Hello, AIMsters and friends,

Our brother and friend, Denver City Council member Paul Lopez, will be leading the passage of a bill to declare the second Monday of October to be a city holiday, to be known as "Indigenous Peoples' Day" (bill attached below). The bill is scheduled to pass this coming Monday, October 3rd, in the Denver City Council. The meeting begins at 5:30 pm, but, according to the agenda (attached below), the bill will not be considered until later in the meeting. The bill will be signed into law the following Monday, October 10. Paul has asked that as many Native people, and allies, as possible to attend both of these Council meetings, to show our support for the bills. Please attend, if you can. Thanks, Glenn

Aquaponics: technology to grow sustainable healthy food anywhere in the world

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Denver

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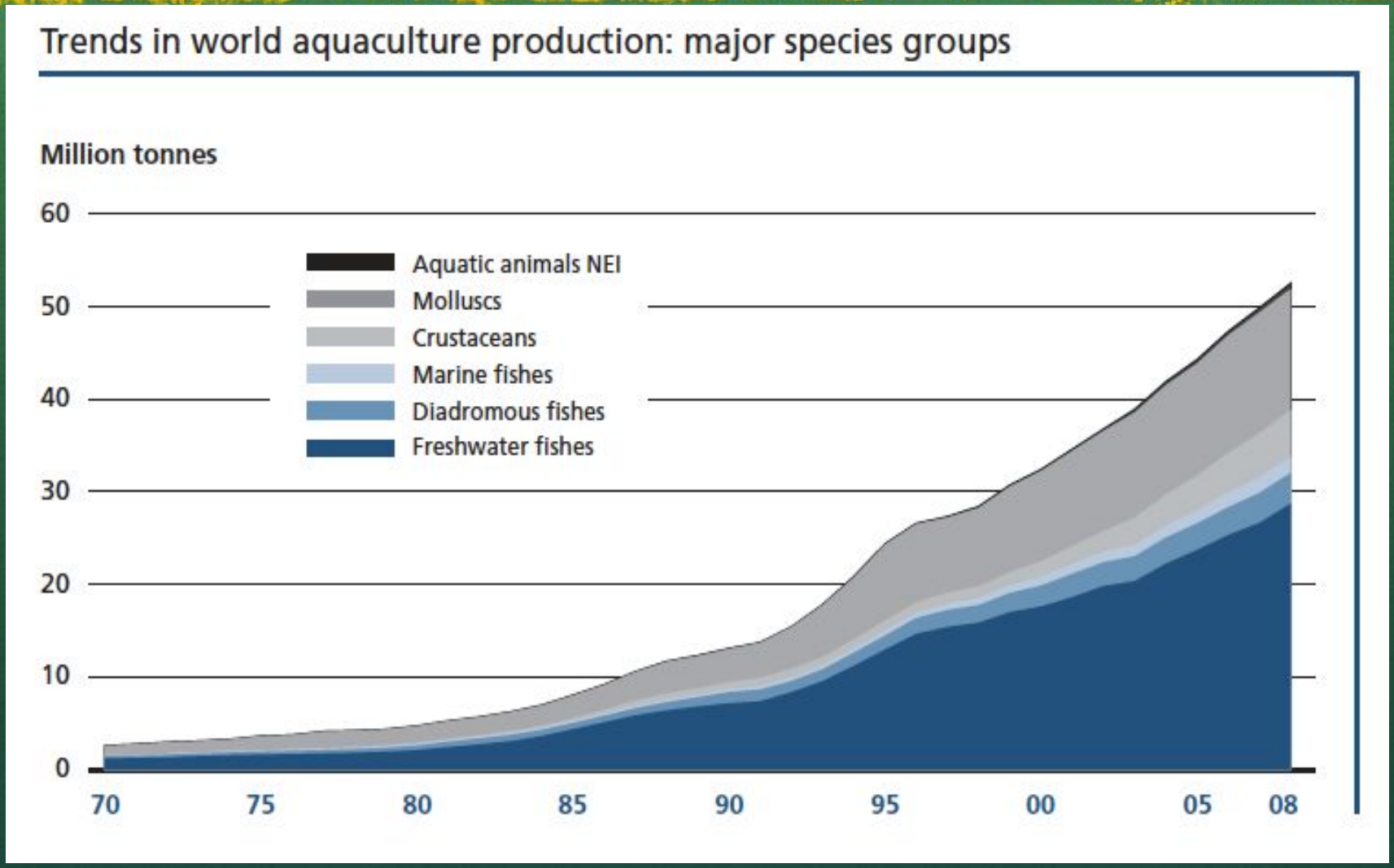
Outline

- Aquaponic Technology
- Relevance to Public Health
  - Current food system
  - Access to healthy food
  - Source/sink of disease vectors
- Relevance to Environmental and Social Justice
  - Climate change buffer
  - Denver County Jail
- Interdisciplinarity

