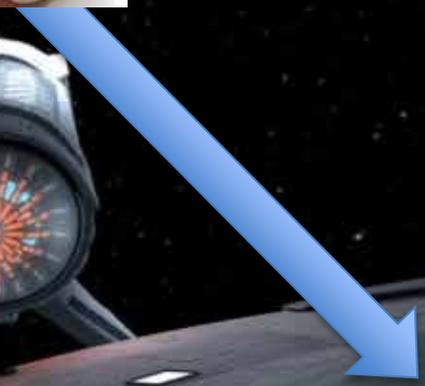
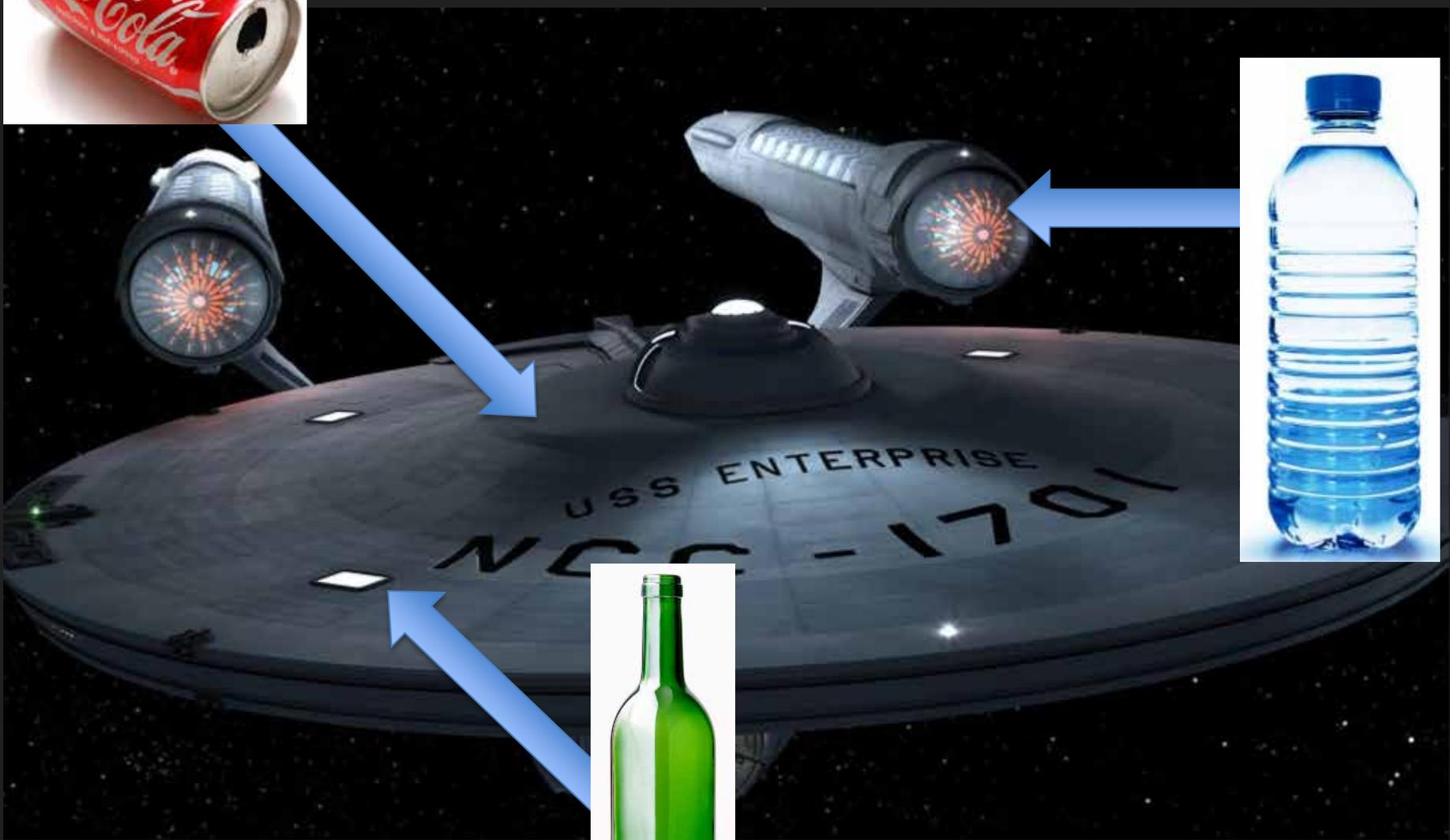


Food- the Final Frontier



Sally Brown
University of Washington



Food and solid waste

Every year, U.S. landfills and trash incinerators receive **167 MILLION TONS** of garbage.

> 50% of typical municipal garbage set out at the curb is compostable.

Landfills and incinerators are dangerous.
Every bag thrown out contributes to:



Pollution of surrounding
soil, air, and water



Climate change



Health hazards to
humans and animals



21% is food scraps alone

15% paper/paperboard

8% yard trimmings

8% wood waste

But it starts before that

And while food diversion from landfills is *TERRIFIC*

And while compost puts those scraps to good use

Actually eating the food is even better



Long Journey



It takes a lot of time, energy and water to grow food

The New York Times | U.S.

The average American consumes more than 300 gallons of California water each week by eating food that was produced there.



