

SUSTAINABLE FOODS AND FOOD SYSTEMS



Stacy Bevan, MS, RD, CD
Professional Practice Assistant Professor

OVERVIEW

- Food Systems
- Components of a Sustainable Food System
- Sustainability and the DGA 2015
 - Dietary Patterns
 - Seafood
- Practical Ways to Apply Sustainability in Communities and Households

WHAT IS A FOOD SYSTEM?



FOOD SYSTEMS

- System:
 - “A group of interacting, interrelated, and oftentimes interdependent elements that function together as a complex, unified whole.”
- Systems have inputs and outputs

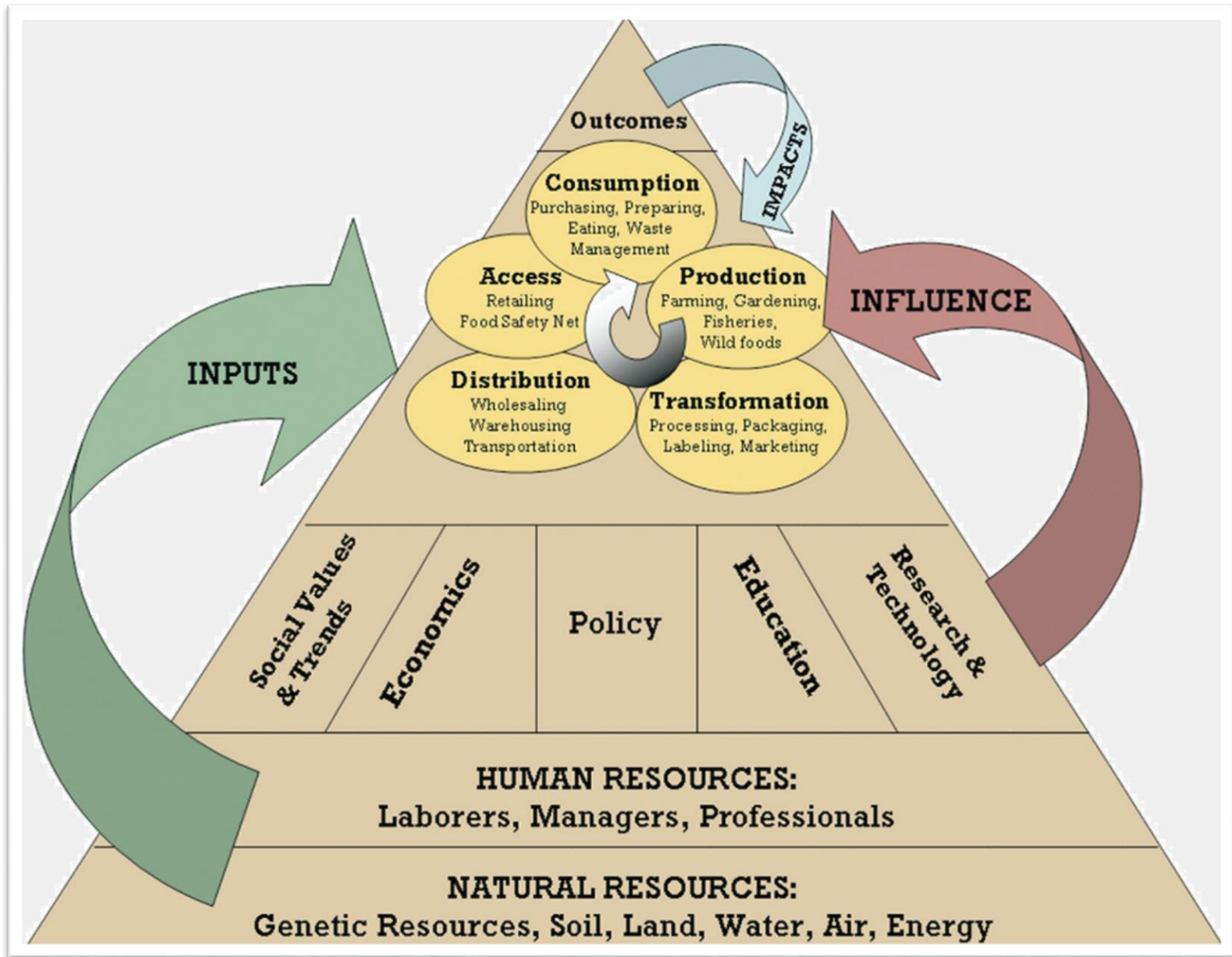


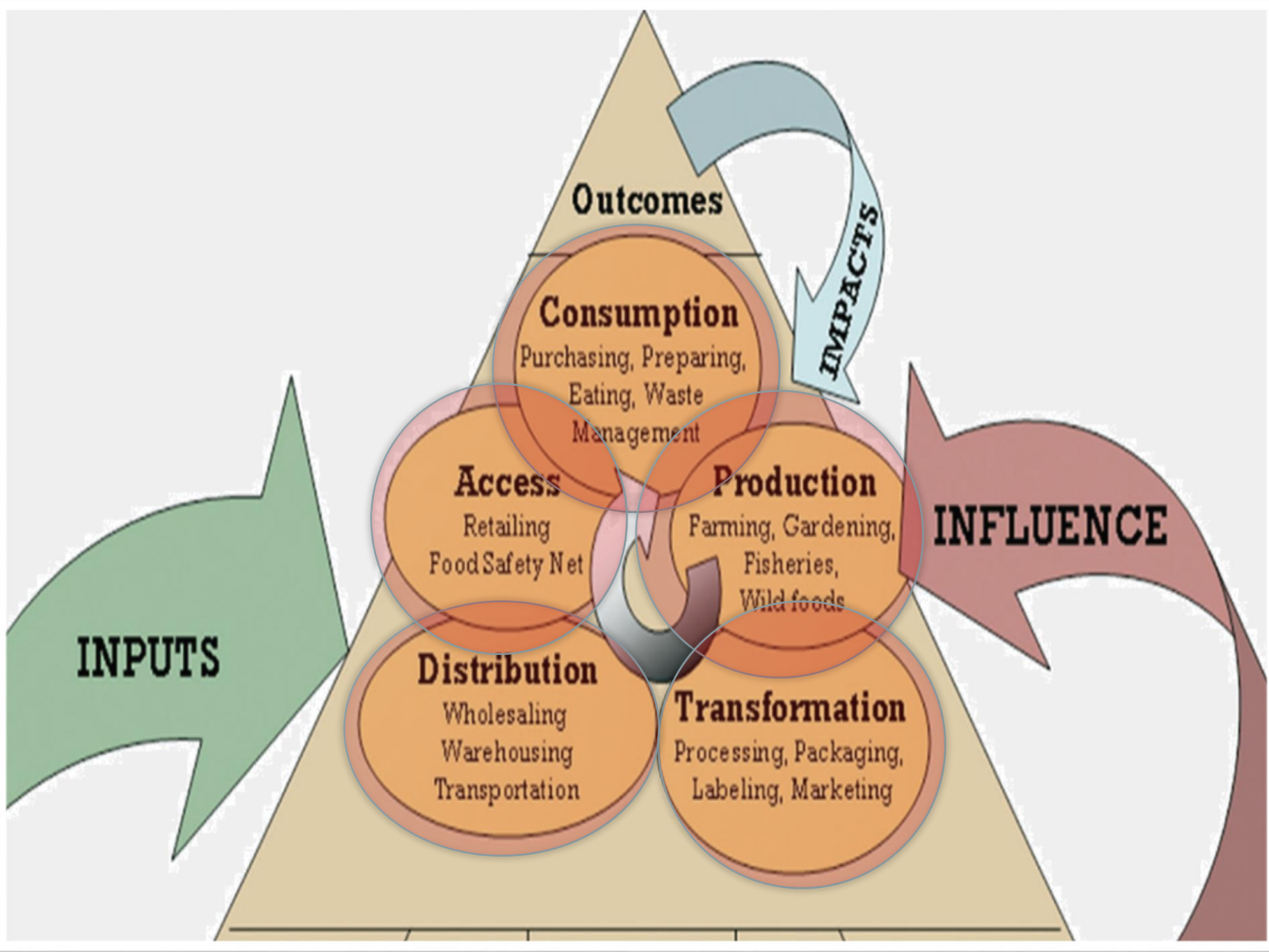
FOOD SYSTEMS – DEFINITIONS

- “...the processes, required inputs, and generated outputs involved in feeding a population, including growing, harvesting, processing, packaging, transporting, marketing, consuming, and disposing of food.”
- Food and nutrition system is “the set of operations and processes involved in transforming raw materials into foods and transforming nutrients into health outcomes, all of which functions as a system within biophysical and sociocultural contexts.”

Rutten LF, Yaroch AL, Story M. *JHEN*. 2011; 6(3):239-246.

Sobal J, Khan LK, Bisogni C. *Soc. Sci. Med.* 1998; 47(7):853-863.





