

WBNERR

**Urine Diversion
Workshop
May 30, 2024**

Why Divert Urine?

Because ...

DIVERTING URINE

Reduces Water Pollution

Conserves Water

Produces Fertilizers

Reduces Costs

**Reduces Greenhouse Gas
Emissions**

Is - low tech

- reliable

- durable

Urine is extremely high in nutrients which cause water pollution

**Excess growth of algae
Toxic cyanobacteria blooms**



**Lack of oxygen
Fish kills**



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Where do the nutrients in the urine come from?

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From the food we eat:

about 2000 pounds per person per year,
traveling an average of 1500 miles to the Cape



How many nutrients are imported onto Cape Cod every year?

460 MILLION pounds of food

6 MILLION pounds of fertilizers,
most for lawns and ornamentals

Most of those nutrients end up in our waters!!



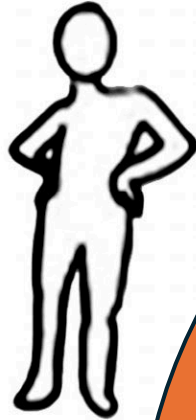
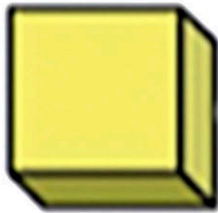
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How Much Nitrogen and Phosphorus is in Urine?

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One person's yearly volume of urine

URINE
120 gallons



8 lbs nitrogen
0.75 lbs phosphorus

URINE

Contains
80% of the nitrogen in
the waste stream but is
only 1% of the volume of
the waste stream

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Where Does Our Urine Go?

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Into our toilet, flushed away with

- 4000 gallons of drinking water, mixed with another
- 2000 gallons of drinking water for feces and another
- 6000 gallons of greywater, together creating a waste stream of more than
- 12,000 gallons/pers/year going into our aquatic environments,

Polluting every waterbody on its way to the ocean and the ocean.



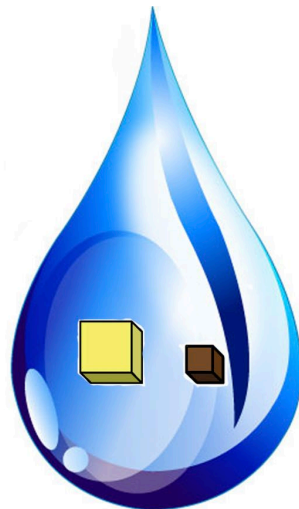
2000 gallons per person per year
to flush 15 gallons of feces



4000 gallons per person per year
to flush 120 gallons of urine



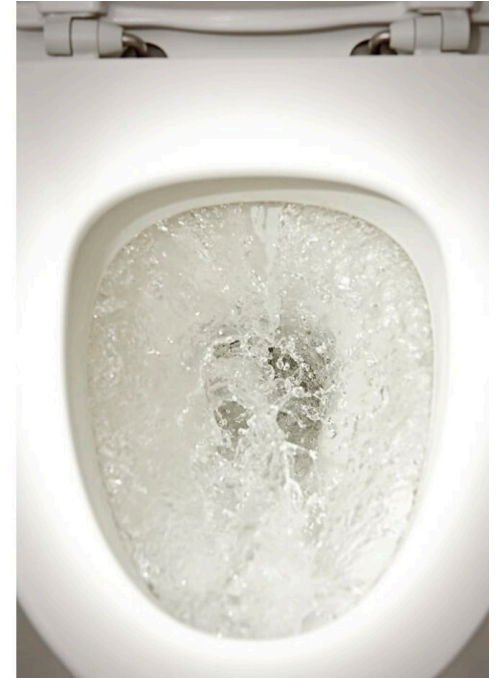
6000 gallons per person
per year greywater
(showers, laundry, cooking etc.)



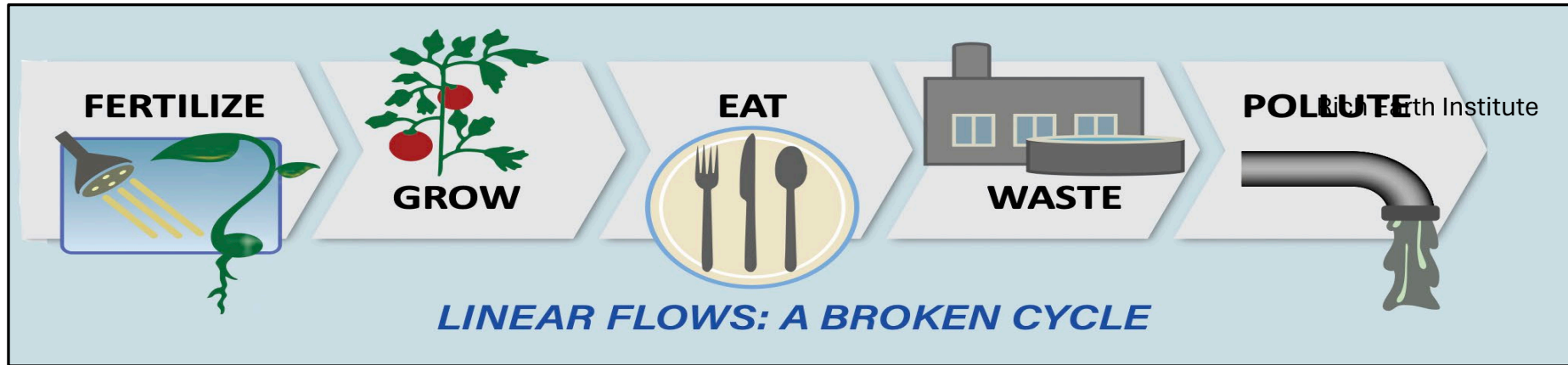
6000 gallons of flush water is mixed
with 6000 gallons of greywater to
produce 12,000 gallons of wastewater
per person per year.

Waterless urinals save 4000 gallons per person per year.

Waterless composting toilets save 6000 gallons per person per year.



