted to the instructor on paper at the end of the course. However, since this is an online course, your reflections can be embedded within Canvas for me to read as we progress through this course. You may want to compose this offline and then cut and paste it in.

The questions below are only intended to guide you through your reflections, so you do not necessarily need to address these topics. These are suggestions but I ask that you do stay on the course topics for your reflections. You may pick one of the topics below and discuss it thoroughly or you may come up with your own questions pertaining to what we have learned in this module.

Challenge yourself to think critically about the above theories and concepts. You may do your own research following the introduction to these (new?) concepts also. These reflections are private and only to be read between you and me and will remain as such throughout the course.

I do not require a minimum or maximum word count as that is usually not required when sharing your inner-most thoughts about the various topics you will reflect upon. I will leave that up to you.

Guided Reflection Theme Suggestions:

- What does food security mean to you?
- What does food sovereignty mean to you and how are the two concepts different and or related?
- How have your understandings about food, food security, food sovereignty, and food insecurity changed and or challenged your assumptions?
- How has your understanding of Indigenous Food Sovereignty affected your understanding of Food Security and Food Insecurity?
- Do you believe that Indigenous Food Sovereignty can have a positive and sustainable effect on the environment and the way we procure food?
- What are the moral implications for considering Indigenous food systems in Canada? What does community food security mean for you?
- In Dr. Valerie Tarasuk's interview, how have the statistics she shares on food insecurity serve to confirm or challenge your previous notions of food security and food insecurity, and especially Indigenous food insecurity? How do these lived realities for others who live with constant food deprivation affect you as you supply your own food and food security?
MODULE 2: WATER SECURITY

Module Description

In the second module, we examine the hydrological cycle and water security as defined by the United Nations. We also analyze various aspects of the importance of water to food production and climate change. We specifically look at programs in the Okanagan which address drought and flooding while reading about examples of successful management of water systems for food and agriculture and for improving agricultural adaptation and building resilience to climate change.

Learning Outcomes

- 1. Explain the hydrological cycle and its principal functions.
- 2. Describe the importance of precipitation globally and locally as it relates to food production.
- 3. Explain how water management is inextricably tied to our food supply and thus the level of food security.
- 4. Understand how food production in the Okanagan is affected by climate change.
- 5. Identify a successful adaptation strategy for the revitalization of Indigenous First Foods

How to proceed with Module 2

Content Section 1

- Read: Module 2 Overview (this page)
- Watch Mini Lecture: Instructor Overview of Module 2
- Read: The Hydrological Cycle: Overview of Water Cycle.
- Watch YouTube video: The Hydrological Cycle and the Influence of Climate Change on the Water Supply
- (Optional) Read: Supplemental Climate Resources.
- Quiz: The Water Cycle [not available in Pressbooks version]
- Watch Mini Lecture: What is Water Security?
- Watch Mini Lecture: Local Water Security in the Okanagan, Agriculture in the Okanagan.
- Read: CAI Programs in the Okanagan addressing drought and flooding.
- Discussion

Content Section 2

- Case Study: Management Strategies that consider climate change.
- Write: Guided Reflection

Instructor Overview of Module 2 (Mini-lecture)



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=86</u>

Video Transcript: FWSMod2-2.1-Overview-of-Module-2-Video-Transcript

What is Water - The Hydrological Cycle: Overview of Water Cycle (Reading)

Required Reading: "The Water Cycle"

Estimated time: 15 Minutes

A unique aspect of life on Earth is that water exists in all three states – as a gas, as liquid and as a solid. Water in its liquid state is capable of absorbing massive amounts of energy. When light from the sun hits the Earth, the atmosphere (including atmospheric water) and oceans absorb this energy. Daily and annual energy fluctuations and exchanges between water reservoirs drive weather and climate.

I believe it is important to have a foundational understanding of how our water system works, how we depend upon it, and the anthropological effects that society has upon this resource. We can look at water on multiple levels – from global changes in the what is known as the water cycle to our local communities and our homes. They are all connected.

For this reading, I've chosen section 13.1 (The Hydrological Cycle) of the open textbook <u>Physical Geology</u>; written by Steven Earle, this book and the excerpted section below, is licensed under a <u>Creative Commons</u> <u>Attribution 4.0 International License</u> (except where otherwise noted).

This text has two full chapters on water related matters (Surface and Ground Water), as well as excellent background material for the geological context of climate change if you choose to look deeper into components of the water cycle.

As you review the materials, ask yourself similar questions to that you were asked to consider with respect to food in module 1:

- How do you define water?
- What does water mean to you?
- How does is relate to your everyday life.

I'd also like you to consider these two additional questions:

- What do we mean by a **cycle?**
- Why is the concept of a cycle important in our considerations of climate change and adaptation?

Chapter 13.1, The Hydrological Cycle

- Excerpted and modified to ensure images are consistently displayed from https://opentextbc.ca/geology/chapter/13-1-the-hydrological-cycle/
- Earle, S. (2015). Physical Geology. Victoria, B.C.: BCcampus. Retrieved from https://opentextbc.ca/geology/
- Download for free from the <u>B.C. Open Textbook Collection</u>

Water is constantly on the move. It is evaporated from the oceans, lakes, streams, the surface of the land, and plants (transpiration) by solar energy (Figure 13.2). It is moved through the atmosphere by winds and condenses to form clouds of water droplets or ice crystals. It comes back down as rain or snow and then flows through streams, into lakes, and eventually back to the oceans. Water on the surface and in streams and lakes infiltrates the ground to become groundwater. Groundwater slowly moves through the rock and surficial materials. Some groundwater returns to other streams and lakes, and some goes directly back to the oceans.



Figure 13.2 The various components of the water cycle. Black or white text indicates the movement or transfer of water from one reservoir to another. Yellow text indicates the storage of water. [SE after Wikipedia: http://upload.wikimedia.org/wikipedia/commons/5/54/ Water_cycle_blank.svg] Even while it's moving around, water is stored in various reservoirs. The largest, by far, is the oceans, accounting for 97% of the volume (Figure 13.3). Of course, that water is salty. The remaining 3% is fresh water. Two-thirds of our fresh water is stored in ice and one-third is stored in the ground. The remaining fresh water — about 0.03% of the total — is stored in lakes, streams, vegetation, and the atmosphere.



To put that in perspective, let's think about putting all of Earth's water into a 1 L jug (Figure 13.3b). We start by almost filling the jug with 970 ml of water and 34 g of salt. Then we add one regular-sized (~20 mL) ice cube (representing glacial ice) and two teaspoons (~10 mL) of groundwater. All of the water that we see around us in lakes and streams and up in the sky can be represented by adding three more drops from an eyedropper.



Figure 13.3b Representation of the Earth's water as a 1 L jug. The three drops represent all of the fresh water in lakes, streams, and wetlands, plus all of the water in the atmosphere. [SE]

Although the proportion of Earth's water that is in the atmosphere is tiny, the actual volume is huge. At any given time, there is the equivalent of approximately 13,000 km³ of water in the air in the form of water vapour and water droplets in clouds. Water is evaporated from the oceans, vegetation, and lakes at a rate of 1,580 km³ per day, and just about exactly the same volume falls as rain and snow every day — over both the oceans and land. The precipitation that falls on land goes back to the ocean in the form of stream flow (117 km³/day) and groundwater flow (6 km³/day). Most of the rest of this chapter is about that 117 km³/day of streamflow. The average discharge of the Fraser River into the ocean is approximately 0.31 km³/day, or 0.26% of the world's total.

The content on this page is adapted from <u>Physical Geology</u> written by Steven Earle, and is is licensed under a <u>Creative Commons Attribution 4.0</u> <u>International License</u> (except where otherwise noted).

What is Water - The Hydrological Cycle: Climate Change's influence on Water Cycle (Videos)

The concept of the hydrological (water) cycle is core to understanding how water as a whole behaves. The videos below demonstrate aspects of the water cycle as well as how climate change influences its behavior. One thing I am hoping that you take away from this section is that the water cycle may on the surface seem like a perfectly balanced system – which is how it is portrayed in a static diagram – but it is anything but static Think of the image on the previous page as a "time slice" – or a single frame in a movie. A change in one part of the system causes the other parts of the system to react to keep everything in balance. Heating up the atmosphere drives certain behaviors, as would cooling. It's complex and messy, which provides some context for the final video in the list. Understanding this simple cycle takes a lot of research and partnerships. Taking it a step further and learning how to adapt to changes takes a lot of research and partnerships.

The next page has a short quiz – created in the form of a "graded survey" (meaning that you can see the answers once you have submitted your quiz). Feel free to open the quiz in a separate window, pause the video, and answer questions while the videos are playing if you find that helpful. You are not being "graded" for getting correct answers. As you will see once you submit the quiz the answers are all provided, along with additional context as applicable. The quiz is meant to help reinforce important components of the videos that relate to how the water cycle provides a framework for understanding climate change's impact on our water security and seek ways to adapt in accordance with changes.

About the movies:

• **The Water Cycle** (National Science Foundation Video), summarizes the information provided in the previous reading in video format. The video covers aspects of the water cycle and highlights water "stores" and flows between them. These aspects are critical in building a deeper appreciation and understanding of how water is intrinsically connected to food, and indeed, life.



