

# *Food Waste and Sustainability Concerns*

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**UNITWIN NETWORK SEMINAR  
THURSDAY SEPTEMBER 3, 2015**



Organisation  
des Nations Unies  
pour l'éducation,  
la science et la culture



• Chaire UNESCO  
• en alimentations du monde  
• France



**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON

# Food Waste - 1:45-3:30

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- ***Economic, social and environmental impacts of food waste.*** L. Zepeda (University of Wisconsin, Unitwin)
- ***Food waste concerns: measure, antecedents and consequences.*** L. Sirieix (Montpellier SupAgro, Chaire Unesco en Alimentations du Monde) and G. Le Borgne (Montpellier SupAgro)
- ***How to encourage a change in people's food waste behavior? Contributions of the Foot in the Door technique in a computerized context.*** S. Costa (INRA, UMR Moisa) and L. Balaine (Montpellier SupAgro)

# Keynote - Sustainability Concerns – Mech Eng room 1106, 1513 University Ave – 4:15 to 5:15pm

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- ***Offering branded remanufactured/recycled products: at what price? L. Hamzaoui***  
(University of Ottawa)
- ***Internal and external motivators for environmentally sound waste management: M. Teisl<sup>1,3</sup>, C. Noblet<sup>1,3</sup>, S. Marrinan<sup>2</sup>, T. Blackmer<sup>3</sup> D. Grezda<sup>1</sup> and N. Dobratiqi<sup>1</sup> (<sup>1</sup>School of Economics, University of Maine; <sup>2</sup>North Pacific Fishery Management Council; <sup>3</sup>Senator George J. Mitchell Center for Sustainability Solutions, University of Maine)***



# Food Waste

Prof. Lydia Zepeda – Consumer Science

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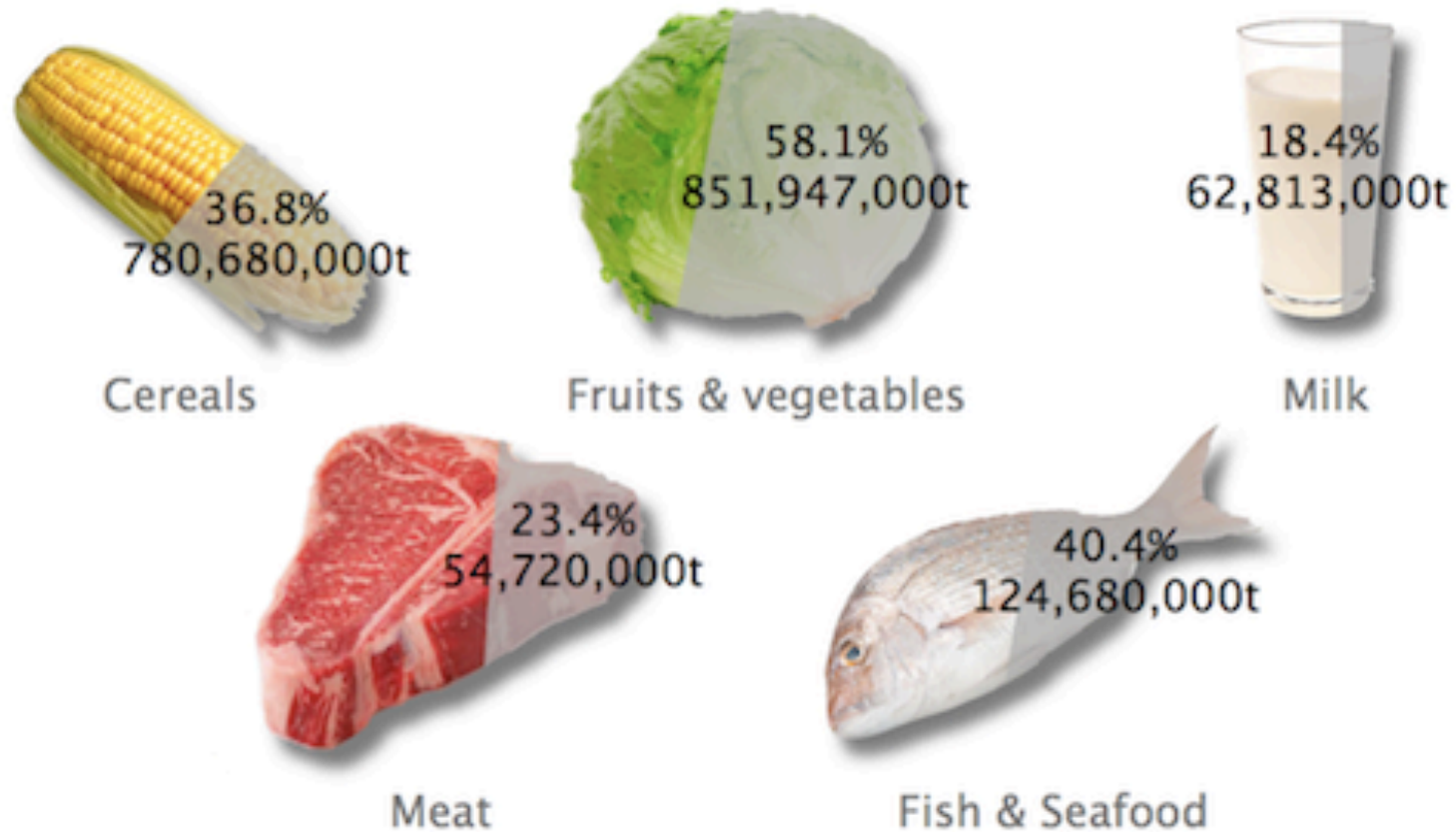
# Global Food Loss

