

INTERACTIONS

The Ontario Journal of Environmental Education

**The mission of OSEE is to support and inspire educators
teaching Environmental Education in Ontario**



VOLUME 22, NUMBER 3

WWW.OSEE.CA

FEBRUARY 2010



Winter Beaver at Work

Published by the Ontario Society for Environmental Education

Interactions is the journal of the Ontario Society for Environmental Education (OSEE), whose mission is to support and inspire educators teaching Environmental Education in Ontario. OSEE is an affiliated subject association member of the Ontario Teachers' Federation (OTF) and operates as a nonprofit organization supporting the Ontario Curriculum. The main focus of the Editorial Board of *Interactions* is to provide teachers with Environmental Education resources and activities to help them in their classrooms with their students. *Interactions* is published five times annually, in October, December, February, April and June. ISSN 1188-3146

Editorial Board of *Interactions*:

Chair: Mike Morris 519-471-2699
258 Berkshire Place, London, ON N6J 3N6

Editor: Bill Thompson 519-539-8413
54 Blackfoot Place, Woodstock, ON N4T 1E6

Proof Readers:

Nicole Hamley, Daniel Panko, Kasey Livingston,
Mike Morris

Articles may be used by OSEE members for classroom use only. Those wishing to use articles for any other purpose must first obtain permission from Mike Morris, Editorial Chair.

Contributions are invited and should reach the Chair of the Editorial Committee, Mike Morris, two months prior to the publishing date. Submit all material by E-mail. Photographs and other graphics should be sent separately in JPG files, not embedded in Word documents.

Opinions expressed in the articles are not necessarily the views of OSEE unless they are expressly recognized as such.

Artwork Credits:

Front cover, Winter Beaver at Work.
Page 8, Painting by Leslie Foster

Disclaimer: The information offered in *Interactions* consists of suggestions or recommendations for your consideration, adaptation to your particular situation, and possible use. This information is neither official OSEE policy nor legal requirements, unless it is specifically identified as such. Opinions, instructions, and conclusions are those of the individual contributors, not of OSEE, unless otherwise specified. Though considerable effort is made to ensure that the information is as correct and complete as possible, neither OSEE nor the individual contributors can guarantee in any way the correctness and completeness of the information. Further, because of the diverse circumstances under which the information may be used, neither OSEE nor the individual contributors can guarantee that all essential safety measures and warnings accompany each article. As a result, OSEE and the individual contributors disclaim any liability in negligence or otherwise for any form of injury, damage, or loss which results from the use of the information in *Interactions*. The user should ensure that instructions, warnings, and safety measures are appropriate for your particular situation.



Interactions Then and Now
CD collection of back issues of
OSEE's journal

OSEE Board of Directors

2009-2010

Executive Members:

President:	Sherri Owen
1st Vice-President:	Cathy Grant
2nd Vice-President:	John Howden
Past President:	Liz Straszynski
Secretary:	Linda Borland
Treasurer:	Urvi Shah
Membership Coordinator:	Urvi Shah
Editorial Chair of <i>Interactions</i> :	Mike Morris
Editor of <i>Interactions</i> :	Bill Thompson
Web Coordinator:	James Creech

Board Members:

Regional Directors:

Eastern Region:	Diana Brushey
Central Region:	Ellen Murray
South Western Region:	Anne Dahmer
Northern Region:	Holly Groome
Far Northern Region:	Beth Dasno

Directors-at-Large:

	Diane Beckett
	Emily Addison
	James Borland
	Ray Clement
	Gwen Layton
	Katie Gad

ad hoc positions:

Conference Chair:	Bill Thompson
Archivist:	Sandra McEwan
French Consultant:	Holly Shaw
University Liaison:	Sylvie Bardin
OTF Representative:	Liz Straszynski