A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=94</u>

• The Water Cycle in a Warming Climate. This short video digs into several processes explained in the previous video that are at the heart of the changes driven by a warming climate. One word to note in this video is the concept of "rate" – this ties back to the time connection I mentioned in the introduction. Rate implies something that is happening over a time interval. If the evaporation rate of water increases – what happens? (This video can be seen in a page that provides additional context¹).

1. The video, *Hydrological Cycle in a Warming Climate*" may be seen in context in the Watershed Institute's post: <u>How Is</u> <u>Climate Change Affecting Water?</u>



A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=94</u>

Rising Tides: Understanding Sea Level Rise is a NASA-produced video that explains sea level rise, a key
impact of a warming climate's impact that result from perturbing the water cycle. Note that are two
mechanisms explained – both have to do with volume of water. This video is embedded in an article that
describes these processes further².

2. The video, Rising Tides: Understanding Sea Level Rise, may be seen in context at the page "Sea Level Change Data Pathfinder". If this is a subject that interests you, you can dig deeper into the science and some of the complexities of sea level rise through <u>The Science of Earth's Rising Seas</u> published at the Jet Propulsion Lab. The JPL link has two excellent videos.



• To What Degree – The Water Cycle (first 5 videos of play list, total of 5 minutes, 22 seconds). This is a NASA generated playlist that explores aspects of the impact of climate change on the water cycle. Please take a look at the first 5 videos only (you can watch all, but it is not required). The videos successively explore key impacts related to the properties of water, drought and land cover changes. These videos foreshadow module 3, and will provide some good background to consider in this modules readings. The video is set to "auto-play", so you can stop after the fifth one. Apologies – but there will be at least one ad – which can be skipped.



A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=94</u>

Global Water Futures: Water Security for Canadians. We know that climate change is causing catastrophic disruptions to the Canadian water supply, including our food supply and hence, our people and our economy. The North (Canada) is disproportionately affected by climate change and introduces questions such as how will we secure a safe future for humanity. This video discusses the Global Water Futures) Project, which is a significant research effort undertaken by four Universities working with a wide range of partners in multiple sectors. What you will see are "snippets" of information about some of the projects. What I would like you to note is the complexity of the issues surrounding water management in the context of climate change. I'm hoping that you gain an appreciation for the kinds of questions that are being asked, the range of partnerships needed to address "wicked problems".



What is Water - Supplemental Climate Resources (not required)

These links provide a deeper understanding of the effects of climate change on the water/weather cycle. As all of you come from a diversity of backgrounds, I think there is something for everyone here, and I am sure that most of you can contribute some of your own links to this page.

REGIONAL

• The Canadian Centre for Climate Services (CCCS)

The Canadian Centre for Climate Services works to build climate change resilience across Canada by delivering climate services driven by user needs, providing access to climate information, building local capacity, and offering training and support.

PCIC collaborates with the CCCS and plays several roles in its network. These include providing climate information, through tools and in raw data, interpreting climate data and information, and doing direct climate communications outreach in communities across the province.

<u>Climate-Related Monitoring Program (CRMP), BC Ministry of Environment and Climate Change</u> <u>Strategy</u>

British Columbia's Climate-Related Monitoring Program is a collaborative project involving are several BC ministries that collect weather data, BC Hydro, Rio Tinto, Metro Vancouver, the Capital Regional District, and PCIC. This project makes long- term meteorological observations available for professional users, through PCIC. CRMP provides information about each of the meteorological networks and the data available, including sampling, methods used, and quality assurance.

<u>ClimateWNA Program, the University of British Columbia</u>

ClimateWNA is a program of the University of British Columbia's Centre for Forest Conservation Genetics. ClimateWNA downscales a variety of data, including monthly PRISM data the output of global climate models for both historical simulations and future climate projections. ClimateWNA provides access to these data sets through a standalone desktop application and a web

Pacific Institute for Climate Solutions

The Pacific Institute for Climate Solutions (PICS) is a knowledge network that supports solutions-oriented research, relative to BC, develops educational tools and outreach activities to inform diverse audiences about climate change, and makes concrete recommendations to BC policymakers and climate stakeholders. PICS offers educational tools and a large number of publications on the science of climate change, climate solutions, and the policy and economics of climate change.

PRISM Climate Group, Oregon State University

Oregon State University's PRISM Climate Group develop spatial climate datasets, which include precipitation,

vapor pressure, and temperature variables, using weather station observations and detailed methods that incorporate knowledge of the region, including expert assessments. The PRISM Climate Group offers datasets, as well as more information about how the PRISM datasets are formed and the development of the PRISM model.

INTERNATIONAL

<u>CLIMDEX Project</u>

The CLIMDEX project produces and provides datasets of climate extremes, using a suite of 27 climate extremes indices that were formulated by the Expert Team on Climate Change Detection and Indices. CLIMDEX provides climate researchers with easy access to datasets, detailed information about their construction, software, trend maps, time series, and uncertainty estimates.

Expert Team on Climate Change Detection and Indices

The joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices develops a number of tools for National Meteorological and Hydrological Service providers, including software toolkits, documentation, and other materials to guide users in both the use and calculation of climate indices, as well as guide users in data homogenization, improvement of global coverage and the assessment of climate indices.

Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change is a scientific body open to all member countries of the UN and WMO. It provides comprehensive scientific assessments of the scientific community's understanding of climate change and the effects of the changing climate, on both human societies and natural systems. It also examines our ability to mitigate climate change. The IPCC provides a variety of summary and assessment reports, from literature reviews to high-level overviews.

North American Regional Climate Change Assessment Program

The North American Regional Climate Change Assessment Program (NARCCAP) is an international effort that produces high-resolution regional climate model simulations of North America's climate, for regional analysis and impacts studies. NARCCAP's output includes both simulations of the historical period and future projections. NARCCAP provides access to regional simulated climate output from a large number of global climate model-regional climate model

What is Water Security (Mini Lecture)

Please view the diagram directly below this mini-lecture. I will be referring to it throughout this lecture and in the discussions page.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=103</u>

Video Transcript: <u>FWSMod2-2.2-What-is-Water-Security-Video-Transcript</u>



Water is central to achieving a larger sense of security, sustainability, develoment and human well-being. UN-water supports the inclusion of water security in the post-2015 development agenda as part of the Sustainable Development Goals.



Achieving water security requires collaboration across sectors, communities, disciplines and political borders, to reduce the risk of potential conflicts over water resources, between sectors and between water users or states. UNWATER

ww.watercooperation2013.org

ww.unwater.org

version October 2013

Local Water Security and Agriculture in the Okanagan (Mini-Lecture)

The following lecture "Okanagan, BC Agriculture & Climate Change Regional Adaptation Strategies" is based on the next reading activity (following this mini-lecture) and should be viewed in tandem with this video "Local Water Security and Agriculture in the Okanagan". Please read pages 3 to 11 from the PDF. The following minilecture and the PDF reading will form the basis of our weekly discussion where I will provide some questions to guide us through this week's Substantive Question and Answer conversation. You may choose in the guided Discussions which questions you wish to address with your fellow colleagues. Or you may create your own topic of investigation.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=107</u>

Video Transcript: FWSMod2-2.3-Management-of Water-Systems-for-Food-and-Ecosystems-Video-Transcript

Local Water Security in the Okanagan -CAI Programs in the Okanagan addressing drought and flooding (Reading)

Week 2/Module 2 – What Does Water Have to do With Food Security and Climate Change Adaptation? Required Reading

15 minutes

The following is **Required Reading,** adapted from the BC Agriculture and Food Climate Action Initiative from the following link:

https://www.bcagclimateaction.ca/wp/wp-content/media/RegionalStrategies-Okanagan.pdf

This reading is meant to help you understand the preceding mini-lecture "Local Water Security and Agriculture in the Okanagan". This reading offers a deeper analysis of the agricultural growing conditions here in the Okanagan. And prepares you to answer some of the guided questions in this week's Discussion.

Please read Pages 3 to 11 while viewing the mini-lecture. The BCAFCAI initiative is our own local case study that we will discuss in our Weekly Discussion Question and Answer.

Further Resources not required to read:

The City of Kelowna Agricultural Plan – Background Report 2017 and Agriculture Plan Engagement Summary 2017

https://www.kelowna.ca/our-community/planning-projects/agriculture-plan

The Regional District of North Okanagan Regional Agricultural Plan – 2015 http://www.rdno.ca/docs/150915_RAP_Final.pdf

South Okanagan Similkameen Conservation Program – Sustainable Agriculture – 2020 https://soscp.org/sustainable-agriculture/

Water Management, Water Security and Climate Change Adaptation: Early Impacts and Essential Responses Claudia Sadoff and Mike Muller

https://www.gwp.org/globalassets/global/toolbox/publications/background-papers/14-water-managementwater-security-and-climate-change-adaptation.-early-impacts-and-essential-responses-2009-english.pdf

AgriFood Canada Research Centre Summerland, BC

https://www.agr.gc.ca/eng/scientific-collaboration-and-research-in-agriculture/agriculture-and-agri-foodresearch-centres-and-collections/british-columbia/summerland-research-and-developmentcentre/?id=1180620561099

Additional resources:

Global Water Partnership at Climate 2010/Klima 2010 www.gwp.org

Module 2 Discussion: Substantive Question and Answer

Module 2 Discussion

Following the first Discussion Activity in Module One, the goal of this exercise is the foster a supportive learning environment together by engaging in relevant topics of learning. Through deeper discussion and analytical frameworks of questioning and critical examination, please address one of the following questions. These are meant to be guides and I encourage you to contribute your own questions as well.