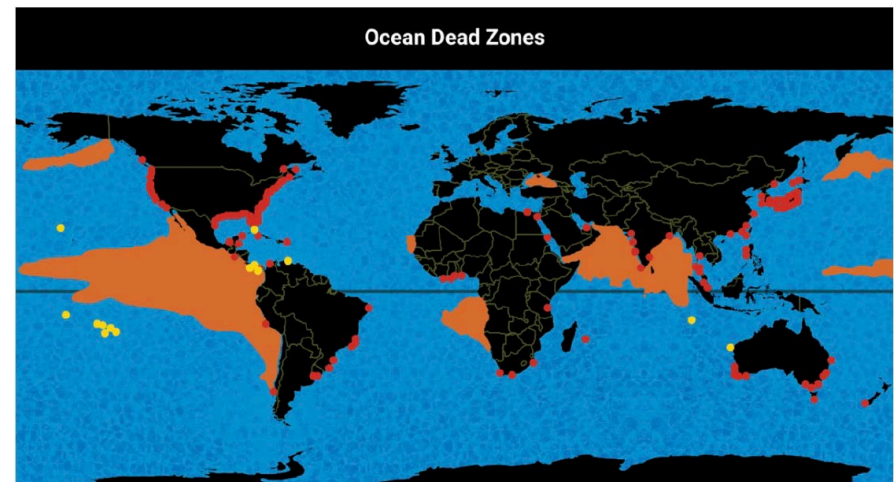
Waste of Water and Nutrients: Unsustainable, Polluting, Climate Changing

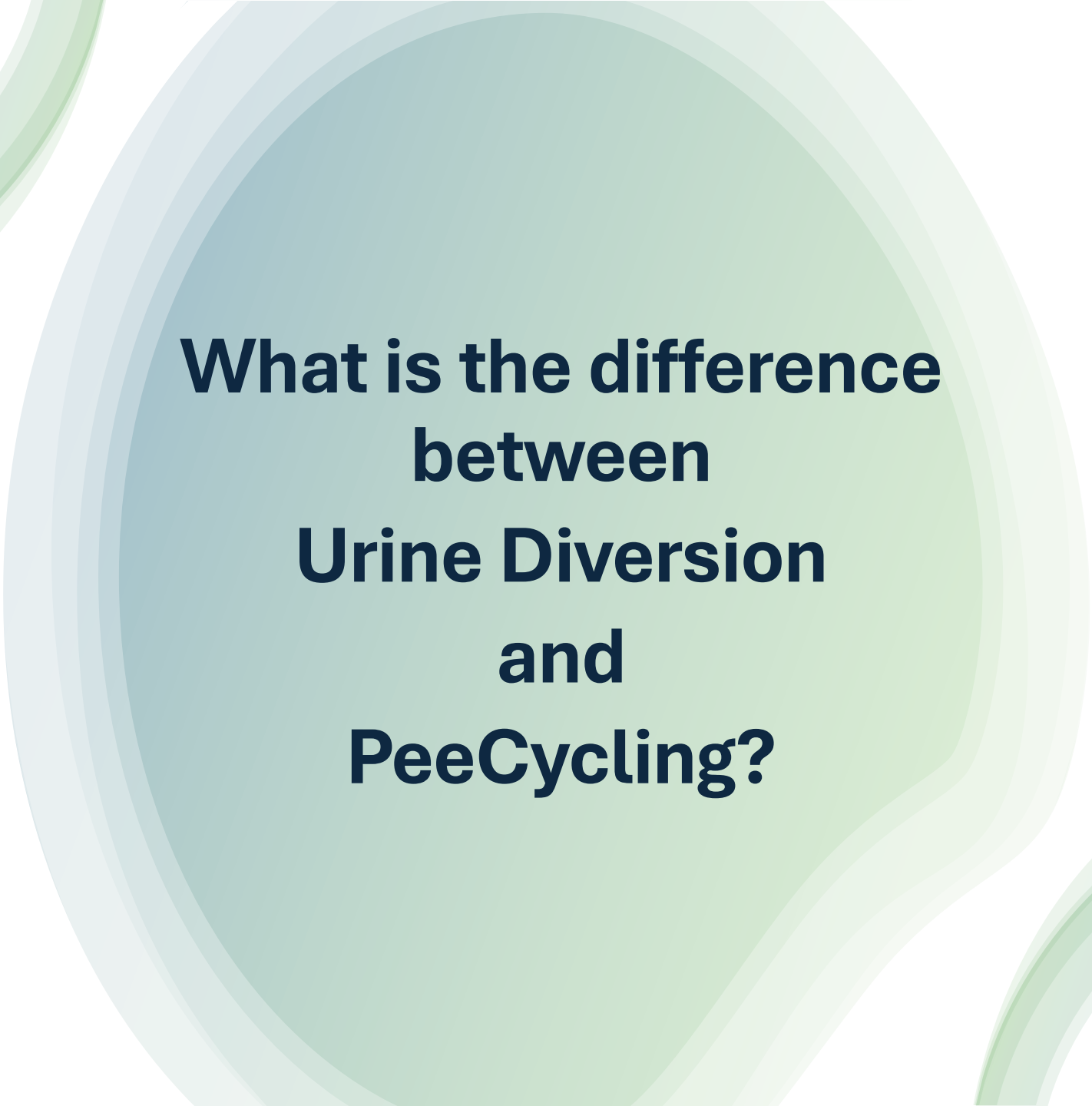


Cape's watersheds and coastal pollution



Ocean Dead Zones





**What is the difference
between
Urine Diversion
and
PeeCycling?**

Urine Diversion is the action of keeping urine out of the waste stream

- divert, collect and dispose of urine
- put the urine into compost toilet
- incinerate the urine in an incinerating toilet

PeeCycling collects, treats and reclaims urine for agricultural fertilizer

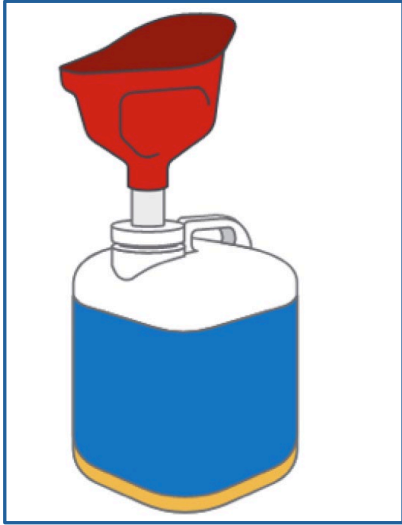
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What are some Urine Diverting Fixtures?