Outcomes

Consumption

Purchasing, Preparing,
Eating, Waste
Management

Access

Retailing
Food Safety Net

Production

Farming, Gardening,
Fisheries,
Wild foods

Distribution

Wholesaling
Warehousing
Transportation

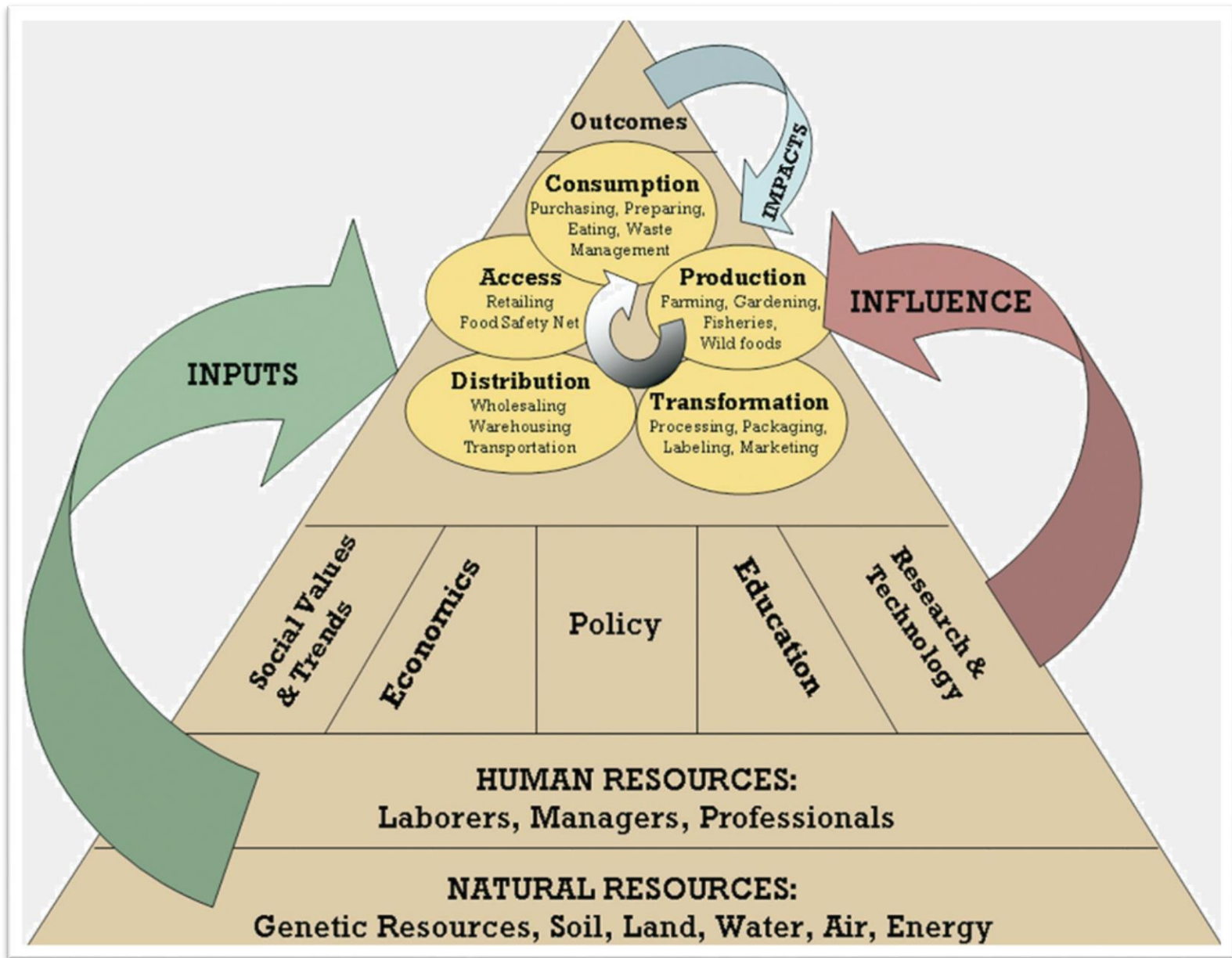
Transformation

Processing, Packaging,
Labeling, Marketing

IMPACTS

INFLUENCE

INPUTS





“...capable of being maintained over the long term, and meeting the needs of the present without compromising the ability of future generations to meet their needs.”

SUSTAINABILITY

“Sustainability is a process, not a prescription...therefore, no simple definition. It is a journey we embark on together, not a formula we agree to.”
- Frederick Kirschenmann

SUSTAINABLE FOOD SYSTEMS

- “...conserves and renews natural resources, advances social justice and animal welfare, builds community wealth, and fulfills the food and nutrition needs of all eaters now and in the future.”
- “...capable of maintaining their productivity and usefulness to society indefinitely.”

SUSTAINABLE FOOD SYSTEMS

- “...preserves biodiversity, maintains soil fertility and water purity, conserves and improves the chemical, physical and biological qualities of the soil, recycles natural resources and conserves energy...produces diverse forms of high quality foods, fibers and medicines.”
- “...builds on current agricultural achievements, adopting a sophisticated approach that can maintain high yields and farm profits without undermining the resources on which agriculture depends.”

NGO Sustainable Agriculture Treaty (Global Forum at Rio de Janeiro, June 1-15, 1992)

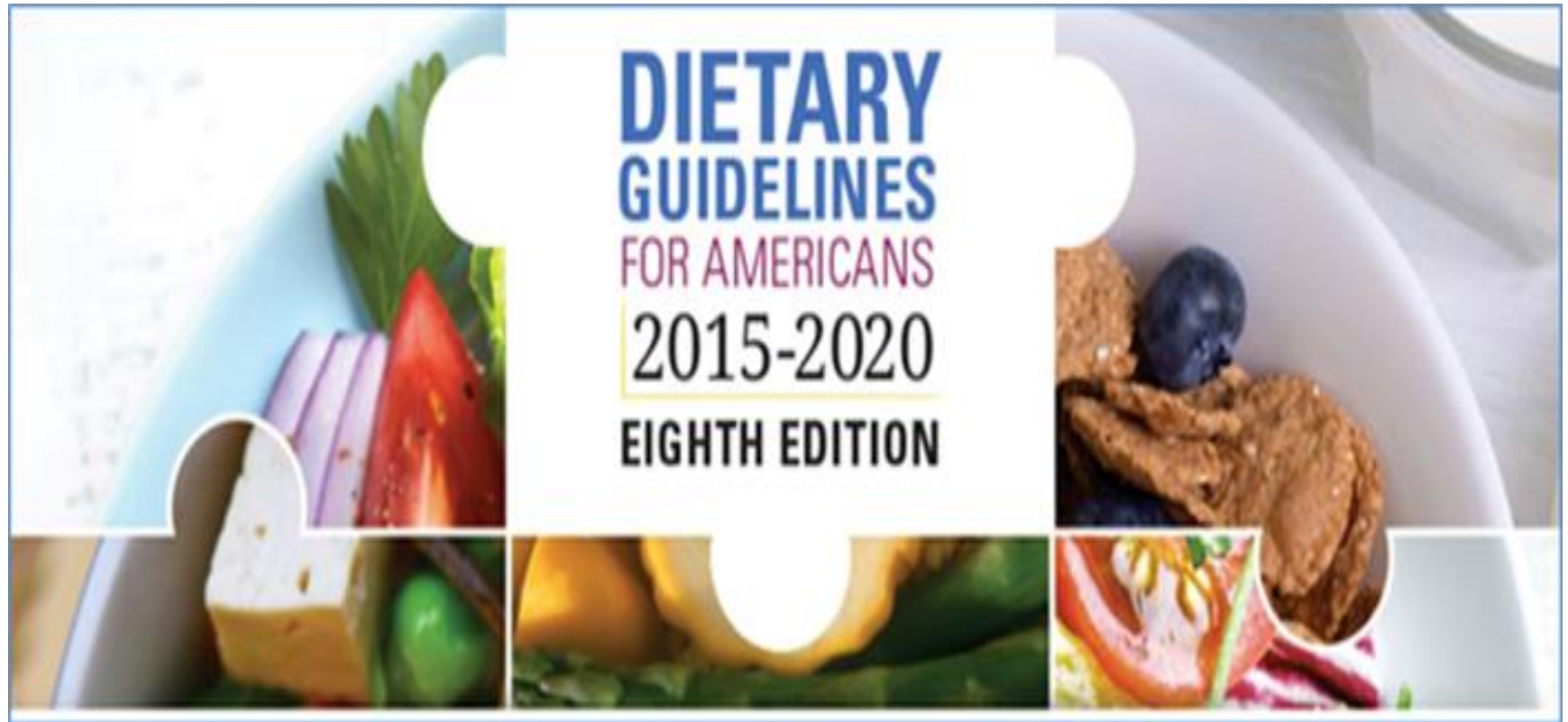
Sustainable Agriculture—A New Vision. Union of Concerned Scientists, 1999

A FAILING FOOD SYSTEM?