- Looking at the Mini Lecture, What is Water Security, as outlined in the United Nations Water World Water Days 2013 info-graphic on the mini-lecture page directly below the video, one of the cornerstones of water security is Good Governance. There is a short definition of this topic along with the other cornerstones of Transboundary Cooperation, Peace and Political Stability, and lastly Financing. If you are interested or specialize in any of these topics, either in your profession or your daily life, I would be interested to hear your opinion and questions related to any one of these four cornerstone topics.
- 2. As you listen to the video at the 1:51 mark in the video, it makes reference to the infographic. It explains Agriculture is by far the largest water consumer along with energy production. What kind of agriculture is being discussed here? Is it large-scale, industrial production? Or is it small-scale agricultural production? Do you believe there is a difference in water consumption by these two methods of food production? What is your opinion of the two types of food production? Don't forget that food production falls on a continuum and there are not just two production styles but many along the entire production spectrum.
- 3. Can you think of places or peoples whose water security is marginalized right here in Canada? Can you discuss why this is happening in a country that is ostensibly well developed, modern, educated, democratic, and fair?
- 4. What are some of the ways that agriculture, food security, and ecosystem function can be reconciled in BC, as indicated in the Okanagan Case Study provided in the previous reading in the BC Agriculture and Climate Change Regional Adaptation Strategies PDF and related mini-lecture – Local Water Security in the Okanagan?
- 5. As discussed in the mini-lecture "Local Water Security and Agriculture in the Okanagan", there are a variety of local ecozones that are conducive to agriculture. And yet because of this, adapting to water challenges is difficult, especially when various crops are grown specifically to an ecozone. How do farmers adapt to the various climatic events when so much of what they produce is dependent on the market, and consumer preferences, which ensures that farmers have a viable livelihood and can contribute to the local economy and community? When such a large part of our local economy is dependent on the agricultural sector, how do farmers adapt quickly to extreme weather events?

6. As stated in my mini-lecture, are the various municipal initiatives enough to help farmers adapt to climate change? What do you feel would work more effectively to help farmers adapt even more quickly in the face of climate change, currently and projected?

Case Study: Management Strategies that consider climate change (Reading)

This reading activity focuses on an Okanagan case study of successful collaborative management of water systems for food and agricultural adaptation between several levels of government, NGOs, and community members on both sides of the Canad/USA border. Please read the following links and familiarize yourself with this collaborative model of fish revitalization and adaptation to climate change that serves to provide food security for Indigenous Peoples. The following links are published online and can easily be accessed. In order to help understand this initiative, the articles describe the positive effects of food security and food sovereignty such as the nutritional, cultural, resilience, adaptation, and revitalization of habitat and ecosystem function – components of food security as I described in my own doctoral work in Module One. It truly is a success story. Please note that topics from these 3 readings will be included in your Weekly Guided Reflections.

To read:

Okanagan Nation Fisheries: "Syilx/Okanagan diet quality positively impacted by increased food sovereignty says study". Please read the following article paying close attention to nutrition for the Okanagan Syilx Peoples. The restoration of salmon has increased the nutritional impacts of eating traditional foods.

https://www.timeschronicle.ca/syilx-okanagan-diet-quality-positively-impacted-by-increased-foodsovereignty-says-study/

Okanagan Nation Alliance – "Harvest". Found on the Okanagan Nation Alliance website, the following article discusses food sovereignty. The ONA's ability to harvest its own sockeye salmon among several other types of fish is indicative of its own resilience, independence, strength, and autonomy in how it directs its land and water resources. This initiative is also important in habitat restoration which is conducive to climate change mitigation.

https://www.syilx.org/fisheries/harvest/

Okanagan Nation Alliance – "Okanagan Chinook Restoration Program"

Another example of collaborative fish restoration is the Chinook Salmon run which the ONA have been working on for the last 15 years. Pay special attention to the development between several key stakeholders that have all contributed to the funding of these projects. This initiative stands as a testament to the will of groups of people to effect positive change in the world.

https://www.syilx.org/projects/okanagan-chinook-restoration-program/

Augmented reading – not required reading.

https://www.syilx.org/wp/wp-content/uploads/2017/10/2017-FAQ_OK-Chinook-Recovery-1.pdf

Extra Reading:

There are other important collaborations taking place and the following link is an example of one initiative here in BC which partners B.C.'s Ministry of Agriculture, Food and Fisheries; Ministry of Environment and Climate Change; Secwépemc Fisheries Commission; Okanagan Nation Alliance; and Fisheries and Oceans Canada. Funding is supplied through the British Columbia Salmon Restoration and Innovation Fund, a joint federal-provincial fund.

https://www.saobserver.net/news/adams-lake-first-nation-heads-program-to-restore-salmon-habitat-inadams-lake/?fbclid=lwAR1j9undng7nON5RSK19V-HxmKI_gxNVuOzZTX646jCfPewKZ-sBIRy1i2U

Module 2 Guided Reflection - Food and Water Security

Module 2 Guided Reflection

Traditionally, reflections were recorded in a journal and submitted to the instructor on paper at the end of the course. However, since this is an online course, your reflections can be embedded within Canvas for me to read as we progress through this course. You may want to compose this offline and then cut and paste it in.

The questions below are only intended to guide you through your reflections, so you do not necessarily need to address these topics. These are suggestions but I ask that you do stay on the course topics for your reflections. You may pick one of the topics below and discuss it thoroughly or you may come up with your own questions pertaining to what we have learned in this module.

Challenge yourself to think critically about the above theories and concepts. You may do your own research following the introduction to these (new?) concepts also. These reflections are private and only to be read between you and me and will remain as such throughout the course.

Guided Reflection Theme Suggestions:

- Do Water Security and its related consequences, dimensions, ramifications, affect you personally?
- How does water consumption play into your everyday life and lifestyle?
- · Are you more aware of the consequences of global warming on the water supply?
- What will you personally do to conserve water for water security in relation to food production and consumption?
 - This could have to do with the types of food you purchase less water consumptive foods
 - Water awareness in your household
 - Water lifestyle choices such as drive-through car washes, or keeping a less water-intensive front lawn like xeriscaping or growing a raised garden bed with flowers for bees
- Have you been able to identify some of the environmental collaborations between First Nations, local groups, for food production, fish, or habitat restoration? Who are some of these funding agencies?
 - Have you personally visited or seen any areas that have been revitalized for fish production or habitat restoration? Where?
 - Have you ever tried canned Okanagan Select Sockey Salmon from the Okanagan River, sustainably grown and harvested right here in the Okanagan?
 - What types of fish do you eat? From where? And do you think your choices contribute to Climate Change adaptation or mitigation?

MODULE 3: CLIMATE CHANGE & FOOD SECURITY IN THE FUTURE

Module Description

In the third module, we delve into climate change (defined as any significant change in the measures of climate lasting for an extended period of time). Using the Okanagan as a lens, we investigate the impacts of drought, flooding, pests, and forest fires on agriculture. We look at how producers are adapting to climatic variations that affect our food supply and the future impacts that climate change is likely to have on global food production.

Learning Outcomes:

By the end of this module, you will:

- 1. Identify the processes contributing to climate change and its effects on the global atmosphere.
- 2. Explain how climate change affects food security.
- 3. Articulate the future effects of climate change on our food supply.
- 4. Communicate in an open forum the relative contributions of individuals to mitigating climate change and food *insecurity*.
- 5. Evaluate climate change topics and food-related insecurity.

How to proceed with Module 3

Content Section 1

- Read: Module 3: Overview, Learning Outcomes and How to Proceed (this page).
- Watch Mini Lecture: Instructor Overview of Module 3.
- Watch Mini Lecture: What is climate change and how does it affect local food security?
- Watch YouTube video: How does Climate Change affect Global Food Supply?
- Read: What are the Future impacts of Climate Change?
- Read: Agricultural Impacts of Climate Change impacts in the Okanagan Region.
- (Optional) Read: Further Readings.
- Quiz: Climate Change [Not available in Pressbooks version]
- Discussion

Content Section 2

• Read: Food Security and Covid.