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Waterless Urinals



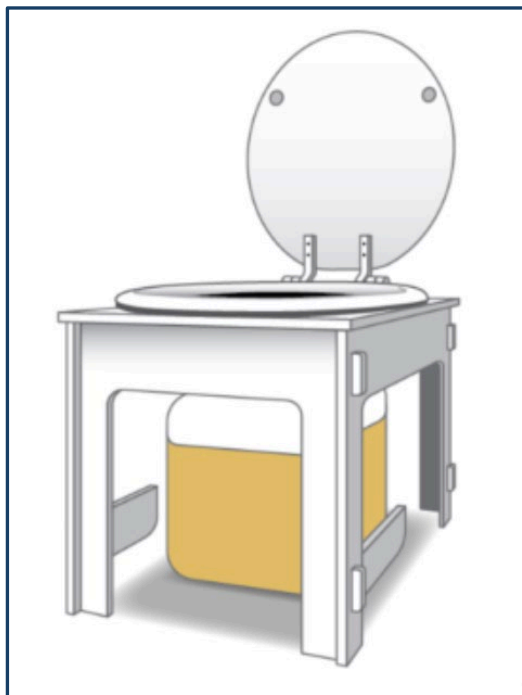
“Cubie”
\$80



“P-POD” Waterless, In-Wall Urinal
Est. \$200



Waterless Urine-Only Pee Toilets



Seated Pee-Toilet
\$275

Collected urine either carried away or piped to storage container in garage, basement or outside.



Cinderella Pee
\$529

Urine goes into pipe to storage tank outside or in basement



Seperett "Pee"
\$ 599

Waterless Incinerating Toilets



Cinderella® Freedom
\$4499



Cinderella® Travel
\$4449

All waste is incinerated. Incineration destroys all nitrogen and contaminants. Ashes contain all minerals (except nitrogen). Often used in combination with Pee only toilet to reclaim urine as fertilizer and reduce energy use.

Waterless Composting Toilets



BioLet 55
\$2255

Urine + Feces composting unit
under the toilet seat



Phoenix
\$7,700-8,700

Urine + Feces
composting unit
in basement below toilet

Waterless Composting with Separate Urine Diversion to Storage



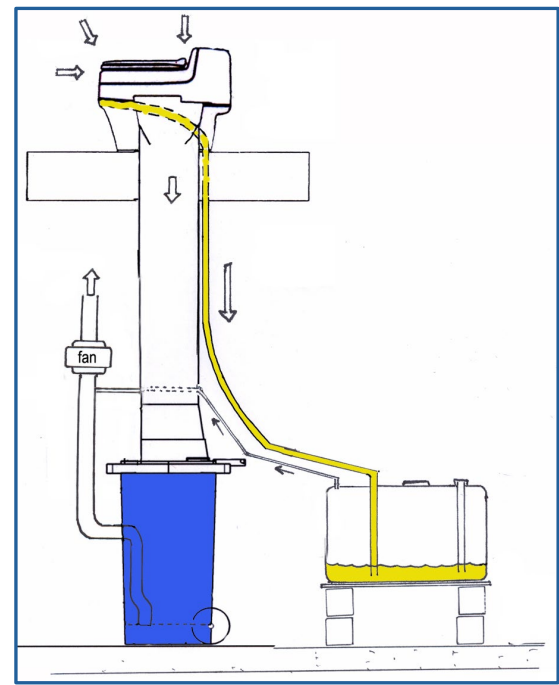
Separett "Villa"
\$989



Separett "Tiny"
\$999



BioLet "Mini"
\$1490



Separett/Full-Circle
\$5000

Urine diverted to storage tank.
Feces go into composting bin.



Nature's Head
\$995

Urine diverted to storage tank.
Feces collected in compostable bag under seat, removed to composter or discarded as trash.

Urine Diverting Flush Toilets



Wostman "EcoFlush"
\$700

Uses water to flush both feces and urine.

Uses less water than normal flush toilets.

Urine is diverted but **urine is diluted with every flush.**

Diluted urine needs twice as much storage, twice as much pump-out, twice cost of transport, and twice as much pasteurization.