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- 2011 UN Food & Agricultural Study found that
- 1/3 of food produced for human consumption is lost or wasted globally
- Equivalent to 1.3 billion metric tons per year

# World food wastage

About 1/3 of the food produced in the world for human consumption every year gets lost or wasted.



<http://www.consumptionomics.com/img/Wastingaway2.png>

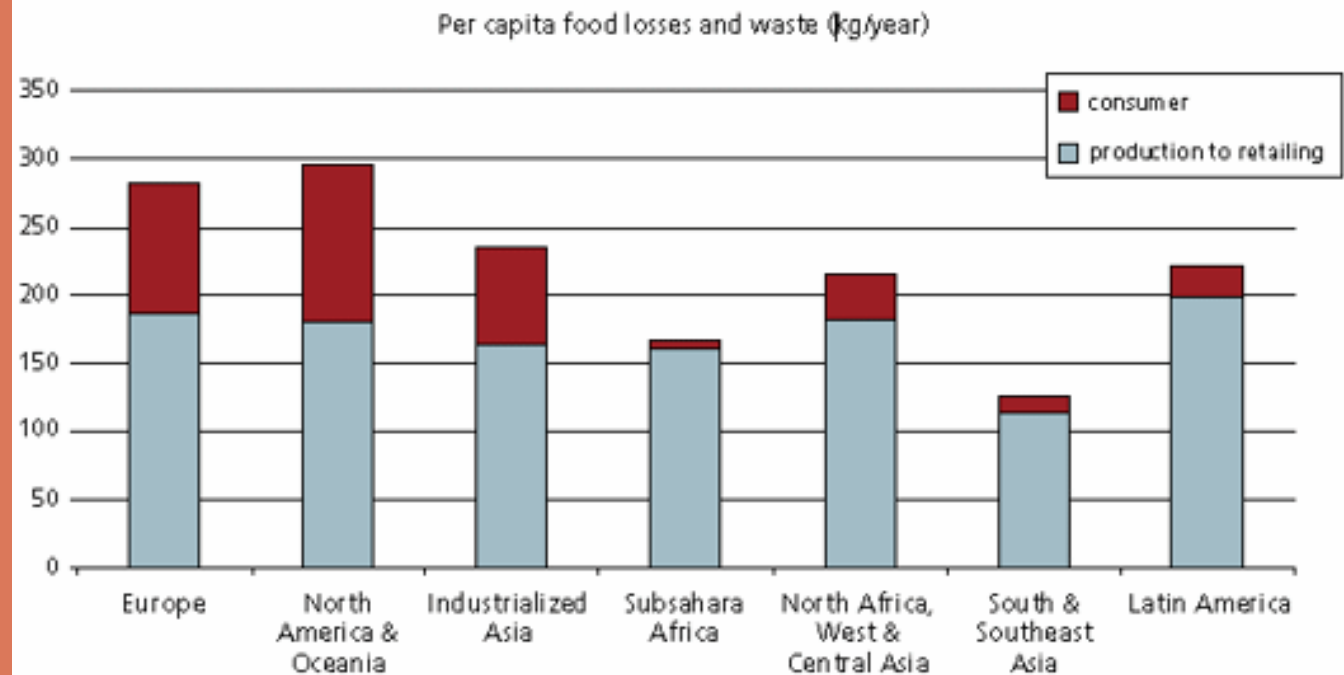
Source: FAO (2007 data)

## Lost all along the food chain

Developing countries: consumers waste 6-11 kg per year

Europe and North America: consumer waste 95-115 kg per year

Figure 2. Per capita food losses and waste, at consumption and pre-consumptions stages, in different regions



<http://climateprogress.org/wp-content/uploads/2011/05/Food-waste.gif>



# Fighting Hunger Worldwide



The cost of hunger to developing nations is an estimated US\$450 billion per year.