- Watch YouTube Video: ACARN and CAI Programs addressing climate. change and agricultural adaptation in the Okanagan.
- Write Guided Reflections

Instructor Overview of Module 3 (Mini-lecture)

This video provides an overview of the topics we will be learning about and the approach we will use in Module 3, Climate Change. I had mentioned in one of my comments in the Module Two Discussion Activity, how dams have affected agriculture in the Creston Valley of BC where one of the Columbia River Treaty Dams, the Libby Dam in Montana on the Kootenay River controls water along the floodplain, affecting agricultural production. I hope you enjoy this module! Please note that in this module overview, I state that we will watch 4 videos in our video activity. This has now been revised to watch 5 videos which I hope will further explain the effects of climate change on agriculture but also agriculture on climate change.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=122</u>

Video Transcript: <u>FWSMod3-3.1-Overview-of-Module-3-Video-Transcript</u>

What is Climate Change - What is Climate Change and how does it affect local food security? Creston Valley, BC (Mini Lecture)

You now have a pretty good understanding of the water cycle and how climate change is impacting our water supply. However, there are other social impacts that also affect our water right here on the ground. The following lecture extracted from my doctoral research in the Creston Valley of BC, an agricultural area in south central BC, discusses the powerful effects of climate change on food security in the Creston Valley. Forest fires from land degradation have had devastating effects on climate change globally but it also effects local food production systems through flooding and erosion, not to mention the terrible effects of smoke on our foods and health. Other contributions to food security come from development and technology, and the need to procure energy for fast growing populations. Hydro developments along flood plains not only have necessitated entire farm communities to relocate but have caused fish populations to collapse bringing food insecurity to Indigenous Peoples who once relied on this most abundant and natural food source.



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=126</u>

Video Transcript: <u>FWSMod3-3.2-WhatIsClimateChange_transcript_Taylor</u>

What is Climate Change - How does Climate Change affect the Global Food Supply? (5 videos)

The following collection of videos provides an overview (primer) on how climate change is affecting our food supply and those who provide and produce food. It discusses how some producers are adapting locally and in some videos, it discusses what we need to do globally.

Please view the Required 5 YouTube Videos for a total of 30 minutes.

1. Global Warming Affects Crops, Food Supply – Required

The following video describes how climate changes has affected local crops in the state of Maryland, US. Crops are changing family farms and global crop production. And developing countries closest to the equator will be most affected. Africa is the main worry. Maize, soybeans, will be most affected for some of the most marginalized peoples in this part of the world. Insects, and weeds increase due to Greenhouse gasses (GHGs). Farmers are adapting however while Canada is one of the worst contributors to global GHGs. Total time is 3:52 minutes. Be prepared to offer a discussion in one of the methods in this video in your Substantive question and Weekly reflections.



A YouTube element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/foodwatersecurity/?p=129

2. How to feed the world in 2050: actions in a changing climate - Total time is 6:00 minutes. Required

The following video discusses agricultural production globally from a large macro-economic and climate change analysis. Climate change really began to hit in 1850 and since that time, growing demand for food and bioenergy crops, and water resources. Crop yields are declining. Given your new knowledge about food security, water security, climate change, food sovereignty, Indigenous food sovereignty, and local food systems, please listen very carefully to this narrative and think about how the thesis argument states that "we" (who is We???) will need to produce more food for populations (which populations) who are hardest hit. What types of agriculture can "feed the world"? Is it industrial or local agriculture and which type of agriculture contributes most to GHGs? Are GMOs the answer? What does intensification of agriculture mean exactly? And how is sustainably intensification mean? Is this an oxymoron? Remember how many of you have argued in your discussions and reflections that we need our food supply to be focused on supplying local food security.



https://pressbooks.bccampus.ca/foodwatersecurity/?p=129

3. Understanding Climate-Smart Agriculture – Total time is 2:46 minutes – Required

The following short video from the United Nations Food and Agricultural Organization (UNFAO) discusses "Climate Smart Agriculture while also discussing global food security. The graphics in this video are interesting in that they use images of small-scale agriculture (horticulture) as a way to explain their message. I like this way of indicating that small scale farmers are affected by climate change but can adapt and mitigate against climate change within their local communities and regions. Remember that community or local food security based on food sovereignty principles is how I define food security, locally, nationally, and globally. The message in this video is currently the basis of research being conducted right here in BC!



4. Future of Food: Farming in the age of climate change – Total time is 7 minutes – Required

The following interesting video begins talking about the future of food. Based on a South Dakota family farm which has converted to organic farming from mono culture cropping cites economic reasons for doing so. In particular they discuss composting which replenishes the soil rather than using petro chemicals and other chemicals that render the soil inert and unfarmable in some cases...it can cause dust storms. It also shows an indoor farm that doesn't even use dirt and uses technology to mimic the earth. Canada largely practices mono culture using conventional or industrial methods of growth. Do you agree with the speaker at 5:22 who discusses traditional agriculture and/vs exotic agriculture? This video also addresses food waste which many of you mentioned in your discussions and is predominantly a problem within affluent countries. Be prepared to discuss the arguments posed in this video in your upcoming discussions and reflections.



5. The Great Challenge: Farming, Food and Climate Change – Michael Pollan – Total time is 30:26 minutes. Required listening. Some of the Discussion and Reflection guided topics, and quiz questions will be based on this video.

Michael Pollan requires no introduction and I will let his lecture stand on his own. The first 15 minutes is required viewing but the rest of his lecture is also most interesting. Many of his topics are what have already been covered in this course thus far and tangentially relates to upcoming topics.



https://pressbooks.bccampus.ca/foodwatersecurity/?p=129

What is Climate Change? - What are the Future Impacts that Climate Change is Likely to Have on Global Food Security? (Reading)

Required Reading: Climate Change Threatens the World's Food Supply, United Nations Warns Anticipated Time Commitment: 20 Minutes

Please read the following article and using the following reading guide be prepared to offer a comparative analysis in your weekly Discussions.

https://www.nytimes.com/2019/08/08/climate/climate-change-food-supply.html Reading Guide:

- 1. The destruction of what two resources coupled with what dire situation is impeding the ability of humanity to feed itself?
- 2. This article delivers some dire statistics about "global" food security. The author states:

"Overall if emissions of greenhouse gases continue to rise, so will food costs, according to the report, affecting people around the world. "You're sort of reaching a breaking point with land itself and its ability to grow food and sustain us," said Aditi Sen, a senior policy adviser on climate change at <u>Oxfam America</u>, an antipoverty advocacy organization. In addition, the researchers said, even as climate change makes agriculture more difficult, agriculture itself is also exacerbating climate change."

- 3. How does industrial agriculture contribute to climate change? And is industrial agriculture a way to "feed the world"? What must happen in order for food security to happen at the household, community, and local level?
- 4. The article shows a picture of cattle in Lagos, Nigeria. Methane is a powerful GHG. Industrial agriculture is apparently feeding the world with an ever-growing desire for meat-based diets for the affluent growing upper classes in the global 'south'. However, local meat suppliers are also feeding their local consumers but without the deleterious emissions involved in shipping their products worldwide. Industrial agriculture that produces coconuts and palm oil is also contributing to climate change and rain forest degradation...I just think about how my coconut chips are produced. Please choose the food group that you most identify with. This course is meant to be inclusive and respectful of all personal choices and all diets .
- 5. I am probably beginning to sound like a broken record about small-scale agriculture vs large scale agriculture. However, what is your personal opinion about mitigating against climate change, and adapting to climate change? This is a BIG question with many facets and dimensions that one course can simply not address but try to engage some of the theories we have learned together as a group thus far.

Climate Change Locally - Climate Change Impacts in the Okanagan and BC (Reading)

Required Reading: Climate Change Impacts in the Okanagan and BC

Anticipated Time Commitment: 20 Minutes

An evaluation of adaptation options must be based on the best possible understanding of the nature, magnitude, and speed of climate change. Climate scientists began developing computer simulations of the Earth's climate in the 1960s and these models have become increasingly sophisticated and refined.

In the past decade, climate scientists have successfully downscaled global climate models to regional scales by taking into account the variability in temperature and precipitation introduced by topography.47 The Pacific Climate Impacts Consortium (PCIC) is a regional climate service center at the University of Victoria that provides practical information on the physical impacts of climate variability and change, in support of long-term planning.48 PCIC was a key partner in developing the regional adaptation strategies that preceded the Okanagan strategy and have assisted in the production of the agriculturally relevant regional climate projections for the 2020s and 2050s that are presented in this document.

Additional information about regional climate projections, maps, and related definitions may be found in Appendix B and Appendix C, and in PCIC's Thompson-Okanagan climate summary at https://www.pacificclimate.org/sites/default/files/publications/Climate_Summary-Thompson-Okanagan.pdf

Figure 2: Okanagan Regional Climate Projections: 2020s to 2050s

Key climate projections for the Okanagan region in the 2020s to 2050s are summarized here. Projections were generated by PCIC using data available through their "Regional Analysis Tool." Numbers provided are the median of all model runs (black line in the graphs), and the shaded area on the graphs shows the range of projected possible future conditions.

Temperature

Projections for key temperature variables show a strong increasing trend, with all models projecting warming in all seasons (see text box and Figure 2, previous page). This trend is significant compared to historical variability, and summer is projected to warm slightly more than other seasons.

Precipitation

While models show the possibility for both increasing and decreasing future annual precipitation, the median annual trend is an increase of 1.2% above the 1990 baseline by 2020 and increasing by 4.4% by 2050.

The majority of models show a decrease in summer precipitation. There may be a slight increase in the amount of winter precipitation, with a marked decrease in the amount falling as snow (see Figure 3).

The distribution of these temperature and precipitation changes is greatly influenced by local geographic settings — temperature by elevation, and precipitation by topography. As Figure 4 shows, temperatures are higher in the valley bottoms of the Okanagan region, with cooler temperatures and wetter conditions around the Okanagan range to the south and the Beaverdell Range to the east. Many agricultural operations in the Okanagan are located in valleys — or on the benches above — and would therefore be affected by the greater temperature increases.

