



Lessons Learned from the Water Industry

Biochar 2018 – Wilmington, DE
Patrick Dube, PhD

Wastewater and Biochar

The wastewater industry is entering a new age of innovation and public awareness. Can lessons can be learned from their past and help biochar in the future?

State of the Industry

5 Key Initiatives

Biosolids Case Study

Public Perception

WASTEWATER

34 BILLION GALLONS PER DAY



THE UNITED STATE(S) OF WATER

Ongoing access to clean, safe water is critical to our economy, health, and way of life. Although we live in different parts of the country, Americans are united in our dependence on water and the infrastructure that connects, protects, and supports it.



THE COST OF CLEAN

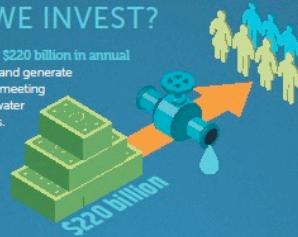
Water is free, keeping it clean, safe, & flowing is not. We must invest in our systems.



\$4.8 trillion to maintain water & wastewater systems

WHAT HAPPENS WHEN WE INVEST?

We could gain over \$220 billion in annual economic activity and generate 1.3 million jobs by meeting U.S. water & wastewater infrastructure needs.



GOING GREEN, SAVES GREEN

30%–60% the amount of \$ saved by treating stormwater at its source with green & traditional infrastructure.

VALUE OF WATER



- 60% of Americans are in favor of paying more to invest in water infrastructure.
- 23 to 1 = return for U.S. public health from early clean water investments.

THE THREE R's

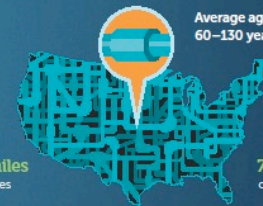
Every drop is cleaned, reused, recycled, & returned to the environment.

- The average American sends between 66–182 gallons of wastewater to the system each day.
- 34 billion gallons of water are treated each day by U.S. water treatment plants.



AGE AT-A-GLANCE

Average age is 60–130 years old.



800,000 miles of water pipes

700,000 miles of wastewater pipes

RETURN ON INVESTMENT



Every new water sector job adds another 3.68 to the economy.



Every \$1 spent on infrastructure generates \$6 in returns.

WHERE'S THE WATER?

The average American uses 100 gallons of water daily.



SOURCES: <http://bit.ly/2ar7711>



For more information, visit www.wef.org

THE UNITED STATE(S) OF WATER

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THE COST OF CLEAN WATER

Water is free, keeping it clean, safe, & fit to drink is not. We must invest in our systems.



\$4.8 trillion
for water & wastewater

WHAT HAPPENS WHEN WE INVEST?

We could gain over \$220 billion in annual economic activity and generate 1.3 million jobs by meeting U.S. water & wastewater infrastructure needs.



GOING GREEN, SAVING GREEN

40% the amount of \$ saved by investing in green stormwater at its source with green infrastructure.

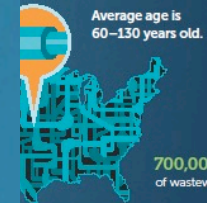
VALUE OF WATER



60% of Americans are in favor of paying more to invest in water infrastructure.

25 to 4 = return for U.S. public health from early clean water investments.

AT-A-GLANCE



American Water Works Association
SOURCES: <http://AWWA.org/2017/11>

Water Environment Federation
For more information on water quality issues

RETURN ON INVESTMENT



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WHERE'S THE WATER?

The average American uses 100 gallons of water daily.



THE UNITED STATE(S) OF WATER

Ongoing access to clean, safe water is critical to our economy, health, and way of life. Although we live in different parts of the country, Americans are united in our dependence on water and the infrastructure that connects, protects, and supports it.



THE COST OF CLEAN

Water is free, like air. But clean water is not. We must invest in the infrastructure that provides it.



WHAT HAPPENS

RETURN ON INVESTMENT



Every new water sector job adds another **3.68** to the economy.



Every \$1 spent on infrastructure generates **\$6** in returns.

VALUE



■ 60% of Americans are in favor of paying more to invest in water infrastructure.

■ 23 to 1 = return for U.S. public health from early clean water investments.



■ 34 billion gallons of water are treated each day by U.S. water treatment plants.

of water pipes

700,000 miles of wastewater pipes

RETURN ON INVESTMENT



Every new water sector job adds another **3.68** to the economy.

