Vol. 6, No. 3
The Engineering Explorations Newsletter

Harmonics

What is a water resource engineer?

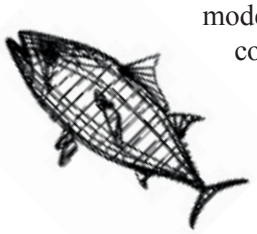
The Mi'kmaq and Maliseet peoples tell the story of *Koluscap and the Water Monster*. During a long ago drought, one village kept precious water from another village by damming the river which flowed past both communities. The people of the upstream village had a monster protect the dam. Life became very hard for the people in the downstream village because they had no water, and they prayed to the Gitchee Manitou for help. Gitchee Manitou sent them a great spirit named Koluscap who took the form of a warrior. He went to the dam and asked the monster for water several times. Each time the monster refused. Finally, Koluscap became angry; he broke the dam and turned the monster into a bull frog. The people in the downstream village were so happy to have water back that some of them jumped into the river and became fish and water creatures. The bull frog, fish and water creatures still live together today, because water is intended to be shared and no one person or creature can ever own it.

Water is one of the Creator's great gifts, it is also one of the most scarce. While more than two-thirds of our planet is covered in water, only about 1% of it is available as fresh water, safe for drinking and other daily uses. The rest of the water is salt water, or stored in glaciers and the atmosphere.

More than 6 billion people need to share all the available fresh water. Because it is so scarce, we need to be very careful how we use it. In 1999, the United Nations Development Program estimated that about 1 in every 6 people did not have access to clean drinking water. It also said that early in the twenty-first century, 1 in every 4 people will suffer from chronic water shortages. These shortages will threaten many lives because, while our bodies can survive for weeks without food, they can only last a few days without water. How do you tap new sources of water? How do you make existing sources clean and safe for drinking? These are jobs for a water resource engineer.

Water resource engineers help protect water supplies and make sure that development of new resources does not disrupt natural processes and water tables. They help in the assessment of pollution sources, and the control of flood damage and soil erosion, the resolution of conflicts over water reserves. If countries and regions don't learn the lessons of *Koluscap and the Water Monster,* international conflicts may arise between regions which have water and those that don't; it will be the job of water resource engineers to find solutions to these conflicts over water reserves.

Too many First Nations communities have been without safe drinking water for too long. Aboriginal water resource engineers give our people the expertise needed to understand government reports about contamination sources and move forward on recommendations. With an understanding of modern science and respect and knowledge for the land, water resource engineers from our communities can help avoid ground-water contamination and play an integral role in ensuring that everyone in the community stays healthy.



The version of *Koluscap and the Water monster* is based on the story found in *Keepers of the Earth: Native American Stories and Environmental Activities for Children* by Michael J. Caduto and Joseph Bruchac (Fulcrum Publishing, 1997).

Native Engineers & Scientists

A place to meet people from your community.

Name: Henry Lickers
Nation: Seneca
School(s) Attended: Trent University in Peterborough, ON and the University of Waikato in New Zealand
Degree: Bachelor of Science
Job Title: Director – Department of the Environment, Mohawk Council of Ahkwesahsne
Favorite thing about job: *"The excitement of doing, using the full knowledge and experience I have gathered over my years to make the community a better place."*

When Henry Lickers decided to go to university, choosing a program was easy, "I decided to enter Biological Science because the natural world around me was so beautiful I wanted to know everything about it."

As the only Native student in the sciences at Trent University at the time, Henry sometimes felt "terribly lonely." He also worried about "losing my native self in the new sciences I was studying." Henry's grandparents encouraged him to remain in school and "use the song of the spirit and the dance of the numbers for together they will forge an instrument strong enough to solve the problems of this world." Now Henry passes their advice on to other Aboriginal students, "Make the numbers dance for you" because "our communities need scientists and engineers very badly. Their skills and knowledge will greatly help to create self-sufficient communities."

After graduating in 1972, Henry worked on a number of projects related to the environment. For the past 25 years he has been using his knowledge and experience to benefit his adopted home community of Ahkwesahsne. Henry is the Director of the Environment for the Mohawk Council of Ahkwesahsne. "My work has a direct bearing on the community and our traditional way of life," he says, "I believe you cannot have a strong community without a healthy environment." He and his staff of ten are responsible for the protection of the community's water, air, and soil.