Related Effects

The magnitude, frequency, and intensity of extreme events, for both temperature and rainfall, are also forecast to increase with climate change. Unusually warm temperatures are very likely to occur more often, and cold temperatures less frequently. Projections are for 2.2 times the number of summer "warm days" (days in June, July, and August that are warmer than the 90th percentile historic baseline Figure 3 Precipitation as Snow, 1970s to 2090s

Precipitation Projections

- Annual precipitation: +1.2% by 2020s (+4.4% by 2050s)
- Summer: -8% by 2020s (-9% by 2050s)
- Winter: +6% by 2020s (+9% by 2050s)
- Winter Snowfall: -9% decrease by 2020s (-19% by 2050s) temperature for that day) and 6.8 times the number of extremely hot days (days so hot they used to occur only once every 10 years).

The intensity and magnitude of extreme rainfall events are also projected to increase. Detailed projections for the 2050s may be found in the Extremes text box on the following page.

As precipitation in the Okanagan and in upstream areas changes, river systems in the region will likely shift to a more rain-dominated pattern, with less predictability and increased variability in timing and volume of flows. With changes to snowpack and temperatures, runoff peaks are likely to occur earlier in the season, with lower discharge later in the summer.

The projected changes outlined in this section will affect the Okanagan's agricultural sector summarized in the next section.
Climate Change Locally - Agricultural Impacts of Climate Change in the Okanagan Region (Reading)

Optional Reading: Agricultural Impacts of Climate Change in the Okanagan Region **Anticipated Time Commitment:** 20 Minutes

Adapted from CAI

https://www.bcagclimateaction.ca/wp/wp-content/media/RegionalStrategies-Okanagan.pdf

The changes in climate projected for the Okanagan region will have a range of impacts on the agriculture sector. These impacts are summarized IN PAGES 13 – 35 of the above PDF

This set of "impact areas" (groupings of projected climate changes and their associated effects and agricultural impacts) formed the basis for discussions at the first set of workshops. These impact areas were explored in detail with participants and ranked in order of importance for both the individual farm and regional level. Based on this input, the highest priorities were identified and some impact areas in the table above were excluded from consideration at the second workshop. Those impacts that were excluded may prove to be problematic or advantageous in the Okanagan region in the future and should continue to be monitored. Adaptation strategies may still be needed for agriculture to address excluded impact areas.

This is not required reading: The BC Climate and Agricultural Initiative <u>https://www.climateagriculturebc.ca/</u> regional-adaptation/okanagan/ shows an updated website that has climate change impacts organized in one area.

Also, from the BC Climate and Agricultural Initiative, try reviewing their new website which has a plethora of information for the Cariboo Region of BC. <u>https://www.climateagriculturebc.ca/regional-adaptation/cariboo/</u>

Climate Change Locally - Further Readings – not required to complete (Reading)

Optional Reading: Further Readings which are some resources that I recommend reading on your own. You may also contribute and share your own resources to our Resources Forum for all of us to benefit from. **Anticipated reading Time Commitment:** 20 Minutes

The Global Water Grab: A Primer – 20 October 2014

Water grabbing refers to situations where powerful actors take control of valuable water resources for their own benefit, depriving local communities whose livelihoods often depend on these resources and ecosystems. https://www.tni.org/en/publication/the-global-water-grab-a-rimer?fbclid=IwAR3wCwbCP0aYztaaf7oIpij1RFlyG68La8SHuc_aILEOquaAr8o8kQDz3Q#m (Links to an external site.)

The Intergovernmental Panel on Climate Change (IPCC) Special Report: GLOBAL WARMING – 2019

https://www.ipcc.ch/sr15/ (Links to an external site.)

IPCC Special Report: Special Report on Climate Change and Land FOOD SECURITY – 2019

https://www.ipcc.ch/srccl/chapter/ chapter-5/#:~:text=Food%20security%20as%20an%20outcome%20of%20the%20food%20system&text=We%20t ake%20a%20food%20systems,and%20adaptation%20to%20climate%20change. (Links to an external site.)

UNITED NATIONS DECLARATION ON THE RIGHTS OF INDIGENOUS PEOPLES

https://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf (Links to an external site.)

Joanne Taylor Dissertation

https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0390002

Module 3 Discussion: Substantive Question and Answer

Module 3 Discussion

Following the Discussion Activities from the previous two modules, the goal of this exercise is to foster a supportive learning environment together by engaging in relevant topics of learning. Through deeper discussion and analytical frameworks of questioning and critical examination, please address one of the following questions. These are meant to be guides and I certainly encourage you to contribute your own novel and autonomous questions as well. Please post one substantive question, and then answer two of your fellow colleagues' questions. You may engage in as many discussion topics as you wish but two is the minimum required.

Substantive Question: Provide one substantive question to group discussion from one of your readings in the first learning block of this module – 5"

Substantive Answer: Answer two substantive questions from group postings - 5"

Your questions can be based on any material that we have discussed thus far in the module.

Please choose one of the following questions to reflect upon. As always, if you would like to reflect upon any other topics covered in this module, feel free to do so. I welcome creative content.

Based upon the theoretical frameworks proposed in Module One: food security, food sovereignty, etc. please reflect upon the New York Times Article in this Module (3) and answer these questions:

1. Which food security narrative and theories that you learned in Module One (food security as defined by the United Nations or food security as defined by community, and local frameworks – think food sovereignty) does this NY Time article use to describe the global food supply? (Especially re-visit the four definitions of Food Security; United Nations Food Security; Indigenous Food Security; Indigenous Food Sovereignty; Community Food Security – the definitions and theoretical frameworks in order to answer this question).

2. What alternative narrative was proposed by *the first lecturer* and the second speaker in the set of 5 You Tube Videos in this module compared to the narrative in the New York Times Article?

3. On what basis are these two narratives different?

4. Which narrative resonates with you and do you personally identify in your own food security practices?

5. I am specifically interested in your thoughts, impressions, reflections, opinions about Michael Pollan's lecture in the 5th Youtube video of the 5 video series. Please offer your comments.

Food Security, Climate Change, and COVID - Food Security and Covid (Reading)

Required Reading: Climate Change and Food Security in the Future

Anticipated Time Commitment: 30 Minutes

Please view the following Video and Radio interviews for a total of 10 minutes.

I was interviewed by the University of British Columbia's media which was then picked up by various media sources who interviewed me for television, online e-news stations, radio, and print. Please listen to or read the following media reports about Covid and Food Security and what the effects of Covid have had on prices, beef, migrant workers, food security and how food producers have adapted in this global pandemic. At the end of this list of media reports is a list of extra readings which you do not need to read. And following this are some statistics about Covid.

UBCO researcher looks at food security during COVID-19: <u>https://news.ok.ubc.ca/2020/08/05/ubco-researcher-looks-at-food-security-during-covid-19/</u>

We should be 'genuinely concerned' about food supply, UBCO researcher warns: https://www.kelownanow.com/watercooler/news/news/Okanagan/

We should be genuinely concerned about food supply UBCO_researcher_warns/

UBC Okanagan researcher says Canadians too dependent on imported foods: <u>https://globalnews.ca/news/</u> 7256219/ubc-okanagan-researcher-canadians-dependent-imported-foods/

Food security amid COVID

https://www.castanet.net/news/Kelowna/307093/UBC-researcher-looks-at-how-COVID-19-has-impacted-food-supply

Kamloops Radio Station NL 610 AM Stingray Live Interview:



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=143</u>

Calgary Radio Station 660 NEWS Live Interview:

Part 1:



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=143</u>

Part 2:



An interactive or media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/foodwatersecurity/?p=143

Kelowna iNFONews Interview:

https://infotel.ca/newsitem/canadians-quickly-adapted-to-find-local-food-but-covid-wasnt-enough-forpermanent-changes-ubco-prof/it76773

Williams Lake Tribune Newspaper:

https://www.quesnelobserver.com/news/food-security-food-sovereignty-top-of-mind-for-first-nations/

Further Readings – Not required: https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19 and https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19 and https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19-and-global-food-systems-aeb1434b/

These articles look at food system resilience and COVID-19. There is a lot of content out there that tries to argue that resilient food systems should be local, usually associated with some association that would gain if that were the case. However, resilience is about how a system recovers from a shock. Cutting off a subsystem from the larger system – local production of food for local consumption – makes that subsystem more vulnerable. All else equal, a global food system is more resilient than a local one. The food system adapted to COVID-19 very well. There were few shortages that were based on production and distribution issues. The shortages we experienced were largely because of consumer fears and the resultant hoarding. There are some very widely circulated stories of crops rotting in the fields, etc. (slick videos with interviews of suffering farmers, ...), but in large part those are exceptions. Food prices have not changed much, food trade has not changed much. The global food system adapted very well.

Notes and Markers of Food Insecurity and Covid:

SUDDENLY BECAUSE OF COVID EVERYONE IS ASKING QUESTIONS ABOUT OUR FOOD SUPPLY!