TWO OUNCES OF RICE

15.1 gallons



16 ALMONDS

15.3 gallons



TWO OLIVES

1.4 gallons

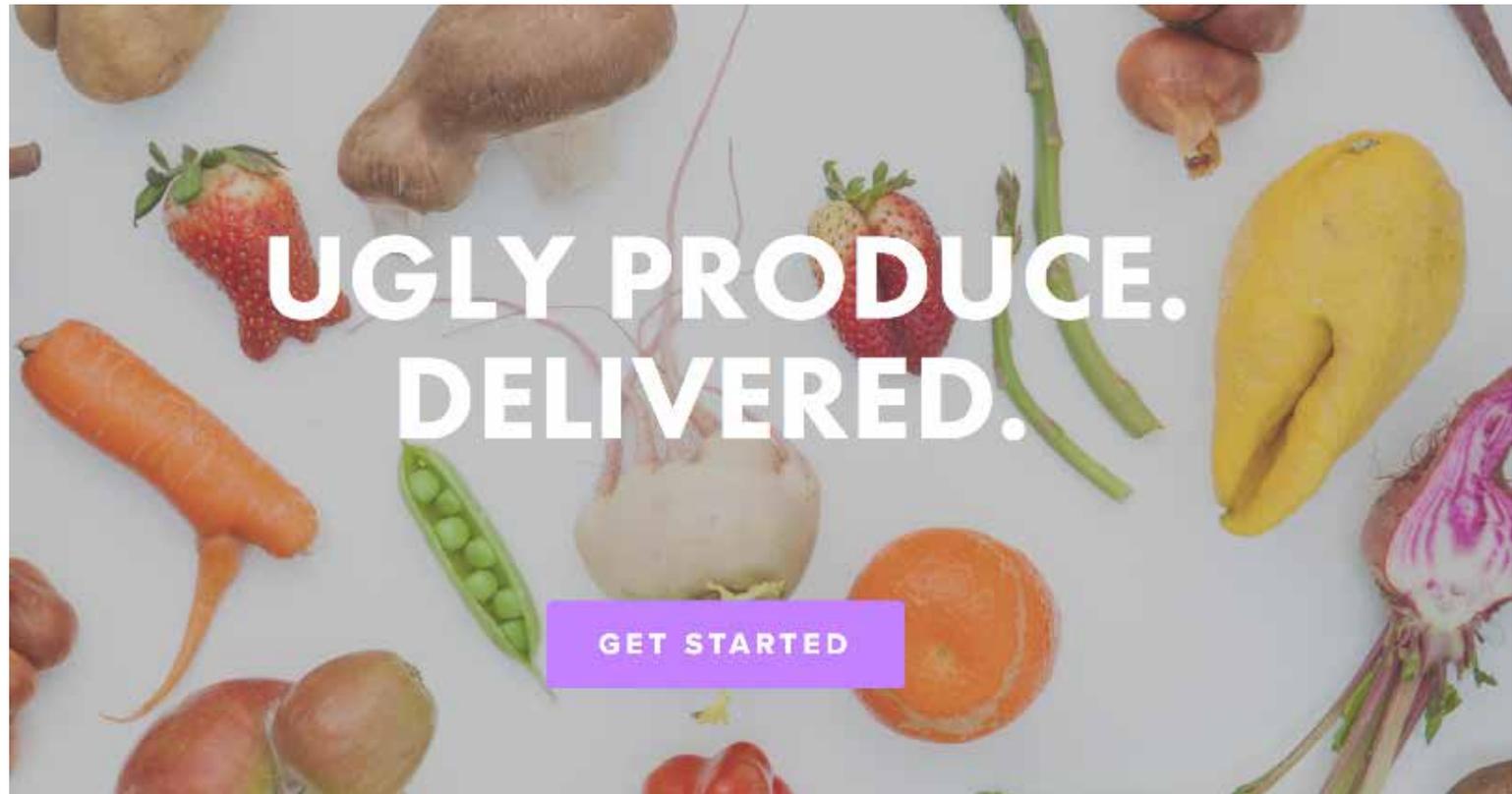
So the best thing to do with it is eat it



Danger Zone- how many have one?



Changes in our understanding of what is marketable



Take advantage of other appetites



Feeding Food Wastes to Swine ¹

University of Florida IFAS Extension

M. L. Westendorf and R. O. Myer²

The feeding of food waste or garbage to swine and other livestock animals is a common practice throughout the world and is often concentrated around metropolitan centers. Food plate waste (formerly referred to as garbage) may be fed to other livestock species, but has most often been used as a source of feed for swine. High disposal costs and fees encourage the feeding of food/plate waste.

If not for money- for people



Gleaning programs

- Work with farms
- Work with urban agriculture
- Work with urban homeowners



Tacoma, WA



- 33,000 lbs tree fruit
- 110,000 lbs total food 2015

How many have fruit trees in their yards?

Save Seattle's apples! City Fruit will show you how to help

📅 APRIL 12, 2015 9:39 PM | Comments Off | 📌 GARDENING | HOW

[TO HELP](#) | [WEST SEATTLE NEWS](#)



Community garden giving plots



Moving to retail....

- What to sell
- What to do with what doesn't sell



New types of grocery stores



Listen

Watch

Schedules

Programs

Give

News ▾

Arts & Culture ▾

Living ▾

Family

Events

Trader Joe's Ex-President Opens Store With Aging Food And Cheap Meals



Facebook



Twitter



Email



Comments

Thursday, June 4, 2015

Curt Nickisch / NPR



PHOTO BY JESSE COSTA WBUR

Daily Table opened its doors Thursday with shelves full of surplus and aging food.

The [nonprofit grocery store](#) is in the low-to-middle income Boston neighborhood of Dorchester. It's selling canned vegetables two for \$1 and a dozen eggs for 99 cents. Potatoes are 49 cents a pound. Bananas are 29 cents a pound.

In the preparation kitchen, Marilyn Bush

Finally – How we purchase and prepare food

College Cafeterias Are Going Trayless

September 15, 2009 by [PARTYSUGAR](#)



Even if we do all that- we still get some
of this



10,000,000 people



How much food waste?

- 10,000,000 people x 30 kg food waste per person =?
- How many tons is that?
- Even if you cut that in half
- 10,000,000 people x 15 kg food waste per person =?