It takes only 25 US cents for WFP to give a hungry schoolchild a cup of food with all the nutrition needed for the day.

The number of undernourished people worldwide is just under 1 billion – equivalent to the population of North America and Europe combined.

## Hunger Map 2011



Category	1	2	3	4	5	
Undernourished	<5%	5-9%	10-19%	20-34%	≥35%	Incomplete data
Description	Extremely low	Very low	Moderately low	Moderately high	Very high	

Source: *The State of Food Insecurity in the World 2010*, Food and Agriculture Organization of the United Nations. Please note that the SOFI 2010 data in some cases dates back to 2005 so may not always reflect the present-day situation in individual countries.

© 2011 World Food Programme

The designations employed and the presentation of material in this map do not imply the expression of any opinion whatsoever of WFP concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

\* The Line of Control in Jammu and Kashmir agreed on by India and Pakistan is represented approximately by a dotted line. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

\*\* A dispute exists between the governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

# Global Hunger

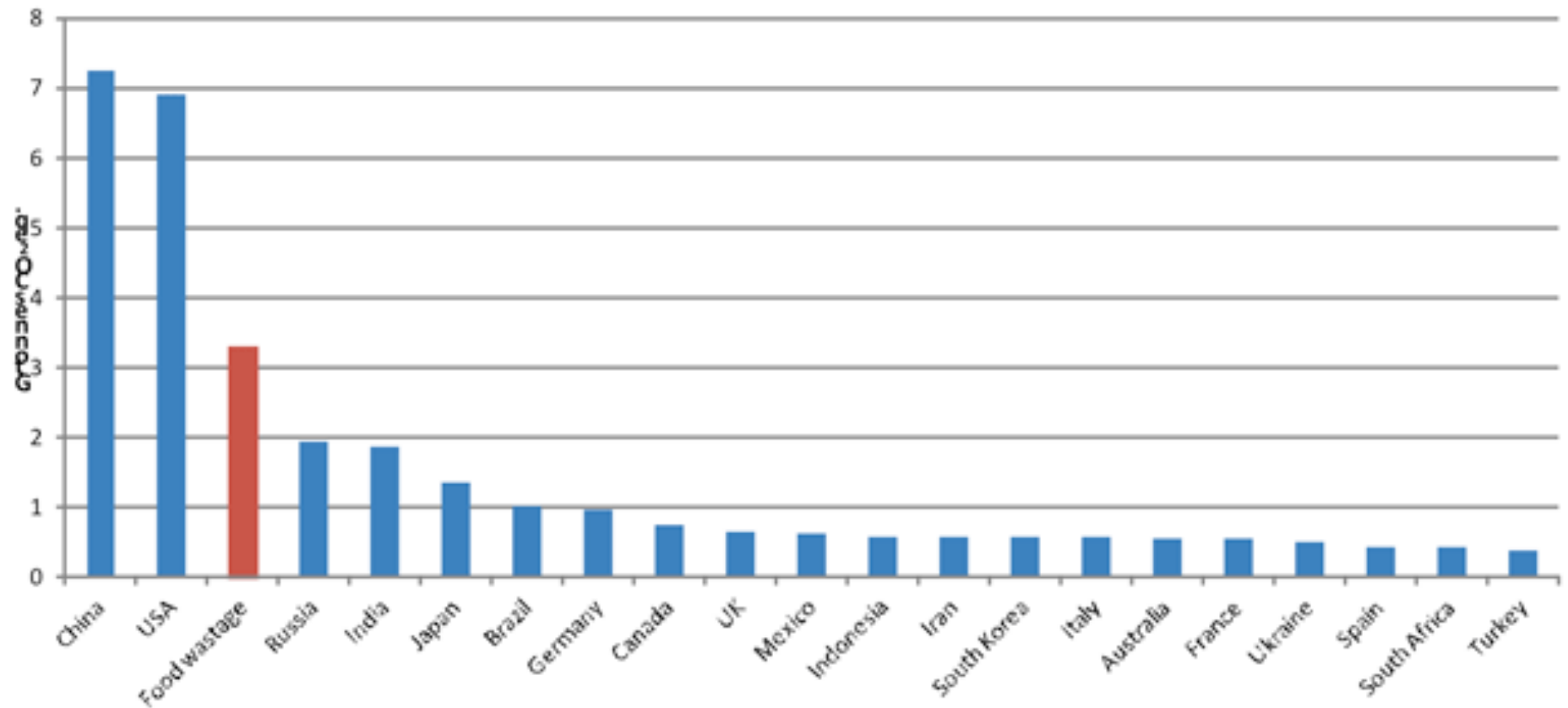
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- UN World Food Programme estimates
- 842 million people are hungry
- Most are in developing countries
- Asia has the most: 500 million
- But Africa has the highest prevalence 24.8%
- Poor nutrition causes the 45% of deaths of children under 5 worldwide (3.1 million deaths)

