"Increase awareness of meaningful actions that you and your community can take to enhance the resiliency of community food systems in order to be better prepared for short and long-term natural or man made hazards."

Food System

Building a Resilient Food System

National Disaster Preparedness Training Center
Department of Urban and Regional Planning
University of Hawaii at Manoa

PLAN 751- SPRING 2014
Practicum Project

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Building a Resilient Food System

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PLAN 751: Spring 2014 Planning Practicum

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# Table of Contents

Introduction ................................................................................................................................. 1  
What is the Point of Planning and this Practicum? ................................................................. 1  
Defining the Problem ............................................................................................................... 2  
Process ..................................................................................................................................... 2  
Why Threads and Scales? ........................................................................................................ 3  
Group Dynamics: How Did We Work Together, Make Decisions, and Adjustments? ........ 4  
Content ........................................................................................................................................ 5  
How to Use the Content ........................................................................................................... 5  
What Did We Leave Out? ....................................................................................................... 7  
Concluding Thoughts: What Did We Learn? .............................................................................. 7  
Module 2: Context....................................................................................................................... 9  
Scope Statement ...................................................................................................................... 9  
Terminal Learning Objective (TLO) ....................................................................................... 9  
Enabling Learning Objectives (ELO) ..................................................................................... 9  
Lesson Topics .......................................................................................................................... 9  
Instructional Method ................................................................................................................ 9  
Research ................................................................................................................................... 9  
  Vulnerability/Food Insecurity .............................................................................................. 9  
  Food Security ..................................................................................................................... 15  
  Resilient Food Systems ....................................................................................................... 17  
  Approaches to Resilient Food Systems .............................................................................. 19  
  Toolbox: Overview of Definitions/Terms ......................................................................... 32  
  Case Studies ....................................................................................................................... 33  
  Exercise .............................................................................................................................. 33  
Module 3: The Global System .................................................................................................. 35  
Scope Statement ..................................................................................................................... 35  
Terminal Learning Objective (TLO) ....................................................................................... 35  
Enabling Learning Objectives (ELO) ..................................................................................... 35  
Lesson Topics .......................................................................................................................... 35  
Instructional Strategy ............................................................................................................. 35  
Research ................................................................................................................................... 35
Introduction

What is the Point of Planning and this Practicum?

Throughout the course of the semester, the question of why planning exists was posed to the practicum team. After reflecting upon our experiences both in the Department of Urban and Regional Planning and our own personal lives, our team believes the role of the planner is to:

- Identify and evaluate alternatives to bound possibilities
- Clarify and codify values
- Address market failures
- Improve equity, fairness, and justice

Each of the aforementioned roles of the planner is required to establish a resilient food system that enables a community’s food security. Providing citizens and decision makers with all available information on resources, capacities, and vulnerabilities as well elements outside of the immediate sphere of influence that impact their system enables a platform for establishing more resilient and secure systems. In doing so with an open process, planners can assist in codifying a values system that addresses market failures and improves equity, fairness, and justice by increasing the resilience within their locus of control.

Through research, lectures, and a collaborative process, the practicum team compiled information for a course for the National Disaster Preparedness Center on creating resilient food systems. The course is designed as an eight hour session that increases awareness of meaningful actions that a community can take to enhance the resiliency of community food systems in order to be better prepared for short and long-term hazards.
Defining the Problem

At the outset of the practicum, it appeared that our task was to “solve the problem of food security.” The geography, demographics, and capacity of individual communities vary widely; as such it is imperative that planners understand the breadth of the issue and how outside factors impact their individual situation (and vice versa). Almost immediately our group realized that a universal solution for such a complex problem does not exist and is especially not possible within the context of an eight-hour course. What is possible is providing a more holistic understanding of the problem by bringing together different perspectives across different scales to allow participants to broaden their aperture. This practicum and the development process taught us that there is a real need for flexibility – in global, national, and local policies, markets, and in programmatic approaches.

Process

This course was developed in three phases: research, review and outlining outcomes, and development. In the research phase, we read from literature selected by the National Disaster Preparedness Training Center and gained the perspective of guest speakers from the state and local levels to understand their take on food security. Speakers included food system and land use subject matter experts from Ma’o Farms, Kamehameha Schools, Hawai‘i Department of Agriculture, UH West Oahu, UHERO, and the National Disaster Preparedness Training Center. Although the preliminary outline for this course featured modules focused on individual topics of resilience, supply chains, policies, and legislation, after reviewing literature and hearing from guest speakers it was apparent that most only focus on their individual locus of control; therefore we revised the course objectives and flow in the review and outlining phase.
At the outset of the practicum we were asked to draw from previous planning courses we had taken to develop the course content so as to gear the course towards planners. One recurring theme throughout the DURP curriculum is the importance of scales, loci of control, and spheres of influence as a key to implementation of policies and plans; consequently, we decided that focusing modules on scales would better demonstrate how the entire food system works and interacts. We felt that a scalar focus would also encourage students to think outside the box and understand how their individual sphere of influence is impacted by outside forces. Conversely, a scalar focus illustrates how an individual’s locus of control impacts the larger system. While the content was organized by scale, the original topic threads were still critical to the final product and therefore included. The review and outlining phase was concluded with the formulation of the course goal as “increasing awareness of meaningful actions that you and your community can take to enhance the resiliency of community food systems in order to be better prepared for short and long-term hazards.”

After reviewing and outlining the course, each team member was assigned a topic thread and a module to manage to ensure appropriate cross-checking and editing occurred throughout the development process. This ensured a comprehensive review and interactivity of content throughout the final product.

**Why Threads and Scales?**

When reading through the pre-determined modules we noticed that each module presented relevant themes that could be discussed in several other sections. We spent time brainstorming how to best organize the information in a way that could be carried throughout the entire course. In order to understand the effects of a local food system, one must also be aware of the global and regional levers of influence that work together to foster (or prohibit) resilience.
Throughout the course, case studies are explored to further enhance and illustrate the concepts of food security, vulnerability, and resilient food systems. By using the given topic threads to develop scalar modules, the team felt that the development process would be appropriately reflective, and ensure teamwork in a streamlined manner. The team also believed that organizing the end product by scalar modules would create a course in which prospective students developed a broader understanding of food security and resilient systems.

**Group Dynamics: How Did We Work Together, Make Decisions, and Adjustments?**

Throughout the practicum, the project team’s cooperation, camaraderie, and overall group dynamic were exceptionally strong and helped turn what was initially a foggy task into a planning problem. While each group member brought different backgrounds, levels of experience, values, strengths, and weaknesses to the table, a fundamental respect for each other, the process, and the importance of the project endured. Although individuals were responsible for specific content, the designed overlap of assignments prevented information stove piping and fostered collaboration.

The decision-making process for this practicum was fairly straightforward; each member was responsible for their assigned content and would periodically brief the team on their progress. As questions came up or decisions were required, the individual issue would be brought to the group and upon establishing consensus a decision would be made and the project moved forward. One advantage of the continuous cross-checking was that the process resolved most issues organically. The use of google docs and the comment function facilitated the continuous evaluation and efficiently streamlined completion. Finally, as individuals completed
content, other members provided a final review to ensure consistency of content, potential opportunities for overlap, and general editing.

**Content**

**How to Use the Content**

The context module is an overview of the significance of, and relationship between, food security and resilience. We examine vulnerabilities to the food system and address how they create food insecurity. It is here that we review various elements of the supply chain to understand its role in establishing food systems. This module lays a foundation for the rest of the course where participants will learn the relationship between food security and resilience, the role that food security and vulnerability plays in the development of resilient food systems, and finally, the contribution of supply chains, as well as policies and legislation that facilitate the development of resilient food systems.

The global module expands on the context module, discussing how global supply, trade, and policies impact the global food system and its resilience. In this module we learn about the interconnectedness of infrastructure, networks, and technology that create the global supply chain. The module then discusses the levers of influence available within the planning and policy toolbox that shape the global food system. Finally, a review of the 2007-2008 global food price crisis illustrates how shocks to the global system impact the security of national and local food systems.

The national/regional module emphasizes the importance of a continuous flow of goods across borders as well as ensuring that those resources are managed so as to ensure constant availability. A discussion of how resilience within the supply chain requires a collaboration between the public and private sectors in order to balance policy and market forces. The module
illustrates how cross-scale interactivity, national level programs, and regulations impact on resilience. It concludes by examining the systems of Australia and Cuba and how they are addressing food security and resilience.

The local module explores a variety of policies and programs that contribute to resilient food systems. Whereas the global and national modules provide broad illustrations of large systems, the local module contains more granularity when discussing supply, policies, and legislation. This section draws heavily from the American Planning Association’s *Policy Guide on Community and Regional Food Planning* in order to offer tools for participants to engage in actions at their respective agencies that both strengthens community and regional food systems and encourages the industrial food system to provide multiple benefits to local areas. The more specific focus was provided as it assumed that most course participants would be concerned with local levels of influence.

The exercise module is focused on applying the themes and topics presented throughout the course in a group exercise that requires participants to assess community food security as it relates to resilient food systems. Participants will learn what a community food security assessment is and how to conduct one. Mapping out the food system network of a community will help guide participants to think about, and identify, the various stakeholders, institutions, organizations, coalitions, and cooperatives that are all interconnected. This exercise allows participants to think about ways in which communities can increase and strengthen connections in the food system network in order to enhance resilience. Likewise, participants will collaboratively identify goals for their community’s food system, develop actionable steps to achieve those goals, and determine metrics to measure and evaluate progress.
What Did We Leave Out?

A considerable effort was made to provide a broad awareness at larger scales and more granularity at the local level, thus in depth specificities on higher level policies are absent from our report. Additionally, more discussion on bottom-up feedback to higher scales could be valuable to the larger discussion; this paper contains cursory discussions only. We also took great care to avoid providing normative statements on potentially divisive issues (such as GMOs) so as to provide unbiased content and to maintain focus on the core issue of food security and resilience. Finally, as previously stated, a universal solution to creating a resilient food system is also not included as it is the team’s opinion that one-size-fits-all solution is not possible.

Concluding Thoughts: What Did We Learn?

The problem of building resilient systems that enable food security is a complex one that encompasses a wide array of opinions on the necessary measures to achieve such a goal. Our team learned many lessons throughout this process but two in particular stood out:

- Influences from scales outside of one’s locus of control are extremely important to resilient systems
- No singular solution to creating a resilient system exists

These two lessons shaped our designated course objectives, research patterns, and general discussions throughout the development process. By bounding the course objectives to providing awareness of tools to increase food system resilience instead of providing a universal solution, our team feels that the course will foster a more comprehensive understanding of the problem for course participants. Creating a resilient food system that fosters food security requires flexibility – in global, national, and local policies, markets, and in programmatic approaches. The practicum team believes that the information compiled throughout this process provides the
baseline knowledge, tools, and resources to develop an appropriately flexible system for their particular sphere of influence.
Module 2: Context

Scope Statement
In this module, participants will examine the significance of and relationship between food security and resilience and the relationship between supply chains for food and vulnerability.

Terminal Learning Objective (TLO)
Participants will understand the significance of food security, resilience, and the relationship of the food system with supply chains through concepts, examples, and an exercise.

Enabling Learning Objectives (ELO)
At the conclusion of this module, participants will be able to:
- 2-1 Define food security and resilient food systems
- 2-2 Examine vulnerabilities to the food system and how they create food insecurity
- 2-3 Review various elements of the supply chain and understand its role in establishing resilient food systems

Lesson Topics
- The role of food security and vulnerabilities in the development of resilient food systems
- Relationship between food security and resilience
- The contribution of supply chains and policies/legislation to resilient food systems

Instructional Method
- Lecture
- Instructor-facilitated discussion on module
- Exercise

Research
Vulnerability/Food Insecurity
- Vulnerability is usually defined in relation to an outcome, such as hunger, food insecurity or famine → precludes/prevents the understanding or evaluation for how susceptible a population is to such shocks (Dilley & Boudreau, 2001)
- In food related contexts, vulnerability means: famine, food insecurity, hunger → undesirable outcomes themselves that vulnerable populations face (Dilley & Bourdreau, 2001, p.3)
- Defining vulnerability in relation to outcomes rather than event is an issue of semantics(Dileey & Bourdreau, 2001, p.7)
  - “risk” in a disaster context = “vulnerability” in food security
  - “hazards in disasters = “risks” in food security
- Vulnerability = external shocks and susceptibility (Dilley & Bourdreau, 2001)
- “The notion of vulnerability is conceptually straightforward. Every population is vulnerable to an emergency” (Dilley & Bourdreau, 2001, p.9)
  - economic, institutional, social, and climatic variables make some populations more vulnerable to famine than others at any point in time
- For food security, vulnerability is the relationship between shock factor and access to food
Vulnerability is a function of how a particular population’s options of access to food is affected by different shocks (Dilley & Bourdreaux, 2001, p.13)

- “This explains the vulnerability to environmental change as a function of exposure to an environmental hazard, which is mediated by social factors and institutions, which combine to determine the adaptive capacity and hence the overall vulnerability of the food system” (Ericksen, 2008, p. 6)

- Global environmental change affects food systems which can negatively affect food security and future food system performance → need to look at vulnerability from a global environmental change perspective (Ericksen, 2008, p. 1)
  - Allows us to understand how food systems are vulnerable to current and future environmental stressors (Ericksen, 2008, p.1)
  - “frames the consequences of environmental change for food systems in the context of socioeconomic and political change so as to understand the synergistic effects of multiple stresses that interact with food systems, sometimes making these systems vulnerable” (Ericksen, 2008, p. 1).

- Potentially future harmful consequences of global environmental change for food systems motivated by 4 schools of thought – all linked by policy considerations (Ericksen, 2008, p. 2)
  - Chronic food insecurity persists in parts of the world → projected changes in demographics and consumption patterns can change the ability for some populations to feed themselves in the next 50-100 years
  - Natural disaster events have heightened awareness of increasing threats of future events to cause disruption (“shock”) to food, income, and environmental security
    - These types of environmental shocks are a major concern, and modern society has little capacity to cope effectively, given widespread lack of proactive policy and preparedness
  - Ecosystem services enabling food production systems are being eroded through environmental trends, such as changes in nutrient cycles, hydrological cycles, vegetation cover and composition, and pollution → predictions of future climate change is furthering this complication with a change in spatial and temporal.
distribution of crop yields

- Greatest concern = while many improvements in human well-being depend on social, political, and institutional improvements, these same mechanisms are inadequate to substitute for ecosystem services
  - For example, decline in wild fisheries cannot be completely reversed with aquaculture
- These four concerns largely stem from increasing influence of human activities on the environment → “this strong human influence places the concern about the vulnerability of food systems in a broader context of concern about the tensions or tradeoffs between ensuring or improving human well-being and maintaining ecosystem services” (Ericksen, 2008, p. 3)

- “When a food system fails to deliver food security or has the potential to do so in the face of future stress, whether the stress is an economic shock, institutional failure, actors in conflict, or environmental change, the system can be considered vulnerable to one or more of the stresses” (Ericksen, 2008, p. 3)
- Households can become food insecure through the failure of one or more failures: availability, access, and utilization (Ericksen, 2008, p. 3)
  - Availability: production, distribution, and exchange networks of food
  - Access: affordability, how well markets function, whether or not preferences are met
  - Utilization: nutritional and social values of food, food safety
- Vulnerability is a function of exposure, sensitivity, and coping or adaptive capacity (Ericksen, 2008, p. 4)
  - Social Vulnerability
    - “coping capacity expresses the understanding that people need more than just access to resources to be less vulnerable, but also active strategies to manage resources in the face of risk” (Ericksen, 2008, p. 4)
    - “vulnerability is always caused by multiple stressors and is the product of complex interactions within the system, as well as those with a given disturbance such as environmental change” (Ericksen, 2008, p. 4)
    - Explained by entitlement theory
      - “Commonly associated with low wealth and economic and social isolation or weak connections” (Ericksen, 2008, p. 6)
  - Ecosystem/Ecological Vulnerability
    - “an ecosystem cannot withstand shocks or stresses without losing its basic ecological properties and shifting to a different state (Ericksen, 2008, p. 5)
      - It is assumed that human activity drives this vulnerability
    - Explained by resilience theory
      - When they are high in wealth and connections, they may be most vulnerable to collapse” (Ericksen, 2008, p. 6)
- Globalization can also impact food systems
Corporations’ modern food systems (factory-based processing, supermarket-controlled retail, industrial agriculture production) may be vulnerable to shocks

- Vulnerability “arises from the degree of specialization and homogenization, which can make it difficult to adjust to changes in preferences or to serve smaller markets” (Ericksen, 2008, p. 7)
- “It is not sufficient to address each food system activity or outcome separately because the vulnerability of a system arises from the sequencing of certain processes and activities and the interactions among them” (Ericksen, 2008, p. 8)
- Table 2: Ericksen, 2008

### Table 2. Characteristics of food systems that may indicate vulnerability.

<table>
<thead>
<tr>
<th>Food system characteristic</th>
<th>Potential links to vulnerability in the food system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy reliance on external or distant resources</td>
<td>Hard for consumers to react to production problems; more potential for weak links in the commodity chain</td>
</tr>
<tr>
<td>Low diversity in assets or entitlements</td>
<td>Consumers have few options if regular food security entitlements fail; agricultural production is more susceptible to degradation or disturbance, the diversity of assets upon which to draw is critical to social adaptive capacity and ecological resilience</td>
</tr>
<tr>
<td>Inequity in either access to resources and/or the ability to take action to use or increase them</td>
<td>Inequity is a sign of social vulnerability</td>
</tr>
<tr>
<td>Institutional weaknesses and low institutional capacity</td>
<td>Institutional capacity is critical to management for both social and environmental outcomes; weak institutions result in poor management</td>
</tr>
<tr>
<td>Inflexible policy</td>
<td>Adaptation in complex systems requires flexible management</td>
</tr>
<tr>
<td>Lack of functioning markets and low levels of economic activity</td>
<td>Markets play a key role in food systems and ensure that demand meets supply; low levels of economic activity constrain access to food</td>
</tr>
<tr>
<td>Highly specialized production, supply, and marketing chains</td>
<td>Highly specialized chains have low diversity, which is a key component for buffering against shocks such as production failures</td>
</tr>
<tr>
<td>Ignoring slow variables and only responding to fast triggers</td>
<td>Ecological resilience depends on slow variables</td>
</tr>
<tr>
<td>Cross-scale interactions, including subsidies, that are poorly understood and lead to uncertainty and surprise</td>
<td>Surprises usually lead to crises; uncertainty can paralyze decisions</td>
</tr>
<tr>
<td>Insufficient recovery from previous shocks that have reduced the adaptive capacity</td>
<td>When the adaptive capacity is eroded, vulnerability is increased and resilience is lost when a shock or surprise overwhelms the system</td>
</tr>
</tbody>
</table>

- Direct marketing has been a key component of community food security programs with the goal of reducing insecurity and supporting rural communities by strengthening traditional ties between farmers and urban consumers (Martinez, 2010)
- Despite the use of local foods as a strategy to reduce food insecurity, little research has been conducted to examine its efficacy in reducing insecurity (Martinez, 2010)
- There is no expectation that local food systems will address the needs of low-income households who are subject to food insecurity (Martinez, 2010)
- Globalization, though one of the most enchanting experiences of human civilization, undermines local economic resilience, creating an unnecessary and unhealthy dependence
on foreign goods which communities could produce at home (Grewal & Grewal, 2012, p.1)
  - Also undermines a community's autonomy
    - most basic necessities, such as food and energy
  - Globalization negatively affects local economic resilience, autonomy, the
    environment, and sustainability (Grewal & Grewal, 2012, p.2)
- The current food crisis reflects the environmental vulnerability, socially inequity, and
  economic volatility of corporate food regime (Holt-Gimenez, 2011, p.4)
- While food system reforms – such as localizing food assistance, increasing aid to
  agriculture in the Global South, increasing food stamps and funding research in organic
  agriculture – are certainly needed and long overdue, they don’t alter the balance of power
  within the food system, and in some cases, may even reinforce existing inequities. (Holt-
  Gimenez, 2011, p.4)
- In the 1980s, several nongovernmental observers estimated that about 20 million people
  in the US are chronically malnourished (Kent, 2005, p.165)
- In 1999, USDA reported that some 31 million Americans were food insecure, in the sense
  that they did not have ensure access at all times to enough food for an active, healthy life
  (Kent, 2005, p.165)
- Every day, one out of six people in the US receives assistance from one or more of the
  Food and Nutrition Service programs
  - In 1997, the Food Stamp program reached only 62% of those who were eligible
    (Kent, 2005, p.166)
- Misconception that food insecurity can be solved/addressed by producing more food
  (Lang & Barling, 2012, p.1)
  - Centered on availability, hunger and unmet needs
- Today food security is more complex and driven by the social, environmental and health
  pressures on food supply (Lang & Barling, 2012, p.1)
- Society depends on agro-ecological and trading systems to provide food for urban
  residents, but there are few tools available to assess whether these systems are vulnerable
  to future disturbances (Fraser et al., 2005, p.1)
  - Vulnerability is determined by 3 characteristics
    - The wealth available in the system
    - How connected the system is
    - How much diversity exists in the system
  - These approaches can lead to better tools for developing policy that can reduce
    vulnerability and can help planners identify where food systems are vulnerable to
    shocks and disturbances that may occur in the future
- Panarchy: landscape ecologists are particularly interested in a framework that helps
  establish the vulnerability of systems (Fraser et al., 2005, p.2)
  - Three characteristics of ecosystems that are likely to be significantly affected by
    disturbances
    - Inherent potential of a system that is available for change
    - The degree to which a system can control external forces
    - Diversity of the system
  - These three can help illuminate vulnerability in social systems
• Connectivity is an important aspect of vulnerability → one method to evaluate connectivity is to assess the pathways that a disturbance might take through the landscape to affect urban food systems (Fraser et al., 2005, p.5)

• Focusing on transport media (the atmosphere, water – lakes and oceans, earth), provides an opportunity to evaluate how urban food systems can be affected by remote events and track the outputs of human activity, including energy, chemicals, biota and pathogens, from their ultimate fate (Fraser et al., 2005, p.6)
  – Makes it possible to identify future vulnerabilities in human systems, and ultimately should allow us to prevent the problems by changing our practices at the source

• Diverse systems are better able to withstand shocks than simple ones (Fraser et al., 2005, p.7) → this is because there is a correlation between diversity and stability in ecology

• Another strategy to decrease vulnerability in the food system would be to consciously and deliberately maintain trading links with numerous regions around the world (Fraser et al., 2005, p.10)
  – Having multiple trading partners will help minimize unsystematic risks associated with global environmental change

• Identifying which regions are vulnerable to environmental problems, however, is challenging because food systems represent constantly evolving systems where farmers continually make decisions that help adapt to changing circumstances (Fraser, 2007, p.1)

• Our globally integrated economy may have resulted in a food system that is economically, socially, and environmentally unsustainable in the long-term and vulnerable to any shocks or disturbances that may emerge in the short-term (Fraser, 2007, p.2)

• Identifying a framework for vulnerability to climate change within food systems (Fraser, 2007, p.5)
  – Collect data on characteristics of agro-ecosystem
    • Crop diversity, soil organic matter
  – Assess whether or not there are viable management options that would allow farmers to adapt to environmental changes
    • Easily accessible irrigation systems
  – Community level policy makers to assess the extent of assets such as social networks as well as financial and natural assets to determine if communities would be able to survive an environmental crisis
    • Would people be able to rely on friends and family in areas unaffected by a problem to send money or food

• Vulnerability in the food system requires a detailed understanding of how socio-ecological systems respond at four scales (ecosystem, farm, community, and institution) and that these scales act as our different lines of defense against the problems posed by climate change (Fraser, 2007, p.7)

• Usually defined in relation to an outcome, such as hunger, food insecurity or famine → precludes/prevents the understanding or evaluation for how susceptible a population is to such shocks (Dilley & Bourdreaux, 2001)

• Vulnerability is usually defined in relation to an outcome, such as hunger, food insecurity or famine” (Dilley & Bourdreaux, 2001, p. 1)

• Vulnerability helps identify characteristics of a population/group that make them
susceptible to experience damage when exposed to hazards/threats/shocks (Dilley & Bourdreau, 2001, p.1)

- Clear definition remains unclear and inhibits ability to conceptualize the real problems that food-insecure families face (Dilley & Bourdreau, 2001, p. 2)
- Vulnerability came to be known recognized that it is the extent to which people suffer from calamities of any kind, which also depends on their likelihood of being exposed to hazards/shocks or their capacity to withstand them (related to socio-economic circumstances) (Dilley & Bourdreau, 2001, p. 3)
- From disaster management perspective, vulnerability is contingent on hazard event (Dilley & Bourdreau, 2001, p. 3)
  - The degree of loss to a given element at risk or set of elements resulting from the occurrence of natural phenomenon of a given magnitude.
- Risk = vulnerability X probability
- Shift from disaster focus of vulnerability to the relationship of vulnerability to its outcome (outcome = famine…) (Dilley & Bourdreau, 2001, p.5)
- Vulnerability refers to: “exposure to contingencies and stress, and difficulty in coping with them” (Dilley & Bourdreau, 2001, p. 5)
  - Two sides: external side of risk/shocks/stress to which an individual/household is subject to and the internal side of defenselessness/lack of means to cope
- Prevention and preparedness frameworks of food security deal with the magnitude of events, people’s susceptibility to these events, and the resulting outcomes (Dilley & Bourdreau, 2001, p.7)

**Food Security**

**Definition**

- Food security = “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Ericksen, 2008, p. 3)  
  □ FAO, 1996
- “Food security is the principal policy objective of a food system. Food security outcomes are described in terms of three components and their subcomponents: food availability, i.e., production, distribution, and exchange; food access, i.e., affordability, allocation, and preference; and food use, i.e., nutritional and social values and safety” (Ericksen, 2008, p. 18)
  - Outcomes determined directly by socio-political and environmental drivers and vary by historical, political, and social context (Ericksen, 2008, p. 18)
- Life Sciences Research Office of the Federation of American Societies for Experimental Biology, 1990: Food security is access by all people at all times to enough food for an active, healthy life and includes at a minimum: a) the ready availability of nutritionally adequate and safe foods, and b) the assured ability to acquire acceptable foods in socially acceptable ways. Food insecurity exists whenever a or b is limited or uncertain (Anderson & Cook, 1999, p.3)
- Those who are food insecure have limited or uncertain availability of healthy and safe food or have uncertain ability to acquire food in normal ways (Martinez, 2010, p.54)
• As of 2008, more than 6.7 million households in the US had very low food security (i.e., multiple instances of reduced food intake and disrupted eating patterns) (Martinez, 2010)
• While programs with local food characteristics impact healthy food choices, food security is influenced by other factors, such as economic conditions, income, and poverty status (Martinez, 2010, p.54)
• Universal Declaration of Human Rights: Everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control (Kent, 2005)
• International Covenant on Economic, Social, and Cultural Rights: recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions (Kent, 2005, p.59)
  o Not simply for adequate food but adequate standard of living
• Definition of food security by UN’s Food and Agriculture Organization – FAO
  o “…a situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life” (Lang & Barling, 2012, p.1)
• Food security: first developed around 1960s/70s, as the ability to meet aggregate food needs in a consistent way (Anderson & Cook, 1999, p.2)
• World Food Conference, 1974: emphasized producing enough food for world needs. Supply needs to be reliable, and avoid dramatic price fluctuations (Anderson & Cook, 1999, p.2)
• “The existence of a sharp disparity between total food supply and people’s access to that food was obvious early on, however, particularly to those trying to improve food access in poor countries. Introduction of new agricultural technology in developing countries as part of the Green Revolution demonstrated that large increases in production did not necessarily improve food access by poor people.” (Anderson & Cook, 1999, p.2)
• Next shift early 1980s: food security analysis began to include ensured food access in addition to production of adequate supplies (Anderson & Cook, 1999, p.2)
  o Food access: individuals or households with food security assessed directly by food-intake surveys, or indirectly through proxies like poverty, real wage rates relative to food prices, employment, and demand on the emergency-food supply system
• Transition from “food first” (assuring short-term nutritional intake is the main objective) to “livelihood” (secure, sustainable livelihoods were considered to be necessary and often sufficient condition for food security) (Anderson & Cook, 1999)
  o Food security now viewed as dependent on individuals and households having a reliable source of livelihood
  o Requires a longer time-frame or planning horizon than “immediate”
• Next shift: change from reliance on objective measures of food security (target consumption levels or access to required daily caloric intakes) to more subjective dimensions of food security (emphasizes the quality of food available or people’s anxiety about food availability) (Anderson & Cook, 1999, p.3)
• 1990: creating food security rather than simply ending hunger (Anderson & Cook, 1999,
Sustainable agriculture advocates looking for production, distribution, and marketing mechanisms that will provide food security for people who are underserved by trends in food systems (Anderson & Cook, 1999, p.4)