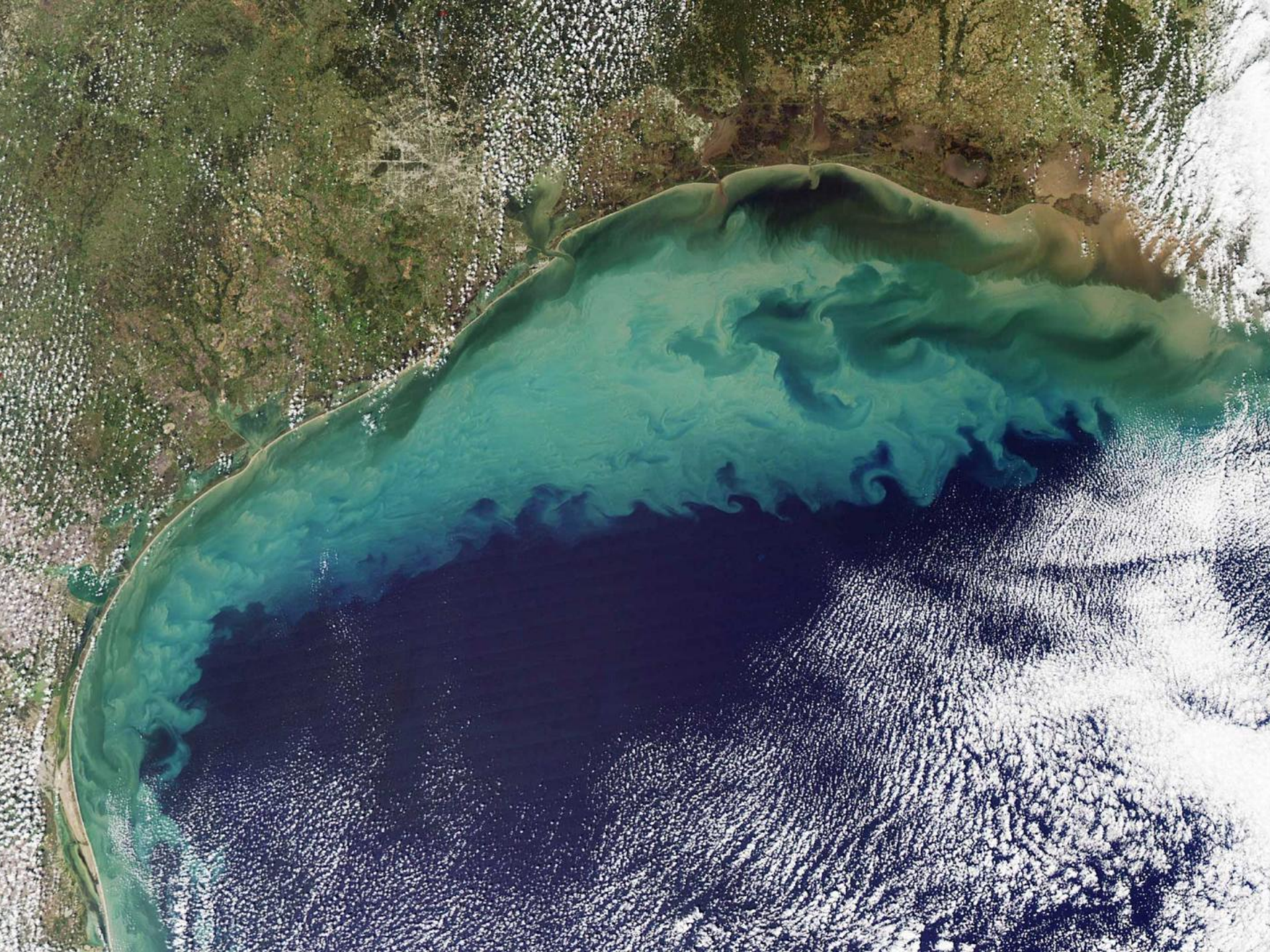


Every \$1 spent on infrastructure generates **\$6** in returns.

WHERE'S THE WATER?

The average American uses 100 gallons of water daily.





Water

Energy

Nutrients

**Water
Resource
Recovery
Facility**

Wastewater and Biochar

How has the water industry grown in the past decade?
What has worked and what lessons have been learned?