While his job carries a lot of responsibility, Henry really enjoys his work, "Being a biological scientist is fun. It allows me to go fishing, hunting and camping and get paid for it." Henry and his staff spend much of their time collecting samples for study and observing the natural processes of the environment. Much of this work helps them evaluate the impact of proposed projects on community life. "During the summer time, my staff are never in the office but out on the land collecting and testing. As the director, I wouldn't have it any other way."

Hey Johnny,

You know how we often have to boil our water at home? Today I found out why.

Our class is visiting Vancouver for the week. Today we went to the science museum. They had an exhibit on water pollution and contamination. Our guide told us lots of neat stuff about how water gets dirty and how it can be cleaned up.

She told us that many things pollute water - human and animal waste, detergents, pesticides, fertilizers, and even radioactive waste. The pollutants are bad enough by themselves, but often they help bacteria and microbes to grow too much. Bacteria and microbes live in water all the time, but they can be removed from our drinking water at a purification plant. But if the plant breaks down, or if there are too many microbes they may get into our drinking water. That's why we have to boil the water - to make sure we don't get sick from the microbes.

It's a good thing we can boil the water, too. Our guide told us that around the world close to 34,000 people die everyday from diseases caused by water pollution. She said that everyone can do things to help keep our water clean. Even little things like getting rid of garbage propoerly and using low phospahte laundrey soap helps.
Anyway, it was a really cool trip. Tomorrow we're going to see a hockey game, that will be even better.

See you when I get home.

Your cousin, Mark.

Sources:
Water Pollution and Wetlands Issues:
http://www.environment.about.com/cs/waterwetlands/
Environment Canada: http://www.ec.gc.ca/envpriorities/cleanwater-e.html

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Do your part

Everyone can help conserve water. At home you can reduce the amount of water used by 35% or more by reducing the amount of water you use, repairing any leaky faucets or toilets in your house, and replacing old water fixtures, like shower heads and toilets, with new, low consumption models.

By working with teachers at school you could do the same thing. It would be good for the environment, for your community and you might even save the school some money.

Community Profile

Iqaluit, Nunavut

A lot of things we use can be recycled. We can recycle paper, metal, plastic, glass, and tires. Now Iqaluit, the capital city of Nunavut, wants to recycle water.

Iqaluit is located at the southern end of Baffin Island on Koojesse Inlet. The Inuit have hunted and fished in the area of the city for thousands of years, in fact, Iqaluit is Inuttitut for "place of many fish." Iqaluit really got its start as a city during the 1940s when the Americans built an air base in the area. It was then that the Inuit who helped with construction of the base began building permanent homes nearby. Today, about 5200 people live in Iqaluit, most of them are Inuit.

Iqaluit has to find new ways to save water because its water supply isn't being renewed as quickly as it gets used. Water has to come from somewhere. For Iqaluit, the main supply comes from Lake Geraldine. The water from the lake is used for drinking, flushing toilets, bathing and washing clothes and dishes - everything you would normally use water for. But Iqaluit gets very little rain and snow, and the water it uses from Lake Geraldine doesn't all get replaced naturally. If this continues, Lake Geraldine will eventually dry up. So, the city wants to test a recycling plan called the Healthy House System in some homes.

Each week, a water truck will deliver a fixed amount of water to each of the test homes. Every time someone uses the water - for washing or even flushing the toilet - instead of being flushed out of the house or into a sewage tank, it will be recycled back into a special holding tank full of biofilters. As the water moves through the biofilters, they remove any impurities like dirt and bacteria. Once it has been filtered, the water is clean enough to use again. In fact, in the Healthy House System, water can be recycled back into the house many times. This may sound a little gross, but while the Healthy House System cleans the water well enough for drinking, the recycled water will only be used for things like washing and flushing toilets.

It is estimated that the Healthy House System will reduce water usage by 90%. So, by recycling their water, people in Iqaluit can save Lake Geraldine.

If the average home in Iqaluit uses this much water each week ...