Local, Sustainable Agriculture

aqua-culture + hydro-ponics = aqua-ponics

Aquaculture: fastest growing segment of food system in the world



Aquaculture

- Farming of fish, shellfish, crustaceans, and other animals
- In 2009, 35 million tons freshwater production, 20.1 marine
- Most production is flow-through, requiring large inputs of water
- Water leaving aquaculture tanks contributes to eutrophication
- Anoxic benthos
- Antibiotics
- Escaped animal genetically ‘pollute’ natural populations of fishes

Hydroponics

- Growing plants without soil
- Input of chemical fertilizers
- Very productive, suitable for small spaces
- More financial risk, but also more potential

Facts of Hydroponic Growing & Field Method

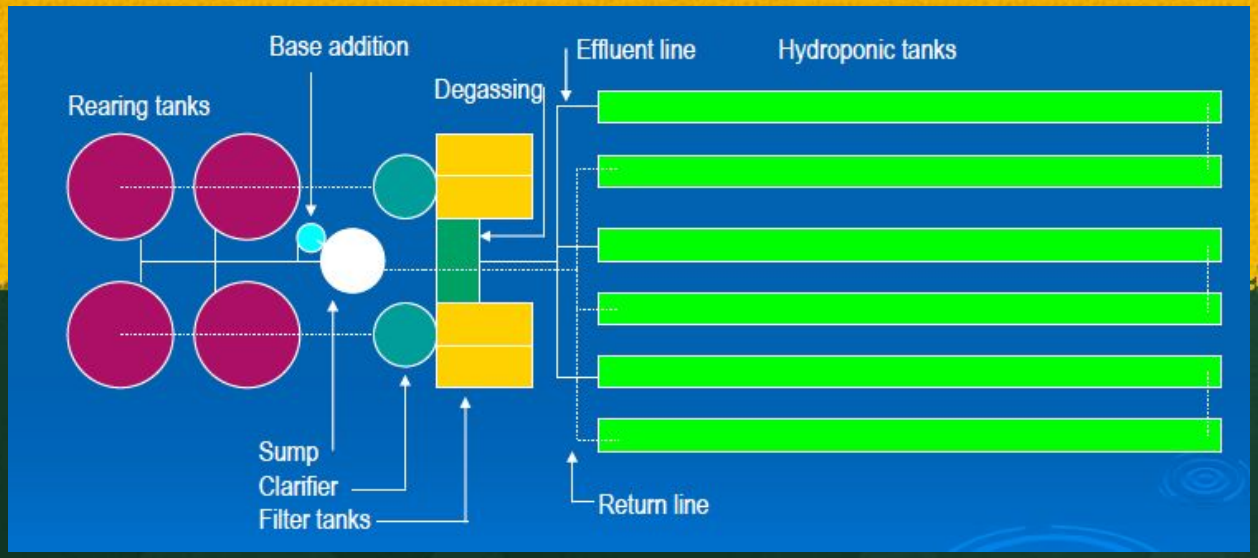
Taken from the Orlando Sentinel Business & Money section
Dated March 9, 1999

	Hydroponics	Field
Yield per acre (in pound):	250,000	62,500
Revenue per pound:	90 cents	32 cents
Revenue per acre:	$213,750	$20,000
Cost per acre:	$175,000	$18,750
Net per acre:	$38,750	$1,250

Aquaponics Anywhere

University of Virgin Islands System

Developed over 30 years by Dr. James Rakocy



UVI System

- Tropical applications, or Denver summers
- UVI focuses on aquaculture production
- no greenhouse necessary
- Symbiosis between plants and animals

Tilapia

- 160 kg/m^3/yr
- Nile Tilapia, 77 fish/m^3; Red Tilapia 154/m^3
- Fed 3X/day ad libitum, 32% protein, floating complete diet
- Feed conversion ratio (FCR) if tilapia is 1.7
  - Trout/salmon 1.2
  - Poultry 2-4 (eggs ~2)
  - Pork 3.5
  - Sheep 7
  - Beef 8 or more
- 46,000 pounds per acre per year