State of the Industry

5 Key Initiatives

Biosolids Case Study

Public Perception

Advance local and regional collaboration



**51,000 Community
Water Systems**

15,000+ WRRFs

**80% serve < 3,330
people**





BACWA
BAY AREA
CLEAN WATER
AGENCIES





Great Lakes
Protection Fund



GLWA
Great Lakes Water Authority



Partner with outside industries to improve water quality



Partnerships



Funding



Policy



Clean Water Services

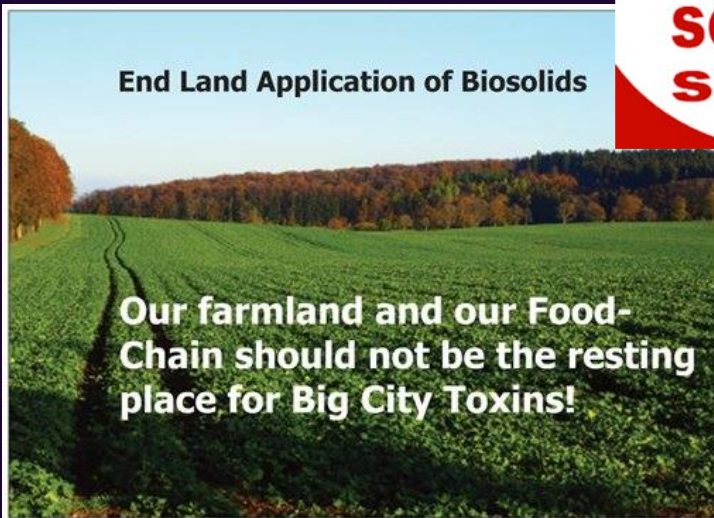




RIO GRANDE **WATER FUND**

A Wildfire and Water Source
Protection Project

Protect public health



Generate alternative sources of funding for water infrastructure



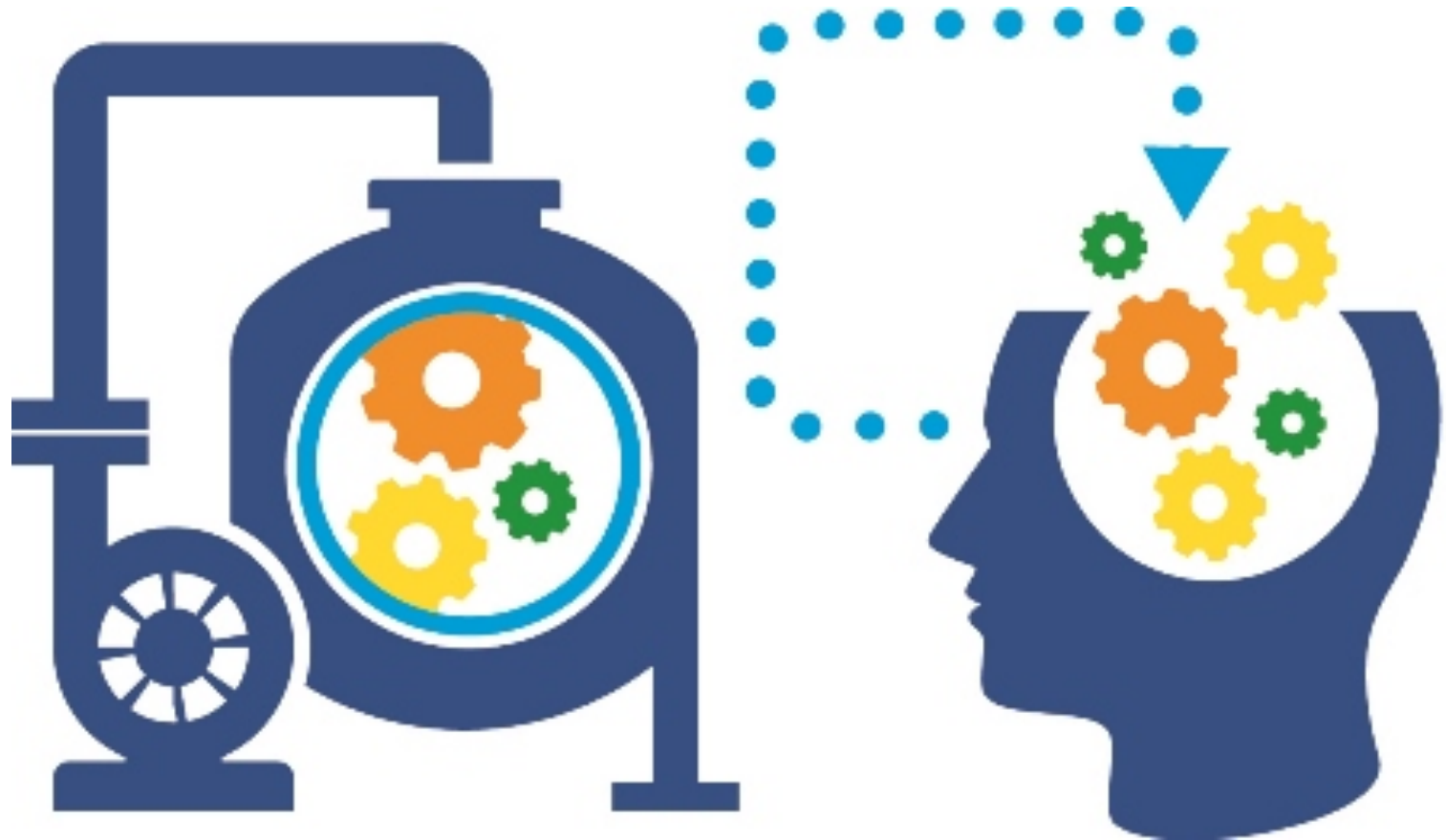
Accelerate technology adoption to build efficiency and improve water service



Accelerate technology adoption to build efficiency and improve water service



LIFT[®]





San Francisco
Water Power Sewer

Services of the San Francisco Public Utilities Commission





dc 
water is life[®]

Wastewater and Biochar

Biosolids and biochar share a lot of similarities such as strong environmental benefits and building a fledgling industry. What has worked and what hasn't?