- Loss of biodiversity
- Heavy dependence on natural resources
- Climate change – GHG emissions
- Animal welfare
- Lack of fair trade and treatment of farmers/producers
- Degradation of soil and ecosystems
- An OVERWEIGHT/OBESE nation exists with food insecurity



SUSTAINABILITY & DGA 2015



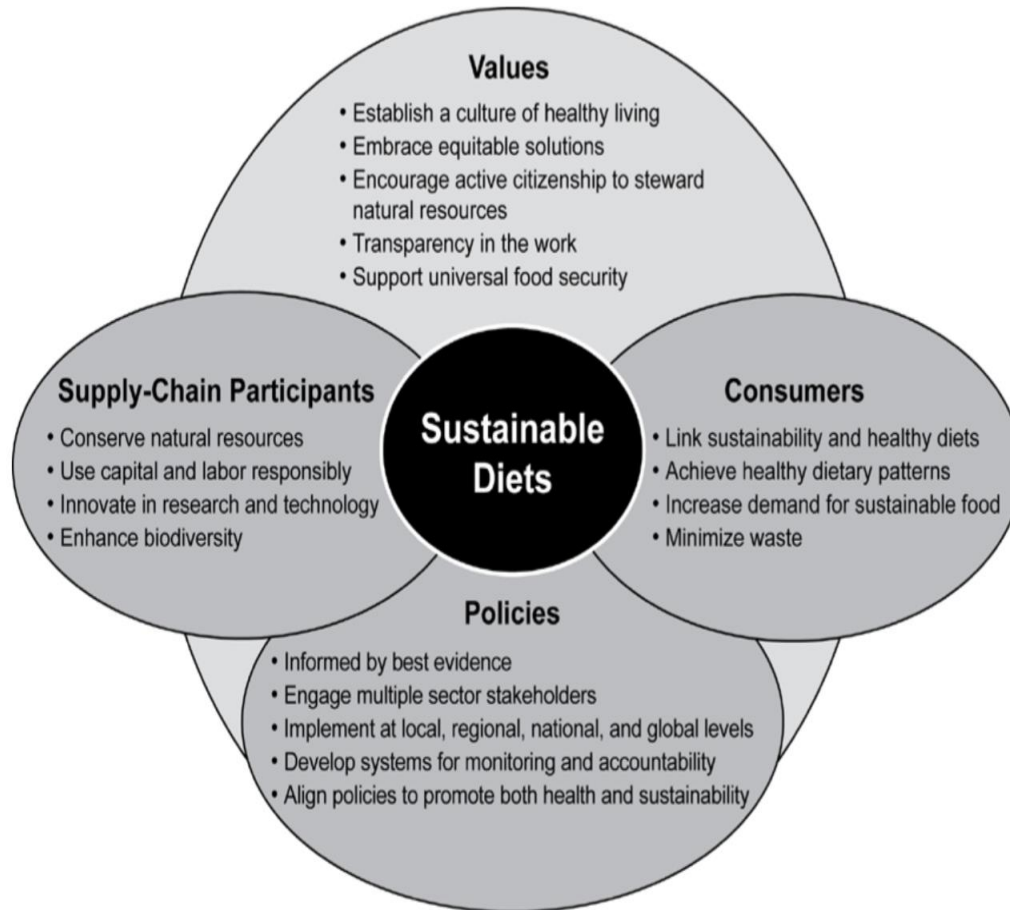
SUSTAINABILITY & DGA 2015

Sustainable Diets: “a pattern of eating that promotes health and well-being and provides food security for the present population while sustaining human and natural resources for future generations.”

Food Security: “exists when all people now, and in the future, have access to sufficient, safe, and nutritious food to maintain a healthy and active life.”

SUSTAINABLE DIETS

Figure D5.1: Elements needed for sustainable diets



DGAC 2015

Areas of Focus:

1. Dietary patterns
2. Seafood

Table C.2 NEL Grading Rubric

USDA Nutrition Evidence Library Conclusion Statement Evaluation

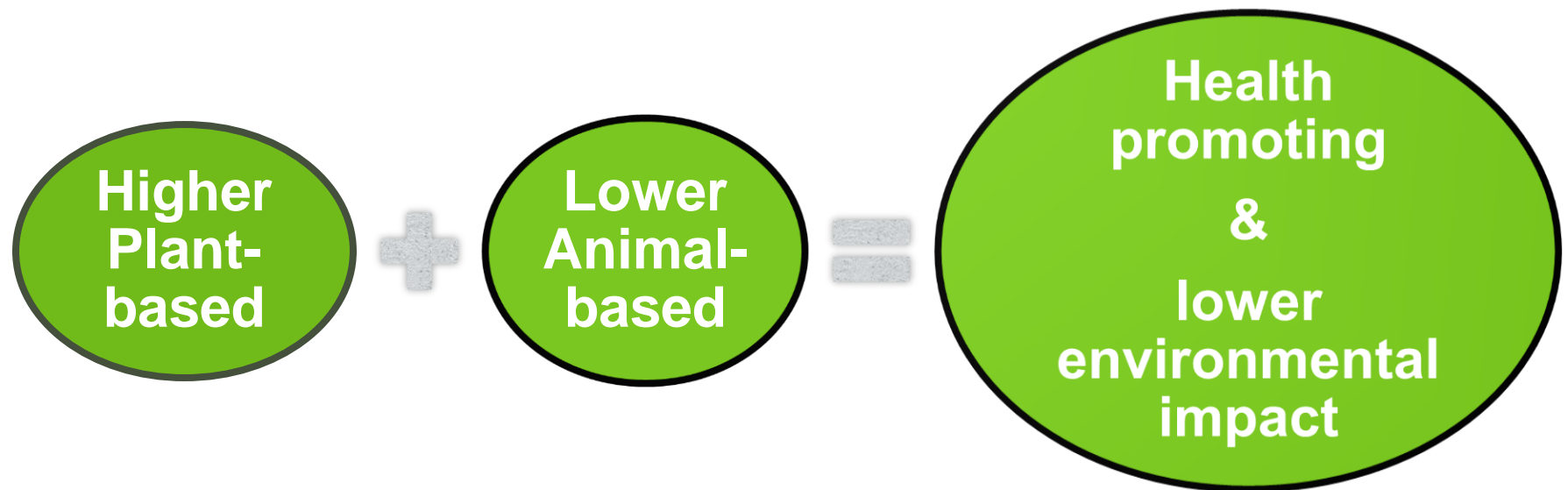
Criteria for judging the strength of the body of evidence supporting the Conclusion Statement

Elements	Grade I: Strong	Grade II: Moderate	Grade III: Limited	Grade IV: Grade Not Assignable*
Risk of bias (as determined using the NEL Bias Assessment Tool)	Studies of strong design free from design flaws, bias and execution problems	Studies of strong design with minor methodological concerns OR only studies of weaker study design for question	Studies of weak design for answering the question OR inconclusive findings due to design flaws, bias or execution problems	Serious design flaws, bias, or execution problems across the body of evidence
Quantity <ul style="list-style-type: none"> • Number of studies • Number of subjects in studies 	Several good quality studies; large number of subjects studied; studies have sufficiently large sample size for adequate statistical power	Several studies by independent investigators; doubts about adequacy of sample size to avoid Type I and Type II error	Limited number of studies; low number of subjects studied and/or inadequate sample size within studies	Available studies do not directly answer the question OR no studies available

Elements	Grade I: Strong	Grade II: Moderate	Grade III: Limited	Grade IV: Grade Not Assignable*
Consistency of findings across studies	Findings generally consistent in direction and size of effect or degree of association and statistical significance with very minor exceptions	Some inconsistency in results across studies in direction and size of effect, degree of association or statistical significance	Unexplained inconsistency among results from different studies	Independent variables and/or outcomes are too disparate to synthesize OR single small study unconfirmed by other studies
Impact <ul style="list-style-type: none"> • Directness of studied outcomes • Magnitude of effect 	Studied outcome relates directly to the question; size of effect is clinically meaningful	Some study outcomes relate to the question indirectly; some doubt about the clinical significance of the effect	Most studied outcomes relate to the question indirectly; size of effect is small or lacks clinical significance	Studied outcomes relate to the question indirectly; size of effect cannot be determined
Generalizability to the U.S. population of interest	Studied population, intervention and outcomes are free from serious doubts about generalizability	Minor doubts about generalizability	Serious doubts about generalizability due to narrow or different study population, intervention or outcomes studied	Highly unlikely that the studied population, intervention AND/OR outcomes are generalizable to the population of interest

DIETARY PATTERNS

What is the relationship between population-level dietary patterns and long-term food sustainability?