Carbon footprint of food waste = 3.3 Gt CO<sub>2</sub> equivalent per year

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**Total GHGs emissions excluding LULUCF**  
Top 20 of countries (year 2005, WRI) vs. Food wastage





# Water waste due to food waste

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- Blue water footprint = volume of surface and groundwater due production of good or service
  - Blue water footprint of agricultural production of food waste is  $250\text{km}^3$  (66 trillion gallons)
  - A bigger blue water footprint than any single country
  - 3.6 times the blue water footprint of the US
  - 38 times the blue water footprint of US households
- <http://www.fao.org/docrep/018/i3347e/i3347e.pdf>

[http://www.celsias.com/  
upload/uploads/admin/  
Food-Waste1.jpeg](http://www.celsias.com/upload/uploads/admin/Food-Waste1.jpeg)





# Use of land to produce wasted food contributes to deforestation, habitat loss, species extinction

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<http://earthfirstjournal.org/newswire/wp-content/uploads/sites/3/2012/05/biodiversity-picture.jpg>



<http://www.life.illinois.edu/ib/335/images/rainforestdeforestation.jpg>  
<http://www.life.illinois.edu/ib/335/images/rainforestdeforestation.jpg>



Now that  
we have  
context  
what is  
going on  
In US?



**NRDC** ISSUE PAPER

AUGUST 2012 IP:12-06-B

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**Wasted:** How America Is Losing Up to 40  
Percent of Its Food from Farm to Fork to Landfill

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**AUTHOR**

Dana Gunders

*Natural Resources Defense Council*



# NRDC report

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- 40% of food is wasted in US
- Equivalent to \$165 billion each year
- Equivalent to throwing out 20 pounds of food per person per month
- Most winds up in landfills

# Europe is way ahead of US!

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2014 “European year against food waste”

UK “Love food hate waste campaign”

<http://audiovisual.europarl.europa.eu/Package.aspx?id=8129>



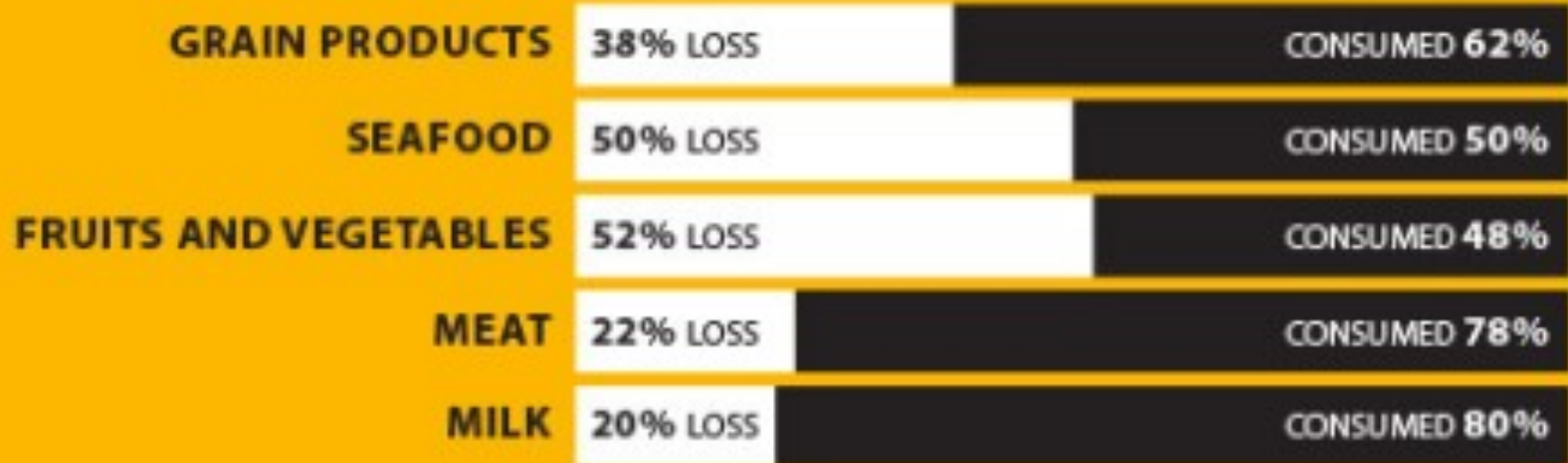
Copyright 2015 Lydia Zepeda

<http://www.healthylifessex.co.uk/pages/Sustainability/images/LoveFoodHeading.jpg>