Community food security an “extension” of food security: all persons in a community having access to culturally acceptable, nutritionally adequate food through local non-emergency sources at all times (Anderson & Cook, 1999, p.6)

Most fundamental problem impeding a clear definition of Community Food Security is the vagueness of the “community” concept

A lack of clarity regarding what “community” entails means that there is not yet a clear understanding about how household or individual level food security is related to community food security (Anderson & Cook, 1999)

Should the criterion of cultural acceptability only apply to people who have grown up in a culture in which such items are traditional? Or should it apply only to food staples? (Anderson & Cook, 1999, p.6)

The bridges between Community Food Security and individual/household level food security and hunger, and the various factors that determine them must be specified in the conceptual model in order for the points of policy and other types of interventions clear (Anderson & Cook, 1999, p.7)

Resilient Food Systems

Definition

Food systems encompass a variety of components, including: social, institutional, and ecological → each presents their own challenges and vulnerabilities to environmental change (Ericksen, 2008, p. 1)

“Food systems comprise a set of activities and outcomes ranging from production through to consumption, which involve both human and environmental dimensions” (Ericksen, 2008, p. 3)

Food systems are often described as comprising four sets of activities: those involved in food production, processing and packaging, distribution and retail, and consumption. All encompass social, economic, political, and environmental processes and dimensions. To analyze the interactions between global environmental change and food systems, as well as the tradeoffs among food security and environmental goals, a food system can be more broadly conceived as including the determinants (or drivers) and outcomes of these activities. (Ericksen, 2008, p. 18)

The Current Food System

Food - along with water, and air – is the essence of life (The People’s Food Plan, 2012, p.15)

Healthy food systems are needed to:

Feed all people well
Look after all food producers
Nurture the land, water and ecosystems from which food is produced

Food is not a simple commodity, like cars or computers or mobile phones
Being essential to life, food systems must be life-enhancing and life-sustaining.
- The globalized food system of recent decades has become all too often life-degrading and life-threatening
- More land is cleared every year, and rural communities displaced in a global ‘land and water grab’ to keep the system expanding

- Planning for fair food systems (p.43)
- Building fair food systems (p.51)
- There is no consensus on a definition of “local” or “local food systems” in terms of the geographic distance between production and consumption (Martinez, 2010, p.3)
- Food system = chain of activities connecting food production, processing, distribution, consumption, and waste management, as well as all the associated regulatory institutions and activities (Pothukuchi & Kaufman, 2000, p.1)
  - Important to the health and vitality of communities
- Sustainable Development Commission: sustainable food systems, where the core goal is to feed everyone sustainably, equitably and healthy; which addresses needs for availability, affordability and accessibility; which is diverse, ecologically-sound and resilient; and which builds the capabilities and skills necessary for future generations (Lang & Barling, 2012, p.9)
- A food system depends on: a functioning global market, open trade routes, affordable energy, and stable weather conditions for crops to flourish (Fraser et al., 2005, p.2)

**Distinction from and connection to food security**
- Global = resilient food system, but all disasters are local
  - At the local level we’re addressing food security
- Economic growth contributions to food systems can be shadowed by increased inequity in profits and power as well as food distribution at multiple scales (Ericksen, 2008, p.1)
- A resilience approach to food systems maintains that adaptive management is critical to maintaining system resilience and avoiding a flip to an undesirable state
  - Adaptive management accepts change and fluctuations as the norm and is important for maintaining system resilience (Ericksen, 2008, p.5)
- Though there is no consensus, the US Congress in the 2008 Food, Conservation, and Energy Act (2008 Farm Act), the total distance that a product can be transported and still be considered a “locally or regionally produced agricultural food product” is less than 400 miles from its origin, or within the State in which it is produced (Martinez, 2010, p.5)
- Barriers to local food market entry and expansion (Martinez, 2010):
  - capacity constraints for small farms and lack of distribution systems for moving local food into mainstream markets
  - limited research, education, and training for marketing local food
  - uncertainties related to regulations that may affect local food production, such as food safety requirements
- Empirical research has found that expanding local food systems in a community can increase employment and income in that community (Martinez, 2010, p.7)
- Growing interest in local foods in the US is the result of several movements (Martinez, 2010, p.9)
o Environmental: encourages people to think about geographic dimensions in their food choices (long distance transport increases GHG)
o Community food security: seeks to enhance access to safe, healthy, and culturally appropriate food for all consumers
o Slow food: a response to homogenous, mass-produced food production, and the “fast” nature of people’s lives, by encouraging traditional ways of growing, producing, and preparing food
o Local food: reflects an increasing interest by consumers in supporting local farmers, and in better understanding the origin of their food

- Federal, state, and local programs devote significant resources to support local foods, because growth in local foods is expected to generate public benefits that are currently lacking in the food marketing system (Martinez, 2010, p.49)
- Paradigm shift need → local self-reliance: localities should be able to obtain at least their basic necessities, if not more of their goods, from within their own physical footprints (Grewal & Grewal, 2012)
  o Encourages communities to use their limited resources in the most efficient and sustainable manner, and grants localities both autonomy and economic resilience, counteracting the major negative externalities of globalization
  o Still encourages the global exchange of ideas and technology but entails that localities be as self-reliant as possible with regards to basic necessities like food, energy, water, and materials
- It is estimated that food in the US travels an average of 1500 miles from the farm to our plates (Grewal & Grewal, 2012, p.2)
- Localization of food will require considerable natural resources including land, buildings, nutrients, and water all of which may have other competing uses (Grewal & Grewal, 2012, p.9)
- City governments can mobilize local, state and federal resources to promote local self-reliance in food to stimulate local economic development, enhance overall food security and access to healthier food, and generate employment and entrepreneurial opportunities for residents in the food system (Grewal & Grewal, 2012, p.10)
- There is less recognition of how extensive change must be before food systems are sustainable (Lang & Barling, 2012, p.10)
  o The only food system to be secure is one that is sustainable, and the route to food security is by addressing sustainability

Approaches to Resilient Food Systems
Supply Chains: Distribution of resources
- General info
  o Supply Chains: Distribution of resources
    - Refers to the processes that describe how food from a farm ends up on our tables. The processes include production, processing, distribution, consumption and disposal.
    - Supply chains are economic and social entities (McLachlin and Larson 2011)
• Local
  o The local food supply chain lacks mid-scale, aggregation and distribution systems that move local food into mainstream markets in a cost-effective manner (Martinez, 2010, p.32)

  o In the last three decades a collection of linear supply chains has become a complex adaptive network of demand creating supply.
  o Transportation, technological, and communications improvements over the past thirty years have transformed a dense lattice of overlapping chains of supply into a shared network for on-demand delivery
  o In the last generation the rate of change and improvement in moving goods is most significant since steam-power transformed maritime shipping and made railroads possible.
  o Three sources of resilience for supply chains:
    • Diversity of roles and functions
      o Effective defense; functional diversity of a system increases the chance for diversity of response under stress
      o Now, fewer competitors in particular niches (less structural redundancy), significant increase in niches (more functional diversity)
    • Decentralization and self-organization
      o Complex systems are innately self-organizing; dynamic communications among participants produce shared behaviors to which the system is attracted and around which system equilibrium unfolds.
      o Supply capacity has become more concentrated in fewer players and places, the number of demand signals has exploded and number of distribution players is highly decentralized
    • Adaptability
      o Resilience can mitigate the negative consequences of change through adaptation
      o Diversity and self-organization are inputs that increase the likelihood of positive adaptation to change.
Sequence: Production – Processing – Distribution – Consumption – Waste

http://www.cdc.gov/foodsafety/images/food_production_chain_900px.jpg
Production: Land – Water – Labor – Capital

1. Land
   a. The concept of land, while seemingly simple, refers to the complex association of soil, terrain, water, climate, and biotic resources that characterize any particular location on the earth’s surface. (Wiebe 2003)

![Figure 1.3—Land degradation effects over space and time](image)


### Table 2.1—Dominant soil stresses

<table>
<thead>
<tr>
<th>Dominant soil stress</th>
<th>Global land area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million km²</td>
</tr>
<tr>
<td>Continuous moisture stress</td>
<td>36.5</td>
</tr>
<tr>
<td>Continuous low temperatures</td>
<td>21.8</td>
</tr>
<tr>
<td>Seasonal moisture stress</td>
<td>10.3</td>
</tr>
<tr>
<td>Low nutrient-holding capacity</td>
<td>7.8</td>
</tr>
<tr>
<td>Shallow soils</td>
<td>7.4</td>
</tr>
<tr>
<td>Excessive nutrient leaching</td>
<td>4.5</td>
</tr>
<tr>
<td>High aluminum</td>
<td>4.1</td>
</tr>
<tr>
<td>Low moisture and nutrient status</td>
<td>3.5</td>
</tr>
<tr>
<td>Low water-holding capacity</td>
<td>3.4</td>
</tr>
<tr>
<td>Other stresses</td>
<td>27.2</td>
</tr>
<tr>
<td>Few constraints</td>
<td>4.1</td>
</tr>
<tr>
<td>Total</td>
<td>130.6</td>
</tr>
</tbody>
</table>

Source: Eswaran et al. (various years).
**Figure 3.2—Global cropland cover**

![Map of global cropland cover]

Source: ERS, based on USGS Global Land Cover Characteristics database.

**Table 4.2—Mean loss in annual yield per ton of soil erosion**

<table>
<thead>
<tr>
<th>Region</th>
<th>Crop</th>
<th>Experiments</th>
<th>Mean yield</th>
<th>Mean yield loss per ton of soil erosion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Tons per hectar</td>
<td>Kg per hectar</td>
<td>% of mean yield</td>
</tr>
<tr>
<td>Africa</td>
<td>Maize</td>
<td>42</td>
<td>2.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Asia</td>
<td>Maize</td>
<td>4</td>
<td>1.7</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Millet</td>
<td>2</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Soybeans</td>
<td>4</td>
<td>0.9</td>
<td>-0.5</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td>4</td>
<td>3.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Australia</td>
<td>Potatoes</td>
<td>2</td>
<td>54.1</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td>16</td>
<td>1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Europe</td>
<td>Millet</td>
<td>2</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td>2</td>
<td>11.4</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Soybeans</td>
<td>1</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td>8</td>
<td>3.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Latin America</td>
<td>Maize</td>
<td>15</td>
<td>2.9</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td>1</td>
<td>20.2</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>Soybeans</td>
<td>4</td>
<td>2.1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td>1</td>
<td>2.1</td>
<td>0.4</td>
</tr>
<tr>
<td>North America</td>
<td>Maize</td>
<td>131</td>
<td>6.2</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td>3</td>
<td>30.5</td>
<td>127.0</td>
</tr>
<tr>
<td></td>
<td>Sorghum</td>
<td>17</td>
<td>4.2</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Soybeans</td>
<td>43</td>
<td>2.1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Wheat</td>
<td>64</td>
<td>2.6</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Note: Some studies report multiple experiments.

Source: den Biemelaar et al. (forthcoming a).
2. Water

GALLONS OF WATER CONSUMED PER POUND OF RETAIL FOOD PURCHASED

3. Labor

a. Labor productivity measures help determine the incomes and welfare of people employed in agriculture (including the majority of rural people in developing countries). (Wiebe 2003)

b. Far cheaper labor costs in African nations, Morocco and Egypt have displaced Spain in just a few seasons as important suppliers of tomatoes and salad greens to central Europe. (Rosenthal 2008)
4. Capital

Processing
1. Entails the preparation and packaging of food for distribution

Distribution
1. Actually getting the food to the market / consumers
2. Requires physical transportation of goods via
   a. Air, Sea (Global)
   b. Rail, Highways (National, Local)
3. Transportation Infrastructure
   a. Better transportation networks have sharply reduced the time required to ship food abroad. For instance, improved roads in Africa have helped cut the time it takes for goods to go from farms on that continent to stores in Europe to 4 days, compared with 10 days not too many years ago. (Rosenthal 2008)
Consumption
1. The actual purchase and eating of food either via grocery stores, restaurants, farmers markets, etc.

Waste
1. ~1/3 of all food is wasted

Scales: International – National / Regional – Local
- Long vs. Short Supply Chains
  - Long supply chains: global
    - dependent on large scale public-private partnerships and trade agreements
    - food travels a long distance to get to consumers
  - Short supply chains: short distance and/or small number of intermediaries between producers and consumers
    - farmer’s markets
    - community supported agriculture
    - food hubs
- Worldwide, the distance and tonnage of food shipment have increased during the past decades. For example, the distance food travelled at the beginning of 21st century had increased by 50% in UK and by 25% in USA from what it travelled in the 1980s
The increase in food transport not only has negative impact on logistics cost and environment but also has increased risk for food quality, safety, security, and traceability (Bosana 2013).

- U.S. and U.K. have least expensive logistics chains (Rushton et al 2006). However, in countries - like USA, the increasing quantity of food transported, shortage of skilled truck drivers, ensuring safety of food, and satisfying customers’ demands remain as the main challenges (Ackerley et al 2010).
- In developing countries, the available transport infrastructures are relatively poor and physical destructions are common due to flooding, local and regional conflicts, and lack of appropriate maintenances. Inadequate logistics services are associated not only with product loss but also with food contamination, and spread of disease at different stages of food supply chain (Bosana 2013)

**Redundancies and Resilience**

- Professional planners approach resilience by creating “redundancy” or parallel systems to supply goods and services, much like backup generators and backup-backup generators. The same approach is being applied to the food supply of cities and regions. (Forster 2012).
- Before the tech revolution, the supply chain featured much more redundancy, safety inventory, and many more independent players than today. It was less complex, less resilient, more costly, and less efficient (Palin 2013).
- For most of the last generation the private sector search for comparative advantage has
resulted in substantial decrease in the supply chain’s structural diversity. Fewer firms play increasingly important roles. As a result, policy makers are inclined to increase regulations to require more redundancy in the supply chain (Palin 2013)

- Increase in traditional modes of regulation will reduce ability of the system to self-organize, undermining the likelihood of innovation under stress or otherwise.
- Public-private tug of war threatens to wring out two key components of resilience.
- Evidence has accumulated that externally imposed rules tend to “crowd out” endogenous cooperative behavior. Externally focused regulation can “undermine subsequent cooperation.”
- Precisely because government is not engaged as a competitor or vendor in the supply chain (but is an important customer), the government could serve as a facilitator or honest broker of boundary setting, rulemaking, and system sanctioning by supply chain stakeholders themselves.

- Redundancies go beyond infrastructure
  - Partnerships with multiple sources of supply
  - Understanding logistic and production capabilities of suppliers at various levels of geography
  - Irene as an example (Forster 2012):
    - Redundancy / resilience developed from understanding local capacities and forming partnerships to ensure post-disaster food
    - Pop up kitchens and food access points have been organized by humanitarian organizations, but also by bootstrap citizen initiatives. New York antihunger orgs that have hundreds of soup kitchen and pantry clients helped supply mobile soup kitchens and food deliveries in vulnerable communities.
    - Amidst the community response came “pop-up partnerships” between non-profits, food businesses, farmers, and market managers.
    - Adhoc partnerships to supply food in crises that bring farmers, community volunteers, and business owners to transport, prepare, and deliver food can lead to innovations that prepare for the next disaster even better, lead to innovations that become a new common practice. Efforts all require leadership and coordination; possibility of chefs as facilitators of community food security, not just ambassadors of healthy regional food systems.
    - In the wake of Irene farmers growing a diversity of fruits and vegetables or farming organically found themselves shut out from disaster relief and crop insurance programs. In the year since, crop insurances and relief programs have become available for them.

- Challenges to redundancies (Forster, 2012)
  - unlike with infrastructure and utilities, farms more dependent on weather, yields are variable
  - institutions and decision support systems complex
    - Food access decisions during non-crisis times are normally made outside the community by agencies, companies, and non-profits removed from the local community; after Irene, more control over New York’s food access was given to local farmers, orgs, etc.
• “It is only right that local authorities and community-based orgs should be allocating resources streaming in from outside their communities.”

Risk elements throughout the supply chain
• Supply changes (Bosona 2013)
  o Weather / crop yield impacts
  o Governance / political turmoil
  • Moyle notes: “Of all the commodities in world trade, food becomes the most political. That’s because you have farm subsidies in many countries, you have arguments over genetically modified foods, and so on. And, a lot of the revolutions that started last year were started over food shortages. Dictators stay in power when everyone’s being fed, but people take to the streets when they get hungry.”
  http://www.foodlogistics.com/article/10657347/the-global-food-supply-chain
• Energy prices
  o It’s likely that food prices in the U.S. will settle into their more historic trajectory, which means price increases in the neighborhood of two and a half to three and a half percent, says Kenneth Moyle, senior vice president, Coface North America. However, there are some wild cards in the current mix that could upset this forecast, he cautions. “Energy prices and natural disasters are the biggest ones,” while grain prices, too, could start to fluctuate sharply due to changes in the tax code. http://www.foodlogistics.com/article/10657347/the-global-food-supply-chain
• Physical destruction of infrastructure
  o Natural disasters
  o War /Terrorism
• Inadequate storage and handling

How can you counter risk?
• Improving infrastructures (in-farm and off-farm) for road, energy, communication and marketing sectors
• Improving food containers, storage and cold food chains
• Reducing transport time and distance
• Designing appropriate packing house at optimal location
• Providing training and improving packaging activities
• Improving loading and unloading (food containers and animals) activities
• Ensuring the ventilation of environment at all stages of food logistics chain (packing house and storage, within packages, in the vehicles).
• Labeling the food appropriately at the time of packaging
• Separating cooked (ready-to-eat) food from raw food during transportation to avoid cross-contamination of food
• Sanitizing the food packaging area, packaging machinery, and food transport vehicles
• Controlling the temperature properly, especially during food transport
• Promoting coordination and integration in food logistics management
• Providing appropriate training to drivers of food and/or animal transporting trucks
• Effective planning of optimal food transport routes
• Increasing the accessibility of information communication in rural areas
• Developing effective food traceability systems in which food chain operators are trained to produce, store, handle and transport food in accordance with food safety standards.

Toolbox: Overview of Definitions/Terms
• Policies / Legislation
  o The particular policy clarification desired for food systems are (Ericksen, 2008, p.2):
    • To help decision makers understand that environmental change has impacts beyond those directly felt in food production
    • To develop interventions that treat the underlying causes, rather than symptoms of vulnerability in food systems
    • To positions researchers and decision makers to better cope with the increasing global environmental changes that are predicted to occur over the next century
  o Dominant policy proposed that a combination of science and technology, and capital investment would enable an increase in food production if there is a better system for distribution and reduced waste (Lang & Barling, 2012, p.4)
    • Result would be to lower food prices and enable improved access and affordability
    • Increased production via a combination of better land management, agriculture, technology, requisite investment and aids to efficiency
    • Belief that human effort could feed more people, could become more affordable, population growth wouldn’t be an issues, and better livelihoods for farmers
  o Policy-making processes typically address single issues problems and not the connections (the production sphere with its environmental, natural resource and ecosystem impacts, or the impact of consumption on waste or public health impacts) (Lang & Barling, 2012, p.6)
  o Policy needs to be focused on maintaining the biological wealth of modern agriculture while maintaining diversity and limiting connectivity so that if a disturbance does threaten food supplies in one region, the problem cannot spread and so that urban consumers maintain a number of different avenues to obtain food (Fraser et al., 2005, p.11)
  o Farmland and community land trusts can be used to preserve agricultural land into the future, preventing development for other purposes that might threaten community and national food security and local food sovereignty (The People’s Food Plan, 2012, p.44)
    • A farmland trust is a ‘private, non-profit organization that preserves farms’ and arable land
    • Farmland trusts are registered legal entities, which may or may not have charitable status, depending on the jurisdiction in which they are incorporated
• Farmland trusts vary in scale, with some operating at the local level, others regional or nationally. The ownership structure of smaller-scale farmland trusts provides for a wide degree of community participation.

• Farmland trusts (The People’s Food Plan, 2012, p.45):
  o Permanently secure land for agricultural use and public benefit
  o Work collaboratively and in partnership with several agencies and organizations
  o Effective in meeting community interests in a region or a specific local farm

Case Studies
• Case study to determine the potential level of food self-reliance for the City of Cleveland (Grewal & Grewal, 2012)
  o The three scenarios can attain overall levels of self-reliance between 4.2% and 17.7% by weight and 1.8% and 7.3% by expenditure in total food and beverage consumption, compared to the current level of 0.1% self-reliance in total food and beverage by expenditure (p.1)
  o The 50 acres devoted to community gardens in Cleveland generate between 1.2 and 1.8 million worth of fresh produce annually (p.4)
    • Expenditure on fresh produce was calculated at 89 million a year with food and beverage at 1.5 billion fresh produce and 0.1% in total food and beverage
  o Cleveland spends 44.0 million on fresh vegetables, 25.7 million on fresh fruit, 36.4 million on poultry, 9.1 million on eggs, 2.1 million on honey
    Cleveland could produce at home given its natural and physical resources and climate (p.6)
    • Between 28.9 and 114.7 million could theoretically be retained in Cleveland, compared to the 1.5 million it currently retains
• Australia: Resilient food systems
  o There was strong support across forums for a greater emphasis on the role that urban agriculture can play, and is playing in building fair and resilient food systems for Australia
    • Participants spoke of a ‘diversified urban ecology in the cities,’ and how ‘vacant land should be prioritized for food production’; of the need to ‘cut red tape’ when it comes to community food initiatives; and the need to ‘integrate food growing into new public housing and high density developments’. (The People’s Food Plan, 2012, p.44)

Exercise
• What does your community’s supply chain look like?
  o Split into groups according to roles in local food system
  o Brainstorm and diagram the community supply chain
  o Being able to honestly respond to questions posed by NIST for Malcolm Baldridge Award makes catastrophic failure less likely:
• What are your key types of suppliers, partners, and collaborators?
• What role do these suppliers, partners, and collaborators play in the production and delivery of your key products and customer support services?
• What are your key mechanisms for communicating with suppliers, partners, and collaborators?
• What role, if any, do these organizations play in implementing innovations in your organization?
• What are your key supply-chain requirements?
Module 3: The Global System

Scope Statement
In this module, participants will discuss global food supply vulnerability, understand levers of influence within the global food system, and examine case studies that illustrate the importance of food system resilience.

Terminal Learning Objective (TLO)
Participants will examine the relationship between supply, trade, and policy within the context of the global food system.

Enabling Learning Objectives (ELO)
At the conclusion of this module, participants will be able to:

- 3-1 Understand the role of supply chains in the global food system.
- 3-2 Understand the role of policy and trade in the global food system.
- 3-3 Examine case studies addressing resilience of the global food system.

Lesson Topics
- The role of trade, commercial actors, and humanitarian actors in the supply chain.
- Levers of influence in the global food system toolbox.
- International examples of programs contributing to resilient food systems.

Instructional Strategy
- Lecture
- Instructor-facilitated discussion on module

Research
Globalization of the Food System
Increasingly, food comes from more distant sources, with serious consequences such as the loss of older local food system infrastructure, and threats to the survival of many U.S. farms. Although the U.S. rightfully prides itself as the breadbasket of the world, in 2006 for the first time, the value of food imported into the U.S. exceeded the value of food exported from the U.S. (USDA Foreign Agricultural Service, 2006). Globalization also leads to greater consumer ignorance about the sources of food. As people know less and less of where their food comes from, how it is produced and with what impacts on communities and the environment, preservation of land and the natural and built resources upon which local agriculture depends becomes more difficult.

Global Food Security
Seeing as “all disasters are local” is there such a thing as global food security? At the global scale we are addressing the food system and its resilience. At the local scale we begin to look at food security- since everyone has that within their locus of control.

The relationship worldwide between production and population is critical:

- Ever increasing production is needed to keep food yield growth ahead of population growth by:
  - Producing more for/with less
  - Optimize supply system
  - Significantly reduce waste
- Reduce consumption or population:
  - Consumption is more governable but could inhibit freedom of choice and economic growth
  - Population control is taboo
- In our model of the global food system population is an independent variable; production and consumption are dependent on:
  - Global supply
  - Trade
  - Policies

**Supply Chain**

**General**

- Top-down/business-driven, market-based, redundancies, distribution of resources, institutional capacity
- Food has moved around the world since Europeans brought tea from China, but never at the speed or in the amounts it has over the last few years. Consumers in not only the richest nations but, increasingly, the developing world expect food whenever they crave it, with no concession to season or geography. Increasingly efficient global transport networks make it practical to bring food before it spoils from distant places where labor costs are lower. And the penetration of mega-markets in nations from China to Mexico with supply and distribution chains that gird the globe — like Wal-Mart, Carrefour and Tesco — has accelerated the trend. (Rosenthal 2008)
  - Wal-mart owes its transition from regional retailer to global powerhouse largely to changes in and effective management of its supply chain. (Palin 2013)
- Global system relies upon an interconnected web of transportation infrastructure and pathways, information technology, and cyber and energy networks. While these interdependencies promote economic activity they also serve to propagate risk across a wide geographic area or industry that arises from a local or regional disruption. (National Strategy 2012).
- Maximize efficiency in order to lower consumer costs, increase production
- Heavily reliant on inexpensive energy sources (for transport, production, and processing). Under longstanding trade agreements, fuel for international freight carried by sea and air is generally not taxed (Rosenthal 2008)
  - Convention on International Civil Aviation, signed in Chicago in 1944 to help the fledgling airline industry, fuel for international travel and transport of goods, including food, is exempt from taxes, unlike trucks, cars and buses. There is also no tax on fuel used by ocean freighters. (Rosenthal 2008)
The ability to transport food cheaply has given rise to new and booming businesses.

Rosenthal 2008:

- “If there’s an opportunity for cheaper production in terms of logistics or supply it will be taken,” said Ed Moorehouse, a consultant to the food industry in London, adding that some of these shifts also create valuable jobs in the developing world. The economics are compelling. For example, Norwegian cod costs a manufacturer $1.36 a pound to process in Europe, but only 23 cents a pound in Asia.
- “In the past few years there have been new plantations all over the center of Italy,” said Antonio Baglioni, export manager of Apofruit, one of Italy’s largest kiwi exporters. Kiwis from Sanifrutta, another Italian exporter, travel by sea in refrigerated containers: 18 days to the United States, 28 to South Africa and more than a month to reach New Zealand.

International Maritime Organization (IMO)

- International shipping transports about 90 per cent of global trade to peoples and communities all over the world
- As a specialized agency of the United Nations, IMO is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented. In other words, its role is to create a level playing-field so that ship operators cannot address their financial issues by simply cutting corners and compromising on safety, security and environmental performance. This approach also encourages innovation and efficiency.
Commercial vs. Humanitarian Supply Chains

From (McLachlin and Larson 2011)

- Commercial supply chains: asset and cost efficiencies, customer service improvements, marketing advantages, profit growth or stability; focus is on increasing sales and profit- if firms can make more money working together, they should consider doing it
- Humanitarian supply chains: increasing awareness, becoming better prepared for the next disaster, gaining more rapid access to accurate information about what is needed, providing better security in the field; if organizations can save more lives or ease more suffering by working together, they should consider it
- Three constraints of humanitarian supply chain network development (Seybolt):
  - Sudden, massive workload following a crisis
  - Need for trust among a system's actors
  - Political interests of certain actors
- Solutions typically come from:
  - Business / Donors
  - Government / Military
  - NGOs
- Status agreements with countries important for NGOs, ensures tax and landing fee exemptions and available warehousing in event of a disaster; enables quick distribution of goods across borders
- Well-developed relationships that utilize complementary capabilities lead to an entire

Toolbox: Levers of Influence

Agenda Setting: Directing Change

- The importance of shifting ag development from "green revolution to ecological intensification
- Two-prong approach:
  - Reduce environmental impact of agriculture
  - Broden scope for agro-ecological production.
- Support relative self-sufficiency at subsidiary scales
- Key Messages (Intro) and Chapter 5, pg. 267, of UN Trade and Environment Report 2013, Ensuring Food Security and Environmental Resilience- The need for supportive agricultural trade rules:
  - Both the crises of hunger/malnutrition and the environmental crises of agriculture are closely linked to trade rules. According to authors, agriculture has always been a stumbling block in GATT and WTO rounds of trade liberalization (trade agreements talks).
  - Agriculture has increasingly been treated like any other industrial sector that should strive to enhance (mostly labour) productivity, based on specialization, economies of scale and industrialization of production methods. But this runs counter to the need for strengthening rural livelihoods, food security and such agricultural practice, which respect the planetary boundaries through enhancing the reproductive capacities, the latter being the essence of real sustainability.
  - Authors advocate for a better understanding of the specificity of agriculture and with a better understanding of this, more regionalized/localized production
networks should be encouraged by trade rules, without excluding the supplementary role trade will have to play

- “Humanity today is consuming an amount of resources equivalent to those of 1.5 earths, with a pronounced worsening tendency.”
- For more info see http://awsassets.panda.org/downloads/lpr_2012_summary_booklet_final.pdf
- This commentary piece attempts to analyze the type of trade rules required to encourage and support desirable, much-needed transformation of the food and agricultural sector

**Forms**

- International agenda setting
    - “The vision of the reformed CFS is to be the most inclusive international and intergovernmental platform for all stakeholders to work together in a coordinated way to ensure food security and nutrition for all. CFS was reformed to address short term crises but also long term structural issues.”
    - “Membership of the Committee is open to all Member States of The Food and Agricultural Organization (FAO), The International Fund for Agricultural Development (IFAD) or The World Food Programme (WFP) and non-Member States of FAO that are Member States of the United Nations.”
  - For the coming biennium, 2014–2015, FAO has outlined the following priorities in its fight against hunger. (http://www.fao.org/about/what-we-do/en/)
    - Help eliminate hunger, food insecurity and malnutrition – contribute to the eradication of hunger by facilitating policies and political commitments to support food security and by making sure that up-to-date information about hunger and nutrition challenges and solutions is available and accessible.
    - Make agriculture, forestry and fisheries more productive and sustainable – promote evidence-based policies and practices to support highly productive agricultural sectors (crops, livestock, forestry and fisheries), while ensuring that the natural resource base does not suffer in the process.
    - Reduce rural poverty – help the rural poor gain access to the resources and services they need – including rural employment and social protection – to forge a path out of poverty.
    - Enable inclusive and efficient agricultural and food systems – help to build safe and efficient food systems that support smallholder agriculture and reduce poverty and hunger in rural areas.
    - Increase the resilience of livelihoods from disasters – help countries to prepare for natural and human-caused disasters by reducing their risk and enhancing the resilience of their food and agricultural systems.
“A unique collaboration between the leading intergovernmental agencies in the areas of food, agriculture, and the environment. The objective of SFSP is to spearhead efforts to improve resource use efficiency and reduce the pollution intensity of food systems from production to consumption, while at the same time addressing issues of food and nutrition security.”