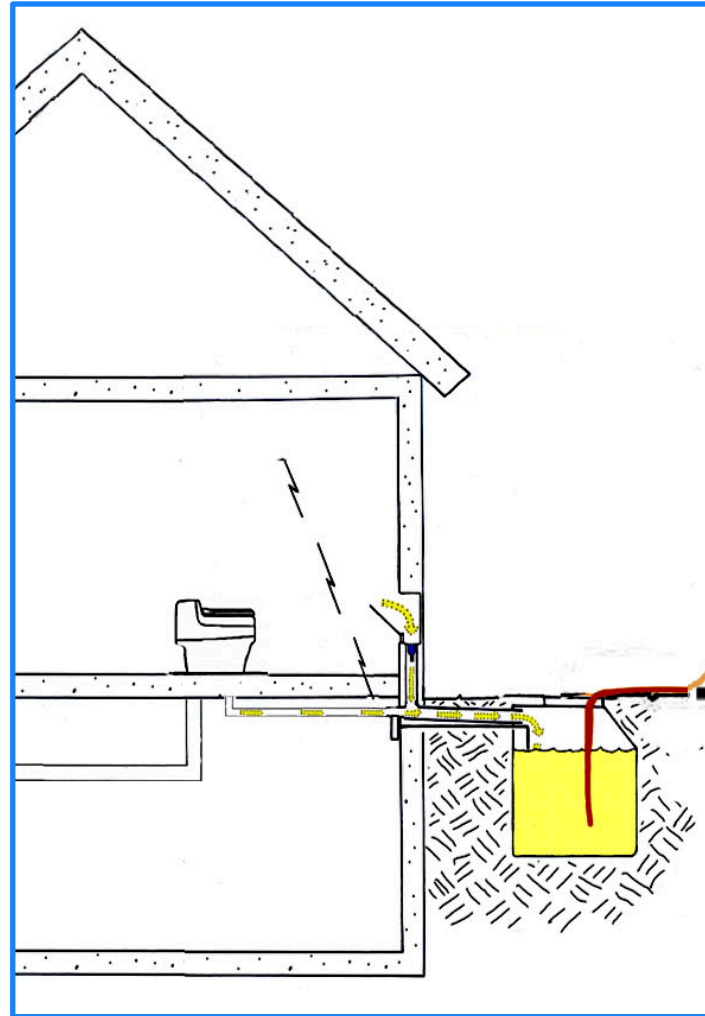
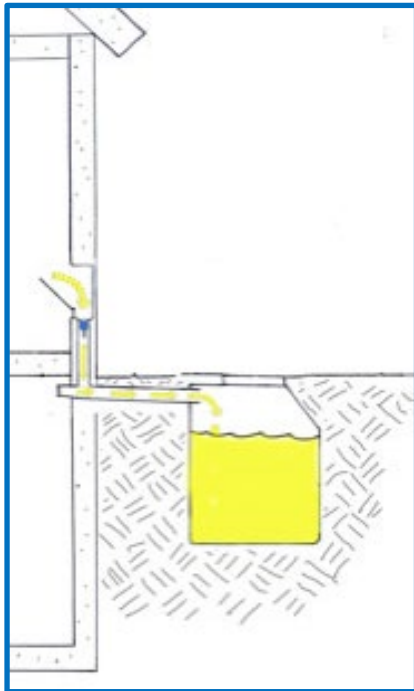
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How and Where does urine get stored?

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URINE STORAGE

Outside barred in-ground or in basement



URINE STORAGE SMALL AND LARGE



PUMP-OUT and HAULING to treatment facility



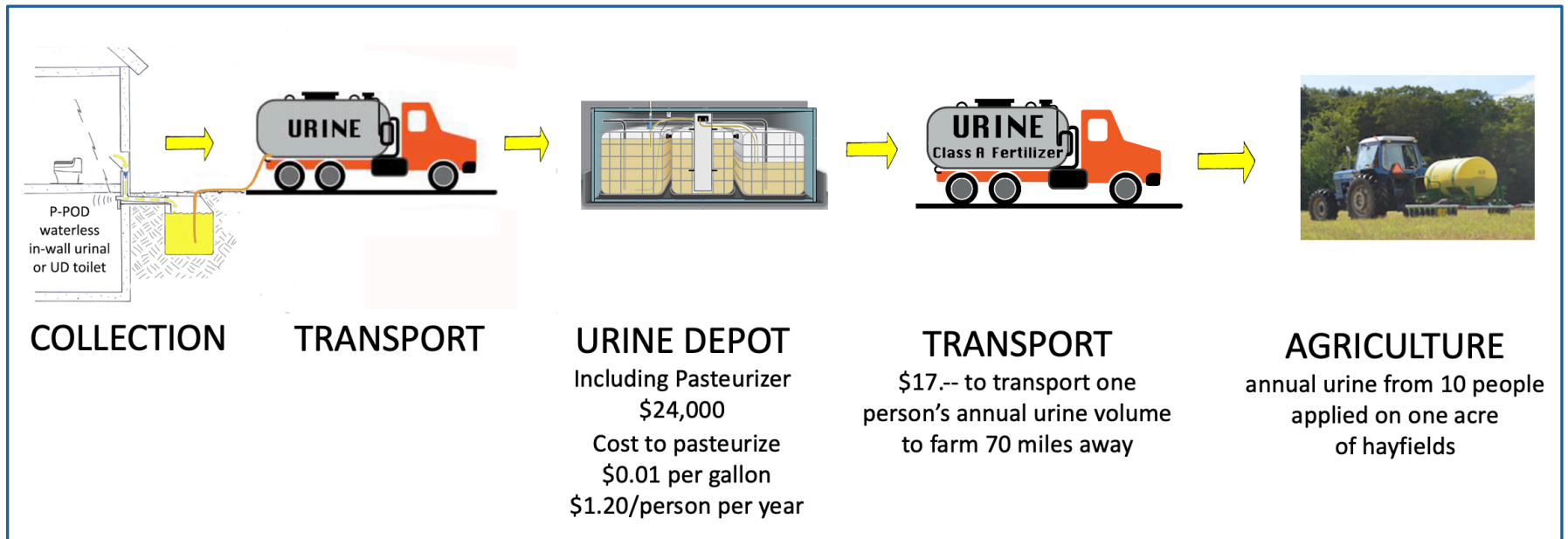
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What does community-scale Urine Infrastructure look like?