# Food loss by food type for US, Canada, Australia & New Zealand

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## FOOD CONSUMED VERSUS FOOD LOSS\*



\*Percentages calculated collectively for USA, Canada, Australia, and New Zealand.

<http://www.nrdc.org/food/images/wasted-food-graph.jpg>

# Land use in US

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- USDA report data for 2007
  - 30% forest land
  - 27% pasture and rangeland
  - 18% cropland
  - Therefore **agriculture uses 45% of US land**
- NRDC report uses 2002 data to say 50% of land use is in agriculture
- So wasting food wastes 18-20% of land in US



# Water use by agriculture

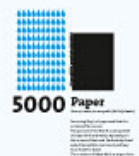
19

- NRDC report: agriculture uses 80% of fresh water in US
- implies 32% of water use to produce food waste
- This refers to **consumptive** water use (removed without return to water resource system) as reported by USDA ERS:  
<http://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use.aspx#.U1afvMfD6Gg>
- Note: USGS says agriculture (irrigation, livestock and aquaculture) use 40% of fresh water
- Most of 41% water for thermoelectric power generation **returned** (Kenny et al, 2009)

# WATER FOOTPRINT

virtual water embedded in products

**Water Footprint** is the total volume of freshwater that is consumed to produce the goods and services we consume. It is the sum of the direct and indirect water consumption. The direct water consumption is the water that is used to produce the goods and services. The indirect water consumption is the water that is used to produce the goods and services that are used to produce the goods and services.



# NRDC: Agriculture uses 10% of US energy

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- USDA ERS (2010) estimates that food system used 15.7% of total US energy
- Implies 4 to 6% of energy use for food waste

