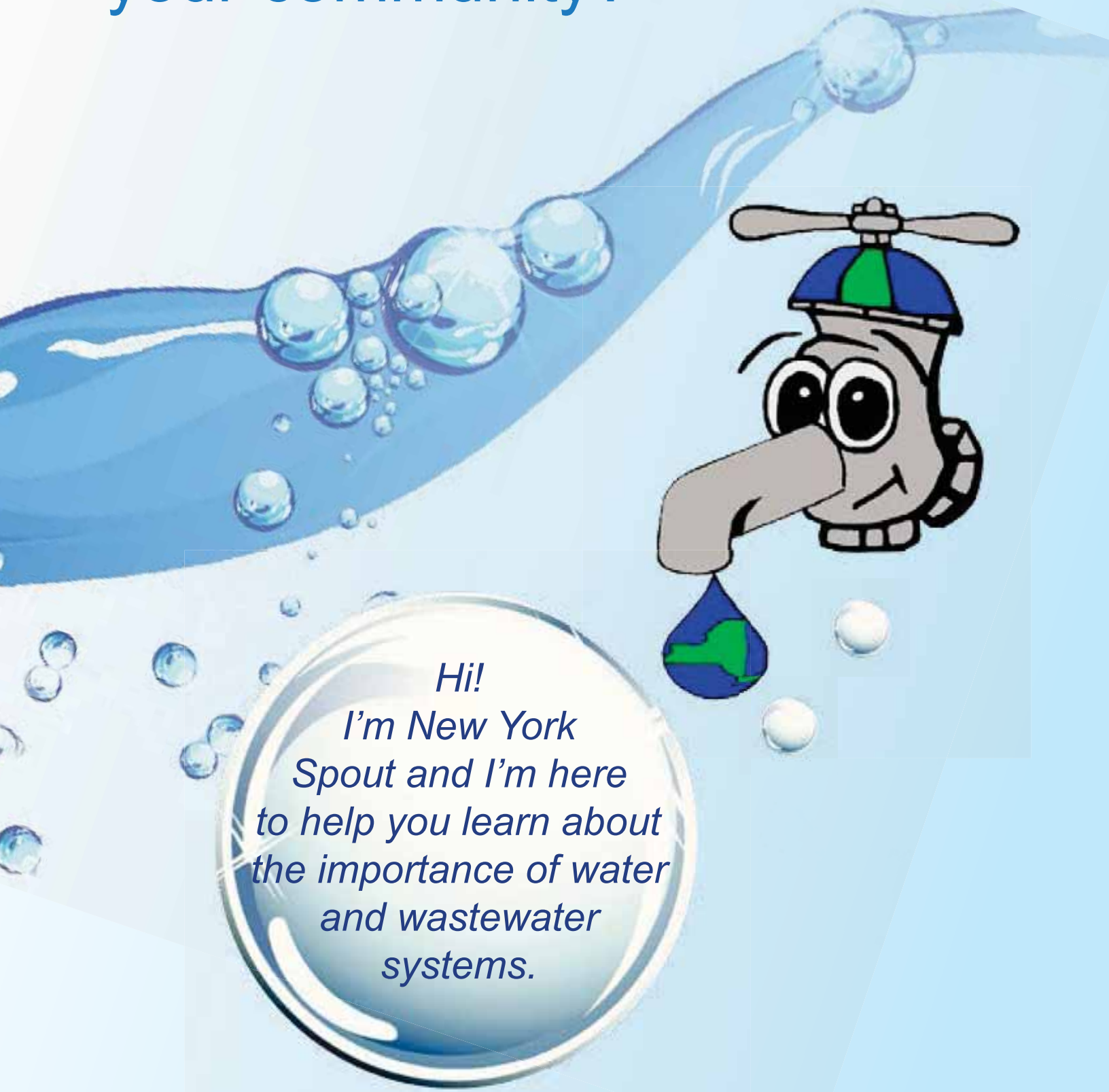
The Value of Water

What's it worth to you and your community?



Hi!
I'm New York Spout and I'm here to help you learn about the importance of water and wastewater systems.