Climate Change:

- 350 ppm CO2 safe upper limit—now at 415 ppm!
- Mean temperatures increased 0.8 c (1.4F) since 1980
- 10-15% staple yield reduction for every 1C increase
- · Because of these temperatures will increase 6C (11F) by 2100
- \cdot The World will face irreversible dry-season rainfall reductions much like the Dust Bowl era
- · Climate change will undoubtedly exacerbate the unsustainability of the global industrial food system

Climate change likelihood of shock aftershock to the global industrial food system:

- reduced yields a physiological response
- Water shortages
- Soil erosion and desertification
- Sea encroachment
- Increased occurrence of novel catastrophic pest infestation
- Increased frequency of extreme weather

• Loss of major production regions

Agriculture is inextricably linked to water supply...which climate change is affecting:

Agriculture uses 70% of the world's freshwater supply. We are tapped out. The world is farming all the land there is to farm...and we can't create more.

Agriculture contributes 10-15% of global GHGs...the entire agri-food system, estimated at 35% We have to get off of Animal cropping and animal feed, and animal agriculture

Agriculture is tied to poverty:

767 million people live in extreme poverty mostly within rural areas of fragile countries where the rural poor are dependent upon agriculture for their livelihoods

815 million people were hungry and food insecure in 2016.

- In B.C., 20.4 percent of children in B.C. aged 0 17 years, live below the poverty line according to Statistic Canada's LIM (First Call 2017).
- Having the highest provincial record in Canada, one in five children (over 167,810 in B.C. and the highest number in the 0-5 age group 20.7 percent) grow up in poverty.
- Children 0 5 are at the most vulnerable age for proper brain development, so it is critical that their daily food and nutrition needs are met (McCain and Mustard 1999).

Food Insecurity Globally:

- We are producing more food and feeding more people than ever before: enough grains, fruits, vegetables, meat for 3,200 calories per day and yet:
- 5 million children die annually from nutritional deficiency
- 5 billion people are overfed (mostly from western diets)
- the number of people experiencing some form of food deprivation has more than doubled, to a total of approximately 2 billion people globally
- The current food crisis is due to many factors ranging from a shift to growing biofuels, rising oil prices, financial market instability, and increasing control of the food supply by industrial, agricultural corporations (Sonnino and Hanmer 2016).

Food Security in Canada:

- 2% of Canadian households are food insecure
- In Canada, the most marginalized are First Nations, Metis, and Innuit. Single mothers with children and the elderly.

Food Insecurity in BC:

B.C.'s population is estimated to increase from 4.5 to 5.9 million by 2036.

Food exports and imports in BC:

BC produces almost \$3 billion of food annually about half of that is exported or about \$1.6 billion annually

Approximately half of B.C. food is imported from other provinces in Canada and other nations such as the U.S.A.

- whereas 55 percent of fruit primarily from California was imported from the States,
- $\cdot\,\,$ eight percent from Mexico and Ecuador, seven percent from China, and six percent from
- The remaining 13 percent came from 30 other

B.C. is most dependent on its import of fruits and vegetables. In 2007 according to Industry Canada (2009), B.C. imported 70 percent of vegetables not only from the U.S. but 17 percent from Mexico and seven percent from China,

Food Wastage:

- \cdot 10% of cherries go overseas of one farmer in the Okanagan 40% local market
- 50% goes into the compost due to imperfections. Losing 50% of his income.
- He must pay to have these cherries hauled away.
- SunRype buys all their concentrate from China and so will not buy his local seconds. MORALLY WRONG!
- During Covid, it will be just as bad!
- Let's get government action. We can get this food into food deserts for example.

PANDEMIC Vulnerabilities to system shocks revealed due to the Pandemic:

Exposed weaknesses:

- Labour shortages, lack of technologies such as indoor greenhouses
- Nations retreated from the global system, curtailed food exports
- A concentration of slaughterhouses and packing plants were closed
- Because of Rigid supply chains, link failures resulted in waste and shortages
- The economic status of farmers/ranchers suffered
- Economically marginalized populations were more vulnerable
- General lack of nimble adaptability, little resilience evidenced
- "The whole food system is precarious," "It's very "
- Dependence on temporary foreign workers
- Canada relies on tens of thousands of migrant workers and open borders. Canada grows mostly
 commodities on an industrial scale to feed animals, make biofuels, or for export. The majority of the fruits
 and vegetables in Canadian grocery stores came from outside of the

BC Pandemic impacts:

- More in lower-income groups, very or extremely difficult to access food And the Wealthier are less likely to notice food price increase
- 11% increase in online food shopping
- 42% reported eating more *junk foods* and less access to fresh fruits and vegetables

- More than 30% are worried about food insecurity if the pandemic continues 61% expressed concern about the reliability of the global food system
- 87% want the government to support the building and strengthening of our regional food systems

Alberta Pandemic impacts:

- The Cargill beef plant in High River, Alta. Months before it became the site of North America's largest COVID-19 outbreak, people were warning about the insecurity of Canada's food system. (Jeff McIntosh/The Canadian Press)
- Two plants in Calgary process about 70% of Canada's beef Slaughterhouses forced to close. Alberta pushed to create an uninspected slaughter operation
- BC farmers push to follow suit.

Dairy farmers are dumping milk. There are no markets since restaurants, schools, and stores, and stay-athome orders have been put in place. Grapes I heard are also being dumped.

Good News in BC for small scale farmers: In BC:

Smaller scaled, community focused farmers, ranchers and other food system actors demonstrated nimble and rapid ability to respond:

...ramped up production, feeding more families

...innovated/expanded mechanisms to facilitate direct marketing

...seed suppliers etc. also ramped up

People quickly adopted alternate procurement means i.e. direct marketing, new outlets, bulk buying, etc. Baking surged

Offers new opportunities for farm direct marketing and online orders Must diversify

KPU, Farm Folk City Folk and UBC open letter to the government

So, all of this Begs the question:

What kind of agriculture and food system will offer the greatest mitigation opportunities and most likely confer the greatest level of adaptability and resilience?

The majority of farmers are struggling, while a small number of multinational companies made handsome profits.

The answer should not be driven by transnational food and fossil fuel interests.

We need to local at social justice issues and food sovereignty paradigms. We need transformative change to our food system.

One further article that is worth reading only if you have time. It gives a balanced view of whether our global food supply is really that bad if we are not changing our eating habits first.

Social Life Cycle Assessment: State of the Art and Challenges for Supporting Product Policies:

https://ec.europa.eu/jrc/en/publication/social-life-cycle-assessment-state-art-and-challenges-supportingproduct-policies?fbclid=IwARIcKPFI9XZY39G9arFSLLRLMvlg_AWQjfL8hMPFC7nHUCc-FGwuBnOX9N8

Well-being is considered one of the main development goals of modern society. Assessing what could improve well-being and what may undermine it is a key element in public policies, looking at social benefit and impacts. Cultural elements, different values, and lifestyles affect the way social issues are perceived. Moreover, social impacts along supply chains are increasingly assessed by different stakeholders, such as government,

business, and NGO's. Life cycle-based methodologies have been developed to assess environmental impacts along supply chains, from the extraction of raw materials to the end of life of products. Social life cycle assessment (SLCA) integrates traditional life cycle assessment by having social aspects as the focus. In fact, sustainability assessment requires that environmental, social, and economic impacts and benefits are taken into account. The present report aims at presenting: i) the state of the art in Social Life Cycle Assessment, illustrating the main theoretical and methodological elements under discussion in the scientific domain. ii) overlaps and synergies with traditional Life Cycle Assessment (LCA) towards a common framework; iii) examples of application at macro-scale (EU- 28) and at sector scale (Metal sector) of a set of indicators.

Food Security, Climate Change, and COVID - ACARN and CAI Programs addressing climate change and agricultural adaptation in the Okanagan (video)

"CAI Programs addressing climate change and agricultural adaptation in the Okanagan"

Please view the first lecture in the following YouTube Video. This Webinar series is over one hour long and goes over the total required viewing time of 20 minutes. However, there are two other speakers in this webinar, and if you have time, please have a listen to my colleagues who discuss climate change and the research they are conducting here in the Okanagan for food producers.

 A Food System in Crisis: Climate Change, COVID 19, and Opportunities for Change – The entire video is not required viewing but viewing the first Lecturer is. Please listen to the first speaker Kent Mullinex. This lecture series is extremely interesting and beneficial to understanding climate change and agricultural adaptation in B.C. so if you do have time, please listen to each speaker. Many of the statistics and theories that I discuss in the previous module are reiterated in this first video.



76 | Food Security, Climate Change, and COVID - ACARN and CAI Programs addressing climate change and agricultural adaptation in the Okanagan (video) A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=145</u>

The total viewing time is 1:02:47

- 1. Kent Mullinex- A social sciences response to climate change, food security, and Covid. Required
- 2. Kirsten Hannem Climate change, Covid, water systems, and food security (Optional)
- 3. Sean Smuckler Farm-level resilience and Covid (Optional)

Your viewing should provide the basis for your substantive question and your response to other questions.

Module 3 Guided Reflection - Climate Change, Food Security, and Covid

Module 3 Guided Reflection

Traditionally, reflections were recorded in a journal and submitted to the instructor on paper at the end of the course. However, since this is an online course, your reflections can be embedded within Canvas for me to read as we progress through this course. You may want to compose this offline and then cut and paste it in.

The questions below are only intended to guide you through your reflections, so you do not necessarily need to address these topics. These are suggestions but I ask that you do stay on the course topics for your reflections. You may pick one of the topics below and discuss it thoroughly or you may come up with your own questions pertaining to what we have learned in this module.