# Energy

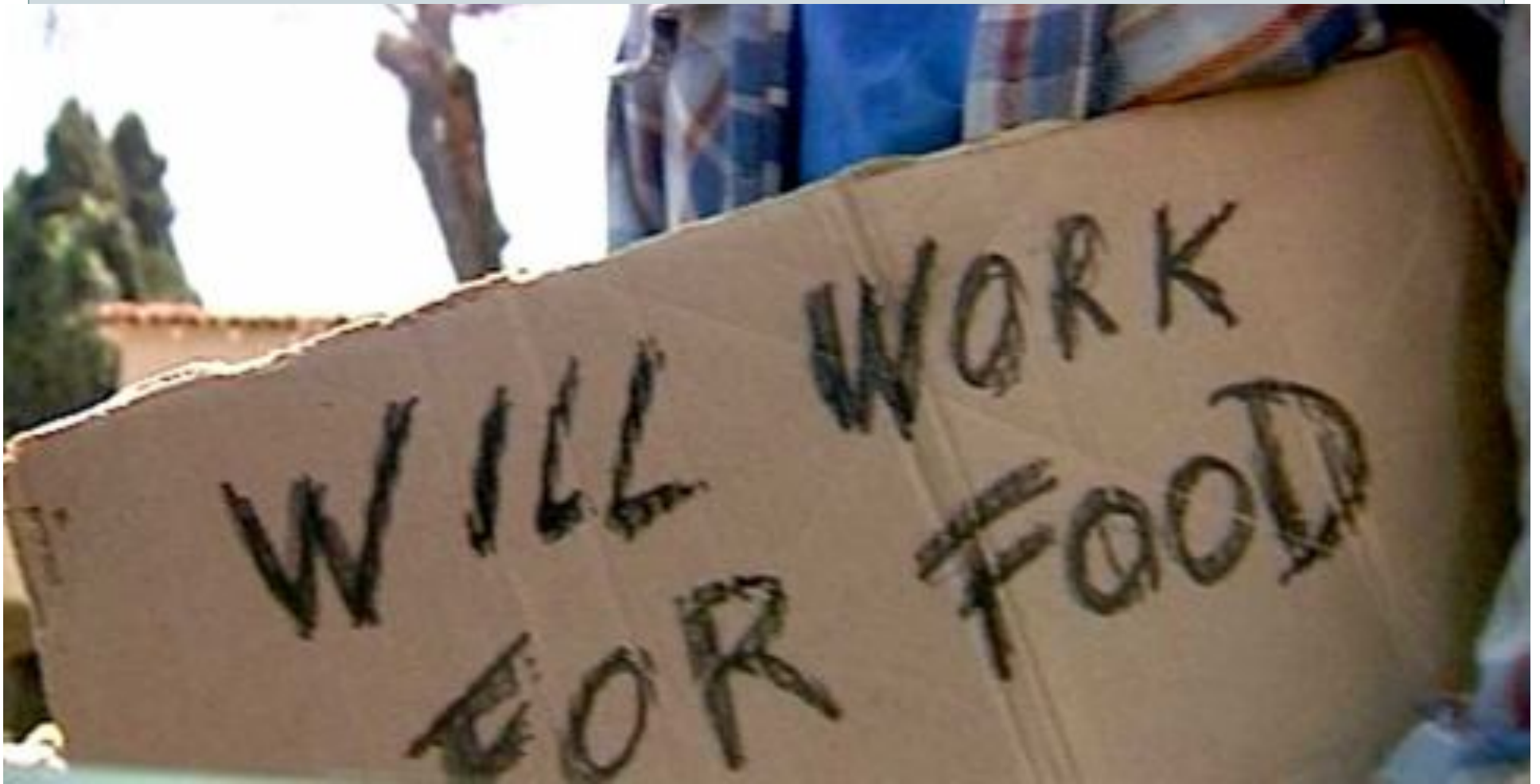


Product	Energy input : Protein output
Lamb	57:1
Beef	40:1
Eggs	39:1
Swine	14:1
Dairy	14:1
Turkeys	10:1
Broilers	4:1
<b>Plant (corn)</b>	<b>2.2:1</b>

*USDA, 2001; Pimentel 1997*

Whatever data you use, agriculture uses a lot of land, energy and water

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# Food insecurity in US



- Feeding America, Map the Meal Gap
  - [feedingamerica.org/hunger-in-america/hunger-studies/map-the-meal-gap.aspx](http://feedingamerica.org/hunger-in-america/hunger-studies/map-the-meal-gap.aspx)

FOOD INSECURITY RATE

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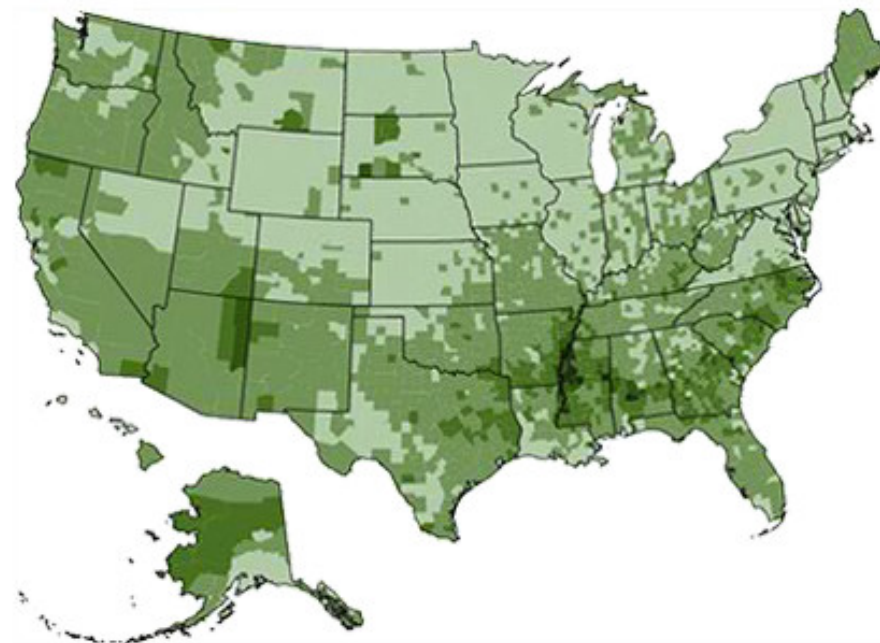


AVERAGE COST OF A MEAL

🍴 \$2.74

ESTIMATED PROGRAM ELIGIBILITY AMONG FOOD INSECURE PEOPLE

CHARITABLE RESPONSE	27%	Above 185% Poverty
REDUCED PRICE SCHOOL MEALS, WIC	17%	130% to 185% Poverty
SNAP, FREE SCHOOL MEALS, CSFP (SENIORS)	57%	Below 130% Poverty