... a house equipped with the Healthy Home recycling system will only use this much water in a week.

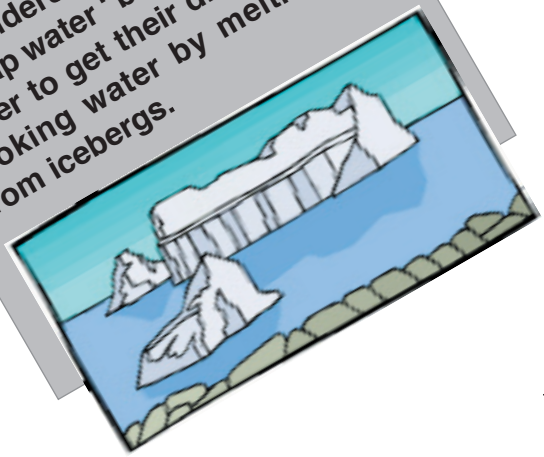
Fun facts and things to think about

36% of pre-cipitation in Canada falls as snow.

For real company and friendship, there is nothing outside of the animal kingdom that is comparable to a river.
-Henry Van Dyke

1 litre of oil can contaminate up to 2 million litres of water! Imagine how much damage a leaking tanker can do.

Inuit Elders in Nunavut often call tap water "bad water." They prefer to get their drinking and cooking water by melting ice from icebergs.



By means of water, we give life to everything.
- The Koran, 21:30

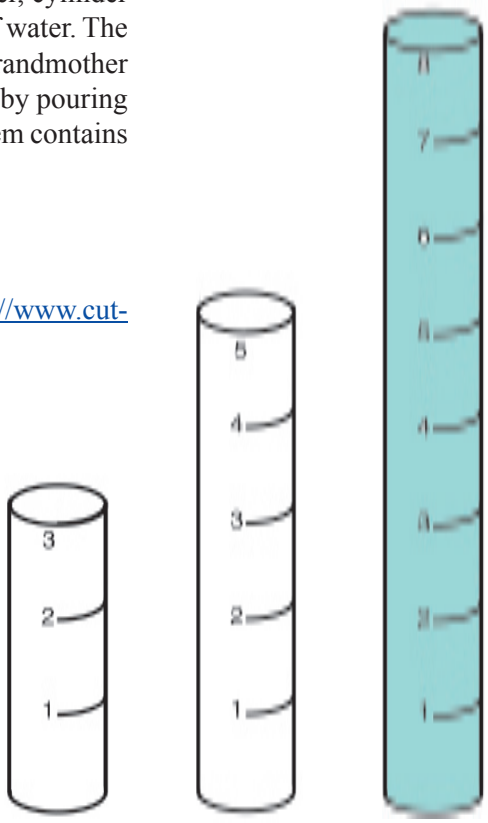
Did you know that…
…over 70% of the world's fresh water supply is located in the Antarctic? Unfortunately, it's all frozen.

Can you pour 4?

You have 3 cylinders - cylinder A holds 3 litres of water, cylinder B holds 5 litres of water and cylinder C holds 8 litres of water. The 8 litre cylinder is full, the other two are empty. Your grandmother needs exactly 4 litres of water. Can you bring it to her by pouring water from one cylinder to another so at least one of them contains exactly 4 litres of water?

You cannot waste water by pouring it on the ground.

Check out the interactive version of this puzzle at http://www.cut-the-knot.com/water.shtml.



Answer: Fill cylinder A from cylinder C. Then pour all of cylinder A into cylinder B. Fill cylinder A again. Pour the water from cylinder A into cylinder B until it is full. This will leave you with 1 litre in cylinder A. Empty cylinder B back into cylinder C. Pour the 1 litre from cylinder A into cylinder B. Fill cylinder A from cylinder C. Cylinder C should contain 4 litres.

NAEP is a winner of the 2003 Michael Smith Awards for Science Promotion.

All about us

Native Access provides culturally relevant learning opportunities in science, math, engineering and technology to Aboriginal students and their teachers across Canada.

Established in 1993, the projectÕs ultimate goal was to increase the representation ofAboriginal peoples among the the ranks of practicing engineers and scientists in Canada.

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