DGAC Grade: Moderate

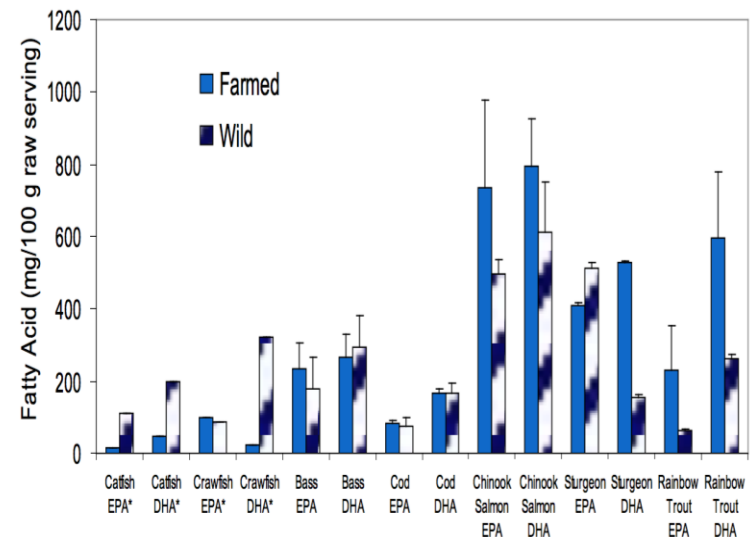
DIETARY PATTERNS

- All food groups can be part of a sustainable diet
- Staying within caloric recommendations is also more sustainable (avoiding overconsumption)
 - Could decrease GHG emissions by 1%
- Is a sustainable diet accessible for all?
- Examples of dietary patterns that meet this conclusion
 - Healthy USDA-style Pattern
 - Healthy Vegetarian Pattern
 - Healthy Mediterranean-style Pattern

SEAFOOD

- What are the comparative nutrient profiles of current farm-raised versus wild-caught seafood?
 - EPA and DHA
 - Farm-raised seafood (bass, cod, trout, and salmon) has the same or more than wild-caught
 - Farm-raised low-trophic (catfish & crawfish) has less than half as wild-caught

Figure D5.2. Comparison of EPA and DHA drawn from data in USDA National Nutrient Database²⁵ and update from Cladis et al.²⁶



For additional details on this body of evidence, visit: [Appendix E-2.38 Evidence Portfolio](#) and <http://www.ars.usda.gov/ba/bhnrc/ndl>

SEAFOOD

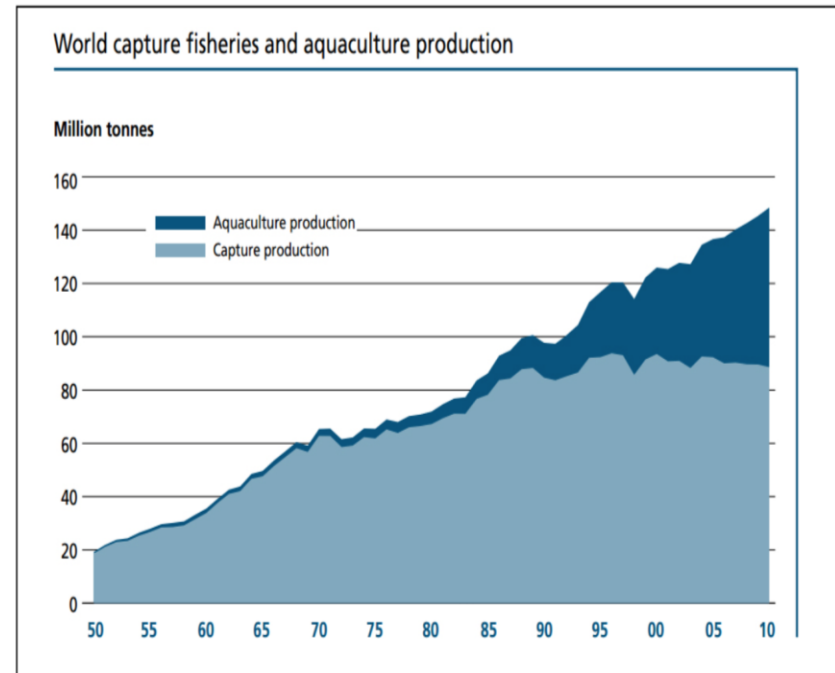
- What are the comparative contaminant levels?
 - DGAC Grade – Moderate
 - Health benefits still outweigh the risks of mercury and pollutants in wild and farmed species, which have similar levels



SEAFOOD

- What is the worldwide capacity to produce farm-raised versus wild-caught seafood that is nutritious and safe for Americans?
 - DGAC Grade for Wild-Caught – Strong for function at full capacity
 - DGAC Grade for Farm-Raised – Moderate for steadily increasing to meet global demand

Figure D5.3. Comparison of fishery production and aquaculture, 1950-2010



For additional details on this body of evidence, visit: UN FAO report on *The State of World Fisheries and Aquaculture, 2012*. Available at <http://www.fao.org/fishery/sofia/en>

EATING SEAFOOD SUSTAINABLY

Monterey Bay Aquarium® Seafood Watch®

The Monterey Bay Aquarium Seafood Watch program creates science-based recommendations that help consumers and businesses make ocean-friendly seafood choices. Carry this guide with you and share it with others to help spread the word.

BEST CHOICES

Arctic Char (farmed)
Barramundi (US & Vietnam farmed)
Bass (US hook and line, farmed)
Catfish (US)
Clams, Mussels & Oysters
Cod: Pacific (AK)
Crab: King, Snow & Tanner (AK)
Perch: Yellow (Lake Erie trap net, except Ohio)
Prawn: Freshwater (Canada & US)
Rockfish (AK, CA, OR & WA)
Salmon (AK & New Zealand)
Sardines: Pacific (Canada & US)
Scallops (farmed)
Shrimp (US farmed & AK)
Smelt: Rainbow (Lakes Erie, Huron, Superior, except bottom gillnet)
Tilapia (Canada, Ecuador & US)
Trout: Lake (Lake Superior, MI)
Trout: Rainbow (US farmed)
Tuna: Albacore (Pacific troll, pole and line)
Tuna: Skipjack (Pacific troll, pole and line)
Whitefish: Lake (Lake Michigan, WI)

GOOD ALTERNATIVES

Branzino (Mediterranean farmed)
Cod: Pacific (Canada & US)
Crab: Blue & Dungeness (US)
Halibut: Atlantic (farmed)
Lobster (Bahamas & US)
Salmon (Canada, CA, OR & WA wild)
Scallops: Sea (wild)
Shrimp (Canada & US wild, Ecuador & Honduras farmed)
Squid (Mexico & US)
Swordfish (US)
Tilapia (China, Indonesia, Mexico & Taiwan)
Trout: Lake (Lakes Huron, Michigan & Superior, Canada, MI & WI)
Tuna: Albacore (US longline)
Tuna: Skipjack (free school, imported troll, pole and line, and US longline)
Tuna: Yellowfin (free school, HI longline, and Pacific & Indian Ocean troll, pole and line)
Whitefish: Lake (Lakes Erie, Huron, Ontario, Michigan (except WI) & Superior, Canada & MI)

AVOID

Basa/Pangasius/Swai
Cod: Pacific (Japan & Russia)
Crab (Russia)
Lobster: Spiny (Belize, Brazil, Honduras & Nicaragua)
Mahi Mahi (Costa Rica, Guatemala & Peru)
Octopus: Common (Portugal & Spain trawl, Mexico)
Orange Roughy
Salmon: Atlantic (farmed)
Sardines: Atlantic (Mediterranean)
Sharks
Shrimp (imported)
Squid (China, India & Thailand)
Swordfish (imported longline)
Tuna: Albacore (except US troll, pole and line, and longline)
Tuna: Bluefin
Tuna: Skipjack (imported purse seine)
Tuna: Yellowfin (Atlantic troll, pole and line)
Whitefish: Lake (Lake Superior, WI)

Start with Best Choices then check the other columns—your favorite seafood could be in more than one.

Best Choices

Buy first, they're well managed and caught or farmed in ways that cause little harm to habitats or other wildlife.

Good Alternatives

Buy, but be aware there are concerns with how they're caught or farmed.

Avoid

Take a pass on these for now, they're overfished or caught or farmed in ways that harm other marine life or the environment.

Visit us online or download our app for a **comprehensive list** of our recommendations.