If that goes to a landfill



New and Improved **US EPA WASTE Reduction Model**



Year 0-1
0% efficiency



Year 2-4
50% efficiency

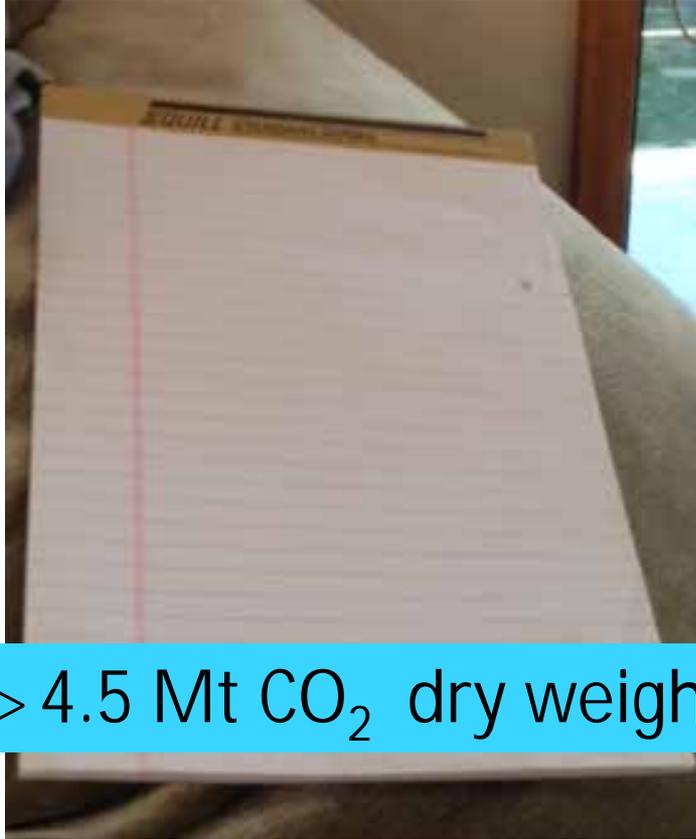


Year 5-14
75% efficiency

US EPA WASTE Reduction Model



> 7 Mt CO₂ dry weight

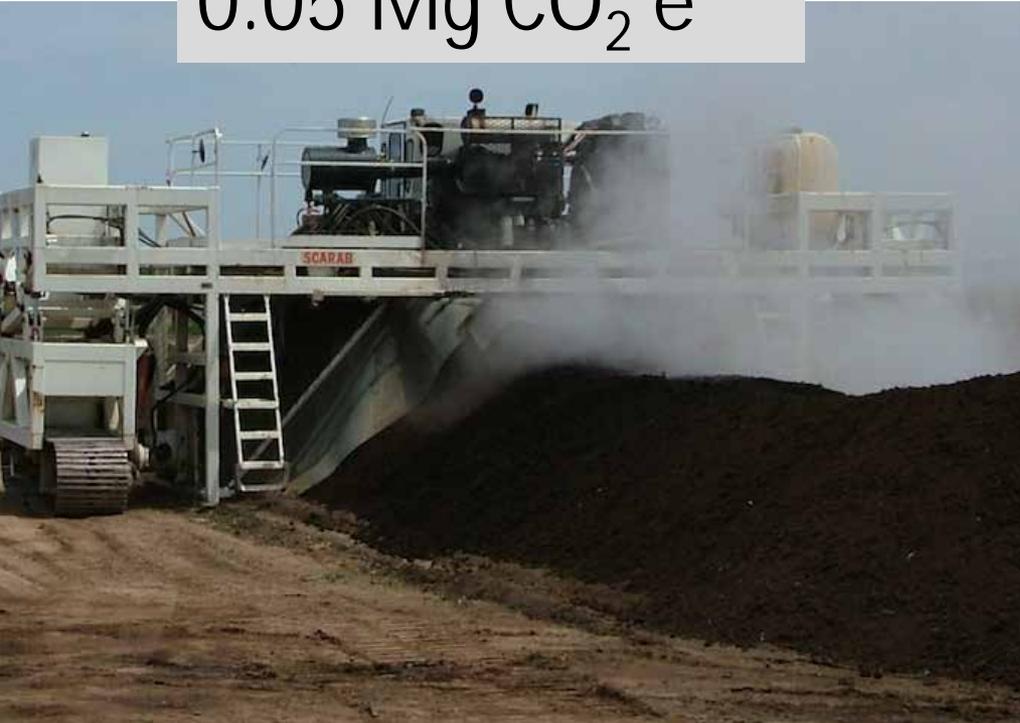


> 4.5 Mt CO₂ dry weight

- Not perfect but
- Much more palatable

Fugitive emissions Composting versus Landfilling Food

0.05 Mg CO₂ e



0.79 Mg CO₂ e



Soil Value

- -0.24 MtCO₂e per ton for C storage with mention of other values not quantified



Sum Total

- WARM model
 - Net benefit for landfill diversion and composting food scraps = 0.71 tons CO₂ per WET ton food scraps (includes soil carbon credit)
 - Strong motivation for diversion

So how many Carbon credits in MI?