State of the Industry

5 Key Initiatives

Biosolids Case Study

Public Perception

Re-sequester
60-70% of the
lost soil organic
carbon

Revenue
source for
WRRFs

Increase
carbon
storage in soils

Increase water
holding
capacity

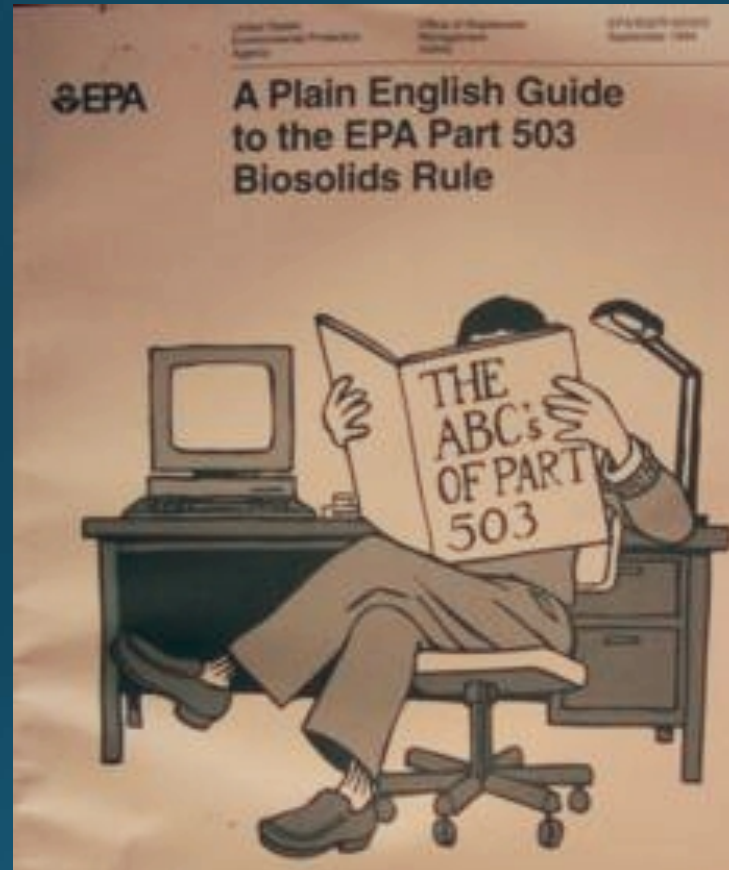
Promote
circular
economy

Increased
organic matter

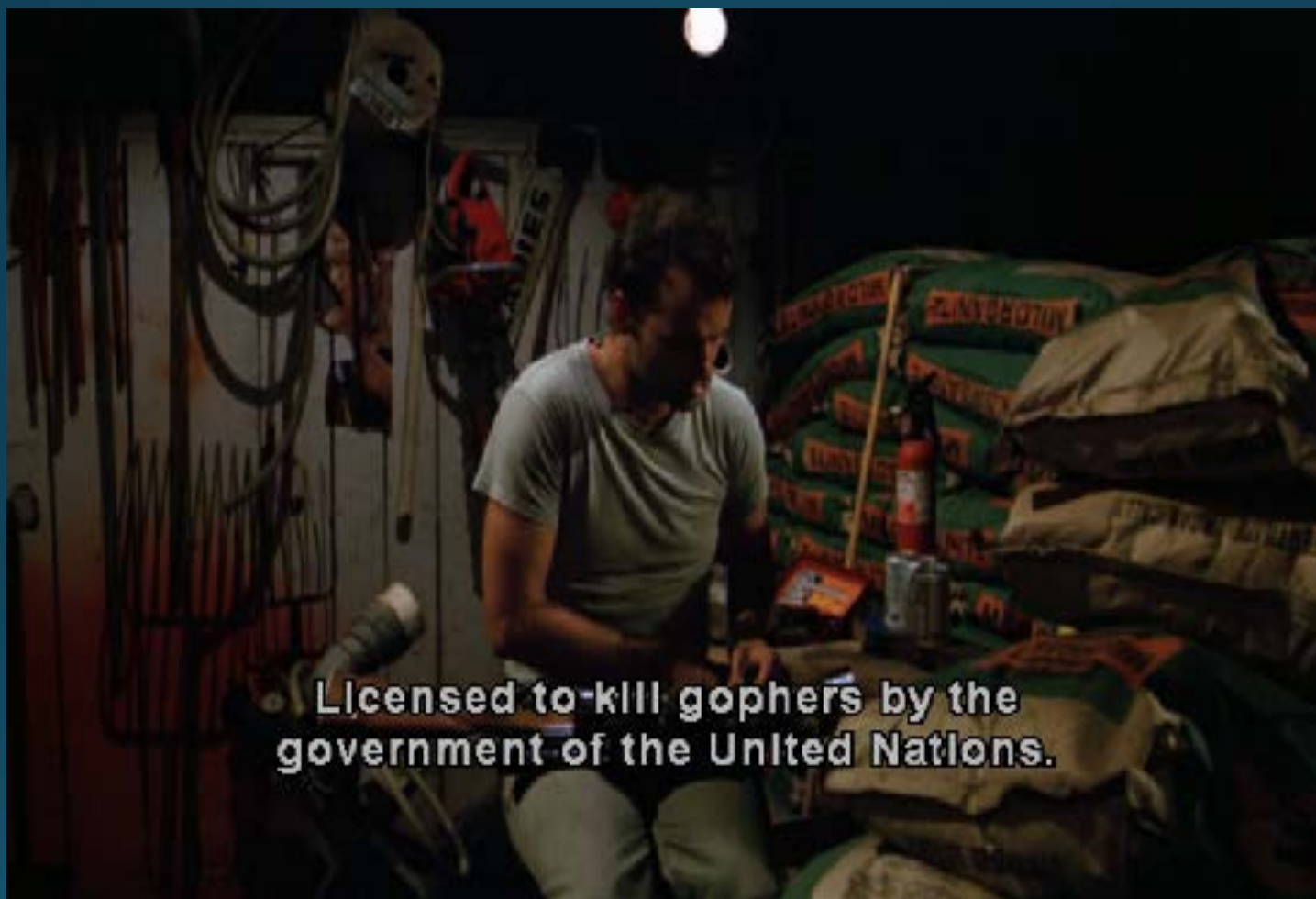
Produce
significant
improvements
in crop growth
and yield