EATING SEAFOOD SUSTAINABLY

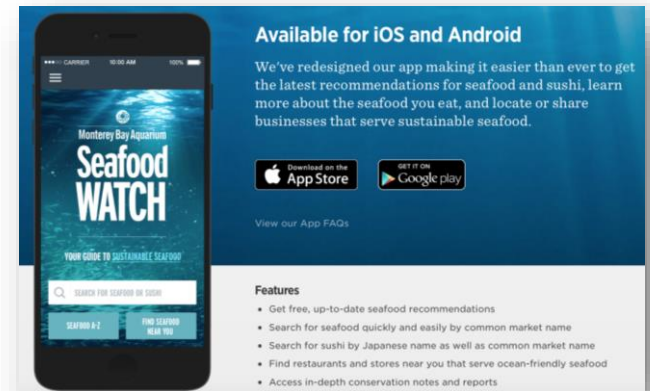
- Resources

- <http://www.seafoodwatch.org> or Seafood Watch app

- <https://www.nrdc.org/stories/smart-seafood-buying-guide?gclid=CJmWouOw68wCFQUFaQodYHwK4w>
(National Resource Defense Council)

- <https://www.msc.org> (Marine Stewardship Council)

- <http://www.fishwatch.gov>
(National Oceanic & Atmospheric Administration – US Database on sustainable seafood)



APPLYING SUSTAINABILITY IN COURSES, COMMUNITIES, & HOMES

- NDFS 1240 Culinary Basics → NDFS 1260 Food Literacy



- ASCEND 2012 Knowledge Requirement 5.1
 - “...food and food systems foundation of the dietetics profession must be evident in the curriculum”
- Meets some the competencies in AND Standards of Professional Performance for RDNs in Sustainable, Resilient, and Healthy Food and Water Systems
- New objectives – food systems and sustainability

FOOD SYSTEMS APPROACH TO CURRICULUM

TABLE 1 Sustainable Food System Action Goals

1. *Eat a healthful diet lower on the food chain*^{3,30}—Diversify the diet: reduce consumption of grain-fed meat, increase fruits, vegetables, and legumes. If desired, consume small amounts of humanely raised pastured or fodder-fed animal products.
2. *Eat and act to promote sustainable farming/fishing practices*^{3,11,14,17,26,27,31,32}—Know how your food is produced; work to support sustainable growing practices and biodiverse agricultural/fishing systems.
3. *Learn to cook, and appreciate cultural food patterns*³⁰⁻³⁶—Cook and eat whole foods! Explore and celebrate traditional food patterns of diverse cultures; promote ethnic eating's environmental and health significance.
4. *Reduce food transport energy*^{10-13,36-39}—Eat foods in season. Create demand for locally produced/processed foods and support restaurants that buy this food.
5. *Reduce food processing and packaging energy*^{39,40}—Eat fresh, lightly cooked, or efficiently stored local foods; cook using energy-saving techniques; avoid unnecessary containers and convenience packaging.
6. *Reduce food waste and landfill methane production*^{10,40-42}—Keep consumption in balance with physiological requirements. Buy sparingly; eat leftovers, freeze for later, share or compost; keep food waste out of landfills.
7. *Eat for social justice*^{16,17,43,44}—Share scarce resources. Support fair trade initiatives and local farming. Buy food that provides living wages and safe conditions for farm and food workers.

EATING A LOW FOOD CHAIN DIET

Veggie Spaghetti

Welcome to the kitchen of Chelsea Stevens! Here is an incredibly easy yet delicious and healthy alternative to a classic Italian dish perfect for sophisticated health nuts and cheap college students alike!

Yield: 2 servings
Serving size: About 1 cup

Ingredients:

- 2 tbsp olive oil
- 2 oz spaghetti noodles
- ½ cup marinara sauce
- **1 medium-sized yellow zucchini**
- **1 medium-sized green zucchini**
- **1 fresh corn cob**
- 2 tbsp garlic salt
- 2 oz spaghetti noodles
- 1 cup marinara sauce



Once all the ingredients have been gathered, obtain the necessary cooking equipment as well ~ access to a stove, a pot, a medium-sized frying pan, a spatula, a cutting board, and a knife suitable for cutting vegetables.

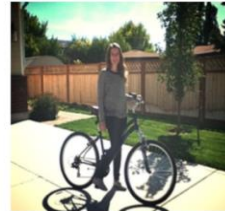
Begin to prepare the recipe by boiling water for the noodles. While the water begins to heat, start to cut the vegetables. For the two zucchinis, cut them into about eight strip-like pieces. Then cut each strip into about four more pieces, cubes as the result. Shuck corn and then simply cut the kernels off the cob.



My Farmer's Market Adventure!

When I prepared my Veggie Spaghetti, I was actually home-home, as in not at college, which for me is in good ol' Twin Falls, Idaho. Although Twin Falls does have a Farmer's Market, I decided to venture to Proost Family Farms, a farmer's market-like venue near my home.

So off I went...on my bike, of course! (Biking is my preferred mode of transportation these days, seeing as my former car didn't make the trek to Utah with me.)



Anyway, I traveled the short half mile to the farm and there found a beautiful farm with a TON of produce!



Then came the fun part – shopping! For my recipe, I bought one fresh corn cob, one green zucchini, and one yellow zucchini. The total came to a whopping \$1.59! It is interesting to note, however, that two weeks ago I bought the exact same three produce items (which looked identical as well) at Lee's in Logan for a total of exactly \$2.00.

There are many benefits of eating local and in season. A major benefit is that you can almost always guarantee a better quality, both in taste and overall value. Also, you ensure that the product has not been sitting in an old warehouse or dumped in the back of semi-truck and in can instead ensure a very recent picking and quality of transportation. Another benefit is often a decrease in cost. Granted, some items may cost more because of the quality factor, but in my case I saved almost 40 cents, which may sound pretty small, but it all adds up!



Rachel Castle

Corn Chowder

Recipe yield and serving size not indicated in recipe.

Ingredients:

1 lb. bacon chopped and fried crisp (I cut my bacon with scissors. It's a lot faster that way)

1 medium onion, chopped*

1 c. celery, chopped

2 lg. potatoes, peeled and chopped*

2 c. com*

1 qt. half and half

Roux (1 c. flour blended with ½ c. butter to make a smooth paste) used to thicken the soup

At the Farmers Market



Meatless Monday

Meatless Monday is a great way to contribute toward sustainability in our food system. Americans consume high quantities of meat. While meat is not inherently bad and contains many important nutrients, consuming as much as many Americans do can be harmful to our bodies and our environment. Participating in Meatless Monday each week can have several benefits including increasing creativity in meals and increasing intake of other food groups such as whole grains and vegetables. By eliminating meat, typically the central point of an American meal, other foods such as whole grains, fruits, vegetables, and legumes become the focal point for the meal. Livestock also need many more resources than crops. By going meatless for just one day each week, the demand on these resources would be greatly reduced!



PROMOTING SUSTAINABLE FARMING PRACTICES

- Educate or have guest speakers on sustainable farming/fishing practices
 - Farmers' panel discussion
- Go on a farm tour
- Use sustainable seafood in labs and at home
- Use the Seafood Watch app/website



LEARNING TO COOK



MaryAnn Jorgensen & Miranda Staley

Budget Friendly Home Recipe

NDFS 1260 November 5, 2013

Cost Break Down

Sweet Potato Hash

Ground Turkey:	\$2.75
Onions:	\$0.59
Sweet Potatoes:	\$1.29
Garlic Powder:	\$0.01
Italian Seasoning:	\$0.03
Fennel Seed:	\$0.2
Paprika:	\$0.01
Cayenne Pepper:	\$0.008
Cumin:	\$0.04
Total:	\$4.92


*This recipe makes (6) 8 oz servings. For the purposes of this assignment it was only necessary to have (4) 8 oz servings. One serving costs \$0.82; 4 servings cost \$3.28.

Eating Healthy on a Budget

A lot of people feel that "eating healthy" is expensive and cannot be done realistically. This meal is one that can be made for under \$2.25 a person and proves to be nutritious.



with two servings of fruit, grains, a protein source, vegetables and no added fat.

While eating healthy on a budget may take more effort and pre-planning, it is worth it!



Budget Friendly Home Recipe

Sweet Potato Hash [yield (4) 8 oz servings]

Ingredients:


- 1lb Ground Turkey (thawed)
- 2 tsp Olive Oil
- 1/2 tsp Garlic Powder
- 1 tsp Italian Seasoning
- 1 tsp Fennel Seed
- 1/2 tsp Smokey Paprika
- 1/4 tsp Ground Cayenne Pepper
- 1/2 lb Onion, chopped

Directions:


- Heat olive oil in a large skillet pan and sauté onions
- Add ground turkey to sautéed onions
- Add seasonings except cumin
- Cook turkey until browned completely
- Add in diced sweet potatoes and cumin

Note:

- To speed up the cooking process microwave the sweet potatoes 4-7 minutes before adding them to the cooked turkey.
- Water may be added if the mixture looks dry.



Cooking hash until sweet potatoes are soft



Putting the Oranges in the Juicer

Strawberries//Toast//Orange Juice



Strawberries

- Make sure to wash the berries under cool water
- Remove stems and slice as desired
- Quick Tip: Serve in a separate bowl so that the juice don't "contaminate" the sweet potatoes hash

Toast

- Place bread carefully in toaster slot
- Don't burn it, no one likes burnt toast
- Optional: Spread butter or jam on top



Orange Juice

When juicing 2 lb of oranges makes approximately 32 oz.

- Follow the specific directions that come with the juicer
- Quick tip: We pre-soaked the oranges first before running them through the juicer
- Refrigerate until ready to serve

PRIORITIZING WASTE REDUCTION



RECYCLING

- Contacted USU Recycling Center for our own recycling cans
- Education
 - Tours of USU Recycling Center
 - Guest presenters from USU Recycling Center & Logan Conservation Coordinator



COMPOSTING

“I have really enjoyed composting in class and it does make me more aware of what I throw away at home.”



