

## ENSC 315

Week 3  
Dr. Donefer:  
Nutrition Part 2

FishBanks wrap up  
Origins of man to modern agriculture  
In-class Quiz

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## FishBanks Wrap-up

- "The Tragedy of the Commons"
  - Hardin (1968) Paper in Science (<http://dieoff.org/page95.htm>):
    - Occurs when, "a group of individuals abuse common goods, to the detriment of the rest of the people."
    - Can be destroyed by putting something in or by taking something out
    - Problems without technical solutions, solution requires change in human values or morals
    - "Each man is locked into a system that compels him to increase his herd without limit -- in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all."

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## Typical Game Behavior

The graph plots three variables over a 7-year period. The y-axis is labeled 'X AND Y' and ranges from 0 to 8. The x-axis is labeled 'YEAR' and ranges from 0 to 7. The 'Fish' series (squares) starts at 8 and decreases to 0. The 'Ships' series (circles) starts at 2 and increases to 5. The 'Catch' series (triangles) starts at 2, peaks at 7.5 in year 4, and then drops to 0.

YEAR	Fish	Catch	Ships
0	8	2	2
1	7.5	3.5	2.5
2	7	4.5	2.8
3	5	7	3
4	1	7.5	3.5
5	0	2	4.5
6	0	0.5	4.8
7	0	0	4.8

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## Total World Fish Catch

The graph shows the total world fish catch in millions of metric tons from 1965 to 1993. The y-axis ranges from 0 to 90. The x-axis is labeled 'YEAR' and shows years from 1965 to 1993. The catch starts at approximately 45 million metric tons in 1965 and shows a steady upward trend, reaching about 85 million metric tons by 1993.

YEAR	Total World Fish Catch (Millions of Metric Tons)
1965	45
1967	50
1969	55
1971	60
1973	60
1975	62
1977	65
1979	68
1981	70
1983	72
1985	75
1987	80
1989	85
1991	82
1993	85

Source: Fisheries of the United States, US Dept. of Commerce.

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## New England Fisheries - Hard Times

"I remember catching 5,000 pounds of fish in eight nets. Today, it might take up to 80 nets. Back then, the average codfish in the spring would probably be 25 to 40 pounds. Now, it's 5 to 8 pounds." - Peter Morse

"Go down to the docks and talk to the guys down there," said John Nelson, chief of the Marine Fisheries Division of the state Fish and Game Department. "Most of them have their boats for sale. If they could sell their boats and do something else, they would."

Source: Clare Kittredge, "N.H. Fish Story Is Not a Happy One," Boston Globe, February 4, 1990.

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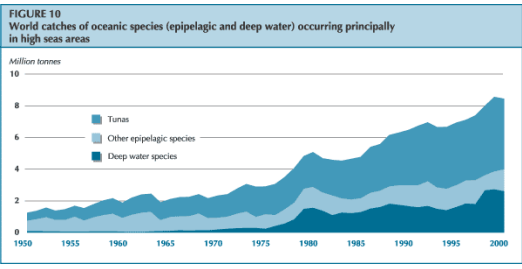
## Canadian Cod Fishery

(Fisheries and Oceans Canada [http://www.dfo-mpo.gc.ca/kids-enfants/map-carte/map\\_e.htm](http://www.dfo-mpo.gc.ca/kids-enfants/map-carte/map_e.htm))

- Between 1992 and 2001, the Government of Canada spent \$3.9 billion
- There were 17,200 Atlantic groundfish licence holders in 1992 and 10,372 in 2002, representing a decline of roughly 35 per cent
- 2003, Cod fishery closed off Newfoundland/ Labrador, PEI and New Brunswick

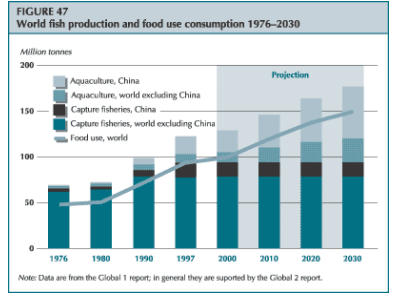
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### World catch of oceanic species (FAO, *The State of World Fisheries and Aquaculture (SOFIA) 2002*)



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### Global fish consumption (FAO, *The State of World Fisheries and Aquaculture (SOFIA) 2002*)



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### What can be done?