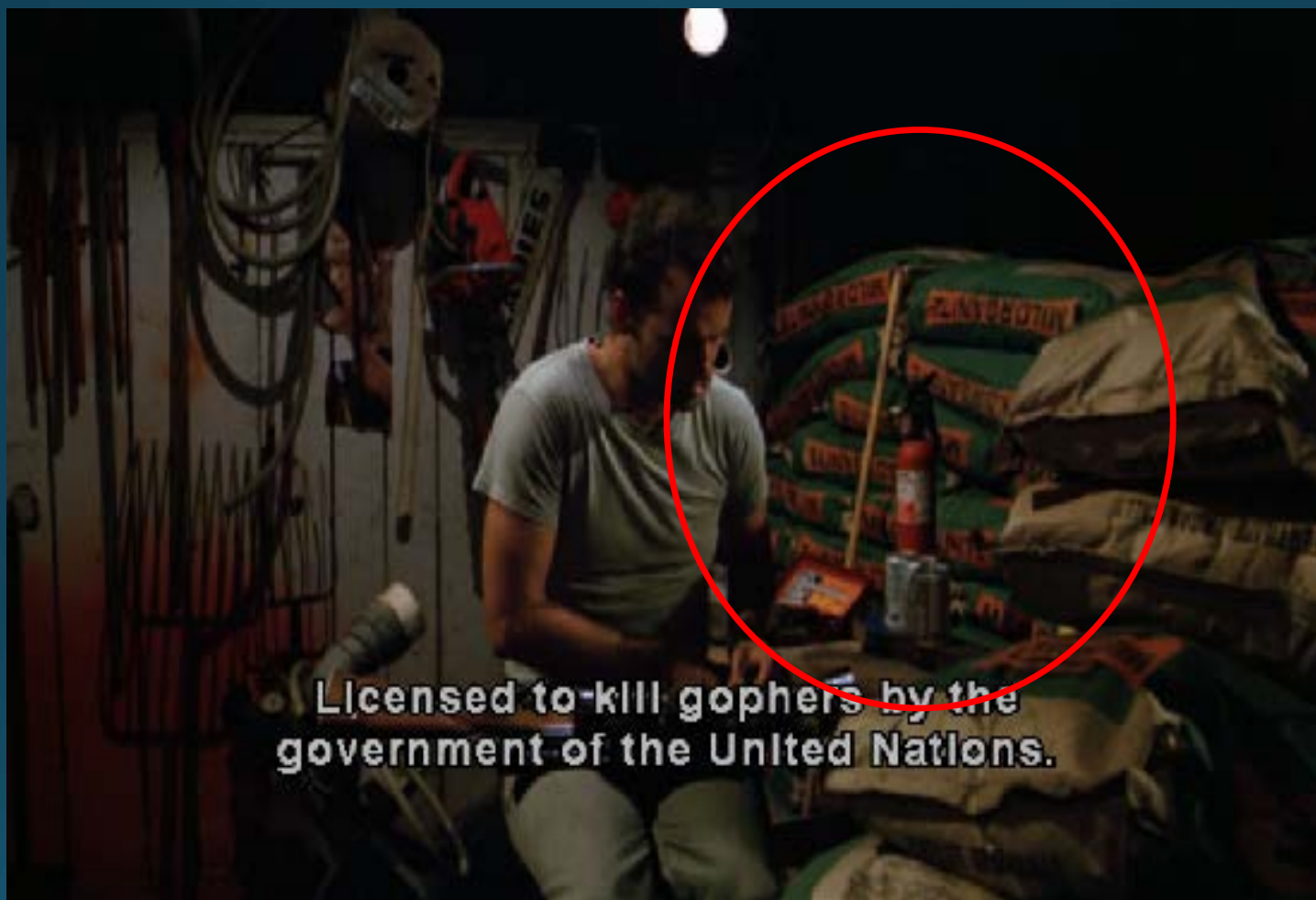
All Growth
Purenutri
Biolife
Bioslurp
Black Gold
Geoslime
Sca-doo