VegetableTanks

Denitrification

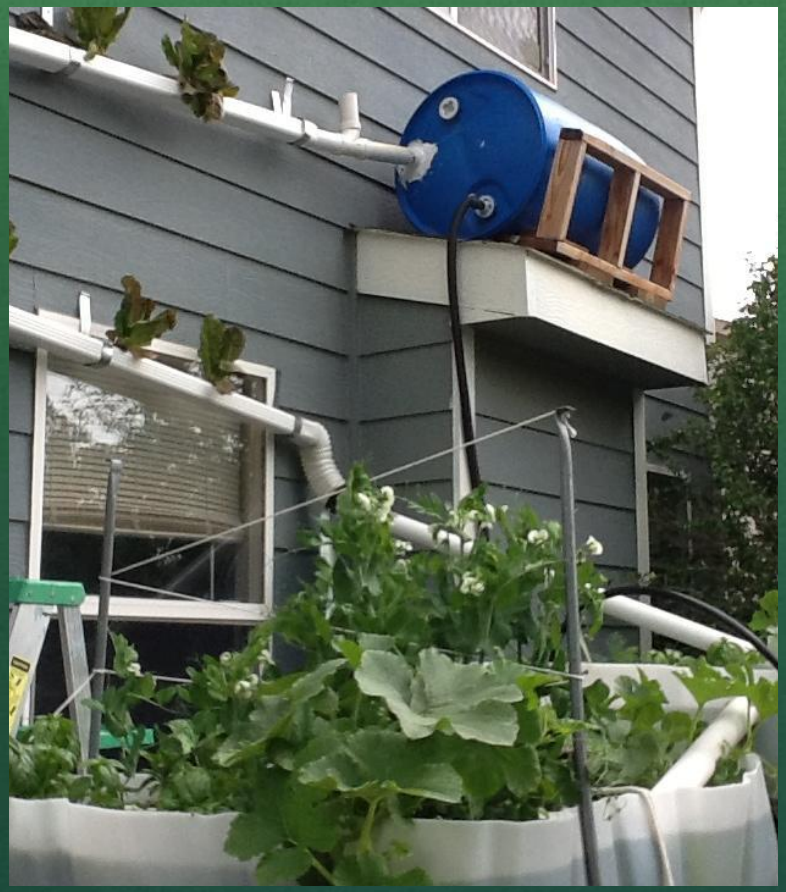
- removes excess nitrate
- improves N:P ratio

Solids removal

- slow removal improves remineralization
- prevents clogging of system
- biosolids can be composted, digested, or used to amend soils