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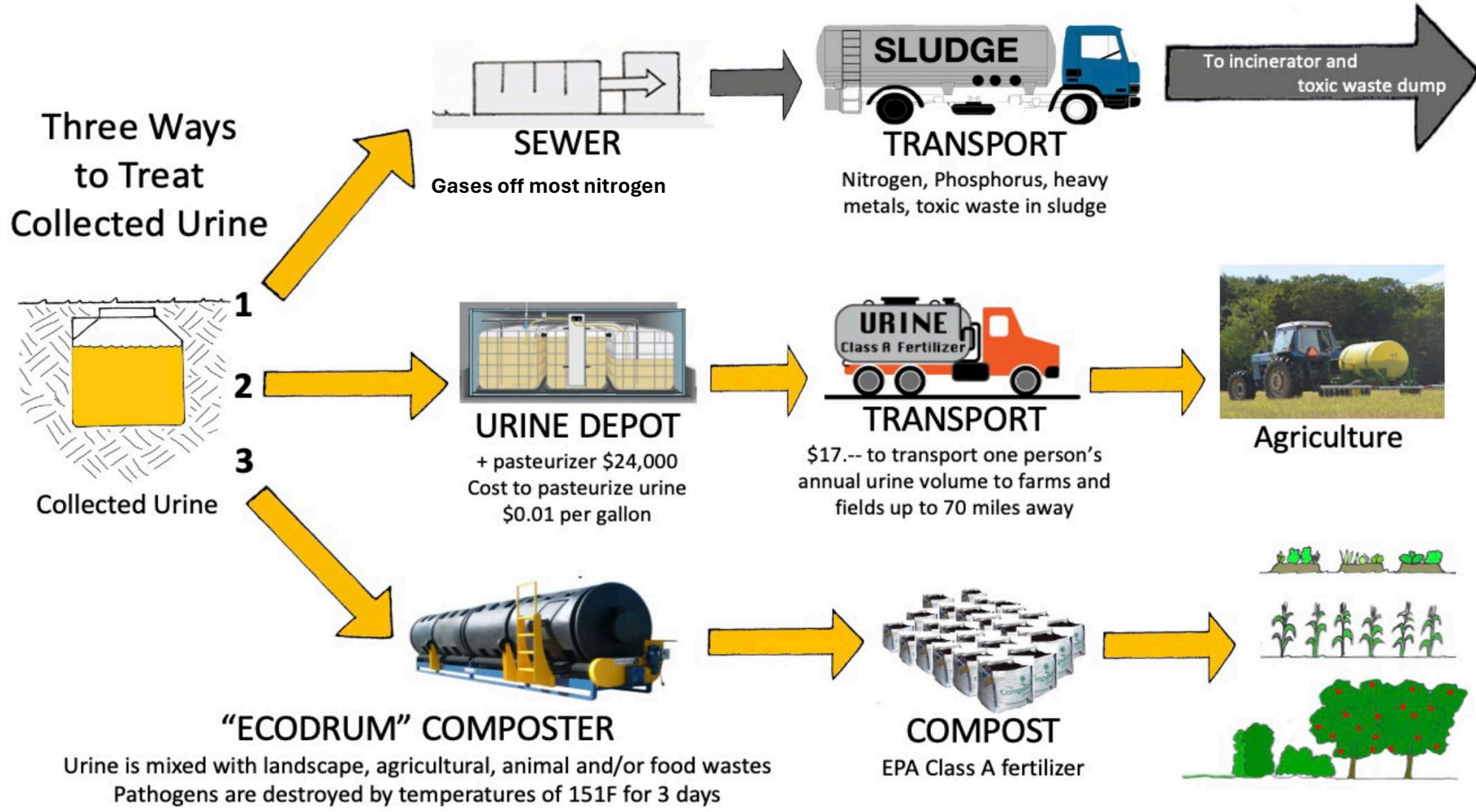
Urine Diversion Infrastructure

collects, treats and recycles urine
for agricultural fertilizer
on a community-scale



Community-Scale Urine Infrastructure

- 1 - Transport to local sewer plant for further treatment. Nutrients wasted.
- 2 - Transport to "Urine Depot". Pasteurize. Transport to farmers as Class A fertilizer
- 3 - Transport to "Ecodrum" in-vessel composter
 - Combine with landscape & food wastes. Produce compost fertilizer



Composting Urine with Organic 'Wastes'