- Partition the seas
  - Establish quotas
  - Farm fish
  - Move down food chain
  - Change consumption preferences
  - Reduce destruction and pollution of fisheries
  - Limit ship fleets, technology
  - Develop better methods to assess stock
  - Change social values and economic incentives
- Clip from The Current, December 3, 2004 (20041203thecurrent\_sec2\_120-5-00)  
Akim Kambamba, former resident of Sudan

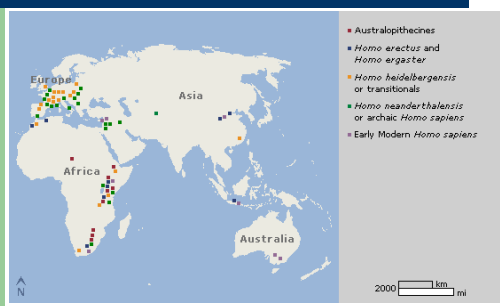
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### HUNTER GATHERER TO AGRICULTURE Historical perspective

- **FOUR PHASES:**
  - I. EVOLUTION OF HOMINID SPECIES
  - II. HUNTER - GATHERER
  - III. ORIGINS OF AGRICULTURE
  - IV. MODERN ERA (1900 - )

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### Hominid Spread



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### Theory of human origin

- Potts (1996) "Humanity's Descent. The Consequences of Ecological Instability":



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## The Savanna Theory

- *“The shift to the savanna ...was responsible for the major events in the early evolution of our kind.”*
- *“...humanness evolved...two-legged walking, tool making, intelligence, new social arrangements, culture...”*

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## Why did we begin agriculture?

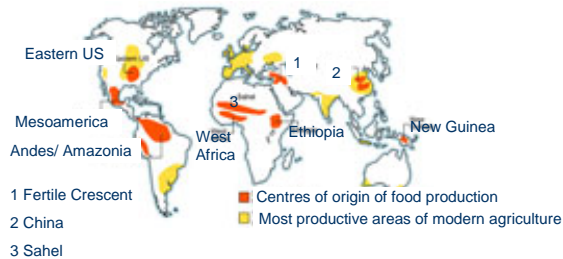
Jared Diamond (1999) *Guns, Germs and Steel*; *Evolution, Consequences and future of plant and animal domestication, Nature insight, 418, August 8, 700-7*

- Decline in large game
- Climatic variability
- Competition between human societies
- Population increases

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## Origins of agriculture: Where?

Jared Diamond (Nature Aug. 8 2002, 418: 700)



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## What... Plant and animal domestication

Fertile Crescent	Wheat, pea, olive Sheep, goat	8500 BC
China	Rice, millet Pig, silkworm	By 7500 BC
Mesoamerica	Corn, beans, squash Turkey	By 3500 BC
Andes/ Amazonia	Potato, manioc Llama, guinea pig	By 3500 BC
Eastern United States	Sunflower, goosefoot None	2500 BC

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## North-south/ East-west spread

Jared Diamond (Nature Aug. 8 2002, 418: 700)



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## What were the results?

- Competitive advantage to agricultural societies  
*“...food production led to high population densities, germs, technology, political organization, and other ingredients of power. Peoples who, by accident of their geographic locations, inherited or developed food production thereby became able to engulf geographically less endowed people.”*
- Spread of domesticates
- Increased population  
*“I am concerned, however, that such attempts [...new domesticates...] may in the long run do us more harm than good. Humanity’s greatest risk today is our growing numbers and aspirations ultimately destroying our society by destroying our environment.”*

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## Population growth

- <http://www.pbs.org/wgbh/nova/worldbalance/numbers.html>
- Will talk more about the modern period of agriculture in Week 11, Technology

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## Next week

- **Lecture focus:**
  - **Agricultural evolution**
    - Movie: History's Harvest
  - **Climate change**
    - Movie: What's Up with the Weather?
- **Readings**
  - B Smit and M Skinner, 2002, Adaptation Options in Agriculture to Climate Change: A Typology, *Mitigation and Adaptation Strategies for Global Change*, 7: 85-114
  - Al Gore, 1993, *Earth in the Balance*, Chapters 6, 7

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## Quiz question

- List six resources of the 'commons' that are linked to food security. (2 marks)
- In a paragraph, elaborate on how one of these factors contributes to (or detracts from) food security. Provide an example that illustrates this connection. (3 marks)

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