Examples

Aquaponics in Residential Setting



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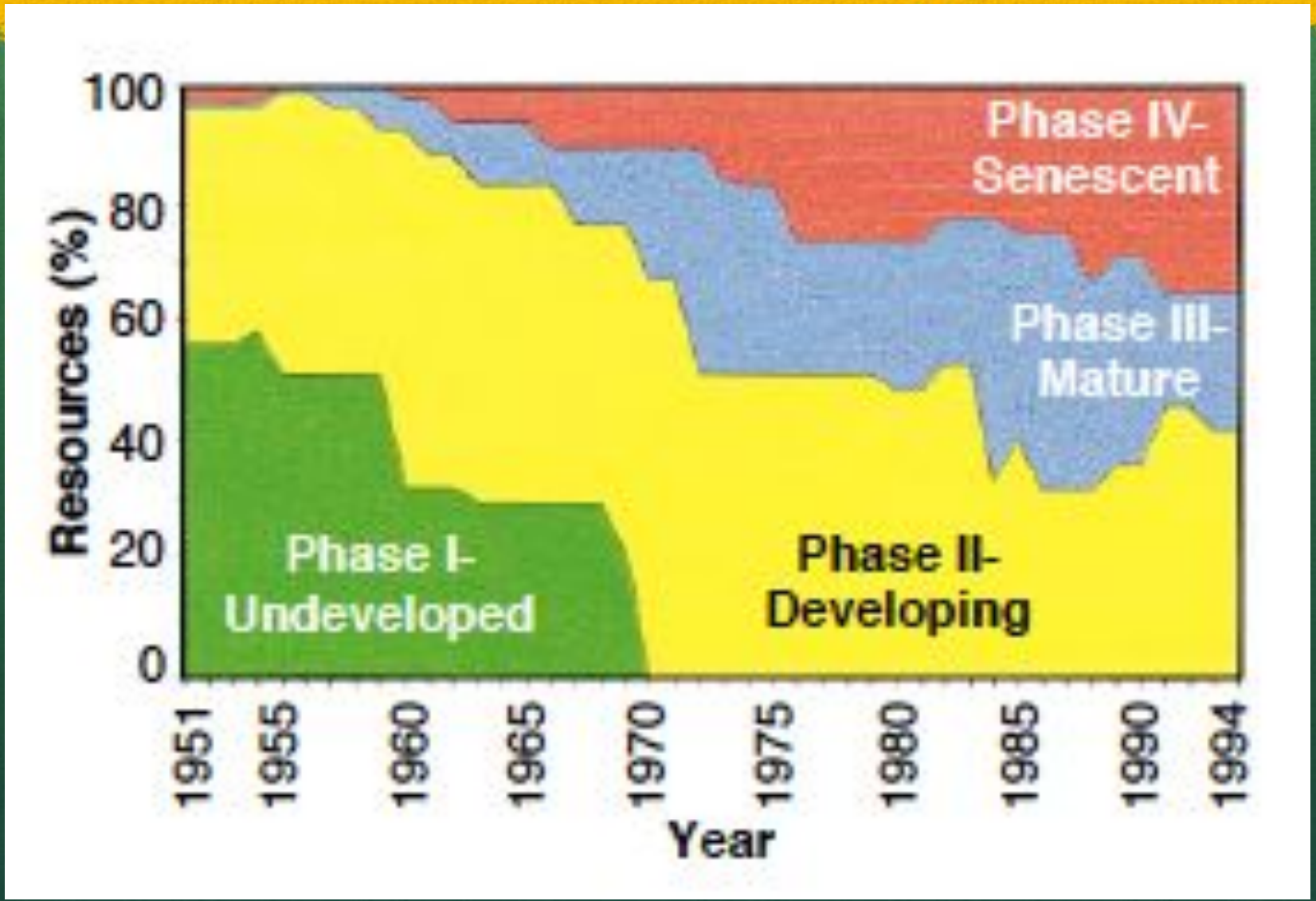
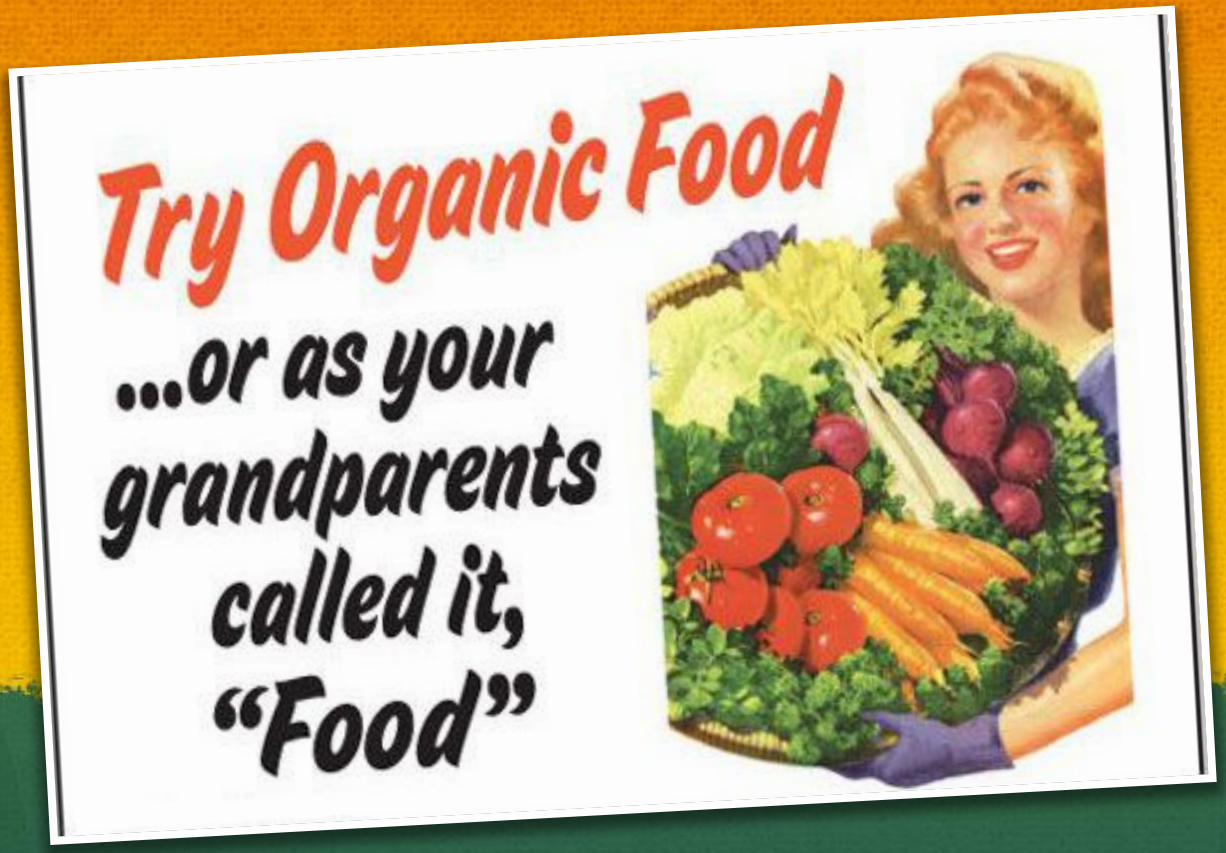
State of Fisheries