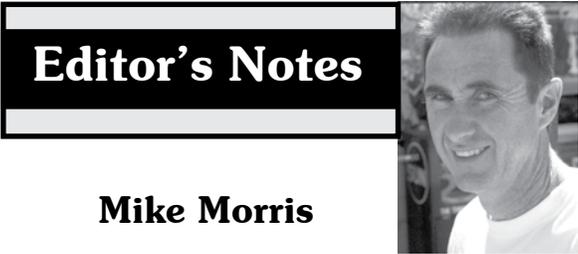
Contact executive members: e-mails are listed at

www.osee.ca/contact.htm

Interactions Complete Set - 1988 - 2008

CD Contents

Archives: All *Interactions* journals from Vol. 1-1, September, 1988, to September, 2008, Vol.: 21-1, in PDF format.
Contents PDFs: PDF copies of the "Contents" pages of each issue to help find articles of interest.
Ecozoic Curriculum: Integrated lesson activities for secondary schools developed from 1992 – 1993. A curriculum project originally sent to all secondary schools. Use where applicable following your professional judgement to match with current expectations.
Environmental Education Articles by Mike Morris
OSEE Information/History: Conference leaders and presidents
E3 Resources – Energy and Climate Change activity guides
Adobe Reader 8: Free PDF viewing program
Updated issues to present will be supplied by e-mail
Cost: \$20, plus \$2 shipping, Contact Bill.Thompson@OSEE.ca



Columns

Editor's Notes..... 3
Mike Morris
President's Message: Climate Change
Is Not the End of the World..... 4
Sherri Owen
Media for Environmental Education..... 5
Ellen Murray
Environmental Education FYI..... 6
Andrew Boughen
Nature Story: The Moonbeam Princess 8
Allan Foster
OSEE Executive and Board 2008-2009 .. 30
Meanders: Right Now, I Am Not a
Spider Man 31
Mike Morris

Features

Winning The Water Bottle Waste Debate.... 9
Adria Vasil
Artifact in Context..... 10
Pam Wilson
OSEE Awards 14
A Letter to Mother Nature..... 15
Max More
Taking Action on Climate Change..... 16
Brian Lim
OSEE Conference: EcoLinks 2010 16
What Animal?..... 19
Mehta, Pimentel, Prichard, Santos
Brrrrrr! Blehhhhh! Humidex
and Wind Chill..... 20
Jennifer Dowker
Alternative Energy Resources 26
Sandra McEwan
Danny Droplet: Making Learning Fun..... 29
OSEE Constitution Changes..... 32

As I write this, London is in the midst of a January thaw. That means that the temperature is slightly above freezing during the day. I wonder how long this thaw will last.

What do we have for you in this issue? To start off with, how about the great cover photo of a beaver hard at work? Imagine the beaver's teeth to put a cut in that massive tree.

We have an article by Jennifer Dowker on weather. She explains about windchill and humidex and how they can be used in curriculum. Brian Lim of Rosedale Heights School of the Arts writes about taking action on climate change for a secondary science course SNC2D. We also have a few more articles that have been sent to us by teacher candidates at OISE/UT. Pam Wilson describes an archaeology activity for Grade 4. Another activity is What Animal? written by Abha Mehta, George Pimentel, Jay Prichard and Joana Santos. This activity is a Grade Two Science and Technology activity Understanding Life Systems - Growth and Changes in Animals.

We are also reprinting an article from an earlier issue of Interactions by Sandra McEwan about alternative energy resources. A letter to Mother Nature connects to the topic of my column in the last issue. Do you know who Danny Droplet is? Check out his story in this issue and see how Danny makes learning fun.

Allan Foster sent us an unusual nature story about the Moonbeam Princess. Andrew Boughen's FYI column continues to be chock full of information. In Meanders, I sadly admit that my green thumb is a figment of my imagination.

Time to read Sherri Owen's President's Message: climate change is not the end of the world.

Are you thinking of nominating someone for an OSEE award? Check out page 18 of this issue to see guidelines and how you can nominate someone deserving.

Also check out OSEE's constitution on our web site. Some changes to it may soon be proposed.

Do you have something you'd like to see in print? Send me something that works well in your classroom. Contact me via e-mail. I'll answer soon. How about looking at our new web site to see what's new: www.osee.ca.



President's Message

Sherri Owen

Climate Change Is Not the End of the World

It is very serious and is having terrible consequences. However I think it is fair to say that the Earth as a living ecosphere and even humanity will survive. There will of course be changes, but, as always, life will adapt and continue. Working as an educator at an outdoor and environment centre, I have become upset at the gloomy, haunted attitude many students bring to environmental issues. Many students seem convinced that not only is complete disaster likely, it is inevitable. They seem to feel that humanity is being tested and pretty much guaranteed to fail.