**Actors**
- Multinational/Transnational Corporate Influence
- National Governments / Allied Partnerships

**Standards: Bounding Possibility**
- Agreements and policies to protect health, safety, cultural concerns, and trade

**Forms**
- Codex Alimentarius: http://www.codexalimentarius.org/
  - “The Codex Alimentarius Commission, established by FAO and WHO in 1963 develops harmonised international food standards, guidelines and codes of practice to protect the health of the consumers and ensure fair practices in the food trade. The Commission also promotes coordination of all food standards work undertaken by international governmental and non-governmental organizations.”
- World Organization for Animal Health (OIE) http://www.oie.int/en/international-standard-setting/overview/
  - Animal health measures have increasing importance to facilitate safe international trade of animals and animal products while avoiding unnecessary impediments to trade.
  - OIE publishes the *Terrestrial Animal Health Code* and *Aquatic Animal Health Code* to assure sanitary safety of international trade in terrestrial animals and aquatic animals in their products
- SPS Agreement
  - “The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) encourages the members of the World Trade Organization (WTO) to base their sanitary measures on international standards, guidelines and recommendations, where they exist.”
  - Sets constraints on member-states' policies relating to food safety (bacterial contaminants, pesticides, inspection and labelling) as well as animal and plant health (phytosanitation) with respect to imported pests and diseases
- International Plant Protection Convention https://www.ippc.int/
  - Aims to protect cultivated and wild plants by preventing the introduction and spread of pests
- Agreement on Technical Barriers to Trade (TBT Agreement) http://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm
  - “Seeks to ensure that technical negotiations and standards, as well as testing and certification procedures, do not create unnecessary obstacles to trade.”
  - “However, it recognizes that countries have the right to establish protection, at levels they consider appropriate, for example for human, animal or plant life or
health or the environment, and should not be prevented from taking measures necessary to ensure those levels of protection are met.”

- “Encourages countries to use international standards where these are appropriate, but it does not require them to change their levels of protection as a result of standardization.”

- Labeling laws
  - To prevent false advertising and promote food safety
  - Generally includes:
    - Ingredients list
    - Safety information
    - Preparation instructions
    - Geographical information
  - Examples
    - US Fair Packaging and Labeling Act
    - EU Labelling (sic) Rules

- Bans on certain goods [link](http://eatlocalgrown.com/article/11944-banned-foods.html)
  - GMOs
  - Ractopamine-tainted meat:
    - Reduces fat content in meat
    - Banned in 160 countries
  - Artificial food colors / dyes
  - Arsenic laced chicken
  - Potassium Bromate treated bread
  - Fat substitutes (Olestra / Olean)

### Actors
- Food safety organizations
- Cultural leaders

### Outcomes
- There is a widespread presumption that food safety standards are used by developed countries as a protectionist tool for discriminating against imports by applying higher and/or more rigorous regulatory standards than those enforced on domestic suppliers (Perito, M. A., & Hammoudi, A. (2013). Food safety standards and their impact on the small farms of developed countries. Pagri/iap, 7.)

### Commensalistic Institutions
Autonomously from the SPS Agreement, a number of global private standard schemes have been developed that have incorporated values rejected by the SPS Agreement. This paper examines the relationship between the Agreement and the private standards and argues that this case highlights a gap in the institutional literature with respect to parallel institutions emerging autonomously from the primary institution to embody values excluded by the latter. We adopt the term commensalism for these previously undescribed relationships. (Botterill, L. C., & Daugbjerg, C. (2014). Commensalistic institutions and value conflicts: the World Trade Organization and global private food standards. European Political Science Review, FirstView (Supplement -1), 1–20. DOI: 10.1017/S1755773913000295)
Trade: Market Management

- Trade and its management is a key component of the global food system. Market based approaches to managing trade include market modification through multilateral trading systems.
- Trade is a key means to fight poverty and achieve the Millennium Development Goals. It allows countries to import ideas and technologies, realize comparative advantage and economy of scale, and foster competition and innovation to increase productivity and achieve higher sustainable employment and economic growth. Food trade is a development mechanism of developing countries (http://www.fao.org/trade/en/, http://web.worldbank.org/WBSITE/EXTERNAL/EXTSITES/ETOOLS/0,,contentMDK:20147690~pagePK:98400~piPK:98424~theSitePK:95474,00.html)
  - Increased trade in agricultural, fishery and forestry products is an essential component of most countries’ development strategies. Global and regional agreements that shape trade policies need to recognize the diverse situations and needs of countries at different levels of development.
  - Countries need the flexibility to address food security, poverty reduction and sustainability issues as they open their markets to trade.

Forms

- Market-based commodities trade agreements
  - Global
    - World Trade Organization (WTO) and General Agreement on Tariffs and Trade (GATT) (http://www.wto.org/english/thewto_e/whatis_e/wto_dg_stat_e.htm)
      - GATT purpose was the "substantial reduction of tariffs and other trade barriers and the elimination of preferences, on a reciprocal and mutually advantageous basis." Replaced by WTO in 1995.
      - WTO goal is to provide a forum for negotiating agreements aimed at reducing obstacles to international trade, ensuring a level playing field, and contributing to economic growth and development.
      - UN international financial institution that provides loans to developing countries for capital programs
      - Official goal is reduction of poverty
      - “The World Bank Group (WBG) trade programs aim to (a) promote a multilateral trading system that is more supportive of development; (b) make trade competitiveness a centerpiece of countries’ development strategies; and (c) support trade and trade facilitation reforms through effective “Aid for Trade” programs.”
  - Regional
    - North American Free Trade Agreement (NAFTA)
    - Trans-Pacific Partnership (TPP)

- Taxes/Subsidies
  - Tariffs
• Regulations
  o WTO
  o Further reading:
• Aid (global and local scale impact)

Actors
• Multinational / Transnational Corporate Influence
• United Nations
• World Trade Organization (Lex Mercatoria → GATT→ WTO)
  o The World Trade Organization (WTO) deals with the global rules of trade between nations. Its main function is to ensure that trade flows as smoothly, predictably and freely as possible.

Outcomes
• Subsidies and Dumping
  o Example: Market flooding of subsidized corn

Box 6: Corporate influence over public policy

Transnational corporations exercise significant influence over the formation of national and international public policy. Below are some illustrative examples.

• Soon after forest fires in the Russian Federation devastated its wheat crops in 2010, the multinational grain trader, Glencore, speculating on a profitable spike in wheat prices, urged the Russian Federation to ban wheat exports, thereby provoking the desired price surge that had global repercussions (Patel, 2011).
• In Brazil, a 2010 Congresional bill, co-authored by a lawyer for the Council for Biotechnology Information, linked to Monsanto, BASF, Bayer, Carigil, Duport and others, proposed repeal of a Biosafety Law prohibition on "genetic use restriction technologies" also known as "terminator technologies" (Camargo, 2010).
• Monsanto and its affiliates lobbied Indonesian legislators in the 1990s to support genetically engineered (GE) crops. In 2005, the firm was fined $1.5 million by the United States Department of Justice for violating the Foreign Corrupt Practices Act by bribing a senior Indonesian Environment Ministry official (Birchal, 2005).
• Chemical companies commonly sit on panels and committees that advise regulators. For example, a representative from Dow Chemical is serving on the Endocrine Disruptor Screening and Testing Advisory Committee of the United States Environmental Protection Agency.
• In 2002, Malayala banned the highly toxic chemical herbicide, Paraquat. Its manufacturer, Syngenta, joined Malaysia’s influential palm oil industry in pressuring the Government to reverse the ban, which it did in 2006. Malaysia’s Fecideide Board subsequently ruled that Paraquat use could continue pending results from a study on alternatives. The study has not been released and Paraquat continues to be used (Watts, 2010).


  o "Higher tariffs, temporary import restrictions, state purchase from small-holders, active marketing boards, safety net insurance schemes, and targeted farm subsidies are increasingly acknowledged as vital measures to rehabilitate local food production capacity in developing countries.
  o “But WTO rules leave little space for developing countries to put these measures in place. “Even if certain policies are not disallowed, they are certainly
discouraged by the complexity of the rules and the threat of legal action,” De Schutter said. “Current efforts to build humanitarian food reserves in Africa must tip-toe around the WTO rulebook. This is the world turned upside down. WTO rules should revolve around the human right to adequate food, not the other way around.”

o “It is a problem of principle: the WTO continues to pursue the outdated goal of increasing trade for its own sake rather than encouraging more trade only insofar as it increases human wellbeing. It therefore treats food security policies as an unwelcome deviation from this path. Instead we need an environment that encourages bold policies to improve food security.”

o WTO members should redefine how food security is treated in multilateral trade agreements so that policies to achieve food security and the realization of the human right to adequate food are no longer treated as a derivations from but as recognized principal objectives of agricultural trade policy. (De Schutter, 2011)

o WTO Members should preserve and create a range of flexibilities in the Doha Round negotiations in order to ensure that the future international trade regime operates in lock step with multilateral and national efforts to address food insecurity. In particular, they should:
  - Make WTO measures more compatible with the pursuit of food security and the human right to food.
  - Exclude defining the establishment and management of food reserves as trade-distorting support,
  - Guarantee the possibility for developing States to insulate domestic markets from the volatility of prices on international markets.
  - Take steps to limit States’ excessive reliance on international trade in the pursuit of food security. In building their capacity to produce the food needed to meet consumption needs, States should support in particular poor small-scale farmers and the production of staple foods.
  - In the case of a failed Doha Round, propose medium and long-term changes to the existing WTO framework to ensure pro-food security programs are not categorized as trade-distorting support.

o In order to achieve greater compatibility in the long term between the international trade regime and global efforts to reverse food insecurity, WTO Members should, with the assistance of the WTO Secretariat (De Schutter, 2011):
  - Convene a panel of experts to systematically analyze the compatibility of existing WTO rules, and those under consideration in the Doha Round, with best practices and current national and international food security strategies and policies.
  - Establish a protocol to evaluate and monitor the impact of trade liberalization on world food prices.
  - Initiate a substantive discussion at the WTO of the medium and longer-term implications of the lessons learned since the 2007 global food prices crisis for the international trade regime, including the new consensus on the role of States in reinvesting in food security at national level.
Consider a food security-based waiver for situations where trade commitments restrict a country’s ability to pursue national food security. (De Schutter, 2011)

Land Use and Other Policies

How do external/international policies and programs impact national/local land use?

- Foreign land grabs for agriculture

![Scramble for land: Food and fuel](Image taken from World Wildlife Federation’s Living Planet Report 2012)

Policy actions to drive the transformation of agriculture

- “Policies and practices that meet global food needs sustainably and equitably and support a shift towards ecological farming systems can conserve biodiversity, water and energy and reduce greenhouse gas (GHG) emissions. Policy options to drive this transformation of agriculture have been described by the United Nations-sponsored International Assessment of Agricultural Knowledge, Science and Technology for Development [IAASTD]. Likewise, the economic viability, environmental urgency and human rights imperative of implementing such a transformation have been well established.” Ishii-Eitmean, M. 2013. p. 62 in the UN2013 Trade and Environment Report.

- The following are policy options sourced from various references, but particularly the IAASTD. These are policy options that intersect through the global, national and local scales of society thus highlighting what Ishii-Eitmean calls for in terms of democratizing control of agriculture for the 21st century.
Box 5: Policy options to support a transition to sustainable agriculture

As identified by the IAASTD (2009a and b), promising policy options to advance sustainable and equitable development goals include:

- Strengthening the small-scale farm sector, in particular farmers’, women’s, indigenous and other community-based organizations, and increasing public investment in rural areas;
- Building local and national capacity in diverse, ecologically resilient farming to cope with increasing environmental stresses;
- Increasing local participation and leadership in agricultural research, direction-setting, policy-formation and decision-making processes;
- Revitalizing local and regional rural economies and food systems, and more closely regulating globalized food systems to ensure good public outcomes;
- Mobilizing public and private sector investments and providing market-based incentives to advance equitable and sustainable development goals;
- Establishing equitable regional and global trade arrangements to support developing countries’ food and livelihood security goals, and revising ownership laws to ensure poor and/or vulnerable communities’ equitable use, access to and control over land, water, seeds and germplasm; and
- Establishing new, transparent, democratically governed institutional arrangements to accomplish these goals.

Source: IAASTD, 2009a and b (see also Ishii-Ellerman, 2009; and Hoffmann, 2011).

Food Waste

- According to a commentary piece by Parfitt et al. (2013) in the 2013 Trade and Environment Review published by the United Nations Conference on Trade and
Development (UNCTAD), food waste is an issue of importance to global food security and good environmental governance for three main reasons:

- It is estimated that between one third and half of all current food production is in fact wasted. For that reasons, Parfitt et al. suggest that the reduction of post-harvest waste in developing countries and consumer waste in high-income countries appear to offer the greatest potential social and environmental gains.

- While there is insufficient data know exactly how much food is being wasted, it is predicted that the absolute quantity of food waste will inevitably grow over the coming decades as production increases to meet future demand and as income rises amongst growing populations in megacities, notably in the BRIC countries (i.e. Brazil, the Russian Federation, India and China) and as diets become more diversified away from starchy staple foods towards fresh fruit and vegetables, dairy, meat and fish.

- Reduction of food waste would contribute to wider policy agendas that are critical to the future, namely increasing production, reducing food insecurity and food price increases, improving sustainability of the global food supply chain (FSC), reducing pressures on land use and freshwater resources and reducing greenhouse gas.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Regional/Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions to Meet Immediate Needs</td>
<td>• Provide timely and reliable data and information</td>
</tr>
<tr>
<td></td>
<td>• Coordinate crisis policy responses</td>
</tr>
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<td></td>
<td>• Facilitate flows of emergency assistance</td>
</tr>
<tr>
<td></td>
<td>• Reduce agricultural trade restrictions and market distortions</td>
</tr>
<tr>
<td>Actions to Improve Medium-to Long-Term Resilience</td>
<td>• Promote research and development, knowledge exchange, and capacity building</td>
</tr>
<tr>
<td></td>
<td>• Improve monitoring and surveillance of food market conditions</td>
</tr>
<tr>
<td></td>
<td>• Promote food trade liberalization</td>
</tr>
<tr>
<td></td>
<td>• Consider mechanisms to promote price stability</td>
</tr>
<tr>
<td></td>
<td>• Enhance collaboration on climate change and accelerate adaptation Measures</td>
</tr>
</tbody>
</table>


Case Studies

Profile of Global Food Price Crisis:
The world food crisis of 2007-2008 caused a substantial rise in the cost of food, especially staple foods such as rice, wheat, and corn. This rise in price had a devastating effect on hungry people in the developing world (Jameson, 2012).

- The crisis certainly awakened the global community. Since 2007, governments and international agencies have made food security a priority issue, and with a decidedly different tone. They stress the importance of agricultural development and food
production in developing countries, the key role of small-scale farmers and women, the
collapse of limited resources in a climate-constrained world, the important role of the
state in “country-led” agricultural development programs, the critical role of public
investment (Timothy et al, 2007).

- For many, these priorities represent a sea change from policies that sought to free markets
  from government policies seen as hampering efficient resource allocation. Now that those
  policies and markets have failed to deliver food security, the debates over how countries
  and international institutions should manage the food system are more open than they
  have been in decades (Timothy et al, 2007).

- World food prices increased dramatically in 2007 and 2008 creating a global crisis and
  causing political and economic instability and social unrest in both poor and developed
  nations.

Figure 1: Annual FAO Food Price Indices (FAO, 2011)

There are several reasons for the food crisis (SPIEGEL, 2008):

- The world population is growing constantly, while the amount of arable land is declining.
- Climate change is causing a loss of agricultural land, irreversible in some cases, as a
  result of droughts, floods, storms and erosion.
- Because of changing eating habits, more and more arable land and virgin forests are
  being turned into pasture for livestock. The yield per acre in calories of land given over to
  pasture is substantially lower than that of arable land.
- The World Bank wants developing countries to introduce market reforms, including the
  abolition of protective tariffs, a move that often causes massive damage to local
  agriculture.
- Speculators are driving up the prices of raw materials. The resulting high oil price leads
  to "energy crops" being cultivated instead of grain for food or animal feed.
- Millions of people displaced by civil wars need food, and yet they themselves are no
  longer capable of producing food.
Countries are more vulnerable to rising international food prices if they meet three criteria:

- High food dependency as measured by the share of cereal imports in total cereal consumption
- High food import burden as measured by the share of cereal imports in total imports.
- Low income as measured by a Gross National Income (GNI) per capita in 2006 of less than $905, or lower middle-income with a GNI per capita between $906 and $3,595 (World Bank, 2007). With low income comes weaker policy, fiscal, and administrative capacity to respond to the crisis.
Lessons Learned from Global Food Crisis.

- How can we use this experience to be prepared for food crises in the future? (Jameson, 2012) According to the U.S. Department of State (DoS), there are a number of lessons to be learned. On one hand, there were policies that made the crisis worse, while, on the other hand, there were policies that helped to combat the crisis.

- Policies that Intensified the Problem:
  - Export restrictions: IFPRI concluded in its Reflections on the Global Food Crisis that about three-fourths of rice price increases occurred in 2008 due to export bans from major exporters. These restrictions caused panic buying in importer countries, which drove up prices and disrupted supply responses by local producers.
  - Panic buying, stock building and lack of transparency: Some nations purchased more basic grains than necessary, in an attempt to increase stocks and decrease prices. However, this resulted in large food losses and food waste.

- Policies That Protected the Poor and Helped to End the Crisis:
  - Market-based responses coupled with targeted safety nets: According to the Organisation for Economic Cooperation and Development (OECD), safety nets “support the purchasing power of the poor without distorting domestic incentives to produce more food, and without reducing the incomes of poor food sellers.” This helps to alleviate the immediate impacts of high food prices without disrupting pricing for farmers.
  - Reducing import restrictions, releasing stocks, and reassuring the markets: Governments that decreased tariffs and taxes on imports decreased prices for staples in their own countries. Also, by publicizing stock information on food, countries were able to end price hikes.
  - Long-term attention to the agricultural sector: Countries that focus on investing in their agricultural sectors decrease their vulnerability during times of volatility and crisis. Investment strategies the DoS suggest include “[alleviating] transportation, distribution, and supply-chain bottlenecks, promoting sound market-based principles for agricultural sector development and regional trade, encouraging
private investment, and undertaking appropriate public investments and use of new agricultural technologies.”

- Emergency donor assistance: As a short-term fix, the international community, including governments, NGOs, private sector organizations, and international partners, can provide aid assistance to those in emergency situations.

- When food prices rise, the poor are the most vulnerable. Rising food prices can have significant impacts on the nutritional levels of people in developing countries. The responses to these crises are also important in shaping how the most vulnerable fare during these times of emergency.

### Table 1: Selected policy responses to the global food crisis and links to WTO provisions

<table>
<thead>
<tr>
<th>Recommended Responses</th>
<th>Links to WTO agricultural trade rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Reinvestment in agriculture and support to smallholders through government provision of inputs, extension services, and infrastructure</td>
<td>Green box and limits on domestic support</td>
</tr>
<tr>
<td>2 Safety-nets and income-insurance for the urban and rural poor</td>
<td>Direct payments and income support</td>
</tr>
<tr>
<td>3 Food reserves</td>
<td>- Public stockholding for food security - State trading enterprises (STEs)</td>
</tr>
<tr>
<td>4 Orderly market management including supply management schemes and marketing boards</td>
<td>- Tariff rate quotas - Special safeguards</td>
</tr>
<tr>
<td>5 Limiting excessive reliance on international trade in the pursuit of food security</td>
<td>Tariffs on food imports</td>
</tr>
</tbody>
</table>

Table 1: From DeSchutter, 2011

“The global food crisis has prompted interest in scaling up developing countries’ food production but also in enhancing their capacity to effectively manage and coordinate food production, distribution and trade policies. “ (De Schutter, 2011)

### Potential Vulnerability: Focus on Energy Price Impacts

![Graph showing food and fuel price indices from 1990 to 2015](image)

Food and fuel prices show a strong correlation, particularly after 2005. Source: International Monetary Fund.
“Energy use statistics are more than just numbers on a page; there are real consequences to having a food system that requires so much energy to function. Heavy demand for energy in the service of producing, processing, distributing and consuming food forges a link between food and fuel prices. When fuel prices rise or become volatile, food prices must follow. When food prices rise and become volatile, that challenges the food security of billions of people worldwide, leading to hunger, starvation and social unrest.”

Questions:
- How could the levers of influence been pulled differently throughout the food price crisis?
- What could have been done at other scales to influence the crisis?

Exercise
In small groups, discuss the following questions:
1. How are availability, affordability, and accessibility at the local and household levels (e.g., in your community) influenced by forces at the global level?
2. To what types of disturbances at the global level -- both slow variables and fast triggers -- is your community food system vulnerable?
   a. (Examples: climate change; water resources; oil prices; food commodity prices; war, etc.)
3. Does your community food system ignore slow variables and only respond to fast triggers?
   a. Ecological resilience depends on slow variables. (Ericksen, 2008)
Module 4: Regional/National Scale

Scope Statement
In this module, participants will discuss regional and national food supply vulnerability, understand mechanisms of influence within a regional/national food system, and examine case studies that illustrate the importance of food system resilience.

Terminal Learning Objectives (TLO)
Participants will understand mechanisms to influence food system resilience at regional and national scales through domestic and international case studies of programs that promote resilient food systems at the state level.

Enabling Learning Objectives (ELO)
At the conclusion of this module, participants will be able to:

- **4-1** Identify the role of regional/national actors in food systems
- **4-2** Explore supply chains and levers of change in domestic examples of programs
- **4-3** Examine international examples of supply chains and levers of change contributing to resilient food systems.

Lesson Topics
- Typologies of programs that contribute to resilient food systems (Farm bill: SNAP, WIC, EBT, )
- Domestic Examples of Programs Contributing to Resilient Food Systems.
- International Examples of Programs Contributing to Resilient Food Systems.
- The role of trade, commercial actors, and humanitarian actors in regional supply chains.
- Levers of influence in the regional/national food system toolbox.
- International examples of programs contributing to resilient food systems.

Instructional Strategy
- Lecture
- Instructor-facilitated discussion on module
- Exercise

Research
National is concerned with continued supply and that resources are managed to insure constant availability. This contrasts with local level which is concerned with HOW resources are managed.

Supply Chain
General
- Resources are available / supply is contained
- Cross-scale (global ← → national):
- Ports of entry are the link to the global scale.
• Whereas global supply is more reliant on air and sea shipping; rail and highways take a more prominent role in national (and local) supply chains

Evolution
• For most of the last generation the private sector search for comparative advantage has resulted in substantial decrease in the supply chain’s structural diversity. Fewer firms play increasingly important roles. As a result, policy makers are inclined to increase regulations to require more redundancy in the supply chain (McLachlin and Larson 2011; Palin 2013)
• Increase in traditional modes of regulation will reduce ability of the system to self-organize, undermining the likelihood of innovation under stress or otherwise.
• Public-private tug of war threatens to wring out two key components of resilience: the ability of the system to self-organize and the likelihood of innovation.

Existing Legislation in the USA
• Supply chain-related legislation includes the Security and Accountability for Every Port (SAFE Port) Act, the Maritime Transportation Security Act, the Aviation and Transportation Security Act, the Implementing Recommendations of the 9/11 Commission Act, and others. (National Strategy 2012).
• Evidence has accumulated that externally imposed rules tend to “crowd out” endogenous cooperative behavior. Externally focused regulation can “undermine subsequent cooperation.” (McLachlin and Larson 2011)
• Precisely because government is not engaged as a competitor or vendor in the supply chain (but is an important customer), the government could serve as a facilitator or honest broker of boundary setting, rulemaking, and system sanctioning by supply chain stakeholders themselves. (McLachlin and Larson 2011)

Conclusions
• Innovating around failure is how a complex adaptive system continues to emerge.
• If supply chain resilience is to be achieved it must remain a matter of policy rather than administration. Supply chain resilience will not be achieved bureaucratically, but it can be crafted through the intelligent give-and-take of authentic public-private collaboration in policy-making.

Toolbox
General
“Well-functioning domestic institutions are required to improve food security at the national level: increased production alone does not guarantee food security unless it is accompanied by a policy framework targeted at matching food production to the needs of food insecure and vulnerable households and improvements in marketing and transportation links. Increased institutional capacity at the national level is also desirable because food policies that are over reliant on international markets do not always lead to optimal outcomes. The global food crisis was an extreme example of this, with the prices of imported staples moving beyond the reach of most poor households in poor net-food-importing countries.” (De Schutter, 2011)
Cross-scale Interactions

- **Global ←→ National/Regional**
  - Tensions between free trade and regulatory autonomy. National measures of an importing state may impose costs on international trade, for example, by regulating goods in a way that vary from home market regulation.
  - National measures may restrict market access of imported goods but may or may not be intended to act as protectionist measures.

- **Regional/National ←→ Local**
  - Commodity markets have various impacts on livelihoods
  - Regulatory Barriers

**Actors**

- **National Governments, Nation States**
  - The nation state is a geographical area that self-identifies as deriving its political legitimacy from serving as a sovereign nation. [1] The state is a political and geopolitical entity, while the nation is a cultural and ethnic one. The term "nation state" implies that the two coincide, but "nation state" formation can take place at different times in different parts of the world, and has become the dominant form of world organization. e.g. Japan, Egypt

- **Multinational States**
  - A multinational state is a sovereign state which is viewed as comprising two or more nations. Such a state contrasts with a nation-state where a single nation comprises the bulk of the population. e.g. Canada, United Kingdom, South Africa
  - https://en.wikipedia.org/wiki/Multinational_state

- **City-States**
  - A city-state is an independent or autonomous entity, not administered as a part of another local government, whose territory consists of a city and possibly its surrounding territory. A city-state can also be defined as a central city and its surrounding villages, which together follow the same law, have one form of government, and share languages, religious beliefs, and ways of life. e.g. Singapore, Malta, Qatar
  - https://en.wikipedia.org/wiki/City_state

- **Regional Intergovernmental Unions**
  - **Forms**
    - Intergovernmentalism: e.g. EU, AU
    - Continental Union: e.g. AU
    - Supranationalism: e.g. EU
  - **Examples**
    - European Union: https://en.wikipedia.org/wiki/European_Union
    - Union of South American Nations

- **Corporate Entities**
  - **Management Roles**
  - **Examples**
    - Manage internal production and external inputs
    - the national mgmt is the more often held responsible if their peoples starve, and have the most accountability (outside of personal) for their wellbeing)
This problem could be solved if Congress steps in. It needs to be Congress doing this because only they have the power to regulate interstate commerce, which this is.