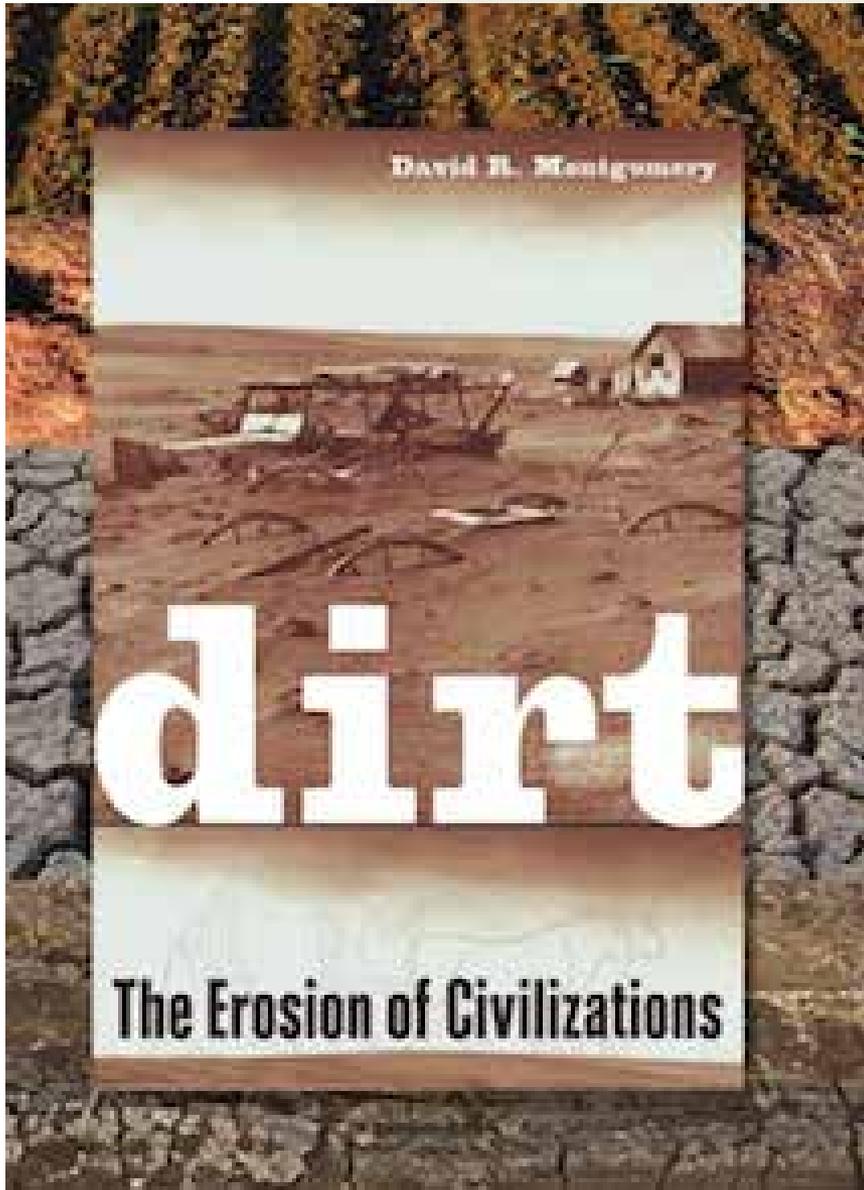


Tons of food
waste
produced x
0.7 tons CO₂
per ton of
food waste =
?

Plus you make soil!



David Montgomery



He reminded us

**DESPITE ALL OUR ACCOMPLISHMENTS
WE OWE OUR EXISTENCE TO
A SIX-INCH LAYER OF TOPSOIL
AND THE FACT IT RAINS.**



**FARM EQUIPMENT ASSOCIATION
OF MINNESOTA AND SOUTH CAROLINA**

Making soil takes a very long time

- Rate of soil formation
 - 0.058 to 0.083 mm yr⁻¹
 - 1875-1900 years to replace top 15 cm



Unless you have a compost facility or a WWTP



- 7 million people
 - 30 kgs biosolids
 - 40 kgs food/yard compost
- 70 kgs per person per year

How much soil?

- 10 million x 70 kg =
 - 700,000 tons of soil per year
 - ? tons per day
 - ? tons per hour



2,500 tons soil
per hectare



- Rate of soil formation
 - 0.058 to 0.083 mm yr⁻¹
 - 1875-1900 years to replace top 15 cm

- 1 hectare soil
 - MI State organics
 - How many days per hectare?
 - How many hectares per year?

Soil

Ecosystem accounting

- Attempt to put a value on the services we get from nature
- 1997 Ecosystem services worth \$33 trillion annually
- 17% of New Zealand GDP from soil



You are also making good soil



Compost 101: Growing Power Style

Food Waste

It all starts with food waste – food waste literally by the truck load. Not only does Growing Power compost all of our farm waste in Milwaukee, Merton, and Chicago, but we also pick-up food waste from Maglio's Produce, Beans and Barley, Garden Fresh, and Outpost Natural Foods Cooperative in Milwaukee, just to name a few.