So, what would failure look like? Complete destruction of the environment, removal of all living things, general mass extinction. This scenario seems extremely unlikely. After all, we and the rest of the planet have survived an ice-age together and life in general has evolved through countless planetary disasters including a possible strike by a massive meteor. All life on Earth has had to fight and struggle and it continues to adapt and change to meet new conditions. Life will continue, changed yes, but not gone.

Admittedly, in Planetary Care 101, we are probably scoring very low. However, the health and well being of the Ecosphere is not a pass/fail course. In fact, if the survival of life on Earth is considered a passing grade, we would be hard pressed to fail. Once students have the burden of saving all life

on Earth off their backs, they can start to work towards making something better, not running away from something awful. This, it seems to me, is a fundamentally different motivation. Lets start moving our students to build hope not prevent disaster.

I don't suggest that we candy coat the impact of climate change on the people, animals and plants of this planet. Even the most optimistic predictions about the future indicate we are all in for a very rough ride. Some areas will be flooded, some areas will experience severe drought. Crops may no longer grow in their traditional territory. Many people will be made homeless refugees. An increase in human conflict may be inevitable. Species that cannot adapt at the accelerated rate of human induced climate change will disappear. The ecosphere's ability to clean our air and water may be reduced. An increase in suffering and decrease in diversity and stability are inevitable.

The question is, how can we reduce the suffering? The values and attitudes that children learn today will determine how they respond to scarcity in the future. As adults and as educators, we need to develop innovation, adaptability and compassion in our children and students. These character traits are essential building blocks to ensure a humane and healthy future.

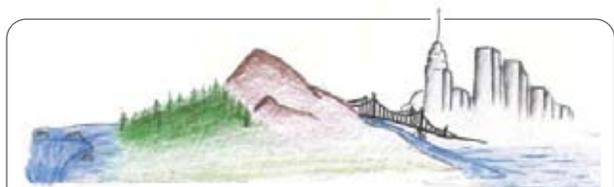
Luckily, many of the life changes needed to make human culture more ecologically sustainable are fun, satisfying and healthy. Get out and ride your bike, plant a garden, turn off the electronics, connect with your local human and natural communities. These suggestions are only a start I know, but a good start and something that students feel empowered to do. From such humble beginnings we may dare to hope for a brighter future.

If we decide that on the subject of environment, we will get at least a pass, the only question is how high can we get the mark? From this perspective, every effort makes a difference, sometimes only a tiny difference, but no effort is wasted or insignificant. Doesn't that sound more exciting?

Sherri Owen is OSEE President



Call for Presentations Closing Soon



ENVIRONMENTAL EDUCATION
Building Connections~Bridging Gaps

NAAEE'S 39TH ANNUAL CONFERENCE

Buffalo-Niagara, New York • Sept. 29 - Oct. 2, 2010

7th Annual Research Symposium • Sept. 28 & 29

THE CALL FOR PRESENTATIONS closes February 1, 2010

<http://www.naaee.org/conference/call-for-presentations>

Nine Strands await your submission:

- Arts, Culture, and Spirituality
- Conservation Education
- Innovative Programs and Practices
- Network and Leadership Development
- Place-based Education
- Socio-ecological Justice and Community Engagement
- Teaching and Learning Sustainability
- Energy Education and Green Technology
- Urban and Rural Interface

Media for Environmental Education

Ellen Murray



DVD Title: *Hungry for Change*

Available: www.ossf.on.ca/commonthreads

DVD Rating: 3 / 5

Resource Material Rating: 5 / 5

The *Hungry for Change* DVD and resource CD is the fourth in the *Common Threads* series sponsored by OSSTF/FEESO. This is an international solidarity program where teachers choose an issue and examine various viewpoints and compare Ontario to another country. The video had some excellent interviews and the theme of 5 meal courses encapsulated the major issues addressed:

- What's in Your Food?
- Where Does Your Food Come From?
- The Politics of Hunger
- Food or Fuel?
- The Future of Food

The *Hungry for Change* DVD is much weaker than the resource materials. I am always annoyed when social issues are portrayed in an alarmist fashion. More care should have been taken not to leave students with a fatalistic view of how dangerous their food is to eat. I also object to the DVD's vilification of industrialized agriculture. I agree wholeheartedly industrial farming has many failings and as a society we must convert to a more sustainable method. But we have managed to feed most people in the world and farmers are not primarily to blame for our industrialized and globalized food production system.