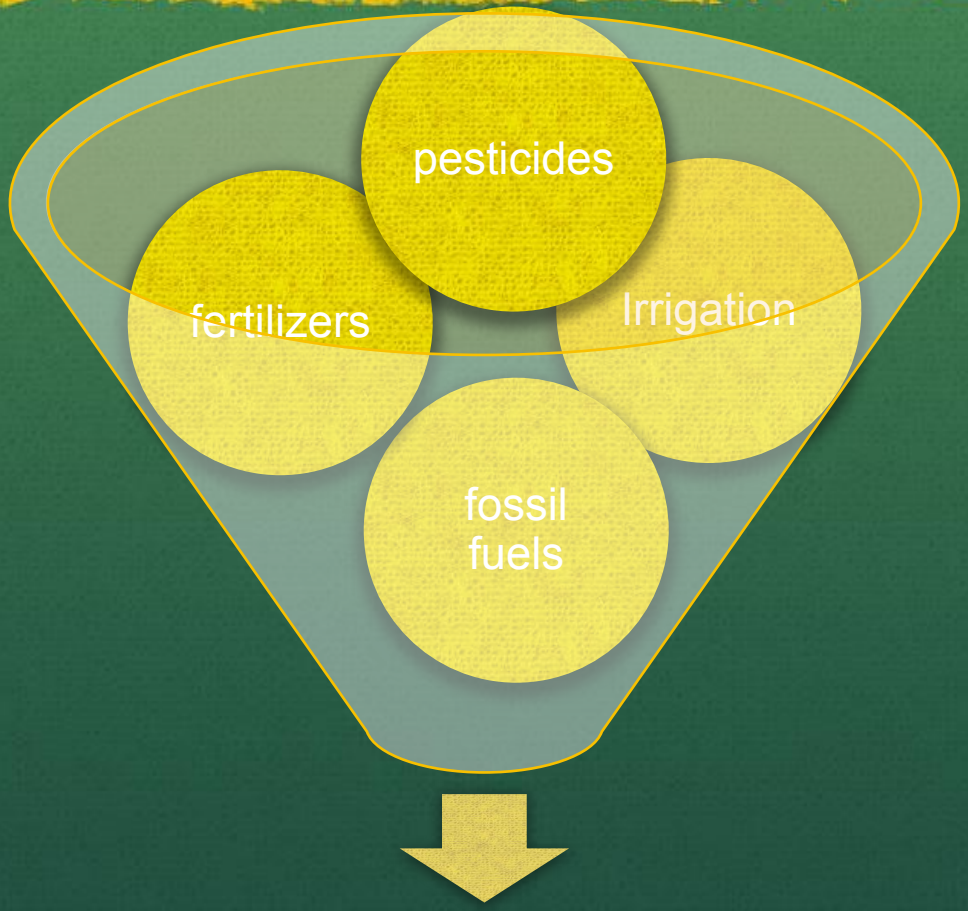
Basic Human Needs

- Air
- Water
- Food



Eat Organic

Denver Food Today



99.8% from outside ‘place’

Today's Food System

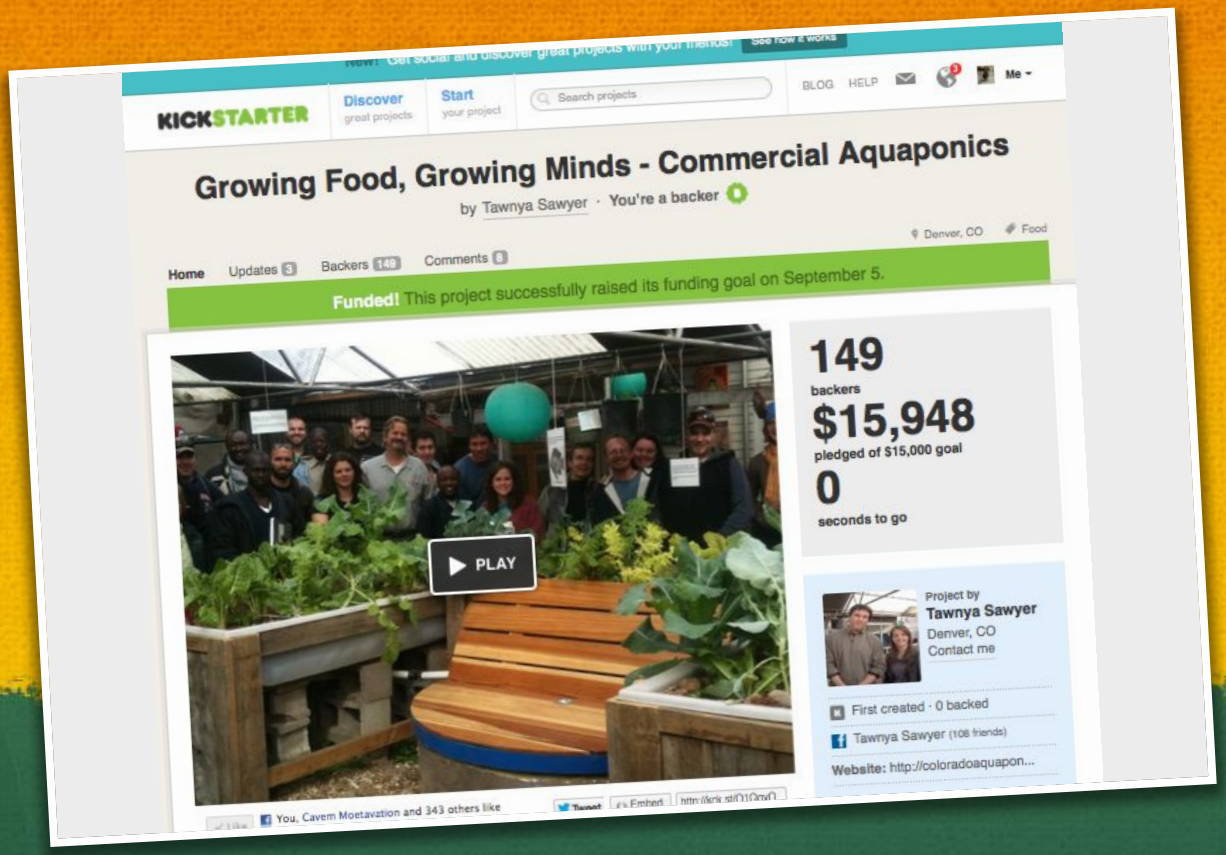
- 40% of land use
- 70% of water use
- 10 billion pounds of pesticides
- 150 million metric tons of fertilizer
- 25% carbon, 65% methane, 80% N_2O
- Dead zones, endocrine disruption, dried streams and lakes
- Food travels 2000 miles before reaching your plate
- 50% is never ingested in the USA
- Food deserts exist
- Unhealthy eating