Ancient Rome: a Blast from the Past

Humans have always needed water to survive. As we gathered in cities, it became necessary to find ways to bring extra water to where we lived. This was true in Ancient Rome. Ancient Rome was a city on the European continent near the center of what is now the country of Italy. It was founded more than 2,750 years ago and grew to be a great empire of over one million people.

Since the earth's gravity causes water to flow downhill, early civilizations dug simple ditches into the ground to make the water travel to where it was needed. Over time, these ditches were improved and made into manmade canals called aqueducts.

Ancient Rome is famous for its water system of many aqueducts, the first of which was built more than 2,300 years ago. Roman engineers designed the aqueducts to run downhill even where the ground was hilly. They built special bridges in low areas, called viaducts, and constructed tunnels through surrounding hills so water could flow.

Once the water reached the city, it flowed into public fountains, where people collected it for drinking and cooking. Some wealthy people had water come directly into their homes. Water was used for farming, public baths, and toilets called latrines. Public baths became places of great significance in the community where people would not only bathe but play games, attend lectures and concerts, exercise, relax, and even gossip!

Used water from the baths, latrines, palaces, and fountains went into Rome's drainage and wastewater collection system. The drainage system emptied directly into the large Tiber River which flows right through Rome. It wasn't until after the late 1800s that people learned that this way of getting rid of waste spread diseases and made it difficult for fish and wildlife to live. Unlike the Romans, we now treat (clean) our wastewater before emptying it into our rivers.

We have also improved our drinking water by treating it and delivering the water through enclosed, underground pipes to our homes. These changes in water and wastewater systems have improved our public health.

Tell Spout What You Learned!

1. Can you name three ways that the Ancient Romans utilized water?
2. Where did most of the people of Rome get their water?
3. Why was the invention and construction of aqueducts so important?
4. How is wastewater disposal different now from Roman times?

Think About a Drink at the Sink

Think about that water from the sink
Without it we'd have nothing to drink.
Our bodies need water to stay alive
Otherwise people would not thrive.
Farmers need water for food to grow
Fish and animals also need this H_2O.

Think about that water going down the drain
Without it, wouldn't life be a pain?
I know what you're thinking
Without water, there would be no drinking.
It wouldn't be logical not to flush
Or goodness forbid, we could not brush!

Think about that water, don't let it drip.
Without it, we would not have even a sip.
No laundry, dishwashing, or showers,
No, without water, certainly no superpowers!

Think about water, what life would be like
Without water treatment, oh what a fright!
We lived until age 47 a hundred years ago,
Now it's 78 thanks to the good water flow!

Find the underlined words from the poem

M	E	F	J	R	E	Q	A	R	I	X
D	Q	L	S	W	W	R	N	E	D	C
T	R	E	A	T	M	E	N	T	E	Y
P	V	I	D	F	F	P	S	A	U	E
E	E	V	N	O	L	H	I	W	R	U
Y	T	P	O	K	O	U	L	R	E	V
E	I	D	Y	W	I	K	S	W	D	B
G	D	C	E	T	S	N	S	H	V	E
N	Z	R	C	Q	X	Y	G	B	L	M
I	S	E	I	D	O	B	W	I	B	G
M	N	Q	F	T	M	R	T	G	W	Q
W	K	B	M	H	K	U	J	Y	C	E
E	R	V	Y	I	N	S	W	F	V	Q
O	V	Z	I	A	L	H	P	I	D	A
U	S	I	F	H	W	F	L	S	Z	N
I	J	D	R	D	R	A	I	N	W	I
G	A	Y	N	H	B	W	Y	B	O	M
Z	W	Z	J	C	T	Q	N	I	L	A
H	S	I	F	Y	K	R	T	X	F	L
S	G	V	W	Y	T	C	V	Q	Z	S

Unit Conversions

1 gallon (gal) = 4 quarts
1 quart (qt) = 2 pints
1 pint (pt) = 2 cups
1 cup (c) = 8 ounces (oz)

Activity	# of times	gal	# of gal		# of qts		# of pts		# of cups	# of cups		# of oz
bath *example*	1	x 40	40	x 4	160	x 2	320	x 2	640		x 8	5120
shower (10 minutes)		x 25		x 4		x 2		x 2			x 8	
brushing teeth		x 1		x 4		x 2		x 2			x 8	
washing hands/face		x 1		x 4		x 2		x 2			x 8	
flushing toilet		x 3		x 4		x 2		x 2			x 8	
drinking water										x1	x 8	
How much did you use today?												