**Safe External Inputs**

**General**
- A key role of national scale is managing risks from food coming in from elsewhere/across the globe

**Forms**
- Regional Trade Agreements e.g. North American Free Trade Agreement - https://en.wikipedia.org/wiki/North_American_Free_Trade_Agreement
- Trans-Pacific Partnership - https://en.wikipedia.org/wiki/Trans-Pacific_Partnership#Potential_members

**Actors**
- International Trade Administrations
  - International Trade Administration of the U.S. Department of Commerce which determines whether imports in question are being subsidized and, if so, by how much
- Customs and Border Control

**Outcomes**
- Trade
  - Intra-national
    - Jones Act
      - Protectionist?
- Taxes
  - Import tariffs

**Reliable Internal Productivity**

**General**

A role of regional and national governance is to conserve and protect reliable internal productivity. This can be done through various policy and fiscal mechanisms oriented towards bolstering market access, subsidies, and limiting the potential deleterious impacts of imported goods that would decrease local market competition.

**Forms**

There are various measures available to rehabilitate food production capacity in areas that have had their internal productivity diminished by international trade.
Measures to rehabilitate food production capacity in developing countries

- Higher tariffs
- Temporary import restrictions
- State purchase from small-holders
- Active marketing boards
- Safety net insurance schemes
- Targeted farm subsidies

Measures to rehabilitate food production capacity in developed countries

- Cut government subsidies to industrial commodity production.
  - Will level field for developing world farmers, and increase capacity for small producers to gain market share by removing market skewing artificially cheap food for internal and foreign markets.


These latest prescriptions appear to give credibility to a market paradox: that growth in global food and agricultural trade under the World Trade Organization (WTO) regime and regional trade regimes like the North American Free Trade Agreement (NAFTA) has brought increased vulnerability and uncertainty to the very populations they were supposed to assist.

To be fair to the FAO, we should recognise that as an intergovernmental organisation comprised of the member states of the UN, it operates under significant constraints that ensure that the offerings from global dialogue, such as the outcome of the 2009 World Summit on Food Security, are almost certainly vague and do not lay blame heavily on any nation-states.

“How visible the “invisible hand” should be is not something the FAO has got to the heart of yet. The overall message from the FAO seems to be that free trade works, but that it has to be fairer. This seems reasonable enough. But without a commensurate change in the position of weak countries in relation to stronger countries, and weak food producers in relation to stronger ones, the present global divide will continue. Furthermore, louder calls for more localised solutions will seem more palatable, even if they don’t make sense in every context.
Countervailing duties

Countervailing duties (CVDs), aka anti-subsidy duties, are trade import duties imposed under World Trade Organization (WTO) rules to neutralize the negative effects of subsidies. They are imposed after an investigation finds that a foreign country subsidizes its exports, injuring domestic producers in the importing country. According to World Trade Organization rules, a country can launch its own investigation and decide to charge extra duties, provided such additional duties are in accordance with the GATT Article VI and the GATT Agreement on Subsidies and Countervailing Measures.

Since countries can rule domestically whether domestic industries are in danger and whether foreign countries subsidize the products, the institutional process surrounding the investigation and determinations has significant impacts beyond the countervailing duties. https://en.wikipedia.org/wiki/Countervailing_duties

Notes
- Intersection of external inputs/internal productivity
- There is a widespread presumption that food safety standards are used by developed countries as a protectionist tool for discriminating against imports by applying higher and/or more rigorous regulatory standards than those enforced on domestic suppliers (Henson and Loader, 2001)

Equitable Consistent Access
General
- Policy and legislative measures to ensure food access to the most vulnerable parts of society. Redistributive mechanisms are key to supporting disadvantaged parts of society.
- Farm Bill

Forms
SNAP, WIC, EBT
Federal/national rationing programs (e.g., Cuba)
- Crisis management
- Victory gardens

Notes
Policies/Legislation
Incentives/Disincentives (carrots and sticks)
- Environmental regulation (EPA)
- Chemical regulations
- EPA’s red book (risk assessment)
Health and safety regulations (e.g., FDA)
- Chemical regulations

Land Use
General
Land reform - https://en.wikipedia.org/wiki/Land_reforms_by_country#United_States

Forms
- Land Use/Zoning
  - Urban Growth Boundaries
  - Portland
- Zone/Code setting (e.g., European countries)
- Central planning impacts

Notes
Land reform
Vulnerabilities/Risks - impacts of isolation/embargo/cut-offs from global system

Exercise
In small groups, discuss the following questions:
1. How are availability, affordability, and accessibility at the local and household levels (e.g., in your community) influenced by policies and programs at the national level?
2. Are people in your community participating in federal food assistance (safety net) programs such as SNAP, WIC, school meals, Child and Adult Care Food Program (CACFP), etc.? How many? What is the profile of these people? Where are they located? Where are they using these programs to make food purchases?
3. In your community, is there a low diversity in assets or entitlements (such as federal food assistance)?
   a. Consumers have few options if regular food security entitlements fail; agricultural production is more susceptible to degradation or disturbance; the diversity of assets upon which to draw is critical to social adaptive capacity and ecological resilience. (Ericksen, 2008)

Case Studies
General
National Case Studies that Contribute to Resilient Food Systems
- Understand and know the importance of domestic approach to resilient food system.
- Begin to think about ways to build resilience local food system.
- Get familiar with domestic case in supporting the local food security system.

Australia
Food security is an issue for Australia
- For Australia, food security is inextricably linked to the political stability of the region and has the potential to affect the national security.
- Australia’s investment in food-related research and development is in decline,
- An aging rural workforce and falling enrolments in agricultural education are degrading the human capital on which innovation depends,
- Productive land is threatened by urban encroachment,
- Food imports are rising, and
- Transport and distribution systems are poorly equipped to deal with food contamination or pandemics.
- It seems entirely plausible that by 2050 Australia will be, at least sporadically, a net food importer.

Highlights Australia’s Role in food security
- Australia has key strengths that are highly relevant to building food security:
  o Australian agriculture has maintained its leading position by producing food on the driest inhabited continent, on low quality soils and in the face of continual climate variability.
• Australia built strong links and capabilities in delivering technological development to developing countries in the region.
• They have a strong research and development (R&D) base and agricultural R&D capability ranks among the best in the world.
• They have developed a strong capability in climate change research including studies on impacts, adaptation and mitigation.
• They have expertise in human health and nutrition research.

These strengths provide a solid foundation to catalyze transformation in the food value chain required to address food security issues. Advances can be made through a national and coordinated approach to food; by building human capacity; by investing in R&D and by inspiring awareness of the nutritional value of food at both the production and consumption levels (PMSEIC, 2010).

Lessons Learned

A national approach to food

• Food production and processing is a fundamental part of Australia’s economy and the health and wellbeing of its citizens. Food, however, is not currently dealt with in a way which brings together food related policy, regulatory agencies and research organizations.

• As food security continues to emerge as a challenge globally and domestically, there will be increasing demand for:
  o Efficiency in food production, processing and distribution and responsibility in purchasing and consumption to reduce wastage and minimize costs.
  o R&D and the delivery of innovations to underpin productivity growth in the food sector, to meet human health needs and bring improvements in food processing.
  o Flexibility and responsiveness in regulation to ensure rapid delivery of innovations to the food value chain.
  o Different policy, regulatory and program areas related to food should be brought together to ensure that government takes a consistent approach to food and food security.
  o A national approach would bring a high level of coordination, build a strategy for a resilient food value chain and emphasize the link between food and population health (PMSEIC, 2010).

• Investing in R&D to reverse declining agricultural productivity growth

Agriculture has an excellent record of productivity growth over the last fifty years. This has global production to meet the large population increase and, for countries like Australia, these gains have kept food prices low while helping farmers stay in business. However, the rate of productivity growth has slowed dramatically over the past decade and there is international consensus that the current productivity gains are not sufficient to meet future global food demands (PMSEIC, 2010).

Scientific advances have underpinned productivity growth through yield improvements in crop production. The key challenges are clear:
  o To improve water use and management in agriculture.
  o To tackle the problem of soil nutrition and reduce the reliance on high energy requirements for fertilizer production.
  o To ensure sustainable management of the natural resource base.
To accelerate advances through new plant, livestock and fish breeding strategies.

- Building human capacity to meet the challenges and opportunities
  Technological advance is critical to productivity gains. It is dependent upon people who can develop the new technologies, deliver them where they are needed and apply the advances to food production systems. The number of agricultural graduates produced nationally falls far short of the estimated needs. Similar declines in other areas of science are increasing the competition for graduates. There are too few graduates taking up the opportunity to study for a higher degree by research and develop a career in agricultural and food sciences. The proportion of graduates in the agricultural industry is lower than that of the broader economy. The age structure across the sector is also of concern. Agriculture has Australia’s oldest workforce with a median age of 48 years. Importantly, the effective delivery of technological advances will depend upon a highly skilled, receptive and dynamic food sector workforce.

- Raising the importance and awareness of food in the public consciousness
  Food is often treated as a bulk commodity which is cheaply and readily available. However, food is strongly linked to the health of the nation. High quality food should be available to all groups within the population. Although information on food and health is readily available in the society and many take advantage of this information, there appears to be a society-wide lack of appreciation of the fundamental role of food in health. Further, authoritative sources of information can be lost in the sheer volume of general information. As a nation there is great potential to apply new technologies in food production and processing systems to benefit the health.

  Management of the food supply should be improved to ensure all Australians, including at-risk populations, have access to food that promotes health and wellbeing. At the same time, to reduce the high levels of food waste in the community, food should be regarded as a valuable resource (PMSEIC, 2010).

**Recommendations**

- Establish the Australian Food Security Agency to ensure that the following issues are tackled:
  o Availability of nutritious food in Australia through coordination of government policy and programs across the food production, processing and supply sectors.
  o Data collection on the environment, food production, food processing and distribution, and food consumption patterns, to support effective policy and program development.
  o A Food Security Research Strategy to provide a framework and research targets for future food production and processing environment. The Strategy would build on the outcomes of current reviews such as the Productivity Commission’s review of the Rural Development Corporations and the Rural R&D Investment Plan being developed by the Rural R&D Council.
  o A National Land Use Planning Framework based on a landscape perspective, developed in conjunction with state and territory governments to secure future food production.
  o Streamlining and harmonization of regulatory procedures to support technology development, evaluation and delivery across the food value chain.

- Australia increases investment in agricultural R&D to harness national expertise and take a leading role in national and international programs targeted to improving low input farming systems.
• Development of incentives to recruit and nurture future generations of innovative and adaptive farmers, researchers and associated professionals for the Australian food production and processing sectors.
• Better engaging the community and partner organizations to elevate the status of food in Australia and build cooperative commitment to an improved food value chain.

Cuba
Profile of Food Security in Cuba
• Cuba is an interesting case for studying on food security. Due to its historical and political background, Cuba has evolved according to a unique development model. Its rapid development after the Revolution of 1959, its economic collapse after the dissolution of the Soviet Union in 1989, and the nation's subsequent struggle to become more self-sufficient created a unique situation from which much can be learned (Lane, 1999).

• The fall of the Soviet Union in 1989 pushed Cuba into the worst economic crisis of its history. The nation was faced with the dual challenge of doubling food production with half the previous inputs such as fertilizers, pesticides and farming equipment (Catherine, 1999). Cuba was importing from the Soviet Union 44 - 57% of its per capita caloric intake, 48% of its manufactured fertilizers, and 82% of its pesticides and herbicides. As food availability decreased, average daily per capita calorie consumption dropped from 2,845 to 2,275 during the period of 1989 to 1992 (Deere, 1993).

Highlights Cuba’s Role in food security
• Cuba responded to the crisis with a national call to increase food production by restructuring agriculture. This transformation was based on a conversion from a conventional, large scale, high input, mono-crop agricultural system to a smaller scale, organic and semi-organic farming system. It focused on utilizing local low cost and environmentally safe inputs, and relocating production closer to consumers in order to cut down on transportation costs (Catherine, 1999).

• Urban agriculture has been a key part of this effort to increase food production. By 1994 a spontaneous decentralized movement of urban residents joined a planned government strategy to create over 8,000 city farms in Havana alone. The success of these gardens has significantly contributed to the easing of Cuba’s food crisis. In 1998 an estimated 541,000 tons of food were produced in Havana for local consumption. Food quality has also improved as citizens now have access to a greater variety of fresh fruits and vegetables. Although the program still faces many challenges, urban gardens continue to grow, and some neighborhoods are producing as much as 30 percent of their own subsistence needs (Catherine, 1999. P3).

• The growth of urban agriculture is largely due to the Cuban state’s commitment to making unused urban and suburban land and resources available to aspiring urban farmers. The issuing of land grants of vacant space in the city has converted hundreds of vacant lots into food producing plots. New planning laws place the highest land use priority on food production (Catherine, 1999. P3).

• The opening of farmer’s markets and the legalization of direct sales from farmers to consumers dramatically increased production incentives for urbanites. Deregulation of prices combined with high demand for fresh produce in the cities has allowed urban farmers to make two to three times as much as professionals (Catherine, 1999. P3).
Lessons Learned

• Urban agriculture has since become a major element of the Havana cityscape. The first boost given to urban agriculture by the government was the creation of the Agricultural Department for Havana City in April, 1994 (Catherine, 1999).

• There are three state run agricultural enterprises in Havana: the Empresa de Cultivos Varios (Mixed Crop Enterprise), the Empresa Horticola Metropolitana (Metropolitan Vegetable Enterprise) and the Empresa Pecuaria (Animal Husbandry Enterprise) (Catherine, 1999).

• Cuba has an extensive agricultural research sector, with most head laboratories and administration offices inside Havana City limits. The Department of Urban Agriculture has been working with all institutes and laboratories to determine how they can best serve the needs of city growers (Catherine, 1999).

• Cuba now has one of the most successful urban agriculture programs in the world and continues expanding urban production with the goal of putting 100 percent of arable land under cultivation, increasing irrigation potential with new wells and water tanks, and maintaining high standards of quality in all aspects of production.

• The key elements in Havana’s success have been:
  o political will
  o real access to public lands
  o coordination of, not competition for, local resources
  o concrete programs to support small producers
  o encouraging producers’ sense of ownership
  o establishing a strong extension program
  o guaranteeing affordable inputs
  o strong local demand for fresh produce


• Based on this article’s case study of Cuba, grassroots organizing, the appropriation of public space for growing, and shared technical and educational support stand out as approaches/practices/tools that can be included in a framework to build/support/nurture resilient food systems. These are tools that can be put into practice at the local level to create an environment

• Urban agriculture as an approach
Module 5: Local

Scope Statement
In this module, participants will discuss local food supply vulnerability, understand levers of influence within the local food system, and examine case studies that illustrate the importance of food system resilience.

Terminal Learning Objective (TLO)
Participants will examine the relationship between supply, trade, and policy within the context of the local food system.

Enabling Learning Objectives (ELO)
At the conclusion of this module, participants will be able to:

- 5-1 Understand the role of supply chains in the local food system.
- 5-2 Understand the role of policy and trade in the local food system.
- 5-3 Examine case studies addressing resilience of the local food system.
- 5-4 Identify typologies of programs that contribute to resilient food systems.

Lesson Topics
- Typologies of programs that contribute to resilient food systems (urban farms, food forests, vertical gardens, home garden networks, and etc.)
- Policies and legislation that facilitate or inhibit resilient food systems at the local level.
- Domestic and International Programs Contributing to Resilient Food Systems at the local level.

Instructional Strategy
- Lecture
- Instructor-facilitated discussion on module
- Exercise

Research

Key takeaways:
- Product aggregation is possible at every point along the supply chain
- As supply chains lengthen, product volume increases while farm identity is lost; bolstering marketing to tell the farm/product’s story is an effective approach to resolving the lost transparency
- Price negotiations based on cost-of-production-plus-profit help ensure that premiums captured in high volume transactions are fairly distributed across the supply chain
Planners have been facilitating ag conservation, farmer’s markets, urban ag, WIC/SNAP; little attention paid to supply chain development and high-volume distribution as this is typically outside the purview of planning practitioners.

- APA, American Dietetic Association, American Nurses Association, and American Public Health Association developed shared principles for a food system (2010):
  - health promoting
  - sustainable
  - resilient
  - diverse in scale, geography, culture, and food choice
  - fair for farmers, workers, and eaters
  - economically balanced
  - transparent

- Three critical components of mid-tier food value chains:
  - Aggregation
  - Transparency and source identity throughout the supply chain
  - fair pricing practices

- Food value chains: values based strategic alliances between midsize independent food production, processing, and distribution/sales enterprises that seek to create and retail more value on the front end of the chain, and effectively operate at regional levels with significant volumes (Stevenson and Pirog).

**Local Food Supply Chains**

*Aggregation:* the consolidation of products sourced from multiple growers

- Diversifies the number of product offerings
- Achieves larger volumes of a single product

![Figure 1. Aggregation Points and Distribution Paths Across the Local/Regional Food Supply Chain](image)

(3 pt) Farm identity is typically lost when a broad line distributor administers aggregation.

(4 pt) May appeal to small growers accustomed to direct sales, though wholesale buyers prefer to use broad line distributors for efficiency.
Aggregation lessons learned from UW Baldwin Case Studies

- Financing strategies historically used by planners for commercial development are starting to be used to fund food hubs; this could help
- “…planners, policy-makers, and allied professionals should advocate for and identify innovative funding strategies to help finance the expansion of physical aggregation and distribution infrastructure such as food hubs. At the same time, we caution entrepreneurs and technical assistance providers to pace physical infrastructural expansion appropriately so as not to overextend financially or programatically.”
- Need for improved post-harvest handling infrastructure to allow for better QC through centralized grading and packing facilities and more efficient transport
- Many reliant on third parties for storage and logistics, distribution; “asset-based development” of infrastructure reduces costs
  - Asset based development/phased development: building out infrastructure from existing strengths
- Economic development planners working with transportation planners to develop incentives and partnerships that facilitate asset based and phased development
- Collaborative research and planning efforts between MPO’s, regional freight coalitions, and academic bodies could be effective

Food Hubs: http://blogs.usda.gov/2010/12/14/getting-to-scale-with-regional-food-hubs/#sthash.noO9U7Kg.dpuf

- “a centrally located facility with a business management structure facilitating the aggregation, storage, processing, distribution, and/or marketing of locally/regionally produced food products.” By actively coordinating these activities along the value chain, food hubs are providing wider access to institutional and retail markets for small to mid-sized producers, and increasing access of fresh healthy food for consumers, including underserved areas and food deserts.

Transparency and source identity: local food movement’s element of consumer’s desire to reconnect with their food

- Transparency is lost as consumers move spherically outward
- Transparency generally corresponds to the percentage of retail food dollar captured by farmers
- However, direct marketing is an impractical means of moving high volumes of local product into venues such as retail grocery stores and cafeterias because farm-direct sales typically move small quantities, while retail and institutional buyers prefer to buy large volumes
- 62% of consumers primarily buy food at grocery stores; as the supply chain lengthens, producers selling into local wholesale markets need to find new ways to connect to buyers, particularly if they want to capture a premium for local product in the competitive grocery marketplace
- To capture that premium, unique origins of local and regional food need to be illustrated to consumers and buyers; storytelling and transparency about production practices can supersede third party certifications as means of product differentiation
- Examples:
  - In-store meet-the-farmer product tastings
  - Posting of farm names / farmer profiles at point of sale
  - Affiliating with reputable regional brands
Transparency and Source Identity lessons learned from UW Baldwin Case Studies:

- Telling the story behind product crucial; small growers often lack this market savvy
- Planners should assist producers by partnering them with private and non-profit local food marketing resources
- Increasing the visibility of local food production and elevating access to healthy food to a metro level priority will help raise the profile of the local food system in planning and policy efforts.

Fair Pricing

- Direct market producers are price-makers; producers who sell into commodity markets are typically price-takers and must capitulate to terminal market pricing
- Mid-tier supply chains can be the “sweet spot” where economies of scale meet socially and environmentally differentiated product, making it possible for meaningful price negotiations between producers and buyers.
- Fair pricing hinges on cost-of-production, wherein producers must have a working knowledge of their input and labor costs and in turn receive “cost-of-production plus” prices that cover the cost of production and incorporate profit margins along the value chain.

Fair Pricing lessons learned from UW Baldwin Case Studies:

- “Planners are not typically engaged in helping establish product prices, but they do foster local and regional economies and so they need to understand how pricing mechanisms might influence their practices. Price negotiation is fundamental to fair pricing for producers and an important component of strategic supply chain relationships because it implies interdependency in supply chains. Buyers benefit from strong, mutually beneficial relationships with their producers because they contribute to improved product quality and consistency in supply. Producers benefit from increased market access, more loyal customers, and in some instances technical assistance. Planners can help establish collaborations that satisfy economic needs.”
• Important to anticipate demand and increase negotiating power, producer-to-producer and producer-buyer meetings to coordinate production planning and align supply and demand in advance of growing season
• more sophisticated pricing mechanisms allow for higher levels of producer coordination, i.e. Organic Valley Produce:
  • Offers producers a base price along with an end-of-season “pooling bonus;” ensures regular payments plus a way to flexibly accommodate freight costs and price fluctuations. Remaining profits equitably distributed to producers.
• producers unfamiliar with high volume markets not always knowledgeable about pricing variability and mark-up practices
  • training for producers on wholesale pricing can alleviate conflicts

Planning Implications

How to manage resources and shape local supply chains

“Professionals active in local and regional food system development should recognize that significant philanthropic and federal grant opportunities exist to establish new organizations and collaborations for existing organizations. Regional planners, public-sector staff, and consultants can help ensure successful applications by assisting organizations and alliances in integrating various elements of the food system appropriately when responding to various request-for-proposal guidelines and by supporting related research assessing these various initiatives.”

• Conduct infrastructure inventories
• Efficient aggregation increasingly orchestrated at multi-purpose food hubs
• Infrastructure investments are costly; asset-based and phased development effective
• Must have working knowledge of regional food systems’ assets (existing processors, distributors, and transportation networks), and how they are interconnected
• Regional food system inventories / asset-mapping significantly help to rebuild sustainable regional food systems and physical infrastructure that supports them
• Include infrastructural and access issues in community food assessments
• Asset maps should detail:
  o Existing distributors
  o Processors
  o Processing capacities of kitchen facilities at regional institutions (i.e., churches and schools)
  o Freight transportation networks
  o Temperature controlled storage facilities
  o Agricultural entrepreneurs, investors, and loan guarantors
  o Current/projected regional production capacity
  o Cooperative extension resources
  o Grocery and retail outlets
  o Other high volume local markets (prisons, schools, nursing homes, corporate campuses)
• Baseline regional food system inventory goals:
  o Help identify gaps and patterns within the current landscape
  o Point to partnership opportunities
  o Lend legitimacy to project proposals and funding requests that seek to strengthen and scale up sustainable regional food systems
Serve as a yardstick against which to chart and assess future progress
Identify existing infrastructure, including distribution centers and storage facilities that could serve as food hubs
Inform siting decisions about new processing and distribution facilities based on production areas and transport infrastructure

- Fostering regional development of allied industries
  - Food clusters could offer advantages to local producers by facilitating value-chain formation and place-based marketing infrastructural and logistic improvements from strategically siting processing facilities near production areas creating enhanced marketing opportunities by developing a regional culinary identity
    - Fosters connectivity through trade synergy and geographic proximity; creates competitive national and international advantage and regional economic development
  - Greater investment needed in development of mid-sized processing infrastructure
    - Many large local institutions (schools, prisons, hospitals) interested in sourcing locally do not have capacity to prepare a fresh product without sufficient, affordable processing infrastructure, growers and local distributors are losing a large portion of their local market and palatable food is wasted
    - Northern California wine consortium; Driftless Region dairy as an example of regional culinary identity
  - Goals for strategic development of cognate industries support regional wholesale distribution:
    - To deliver more local product to larger volume regional markets
    - Enhance access to fresh and fresh-frozen local product for consumers in large-local institutions
    - Reduce food miles traveled by food consumed in the region
    - Retain more food dollars in regional economy
    - Foster community long-term, purposeful, and permanent economic development that increases communities’ capacity to act and innovate
    - Enhance opportunities for place-based marketing through regional culinary identities

Realigning Regulatory Policy
“The government has an important role to play in developing a level regulatory and infrastructural playing field for mid-tier distribution. Such efforts will facilitate the development and growth of new enterprises with their associated economic and social benefits. Finally, the foregoing recommendations associated with inventories and assessments, economic development and organizational design, and regulatory frameworks, can all be implemented by multidisciplinary planning offices, both public and private. Clearly planners have much to offer in this important element of food system practice.”

- Current regulations present challenges to small and midscale growers and distributors whose production/distribution ranges are often incongruent with regulatory costs and procedures associated with their trades; this contributes to price-setting challenges.
Clusters can facilitate fair pricing, complementary policies to address scalar incompatibilities required

Food safety regulations are poorly tailored to small/mid-scale enterprises, inconsistently enforced and inadequately implemented partnering between state departments (ag, health, trade), co-ops, consumer watchdogs, non-profits, all tiers of policy makers can facilitate regulatory framework that achieves:

- Increased food safety and consumer trust within regulatory system
- Enhances interstate regional trade opportunities by fostering reciprocity agreements that formally recognize equivalencies with production and processing standards
- Leverage all tiers of grants to help growers and processors cover required infrastructure costs for facility upgrades
- Improve accessibility, clarity, and consistency of regulatory policy for emergent farmers and local food entrepreneurs and distributors through toolkits tailored to distinct phases of regional supply chains
- Improve small and midscale enterprise regulatory compliance
- Invest in site planning, design, and other assistance to facilitate food distribution

Supply Chain in New Orleans: Alternative methods of trade (Pyles et al 2008)

Individuals depend on family and friends to share resources such as food and clothing and services such as child-care in resourceful ways. According to Stack (1974), networks “trade food stamps, rent money, a TV, hats, dice, a car, a nickel here, a cigarette there, food, milk, grits, and children” (p. 32). She identified a rhythm of exchange where an object or service is swapped with the intent of obligating the receiver over a period of time. One of the respondents describes the process: “It’s just like at stores where people give you credit. They have to trust you to pay them back, and if you pay them you can get more

Transportation to get food was often critical after Hurricane Katrina. Often, transportation required a boat that could get through the flooded streets:

- “My little granddaughter and my little niece and the two gentlemen next door and my other daughter took a boat. And he said he was going to the convention center, to the Superdome. And he left the boat there with us, so then we get in the boat and go around there by my daughter’s house and got some more food and stuff for us to have. And then they went and got water and stuff too. . . . Some of the stores were open, sitting wide open, so they went in to see if they could find water and stuff.”

The strategies that impoverished families use to provide basic necessities for themselves are complex combinations of informal and formal helping systems. Often under pressure from changes in familial circumstances, community context, and special needs, families face insecurity even in the context of cohesive neighborhoods and available federal and state programs. A major disaster, disrupting community and informal networks, illuminates the dependence of many households on larger state systems for support, and the degree of hardship experienced when it fails.

Under the pressures of a disaster, not only individual households, but the sharing networks in which they were embedded became bereft of food.

When food supplies were delivered by agencies charged with helping participants rather than relief many participants experienced terror and feelings of degradation
• When an emergency robs households of self-sufficiency, a localized support system, itself disrupted by the emergency may be incapable of making the response required to minimize hardship.

Policies/Legislation
The intent of the next section is to use the APA Policy Guide on Community and Regional Food Planning to offer tools for participants engage at their respective agencies that both strengthens community and regional food systems and encourages the industrial food system to provide multiple benefits to local areas. What follows are seven general policies drafted in 2007 by the American Planning Association to help planners tackle community and regional food planning, however these principles can overlap with other professions and serve as a guide useful to all:
• Support comprehensive food planning process at the community and regional levels;
• Support strengthening the local and regional economy by promoting local and regional food systems;
• Support food systems that improve the health of the region's residents;
• Support food systems that are ecologically sustainable;
• Support food systems that are equitable and just;
• Support food systems that preserve and sustain diverse traditional food cultures of Native American and other ethnic minority communities;
• Support the development of state and federal legislation to facilitate community and regional food planning discussed in general policies #1 through #6.

These seven principles will guide the rest of the module as we familiarizing course participants with the interactions, tools, and vulnerabilities at the local/community level. These principles are outlined in “Policy Guide on Community and Regional Food Planning” produced by the American Planning Association in 2007. This is a useful document applicable on many levels but particularly to local actors addressing their own community’s food security issues. The policy guide has been adapted for the purpose of this course, but the full version can be found at http://www.planning.org/policy/guides/adopted/food.htm.

• A clear trend in all parts of the food system is greater concentration of ownership, which means that decisions affecting communities are increasingly made by absentee business owners. Mergers of chain supermarkets often result in the closure of stores, thereby reducing residents' access to healthy food, and lowered tax base and employment. Another trend, vertical integration, leads to increased consolidation of different activities such as food production, processing, and distribution under the control of single entities.