“I have realized that there is a lot of waste that can come from certain foods as well as certain cooking techniques... To sum it up, the more cooking I have done the more conscious I have become of how much food is wasted.”



REFERENCES

- Cornell University – Food System Basics, Lesson 2.
<http://gardening.cce.cornell.edu/discovering-our-food-system/>
- Tagtow A, Harmon A. Healthy Land, Healthy Food, Healthy Eaters. *ADA*. 2007
- Harmon AH, Gerald BL. Position of the American Dietetic Association: food and nutrition professionals can implement practices to conserve natural resources and support ecological sustainability. *J Am Diet Assoc*. 2007;107:1033-1043.
- Tagtow, A.M. & A.H Harmon. Healthy Land, Healthy Food & Healthy Eaters: Dietitians Cultivating Sustainable Food Systems. 2009; White paper for the American Dietetic Association Food and Nutrition Conference and Exhibition.
- John Ikerd, as quoted by Richard Duesterhaus in Sustainability's Promise. *Journal of Soil and Water Conservation*. 1990; 45(1):4.

REFERENCES CONT.

- *NGO Sustainable Agriculture Treaty* (Global Forum at Rio de Janeiro, June 1-15, 1992).
- *Sustainable Agriculture—A New Vision*. Union of Concerned Scientists, 1999.
- U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015 – 2020 Dietary Guidelines for Americans. 8th Edition. December 2015. Available at <http://health.gov/dietaryguidelines/2015/guidelines/>.<http://www.seafoodwatch.org>
- Harmon A, Lapp JL, Blair D, Hauck-Lawson A. Teaching Food System Sustainability in Dietetic Programs: Need, Conceptualization, and Practical Approaches *Journal of Hunger & Environmental Nutrition*, 6:114–124, 2011.
- <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>

SUSTAINABLE FOODS AND FOOD SYSTEMS



Stacy Bevan, MS, RD, CD
Professional Practice Assistant Professor

OVERVIEW

- Food Systems
- Components of a Sustainable Food System
- Sustainability and the DGA 2015
 - Dietary Patterns
 - Seafood
- Practical Ways to Apply Sustainability in Communities and Households

WHAT IS A FOOD SYSTEM?



FOOD SYSTEMS

- System:
 - “A group of interacting, interrelated, and oftentimes interdependent elements that function together as a complex, unified whole.”
- Systems have inputs and outputs

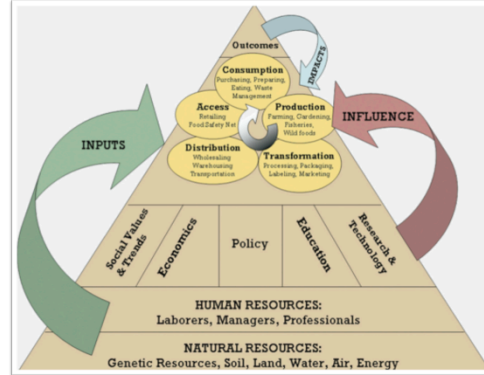


Cornell University – Food System Basics, Lesson 2

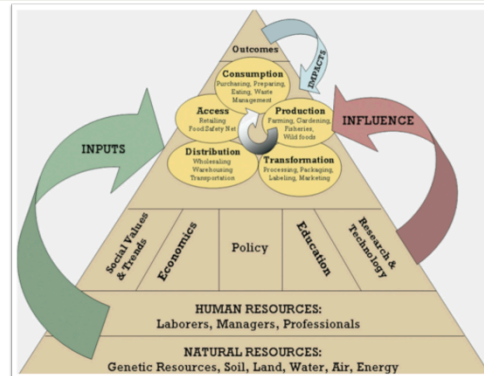
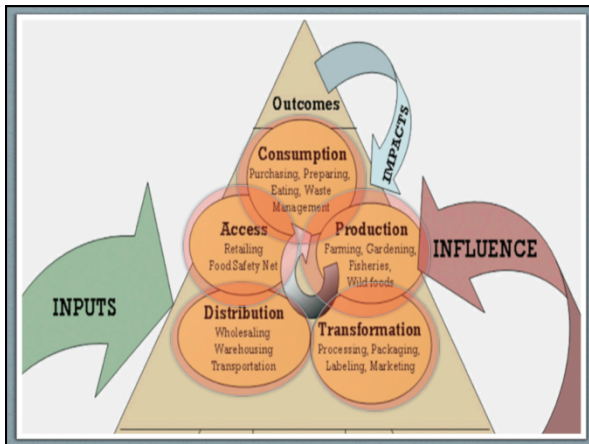
FOOD SYSTEMS – DEFINITIONS

- “...the processes, required inputs, and generated outputs involved in feeding a population, including growing, harvesting, processing, packaging, transporting, marketing, consuming, and disposing of food.”
- Food and nutrition system is “the set of operations and processes involved in transforming raw materials into foods and transforming nutrients into health outcomes, all of which functions as a system within biophysical and sociocultural contexts.”


Rutten LF, Yaroch AL, Story M. *JHEN*. 2011; 6(3):239-246.
 Sobal J, Khan LK, Bisogni C. *Soc. Sci. Med.* 1998; 47(7):853-863.



Tagtow A, Harmon A. Healthy Land, Healthy Food, Healthy Eaters. *ADA*. 2007



Tagtow A, Harmon A. Healthy Land, Healthy Food, Healthy Eaters. *ADA*. 2007



What is Sustainability?

“...capable of being maintained over the long term, and meeting the needs of the present without compromising the ability of future generations to meet their needs.”

J Am Diet Assoc. 2007;107:1033-1043

SUSTAINABILITY

“Sustainability is a process, not a prescription...therefore, no simple definition. It is a journey we embark on together, not a formula we agree to.”

- Frederick Kirschenmann

Picture: <https://umsustain.wp.d.umn.edu/sustainable-food-systems/>

SUSTAINABLE FOOD SYSTEMS

- “...conserves and renews natural resources, advances social justice and animal welfare, builds community wealth, and fulfills the food and nutrition needs of all eaters now and in the future.”
- “...capable of maintaining their productivity and usefulness to society indefinitely.”

Tagtow A, Harmon A. Healthy Land, Healthy Food & Healthy Eaters; Oct. 2008. Journal of Soil and Water Conservation. 1990; 45(1):4.

SUSTAINABLE FOOD SYSTEMS

- “...preserves biodiversity, maintains soil fertility and water purity, conserves and improves the chemical, physical and biological qualities of the soil, recycles natural resources and conserves energy...produces diverse forms of high quality foods, fibers and medicines.”
- “...builds on current agricultural achievements, adopting a sophisticated approach that can maintain high yields and farm profits without undermining the resources on which agriculture depends.”

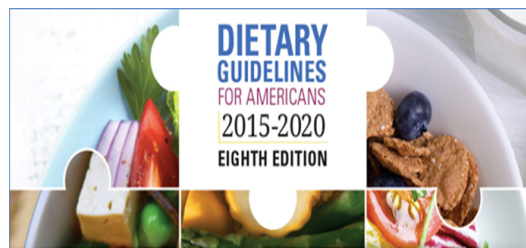
NGO Sustainable Agriculture Treaty (Global Forum at Rio de Janeiro, June 1-15, 1992) Sustainable Agriculture—A New Vision. Union of Concerned Scientists, 1999

A FAILING FOOD SYSTEM?

- Loss of biodiversity
- Heavy dependence on natural resources
- Climate change – GHG emissions
- Animal welfare
- Lack of fair trade and treatment of farmers/producers
- Degradation of soil and ecosystems
- An OVERWEIGHT/OBESE nation exists with food insecurity



SUSTAINABILITY & DGA 2015



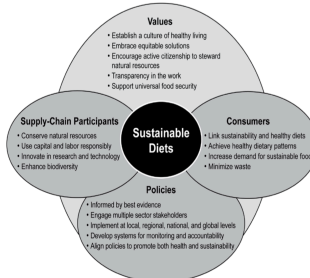
SUSTAINABILITY & DGA 2015

Sustainable Diets: “a pattern of eating that promotes health and well-being and provides food security for the present population while sustaining human and natural resources for future generations.”

Food Security: “exists when all people now, and in the future, have access to sufficient, safe, and nutritious food to maintain a healthy and active life.”