Ecodrum Composter

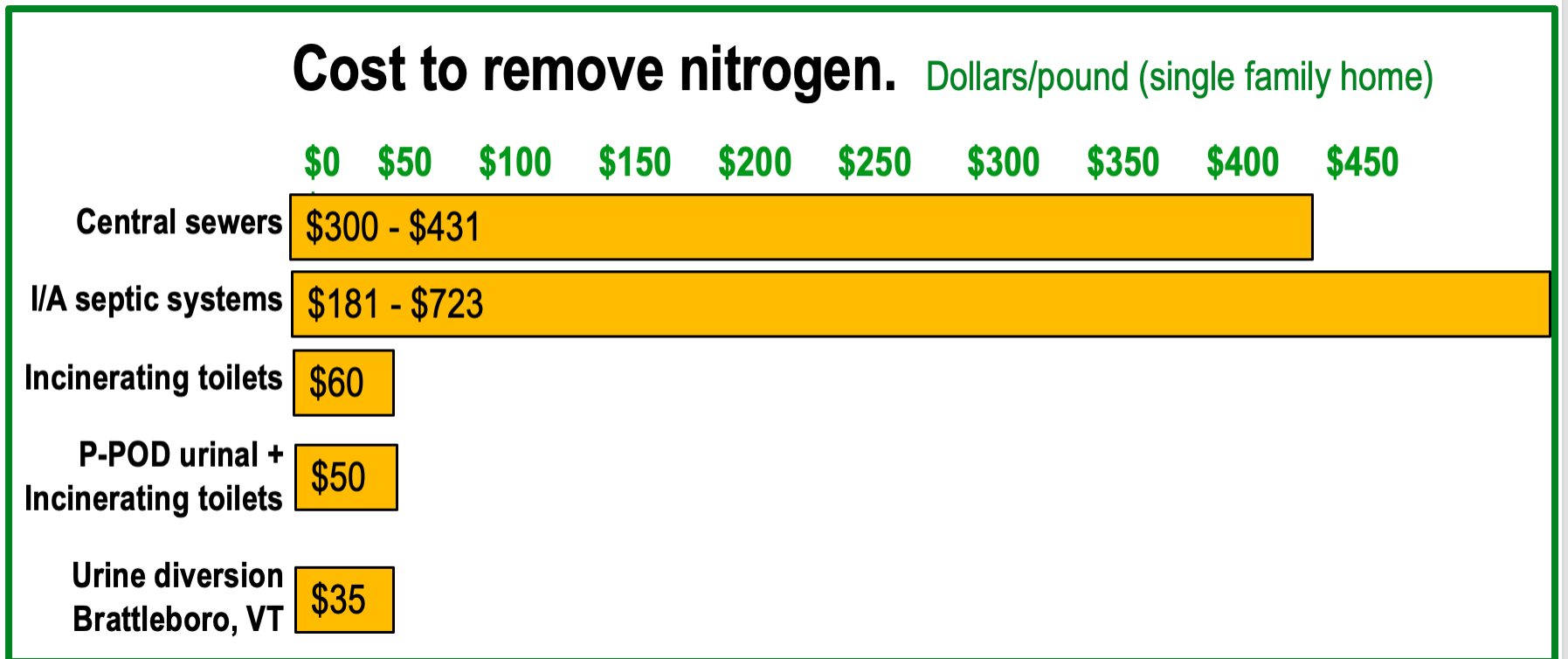


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What is the cost of removing nitrogen from the waste stream?

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An average adult produces 8 lbs of nitrogen in urine per year!



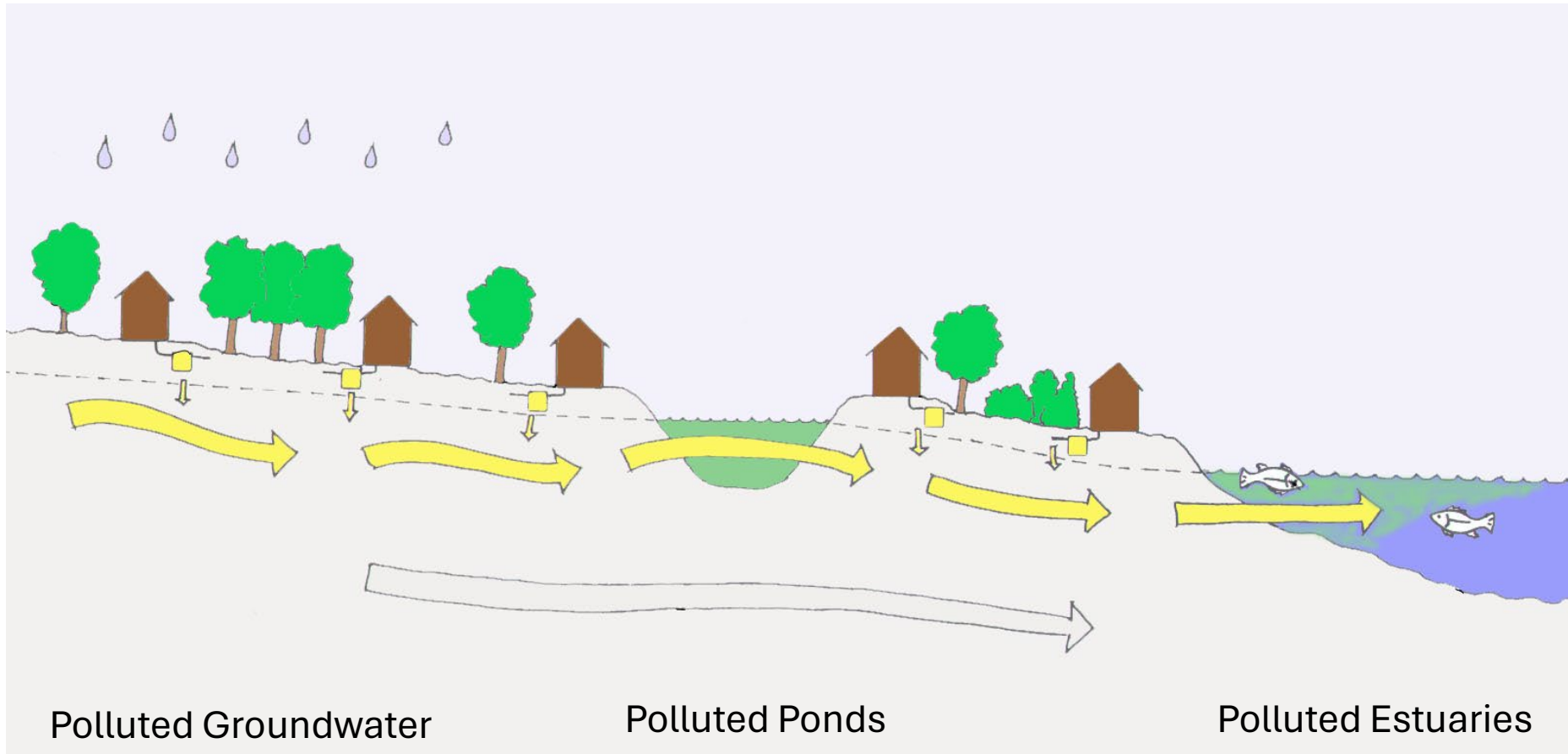
Cost of urine diversion does not include the savings on water and value of fertilizer