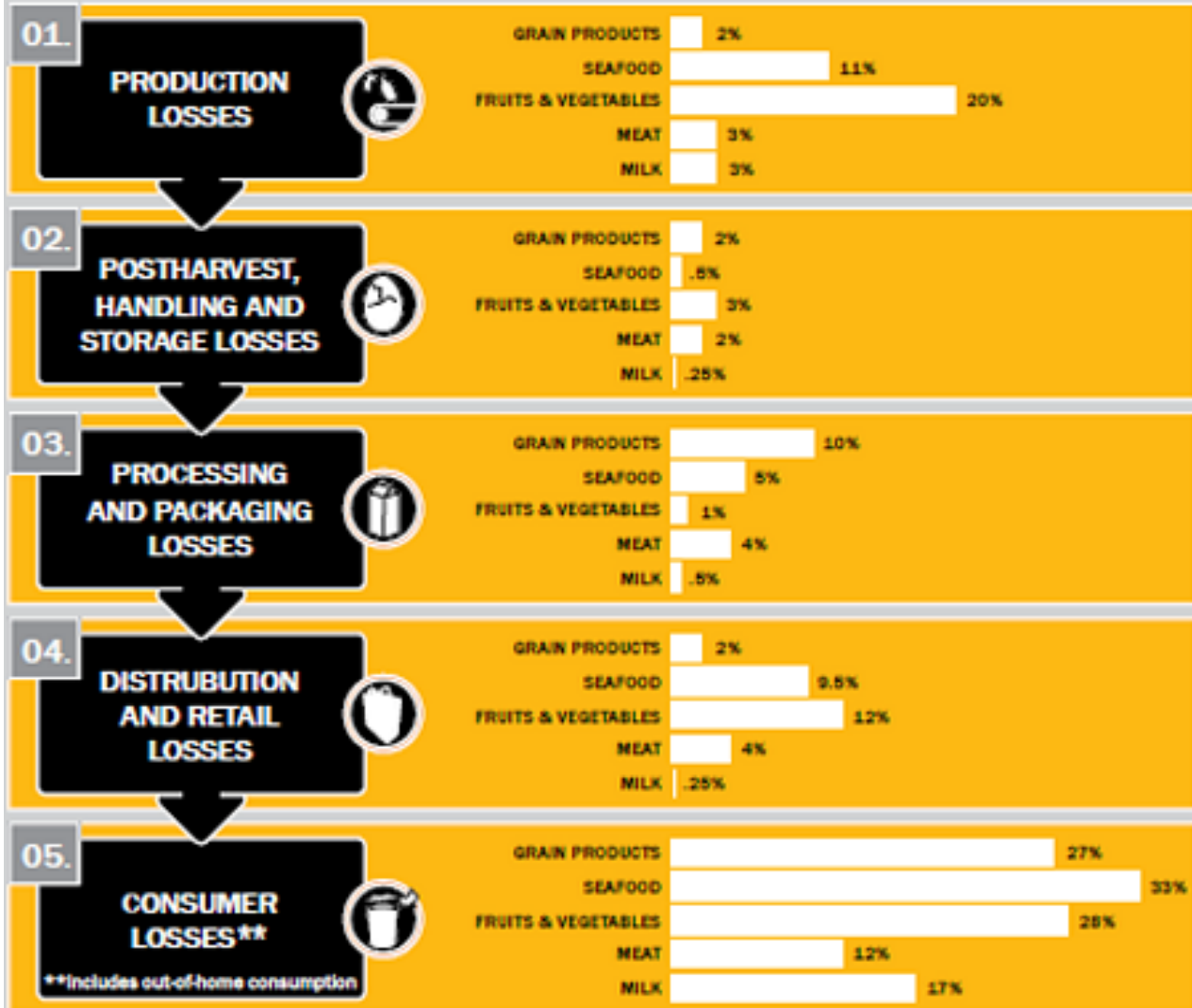
**Overall Food Insecurity Rate**

- 30% and above
- 25% - 29%
- 20% - 24%
- 15% - 19%
- 4% - 14%

Hunger exists in every corner of the United States, but as Feeding America's Map the Meal Gap study shows, food insecurity looks different from one county to the next. In addition to providing data about the prevalence of food insecurity at the local level, Map the Meal Gap estimates the share of food insecure individuals who are income-eligible for federal anti-hunger programs and provides local variations in food costs. The study finds that many food insecure individuals do not qualify for federal nutrition programs and must rely on charitable food assistance, suggesting that complementary programs and strategies are necessary to

## NORTH AMERICAN\* FOOD LOSSES AT EACH STEP IN THE SUPPLY CHAIN

\*Percentages calculated collectively for USA, Canada, Australia, and New Zealand.