• Today's food system has also contributed to the increased incidence of obesity and diet-related disease; loss and erosion of diverse culinary traditions represented by First Nations and immigrant cultures; and ecological crises including extinction of species, declining aquifers, and deforestation. Government policies sometimes
exacerbate these trends due to the increasing political influence of food industry giants.

- While there is little doubt that the industrial food system will remain dominant, more communities and regions are acting to resolve some of these problems by developing alternative, local, and sustainable food systems. (Cited in APA, 2007)

Specific trends related to the food system's impacts on localities and regions, and examples of positive actions are described below.

**Loss of Farmland**

Although agriculture is America's dominant land use, with nearly 1 billion acres of land in agricultural use, farmland in metropolitan areas is disappearing at a rapid pace. "Urban-influenced" counties account for more than half (56 percent) the total U.S. farm production, 63 percent of dairy production, and 86 percent of fruit and vegetable production; yet these counties have annual population growth rates more than twice the national average. This rapid growth threatens our capacity to obtain fresh and local food (cited in APA, 2007).

**Aging of Farmers**

One fourth of U.S. farmers and half of farm landlords are at least 65 years old; by comparison, about 3 percent of the U.S. labor force falls in this age group. Farmers and landlords aged 65 and over own a combined one-third of farm assets. The aging of farmers reflects the weakening of "family farm" institutions, including intergenerational transfer of farm assets. Consequences with implications for planning include the speeding up of the conversion of agricultural land and the consolidation of agricultural land into larger operations (cited in APA, 2007).

**Protecting Agriculture**

Across the country communities are preparing plans to protect agriculture. A countywide plan in Marin County, California, identifies several policies to overcome challenges facing local agriculture and farmers. These include policies to protect agricultural land from sprawl, protect productive agricultural soils, support sustainable water supplies, and enhance agricultural viability (cited in APA, 2007).

**Farm Bill and Local Areas**

All Titles of the Farm Bill, including nutrition programs, commodity programs, trade, conservation, and rural development, have implications for urban and rural communities and therefore for local planning. For example, as Dallas County, Iowa, urbanizes, its county soil and water conservation district and the Natural Resources Conservation Service of the USDA now work with developers to employ land conservation measures and keep soil on construction sites (cited in APA, 2007).

**Food System Links with the Economy**

*Globalization of the Food System*

Increasingly, food comes from more distant sources, with serious consequences such as the loss of older local food system infrastructure, and threats to the survival of many U.S. farms.
Although the U.S. rightfully prides itself as the breadbasket of the world, in 2006 for the first time, the value of food imported into the U.S. exceeded the value of food exported from the U.S. (USDA Foreign Agricultural Service, 2006). Globalization also leads to greater consumer ignorance about the sources of food. As people know less and less of where their food comes from, how it is produced and with what impacts on communities and the environment, preservation of land and the natural and built resources upon which local agriculture depends becomes more difficult.

**Rural Decline**
Farms between 50-500 acres and 500-1,000 acres, the largest share of "working farms" and those that fall between local and commodity markets, decreased by about 7 and 11 percent respectively between 1997 and 2002, while those over 2,000 acres have gone up nearly 5 percent. This loss of "the middle" in farming threatens rural communities by making them more economically insecure and changes land stewardship practices handed down over generations. (Kirschenmann et al., no date).

**Economic Impacts of Local Purchasing**
Robert Waldrop, a 2006 candidate for mayor of Oklahoma City, highlights the under-appreciated economic development possibilities of buying food directly from area farmers. Using USDA data and analyses, he identifies $2.1 billion in economic activity in Central Oklahoma if Oklahoma County residents bought their eggs, poultry, meat, vegetables, flour, and milk and dairy products directly from farmers in the region.

**A Local Food Purchasing Policy**
In 2006, the Woodbury County (Iowa) Board of Supervisors adopted a "Local Food Purchase Policy," mandating the purchase of locally grown organic food for department events at which food is served. This action has the potential of providing $281,000 in annual food purchases to a local farmer-owned cooperative.

**Food System Links with Health**

**Farm Policy and Health**
Federal farm policy since the 1950s has encouraged the overproduction (and therefore the driving down of prices) of a few commodities such as corn and soybeans, all with serious implications for farmers, rural and urban communities, and the health of consumers. Support for fruits and vegetables, on the other hand, has been low (Nestle, 2002). Low commodity prices have led to the heavy use by the food industry of products such as high fructose corn syrup and hydrogenated vegetable oils, which are linked with obesity and related illnesses. Processed grocery foods, frozen foods and baked goods represented over 40 percent of supermarket sales in 2000, while produce claimed only 9 percent (Schoonover and Muller, 2006).

**Obesity**
Obesity and associated costs are a significant concern nationwide. While over 60 percent of Americans are overweight or obese, the effects of obesity are not borne equally across race and socio-economic strata, or even states and localities, thereby generating unequal burden. Similarly, many diet related diseases, such as heart disease, certain cancers, and diabetes are found to be more prevalent among minority populations. In 2000, nearly 16 percent of children
and adolescents, ages 6 to 19, were classified as obese (Centers for Disease Control and Prevention, 2002).

**Obesity and the Built Environment**
Land use and transportation policies have been implicated in the rise of obesity through both, increased food consumption and reduced physical activity. Research suggests lower rates of obesity and overweight in neighborhoods where supermarkets offering more healthful food choices are present (Morland et al., 2006). This access is not even however: low income and minority areas contain fewer supermarkets on average; these areas also tend to have a higher density of convenience stores offering fewer healthful choices and higher prices, and fast food outlets (Morland et al., 2002). Because these communities experience lower vehicle ownership rates, problems of access are exacerbated.

**Food System Links with Ecological Systems**

**Energy Consumption in the Food System**
At roughly eight calories of energy to produce one typical food calorie, today's food system is both energy-intensive and inefficient. The average food item travels at least 1500 miles. According to Thomas Starrs (2005), growing, processing and delivering the food consumed by a family of four each year requires more than 930 gallons of gasoline or about the same amount used to fuel the family's cars.

**Water Issues in Agriculture**
Sedimentation and chemical pollutants resulting from agricultural practices continue to pose serious problems for fisheries, other wildlife, water-based recreation, and household water use. The Dead Zone in the Gulf of Mexico is one of the largest such examples of depletion of oxygen caused largely by farm runoffs. In 2005, it covered nearly 5,000 acres (National Aeronautics and Space Administration, 2004). In addition, U.S. agriculture is an especially prolific consumer of surface and ground water. For example, 38 percent of irrigation water in California and 66 percent in Texas are pumped from ground water (Pimental et al., 1997).

**Concentrated Animal Feeding Operations (CAFOs)**
CAFOs are agricultural facilities that house and feed a large number of animals in a confined area for 45 days or more during any 12 month period. In 2003, CAFOs, a small percentage of the nation's 238,000 feeding operations, produced more than half the 500 million tons of manure, according to the U.S. Environmental Protection Agency (Centers for Disease Control and Prevention, no date). Health threats from such operations include chronic and acute respiratory illnesses, injuries, infections, and nuisances such as flies, and odor (Bowman et al., 2000). CAFOs are also implicated in spreading stronger strains of E. coli bacteria and environmental problems such as ground water contamination. An emerging and promising method to reduce odors and generate renewable energy from livestock manure in CAFOs is anaerobic digestion (Wilkie, 2005).

**Loss of Biodiversity**
Across the country, native vegetation (forests, prairie, and wetlands) which provides wildlife habitat and performs valuable ecosystem services such as flood control has been depleted or seriously threatened. In Illinois, for example, over 90 percent of all natural wetlands have been
lost, the majority to agricultural production. According to noted ecologist Gary Nabhan, the U.S. has lost over 60 percent of all the heirloom crop varieties that were here at the time of Columbus's arrival to the New World; the other 40 percent remains below the radar of the food industry (Mangan, 2006).

**Fisheries**
In fisheries across North America, the needs of consumers and the long-term sustainability of fishery populations have fallen out of balance due to over-fishing or habitat loss or degradation. Fish populations of haddock, Atlantic cod, red snapper, Pacific herring, Pacific halibut, salmon, and king crab have seen significant declines (American Fisheries Society, no date).

**Food system wastes**
Wastes at each point of the food system use up local landfill capacity, or if incinerated, increase air pollution. One study showed that nearly 30 percent of all solid wastes are related to food consumption, with half of that being food packaging (University of Wisconsin Department of Urban and Regional Planning, 1997). Natural organic wastes may be a valuable input for agriculture if they can be separated from the waste stream. Such wastes can be fed to hogs, composted and reapplied to the land, or converted into renewable energy through anaerobic digesters.

**Food System and Social Equity**
Hunger and food insecurity are prevalent in the United States. The U.S. Department of Agriculture's Economic Research Service (2006) reports that in 2005, 11 percent of all U.S. households were "food insecure" because of a lack of sufficient food. Black (22.4 percent) and Hispanic (17.9 percent) households experienced food insecurity at far higher rates than the national average.

**Emergency food assistance**
In 2003-04, requests for emergency food assistance increased by about 14 percent in the 27 cities surveyed by the U.S. Conference of Mayors (2004). About 20 percent of the demand for food went unmet. Fifty-six percent of those requesting assistance represented families with children; 34 percent of adults requesting assistance were employed.

**Food Stamps**
In 2003, 21.2 million individuals participated in the Food Stamp Program; however, this represented only 60 percent of people eligible to receive Food Stamp benefits. The average monthly food stamp benefit was $83.77 per person (Food Research and Action Center, no date).

**Supermarket initiative**
Research documents lower availability of grocery supermarkets in low-income areas. In Rochester, NY, planners worked with neighborhood groups to bring a Tops Supermarket to the Upper Falls area, a neighborhood that had long gone without a grocery store. As a result of their negotiations, Tops agreed to renovate three other stores in the city, thereby increasing access to a variety of affordable and healthful food choices (Pothukuchi, 2005).
Vacant urban land for growing food

Inner cities have significant amounts of vacant land that, when used for vegetable gardening by low-income residents, produce multiple health, social, and economic benefits. For example, Detroit has over 60,000 publicly owned vacant parcels, and a vibrant urban agriculture movement that can make productive use of this land, if made available by public agencies that control it (Kaufman and Bailkey, 2000). The Diggable City, a Portland State University graduate planning workshop project prepared for the City of Portland, Oregon, produced a land inventory containing specific sites of publicly owned properties to assess opportunities to expand community gardens and other forms of urban agriculture. This project has educated the community on the significance of urban land as a resource for food production and food security in the inner city (Portland State University, 2005).

Immigrants as food sector workers

The food system's least desirable jobs are worked by immigrants in vegetable harvests, industrial slaughterhouses, and food processing plants. According to the U.S. Farm Bureau, immigrant labor may add up to $9 billion to the nation's $200 billion annual agricultural output (Keller, 2006). It is estimated that of the more than 4 million agricultural workers in the U.S., at least two-thirds are immigrants, 80 percent of whom are from Mexico. Because many are undocumented, they typically receive below-minimum wages, experience substandard living conditions, and make up a large portion of the food insecure.

Native/Ethnic Food Cultures

Food issues faced by Native American communities. Native American communities are hit particularly hard by the loss of or threats to ecologies, habitats, and native food ways that included subsistence agriculture, hunting, fishing, and gathering. As Native Americans were pushed into the dominant food system, the incidence of diet-related disease rose rapidly. Diabetes-related mortality among American Indians is over twice that of the general U.S. population (231 percent). In addition, nearly one-fourth of Native American households are food insecure because of inadequate resources with which to meet daily food needs, with one out of 12 individuals so food insecure as to be classified as hungry (Bell-Sheeter 2004).

Native Food Planning

The Oneida Community Integrated Food Systems, established in 1994, started with a task force to address concerns related to poverty and health on the Oneida reservation. Through their assessment of food-related needs and assets, they developed actions to support goals related to increasing employment for Native Americans; educating community members about healthy foods and diets; and producing meats, fruits, and vegetables for both, food security and increased profits.

Ethnic Cuisines

Although Mexican, Italian, and Cantonese-Chinese cuisines are the most sought after dining-out ethnic choices, newer cuisines are gaining a foothold. According to an "Ethnic Cuisines" survey by the National Restaurant Association, Hunan, Mandarin and Szechwan variations of Chinese cuisines, German, French, Greek, Cajun/Creole, Japanese (including sushi), Asian Indian, Soul Food, Scandinavian, Caribbean and Spanish cuisines have been tried by more than 70 percent of

**Locally Sourced Ethnic Foods**
Ethnic foods are part of the $25 billion specialty food industry, whose sales jumped 16 percent between 2002 and 2004. Farmers across the country are finding profit in this trend. For example, some Pennsylvania and Maryland farmers are growing n'goyo and gboma — West African vegetables — Thai eggplants, Jamaican Callalou, and Halal lamb products desired by Muslim residents (Paley, 2005).

**Comprehensive Food Planning and Policy**

*Food Policy Councils*
Over 35 local and state food policy councils have been established in North America in the past 10 years. Broadly representative of groups in the local and regional food system, and affiliated with either city, county, or state governments, these institutions work to strengthen local and regional food systems, among other goals.

*Community-based Food Projects*
USDA's Community Food Projects Competitive Grants Program, now in its 10th year, is an important source of funding for food projects that serve low income communities. Currently authorized at the level of $5 million a year, the program has been expanded to encourage more comprehensive food planning. A Farm to Cafeteria legislation was recently enacted but no money was appropriated to implement it. Programs related to the Farmers Market Nutrition Program (Farmers Market WIC) and the Senior Farmers Market Nutrition Program are also important to local communities.

The seven general policies provided below, accompanied by specific policies and planner roles, suggest concrete ways in which food issues may be woven into current planning activities, and more systematic, comprehensive community and regional food planning may be undertaken.

**Specific Policy #1A**
Planners support the creation of local and regional food planning mechanisms that integrate major local planning functions (such as land use, economic development, transportation, environment, parks and recreation, public safety, health and human services, and agricultural preservation).

Multiple and complex links exist among food system activities and between food and planning activities such as land use, transportation, and economic development planning. Community concerns about health, economic development, ecological sustainability, social equity, and cultural diversity are also intricately linked to food system issues and to each other. Achieving community-food objectives will require collaborations between groups representing diverse interests such as anti-hunger, nutrition, farming, and environmental issues; span separate government agencies; and include multiple levels of government in dialogues.

Planners could play the following roles:

- Advocate for, and build support in communities and regions for a more comprehensive approach to food planning, such as through local and/or regional food policy councils or coalitions.
- Undertake periodic assessments of community/regional food issues, including broad community participation, and develop recommendations for actions.
- Integrate recommendations emerging from community and regional food planning into comprehensive plans and supporting ordinances, strategic plans, economic development plans, environmental plans, neighborhood or area plans, and plans for specific agencies such as transportation and parks and recreation.
- Assist nonprofit agencies and public-private-nonprofit partnerships engaged in anti-hunger, nutrition, and agriculture activities by sharing data for planning, implementing, and evaluating programs.

Specific Policy #1B

Planners support the development of plans for building local food reserves and related activities to prepare for emergencies. Because of the important roles planners play in recommending proposals for the future of their communities, they have the skills and knowledge to also contribute to planning for emergencies and crises — natural or man-made. Due to recent concerns of homeland security and natural disasters such as Hurricane Katrina, and potential threats associated with bioterrorism, climate change, disruptions in transportation systems, and pandemics such as the avian flu, communities around the country are undertaking emergency preparedness plans to protect the health of community residents, meet basic needs, and prepare for post-emergency operations. Maintaining food security at household, community, and regional levels during the crisis and recovering food systems in a sustainable manner soon thereafter are central goals of such preparedness.

Planners could play the following roles:

- Assist in assessing the community and region's potential food needs during emergencies of different kinds (such as a major earthquake, hurricane, terrorist attack, or the spread of contagious disease) and the capacity of current food sources and distribution systems in the community and region.
- Partner with appropriate public agency and private stakeholder groups to develop appropriate plans to build sufficient local and regional food reserves for emergencies, including related communications, logistics, and transportation infrastructure, and to restore food system integrity and operation after the emergency.
- Coordinate with other agencies in the implementation of public outreach and education campaigns to inform the community about food related emergency preparedness.

Specific Policy #2A

Planners support integrating food system elements into urban, rural, and regional economic development plans. The food sector is a significant, yet under-appreciated part of local and regional economies. The lack of awareness of the economic significance of the food sector is partly due to the sector's fragmentation and the absence of an overall food planning agency or food department in government. Incorporating food issues into economic development analyses and plans assures that the important economic contributions that the food sector makes to communities and regions are preserved and enhanced.

Planners could play the following roles:
• Support preparation of area-wide economic development plans that incorporate food production, processing, wholesale, retail, and waste management activities as well as consideration of the impacts these activities have on the local and regional economy in terms of jobs, tax and sales revenues, and multiplier effects.
• Support efforts to raise public awareness of the importance of the food sector to the local and regional economy.

Specific Policy #2B
Planners support developing land use planning policies, economic development programs, land taxation, and development regulations to enhance the viability of agriculture in the region.
In an era of globalization of agricultural commodities, economic viability at the local and regional levels is enhanced by promoting agriculture and food processing for local consumption. In addition to economic viability, planners can help achieve other benefits by taking a comprehensive view of the multiple functions served by rural landscapes adjacent to suburban and urban population centers. They can promote profitable agricultural enterprise farms that preserve resources for future generations while providing significant public goods in the form of beautiful working landscapes, ecological stewardship, and greater awareness and appreciation of the area's agriculture among the general population.
Planners could play the following roles:
• Conduct assessments of prime agricultural lands that will be affected by current and projected development trends.
• Analyze factors that support or constrain the viability of agriculture in the region such as high property taxes, access to markets, high cost of capital, and land use regulations that restrict farmers' ability to earn additional income through agri-tourism or farm stands.
Special attention in this category may be given to "agriculture of the middle," i.e. farms that fall in between local and commodity markets.
• Develop or modify policies, regulations, and other tools such as agricultural land preservation zoning, purchase of development rights, transfer of development rights, and partnerships with land trusts, to protect prime agricultural land.
• Partner with organizations that promote better understanding of farm life for urban dwellers to reduce the urban/rural divide.

Specific Policy #2C
Planners support developing appropriate land use, economic development, transportation and comprehensive planning policies and regulations to promote local and regional markets for foods produced in the region.
Planners can help open up more area-wide markets for farmers in the region. Expanding markets for local farmers and processors would not only help them survive economically and preserve unique regional agricultural and food traditions, but also reduce the pressures on some farmers to sell their land for urban development engendered by sprawl. Efforts to combat sprawl would benefit significantly from initiatives to enhance local markets for locally produced and processed foods.
Planners could play the following roles:
• Develop land use and transportation plans, modify development regulations, and help prepare economic incentive programs to provide accessible and well-serviced sites and
other development assistance for year round public markets, farmers' markets, small-scale processing facilities, and distribution centers for foods produced in the region.

- Prepare comprehensive and neighborhood plans that recognize community gardens and other forms of urban agriculture, farm/garden stands, and farmers' markets as desirable civic uses in neighborhoods, and provide sufficient space, infrastructure, and inter-modal transportation access for such uses. Ensure that zoning barriers to these activities are addressed or removed.

- Through plans, state and federal agricultural policies and funding, and development regulations, support food production for local consumption, direct marketing by farmers, agri-food tourism, and niche marketing of specialized agricultural products such as wines, cheeses, and cherries.

- Assemble and implement business enhancement and related incentives to help public institutions such as schools, hospitals, colleges, and government agencies, and private food outlets such as grocery stores and restaurants source foods produced in the region.

Specific Policy #2D
Planners support developing food system inventories, economic and market analyses, and evaluation techniques to better understand the economic impact and future potential of local and regional agriculture, food processing, food wholesaling, food retailing and food waste management activities.

More accurate metrics are needed to guide community and regional food-related economic development planning in a comprehensive manner, and in a way that considers direct and indirect impacts. The censuses of agriculture and retail and wholesale trades, national surveys, and many forms of local food assessments are used to understand the relationships between the food system and the other sectors of the economy. Differing data-gathering conventions in these categories can make it difficult to measure relationships accurately. Planners can help to bring different data together and provide comprehensive analyses at community and regional levels on a variety of indicators needed to inform food-related economic development planning.

Planners could play the following roles:

- Support studies that consider the impact on the area-wide economy of locally oriented food production and distribution activities such as farmer's markets, food co-operatives, community supported agriculture farms, local food processing facilities, community gardens, public markets, niche farming enterprises, and other locally sourced food businesses.

- Undertake studies assessing trends in farm consolidation, including underlying factors, to inform plans to support "agriculture of the middle."

- Contribute to the preparation of regional food resource guides that identify organizations and businesses that are involved in local and regional food production, processing, and retailing, the better to educate the public and build links between local producers and local consumers.

Specific Policy #2E
Planners support initiatives in marketing, technical, and business development assistance for small-scale and women and minority-owned farm, food-processing and food retail enterprises.
A vibrant local economy supports a range of enterprises run by a diverse group of owners and managers. New and transitioning small-scale farm and food enterprises can benefit from programs that provide production training, build marketing connections, teach business and financial planning, and provide other business services. Community organizations exist in many areas to provide these training and assistance programs.

Planners could play the following roles:

• Collaborate with agricultural and related agencies and other organizations that provide training, technical assistance, and capital to small-scale businesses and businesses owned by women and minorities engaged in farming, food processing, and food retailing operations.

• Assist efforts to help regional farmers diversify their products, and produce and market organic and other high-value products desired by consumers.

• Support the development of community kitchens and related infrastructure, food business incubator facilities, and entrepreneurial urban agriculture projects.

**Specific Policy #3A**

Planners support and help develop policies, plans, and regulations in land use, transportation, economic development, and urban design so as to increase access to food sources that offer affordable and culturally appropriate healthful foods. Especially for low income households in urban and rural areas.

Research suggests that households' proximity to supermarkets is correlated with positive dietary health. Planning can facilitate the availability of and convenient access to retail grocery outlets. Besides grocery stores, mom-and-pop corner stores, farmers markets, farm stands, ethnic markets, and community vegetable gardens can offer access to healthful foods at low-cost to low-income and ethnic and racial minority households. On the other hand, it should be recognized that sometimes planning decisions can have unintended negative impacts on the development, operation, or use of neighborhood-oriented grocery stores and other food sources that offer healthy, affordable foods; such decisions should be avoided.

Planners could play the following roles:

• Encourage mixed-use neighborhood design and redevelopment to include small and mid-size grocery stores (e.g., 3,000 to 20,000 square feet), seasonal farmers markets, community-based and government nutrition programs, and open space and related infrastructure for community vegetable gardens to allow residents to grow their own food.

• Develop area plans and design schemes in ways that encourage safe and convenient pedestrian, bike, transit connections between neighborhoods and the food sources described above.

• Support transit programs that improve connections between low-mobility neighborhoods on the one hand, and supermarkets, community gardens, food assistance programs such as food pantries and soup kitchens, and health and social service providers on the other, with a view to reducing travel time and enhancing safe and convenient use.

• On publicly owned lands, such as schoolyards, parks and greenways, and tax-foreclosed properties, support the development of vegetable gardens, edible landscaping, and related infrastructure, and the formation of partnerships with community-based nonprofits serving low-income residents for garden related programs.
Specific Policy #3B
Planners develop and support policies, plans, and regulations in land use, transportation, economic development, and urban design to encourage the availability of healthy types of foods associated with reduced risk of or occurrence of obesity and poor nutrition leading to diet-related diseases like diabetes and heart disease (especially in and near schools and other predominantly youth-centered environments.)
Low-income, particularly African American and Hispanic, neighborhoods often have a higher density of convenience stores selling junk food, liquor stores, and fast food outlets relative to full service grocery stores that offer a variety of healthy products. This is correlated with higher rates of diet-related disease and mortality in these communities. Youth in disadvantaged neighborhoods are especially vulnerable to the disproportionate availability of such foods.
Planners could play the following roles
• Assess and map the availability of fast food restaurants in low income neighborhoods relative to the availability of grocery stores offering healthier food options.
• Explore the feasibility of zoning changes to limit the development of fast food outlets within a specified radius of schools (say, one-half mile) and other youth-centered facilities such as the local YMCA and YWCA and boys and girls clubs.
• Explore the possible use of sign controls to prevent billboards that market low nutrient/high calorie foods fast foods and other negative food marketing within a specified radius of schools and other youth-centered facilities.

Specific Policy #3C
Planners support, through appropriate land use and zoning, transportation, urban design, and research tools, community-based organizations that develop demand for healthful foods, especially in low-income communities.
Activities to promote healthy diets have to address both the supply and demand side of healthy eating. Although supplying healthful foods tends to require greater attention to physical infrastructure and logistics of food product flows, supply and household demand are also closely linked. In neighborhoods lacking healthful options, households often adapt by depending more heavily on fast food outlets and convenience stores located there. Although planners may have few direct roles to play in increasing household demand for better quality foods, their activities in land use, transportation, and community assessment make them important partners to nutrition and health education groups.
Planners could play the following roles:
• Undertake neighborhood studies related to the siting of health and social service facilities (that may offer food stamps and other nutrition programs) near retail grocery outlets offering nutritious foods.
• Support the development of temporary farm stands, urban agriculture projects, and community vegetable gardens on school, park, and community center sites, and near public agency offices and nonprofit providers offering health, human and social services.
• Promote the provision of community gardens, urban agriculture projects, and community kitchens in multifamily and low-income housing projects.
• Assist programs that encourage youth to consume healthy foods that they are involved in producing, such as through edible schoolyards, after school gardening and snack programs, and food preparation classes.
Assemble and implement business-enhancement incentives to encourage partnerships between convenience stores and neighborhood-based nonprofits that encourage stores to offer healthful foods on the one hand, and educate the community to adopt healthy diets, on the other.

Specific Policy #3D
Planners support, through land use decisions, environmental monitoring, ecological mitigation, and policies related to working conditions of farm and food workers, food safety practices that ensure consumer health.

Recent food contamination scares related to spinach and peanut butter have revealed the possible pathways between land use patterns, agricultural operations, sanitary living and working conditions for farm workers, and food safety practices within processing plants, markets, and stores on the one hand and food safety outcomes and related human health on the other. For example, runoffs from concentrated animal operations have been found to taint spinach with strains of E coli bacteria that proved deadly when raw spinach was consumed. Similarly, the use of sub-clinical doses of antibiotics to speed up animal growth has implications for human health in the form of more powerful and antibiotic-resistant bacteria. Finally, the quality of environments and working conditions for farm and food workers, and specifically, the availability of sanitary facilities near farms, are also an important factor for food safety. A further example relates to the high speed of meat processing conveyer belts that creates a higher risk of injury to workers and of fecal material entering the meat, both of which pose significant implications for food safety.

Planners could play the following roles:

- Support land use decisions, environmental monitoring, and ecological mitigation that prevents potential contamination of agriculture and food products through water runoffs from animal operations, provides sanitary living and working conditions for farm and food workers, and otherwise promotes food safety. In supporting these decisions, additional barriers and costs that potentially may be imposed on especially small and limited resource farmers and ranchers may need to be considered and addressed.
- Support agricultural and food practices that affirmatively and proactively address worker health and safety in ways that also advance food safety.
- Assess the possible food safety implications of older buildings housing food markets, grocery stores, and food processing operations, with a view to supporting goals related to food safety and business viability, and consider providing incentives to businesses to enhance food safety.

Specific Policy #4A
Planners support the creation of community and regional food systems linking production, processing, distribution, consumption, and waste management to facilitate, to the extent possible, reliance on a region's resources to meet local food needs.

A core principle of sustainability involves meeting basic human needs, such as food, shelter, and water, via renewable sources as spatially proximate to their consumption as possible. Communities that rely on distant food sources are rendered vulnerable to the vagaries of market decisions, transportation infrastructure, and energy prices over which they have little control. Additional benefits to greater regional self-reliance in food include cutbacks in emissions of greenhouse gases from transporting food products; protection of local
agriculture; and a greater likelihood that residents' greater connection to their region as a source of sustenance will lead them to care more about the region's resources, protect them, and balance appropriately the priorities for development versus conservation of regional agriculture.

Planners could play the following roles:

- Encourage conservation of regional agricultural land, open space, and wilderness resources for agriculture and food systems (as identified in the APA Agricultural Land Preservation Policy Guide).
- Support the creation of marketing networks to bring together farmers, processors, and purchasers of locally grown and produced foods.
- Support, as relevant with the use of planning tools, the integration in food production and distribution of sustainability principles and practices, which promote clean air, water, healthy soils, and healthy habitats and ecosystems.
- Provide incentives and special zoning provisions to integrate locally supported agriculture (e.g., community gardens, urban agriculture, small farms) into existing settlements and new areas of residential development.