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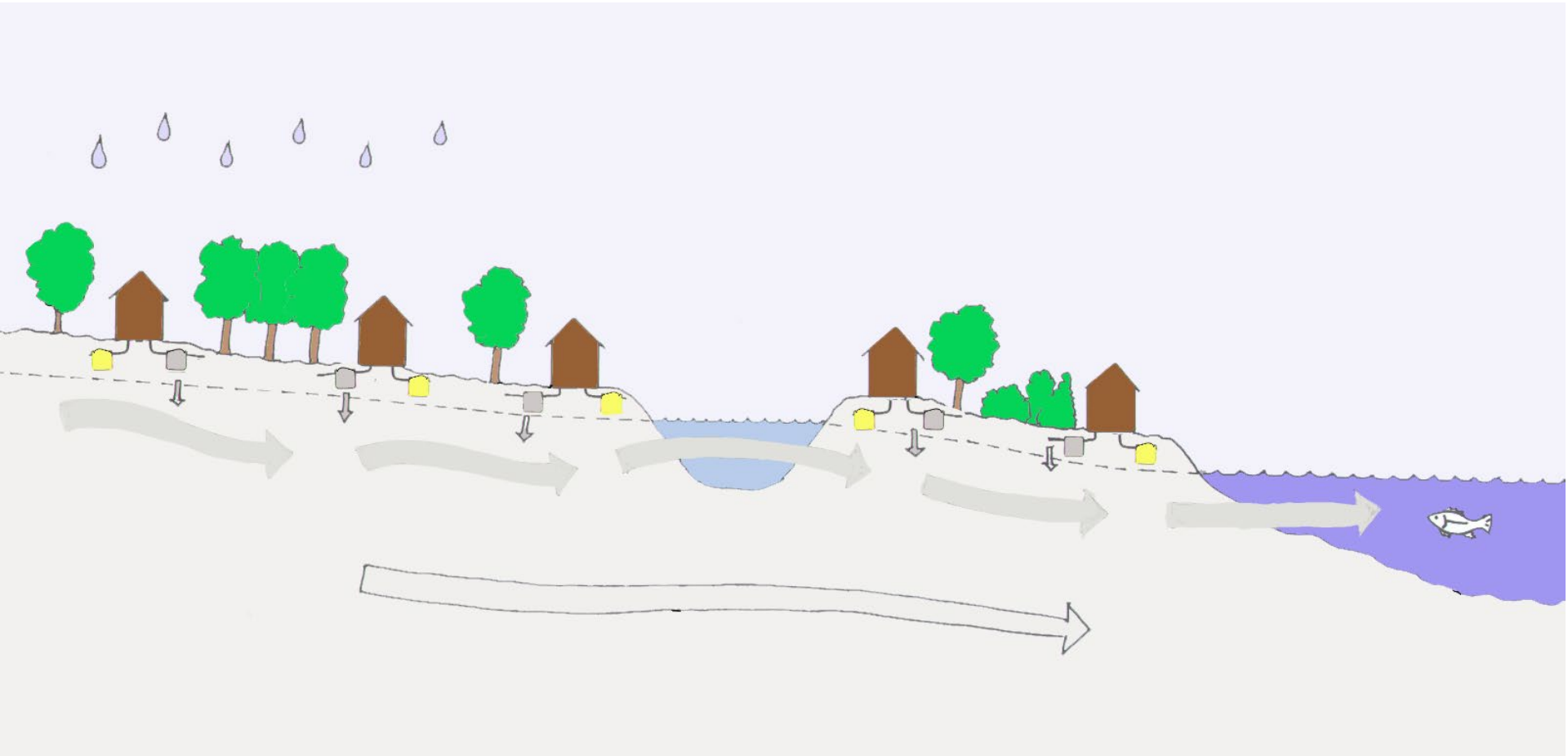
Urine Diversion:
the most cost effective,
quickest way
to reduce pollution in a Watershed

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Urine Pollution of a Watershed

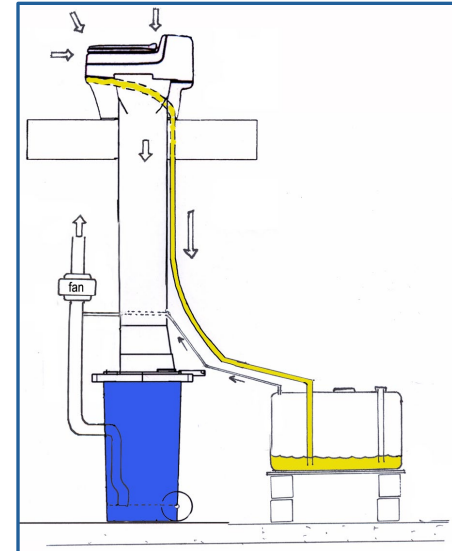
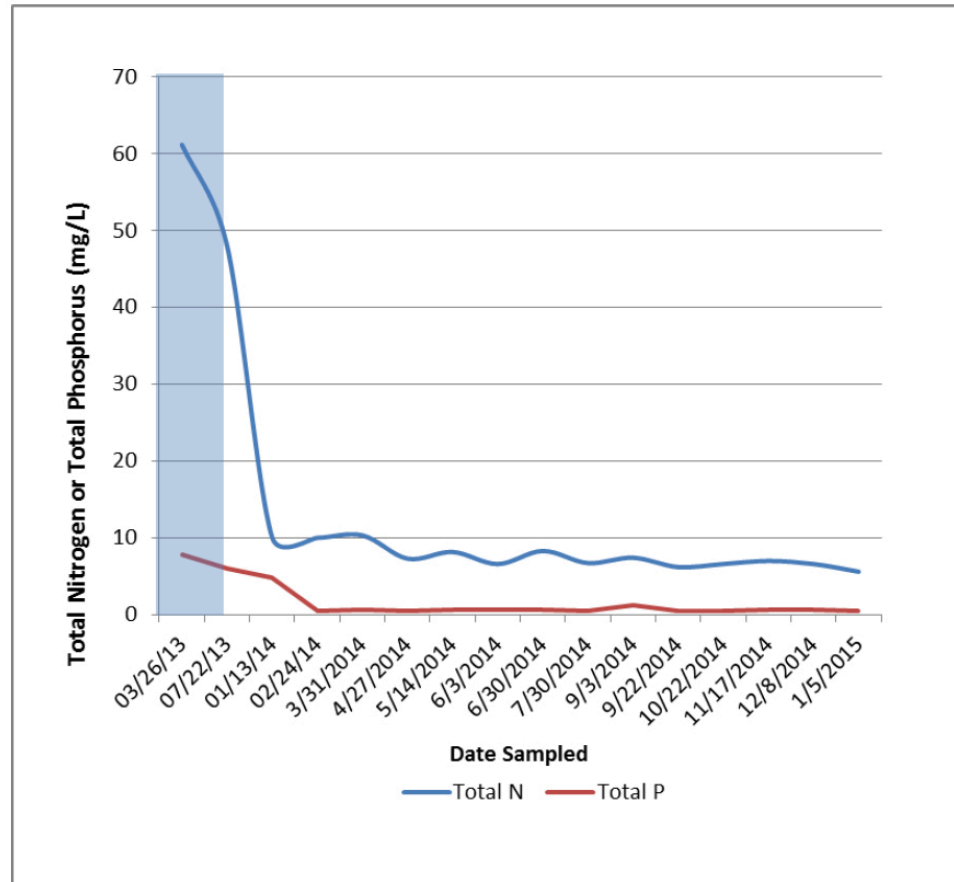


Urine Diversion in a Watershed



Cleans ALL Water in a Watershed

Urine Diversion



**Urine Diversion can reduce nitrogen up to 80%
and phosphorus up to 55%**

**Composting toilets reduce nitrogen by 90%
and phosphorus by 99%**

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What actions to take now to improve the Cape's water quality?