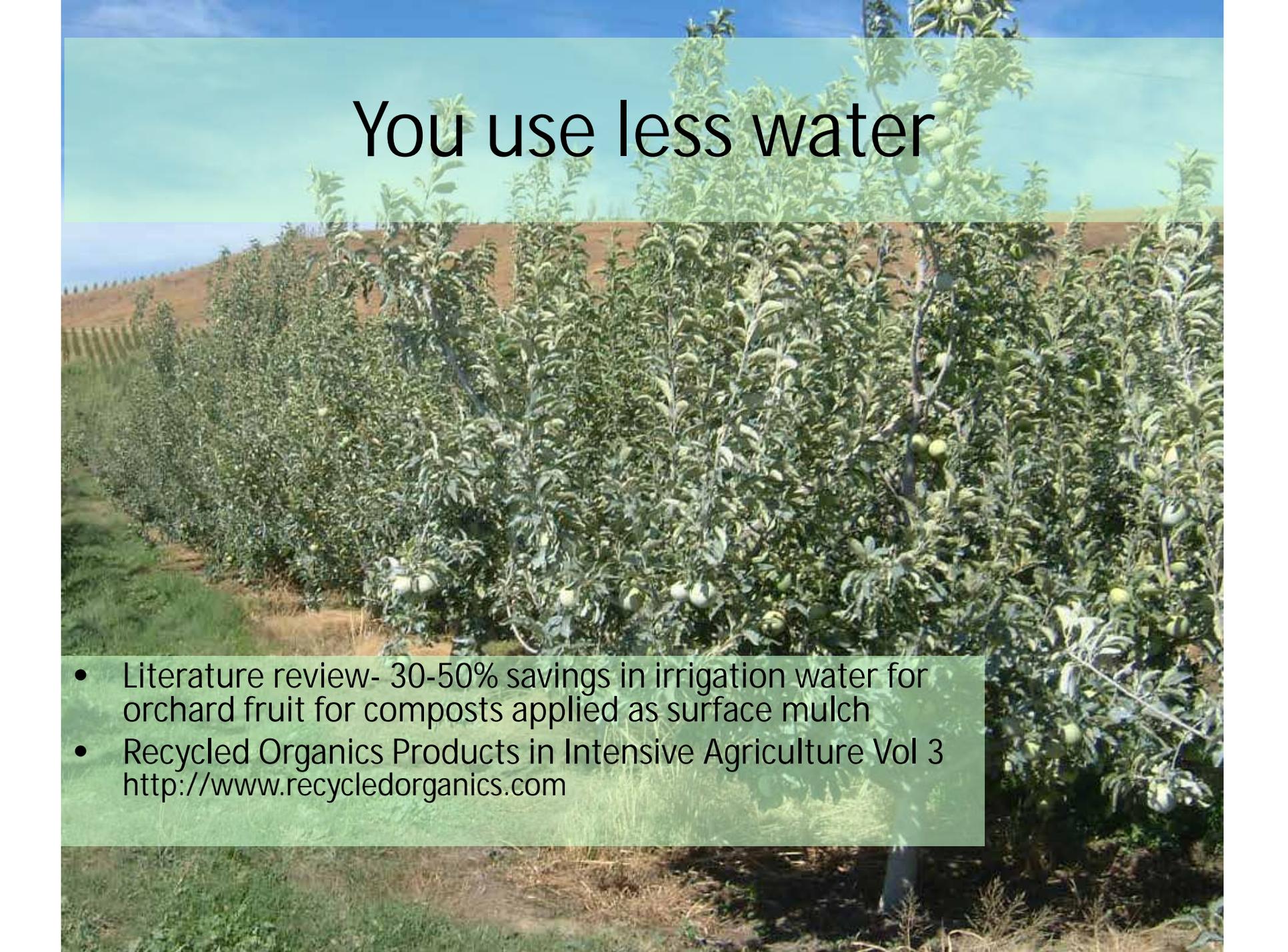


Primary benefit

You get more food- right back to the beginning



You use less water

The background image shows a well-maintained orchard with rows of young trees. The trees are covered in green leaves and small, round green fruits. The ground is covered with a layer of brown mulch. In the background, there are rolling hills under a clear blue sky.

- Literature review- 30-50% savings in irrigation water for orchard fruit for composts applied as surface mulch
- Recycled Organics Products in Intensive Agriculture Vol 3
<http://www.recycledorganics.com>

Almonds cast as water war villain



- 1 lb almonds requires 276 gallons of water
- CA state grows over 2 billion pounds of almonds on 840,000 acres