Humanure
Hu-doo
Organic residuals
Bioresidue
Powergro
Organite
Recyclite
Nutri-cake



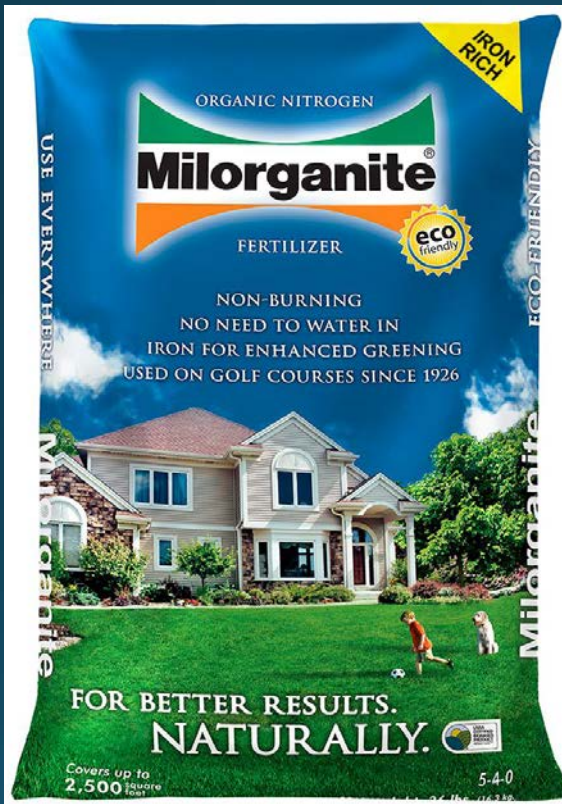
**Licensed to kill gophers by the
government of the United Nations.**



“The Original Organic Fertilizer”

BLOOM

GOOD SOIL,[™]
BETTER EARTH.

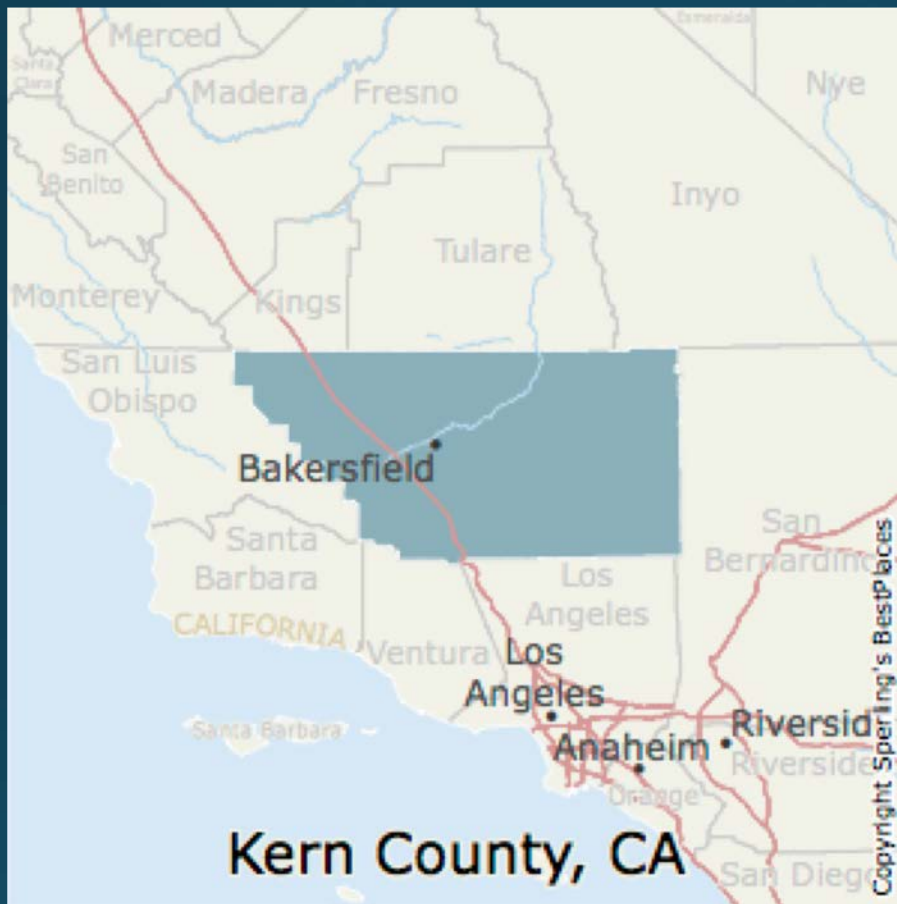




BIOSOLIDS

MESSAGING BOOK





Copyright Spelling's Best Places

Biosolids Innovations

Thermal Hydrolysis



Pyrolysis





VS



Wastewater and Biochar

Public perception is critical in wastewater. The water industry faces a certain “yuck factor” that must be overcome to move forward.

State of the Industry

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Biosolids Case Study

Public Perception





The winner from the second annual Pure Water Brew competition has their winning beer served at WEFTEC

2015



The Pure Water Brewing Alliance is formed, bringing together utilities, brewers, engineering firms and technology companies to help promote recycled water through beer.