Health Impacts of Today's Food System

- Obesity
- Type 2 diabetes
- Heart Disease
- Food-borne diseases
- Anti-biotic resistant diseases
- Endocrine Disruption
  - Cancers
  - Developmental problems
  - Immune disorders
  - Reproductive disorders

Live Local, Give Global

Denver's 1st Commercial-Scale Aquaponic System



Community Aquaponic System

Located in a Denver Food Desert

Case Study: Denver, CO, USA

- Urban agriculture has long history of discouragement
- 2009: Councilman Michael Hancock, Ashara Ekundayo, and others create rules to allow aquaponics in city limits
- 2011: Food producing animals allowed without permit
- 2012: Denver Seeds has mission to create local food system in Denver
- More than 99% of food consumed in the city comes from outside CO

Case Study: Nairobi, Kenya

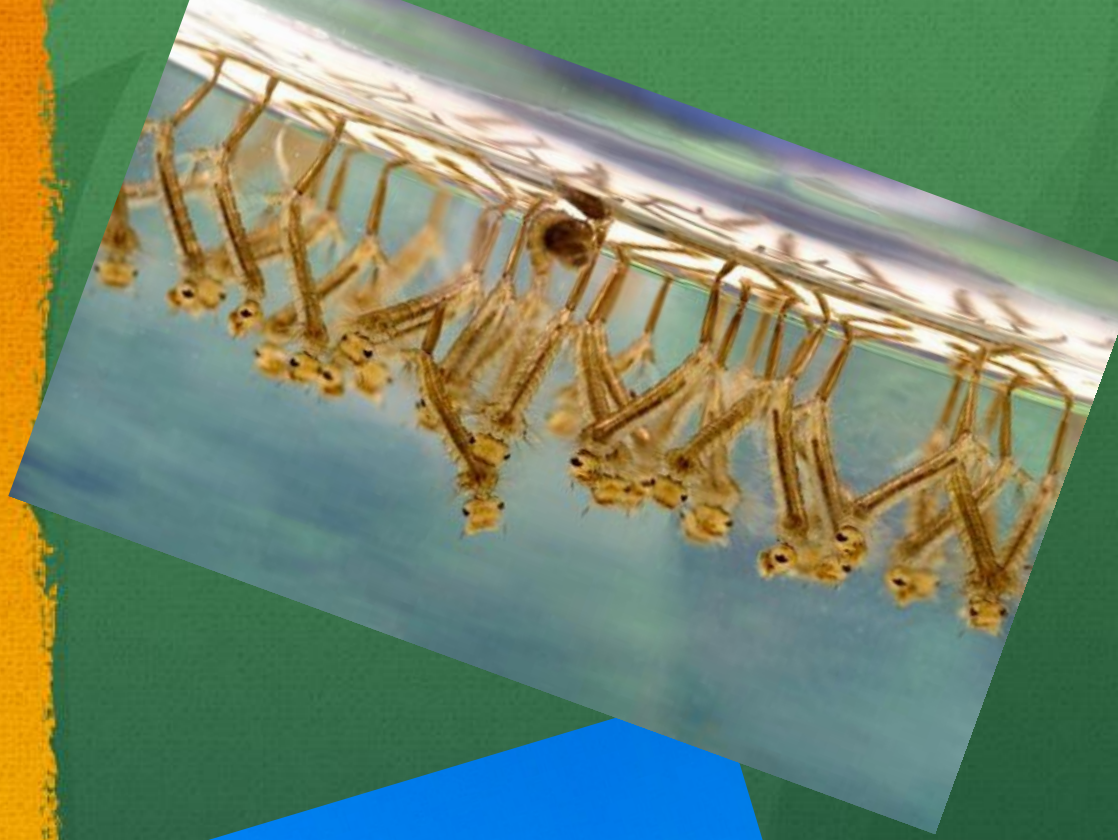
- Antiquated rules from British colonization remain: it is illegal to garden or have animals within city limits
- Urban farmers are susceptible to harassment/theft by corrupt officials
- Ongoing effort to reform laws that affect urban agriculture
- 20% of citizens grow crops
- 7% of citizens keep livestock

Case Study:Kampala, Uganda

- Urban agriculture ordinances established in 2004
- Held as a successful example of UA world-wide
- Fruit trees planted throughout the city
- 60% of vegetables produced within the city
- 90% of poultry products produced within the city
- Komamboga Fish farming Demonstration and Fry Production Project

Vector dynamics

- Are aquaponic systems a significant source or sink of disease vectors?
- If a source, how to make them sinks?
- Public health implications?
- Can baits be used to supplement the feeding of fish?