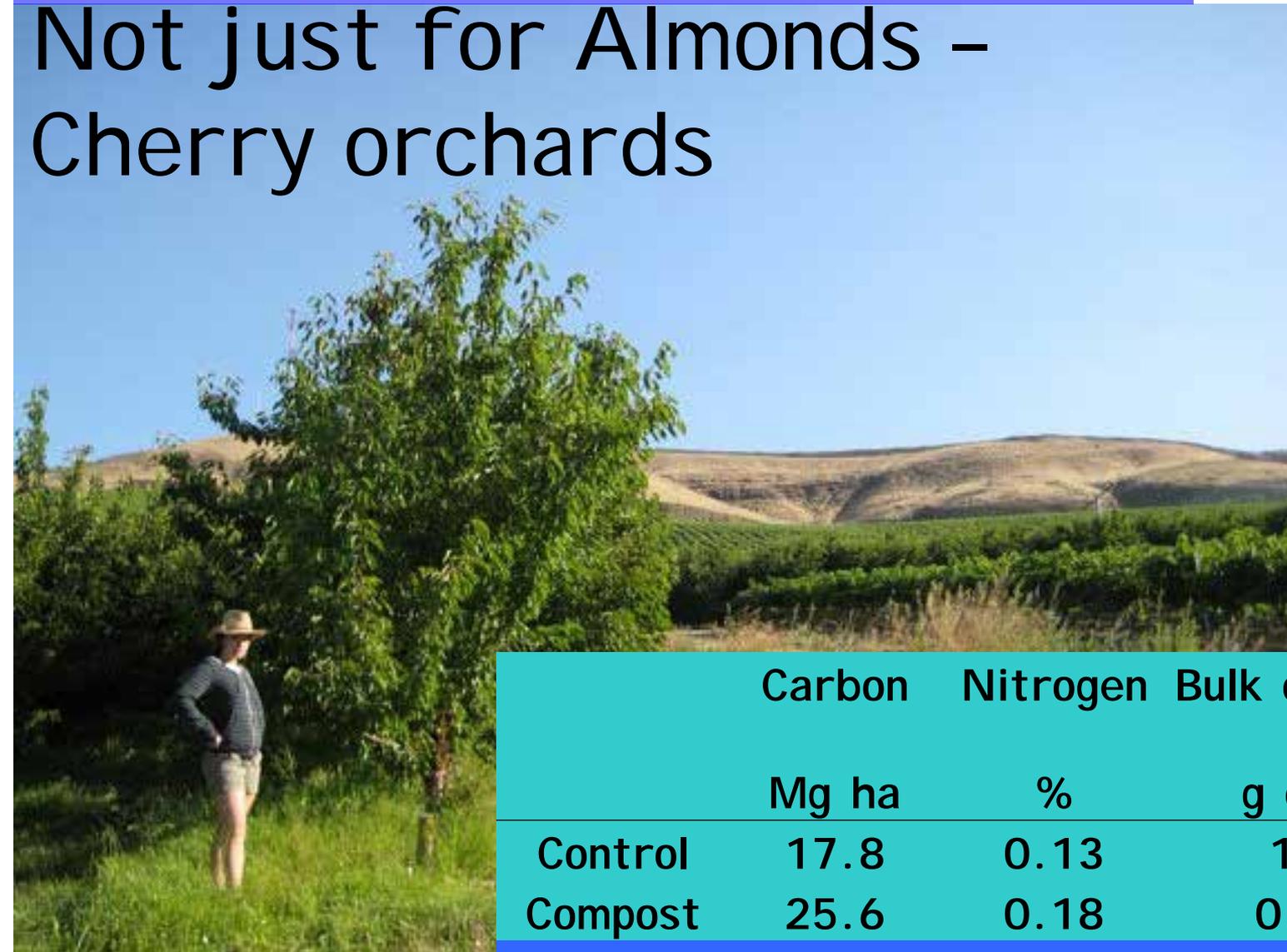
Irrigated orchards

- A 20% water savings = 27.5 gallons per lb
- Or 111 billion gallons for the State crop
- Or > enough for LA + San Diego



Water efficiency

Not just for Almonds - Cherry orchards



	Carbon Mg ha	Nitrogen %	Bulk density g cm ³	Water 0.1 bar
Control	17.8	0.13	1.2	0.31
Compost	25.6	0.18	0.89	0.48
% Change	144	138	74	55%

You recycle nutrients

'the only means to confront the decline in reserves (other than conversion from domestic to imported P) is to develop a more coherent and integrated program of P (and other nutrient) re-cycling.'

Amundson et al., 2015 Science



You make soils safer

Orchard soils- Pb/As contamination

EXCLUSIVE METRO



Why NYC's toxic community gardens may give you cancer

By Gary Buiso

May 4, 2014 |



READ NEXT: [Baristas feeling the grind](#)

The New York Times

Dining & Wine

WORLD U.S. N.Y. / REGIO BUSINESS TECHNOLOGY SCIENCE HEALTH SPORTS OPINION

FASHION & STYLE DINING & WINE HOME & GARDEN WEDDINGS&

High Lead Found in City-Sourced Eggs



Michelle V. Agran/The New York Times

Homeowners who keep chickens in their backyards have little way of knowing whether their eggs might be contaminated unless they have them tested themselves.

Benefit: Reduces
availability of
contaminants in soils
Attanayake et al., 2014



Tagro+
dolomite
added

Control

Does this mean all food scraps will end up in a bin or a pile rather than a can?



Retail level-Complex process



Home owner: Complex process



Municipal Complex process



Composter: Complex process



Markets: Complex process



Local Level- a great way to start



And you are already doing it



Why^{we} COMPOST

Well it's simple.

We can take something that would have wasted and make something good from it,
and no one else does it.

You already have a local hero

Pashon Murray



Major Issue

Two goals of food waste composting



To make beautiful compost



To take organics out of the landfill



Shuttered Peninsula Compost misses shutdown targets

- The Quest stands upon the edge of a knife. Stray but a little, and it will fail, to the ruin of all. Yet hope remains while the Company is true

- **Michigan and Regional Sustainable Food Management Resources**

- Food Rescue

- Food Bank Council of Michigan
- Phone: 517-485-1202 or 800-552-4483
- Email: fbcм@fbcмich.org
- Website: www.fbcмich.org/

- Feeding America West Michigan

- Phone: 616-784-3250
- Email: andrews@feedwm.org
- Website: <https://www.feedwm.org/>

- Forgotten Harvest

- Phone: 248-967-1500
- Email: info@forgottenharvest.org
- Website: <http://www.forgottenharvest.org/>

- Pollution Prevention and Stewardship
- Michigan Department of Environmental Quality
- Office of Environmental Assistance
- Debbie Swartz
- Phone: 517-284-6903
- Email: swartzd@michigan.gov,
- Website: <http://www.michigan.gov/deqp2>

- Composting
- Michigan Department of Environmental Quality
- Office of Waste Management and Radiological Protection
- Duane Roskoskey
- Phone: 517-582-3445
- Email: roskoskeyd@michigan.gov
- Website: http://www.michigan.gov/deq/0,1607,7-135-3312_4123_4629-185537--,00.html

- Detroit Dirt
- Phone: 313-397-1613
- Email: info@detroitdirt.org
- Website: <http://detroitdirt.org/>

Anaerobic Digestion

Michigan State University

Dana M Kirk, Ph.D., P.E.

Phone: 517-432-6530

Email: kirkdana@msu.edu

Website: <http://www.egr.msu.edu/bae/adrec/>

Recycling

Michigan Recycling Coalition

Phone: 517-974-3672

Email: info@michiganrecycles.org

Website: <http://www.michiganrecycles.org/>

Sustainable Management of Food

US Environmental Protection Agency

Sustainable Management of Food

<http://www.epa.gov/foodrecoverychallenge>

US Environmental Protection Agency

Sustainable Food Management Webinar Series

<http://yosemite.epa.gov/R10/ECOCOMM.NSF/climate+change/sustainablefoodwebinars>



Climate Math To Drive Community Action
or
Learning with Numbers

Examples make things real

- Great communication tool
- Way to apply science to everyday life
- What better tool in the PNW than coffee?
 - The flat white is excellent



Coffee an integral part of culture



(Coffee and devices)

The grinds



300 cups per store per day



- 30 g of grounds per cup
- How many kg per store per day?

$$\underline{30/1000 \times 300 = 9 \text{ kg}}$$

– Hint 1000 g = 1 kg

- How many Mg per store per year?

$$\underline{9/1000 \times 365 = 3.3 \text{ Mg/yr}}$$

– Hint 1000 kg = 1 Mg

University Village



- 3 Starbucks in 1 mall
- How many Mg per year?

$$\underline{3.3 \times 3 = 9.9 \text{ Mg per year}}$$

- 20,000 stores worldwide
- How many Mg per year?