2017



2014

Pure Water Brew is launched with a homebrewing competition hosted by Clean Water Services, Carollo Engineers and the Oregon Brew Crew



2016

The Arizona Community Federation awards first place and \$250,000 to the Arizona Pure Water brew Challenge.



2018

The Pure Water Brewing Alliance continues to help educate the public about the value of water through different events, including speaking at the 2018 Craft Brewers Conference.





RECYCLED COMMUNITY
WASTEWATER

The water purification process

Using a multi-barrier purification process, we can transform recycled water into PURE water – A Proven Technology.

The result is a **Safe, Reliable** and **Sustainable** water supply.



ULTRAFILTRATION

Removes:
Suspended solids.
Bacteria.
Protozoa.
Cryptosporidium.
Giardia.



REVERSE
OSMOSIS

Removes:
Organics.
Pharmaceuticals.
Personal Care Products.
Inorganics.
Heavy metals.
Viruses.



UV/ ADVANCED
OXIDATION

Destroys:
Pathogens.
Trace organics.



GRANULAR
ACTIVATED CARBON

Removes:
Trace organics.
Disinfection byproducts.
Remaining hydrogen
peroxide.



CHLORINE
DISINFECTION

Destroys:
Pathogens.
Viruses.



PURE Water



Beer!







theveilbrewing 14h



Batch 1!



Write a message...



QUALITY. INTEGRITY. PASSION.

FUNKY



BUDDHA

MADE WITH PRIDE



WWW.FUNKYBUDDHABREWERY.COM



POUR SLOWLY
INTO A
STANDARD GLASS.
SERVE AT 38°

NOT FOR RESALE - NO REFUND/REDEMPTION VALUE

"We proudly brew our beers with the finest, natural ingredients, then serve them up unpasteurized, unfiltered, and unfettered. Please consume this product fresh, as it was intended to be. Cheers!"

MAPLE BACON COFFEE PORTER



GOVERNMENT WARNING: (1) ACCORDING TO THE SURGEON GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

FUNKY BUDDHA
DRINK LOCAL BEER

BREWED AND BOTTLED BY
FUNKY BUDDHA BREWERY, INC.
GALLIANO PARK, FL, USA

PLEASE RECYCLE
THE BOTTLE

BOTTLED AND RELEASED JANUARY, 2014

MALT BEVERAGE BREWED WITH MAPLE SYRUP,
COFFEE, AND NATURAL FLAVORS

22 FL. OZ

6.4% Alc by Vol

PLEASE CONSUME FRESH

THE MAPLE BACON STORY

Maple Bacon Coffee Porter was initially released in the Spring of 2011 at The Funky Buddha Lounge & Brewery in Boca Raton. What started as a strange idea to make a beer that tasted like breakfast at some roadside waffle hut soon blossomed into a cult following among beer fans nationwide. The "Maple Bacon" craze that



followed was a large part of what propelled us to open our brewery in Oakland Park today.

Maple Bacon Coffee Porter pours an opaque ebony with a frothy tan head. Aromas of sticky maple syrup and fresh-brewed coffee creep forth from the glass. The mouth feel is luxuriously creamy, with layers of sweet malt and roast giving way to waves of smoke, coffee, and dark salted chocolate. The finish is sticky, rich, and sweet, with flavors of maple syrup lingering pleasantly on the tongue. Enjoy in a deep, wide glass with good friends (and maybe a short stack on the side).

BEERPULSE.COM





Menu Set Weather

50 comments

Transforming sewage into beer? Science behind Oregon brewers' plan

CORE ONLINE
The Oregonian

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the salt WHAT'S ON YOUR PLATE

eating and health foodways producers food for thought for foodies

Why Dump Treated Wastewater When You Could Make Beer With It?

food for thought

JANUARY 28, 2015 11:06 AM ET

From The Atlantic

CITYLAB

NAVIGATOR CITYFIXER MAPS PHOTOS

COMMUTE WORK HOUSING WEATHER

Oregon Homebrewers Get Set to Experiment With 'Sewerage' Brewerage'

Portland will get to show off just how good its super-pure recycled wastewater is.



NEW YORK POST

Brewers tasked with turning sewage into booze

By Associated Press

April 29, 2015 | 4:37am

Clean Water Services spokesperson Mark Jockers shows sealed containers of highly purified water from their facility in Forest Grove, Ore.

PORTLAND, Ore. — Some companies boast of making beer with spring water from majestic mountains.

BEER

Looking for a beer made from actual human piss? Urine luck.

by Charley Cameron, 01/31/15

filed under: News, Recycling / Compost, Water Issues

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Twitter


Pint

Is Sewage Beer The Next Big Thing?

The Huffington Post | By Alison Spiegel

Posted: 02/03/2015 7:00 am EST | Updated: 02/07/2015 11:59 am EST

100 Likes 15 Shares 0 Tweets 0 Dislikes 0 Comments

A full-body shot of Conan O'Brien on a stage. He is wearing a dark grey suit jacket over a plaid shirt and a patterned tie. He has a surprised or concerned expression on his face, with wide eyes and a slightly open mouth. He is pointing his right index finger towards the camera. The background is a stage set with a blue backdrop and wooden paneling.