The teaching resources are superb. This is a gold mine for Family Studies, Environmental Science and Resource Management teachers. Awesome visuals, attention grabbing activities, participatory lessons, and support materials for Powerpoint and SmartBoards are all included. Activities focusing on Brazil's amazing Hunger Zero program to feed Brazilians with healthy, locally produced food and content about the Aracuai farm were fantastic examples for students of alternative approaches to solving food issues.

The resources include lesson plans, blackline masters, rubrics, an immense variety of activities to appeal to all learning styles, lessons designed around differentiated instruction, assessment and evaluation tools and answer keys galore. There is an intriguing *Feast or Famine* card game ready to copy and play and challenging food labelling and food safety hands on activities. The maps and

cereal consumption data are wonderful to build understanding of food security and globalization of food production and consumption and have instructions for use with *Arctview* for geographers.

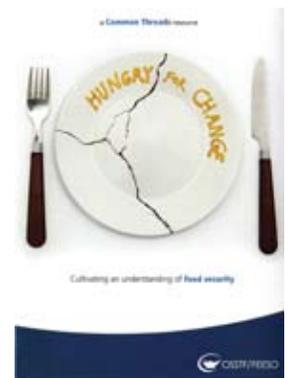
It is distressingly wonderful to have activities that focus on hunger here in Ontario. I often feel it misleads students when we talk about hungry people in other countries without showing how they can help local hungry people. This resource guide and the supporting materials can all be downloaded from the OSSTF website. The DVD is not available for streaming and there is no information on the website about how to buy a copy. Try calling the OSSTF provincial office at 1-800-267-7867.

DVD Title: *Garbage: The Revolution Starts at Home*

Available: www.garbagerevolution.com

DVD Rating: 2 / 5

While filmed in Toronto and full of excellent Canadian content, I can't honestly say I would use this DVD in my class. The documentary is appropriate for adults with a science background and some framework to analyze all the terrible news this DVD dumps on you. The narrative of the film follows a family of five in Toronto as they embark on a three month mission to collect all their garbage in their garage. There is great potential in a film trying to cover organics, garbage, recycling, water use, transportation waste and water overconsumption but it proved to be more than the film director could integrate into one film. The camera work is less than ideal, the science lacking or overwhelming, and the detours to explore Toronto's organic processing facility or the coal mines of Virginia are too long and detailed to hold most student's interest.





Environmental Education FYI

Andrew Boughen

Conferences

The Canadian Network for Environmental Education and Communication (EECOM) is holding its annual conference at Simon Fraser University in Burnaby, B.C. this year May 19-22. The conference is entitled: *Diversity, sustainability and environment: Exploring cultural and practical diversity for environmental learning*. This year's conference will focus on environmental education in K to 12 classrooms as well as youth leadership initiatives, and environmental education research and interpretation. To find out more about the conference and this organization, visit their website at www.eecom.org.

One of the best teacher conferences of the year is that of The Science Teachers' Association of Ontario (STAO) held in November each year. There are often some excellent sessions focusing on the environment, including those offered by OSEE members. STAO is now accepting proposals for sessions that will be part of the 2010 conference. Check the STAO website at <http://stao.ca/conf2/propose.php> to find the details regarding submission of a proposal. Proposals are due no later than March 1, 2010.

Grants and Contests

The Metro Grocery Chain is offering grants of \$1000 to schools that are interested in developing environmental projects in their schools and communities. The Green Apple School Program allows schools to submit applications for grants to support projects addressing such areas as Biodiversity, Environmental Education, Waste Management, Water and Energy Conservation. Every registered elementary and secondary school, both public and private in Ontario and Quebec is eligible to submit an application. Applications can be submitted up to March 1st 2010, and grants are being awarded as proposals are submitted and approved. Metro is apparently prepared to commit one million dollars per province to the grant program, and further information can be found at the website www.fonds-eco-ecole.ca/home.en.html.