Water and Wastewater Fun Facts!

There are over 9,500 public water systems and 600 wastewater treatment plants in New York! These facilities probably serve your community, school, or favorite restaurant.

Water used for drinking comes from **groundwater** (e.g. wells) and **surface** water (e.g. rivers, lakes).

Many of New York's public water systems treat water by filtering and disinfecting. Sometimes an **element** called "**fluoride**" is added to help prevent tooth decay.

Many of New York's public water and wastewater systems are over 100 years old! It will cost billions of dollars to repair and replace this critical **infrastructure**.

New York City has the largest unfiltered engineered public water system in the world! It serves 9 million people!

The New York State Department of **Health** (DOH) oversees public water systems and the New York State Department of Environmental Conservation (**DEC**) oversees wastewater treatment plants.

After you use water, it goes down the sink, **tub**, or toilet, and is then called "**wastewater**." In most New York homes the wastewater then travels through **pipes** to the wastewater treatment plant where it is cleaned and then released back into the **environment**.

It takes thousands of water and wastewater professionals in New York to ensure water and wastewater services are provided to your community.

The largest wastewater treatment plant in New York is Newtown Creek in New York City. It serves over one million people.

Crossword clues

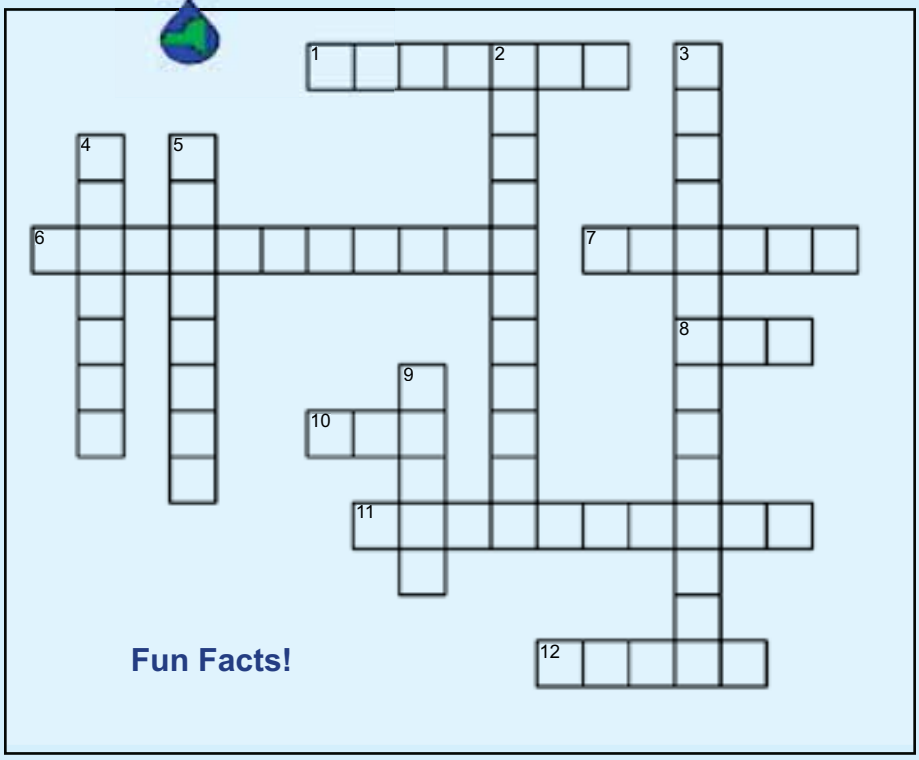
(Hint: use the bold words)

Across

1. fluoride is an _____
6. water under the surface of the ground
7. the Department of _____ oversees public water systems
8. you bathe here
10. abbreviation for the New York wastewater plant overseer
11. waste matter that goes down the drain
12. wastewater travels through these

Down

2. clean water goes back into the _____
3. systems for delivering water and wastewater
4. a lake is a type of _____ water
5. this prevents tooth decay
9. contains lots of salt water



Where does your water come from? Where does your wastewater go?