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Actions

Divert your urine

Use urine fertilizers

Grow your own food

Support local farms

Eat less meat & dairy

Demand UD



Thank you.

**Earle Barnhart & Hilda Maingay
The Green Center, Inc.
thegreencenterinc@gmail.com**

Extra topics:

All watershed plans are based on estimates.

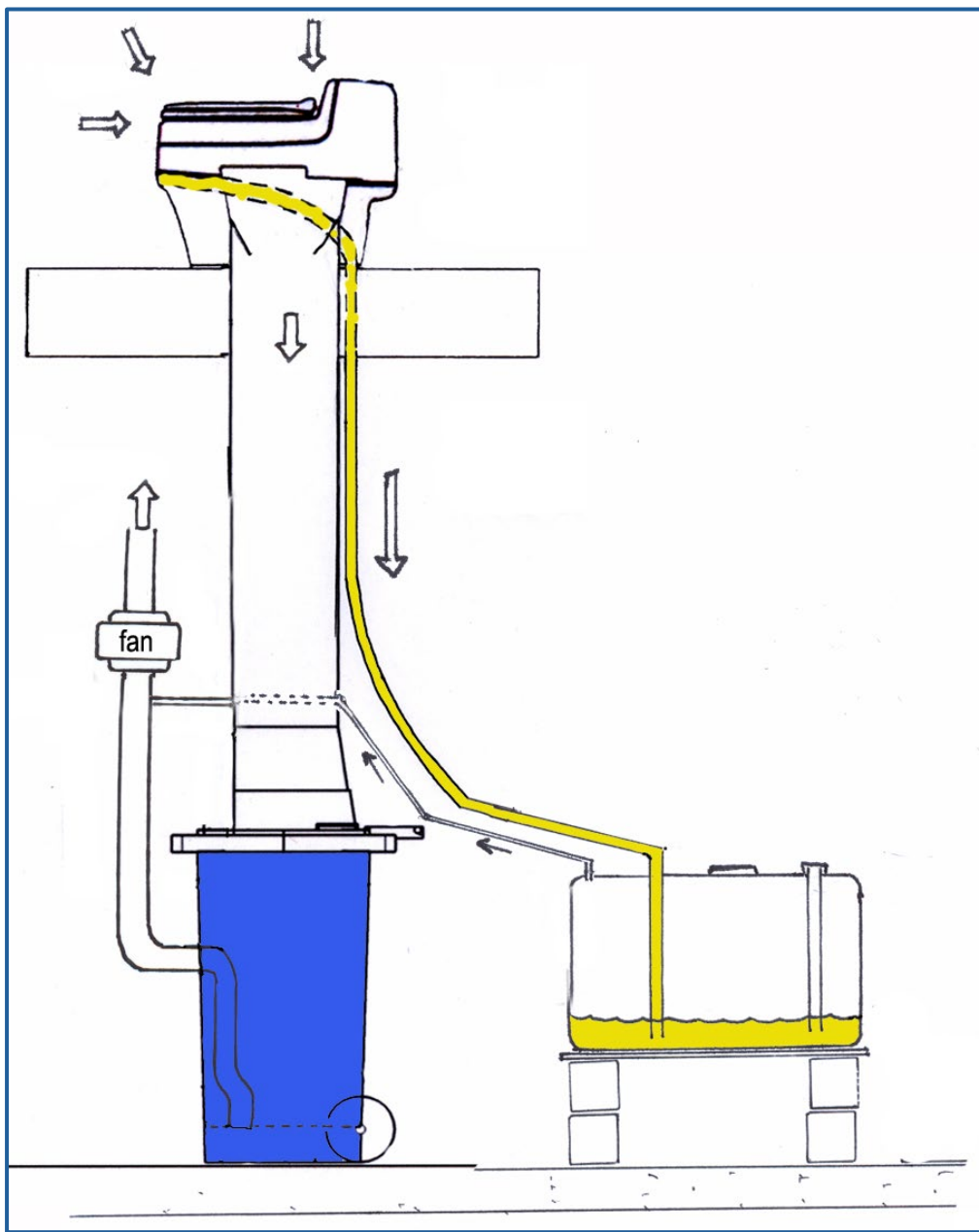
These data are based on concentration of nitrogen in the effluent water after it leaves the septic tank.

Households that use a lot of water, can have a low concentration but could contribute a high total amount of pounds of nitrogen to the groundwater.

People who have a high protein diet, produce more nitrogen and phosphorus than those who eat less protein. The amount of nitrogen going into our wastewater in the US and globally has increased dramatically due to higher consumption of meat.

Sewers do NOT clean the water. They only gas off large portion of the nitrogen in the wastewater. The rest of the nitrogen and all the minerals and heavy metals and other contaminants are deposited into water and onto land as sludge or toxic ashes.

Slides for panel discussion



Separett / Full-Circle Urine Diverting Composting Toilet



waterless, odorless



Separett Villa 9220



active bins



“resting bins” inside, with airlines to fan and chimney



“resting bins” outside, passive ventilation

Steve & Jenny Junker's
Full Circle toilets
In Woods Hole







active bin #1



“resting bins”



active bin #2 urine storage tanks