Challenge yourself to think critically about the above theories and concepts. You may do your own research following the introduction to these (new?) concepts also. These reflections are private and only to be read between you and me and will remain as such throughout the course.

I do not require a minimum or maximum word count as that is usually not required when sharing your inner-most thoughts about the various topics you will reflect upon. I will leave that up to you.

Guided Reflection Theme:

Please choose one of the following questions to reflect upon. As always, if you would like to reflect upon any other topics covered in this module, feel free to do so. I welcome creative content.

Based upon the theoretical frameworks proposed in Module One, food security, food sovereignty: Reflect upon the New York Times Article in this Module (3) and answer these questions:

 Which food security narrative and theories (food security as defined by the United Nations or food security as defined by community, and local frameworks – think food sovereignty from Module One) does this NY Time article use to describe the global food supply? (Re-visit the four definitions of Food Security; United Nations Food Security; Indigenous Food Security; Indigenous Food Sovereignty; Community Food Security – the definitions and theoretical frameworks in order to answer this question).

2. What alternative narrative was proposed from *the first lecturer* in the first YouTube video in the "What is Climate Change – How does Climate Change Affect the Global Food Supply? and the second video in this set of five videos compared to the narrative in the New York Times Article – What is Climate Change? – What are the Future Impacts that Climate Change is Likely to Have on Global Food Security? On what basis are these three narratives different? Which narrative resonates with you and which do you personally identify with in your own food security practices?

3. Looking at the Covid media material I presented in this module, please address some of the issues

surrounding Covid and agriculture and its effects it has had on food security. This can be a sociocultural, socio-economic, or environmental assessment.

4. What models of food production do you personally think can mitigate against food insecurity, climate change?

5. From the Webinar Series where you were required to listen to Kent Mullinex's lecture, please address one of the topics he presents. If you went on to listen to the other two speakers please pose questions relating to their research.

- 1. Kent Mullinex- A social sciences response to climate change, food security, and Covid. Required
- 2. Kirsten Hannem Climate change, Covid, water systems, and food security. (Optional)
- 3. Sean Smuckler Farm-level resilience and Covid (Optional)

6. Return to Michael Pollan's YouTube video and reflect upon the use of petrochemical use in agriculture. Please share your thoughts with me.

MODULE 4: WHAT DOES IT ALL MEAN AND WHAT CAN WE DO?

Module Description

In the fourth module, the course culminates by asking ourselves "How do we go forward in addressing food insecurity, water security, climate change, adapting to future climate change, and what we can do as individuals, communities, nations, and a community of nations?".

Learning Outcomes:

- 1. Understand the multiple definitions of food security and understandings of climate change.
- 2. Navigate through the multitude of United Nations Documents on food security, food insecurity, climate change, and Indigenous rights.
- 3. Articulate some of the actions you can take towards achieving Food Security, as an individual, community, nation, and global community member.
- 4. Critically think about how you can apply these actions to help humankind address climate change and food security.

How to proceed with Module 4

Content Section 1

- Read: Module 4 Overview, Learning Outcomes & How to Proceed (this page).
- Watch Mini Lecture: Instructor Overview of Module 4
- Watch YouTube video: What can we do as individuals to achieve food security in an unstable climate?
- Read: United Nations Documents on Food Security, Climate Change, and Adaptation.
- Watch YouTube video: Achieving Food Security in an Unstable Climate?
- Write: Mini Essay Response to one of the YouTube Videos.
- Discussion

Content Section 2

- Read What are some of the climate actions we can take towards achieving food security?
- Write: Accumulative Guided Reflections
- Watch Mini Lecture: Closing Remarks

Instructor Overview of Module 4 (Mini-Lecture)



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=151</u>

Video Transcript: FWSMod4-4.1-Overview-of-Module-4

Individual Approaches to Addressing Climate Change - What can we do as individuals to achieve food security in an unstable climate? (videos)

Video One: Please watch this video "Transforming food systems under a changing climate: Key messages from stakeholders at COP24". It is about 3 minutes long. It describes the action items that people are calling for to improve food production, food security, and climate change. Many of these items are called for right here in BC and other provinces in Canada as well as around the globe. The speakers also offer solutions and one of the questions that people ask is whether policy can change the food system and I believe that answer is yes! What do you believe about the dollars that go into agriculture and policy? This video foregrounds the following set of four videos that you will be required to watch that ask some BIG questions about food security and climate change globally and nationally.



https://pressbooks.bccampus.ca/foodwatersecurity/?p=154

Individual Approaches to Addressing Climate Change - United Nations Documents on Food Security, Climate Change, and Adaptation (Reading)

Required Reading: United Nations Documents on Food Security, Climate Change, and Adaptation **Estimated time:** 10 Minutes

The following links provide some resources from various global initiatives to combat climate change, poverty, education, and sustainable development. You do not need to spend much time on looking at these resources but if you are interested, I would suggest that you pick one and investigate the various policies that have been proposed. I like the third link on the sustainable development goals. The second link is to a journal that provides several good articles on various topics that may interest you for your further knowledge goals. Even the first link may be of interest to some of you. Secondly, I provide a link to a journal article that I found interesting. If you have time, please have a read. As many of you know, academic journal articles are not quick reads...sometimes taking a full day for a really deep reading of the longer ones. This article is only to guide you further in your knowledge goals and aims. Simply look at the resources that are here for you. Just looking at them will take about 10 minutes. You can decide which one you would like to take a deep dive into during your spare time ?

https://www.ers.usda.gov/webdocs/publications/41330/31767_aer802c.pdf?v=8581.3 https://academic.oup.com/aepp/article-abstract/28/2/168/7560 https://www.un.org/sustainabledevelopment/sustainable-development-goals/ https://cop23.unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement https://unfccc.int/

The following journal articles problematize the question of supporting local. There is a somewhat small food holder aspect to efforts to focus on the local – local currencies, local food, etc. – that ignores the fact we are wealthy and those developing countries that we buy stuff from are impoverished. To me, one of the big challenges humanity faces is the challenge of doing something about climate change; how to get over our small scale thinking and view ourselves as one large global community. What are your thoughts?

Graham, Jesse, et al. "Centripetal and centrifugal forces in the moral circle: Competing constraints on moral learning." *Cognition* 167 (2017): 58-65.

The above article describes how we have a tendency towards being more supportive of those we are closer to typically, family, then friends, then acquaintances, then people we have no connection with, then animals. We are social beings, and our health and wellbeing is better when we have good relationships. However, if our social circle and our circle of commerce overlap, will that harm our fellows in other parts of the world whom we don't know? I.e., we know the farmer, and therefore since we are acquaintances or friends, we pay a somewhat higher price at the farmers market, instead of buying the cheaper, imported equivalent at the big box store. This reduces the income of farmers in other parts of the world. The studies of agricultural trade barriers typically show that the biggest beneficiaries are farmers in developing countries, and yes farmers in developed countries will suffer. However, we in the developed countries can afford to help farmers transition out of agriculture, while developing countries cannot. So, perhaps reconciling a landscape preference which includes more compact, walkable and bikeable communities with abundant green space and local food production, with my concern for justice on the international level and the need to think of **we** as one world is not simple. We live in a complex, interconnected web of life on this planet. In complex systems there are a multitude of feedbacks working at a

variety of scales. Seldom is anything purely local, and I fear that an emphasis on local can ignore the larger scale connections, and the moral implications of these connections. What do you think?

Community and National Approaches to Climate Change and Food Security -Achieving Food Security in an Unstable Climate (videos)

Please watch the next set of four You Tube videos (two videos are repeats from Module Three) and choose one of them to base your short essay on. A question is provided to go with each video, in this week's Essay Activity.

The videos below provide multiple perspectives on the question: What can we do as a community of nations, and a nation of communities, to achieve food security in an unstable climate?

Please watch these videos and consider the questions that I have associated with them. After doing so, please proceed to the next page where you will be asked to select **one** of the videos, and answer the associated question in a 300 word mini-essay.

You might consider taking a few notes whole you watch the video, so that you can put together your miniessay.

How to ensure Food Security in Times of Climate Change – 4:01

Do you believe eco system function can help mitigate climate change? We talked about ecosystems being revitalized to support agriculture and fisheries. But in this video are these calls to action a function of global or local initiatives? How does this affect you and your community directly?



How to feed the world in 2050: actions in a changing climate – 6:00

Do you believe large scale food production habits contribute to climate change? Do you think growing food on a small scale is more sustainable? Does this narrative take into consideration community food security as we have come to define it in this course?



Understanding Climate-Smart Agriculture – 2:46

Small scale farmers are discussed in this video. Can you talk about climate-smart agriculture? What is it and do you have this type of agricultural food production in your community where you currently reside? These methods are quite different than what is discussed in the first and second videos. Does smart agriculture include Indigenous practices and attitudes towards climate change and food security?



Climate Change and Agriculture: America's Heartland – 6:21

This video is interesting because if you listen closely, it contrasts small scale and industrial food production. Again, various strategies are presented. Can you summarize these strategies and describe how they can benefit global climate change and global food security? I especially like the very last speaker's statement. Discuss.