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Degraded Forests/Soils

- Deforestation

Soil loss contributes to agricultural failure

Famine in East Africa

11 An aerial view of the Dadaab Refugee camp in eastern Kenya, where the influx of Somali's displaced by a ravaging famine remains high, on July 23, 2011. The European Union Aid Commissioner Kristalina Georgieva has vowed to do all that is possible to help 12 million people struggling from extreme drought across the Horn of Africa, boosting aid by 27.8 million euros ($40 million). The funds come on top of almost 70 million euros ($100 million) the bloc has already contributed as assistance in the worst regional drought in decades, affecting parts of Ethiopia, Kenya, Somalia, Djibouti and Uganda. (Tony Karumba/AFP/Getty Images) #

IMPACTS OF CLIMATE CHANGE

Effect of drought on livestock

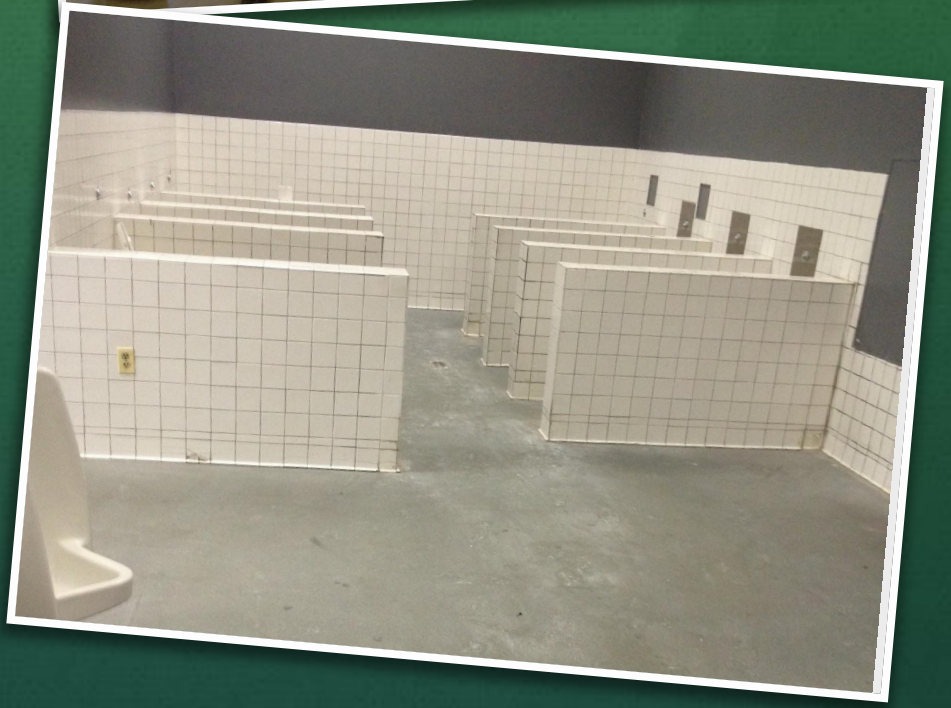
Famine in East Africa

- Worst drought in 60 years
- 15 million affected
- ~100,000 dead
- Crop failure caused by drought/climate change
- African BoldFOOD Fellows state that ***unpredictable, variable*** nature of rains contributes to famine
- Unpredictable floods destroy crops
- Extended drought results in crop failure