The Sobeys Grocery Chain has teamed with Earth Day Canada to create the Community Environment Fund. This program offers grants of up to \$20,000 to support successful applicants' environmental initiatives in their communities. Schools are one of the groups that are eligible to apply for fund-

ing and several of the funded groups are highlighted on the Community Environment Fund website. There are two granting periods each year, and for the spring grants applications are due by February 28, 2010. To review the application procedures visit www.earthday.ca/envirofund/default.aspx.

Ontario Nature is again running a youth writing contest open to grade 7 and 8 students, and this year they have added the opportunity for students to submit art work in the form of drawings or paintings (8 1/2 X 11 size). Written submissions are limited to a maximum of 700 words. The topic this year is highlighting the fact that 2010 is the *International Year of Biodiversity*. The topic is set as the following: Wild species and wild spaces: why biodiversity is important to me. Students can submit writing or artwork to the Ontario Nature judges before February 26, 2010, and winners in each category will have their submissions featured in the *Ontario Nature* magazine, receive a cash prize, and also some funding for their class to participate in a nature-based activity. Second and third place winners are eligible for a variety of other prizes. Students can download an application, and find out more about the contest at www.ontarionature.org.

Biodiversity Education

2010 is the *International Year of Biodiversity*. A good place for educators to find Canadian based information on this topic is to check out the website of the Biodiversity Education and Awareness Network (BEAN) www.biodiversityeducation.ca. This organization is a collaborative network of groups and individuals representing private industry, formal and non-formal education, government, the environment and conservation. BEAN was set up to implement Action Items 1 and 2 of Ontario's Biodiversity Strategy, which calls for an increased awareness and understanding of biodiversity, its benefits and threats, and what each of us can do to support it. BEAN is a working group of Ontario's Biodiversity Council, and the Education Alliance for a Sustainable Ontario. The group has produced some excellent resources available on the website such as a primer on Biodiversity in Ontario, lesson guides such as one highlighting invasive species in Ontario, and support materials linking Biodiversity concepts to the Ontario curriculum. The website also has a



wide variety of well organized links to other resource materials, and organizations.

The Canadian Wildlife Federation has produced a beautiful biodiversity poster that can be ordered at www.cwf-fcf.org/en/educate/. It would be a lovely addition to your classroom, and great visual reminder to your students of this important issue. While visiting the CWF website, order the *Pollinators* teaching poster too. It too is a wonderful visual reminder of the importance of the pollinators that much of our biodiversity depends upon.

In early January, the CBC's *The Nature of Things* highlighted the concerns about bees, in an episode entitled *To Bee or not to Bee*. Bees are of crucial importance to pollination, which in turn affects many things including biodiversity. For some as yet unknown reason bee populations are sickening, and collapsing around the world. This show explores this disturbing issue with international footage and interviews. Hopefully we can soon come to a better understanding of how we can best help reverse these declines. You can view the entire show at the CBC website www.cbc.ca/documentaries/natureofthings/2010/bees/

Another compelling voice speaking out about losses to biodiversity is Dr. Bridget Stutchbury. She is a professor at York University, and author of *Silence of the Songbirds*, which was shortlisted for the Governor General's Award. In this book, and a recent article in *Ontario Nature*, Dr. Stutchbury describes how habitat destruction has influenced the decline of migratory songbirds. Many of our well known songbirds spend summer in the boreal forest of Canada, and then travel thousands and thousands of kilometres to Latin American countries to overwinter. At both ends of their journey, and along their migration route these birds require intact, unfragmented tracts of healthy habitat to maintain their own health. The importance of shaded coffee plantations are discussed, as are the effects of resource extraction on habitat that the songbirds depend upon. "Bird Motels" is a term that Dr. Stutchbury uses to describe the stopping places along the migration route, and she explains how important it is that we protect and maintain sizable, healthy areas of habitat where migrants can rest and refuel. Put this book on your reading list, and if you have a chance, take the opportunity to hear this passionate scientist in person at one of her speaking engagements.