SUSTAINABLE DIETS

Figure DS.1: Elements needed for sustainable diets



DGAC 2015 Areas of Focus:

1. Dietary patterns
2. Seafood

Table C.2 NEL Grading Rubric
USDA Nutrition Evidence Library Conclusion Statement Evaluation
 Criteria for judging the strength of the body of evidence supporting the Conclusion Statement

Elements	Grade I: Strong	Grade II: Moderate	Grade III: Limited	Grade IV: Grade Not Assignable*
Risk of bias (as determined using the NEL Bias Assessment Tool)	Studies of strong design free from design flaws, bias and execution problems	Studies of strong design with minor methodological concerns OR only studies of weaker study design for question	Studies of weak design for answering the question OR inconclusive findings due to design flaws, bias or execution problems	Serious design flaws, bias, or execution problems across the body of evidence
Quantity • Number of studies • Number of subjects in studies	Several good quality studies; large number of subjects studied; studies have sufficiently large sample size for adequate statistical power	Several studies by independent investigators; doubts about adequacy of sample size to avoid Type I and Type II error	Limited number of studies; low number of subjects studied and/or inadequate sample size within studies	Available studies do not directly answer the question OR no studies available

Elements	Grade I: Strong	Grade II: Moderate	Grade III: Limited	Grade IV: Grade Not Assignable*
Consistency of findings across studies	Findings generally consistent in direction and size of effect or degree of association and statistical significance with very minor exceptions	Some inconsistency in results across studies in direction and size of effect, degree of association or statistical significance	Unexplained inconsistency among results from different studies	Independent variables and/or outcomes are too disparate to synthesize OR single small study unconfirmed by other studies
Impact • Directness of studied outcomes • Magnitude of effect	Studied outcome relates directly to the question; size of effect is clinically meaningful	Some study outcomes relate to the question indirectly; some doubt about the clinical significance of the effect	Most studied outcomes relate to the question indirectly; size of effect is small or lacks clinical significance	Studied outcomes relate to the question indirectly; size of effect cannot be determined
Generalizability to the U.S. population of interest	Studied population, intervention and outcomes are free from serious doubts about generalizability	Minor doubts about generalizability	Serious doubts about generalizability due to narrow or different study population, intervention or outcomes studied	Highly unlikely that the studied population, intervention AND/OR outcomes are generalizable to the population of interest

DIETARY PATTERNS

What is the relationship between population-level dietary patterns and long-term food sustainability?

The diagram consists of three green ovals. The first oval on the left contains the text 'Higher Plant-based'. To its right is a plus sign '+'. The second oval contains the text 'Lower Animal-based'. To its right is an equals sign '='. The final, larger oval on the right contains the text 'Health promoting & lower environmental impact'.

DGAC Grade: Moderate

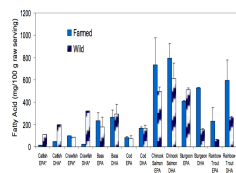
DIETARY PATTERNS

- All food groups can be part of a sustainable diet
- Staying within caloric recommendations is also more sustainable (avoiding overconsumption)
 - Could decrease GHG emissions by 1%
- Is a sustainable diet accessible for all?
- Examples of dietary patterns that meet this conclusion
 - Healthy USDA-style Pattern
 - Healthy Vegetarian Pattern
 - Healthy Mediterranean-style Pattern

SEAFOOD

- What are the comparative nutrient profiles of current farm-raised versus wild-caught seafood?
 - EPA and DHA
 - Farm-raised seafood (bass, cod, trout, and salmon) has the same or more than wild-caught
 - Farm-raised low-trophic (catfish & crawfish) has less than half as wild-caught

Figure D5.2. Comparison of EPA and DHA drawn from data in USDA National Nutrient Database²⁵ and update from Cladis et al.²⁶



For additional details on this body of evidence, visit: [Appendix E-2.38 Evidence Portfolio and http://www.as.usda.gov/ncnr/ncnr/](http://www.as.usda.gov/ncnr/ncnr/)

SEAFOOD

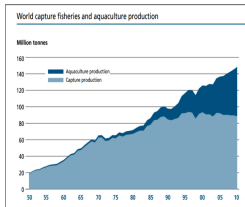
- What are the comparative contaminant levels?
 - DGAC Grade – Moderate
 - Health benefits still outweigh the risks of mercury and pollutants in wild and farmed species, which have similar levels



SEAFOOD

- What is the worldwide capacity to produce farm-raised versus wild-caught seafood that is nutritious and safe for Americans?
 - DGAC Grade for Wild-Caught – Strong for function at full capacity
 - DGAC Grade for Farm-Raised – Moderate for steadily increasing to meet global demand

Figure D5.3. Comparison of fishery production and aquaculture, 1950-2010



For additional details on this body of evidence, visit: UN FAO report on [The State of World Fisheries and Aquaculture, 2012](http://www.fao.org/fishery/sofia). Available at <http://www.fao.org/fishery/sofia>

EATING SEAFOOD SUSTAINABLY

Monterey Bay Aquarium Seafood Watch

The Monterey Bay Aquarium Seafood Watch program creates science-based recommendations that help consumers and businesses make ocean-friendly seafood choices. Carry this guide with you and share it with others to help spread the word.

BEST CHOICES	GOOD ALTERNATIVES	AVOID
Arctic Char (farmed) Barramundi (US & Vietnam farmed) Bass (US hook and line, farmed) Catfish (US) Clams, Mussels & Oysters Cod (US) Crab King, Snow & Tanner (AK) Perch: Yellow (Lake Erie trap net, electric Ohio) Prawn: Freshwater (Canada & US) Rockfish (AK, CA, OR & WA) Salmon (AK & New Zealand) Sardines: Pacific (Canada & US) Scallop (farmed) Shrimp (US farmed & AK) Smelt: Rainbow (Lakes Erie, Huron, Superior, except bottom gillnet) Tilapia (Canada, Ecuador & US) Trout: Lake & Lake Superior, MO Trout: Rainbow (US farmed) Tuna: Albacore (Pacific, troll, pole and line) Tuna: Skipjack (Pacific, troll, pole and line) Whitefish: Lake (Lakes Erie, Huron, Ontario, Michigan except WI & Superior; Canada & MO)	Branzino (Mediterranean farmed) Coi: Pacific (Canada & US) Crab: Blue & Dungeness (US) Halibut: Atlantic (farmed) Lobster (Bahamas & US) Salmon: Canada, CA, OR & WA wild Scallops: Sea (wild) Shrimp: Canada & US wild, Ecuador & Honduras (farmed) Squid: Mexico & US Sweetfish (US) Tilapia (China, Indonesia, Mexico & Taiwan) Trout: Lake (Lakes Huron, Michigan & Superior; Canada, MI & WI) Tuna: Albacore (US longline) Tuna: Skipjack (Free school, imported troll, pole and line, and US longline) Tuna: Yellowfin (Free school, H longline and Pacific & Indian Ocean troll, pole and line) Whitefish: Lake (Lakes Erie, Huron, Ontario, Michigan except WI & Superior; Canada & MO)	Bass/Pangasius/Osteo Coi: Pacific, Eastern & Russia Crab (Russia) Lobster: Spiny (Brazil, Brazil, Honduras & Nicaragua) Mahi-Mahi (Costa Rica, Guatemala & Peru) Octopus: Common (Portugal & Spain, Brazil, Mexico) Orange Roughy Salmon: Atlantic (farmed) Sardines: Atlantic (Mediterranean) Sharks Shrimp (imported) Squid (China, India & Thailand) Seafood (imported longline) Tuna: Albacore (except US troll, pole and line, and longline) Tuna: Bluefin Tuna: Skipjack (imported purse seine) Tuna: Yellowfin (Atlantic troll, pole and line) Whitefish: Lake (Lakes Erie, Huron, Ontario, Michigan except WI & Superior; Canada & MO)

Start with Best Choices then check the other columns—your favorite seafood could be in more than one.

Best Choices
Buy first, they're well managed and caught or farmed in ways that cause little harm to habitats or other wildlife.

Good Alternatives
Buy, but be aware there are concerns with how they're caught or farmed.

Avoid
Take a pass on these for now, they're overfished or caught or farmed in ways that harm other marine life or the environment.

Visit us online or download our app for a **comprehensive list** of our recommendations.

EATING SEAFOOD SUSTAINABLY

• Resources

- <http://www.seafoodwatch.org> or Seafood Watch app
- <https://www.nrdc.org/stories/smart-seafood-buying-guide?gclid=CJmWouOw68wCFQUFaQodYHwK4w> (National Resource Defense Council)
- <https://www.msc.org> (Marine Stewardship Council)
- <http://www.fishwatch.gov> (National Oceanic & Atmospheric Administration – US Database on sustainable seafood)



APPLYING SUSTAINABILITY IN COURSES, COMMUNITIES, & HOMES

- NDFS 1240 Culinary Basics → NDFS 1260 Food Literacy
- ASCEND 2012 Knowledge Requirement 5.1
 - "...food and food systems foundation of the dietetics profession must be evident in the curriculum"
- Meets some the competencies in AND Standards of Professional Performance for RDNs in Sustainable, Resilient, and Healthy Food and Water Systems
- New objectives – food systems and sustainability



FOOD SYSTEMS APPROACH TO CURRICULUM

TABLE 1 Sustainable Food System Action Goals

1. **Eat a beautiful diet lower on the food chain**^{8,30}—Diversify the diet; reduce consumption of grain-fed meat, increase fruits, vegetables, and legumes. If desired, consume small amounts of humanely raised pastured or fodder-fed animal products.
2. **Eat and act to promote sustainable farming/fishing practices**^{3,11,14,17,26,27,31,32}—Know how your food is produced; work to support sustainable growing practices and biodiverse agricultural/fishing systems.
3. **Learn to cook, and appreciate cultural food patterns**^{39,40}—Cook and eat whole foods! Explore and celebrate traditional food patterns of diverse cultures; promote ethnic eating's environmental and health significance.
4. **Reduce food transport energy**^{17,18,36,39}—Eat foods in season. Create demand for locally produced/processed foods and support restaurants that buy this food.
5. **Reduce food processing and packaging energy**^{39,40}—Eat fresh, lightly cooked, or efficiently stored local foods; cook using energy-saving techniques; avoid unnecessary containers and convenience packaging.
6. **Reduce food waste and landfill methane production**^{10,40-42}—Keep consumption in balance with physiological requirements. Buy sparingly; eat leftovers, freeze for later, share or compost; keep food waste out of landfills.
7. **Eat for social justice**^{40,41,43-44}—Share scarce resources. Support fair trade initiatives and local farming. Buy food that provides living wages and safe conditions for farm and food workers.