Specific Policy #4B

Planners support food system activities that minimize energy use and waste, and encourage the use of local and renewable energy resources.

The historic low cost of fossil fuel has led to the development of highly inefficient agriculture and food system practices. As petroleum prices rise, the costs to consumers increase, critically affecting low-income households' efforts to be food-secure. Excessive dependence on a fossil-fuel based economy also has significant implications for homeland security; on the other hand, promoting local and renewable energy resources can enhance security as well as the regional economy. Assess and map the availability of fast food restaurants in low income neighborhoods relative to the availability of grocery stores offering healthier food options.

Planners could play the following roles:

- Develop regional plans and policies that strengthen markets for the region's food producers so as to reduce long-distance transportation of agricultural products and processed foods.
- Assist in conducting energy audits to assess amounts and sources of energy used in the region for the production, distribution, and consumption of food. This inventory can identify existing uses of local and sustainable energy resources as well as the potential for expansion in this area.
- Support as relevant with planning tools, efforts to assess the capacity of regional agriculture for meeting potential energy demands versus regional food needs.
- Assess the impact of food waste disposal on area landfills and explore possibilities related to recycling food wastes through composting and bio-fuel development.

Specific Policy #4C

Planners support efforts to assess and mitigate the negative environmental and ecological effects caused by and affecting food system activities.

Conventional agriculture, fisheries, and other food system activities create considerable amounts of air and water pollution, loss of topsoil, and extinction of species including those central to the cultural traditions of many ethnic groups and Native Americans. Water
pollution from other sources such as mining operations and industrial discharge into waterways, etc., can also affect food systems, though, for example, increased mercury concentrations in fish, fish kills, and loss of habitat. Planners involved in environmental assessment and mitigation activities could look more closely at how food system activities create or are affected by negative environmental impacts. These environmental impacts can also have human health implications, which need special attention. Fisheries play an especially important role in subsistence and commercial food systems and need special consideration to balance human needs with the long term sustainability of the fisheries. Fisheries, like most food-ecosystem linkages described in this policy guide, need greater development in future food planning policy.

Planners could play the following roles:

- In collaboration with other professionals, explore pathways through which the food system impacts the region's natural environment, fisheries and other wildlife habitats, and ecology, and the impacts of pollution on food systems. This analysis can inform plans to sustain ecologies including those upon which our food system depends, and to minimize harm to them.
- Assist in assessing the sources of lake and river pollution and eutrophication, and considering ways to reduce such pollution.
- Assist in assessing solid waste streams at different points of the community's food system (production, wholesale, retail, consumer, etc.) and considering ways to reduce, reuse, and recycle wastes.
- Support efforts to reduce and mitigate negative air quality impacts in food system activities, including those contributed by farm activities and the long-distance transportation of food from farm to fork.
- Support strategies to increase the adoption of water and soil conservation practices in agriculture.

Specific Policy #5A

Planners employ land use, transportation, and other planning tools to increase spatial access to programs and facilities that help reduce hunger and food insecurity for residents in impoverished urban and rural communities. Hunger and food insecurity affect impoverished households in urban and rural communities across the country. Land use, transportation and other policies planners recommend, and regulations they implement, could inadvertently increase the incidence of hunger and food insecurity in low-income neighborhoods. However, planners are also uniquely positioned to help improve low-income people's access to programs and facilities that enhance food security.

Planners could play the following roles:

- Provide data and mapping support to community and regional food assessments, including the incidence of food insecurity and location of diverse food assets.
- Develop plans and redevelopment proposals for food insecure areas with sites and incentives for community gardens, entrepreneurial urban agriculture projects, farmers markets, neighborhood grocery stores, and food assistance programs.
- Investigate the use of appropriate brownfield sites in low-income areas for food production.
• Develop transportation, community development, and other plans and policies to provide convenient and safe access for low-income households to grocery stores, community gardens, and food assistance providers.
• Encourage business district revitalization efforts to include support for convenience store sales of fresh foods.

Specific Policy #5B
In partnership with community-based organizations, planners support the creation of programs to enhance food-related economic opportunities for low-income residents. Food-related enterprises are among the most common type of small business development and a way for many households to supplement income and achieve economic stability. In the past decade, community-based food projects have sprung up in some low-income urban and rural areas to provide economic opportunities for residents there. Among these are urban agriculture projects on vacant lots where some of the produce grown is sold at farmers markets and to restaurants; food business incubation in community kitchens to create value-added products like salsa and salad dressing; and assistance with opening food kiosks and catering operations. Planners can assist these efforts through land use, zoning, facility location, and support of related community development activities.

Planners could play the following roles:
• Develop area-wide and neighborhood plans with appropriate sites for facilities (such as community kitchens) and spaces (such as for entrepreneurial community gardens) that support food-related entrepreneurial development for low-income households.
• Assemble in partnership with other public agencies and community-based organizations, economic development programs and incentives for food-related enterprise development, job creation, and workforce development.

Specific Policy #5C
Planners encourage and support food production on the grounds of public agencies and institutions while providing employment to low income workers and distributing products to cafeterias and area food assistance sites.
Public institutions such as universities, schools, hospitals, and correctional facilities have public missions and often collaborate and coordinate with local public agencies related to land, infrastructure, and utility issues. They are generally located on large sites with vacant land suitable for growing food, and spend money on landscaping, grounds keeping and management. Some of this money can be put to productive use in growing food for their on-site cafeterias while also providing healthy food and employment related benefits for lower-income residents.

Planners could play the following roles:
• Develop assessments of land on institutional properties suitable for cultivation and support food production activities on these sites.
• Explore ways in which these institutions can be linked with community-based organizations in producing food on their sites to provide job opportunities and healthy food for school cafeterias and low-income residents — e.g., programs such as "plant-a-row" that add fresh produce to food assistance provided by Second Harvest Food Banks.
• Provide site planning, design, and other relevant assistance to these institutions to facilitate food production and distribution.
Specific Policy #5D

Planners support resolving issues of rural poverty through land use, transportation, economic development planning and appropriate regulatory measures. Many farm and food sector jobs in rural areas are characterized by poor working conditions, high rates of occupational hazards, rapid turnover, and low rates of union representation. Migrant farm workers and immigrant employees of slaughterhouse and meat packing facilities located in rural communities are most subject to these difficulties. In addition, the increasing number of farm closures can cause farmers to slip into poverty. Planners can recommend policies in land use, transportation, economic development, and social services to improve the quality of life of impoverished rural households.

Planners could play the following roles:

• Assist the region's farm and food worker organizations in rural food and community assessment and improvement efforts.
• Undertake assessments of possible links between farm and food workers' work conditions and planning-related decisions (e.g., distance between housing, schools, and work sites, and availability of transportation options).
• Prepare comprehensive and rural community plans to address the spatial, social and economic needs of low-income rural residents.
• Explore the development community policies for "fair trade" purchasing by public agencies to ensure that public expenditures in food procurement are fair and equitable to producers and communities in other countries.

Specific Policy #6A

Planners support community food assessment and planning to preserve and strengthen traditional native and ethnic food cultures (e.g., fisheries in Louisiana and Alaska and desert foodscapes in New Mexico and Arizona).

Native American and other ethnic minority communities contribute to the nation's diversity of local food traditions which are important to the identity and economic vitality of a region, and the nutritional health of its residents. Unfortunately, recent Native American history includes forced relocations of tribes and dependence on non-native foods (including lard, refined flour, and sugar) leading to a disconnection with traditional food sources and an erosion of traditional food practices that are at the heart of native community life and rituals. The health implications of this history are significant: diabetes and diet-related illnesses are at epidemic proportions in many Native American communities. To a smaller extent, these patterns of dietary health and cultural loss are also familiar in many immigrant communities.

Planners could play the following roles:

• Assist and support locally based efforts by Native American and other ethnic minority communities, to identify and document community and ecological assets and cultural traditions that are tied to food production, preparation, and consumption (e.g. salmon runs, wild rice and nut-gathering, agricultural fairs, and ethnic and cultural festivals).
• Support locally based efforts to identify challenges and needs faced by members of Native American and ethnic minority groups in consuming healthful diets.
• Support locally based efforts to prepare action plans to build on existing assets and cultural traditions that nourish Native and ethnic minority food cultures and to mitigate challenges to them.
• Assist efforts to develop ongoing community participation mechanisms in food assessments and related planning in First Nations and in communities with a significant Native American or other minority ethnic cultures.

Specific Policy #6B
With the participation and collaboration of communities to be served, planners support the development of plans to preserve and restore the natural environment and biodiversity in the region, to revitalize traditional and ethnic food systems that depend on the regional ecology. In many cases, local food systems and diets have been lost or impacted due to environmental degradation, habitat destruction or development (e.g. the Onondaga Lake whitefish, Chesapeake Bay blue crab). Restoration of indigenous and traditional food systems has been shown by research to be linked to improved health of residents and benefits to the local economy. Healthy food systems are important for all regions and must be supported in order to ensure food safety and security, sustainable development, public health and nutrition, and sound environmental management.

Planners could play the following roles:
• Support efforts by and within Native American and other ethnic minority communities to identify and document indigenous and ethnic food systems that have been degraded or are threatened.
• Support local efforts to restore or protect native, indigenous, or ethnic food systems.
• Consider the impact of proposed changes in land-use and other plans on the ability of Native American and ethnic minority communities to sustain food production systems and support the coordination of planning efforts to enhance such systems in the future.

Specific Policy #6C
Planners support integrating traditional food systems and related cultural issues into community and regional planning efforts — including comprehensive and economic development plans — and other governance activities.

Diverse local and traditional food practices contribute to a sense of place and help achieve economic, environmental, and health goals of communities. Efforts to integrate traditional methods of food production (such as farming in Amish communities, Navajo shepherding, food gathering, and fisheries) into a multi-functional working landscape require sensitivity to a spectrum of traditions of distinct cultural groups. Additionally, they require effective communication and collaboration across groups in the region and dispute resolution mechanisms. To the extent possible, land use and economic development policies should support the right of farmers, hunters, and food gatherers to practice their occupation in accordance with their religious and cultural norms.

Planners could play the following roles:
• Support planning that builds on and celebrates the diverse cultural, agricultural, and dietary traditions present in the region.
• Work with tribal governments and state agencies to address land and resource management issues so as to strengthen Native American food systems including farming, hunting, gathering and fishing and nutritious diets.
• Work collaboratively to establish mechanisms in the region to minimize and resolve conflicts between tribal governments, other local governments, and state and federal
agencies and among different minority groups in communities, so as to facilitate Native
and other ethnic minority communities' efforts to sustain their food systems.

Specific Policy #7A
Support developing and advocating for programs in the federal Farm Bill to facilitate
community and regional food planning discussed in General Policies #1 through #6.
All titles of the Farm Bill affect local areas and therefore what planners can accomplish by
engaging in community and regional food planning. For example, the continued availability
of food stamps and farmers market nutrition program benefits is important for impoverished
households as well as to the vitality of grocery stores and farmers markets. Similarly, rural
development programs can help develop value-added food enterprises, renewable energy
systems, land use management, and air and water quality enhancement. The Farm Bill also
includes many provisions that favor, intentionally or not, larger agribusinesses over smaller
farm operations in the distribution of subsidies, design of regulations, and other requirements
that impose greater burden on the latter. To achieve the goals of community and regional
food planning, many of these provisions will need to be re-oriented. In the end, federal (and
state) support is indispensable to communities and regions’ ability to plan for food under
normal and emergent circumstances and further the goals of food planning identified in this
Policy Guide.
Planners could play the following roles:
• Analyze how different titles of the Farm Bill affect communities and regions, pose barriers
to achieving goals of community and regional food planning, and in particular, how they
may affect planners' ability to implement actions recommended in General Policies #1
through #6.
• In collaboration with other organizations advocating for policies relevant for economic
development, public health, sustainable agriculture and food systems, and social justice,
develop and advocate for proposals in the Farm Bill to facilitate actions described under
General Policies #1 through #6.

Specific Policy #7B
Support the development and advocacy of policies and programs outside of the federal Farm
Bill to further General Policies #1 through #6.
Reason to support
The food system is complex and intricately linked with other systems such as health, energy,
education, economy, environmental protection, and housing. Although the Farm Bill might
be a first, seemingly intuitive target of policy advocacy efforts to further objectives suggested
in this Policy Guide, effective community and regional food planning may also need to be
supported through other federal legislation. For example, programs in the next Transportation
Bill could conceivably support small farmers' needs to bring product to markets, increase
transit access of urban and rural households to grocery supermarkets, and renewable and
sustainable biofuel development. Legislation related to the functions administered by the
Departments of Education or Health and Social Services might help supply more fresh foods
from local farms in all schools, or support the development of farmers markets in public
health and social service institutions.
For each general policy statement in this guide, identify and research significant upcoming
federal legislative opportunities, rule-making, or appropriations activities that affect that
policy, and planners' ability to implement suggested actions under that policy. For example, programs in the Transportation Bill could be targeted as applying to General Policy #2 (economic vitality), #3 (health) or #5 (social equity).

- In collaboration with other organizations, develop and advocate for proposals related to legislation, appropriations, or rule-making, to further actions described under policy statements #1 through #6.

**Specific Policy 7C**
Support the development and advocacy of state policies and programs to further General Policies #1 through #6.

These reasons are similar to those stated in Specific Policies #7A and #7B, but within the arena of state legislation. State policies, regulations, and programs can provide important resources or pose significant constraints to achieve objectives sought under this Policy Guide. Additionally, states have arguably a greater ability than federal agencies to design and implement policies that support community and regional food planning, such as those that discourage the conversion of productive farmland, ease regulatory burdens on small and moderate farms, and encourage the development of regional food infrastructure.

**Specific Policy #7D**
Support the development of and participation in state food policy councils that provide a comprehensive and systematic focus on statewide food issues and needed actions.

*Reason to support*

Comprehensive and systematic food planning at the state level could provide a significant impetus to General Policy #1 and others in this Policy Guide. In ways that are currently nonexistent except for a handful of states such as Connecticut, Iowa, California, and Michigan, state food policy councils provide a way for stakeholders in public, for-profit, and nonprofit sectors to come together to discuss community and regional food concerns, share information, and recommend policies and actions to achieve goals identified in this Policy Guide.

**Specific Policy #7E**
Support the development of federal policies related to international trade, humanitarian aid, development assistance, and other categories of international involvement in ways that promote sustainable and self-reliant solutions to hunger and food insecurity experienced in other countries.

Across the world, populations in impoverished countries continue to experience hunger and food insecurity at high rates. Half of the global population — nearly 3 billion people — lives on less than two dollars a day, an important indicator of poverty. In an increasingly interdependent world, it is not only incumbent upon wealthier countries to act responsibly to end hunger and food insecurity across the globe, it is also important to redress the adverse impacts of agriculture trade policies on the ability of poor urban and rural households to subsist. Most of the world's farmers are small-scale farmers; they also tend to have inadequate or precarious access to food themselves. Yet foreign aid for agriculture and rural development has continued to decline over the last three decades. Solutions to hunger and poverty in impoverished countries need to include investments in agriculture, education, health, and essential public goods.
### Learning Objective for Local Case Studies
- Understanding typologies of programs for resilient food system
- Get familiar with different type of programs for resilient food system
- Understanding key elements of how to build resilient food system
- Understanding the importance of domestic approach to resilient food system.
- Begin to think about ways to build resilience local food system.

### Profile of local food system:
- What is a “local food system”?  
- The term “local food system” is used to describe a method of food production and distribution that is geographically localized, rather than national and/or international. Food is grown (or raised) and harvested close to consumers' homes, then distributed over much shorter distances than is common in the conventional global industrial food system. In general, local/regional food systems are associated with sustainable agriculture, while the global industrial food system is reliant upon industrial agriculture (Martinez. et al., 2010).

![Figure 4: Components of a community’s food system. (Raja et. al, 2008)](image)

### Typologies of Local Food System
#### Local Farm – CSAs
- Community Supported Agriculture (CSAs) are direct-to-consumer programs in which consumers buy a “share” of a local farm’s projected harvest. Consumers are often required to pay for their share of the harvest up front; this arrangement distributes the
risks and rewards of farming amongst both consumers and the farmer. CSA participants often pick up their CSA shares in a communal location, or the shares may be delivered directly to customers. The USDA estimates that there may be as many as 2,500 CSAs currently operating in the US. (Martinez. et al., (2010) Local Food Systems: Concepts, Impacts, and Issues).

Urban Farms
- Urban Farm is the practice of cultivating, processing, and distributing food in or around a village, town, or city (Bailkey et al., 2000). Urban farm can also involve animal husbandry, aquaculture, agroforestry, urban beekeeping, and horticulture. These activities occur in peri-urban areas as well (Hampwaye et al., 2013).
Community Garden

- A community garden (the term favored in the United States, Canada, Australia and New Zealand) is a single piece of land gardened collectively by a group of people (ACGA, 2007). Community gardens provide fresh produce and plants as well as satisfying labor, neighborhood improvement, sense of community and connection to the environment (Hannah, et al., 2000). They are publicly functioning in terms of ownership, access, and management, as well as typically owned in trust by local governments or not for profit associations (Ferris, 2001).

Type of community gardens (Division of Agriculture and Natural Resources, University of California, 2014):

- **Neighborhood gardens.** This type of garden is normally defined as a garden where a group of people come together to grow fruits, vegetables and ornamentals. They are identifiable as a parcel of private or public land where individual plots are rented by gardeners at a nominal annual fee.

- **Residential Gardens** are typically shared among residents in apartment communities, assisted living, and affordable housing units. These gardens are mainly cared for by residents living on the grounds.

- **Institutional Gardens** are defined as gardens attached to either public or private organizations. These gardens offer a number of beneficial services for residents, ranging from mental or physical rehabilitation and therapy to teaching a set of skills for job placement.

- **Demonstration Gardens** are used in educational and recreational settings. Oftentimes short seminars and presentations about gardening will be hosted at any of the five gardens located around the county.
Farm to School

- Farm to School is a program in the United States through which schools buy and feature locally produced, farm-fresh foods such as fruits and vegetables, eggs, honey, meat, and beans on their menus. Schools also incorporate nutrition-based curriculum and provide students with experiential learning opportunities such as farm visits, gardening, and recycling programs. As a result of Farm to School, students have access to fresh, local foods, and farmers have access to new markets through school sales. Farmers are also able to participate in programs designed to educate kids about local food and agriculture.

![Farm to School](http://westportnorthgarden.blogspot.com)

- Farm to school enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools and preschools (NFSN, 2014).
- Students gain access to healthy, local foods as well as education opportunities such as school gardens, cooking lessons and farm field trips. Farm to school empowers children and their families to make informed food choices while strengthening the local economy and contributing to vibrant communities.
- Farm to school implementation differs by location but always includes one or more of the following:
  - Procurement: Local foods are purchased, promoted and served in the cafeteria or as a snack or taste-test;
  - Education: Students participate in education activities related to agriculture, food, health or nutrition; and
  - School gardens: Students engage in hands-on learning through gardening.

Conventional Agriculture

- Conventional agriculture is a term that describes any farming not dedicated to alternative schemes. Fundamentally, it is the type of farming that dominated the 20th century and which
accounts for most farming nowadays. In conventional farming, chemical fertilizers, intensive mass animal farming as well as chemical plant protectants are general.

- In ancient times, conventional agriculture relied on sustainable practices. The ancients used the natural flooding of a plane, irrigation and organic fertilizer, dry farming techniques, and even the use of rudimentary aquaponic systems.

- In modern times the term “conventional agriculture” is difficult to define as it is used to describe a wide range of agricultural practices. In general, it is any type of agriculture that requires high external energy inputs to achieve high yields and generally relies upon technological innovation and fossil fuels to supplement the required energy. Many also define the term conventional agriculture as being synonymous with non-organic. (Kathy Fairchild, 2011)

Aquaculture

- Aquaculture is the farming of aquatic organisms in both coastal and inland areas involving interventions in the rearing process to enhance production (FAO, 2012). It is probably the fastest growing food-producing sector and now accounts for nearly 50 percent of the world's fish that is used for food.

- Marine aquaculture refers to the culturing of species that live in the ocean. U.S. marine aquaculture primarily produces oysters, clams, mussels, shrimp, and salmon as well as lesser amounts of cod, mo, yellowtail, barramundi, seabass, and seabream. Marine aquaculture can take place in the ocean (that is, in cages, on the seafloor, or suspended in the water column) or in on-land, manmade systems such as ponds or tanks. Recirculating aquaculture systems that reduce, reuse, and recycle water and waste can support some marine species (NOAA, 2014).

- Freshwater aquaculture produces species that are native to rivers, lakes, and streams. U.S. freshwater aquaculture is dominated by catfish but also produces trout, tilapia, and bass. Freshwater aquaculture takes place primarily in ponds and in on-land, manmade systems such as recirculating aquaculture systems (NOAA, 2014).
Green Houses (hydroponics)

- Hydroponics is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite, gravel, biochar, mineral wool, expanded clay pebbles or coconut husk (Merle Jensen, 2014)

- In combination with greenhouses, it is high technology and capital-intensive. It is also highly productive, conservative of water and land, and protective of the environment. Hydroponic culture requires only basic agriculture skills. Since regulating the aerial and root environment is a major concern in such agricultural systems, production takes place inside enclosures designed to control air and root temperatures, light, water, plant nutrition, and adverse climate.
**Food Hubs**

- As the demand for local, fresh produce and animal products continues to grow, innovative programs to help small farmers bring their farm products to market are also expanding. One increasingly common solution to the logistical, transportation, and marketing challenges faced by small family farmers is the creation of local and regional “food hubs.” The USDA describes a food hub as the “drop off point for multiple farmers and a pick up point for distribution firms and customers that want to buy source-verified local and regional food.” Some food hubs also provide transportation of farm products directly to consumers and retail, restaurant, and institutional customers. Food hubs take much of the burden of marketing and transportation from local farmers by finding viable consumers, and provide other business-related services, such as logistical coordination. In addition, they often provide refrigerated storage facilities and auxiliary services such as commercial kitchens and light food processing. Food hubs can expand the market reach of small, local farmers, help create local jobs, and can expand access to fresh, local food in urban and suburban markets.

![Figure: Food hubs connection (http://everblossomfarm.blogspot.com)](http://everblossomfarm.blogspot.com)

**The Case of Local Food System in Hawai‘i** (DBEDT, 2012)

- Hawai‘i is located approximately 2,506 miles from the continental United States
- About 85-90% of Hawai‘i’s food is imported
- Particularly vulnerable to natural disasters and global event that might disrupt shipping and the food supply (DBEDT, 2012)

**The strategic objectives of Food System in Hawai‘i:**

- Increase demand for and access to locally grown foods
- Increase Production of locally grown foods
- Provide policy and organizational support to meet food self-sufficiency needs

**Recommended actions include:**

**Demand:**

- Expand the “Buy Local/It Matters” marketing campaign as to promote the benefits of buying local foods.
• Expand and improve branding and labeling programs and provide consumer education programs to help consumers identify local products at the time of purchase.
• Encourage public institutions to purchase locally grown foods. Establish a pilot program in the charter schools.
• To address food safety issues, increase the farm food safety coaching program and farm food safety certifiers.

**Production:**
• To increase production of locally grown foods, improve agricultural infrastructure including agricultural parks, irrigation systems and distribution systems/facilities.
• Support the Agricultural Park Program which provides public lands at reasonable cost and long-term tenure to farmers and complete the transfer of agricultural lands from the Department of Land and Natural Resources (DLNR) to the Department of Agriculture (DOA).
• Support Capital Improvement Project (CIP) funding to repair and maintain State irrigation systems since these systems provide water at low cost to farmers.
• Encourage a variety of distribution systems to move goods to the market place. Nationally, direct consumer sales, farmers’ markets, community-supported agriculture organizations and farm-to-school programs have all increased.
• Support multi-functional food hub facilities or food incubator facilities to handle aggregation, processing, treatment and distribution.
• To build the agricultural workforce, continue the “Green Jobs Initiative” which provides workforce development services for the agricultural, energy, natural resources and related industries.

**Policy and Organizational Support**
• Restore the Market Analysis and News Branch of DOA to track progress toward food self-sufficiency.
• Adopt legislation to establish an Agricultural Development and Food Security Program.
• The Strategy also contains recommendations to provide for pest prevention and control, research and extension services, and policy and organizational support. The proposed Agricultural Development and Food Security Program will help to coordinate and direct efforts to address food self-sufficiency.
• A critical factor towards successful implementation will be building partnerships with the increasing number of organizations involved in food self-sufficiency/food security.

**Exercise 5-1**
What does your community food resources network map look like?
• In small groups, draw a network map that visually (and spatially/geographically) answers the following questions:
  o What are the retail resources for food purchases in your community (conventional market sector)? How many? What types? Where are they located?
  o What are the emergency food resources (charitable food aid) in your community? Where are they located?
  o Does your community have food production, value-added processing, or food distribution resources? If so, what types? How many? Where are they located?
Examples: community gardens, school-based gardens, community-supported agriculture (CSA) programs
- Other examples of urban agriculture: food forests, foodscaping, rooftop gardens, container gardens, vertical farming, windowfarms, urban chickens, backyard animal husbandry, urban beekeeping, aquaponics, hydroponics, etc.
  - Farms, dairies, fisheries
  - Food manufacturers and distributors
  - What are the interconnections between these different community food resources?
- How are these resources located in relation to residential neighborhoods? If possible, include transportation routes, nodes, etc.

**Exercise 5-2**
- Using the community food resources network map (from previous exercise), participants answer and discuss the following questions:
  - Is there inequity in either access to resources and/or the ability to take action to use or increase them?
    - Inequity is a sign of social vulnerability. (Ericksen, 2008)
  - Are resources geographically accessible for all members of the community? Are there barriers to access?
    - Are food resources located near low-income neighborhoods?
    - Is public and/or private transportation available between the resources and low-income neighborhoods?
    - What barriers influence people’s use of community food resources?
      - For example: inconvenient hours, poor customer service, lack of information, stigma, and distance to resources, insufficient food or food benefits available or offered.
    - Does the community have the infrastructure necessary to deliver Federal food assistance benefits effectively?
  - Are there any vulnerabilities in the geographic/spatial accessibility of food resources? Any vulnerabilities in the infrastructure and the delivery/distribution of food? What are the risks to the geographic/spatial accessibility of food resources?
    - Identify risks and vulnerabilities as well as assets and strengths. How to address these risks and vulnerabilities while strengthening resilience in terms of geographical/spatial accessibility?
  - Is a variety of food available in retail stores? Which stores have greater variety? Which stores have less variety?
  - Are the available foods affordable to low-income households?
  - What are some ways to increase the availability, affordability, and accessibility of food for all members of your community?
Module 6: Community Food Security Assessment

Scope Statement:
In this module, participants will complete a community food security assessment and planning exercise.

Terminal Learning Objective (TLO)
The exercise leads to (inspires) action after completion of the class.

Enabling Learning Objectives (ELO)
- 6-1 Learn what a community food security assessment is, and how to conduct one.
- 6-2 Identify vulnerabilities in the community food system.
- 6-3 Determine ways to reduce vulnerability and enhance resilience in the community food system.
- 6-4 Collaboratively identify goals for the community’s food system, identify actionable steps to achieve those goals, and determine metrics to measure and evaluate progress.
- 6-5 Map out the food system network of the community, to identify the various stakeholders, institutions, organizations, coalitions, cooperatives, etc., and how they are interconnected. Determine ways to increase and strengthen connections in the network to enhance resilience.