Annual Resource

The Worldwatch Institute has just published its 2010 *State of the World Publication*, this year entitled *Transforming Cultures*. In this volume sixty renowned researchers and practitioners describe how to harness the world's leading institutions – education, the media, business, governments, traditions, and social movements – to reorient cultures from a

focus on consumerism toward a culture of sustainability. The Worldwatch annual *State of the World* publication is always thought provoking, and a great resource for discussion of current environmental issues.

Starry Nights of Winter

A crisp, clear, cold night in winter is a great time to get a group out to enjoy viewing the winter sky. A special part of interpreting the constellations can be the inclusion of some legends that originated with our first nations. The current issue of *Green Teacher* (Issue 86) has an article with just this theme, and includes one of my favourite legends about Ursa Major, attributed to the Mi'kmaq people. The article also includes an activity that teaches about the seasonal changes in the positions of the stars as we see them in the sky. Check out this issue of what continues to be a wonderful teaching resource. Better still, subscribe at www.greenteacher.com/

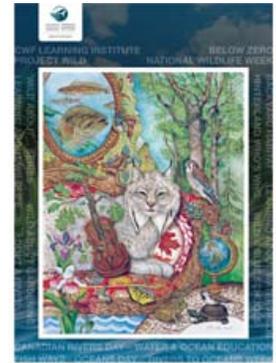
Ontario Government support for Environmental Education

In late summer the Ontario Ministry of Education took further action to support the implementation of *Acting Today, Shaping Tomorrow*, its policy framework document. The Province established the position of Regional Environmental Education Lead (REEL) in each of 6 English-language and 3 French-language regions across the province. The role of the person in this position is as follows:

- support boards in their region in revising or developing a board environmental education policy aligned with the provincial policy framework;
- establish a network of environmental education contacts in all boards in the region, including student leaders;
- develop and share a network of community partners who can assist schools and boards in accessing and enhancing resources that support teaching and learning about environmental education;
- develop a provincial and regional plan for building and sustaining environmental education leadership capacity.

These positions have now been filled by boards of education, and the term of these positions is currently set to end in August 2010. It was nice to hear that one of the REELs in Southern Ontario is former OSEE regional director Roberta Oswald. Perhaps you have had some contact with the REEL in your area already, but, if not, I think it would be important to support this Environmental Education initiative of the Ministry by seeking out the REEL that is serving your Board and offer to assist them in their efforts.

Andrew Boughen is an environmental educator living in Newmarket, Ontario



CWF EDUCATION .CA
All Grades All Subjects All Ages
Biodiversity 2010



Earth Day Canada
All filmmakers, young and old, established and aspiring, are invited to submit 90-second silent videos to the Every Day Heroes Film Competition.
The deadline for submissions is March 15, 2010. Submissions received prior to February 15, 2010 will be entered into the raffle to win a Panasonic 60GB HDD/SD Camcorder.
Visit www.earthday.ca/film for more details and submission form.



Nature Story

Allan Foster

The Moonbeam Princess

Tell this story whenever moonlight illuminates the trees of the forest. The tale comes from Japan.

Once upon a time there was an old, childless couple that lived in a small cottage at the edge of the forest. He was so old and stiff that he struggled to make his living through cutting bamboo trees and taking them to market. He worked long hours and often was still in the forest at nightfall.

One night, when a full moon shone brightly, he discovered a bamboo tree that mysteriously seemed to glow from within. He cut the tree down and was amazed to find nestled within the bamboo a tiny little girl no bigger than his thumb. He hurried home with the little girl, anxious to show his amazing discovery to his wife.

Once his good wife got over the shock of seeing such a tiny person, she agreed that they should keep the baby and raise her as if she were their very own. So from that day on they loved that little girl and she thrived in their home. She began to grow and eventually grew to the size of a normal girl. But more than that, she became extremely beautiful.

No matter how hard the couple tried to keep their beautiful daughter a secret, word of her breathtaking beauty slipped out into the neighbourhood. It wasn't long before noblemen began to call at the house asking the parents for her hand in marriage. At first the old man simply said, "No." But eventually he was pressured to give in. But he wasn't about

to make it easy. He gave prospective suitors a list of impossible tasks such as retrieving Buddha's magic begging bowl, finding magic gold blossoms from an enchanted island or bringing home the legendary magic coat from an enchanted rat.