A YouTube element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=158</u>

Mini Essay: Selected Video Response

This assignment is meant to prompt you to think about a key issue in climate adaptation practices that is of interest to you. Please select one of the previous four videos, and answer the question associated with each of them in a few short paragraphs. A page that has one inch, 2.54 cm borders, 12 font, Times New Roman preferred is usually about 350 words, which is the maximum required for this activity. I have asked for 300 words double spaced so it is less than one page. And you also do not need to double space. That is simple a spatial reference guide. Please do not worry about making your response perfect!

The four videos are:

- How to ensure Food Security in Times of Climate Change 4:01 minutes Do you believe eco system function can help mitigate climate change? We talked about ecosystems being revitalized to support agriculture and fisheries. But in this video are these calls to action a function of global or local initiatives? How does this affect you and your community directly?
- 2. <u>How to feed the world in 2050: actions in a changing climate</u> **6:00**Do you believe large scale food production habits contribute to climate change? Do you think growing food on a small scale

is more sustainable? Does this narrative take into consideration community food security as we have come to define it in this course?

- 3. Understanding Climate-Smart Agriculture 2:46Small scale farmers are discussed in this video. Can you talk about climate-smart agriculture? What is it and do you have this type of agricultural food production in your community where you currently reside? These methods are quite different than what is discussed in the first and second videos. Does smart agriculture include Indigenous practices and attitudes towards climate change and food security? Can this method of food production be classified as a food sovereignty movement? Why or why not?
- 4. <u>Climate Change and Agriculture: America's Heartland</u> 6:21This video is interesting because if you listen closely, it contrasts small scale and industrial food production. Again, various strategies are presented. Can you summarize these strategies and describe how they can benefit global climate change mitigation and global food security? I especially like the very last speaker's statement. Discuss.

Module 4 Discussion: Substantive Question and Answer

Module 4 Discussion

Following the Discussion Activities from the previous three modules, the goal of this exercise is to foster a supportive learning environment together by engaging in relevant topics of learning. Through deeper discussion and analytical frameworks of questioning and critical examination, please address one of the following questions. These are meant to be guides and I certainly encourage you to contribute your own novel and autonomous questions as well.

Substantive Question: Provide one substantive question to group discussion from one of your readings in the first learning block of this module – 5"

Substantive Answer: Answer two substantive questions from group postings - 5"

Your questions can be based on any material that we have discussed thus far in the module. I have provided much reading material in this learning block from international organizations for example and you may wish to base your question on some of these resources. Following are some suggestions:

- 1. What are some of the things you have learned in this final module, especially from the last set of readings discussing food miles and its various arguments?
- 2. What can we do as a nation to achieve food security in an unstable climate? This question is based within the Canadian context.
- 3. What can we do as a community of nations (globally) to achieve food security in an unstable climate?
- 4. You may wish to comment on any aspect of what you have learned within this first block of learning. Many of the topics in this final module relate directly to the topics we discussed in the previous three modules and weaves threads of those first food security and water security theories that you learned about. You may try to encapsulate the most salient aspects from each module into your final question posed to your cohort of learners.

Individual Approaches to Food Security During Climate Change - What are some of the Climate Actions we can take towards achieving Food Security? (Reading)

Required Reading: What are some of the Climate Actions we can Take Towards achieving Food Security **Estimated time:** 20 Minutes

In this activity module, I have added a few more readings that may be of interest to you. We have not yet talked about food miles and the distance that food has to travel, although we do talk a lot about imported food and how those transportation GHGs contribute to global emissions. Please do not read each article in any depth...this would take hours, unless of course you wish to. I ask that you skim each article...perhaps reading just the abstract. After skimming a few of these articles I ask you a question that you may wish to answer in your guided reflections this week. That is up to you.

1) This article talks about the environmental impact of buying local. It might surprise you. Please bear in mind that this article is already a bit outdated, but it is a good read nonetheless.

https://pubs.acs.org/doi/pdf/10.1021/es702969f– Some people say that the environmental impact of food is more about diet choices than about distance food travels. Even for local food, it is better to have boxes delivered than to go and visit the farm one-self. Or should local food producers work like grocery stores, collecting stuff they produce at a central hub and then distributing from that hub to households? I suggested this in response to a recent public request for input on agriculture, about the use of electronic marketing in China. Each farm having its own website and placing orders with the farmer and going to the farm to pick it up is nice and nostalgic, but not good for the environment if that travel is more than half a dozen km round trip. I think that many people in the local food movement like the social interaction of farmers markets and of talking to their customers when they come to the farm. These are great things for community, but they come at an environmental and social justice cost. What do you think?

2) Here is another article that discusses food miles.

https://www.getmoreeducation.org/Content/Modules/Module1/1_Coley_Howard_and_Winter_Food_Miles.pdf

3) This article discusses the social justice dimension of food miles. It states that an emphasis on food miles will harm developing countries and increase global inequality. Do you believe this. I firmly believe that it is the lens that you choose to critically analyze a problem. Which lens does the author choose to analyze food miles from? Economic, geographical, food security, food sovereignty, and many more?

https://onlinelibrary.wiley.com/doi/full/10.1111/j.1467-9701.2010.01270.x

4) This article offers a presentation of the relative role that transportation plays in environmental impact. I think this is a good article to read!

https://ourworldindata.org/food-choice-vs-eating-local

5) Publications in Nature looking at land use change and carbon benefit (reduced carbon production). Analysis finds that organic agriculture has in the situations analyzed a larger carbon footprint than conventional agriculture. Organic yields are lower, and to produce the same amount of food, more land needs to be farmed. That land would have stored more carbon in its soil and vegetation than when it is used for agriculture. Switching to organics will result in more habitat loss than using conventional agriculture as well, another

negative impact of organic. Again, think about the lens that this author is using to analyze the topic. Do you agree with this paper?

https://www.nature.com/articles/s41586-018-0757-z

This reading activity asks you to merely skim the above journals to get a bit of an understanding of the duality of food arguments that run the entire spectrum from industrial agriculture to small scale agriculture and the effects that all food producing regimes contribute towards climate change. In previous modules we investigate agricultural adaptation to climate change and therefore how climate change affects agriculture. The relationship food production has with the earth can be either a positive feedback loop, or a negative one. It is a complex and complicated issue that has many aspects to it. It is difficult to parse out the nuances of all arguments. This reading exercise is meant to further problematize the discussions we have had about food security and climate change, not by complicating the discussion, but by introducing as many facets of the dilemma for you to think about...in other words I have attempted to give you a lot of 'food' for thought. And I have merely skimmed the surface in this aspect.

This is a comment made to me by a colleague: "I like my surroundings to include agriculture. I like talking to people who work in agriculture, and people who are interested in what can be grown locally. Local food may contribute to social capital and local connections in ways that other activities do not. However, I fear that when local food movements try to frame their benefits in environmental or justice terms, they run the risk of undermining their own case. Critical analyses simply don't back it up. One ends up with a small group of passionate believers who won't consider critical analyses and the rest of the population who end up seeing the local food movement as just another self-interested lobby group". Does the 'rest of the population' view the local food movement as 'just another self-interested lobby group'? *What do you think*? This question can be answered in your reflections if you so choose.

Module 4 Guided Reflection

Module 4 Guided Reflection

Traditionally, reflections were recorded in a journal and submitted to the instructor on paper at the end of the course. However, since this is an online course, your reflections can be embedded within Canvas for me to read as we progress through this course. You may want to compose this offline and then cut and paste it in.

The questions below are only intended to guide you through your reflections, so you do not necessarily need to address these topics. These are suggestions but I ask that you do stay on the course topics for your reflections. You may pick one of the topics below and discuss it thoroughly or you may come up with your own questions pertaining to what we have learned in this module.

Challenge yourself to think critically about the above theories and concepts. You may do your own research following the introduction to these (new?) concepts also. These reflections are private and only to be read between you and me and will remain as such throughout the course.

I do not require a minimum or maximum word count as that is usually not required when sharing your inner-most thoughts about the various topics you will reflect upon. I will leave that up to you.

Guided Reflection Theme:

- In *the* first YouTube video in this module, it was stated that half a trillion dollars are given directly and indirectly each year in agricultural subsidies.
 - Do you agree with this?
 - How can these dollars be better allocated?
- If you could create a policy, what are some of your suggestions for a redistribution of agricultural dollars?
- In the "Individual Approaches to Addressing Climate Change United Nations Documents on Food Security, Climate Change, and Adaptation (Reading)" a number of resources were provided to you for your own learning goals and aims. If any of these websites and topics resonate with you, please explain what they are and why?
- In the "Individual Approaches to Food Security During Climate Change What are some of the Climate Actions we can take towards achieving Food Security? (Reading)" I ask at the end of the activity what you think about a comment made to me by a colleague. Please comment on this if you wish.
- As this is your last Reflection Activity, you may choose to reflect on any topic within this course.
 We have covered a lot of material in a very short time so your reflection can include aspects of the entire course itself, or something of particular interest. I welcome all comments.

Module 4 Closing Remarks (Mini Lecture)



An interactive or media element has been excluded from this version of the text. You can view it online here: <u>https://pressbooks.bccampus.ca/foodwatersecurity/?p=168</u>

Video Transcript: <u>FWSMod4-4.2-Closing-Remarks</u>