Lesson Topics
- Community food security as it relates to resilient food systems
- Community food security assessments

Instructional Strategy
- Lecture
- Instructor-facilitated discussion on module
- Exercise

Research
What is Community Food Security?
- Four major streams of food flow into communities (Pothukuchi, 2004, p. 357):
  - Conventional market sector: the mainstream, market-oriented food system currently dominated by large corporations
  - Charitable/voluntary sector: the charitable food assistance network made up of food banks, food pantries, and soup kitchens
  - Government sector in nutrition: the federal nutrition safety net with programs targeted at poor children and adults, pregnant women and nursing mothers, and seniors
  - Community food systems: community food systems characterized by closer regional connections between producers, processors, and consumers
Table 1. A comparative overview of four streams linking food and communities.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Conventional Market Sector</th>
<th>Charitable/Nonprofit Sector</th>
<th>Government Sector in Nutrition</th>
<th>Community Food Systems (informed by community food security framework)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Maximizing sales/profits (b) Increasing efficiency, reducing cost</td>
<td>(a) Helping individuals and families (b) Contributing to serving local community (for volunteers, employees)</td>
<td>(a) Pepping commodity prices (b) Promoting hunger, malnutrition among those without access, ability to pay</td>
<td>(a) Promoting local planning for food systems (b) Promoting risks between food and community objectives</td>
</tr>
<tr>
<td></td>
<td>(c) Denominating individual eligibility or capacity to participate in stream</td>
<td>(d) Individual/family</td>
<td>(e) Individual/family</td>
<td>(f) Individual/family</td>
</tr>
<tr>
<td></td>
<td>(a) Ability to pay</td>
<td>(b) Social/cultural access</td>
<td>(c) Social/cultural access</td>
<td>(d) Social/cultural access</td>
</tr>
<tr>
<td></td>
<td>(a) Conventional link to food economy</td>
<td>(b) Freedom from stigma</td>
<td>(c) Food safety net in crisis or chronic poverty situations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) Costs, products are competitive</td>
<td>(e) Fairness selected for nutrition value</td>
<td>(f) Widespread (national) availability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Jobs, business opportunities</td>
<td>(b) Contribute to neighborhood quality of life</td>
<td>(c) Contribute to local economy in jobs, food sales, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) Community service (for volunteers, employees)</td>
<td>(e) Contribute to community assets, farms, and food security</td>
<td>(f) Fosters greater connections between food and community goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(f) Stream supports notion of food as an entitlement</td>
<td>(g) Contributes to local economy in jobs, food sales, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(h) Stream supports notion of food and local food security</td>
<td>(i) Supports farmers, farm communities by channeling surplus to needy, poor populations, while supporting commodity prices</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(j) Stream supports notion of food as an entitlement</td>
<td>(k) Delivers positive outcomes, reduced costs to some segments of society as a result of localization; benefits to society as a whole due to increased sustainability of activities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pothukuchi, 2004, p. 358
There is the belief that “community food systems, developed systematically with the guiding framework of community food security, can strengthen localities and regions in multiple ways, alleviate the problems posed by the three dominant streams, and enhance possibilities for community planning -- including community food planning” (Pothukuchi, 2004, p. 357).

The community food security framework is characterized by three principal features (Pothukuchi, 2004, p. 357):

- It seeks goals associated with progressive planning -- equity, health, and sustainability
- It is comprehensive in its view of food systems and their connections to people, natural resources, and place
- It holds community as an indispensable unit of solution to food problems

Community food security cannot solve all problems of the global, corporate-dominated market food system, nor can/should it replace federal entitlement programs aimed at poor and vulnerable residents.

“Rather, [community food security] is an approach that seeks to increase community influence on these systems, to offer an integrated view of the links within the food system and between food and communities, and to provide more

(Table 1 source: Pothukuchi, 2004, p. 358-359)
sustainable alternatives to current streams” (Pothukuchi, 2004, p. 360).
• Definition One: “Community food security is a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that also maximizes community self-reliance and social justice.” (Pothukuchi, 2004, p. 357)
• Definition Two: “Whereas household food security is concerned with the ability to acquire food at the household level, community food security concerns the underlying social, economic, and institutional factors within a community that affect the quantity and quality of available food and its affordability or price relative to the sufficiency of financial resources available to acquire it.” (USDA Community Food Security Assessment Toolkit, 2002, p. 3)
• Programs and policies to improve community food security (USDA Toolkit, p. 4):
  o Food stamp outreach programs that help increase the number of eligible households that participate in the Food Stamp Program.
  o Farmers’ markets that boost incomes of small, local farmers and increase consumers’ access to fresh produce.
  o Community gardens that help public housing residents and other low-income consumers supplement their diets with home-grown produce.
  o Asset development programs that assist low-income families to accumulate funds for obtaining additional education, purchasing a home, or starting a business.
  o Food-buying cooperatives that help families save money by pooling food purchases.
  o Community-supported agriculture programs that can help provide small farmers with economic stability and consumers with high-quality produce, often at below retail prices.
  o Farm-to-school initiatives that help local farmers sell fresh fruits and vegetables directly to school meals programs.
  o Community kitchens that provide job training to the unemployed while converting surplus food to meals for the needy.

What is a Community Food Security Assessment?
• Community Assessment: A community assessment is a tool and process by which community members can “address their needs by using their own resources in a systematic way to identify resources, needs, and specific challenges or problems. The word ‘community’ is key to the process. It is a process led and implemented by community members, to achieve a community goal.” (USDA Toolkit, p. 8)
  o Participation and Inclusion: “By integrating people from different parts of the community into the [assessment] team and developing a joint agenda and a resulting action plan, the community’s bonds are tightened” (USDA Toolkit, p. 8).
  o Goal: “The goal of the [community] assessment is to collect information to identify gaps and needs in the community and the resources, services, and systems that could be used to fill the gaps and meet the needs of residents. To accomplish this, you will gather information that helps you understand the following” (USDA Toolkit, p. 8):
    • Status of community residents
    • Availability of community resources
• Capacity of community resources

• Community Food Security Assessment: A community food assessment (CFA) or community food security assessment (CFSA) is “a unique type of community assessment. It includes the collection of various types of data to provide answers to questions about the availability of existing community resources to provide sufficient and nutritionally sound amounts of culturally acceptable foods to households in the community.” (USDA Toolkit, p. 8)

• “The purpose of community food security assessment is to facilitate decision-making about programs and policies that affect food security in your community, not simply to collect data.” (p. 10)

• “The result of the assessment is the generation of a community profile that may highlight the negative and positive components of the community’s efforts to satisfy households’ food needs.” (p. 8)

• A community food security assessment will help you to:
  o understand local food systems
  o inform the setting of goals to improve these local food systems
  o inform decision-making about policies and actions to improve community food security
  o establish a long-term monitoring system with a clear set of indicators (USDA Toolkit, p. 9)

• CFAs/CFSAs provide strategic data to inform and support institutional functions vis-a-vis community-food linkages (Pothukuchi, 2004, p. 360):
  o a central intelligence function, to facilitate local operations of different food system functions through regular issuance of appropriate local analyses;
  o a pulse-taking function, to alert the community through periodic reports to danger signs in the local community that may impact food access, hunger and nutrition, diet-related disease, population, and food-business movements;
  o a policy clarification function, to help frame and regularly revise food system functions of local government;
  o a community food security strategic plan function, to phase specific private and public programs toward enhancing community food security for a period of ten to twenty years; and
  o A feedback review function, to analyze through careful research the consequences of program and project activities as a guide to future action.

• Five common characteristics of CFAs (Pothukuchi, 2004):
  o Focus on the needs of low-income residents (p. 362)
  o Concern about the sustainability of the food system (p. 366)
  o Recognition of community as a unit of solution to food system problems (p. 366)
  o Focus on assets
  o Variety of categories and multiple sources

• When assessing and analyzing community food security and resilience, there are certain questions that can be asked vis-a-vis different aspects of the food system. The Spinwheel below provides a useful conceptual heuristic when conducting such an assessment/analysis:
Figure 1. The role of community food assessments in the design of strategies for change.
Note: Community food security calls for greater local integration of food system links and envisions food as a tool for achieving community objectives in health, economic development, equity, and sustainability. Individual members of a community, community-based organizations, public agencies, and the private sector all have roles to play in enhancing a community's food security.

(Figure 1 source: Pothukuchi, p. 361)
Planning Process and Steps for a Community Food Security Assessment

- These are the steps for the CFSA planning process to be conducted in the community. This is meant to give participants a brief overview of the basic steps to be taken.
- Identify key questions: “Before embarking on data collection, it is important to identify key questions, to determine the types of information and analysis needed to answer those questions, and to identify potential users of your findings” (USDA Toolkit, p. 10).
  - A key question at the onset is to define and delineate the community: “What are the geographic boundaries of the community that you are planning to study?”
- Create a team: Create a CFSA team with diverse representation
  - “Diverse representation in the planning process is key to a successful outcome. The involvement of individuals from different parts of the community may increase access to data” (p. 10).
  - A diverse team of 8-12 people is ideal
  - “Ideally, the team should consist of professionals and others in the community who have a common interest in community food security and who have different areas of expertise. The team also should include community residents who have direct experience with food security issues.” (p. 11)
  - Who should be included in the team? Why? Does this team adequately represent the community? Are any segments of the community being excluded, marginalized, or forgotten? How to include these members to the process?
- Set goals and objectives: “The most successful effort will be achieved by involving all team members in the development of goals and objectives. Your role is to facilitate the team through the assessment process, ensuring that it gains ‘ownership’ of the final product.” (p. 11)
  - Some factors to think about when setting goals (USDA Toolkit, pp. 11-12):
    - Key food security issues in your community
    - Key policies that may affect community food security
    - Programming or policy decisions that may be needed on these issues
    - Key local leaders who make policy and programming decisions
    - Data and information needed to inform programming and policy decisions
    - Deadline for completion of the food security assessment
    - Methods to disseminate the information
- Collect data:
  - Quantitative and qualitative data
  - Existing data:
    - Census numbers, etc.
  - Original data:
    - Surveys and observation
    - Focus groups
- Analyze data:
  - Statistical profiling
  - Comparative analysis
  - Focus group analysis
  - Community mapping
    - Community mapping “allows a community to pinpoint particular problem
areas to identify problems with access to resources or services.” (USDA Toolkit, p. 24)

- It “may be useful in identifying a physical barrier that influences the use of resources.” (p. 24)
- “A map helps to display the availability of resources within the most affected areas of the community.” (p. 24)
- “It will be useful to map all resources and services identified, including food stores, emergency food providers, farmers’ markets, food cooperatives, and government food assistance programs.” (p. 24)
- “The map will draw attention to the need for specific services and/or resources and will help to identify areas in which few services are within easy access of the families who need them. The process of mapping community-based resources may reveal problems with certain community locations and may give insight into the best locations for creating new or expanded services.” (p. 24)
- Community mapping can also be used to identify supply chains (including production), as well as delivery/distribution routes and networks spatially.

**Six Basic Components of a Community Food Security Assessment**

- This is meant to be a quick overview of the six basic components of a Community Food Security Assessment. It is not meant for the participants to actually conduct an assessment, but rather to familiarize participants with the basic types of data that should be collected and analyzed.
- Most of these components will have been covered in the exercises in the previous modules. The participants should have already begun vulnerability assessments in Modules 2 through 5.
- Have participants recall the exercises from Modules 1 through 5.

**Profile of community socioeconomic and demographic characteristics**

- Who are the people in the community? (Have participants brainstorm how/where they can find actual demographic data.)
- What are their demographic characteristics?
  - Demographic characteristics:
    - Total population
    - Age
    - Race/ethnicity
    - Citizenship
    - Household structure
  - Where are they located? How are they geographically dispersed, (inter)connected, segregated? What are the patterns in terms of spatial/geographic distribution or location?
- What is their economic status?
  - Socioeconomic characteristics
    - Employment status
    - Income
    - Poverty status
- Who are the most vulnerable people/segments in your community? Are there any groups of people who have been marginalized or isolated?
Profile of community food resources

- See Exercises 4-1 (Module 4) and 5-1 (Module 5)

The three major streams:

- Federal food assistance program resources and participation
  - Are Federal food assistance programs available to help people purchase food?
    - SNAP, WIC, school meals, Child and Adult Care Food Program (CACFP), etc.
  - Are people in the community participating in food assistance programs? How many? What is the profile of these people? Where are they located? Where are they using these programs to make food purchases?

- Retail resources for food purchases
  - How many? What types? Where are they located?
    - Supermarkets, grocery stores, and other food stores
    - Farmers’ markets
    - Food cooperatives
  - Supply lines: Production, distribution, and retail

- Emergency food resources
  - Food pantries, soup kitchens, food banks, and other community-based food distribution programs
    - Local government; churches, synagogues, and community centers; outreach programs; etc.
  - Where are they located? How accessible are these resources? Are there any barriers to access? Stigma?

Assessment of household food security

- Main question: “Is household food insecurity a problem that is directly or personally experienced for a significant number of people in the community?” (USDA Toolkit, p. 40)

- Data sources: surveys, focus groups

- Measurement tool available consisting of a set of standard questions regarding:
  - “Anxiety that the household food budget or food supply may be insufficient to meet basic needs.” (p. 40)
  - “Perceptions that the food eaten by household members is inadequate in quality or quantity.” (p. 40)
  - “Reported instances of reduced food intake, or consequences of reduced food intake (such as the physical sensation of hunger or reported weight loss) for adults in the household.” (p. 40)
  - “Reported instances of reduced food intake or its consequences for children in the household.” (p. 40)

- Food insecurity: “the condition of deprivation in this one area of basic need” (p. 40).

Three broad ranges of severity:
  - Food secure: households with no or minimal indication of food insecurity.
  - Food insecure without hunger: households concerned about inadequate resources to buy enough food who have adjusted by decreasing the quality of their family diet with little or no reduction in household food intake.
  - Food insecure with hunger: food insecure households in which one or more
members (mainly adults) have decreased the amount of food they consume to the extent that they have repeatedly experienced the physical sensation of hunger.

- “Clearly, a community cannot be considered food secure if any of its members are experiencing food insecurity directly in their own lives. In this sense when the household food security measure is used in a representative survey of the community, it can provide a solidly quantified ‘bottom-line’ indicator of the state of food security within the community, as directly experienced by community members” (p. 41).

- Participants will not be able to conduct actual surveys of the community at this time, but could brainstorm metrics and methods to obtain such data. Participants may look at sample surveys from cities/communities that have conducted such surveys for their community food assessments.

**Assessment of food resource accessibility (spatial/geographic)**

- See Exercise 5-2 in Module 5.
- Are resources geographically accessible?
- Are there barriers to access? (*Participants will not be able to conduct actual focus groups in the community to collect these data, but could conduct and participate in a mock focus group.*)

Four key questions:

- Are food resources located near low-income neighborhoods?
- Is public and/or private transportation available between the resources and low-income neighborhoods?
- What barriers influence people’s use of community food resources?
  - For example: inconvenient hours, poor customer service, lack of information, stigma, distance to resources, insufficient food or food benefits available or offered.
- Does the community have the infrastructure necessary to deliver Federal food assistance benefits effectively?

- Are there any vulnerabilities in the geographic/spatial accessibility of food resources? Any vulnerabilities in the infrastructure and the delivery/distribution of food? What are the risks to the geographic/spatial accessibility of food resources?
- Are there any isolated communities?
Exhibit 1. Food Resource Accessibility Assessment

Are food resources accessible to low-income residents?

Yes → Accessibility problem unlikely

No → Is public or personal transportation available?

Yes → Are personal transportation resources available?

No → Potential accessibility problem

No → Are there other barriers to use of food resources?

Yes → Potential food resource problem

No → Food resource problem unlikely

(Source: USDA Toolkit, p. 45)
Assessment of food availability and affordability

- See Exercises 3-1 (Module 3), 4-1 (Module 4), and 5-2 (Module 5).
- Is a variety of food available in retail stores?
  - Food store survey to calculate the following indicators:
    - Total number of missing items per store
    - Average number of missing items per store
    - Percentage of items missing per store
    - Items most frequently missing
    - Percentage of items missing per store in each food category (fresh vegetables, fresh meats, canned and frozen vegetables, condiments, etc.)
    - Percentage of missing items compared with the national average
  - Comparisons across stores
    - Total number of items missing in each store
    - Percentage of items missing in each store
    - Percentage of items missing in each food category
  - Comparisons with national data
    - Food availability “measured as the percentage of the total market basket of foods offered in a particular store type” (p. 52).

- Are the available foods affordable to low-income households?
  - For each store type, answer the following questions:
    - What is the average price of individual food items across all stores?
    - What is the average price per unit of each food category across all stores?
    - How does the average price for an individual food item differ across stores?
    - How does the average price for an entire food category differ across stores?
    - What is the cost of the entire toolkit market basket?
    - How does the cost of the toolkit market basket vary across individual stores and store types?
    - How does the cost of the toolkit market basket vary across different food categories?
    - How does the cost of the toolkit market basket compare with the Thrifty Food Plan (TFP) reference price?
    - How does the gap between the toolkit market basket price and the TFP reference price differ across stores?
  - Can the Thrifty Food Plan (TFP) market basket be purchased from these retailers at or below the TFP cost threshold set by USDA?
  - What are some ways to increase the availability and affordability of food for all? Are there any food sharing networks that could help offset the cost of food for communities and households? Are there any community-based pooling of assets (cooperatives, etc.) that could help strengthen resilience?
Assessment of community food production resources

- See Exercises 5-1 and 5-2 (Module 5).
- Data collection: focus groups; mapping techniques
- Key questions include:
  - Does the community have food production, value-added processing, or food distribution resources? Number and location of:
    - Community gardens, school-based gardens, community-supported agriculture (CSA) programs
    - Other forms/methods of urban agriculture: food forests, foodscaping, rooftop gardens, container gardens, vertical farming, window farms, urban chickens, animal husbandry, urban beekeeping, aquaponics, hydroponics
    - Farms, dairies, fisheries
    - Food manufacturers and distributors
  - Do low-income households have the opportunity to participate in community gardens or other food production activities?
  - Are there any school-based gardening programs?
  - Are locally produced foods sold through local food retailers and restaurants?
  - Does the local school district purchase foods from local producers?
  - Are locally produced foods used by other institutional food service outlets, such as colleges, prisons, and hospitals?
- What are the community’s food production resources?
- What is the level of political and community support?
  - Linkages between local food producers, food processors, food retailers, and other marketing outlets
  - Political support for local food producers
  - Economic support for local food producers
  - Frequency of use by individuals
  - Frequency of use by community organizations
  - Frequency of use by food retailers
- What are the risks and vulnerabilities to the community food production resources? How
Exhibit 3. Community Food Production Assessment

Are there local food production resources? (Community gardens, local producers, community-supported agriculture, farmers, dairies, fisheries)

- Yes
- No

Are they politically and financially supported by the community?

- Yes
- No

Is locally produced food available and affordable to all community members?

- Yes
- No

Potential food systems problem

Food systems problem unlikely

(Source: USDA Toolkit, p. 57)
Practical Exercise

- Adapted from FEMA Community Coastal Resilience Instructor Guide.
- To complete this practical exercise, participants should use the ideas and information generated by the Vulnerability Assessment (i.e., adapted Community Food Security Assessment) Exercises in Modules 2 through 5.

Practical Exercise Statement
This exercise allows participants to identify their organizational, individual, and systemic vulnerabilities to disturbances, and to begin thinking about ways to increase their ability to cope with disturbances and changes, thereby enhancing resilience.

Participants will be given “disturbance” cards and divided into groups by common disturbance. The instructor will explain the exercise.

Exercise: The Cards You’re Dealt
Introduction
You will select a disturbance card. This disturbance is going to impact your community. During this exercise, you will evaluate how your assigned disturbance will affect you, your organization, and your community food system, and what steps can be taken to cope with these changes to enhance resilience.
Action to be Completed:

First, let each participant select a disturbance card. Hold the cards with the back to the participant so they can’t see the disturbance they are going to analyze. This represents the unpredictable nature of hazards/disturbances. Make sure each group consists of three or four participants when determining how many cards to use. Have the participants break into groups based on the disturbance they selected.

Instructor Notes:

Have the participants follow the directions on the exercise worksheet (provided below). Individually, participants will determine their exposure, sensitivity, and current ability to cope with their assigned hazard/disturbance. After everyone in the group is finished, have them discuss their results with the team. One member of the team should write down the current ways each team member could increase their ability to cope with the disturbance and increase resilience. This list will be used in the exercise debrief.

Rationale:

The purpose of this exercise is to have the participants identify their vulnerabilities and begin to understand that they might already have some ability to cope. They also will see that other participants face similar disturbances and challenges. Participants will also begin to consider how they increase their ability to cope and enhance resilience.

Time Necessary to Complete: 30 minutes

Resources: Disturbance Cards and Exercise Worksheet

Findings:

The instructor should make sure the participants are evaluating social, economic, and environmental vulnerabilities as well as the exposure, sensitivity, ability to cope, and resilience components. The instructor may need to make the environmental vulnerabilities relevant to individuals in the class since they are often overlooked. The participants should be considering vulnerabilities at the individual, organizational, and systemic level.

Total Exercise Time:

Estimated time of 45 minutes with 30 minutes of exercise and 15 minutes of debrief by the instructor.

The Cards You’re Dealt Worksheet

Directions:

Write in the disturbance you will be evaluating in the space below. In the left column under Exposure, write down the applicable individuals, built environment, and natural environment of concern to you and your organization. In the Sensitivity column, write down how sensitive these assets will be to your hazard/disturbance. In the next column, Ability to Cope, write down how you and your organization would currently cope with these hazards/disturbances. In the last column, Resilience, write down possible actions that can be taken to reduce vulnerability and enhance resilience to the disturbance. Take 15 minutes to
complete this worksheet.

Disturbance: ________________________________

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Sensitivity</th>
<th>Ability to Cope</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
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<td>2.</td>
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<td></td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
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<td></td>
</tr>
<tr>
<td>Built Environment</td>
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<td></td>
<td></td>
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<tr>
<td>1.</td>
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<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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<td></td>
<td></td>
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<tr>
<td>5.</td>
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<tr>
<td>Natural Environment</td>
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<td></td>
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<tr>
<td>1.</td>
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<tr>
<td>2.</td>
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<td></td>
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<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples of Disturbances to the Food System:
Information for the instructor. Any of these disturbances may be used for the Disturbance Cards. Ideally, disturbances that are relevant to the particular community should be chosen for this exercise.

*Both slow-onset and rapid-onset disturbances

<table>
<thead>
<tr>
<th>Environmental</th>
<th>Social/Political/Cultural</th>
<th>Economic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Water scarcity</td>
<td>• Population growth</td>
<td>• Commodity prices</td>
</tr>
<tr>
<td>• Climate change:</td>
<td>• Population control</td>
<td>• Food prices</td>
</tr>
<tr>
<td>o Sea level rise</td>
<td>• Demographic changes</td>
<td>• Oil prices</td>
</tr>
<tr>
<td>o Chronic / severe</td>
<td>• Migration</td>
<td>• Energy</td>
</tr>
<tr>
<td>droughts, floods</td>
<td>• Refugees</td>
<td>• Trade policy</td>
</tr>
<tr>
<td>o Desertification</td>
<td>• Poverty</td>
<td>• Trade embargoes and sanctions</td>
</tr>
<tr>
<td>o Loss of biodiversity</td>
<td>• Wealth inequality</td>
<td>• Development policies</td>
</tr>
<tr>
<td></td>
<td>• Ag/Food policies</td>
<td>• Industrialization and</td>
</tr>
<tr>
<td></td>
<td>• Federal food</td>
<td>urbanization</td>
</tr>
</tbody>
</table>
Severe weather events
• Ocean acidification
  • Environmental degradation (air, land, water) -- pollution
  • Loss of agricultural lands
  • Diseases affecting livestock, crops
  • Bee colony collapse

Food subsidies
• Food deserts
• Land use policies
• Labor policies
• Changing cultural practices/norms
• Political turmoil, instability, conflict
• War

Agriculture subsidies
• Land prices
• Labor markets
• Unemployment

The Cards You’re Dealt -- Disturbance Cards

Card set #1

<table>
<thead>
<tr>
<th>WATER CRISIS!</th>
<th>WATER CRISIS!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your community has been experiencing rapidly decreasing water supplies, and further decreases are projected for the next decade.</td>
<td>Your community has been experiencing rapidly decreasing water supplies, and further decreases are projected for the next decade.</td>
</tr>
</tbody>
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Card set #2

<table>
<thead>
<tr>
<th>CLIMATE CHANGE: CHRONIC DROUGHTS</th>
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<tbody>
<tr>
<td>Your community has been experiencing chronic and severe droughts in recent years, decimating local food production. The droughts are predicted to worsen in the future.</td>
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**Card set #3**

<table>
<thead>
<tr>
<th>UNEMPLOYMENT</th>
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<tbody>
<tr>
<td>Your community has experienced a sudden rise in unemployment due to a global economic downturn. Many households are now experiencing chronic food insecurity, and many individuals and families have even become homeless.</td>
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**Card set #4**

<table>
<thead>
<tr>
<th>OIL CRISIS!</th>
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<tr>
<td>Due to global events, the price of oil has skyrocketed, affecting fuel and shipping costs across the board. This has resulted in a sudden, sharp rise in food prices in your community.</td>
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</tr>
</tbody>
</table>
Due to global events, the price of oil has skyrocketed, affecting fuel and shipping costs across the board. This has resulted in a sudden, sharp rise in food prices in your community.

Collaborative Goal for Community Food Security and Resilience
(Alternative Exercise)

- Collaborative Goal: Participants collaboratively identify the goal(s) for their community. What does “community food security” and a resilient food system look like for them? What would be the key components of their food system that would enhance its resilience? What thresholds (e.g., imports vs. exports vs. locally produced and consumed) would be ideal? What foods can or should be produced and consumed locally? Why? What are the potential impacts on the ecosystem? What are the potential social and economic impacts?
- How to prioritize goals?
  - (Implicit in goal setting and prioritizing process: What are the community’s core VALUES? How do the goals reflect the values of the community?)
- Identify steps (tools, etc.) to achieve the goal(s).
  - What are potential barriers at each step? How to overcome these barriers?
- What metrics should be used? How to measure and evaluate progress? How often? (And measured by whom?) Why?
- Resilience: Planning ahead for how to build back better, stronger, more equitable (after a disruption/disaster)

Network Mapping
(Alternative Exercise)

- Who are the “nodes” (i.e., the actors, stakeholders, institutions, organizations) in their food system network? How are they connected? How can we increase and strengthen connections in the network?
- Where are the “pukas” (holes) in the network? Who’s missing? Why? How to incorporate them into the network? Are vulnerable and/or marginalized populations (interests) equitably represented in the network?
- Where is the locus (loci?) of control in the system (and at what scale)? Who has the authority/power? Why? Is the system hierarchical or centralized? Can or should the power be redistributed/dispersed/shared throughout the network? Why (or why not)? How?
Case Study Library

Learning Objective for Global Case Studies

- Understand and know the importance of International approach to resilient food system.
- Begin to think about ways to build resilience global food system.
- Get familiar with global case study in supporting the food security system.

Global Food Prices Crises

- The world food crisis of 2007-2008 caused a substantial rise in the cost of food, especially staple foods such as rice, wheat, and corn. This rise in price had a devastating effect on hungry people in the developing world (Jameson, 2012).
- The crisis certainly awakened the global community. Since 2007, governments and international agencies have made food security a priority issue, and with a decidedly different tone. They stress the importance of agricultural development and food production in developing countries, the key role of small-scale farmers and women, the challenge of limited resources in a climate-constrained world, the important role of the state in “country-led” agricultural development programs, the critical role of public investment (Timothy et al, 2007).
- For many, these priorities represent a sea change from policies that sought to free markets from government policies seen as hampering efficient resource allocation. Now that those policies and markets have failed to deliver food security, the debates over how countries and international institutions should manage the food system are more open than they have been in decades (Timothy et al, 2007).

Highlights

World food prices increased dramatically in 2007 and 2008 creating a global crisis and causing political and economic instability and social unrest in both poor and developed nations.

![Figure 1: Annual FAO Food Price Indices (FAO, 2011)](image-url)
There are several reasons for the food crisis (SPIEGEL, 2008):

- The world population is growing constantly, while the amount of arable land is declining.
- Climate change is causing a loss of agricultural land, irreversible in some cases, as a result of droughts, floods, storms and erosion.
- Because of changing eating habits, more and more arable land and virgin forests are being turned into pasture for livestock. The yield per acre in calories of land given over to pasture is substantially lower than that of arable land.
- The World Bank wants developing countries to introduce market reforms, including the abolition of protective tariffs, a move that often causes massive damage to local agriculture.
- Speculators are driving up the prices of raw materials. The resulting high oil price leads to "energy crops" being cultivated instead of grain for food or animal feed.
- Millions of people displaced by civil wars need food, and yet they themselves are no longer capable of producing food.

Figure 2: Consequences of the global food crisis (SPIEGEL, 2008)

Countries are more vulnerable to rising international food prices if they meet three criteria:

- High food dependency as measured by the share of cereal imports in total cereal consumption
• High food import burden as measured by the share of cereal imports in total imports.
• Low income as measured by a Gross National Income (GNI) per capita in 2006 of less than $905, or lower middle-income with a GNI per capita between $906 and $3,595 (World Bank, 2007). With low income comes weaker policy, fiscal, and administrative capacity to respond to the crisis.

![Figure 3: Countries vulnerable to an international food price shock (Janvry et. al., 2008)](image)

**Lessons Learned**

How can we use this experience to be prepared for food crises in the future? (Jameson, 2012) According to the U.S. Department of State (DoS), there are a number of lessons to be learned. On one hand, there were policies that made the crisis worse, while, on the other hand, there were policies that helped to combat the crisis:

**Policies that Intensified the Problem:**

- **Export restrictions:** IFPRI concluded in its Reflections on the Global Food Crisis that about three-fourths of rice price increases occurred in 2008 due to export bans from major exporters. These restrictions caused panic buying in importer countries, which drove up prices and disrupted supply responses by local producers.