Source: Food and Agriculture Organization 2011.

[http://switchboard.nrdc.org/blogs/khenderson/assets\\_c/2012/09/nrdc-food-waste-supply-chain-thumb-450x454-7915-thumb-450x454-7916.png](http://switchboard.nrdc.org/blogs/khenderson/assets_c/2012/09/nrdc-food-waste-supply-chain-thumb-450x454-7915-thumb-450x454-7916.png)

# NRDC: How can we reduce food waste?

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- Farming and post harvest: gleaning, donating, transforming unharvested or unpretty food
- Processing: utilize trimmings for processed foods or animal feed
- Distribution: increase market communication and exchanges to prevent loss of perishable foods
- Retail: reduce overstocking, reduce pack sizes, have reduce prices for or donate food rather than throw out if imperfect or near expiration



# NRCDC: Losses in food service

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- **Due to large portion sizes**
  - Reduce portion size or at least give options
- **Pressure to maintain extensive range of menu items**
  - Serve more seasonal food (keeps better) and fewer options
- **Inflexibility of chain store management**
  - Bottom line: Cost of food waste
- **Culture of waste among kitchen staff**
  - Make reducing food waste a priority

# Portion Distortion

What you're served



1/2 lb cheeseburger,  
French fries, tomato slice,  
lettuce, 3/4 cup ketchup  
**1,345 calories**  
**53 grams fat**

What's one serving



1/4 lb cheeseburger, with  
half the French fries, and  
2 tablespoons ketchup,  
lettuce and tomato  
**685 calories**  
**33 grams fat**

## Everyday excess

**What you're served:**  
Jumbo popcorn (20 cups, unbuttered\*)  
1,800 calories, 93 grams fat

**What's one serving:**  
3 cups popcorn, unbuttered\*  
165 calories, 9 grams fat

\* 6 tablespoons butter adds  
400 calories and 69 grams fat



**What you're served:**  
Large 4 oz. sugar, plain\*\*  
300 calories, 3 grams fat

**What's one serving:**  
1.5 oz. sugar, plain\*\*  
120 calories, 1 gram fat

\*\* 2 tablespoons cream cheese adds  
100 calories and 50 grams fat



**What you're served:**  
24 oz. soda = 210 calories, 0 grams fat

**What's one serving:**  
12 oz. soda = 135 calories, 0 grams fat



**What you're served:**  
40 tortilla chips = 400 calories, 30 grams fat

**What's one serving:**  
10 tortilla chips = 100 calories, 8 grams fat

**What you're served:**  
8 oz. chocolate chip cookie  
700 calories, 20 grams fat

**What's one serving:**  
1 oz. chocolate chip cookie  
140 calories, 4 grams fat



**What you're served:**  
4 slices of 3.4" popcorn  
out in 1.2 slices  
920 calories, 36 grams

**What's one serving:**  
2 slices of 3.4" popcorn  
out in 1.2 slices  
460 calories, 18 grams

# NRDC: Reduce loss in households

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<http://www.down2earthmaterials.ie/wp-content/uploads/2013/03/food-waste.jpg>

# NRDC: Reduce loss in households

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- Average US family throws out 25% of their food
  - Equivalent to \$1365 - 2275 per year for family of 4
- Increase awareness of food waste & value of food
- Label dates are not regulated: do not indicate food safety
- Food spoils due to suboptimal storage, misjudged food needs, etc.
- Reduce impulse buys: plan food needs
- Reduce portion, meal size!

## NRCDC recommendations: Federal government can help by

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- Comprehensive tracking of food losses
- Establish national goals to reduce losses
- Address label date confusion
- Support and enable food recovery
- Improve public awareness
  
- State and local governments can do their part!



# Compost

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- Most food winds up in landfills
- Composting can reduce solid waste and save money
- Madison: weekly compost pick-up pilot program

# Government policies can help

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Jan 1: Seattle's new garbage policy  
Blue bin = recyclables  
Green bin = yard waste & compost  
Tiny bin = garbage



Extra  
garbage is  
\$16 a bag





# food

- 1- buy it with thought
- 2- cook it with care
- 3- use less wheat & meat
- 4- buy local foods
- 5- serve just enough
- 6- use what is left

*don't waste it*

U.S. FOOD ADMINISTRATION

What  
can you  
do to  
reduce  
food  
waste?

[https://  
www.amoils.com/  
health-blog/wp-  
content/uploads/  
2013/11/blog-  
image-food-  
waste-2.jpg](https://www.amoils.com/health-blog/wp-content/uploads/2013/11/blog-image-food-waste-2.jpg)