In Oregon, a number of brewers are competing to turn sewer water into beer. The brewers said, "Hey, if Bud Light can do it, we can do it!"

*It's all a matter of perception.
ALL of the water we use, has
been recycled, over and over
again, by nature. Which is
something we SHOULD be
paying more attention to—OPB
Radio*

*Pure water is pure
water however it got
there
KGW TV*

There is no reason in the world to judge water by its history. We are very much focused on what's the quality of the water for the use to which it will be put. --Ken Kopocis, EPA Deputy Administrator Office of Water



Water as a fundamental right is not taken away in the name of greed

SCALED UP decentralized technology will be considered in the URBAN CORE



THAT CORPORATIONS WILL QUIT STEALING FROM FRESH WATER SOURCES

That the color of your skin will determine your access to clean water or government aid in TIMES OF NEEDED

WISER USE OF OUR WATER RESOURCES THROUGH conservation efficiency reduced loss

THAT OUR KIDS ARE GRABBING DIFFERENCE FOR WATER



To make Rain WATER Sustainable in order to help those in difficult parts of the world who don't have enough RUNNING WATER

We see that each of us has a CLEAN BY ARRIVING to make a profound difference

to protect the profits in the Street and profit

one day we all value water as our Precious gem

OLD IN-FRA-STRUCTURE is repud

My hope would be that every part of the world has CLEAN SUSTAINABLE WATER

POTABLE WATER FOR ALL PEOPLE WATER REUSE FOR AGRICULTURE AND BUSINESS



WE CLEAN THE SHIT OUT OF WATER CRUSHED RESOURCE

EMBRACE WATER AS A RESOURCE

to make ENVIRONMENTAL CONSCIOUSNESS the NORM

Develop desalination systems that can cheaply convert seawater to drinking water

CLEAN DRINKABLE WATER FOR ALL

INDIVIDUAL WATER RIGHTS GIVES WAY TO

ACCESSIBLE Every INDIVIDUAL To Everyone



ACHIEVE WATER QUALITY OUTCOMES NOT MERELY GUESSES AND ESTIMATES

Find innovative ways to conserve water and protect our natural water sources

SMART CITY & SUSTAINABLE water system

FOGS TO ORAIL

WATER RIGHTS

INDIVIDUAL CONTRIBUTES

What is your hope for your Water Legacy?

WATER HUMAN RIGHTS

WE HOPE TO SHAPE A BETTER WORLD AND HAVE A POSITIVE SOCIAL IMPACT ON THE COMMUNITIES WE AFFECT/IMPACT

That NO MORE children will die

Water Environment Federation the water quality people®

Safe & Abundant

that we improve upon what we have



MAINTAIN HIGH QUALITY OF LIFE

Because they don't have access to clean water and Sanitation

I would like to help EXTRACT ENERGY from what we do in the process.

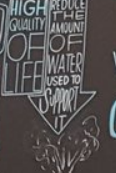
PROPOSED

WATER'S WORTH IT!

ALL LIVING THINGS NEED WATER TO SURVIVE people will respect BACTERIA

improve upon what we have

that women can serve as EQUALS IN THE water sector WITHOUT harassment or DISCRIMINATION

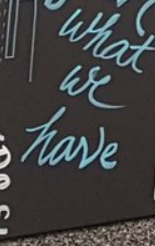


we can help reduce our CARBON FOOTPRINT and ween ourselves of FOREIGN etc OIL

WASTEWATER TREATMENT PLANS TURN INTO RESOURCE RECOVERY PROMISES

THAT WATER RESERVOIRS CAN BE USED TO HELP PREVENT SPREADING OF FOREST FIRES

my children can swim in Rivers & around cities



that women can serve as EQUALS IN THE water sector WITHOUT harassment or DISCRIMINATION

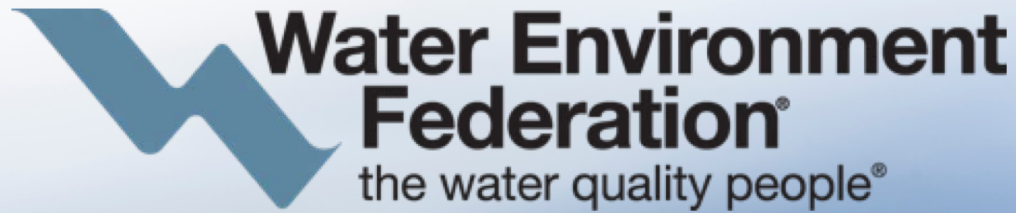
THAT WOMEN CAN SERVE AS EQUALS IN THE water sector WITHOUT harassment or DISCRIMINATION

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THANK YOU!

pdube@wef.org

www.wef.org



91st Annual Water Environment Federation
Technical Exhibition and Conference
New Orleans Morial Convention Center
New Orleans, Louisiana, USA
Conference: September 29–October 3, 2018
Exhibition: October 1-3, 2018