When you turn the tap on, water comes out. When you flush the toilet, water flows down through the pipes. Do you know how water gets to your tap? The journey is called the water cycle! *Use the words in the box at the bottom of the page to fill in the blanks.*

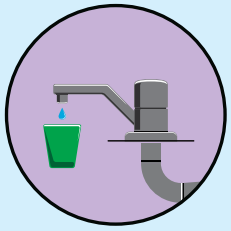
1. _____

2. _____

3. _____

4. _____

5. _____



6. _____

7. _____

8. _____

1. Water is heated by the sun and evaporates.
2. As it cools, it becomes very small water droplets.
3. When many water droplets come together, they form clouds. When the water droplets become too big, it rains.
4. Rain water looks for the quickest way to the sea and flows into rivers, streams and underground.
5. The water we drink goes through a water treatment plant to be cleaned. It is often cleaned by flowing through sand filters to get rid of dirt. Some chemicals may be added to keep the water clean.
6. Clean drinking water is pumped into storage tanks and through the distribution system, right to your tap.
7. Dirty water goes down the sink or toilet to the sewer.
8. Wastewater goes to the wastewater treatment plant where it is cleaned and then goes back into rivers. The water flows back into the sea where it evaporates into the atmosphere and the cycle begins again.

Condensation	Rain	Wastewater	Water distribution
Evaporation	Rivers	Wastewater treatment	Water treatment

Effects of Climate

The water cycle is a delicate balance. When something upsets that balance, the environment (water, air, soil) and our health are affected. Scientists are learning that climate in New York State is changing. Overall, it is warmer and wetter. There are more major storms that produce heavier and longer periods of rain and snow in the winter. There are more very hot summer days, heat waves, and less rain in the summer.

Draw different color lines from each cause to the effect. Some effects may have more than one cause.

Cause:

Heavy rainfall
(draw blue lines)

Heavy snowfall
(draw purple lines)

Warmer seasons
(draw green lines)

Heat waves
(draw red lines)

More storms
(draw black lines)

Effect:

- Wastewater treatment plants can overflow
- Heat stroke
- Breathing problems
- Drowning
- Food spoiling
- Difficulty getting medicine to doctors or hospitals
- Allergies from mold
- Air conditioners use electricity which increases air pollution
- Trash, animal waste, chemicals, and other materials are washed into rivers and lakes
- Injuries from floods
- Dehydration
- Emotional stress
- More mosquitoes that carry diseases
- Harder for water suppliers to provide enough clean drinking water
- Coastal flooding
- Rising sea level
- Eroding beaches
- Water and wastewater infrastructure can be damaged
- Contamination of private and public wells

Join the Force

Join the Force! We sure need more people like you to be water and wastewater professionals. Be sure to take classes in science, technology, engineering, and math to prepare for this work. Learning about plumbing, pumps, energy efficiency, and laboratory skills will help too. With a career in water and wastewater, you can help protect your community and the environment!

We are going to join the force! We want to make sure people have clean water to drink and that rivers are protected from contaminated water.

Just imagine having one of the most important jobs in the world...

Draw a picture of how you can help protect your community's water and environment.

More Information

New York State Department of Health
health.ny.gov/environmental/water/drinking/

New York State Department of Environmental Conservation
dec.ny.gov/chemical/93615.html

US Environmental Protection Agency
water.epa.gov/

Water Environment Federation
waters-worth-it.org/

American Water Works Association
awwa.org/

Teacher Resources:

US Environmental Protection Agency
epa.gov/students/teachers.html

Games, Quizzes, & Other Cool Stuff:
US Environmental Protection Agency
epa.gov/students/

Careers:

New York State Department of Health
health.ny.gov/environmental/water/drinking/operate/opcareer.htm

Work for Water
workforwater.org/

This brochure was produced as a project of the Water and Wastewater Education and Outreach Committee, a partnership of public and private organizations formed to protect public health and the environment by ensuring that water and wastewater systems in New York State are operated and maintained to be viable and self-sustaining. For more information about the Committee and the answer key, visit: http://efc.syracusecoe.org/WWEOC.
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