$$\underline{3.3 \times 20,000 = 66,000}$$

Directly to Soil

- N = 2.28% (0.0228)
- P = 0.06% (0.0006)
- K = 0.6% (0.006)
- For each ton (1 Mg) of grounds how much N, do you have? _____ $1000 \text{ kg} \times 0.0228 = 22.8 \text{ kg}$
- Across the world- how much N do you have?
- 198,000 $\times 23 = 1\,518\,000$
- At 100 kg per hectare- how many hectares could you fertilize? _____ $1\,518\,000 / 100 = 1\,518$

Decentralized collection and composting in the absence of municipal mandated collection

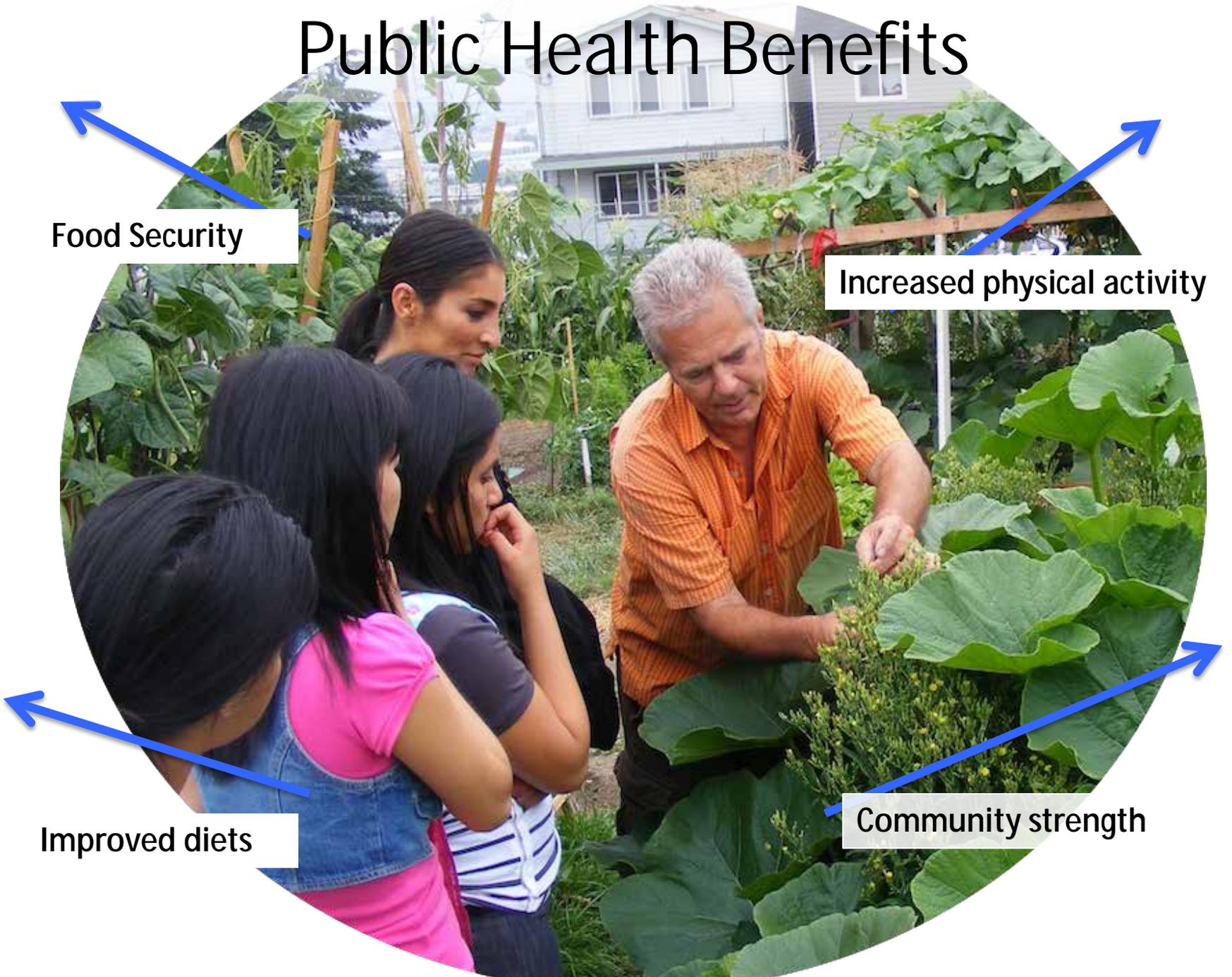
Red Hook, Brooklyn- sponsored by the NY Dept of Sanitation