Journal of Hunger & Environmental Nutrition, 6:114–124, 2011

EATING A LOW FOOD CHAIN DIET

Veggie Spaghetti

Welcome to the kitchen of Creative Therapist! Here is an incredibly easy and delicious meal healthy alternative to classic spaghetti and topped with something other than rich and creamy cottage cheese or other meat toppings.

Plant-Based Recipe!
 Recipe: [http://www.seafoodwatch.org](#)
 Ingredients:
 • 2 cups whole wheat spaghetti
 • 1/2 cup olive oil
 • 1/2 cup onion
 • 1/2 cup garlic
 • 2 cups vegetable broth
 • 1 cup mushrooms
 • 1/2 cup tomatoes

Once all the ingredients have been gathered, chop the vegetables and spices and sauté in a pot with olive oil. Add the vegetable broth, mushrooms, and a little salt and cook for 10 minutes.

Boil to tender the pasta to al dente and the vegetables. While the water is boiling, add the spaghetti to the pot. For the best texture, cook the pasta in the same water. Drain the pasta and then sauté for 5 minutes in a separate pot with olive oil.

Recipe Adaptation:
 This recipe can be adapted to use any type of pasta and any type of vegetables. The only thing to keep in mind is to use whole wheat pasta and to use fresh vegetables.

Recipe Inspiration:
 This recipe was inspired by a recipe found on the website [http://www.seafoodwatch.org](#). The recipe is a great example of how to use fresh vegetables and whole grains in a healthy and delicious meal.

My Farmer's Market Advertiser

When I stepped to the Veggie Spaghetti, I had actually found some, so out of college, which was a great first! The Veggie Spaghetti was actually the best I had ever had in my home.

After I started to eat the Veggie Spaghetti, I started to eat the Veggie Spaghetti in my home.

Dear reader, this is my first attempt at writing a recipe for you. I hope you like it. I would love to hear from you if you come out! I would love to hear from you if you come out!

Recipe: [http://www.seafoodwatch.org](#)

Ingredients:
 • 2 cups whole wheat spaghetti
 • 1/2 cup olive oil
 • 1/2 cup onion
 • 1/2 cup garlic
 • 2 cups vegetable broth
 • 1 cup mushrooms
 • 1/2 cup tomatoes

Once all the ingredients have been gathered, chop the vegetables and spices and sauté in a pot with olive oil. Add the vegetable broth, mushrooms, and a little salt and cook for 10 minutes.

Boil to tender the pasta to al dente and the vegetables. While the water is boiling, add the spaghetti to the pot. For the best texture, cook the pasta in the same water. Drain the pasta and then sauté for 5 minutes in a separate pot with olive oil.

Recipe Adaptation:
 This recipe can be adapted to use any type of pasta and any type of vegetables. The only thing to keep in mind is to use whole wheat pasta and to use fresh vegetables.

Recipe Inspiration:
 This recipe was inspired by a recipe found on the website [http://www.seafoodwatch.org](#). The recipe is a great example of how to use fresh vegetables and whole grains in a healthy and delicious meal.

Collard Greens

Recipe: [http://www.seafoodwatch.org](#)

Ingredients:
 • 1/2 cup olive oil
 • 1/2 cup onion
 • 1/2 cup garlic
 • 2 cups vegetable broth
 • 1 cup mushrooms
 • 1/2 cup tomatoes

Once all the ingredients have been gathered, chop the vegetables and spices and sauté in a pot with olive oil. Add the vegetable broth, mushrooms, and a little salt and cook for 10 minutes.

Boil to tender the pasta to al dente and the vegetables. While the water is boiling, add the spaghetti to the pot. For the best texture, cook the pasta in the same water. Drain the pasta and then sauté for 5 minutes in a separate pot with olive oil.

Recipe Adaptation:
 This recipe can be adapted to use any type of pasta and any type of vegetables. The only thing to keep in mind is to use whole wheat pasta and to use fresh vegetables.

Recipe Inspiration:
 This recipe was inspired by a recipe found on the website [http://www.seafoodwatch.org](#). The recipe is a great example of how to use fresh vegetables and whole grains in a healthy and delicious meal.

Minted Mashed Potatoes

Recipe: [http://www.seafoodwatch.org](#)

Ingredients:
 • 2 cups whole wheat spaghetti
 • 1/2 cup olive oil
 • 1/2 cup onion
 • 1/2 cup garlic
 • 2 cups vegetable broth
 • 1 cup mushrooms
 • 1/2 cup tomatoes

Once all the ingredients have been gathered, chop the vegetables and spices and sauté in a pot with olive oil. Add the vegetable broth, mushrooms, and a little salt and cook for 10 minutes.

Boil to tender the pasta to al dente and the vegetables. While the water is boiling, add the spaghetti to the pot. For the best texture, cook the pasta in the same water. Drain the pasta and then sauté for 5 minutes in a separate pot with olive oil.

Recipe Adaptation:
 This recipe can be adapted to use any type of pasta and any type of vegetables. The only thing to keep in mind is to use whole wheat pasta and to use fresh vegetables.

Recipe Inspiration:
 This recipe was inspired by a recipe found on the website [http://www.seafoodwatch.org](#). The recipe is a great example of how to use fresh vegetables and whole grains in a healthy and delicious meal.

PROMOTING SUSTAINABLE FARMING PRACTICES

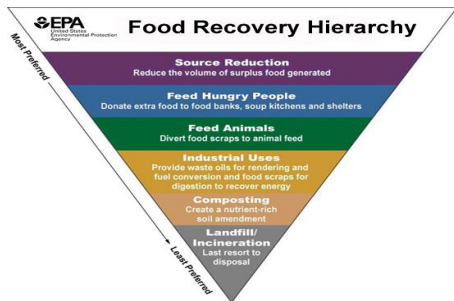
- Educate or have guest speakers on sustainable farming/ fishing practices
 - Farmers' panel discussion
- Go on a farm tour
- Use sustainable seafood in labs and at home
- Use the Seafood Watch app/ website



LEARNING TO COOK



PRIORITIZING WASTE REDUCTION



RECYCLING

- Contacted USU Recycling Center for our own recycling cans
- Education
 - Tours of USU Recycling Center
 - Guest presenters from USU Recycling Center & Logan Conservation Coordinator



COMPOSTING

"I have really enjoyed composting in class and it does make me more aware of what I throw away at home."

"I have realized that there is a lot of waste that can come from certain foods as well as certain cooking techniques... To sum it up, the more cooking I have done the more conscious I have become of how much food is wasted."



REFERENCES

- Cornell University – Food System Basics, Lesson 2. <http://gardening.cce.cornell.edu/discovering-our-food-system/>
- Tagtow A, Harmon A. Healthy Land, Healthy Food, Healthy Eaters. ADA. 2007
- Harmon AH, Gerald BL. Position of the American Dietetic Association: food and nutrition professionals can implement practices to conserve natural resources and support ecological sustainability. *J Am Diet Assoc.* 2007;107:1033-1043.
- Tagtow, A.M. & A.H Harmon. Healthy Land, Healthy Food & Healthy Eaters: Dietitians Cultivating Sustainable Food Systems. 2009; White paper for the American Dietetic Association Food and Nutrition Conference and Exhibition.
- John Ikerd, as quoted by Richard Duesterhaus in Sustainability's Promise. *Journal of Soil and Water Conservation.* 1990; 45(1):4.

REFERENCES CONT.

- *NGO Sustainable Agriculture Treaty* (Global Forum at Rio de Janeiro, June 1-15, 1992).
- *Sustainable Agriculture—A New Vision.* Union of Concerned Scientists, 1999.
- U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015 – 2020 Dietary Guidelines for Americans. 8th Edition. December 2015. Available at <http://health.gov/dietaryguidelines/2015/guidelines/>. <http://www.seafoodwatch.org>
- Harmon A, Lapp JL, Blair D, Hauck-Lawson A. Teaching Food System Sustainability in Dietetic Programs: Need, Conceptualization, and Practical Approaches *Journal of Hunger & Environmental Nutrition*, 6:114–124, 2011.
- <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>