- **Panic buying, stock building and lack of transparency:** Some nations purchased more basic grains than necessary, in an attempt to increase stocks and decrease prices. However, this resulted in large food losses and food waste.

**Policies That Protected the Poor and Helped to End the Crisis:**

- **Market-based responses coupled with targeted safety nets:** According to the Organisation for Economic Cooperation and Development (OECD), safety nets “support the purchasing power of the poor without distorting domestic incentives to produce more food, and without reducing the incomes of poor food sellers.” This helps to alleviate the immediate impacts of high food prices without disrupting pricing for farmers.

- **Reducing import restrictions, releasing stocks, and reassuring the markets:** Governments that decreased tariffs and taxes on imports decreased prices for staples in their own countries. Also, by publicizing stock information on food, countries were able to end price hikes.
• Long-term attention to the agricultural sector: Countries that focus on investing in their agricultural sectors decrease their vulnerability during times of volatility and crisis. Investment strategies the DoS suggest include “[alleviating] transportation, distribution, and supply-chain bottlenecks, promoting sound market-based principles for agricultural sector development and regional trade, encouraging private investment, and undertaking appropriate public investments and use of new agricultural technologies.”

• Emergency donor assistance: As a short-term fix, the international community, including governments, NGOs, private sector organizations, and international partners, can provide aid assistance to those in emergency situations.

• When food prices rise, the poor are the most vulnerable. Rising food prices can have significant impacts on the nutritional levels of people in developing countries. The responses to these crises are also important in shaping how the most vulnerable fare during these times of emergency.

Profile of Walmart

• Walmart indeed has been a good example of a successful retailer that has successfully expanded and survived in the international markets. This had proved that there is potential for retailers in domestic markets to expand their business into the international arena through appropriate marketing strategies and entry modes (Lee, 2013). In 1991, Walmart became an international company. They operate retail units with many different formats to fit in with local customer needs, desires and customs. Walmart International is the fastest-growing part of their overall business, with more than 4,400 stores in the U.S. and more than 5,200 units that established globally in 28 countries (Beth Keck, 2012). While more than 75 percent of international stores operate under a different banner than Walmart, they all share a common goal: Saving people money so they can live better.

Figure 1: Walmart’s Global Presence – 28 Countries (Beth Keck, 2012)
General Environment

- Social - The social cultural segment is concerned with a society’s attitudes and cultural values. A major social cultural trend is the continued growth of suburban communities. The increasing number of people living in the suburbs has a number of effects. Walmart continues expanding its current store capacity to include new products and services for customers. Walmart will build new supercenters in previously unexplored regions in Canada, which includes plans for 37 new stores in the next fiscal year (Canadian Press, 2013). In America alone, Walmart established 4,017 stores in central and convenient locations to serve communities (Global Responsibility, 2013).

- Political/legal - Walmart must carefully analyze the business-related polices. Competition laws, taxation laws, and labor training laws are areas in which policies can affect Walmart’s operation and profitability a lot. Walmart is facing an issue regarding discrimination of employees based on their gender. Women are discriminated by not allowing them to sit in supervisory and managerial levels (Walmart: An Analysis, 2008). There are said to be pending lawsuits waiting for Walmart's notions as the company has allegedly went against the labor laws. This negative reputation could result in a loss of competitive advantages, sales, and possibly Walmart’s reputation as the world’s leading Retail Company. Therefore, engaging in gender equality practices will help contribute to Walmart’s success.

- Demographic - For Walmart, demographic segments are analyzed on a global basis, because it operates internationally. Demographic segments are concerned with many areas such as population size, age structure and geographic distribution. Walmart is using its wealth of sales and inventory data to segment based on demographics, allowing it to market to specific age, ethnicity and income brackets (Brian, 2006). By analyzing the demographic segment, Walmart will know their customers better, so better services could be provide.

- Economic - Walmart is always sensitive towards economy growth, their sales model which depends on low margins of profit and a high volume of sales, could alter relatively fast. When economy doing well, Walmart’s low price strategy would be of less importance to customers, in the other hand, during a time of recession Walmart goal of high volume of sales would be threatened. As a result of the previously mentioned points, Walmart should conduct a thorough study before entering an unbalanced economy (Walmart, 2013).

- Technological - Walmart embraced technology to become an innovator in the way stores track inventory and restock their shelves (Traub, 2012). Walmart has invested heavily in its unique cross docking inventory system, which can help Walmart to achieve economies of scale to reduce the costs. With its successful system, Walmart is able to responds quickly at demand changing, maintain low costs and satisfy its customers. The effort that Walmart put into the supply chain management makes the company become the leader of this area.

- Global - Walmart focus on the global market, the company expands into many different countries. However, there are different cultures and laws apply to in different countries, which may increase the risk and expenditure of the company to enter into a new market.
Support Resilience Food System

- To support the resilience food system, Walmart continues to deliver on the Sustainable Agriculture commitments, including providing training to smallholder farmers and increasing sourcing from them (World Economic Forum Annual Meeting 2014).
- In October 2010, Walmart launched its sustainable agriculture initiative. One of the core pillars of this initiative is to support farmers and their communities through a combination of direct sourcing and training in sustainable agricultural practices. A direct link to the retail supply chain and shared best practices including the optimal amount of water, pesticides and fertilizers, builds capacity of small-scale farmers, moving them toward demand-driven production that improves operations and product quality.
- In March of 2011, for example, Walmart signed a Memorandum of Understanding with USAID linking Feed the Future, the U.S. government's global hunger and food security initiative, with Walmart's Global Sustainable Agriculture Goals. The USAID-Walmart regional agreement builds on experience gained from previous collaborations in Guatemala, Honduras, Nicaragua and El Salvador.

Highlights of Walmart’s Programs for Resilience Food System.

- **Central America**
  - Central America enjoys an abundance of land and farmers. With a little education and investment, these farmers are capitalizing more than ever before on opportunities to bring a wider variety of fruits, vegetables and grains to markets across the region. Walmart supports farmers in Costa Rica, Nicaragua, Honduras, Guatemala and El Salvador in diversifying their crops to meet real market needs. A specialized group of agronomical engineers advises local farmers on seed and crop quality, soil use, yields, maturity, safety, responsible use of agrochemicals, crop rotation and more. Walmart has assisted over 2,200 farmers and improved the quality of life for more than 16,600 Central American families by purchasing over $1.1 billion pesos ($90 million USD) in fruit, vegetables and grains. In addition to the economic and social value created, the consultancy, training and processes ensure a supply of quality products for the stores. Local production development also reduces distance to market, resulting in fewer greenhouse gas emissions.

![Figure 2: Walmart’s Programs in Central America](image)

- **India**
  - Building a successful Direct Farm program that has grown to 800 farmers in India since its initiation in December 2008, Bharti Walmart expanded its model into Delhi,
Uttar Pradesh and Maharashtra in 2010. By the end of 2010, approximately 15 percent of the vegetables sold in Bharti Walmart stores were through the Direct Farm program.

- Through this program, Walmart works directly with local farmers to encourage the cultivation of safe, high-quality seasonal vegetables. In an effort to improve quality and reduce waste, field agronomists visit these fields at every stage of cultivation, from the leveling of land, nursery and transplant, to nutrient management, harvest and post-harvest. The Bharti Walmart program provides quality fresh produce to retail stores, while enhancing the net incomes of local farmers through better agronomic practices.

Figure 2: Walmart’s Programs in India  Figure 3: Walmart’s Programs in China

- **China**
  - Walmart China has successfully engaged 473,999 farmers into Direct Farm program in 2010, bringing the total to 757,149. Walmart strives toward the goal of engaging 2 million Chinese farm workers and reducing produce waste by 15 percent by the end of 2015, while upgrading 15 percent of Direct Farm program products from Green to Organic certified.

- **Brazil**
  - Through Walmart Brazil's Producers' Club (Clube dos Produtores), they negotiate directly with more small- and medium-sized farmers across the country than ever before. By the end of 2010, the Producers' Club featured 8,400 producers in more than 300 cities of 11 Brazilian states. These producers have been screened to ensure compliance with labor laws and environmental standards. In addition to the new business opportunities direct contact has opened for these farmers, the customers are now receiving fresher, locally grown fruits and vegetables at affordable prices.

**Lessons Learned from Walmart**

- Supply chain management at Wal-Mart can be described in 3 sections.
  - **Procurement and Distribution**
    - Wal-Mart’s process of procurement involves reducing its purchasing costs as far as possible so that it can offer best price to its customers. The company procures goods directly from the manufacturers, bypassing all intermediaries.
• Wal-Mart has distribution centers in different geographical places in US. Wal-Mart’s own warehouses supplies about 80% of the inventory. Each distribution center is divided in different groups depending on the quantity of goods received. The distribution centers ensured steady flow and consistent flow of products.

  Logistics Management
  • This involves fast and responsive transportation system. More than 7000 company owned trucks services the distribution centers. These dedicated truck fleets enables shipping of goods from distribution centers to the stores within 2 days and replenish the store shelves twice a week.
  • For more efficiency, Wal-Mart uses a logistics technique called “Cross Docking”. In this system, finished goods are directly picked up from the manufacturing site of supplier, sorted out and directly supplied to the customers.

  Inventory Management
  • Considering the rapid expansion of Wal-Mart stores, it was essential to have a very good communication system.
  • Wal-Mart ensures that unproductive inventory is as less as possible, by allowing the stores to manage their own stocks, thereby reducing pack sizes across many categories and timely price markdowns.
  • Wal-Mart owns the “Massively Parallel Processor (MPP)”, largest and the most sophisticated computer system in private sector, which enables it to easily track movement of goods and stock levels across all distribution centers and stores.
  • Employees use “Magic Wand”, which is linked to in-store terminals through a Radio frequency network, to keep track of the inventory in stores, deliveries and backup merchandise in stock at the distribution centers.
  • Sustainable agriculture is an area where Walmart can make a big difference for local communities, for local economies, and for families all over the world. They have a unique responsibility through sustainable agriculture since they are the world’s largest grocer.

Learning Objectives for National Case Studies
• Understand and know the importance of domestic approach to resilient food system.
• Begin to think about ways to build resilience local food system.
• Get familiar with domestic case in supporting the local food security system.

Food Security is an Issue for Australia
• For Australia, food security is inextricably linked to the political stability of the region and has the potential to affect the national security.
• Australia’s investment in food-related research and development is in decline,
• An aging rural workforce and falling enrolments in agricultural education are degrading the human capital on which innovation depends,
• Productive land is threatened by urban encroachment,
• Food imports are rising, and
• Transport and distribution systems are poorly equipped to deal with food contamination or pandemics.
• It seems entirely plausible that by 2050 Australia will be, at least sporadically, a net food importer.
Highlights Australia’s Role in food security

- Australia has key strengths that are highly relevant to building food security:
  - Australian agriculture has maintained its leading position by producing food on the driest inhabited continent, on low quality soils and in the face of continual climate variability.
  - Australia built strong links and capabilities in delivering technological development to developing countries in the region.
  - They have a strong research and development (R&D) base and agricultural R&D capability ranks among the best in the world.
  - They have developed a strong capability in climate change research including studies on impacts, adaptation and mitigation.
  - They have expertise in human health and nutrition research.

These strengths provide a solid foundation to catalyze transformation in the food value chain required to address food security issues. Advances can be made through a national and coordinated approach to food; by building human capacity; by investing in R&D and by inspiring awareness of the nutritional value of food at both the production and consumption levels (PMSEIC, 2010).

Lessons Learned

- A national approach to food
  Food production and processing is a fundamental part of Australia’s economy and the health and wellbeing of its citizens. Food, however, is not currently dealt with in a way which brings together food related policy, regulatory agencies and research organizations.
  As food security continues to emerge as a challenge globally and domestically, there will be increasing demand for:
    - Efficiency in food production, processing and distribution and responsibility in purchasing and consumption to reduce wastage and minimize costs.
    - R&D and the delivery of innovations to underpin productivity growth in the food sector, to meet human health needs and bring improvements in food processing.
    - Flexibility and responsiveness in regulation to ensure rapid delivery of innovations to the food value chain.

Different policy, regulatory and program areas related to food should be brought together to ensure that government takes a consistent approach to food and food security.

A national approach would bring a high level of coordination, build a strategy for a resilient food value chain and emphasize the link between food and population health (PMSEIC, 2010).

- Investing in R&D to reverse declining agricultural productivity growth
  Agriculture has an excellent record of productivity growth over the last fifty years. This has global production to meet the large population increase and, for countries like Australia, these gains have kept food prices low while helping farmers stay in business. However, the rate of productivity growth has slowed dramatically over the past decade and there is international consensus that the current productivity gains are not sufficient to meet future global food demands (PMSEIC, 2010).
Scientific advances have underpinned productivity growth through yield improvements in crop production. The key challenges are clear:

- To improve water use and management in agriculture.
- To tackle the problem of soil nutrition and reduce the reliance on high energy requirements for fertilizer production.
- To ensure sustainable management of the natural resource base.
- To accelerate advances through new plant, livestock and fish breeding strategies.

**Building human capacity to meet the challenges and opportunities**

Technological advance is critical to productivity gains. It is dependent upon people who can develop the new technologies, deliver them where they are needed and apply the advances to food production systems. The number of agricultural graduates produced nationally falls far short of the estimated needs. Similar declines in other areas of science are increasing the competition for graduates. There are too few graduates taking up the opportunity to study for a higher degree by research and develop a career in agricultural and food sciences. The proportion of graduates in the agricultural industry is lower than that of the broader economy. The age structure across the sector is also of concern. Agriculture has Australia’s oldest workforce with a median age of 48 years. Importantly, the effective delivery of technological advances will depend upon a highly skilled, receptive and dynamic food sector workforce.

**Raising the importance and awareness of food in the public consciousness**

Food is often treated as a bulk commodity which is cheaply and readily available. However, food is strongly linked to the health of the nation. High quality food should be available to all groups within the population. Although information on food and health is readily available in the society and many take advantage of this information, there appears to be a society-wide lack of appreciation of the fundamental role of food in health. Further, authoritative sources of information can be lost in the sheer volume of general information. As a nation there is great potential to apply new technologies in food production and processing systems to benefit the health. Management of the food supply should be improved to ensure all Australians, including at-risk populations, have access to food that promotes health and wellbeing. At the same time, to reduce the high levels of food waste in the community, food should be regarded as a valuable resource (PMSEIC, 2010).

**Recommendations**

- Establish the Australian Food Security Agency to ensure that the following issues are tackled:
  - Availability of nutritious food in Australia through coordination of government policy and programs across the food production, processing and supply sectors.
  - Data collection on the environment, food production, food processing and distribution, and food consumption patterns, to support effective policy and program development.
  - A Food Security Research Strategy to provide a framework and research targets for future food production and processing environment. The Strategy would build on the outcomes of current reviews such as the Productivity

- A National Land Use Planning Framework based on a landscape perspective, developed in conjunction with state and territory governments to secure future food production.
- Streamlining and harmonization of regulatory procedures to support technology development, evaluation and delivery across the food value chain.

- Australia increases investment in agricultural R&D to harness national expertise and take a leading role in national and international programs targeted to improving low input farming systems.
- Development of incentives to recruit and nurture future generations of innovative and adaptive farmers, researchers and associated professionals for the Australian food production and processing sectors.
- Better engaging the community and partner organizations to elevate the status of food in Australia and build cooperative commitment to an improved food value chain.

Profile of Food Security in Cuba

- Cuba is an interesting case for studying on food security. Due to its historical and political background, Cuba has evolved according to a unique development model. Its rapid development after the Revolution of 1959, its economic collapse after the dissolution of the Soviet Union in 1989, and the nation's subsequent struggle to become more self-sufficient created a unique situation from which much can be learned (Lane, 1999).

- The fall of the Soviet Union in 1989 pushed Cuba into the worst economic crisis of its history. The nation was faced with the dual challenge of doubling food production with half the previous inputs such as fertilizers, pesticides and farming equipment (Catherine, 1999). Cuba was importing from the Soviet Union 44 - 57% of its per capita caloric intake, 48% of its manufactured fertilizers, and 82% of its pesticides and herbicides. As food availability decreased, average daily per capita calorie consumption dropped from 2,845 to 2,275 during the period of 1989 to 1992 (Deere, 1993).

Highlights Cuba’s Role in food security

- Cuba responded to the crisis with a national call to increase food production by restructuring agriculture. This transformation was based on a conversion from a conventional, large scale, high input, mono-crop agricultural system to a smaller scale, organic and semi-organic farming system. It focused on utilizing local low cost and environmentally safe inputs, and relocating production closer to consumers in order to cut down on transportation costs (Catherine, 1999).

- Urban agriculture has been a key part of this effort to increase food production. By 1994 a spontaneous decentralized movement of urban residents joined a planned government strategy to create over 8,000 city farms in Havana alone. The success of these gardens has significantly contributed to the easing of Cuba’s food crisis. In 1998 an estimated 541,000 tons of food were produced in Havana for local consumption. Food quality has also improved as citizens now have access to a greater variety of fresh fruits and vegetables. Although the program still faces many challenges, urban gardens continue to grow, and some neighborhoods are producing as much as 30 percent of their own subsistence needs (Catherine, 1999. P3).
• The growth of urban agriculture is largely due to the Cuban state’s commitment to making unused urban and suburban land and resources available to aspiring urban farmers. The issuing of land grants of vacant space in the city has converted hundreds of vacant lots into food producing plots. New planning laws place the highest land use priority on food production (Catherine, 1999. P3).

• The opening of farmer’s markets and the legalization of direct sales from farmers to consumers dramatically increased production incentives for urbanites. Deregulation of prices combined with high demand for fresh produce in the cities has allowed urban farmers to make two to three times as much as professionals (Catherine, 1999. P3).

Figure 1: Havana’s urban farms have varying levels of infrastructure and investment, but much of the labor is done by hand (Photo: Andy Cook)

Lessons Learned

• Urban agriculture has since become a major element of the Havana cityscape. The first boost given to urban agriculture by the government was the creation of the Agricultural Department for Havana City in April, 1994 (Catherine, 1999).

• There are three state run agricultural enterprises in Havana: the Empresa de Cultivos Varios (Mixed Crop Enterprise), the Empresa Horticola Metropolitana (Metropolitan Vegetable Enterprise) and the Empresa Pecuaria (Animal Husbandry Enterprise) (Catherine, 1999).

• Cuba has an extensive agricultural research sector, with most head laboratories and administration offices inside Havana City limits. The Department of Urban Agriculture has been working with all institutes and laboratories to determine how they can best serve the needs of city growers (Catherine, 1999).

• Cuba now has one of the most successful urban agriculture programs in the world and continues expanding urban production with the goal of putting 100 percent of arable
land under cultivation, increasing irrigation potential with new wells and water tanks, and maintaining high standards of quality in all aspects of production. 

- The key elements in Havana’s success have been:
  - political will
  - real access to public lands
  - coordination of, not competition for, local resources
  - concrete programs to support small producers
  - encouraging producers’ sense of ownership
  - establishing a strong extension program
  - guaranteeing affordable inputs
  - strong local demand for fresh produce

**Learning Objective for Local Case Studies**

- Understanding typologies of programs for resilient food system
- Get familiar with different type of programs for resilient food system
- Understanding key elements of how to build resilient food system
- Understanding the importance of domestic approach to resilient food system.
- Begin to think about ways to build resilience local food system.

**Profile of Local Food Systems**

- What is a “local food system?”
- The term “local food system” is used to describe a method of food production and distribution that is geographically localized, rather than national and/or international. Food is grown (or raised) and harvested close to consumers' homes, then distributed over much shorter distances than is common in the conventional global industrial food system. In general, local/regional food systems are associated with sustainable agriculture, while the global industrial food system is reliant upon industrial agriculture (Martinez. et al., (2010).

![Components of a community’s food system. (Raja et. al, 2008)](image-url)
Typologies of Local Food Systems

- Local Farm – CSAs
  - Community Supported Agriculture (CSAs) are direct-to-consumer programs in which consumers buy a “share” of a local farm’s projected harvest. Consumers are often required to pay for their share of the harvest up front; this arrangement distributes the risks and rewards of farming amongst both consumers and the farmer. CSA participants often pick up their CSA shares in a communal location, or the shares may be delivered directly to customers. The USDA estimates that there may be as many as 2,500 CSAs currently operating in the US. (Martinez. et al., (2010) Local Food Systems: Concepts, Impacts, and Issues).

![Image of Local Farm – Community Supported Agriculture](http://millsapfarms.wordpress.com)

Figure: Local Farm – Community Supported Agriculture
(http://millsapfarms.wordpress.com)

Urban Farms

- Urban Farm is the practice of cultivating, processing, and distributing food in or around a village, town, or city (Bailkey et al., 2000). Urban farm can also involve animal husbandry, aquaculture, agroforestry, urban beekeeping, and horticulture. These activities occur in peri-urban areas as well (Hampwaye et al., 2013).
A community garden (the term favored in the United States, Canada, Australia and New Zealand) is a single piece of land gardened collectively by a group of people (ACGA, 2007). Community gardens provide fresh produce and plants as well as satisfying labor, neighborhood improvement, sense of community and connection to the environment (Hannah, et al., 2000). They are publicly functioning in terms of ownership, access, and management, as well as typically owned in trust by local governments or not for profit associations (Ferris, 2001).

Type of community gardens (Division of Agriculture and Natural Resources, University of California, 2014):

- **Neighborhood gardens.** This type of garden is normally defined as a garden where a group of people come together to grow fruits, vegetables and ornamentals. They are identifiable as a parcel of private or public land where individual plots are rented by gardeners at a nominal annual fee.
• **Residential Gardens** are typically shared among residents in apartment communities, assisted living, and affordable housing units. These gardens are mainly cared for by residents living on the grounds.

• **Institutional Gardens** are defined as gardens attached to either public or private organizations. These gardens offer a number of beneficial services for residents, ranging from mental or physical rehabilitation and therapy to teaching a set of skills for job placement.

• **Demonstration Gardens** are used in educational and recreational settings. Oftentimes short seminars and presentations about gardening will be hosted at any of the five gardens located around the county.

**Farm to School**

• Farm to School is a program in the United States through which schools buy and feature locally produced, farm-fresh foods such as fruits and vegetables, eggs, honey, meat, and beans on their menus. Schools also incorporate nutrition-based curriculum and provide students with experiential learning opportunities such as farm visits, gardening, and recycling programs. As a result of Farm to School, students have access to fresh, local foods, and farmers have access to new markets through school sales. Farmers are also able to participate in programs designed to educate kids about local food and agriculture.

![Figure: Farm to School (http://westportnorthgarden.blogspot.com)](http://westportnorthgarden.blogspot.com)

• Farm to school enriches the connection communities have with fresh, healthy food and local food producers by changing food purchasing and education practices at schools and preschools (NFSN, 2014).

• Students gain access to healthy, local foods as well as education opportunities such as school gardens, cooking lessons and farm field trips. Farm to school empowers children and their families to make informed food choices while strengthening the local economy and contributing to vibrant communities.

• Farm to school implementation differs by location but always includes one or more of the following:
  o Procurement: Local foods are purchased, promoted and served in the cafeteria or as a snack or taste-test;
Education: Students participate in education activities related to agriculture, food, health or nutrition; and
School gardens: Students engage in hands-on learning through gardening.

Conventional Agriculture

- Conventional agriculture is a term that describes any farming not dedicated to alternative schemes. Fundamentally, it is the type of farming that dominated the 20th century and which accounts for most farming nowadays. In conventional farming, chemical fertilizers, intensive mass animal farming as well as chemical plant protectants are general.
- In ancient times, conventional agriculture relied on sustainable practices. The ancients used the natural flooding of a plane, irrigation and organic fertilizer, dry farming techniques, and even the use of rudimentary aquaponic systems.
- In modern times the term “conventional agriculture” is difficult to define as it is used to describe a wide range of agricultural practices. In general, it is any type of agriculture that requires high external energy inputs to achieve high yields and generally relies upon technological innovation and fossil fuels to supplement the required energy. Many also define the term conventional agriculture as being synonymous with non-organic. (Kathy Fairchild, 2011)

Figure: Conventional Agriculture in Thailand (http://ag-transition.org)

Aquaculture

- Aquaculture is the farming of aquatic organisms in both coastal and inland areas involving interventions in the rearing process to enhance production (FAO, 2012). It is probably the fastest growing food-producing sector and now accounts for nearly 50 percent of the world's fish that is used for food.
- Marine aquaculture refers to the culturing of species that live in the ocean. U.S. marine aquaculture primarily produces oysters, clams, mussels, shrimp, and salmon as well as lesser amounts of cod, moi, yellowtail, barramundi, seabass, and seabream. Marine aquaculture can take place in the ocean (that is, in cages, on the seafloor, or suspended in the water column) or in on-land, manmade systems such as ponds or tanks. Recirculating aquaculture systems that reduce, reuse, and recycle water and waste can support some marine species (NOAA, 2014).
Freshwater aquaculture produces species that are native to rivers, lakes, and streams. U.S. freshwater aquaculture is dominated by catfish but also produces trout, tilapia, and bass. Freshwater aquaculture takes place primarily in ponds and in on-land, manmade systems such as recirculating aquaculture systems (NOAA, 2014).

Green Houses (hydroponics)

- Hydroponics is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite, gravel, biochar, mineral wool, expanded clay pebbles or coconut husk (Merle Jensen, 2014)
- In combination with greenhouses, it is high technology and capital-intensive. It is also highly productive, conservative of water and land, and protective of the environment. Hydroponic culture requires only basic agriculture skills. Since regulating the aerial and root environment is a major concern in such agricultural systems, production takes place inside enclosures designed to control air and root temperatures, light, water, plant nutrition, and adverse climate.
Food Hubs

- As the demand for local, fresh produce and animal products continues to grow, innovative programs to help small farmers bring their farm products to market are also expanding. One increasingly common solution to the logistical, transportation, and marketing challenges faced by small family farmers is the creation of local and regional “food hubs.” The USDA describes a food hub as the “drop off point for multiple farmers and a pick up point for distribution firms and customers that want to buy source-verified local and regional food.” Some food hubs also provide transportation of farm products directly to consumers and retail, restaurant, and institutional customers. Food hubs take much of the burden of marketing and transportation from local farmers by finding viable consumers, and provide other business-related services, such as logistical coordination. In addition, they often provide refrigerated storage facilities and auxiliary services such as commercial kitchens and light food processing. Food hubs can expand the market reach of small, local farmers, help create local jobs, and can expand access to fresh, local food in urban and suburban markets.

Figure: Food hubs connection (http://everblossomfarm.blogspot.com)

- The Case of Local Food System in Hawai‘i (DBEDT, 2012)
  - Hawai‘i is located approximately 2,506 miles from the continental United States
  - About 85-90% of Hawai‘i’s food is imported
  - Particularly vulnerable to natural disasters and global event that might disrupt shipping and the food supply (DBEDT, 2012)
- The strategic objectives of Food System in Hawai‘i:
  - Increase demand for and access to locally grown foods
  - Increase Production of locally grown foods
  - Provide policy and organizational support to meet food self-sufficiency needs
- Recommended actions include:
  - Demand:
    - Expand the “Buy Local/It Matters” marketing campaign as to promote the benefits of buying local foods.
Expand and improve branding and labeling programs and provide consumer education programs to help consumers identify local products at the time of purchase.

Encourage public institutions to purchase locally grown foods. Establish a pilot program in the charter schools.

To address food safety issues, increase the farm food safety coaching program and farm food safety certifiers.

Production:

To increase production of locally grown foods, improve agricultural infrastructure including agricultural parks, irrigation systems and distribution systems/facilities.

Support the Agricultural Park Program which provides public lands at reasonable cost and long-term tenure to farmers and complete the transfer of agricultural lands from the Department of Land and Natural Resources (DLNR) to the Department of Agriculture (DOA).

Support Capital Improvement Project (CIP) funding to repair and maintain State irrigation systems since these systems provide water at low cost to farmers.

Encourage a variety of distribution systems to move goods to the market place. Nationally, direct consumer sales, farmers’ markets, community-supported agriculture organizations and farm-to-school programs have all increased.

Support multi-functional food hub facilities or food incubator facilities to handle aggregation, processing, treatment and distribution.

To build the agricultural workforce, continue the “Green Jobs Initiative” which provides workforce development services for the agricultural, energy, natural resources and related industries.

Policy and Organizational Support

Restore the Market Analysis and News Branch of DOA to track progress toward food self-sufficiency.

Adopt legislation to establish an Agricultural Development and Food Security Program.

The Strategy also contains recommendations to provide for pest prevention and control, research and extension services, and policy and organizational support. The proposed Agricultural Development and Food Security Program will help to coordinate and direct efforts to address food self-sufficiency

A critical factor towards successful implementation will be building partnerships with the increasing number of organizations involved in food self-sufficiency/food security.