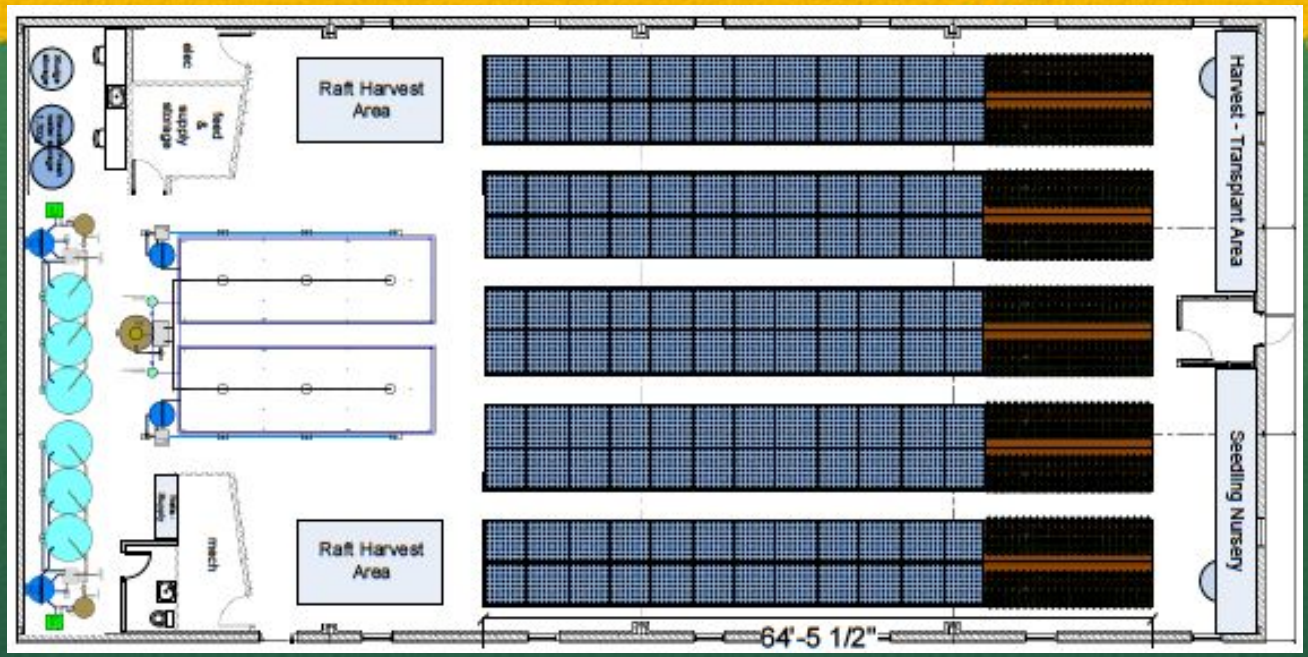
Climate Buffer

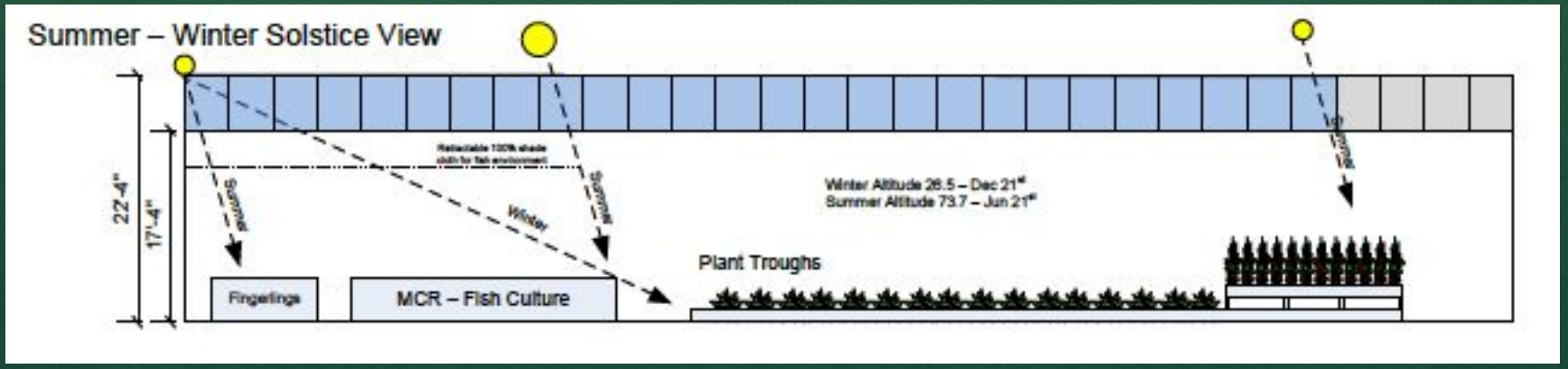
- Aquaponics represents water storage to fill during floods, and efficient use during droughts

Prison Aquaponics



Prison Aquaponics





Prison Aquaponics

- Up to 1600 people fed
- Final phase: 100% of food produced on campus and nearby greenhouses
- Operated and maintained by prisoners
- Job training
- Therapeutic value and pride of growing own food
- Cooperative: Denver Sheriff, Denver Mayor, CU Denver, Colorado Aquaponics, Urban Farm at Stapleton

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CLAS Farm to Fork Forum

UCD Homecoming Event

- A panel discussion about Denver Food System
- Interdisciplinary
  - Agricultural Anthropology: Moderator
  - Two Urban Farmers
  - ‘Denver Seeds’ politician
  - University academic
  - Chef
  - Poet

Interdisciplinary Nature

- Political sciences
- Climate sciences
- Biological sciences
- Agricultural sciences
- Communication
- Arts
- Philosophy
- Public Health
- Family planning
- Economics
- Hydrology
- Engineering
- Development
- Business
- Many more

Aquaponics: a promising solution to multiple problems

- Releases no pollution
- Uses water efficiently
- Does not require soil
- Converts compost into food
- Requires little space
- A ‘climate buffer’
- Intensive = jobs

Other Applications?

- Composting/Soil Building
- Nutrient Farming
- Wastewater Treatment
  - nutrients
  - pcp, endocrine disruptors
- Marine applications

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