Urban Agriculture



Public Health Benefits



Food Security

Increased physical activity

Improved diets

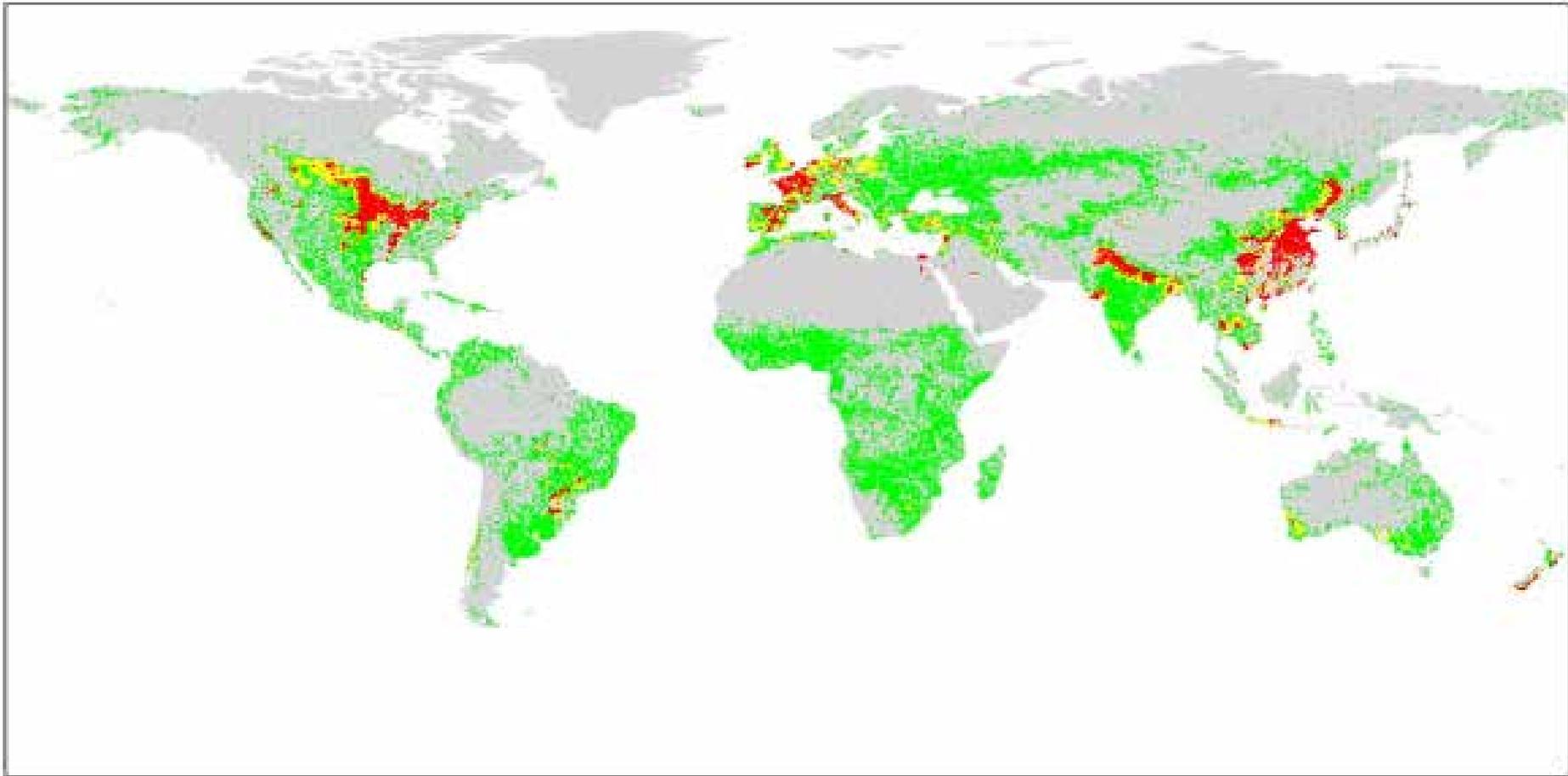
Community strength

Not just for Grist readers



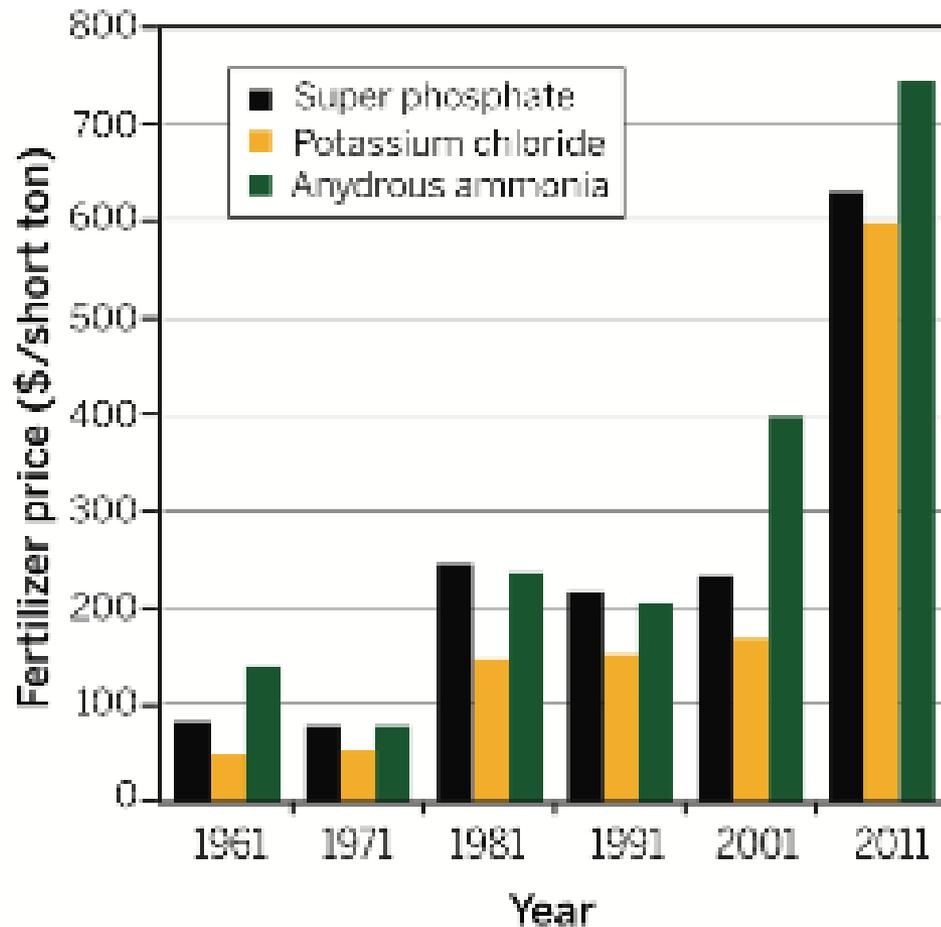
Planetary boundaries

A Phosphorus



Steffen et al., 2015 Science

Case of Phosphorus



Amundson et al., 2015 Science