These tasks were truly impossible and none of the suitors succeeded. But word of all of these impossible tasks only served to increase the reputation of the beautiful daughter. Eventually the emperor himself arrived at their door to ask for the girl's hand in marriage. This time the old forester could not refuse, but, as it turned out, the emperor had arrived too late and, once he laid eyes on the daughter, he was broken-hearted to discover that he would never have her as his wife.

You see, the enchanted daughter was a moonbeam. Her great beauty had sadly only been loaned to the people for a short while and now it was time for her to return to the moon – to her own people. Before she rose up to the sky, she embraced the emperor and gave him a small vial of the elixir of immortality. All he had to do was drink a few drops of the magic liquid and he would live forever.

Before he could thank her and beg one more time for her to stay, she left the world forever and disappeared back into the sky. So great was the emperor's love that he followed her up to the top of the highest mountain in the country. But once he reached the top, unable to stand the thought of living without her, he built a small fire and burned the elixir of immortality. Then he hung his head and returned to rule his kingdom at the foot of the mountain.

This mountain, the highest place in Japan, is still called "Mount Fuji" which means "mountain of immortality."

The kind old couple missed their adopted daughter terribly, but, happily, they never had to worry about money again. From the day he discovered his moonbeam princess, within every bamboo stem he cut, the old forester found a tiny nugget of gold.



Allan Foster is a long time educator at the Kortright Centre for Conservation. To read more of Allan's nature stories, visit his website at www.kortright.org and click on AllanFoster's Stories.

Winning The Water Bottle Waste Debate

Adria Vasil

Reprinted from *Now Magazine*:

Volume: 29, Number: 8, October 20, 2009

My roommates buy highly packaged products and bottled water. How do I address this in a completely non-patronizing way?

Having roommates is sort of like living at the UN. It brings together all sorts of different norms under one roof, and when differences arise, it's best to talk it out. Not Moammar Ghadafi-style (ranting 'n' browbeating won't win anyone over), but through more persuasive diplomacy.

For one, you have to lead by example (just as developed countries should on greenhouse gas emissions, ahem). But honestly, this tactic will only get you so far. You sound like a stand-up green citizen, but clearly your canister-filling, bulk-buying ways haven't caught on by osmosis.

The key here is to slip info and solutions under their noses without being preachy. (Nagging is only effective on family members who are forced to love you.) It being Waste Reduction Week and all, you've got the perfect excuse to do all this stuff in the open.

If they drink bottled water, they probably believe that tap water isn't clean and don't realize that bottled H₂O is less regulated than the municipal stuff.

You could kick off a friendly chat with, "Hey, did you hear how they found traces of paint thinner and Tylenol in bottled water? Can you believe it?" (If they don't, send them to ewg.org/reports/bottledwater.) You could add, "Yeah, I also read that 1.5 million barrels of oil go into making the plastic for water bottles alone each year. Isn't that crazy?"

If telling them all this is too direct for you, just give them each a pretty stainless steel reusable water canister from Otter Bottles as gifts. You could also slip a printout of Polaris Institute's *Inside The Bottle* flyer into their canisters (www.insidethebottle.org). And if they still complain about the taste of tap water, buy a basic charcoal faucet filter for \$35.

The same kind of tactics could be applied to getting them into reusable bags, but you might have trouble convincing your roomies to buy in bulk or to leave packaging at the store, even though the premier, yes, Dalton McGuinty, suggested we do it earlier this year. For that, they'll need to be more emotionally invested.

One way to passively educate (and motivate) friends and family is through the power of docu-

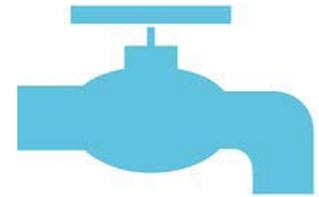
mentaries. You could try a classic like *An Inconvenient Truth*, though in your case you'll probably want something more scintillatingly trashy, like *Garbage! The Revolution Starts At Home*. The doc follows a typical Toronto family as they reluctantly agree to stash all their garbage in their garage for three months.

There's lots of good ick factor, tons of riveting facts on how much trash we produce, as well as an eye-opening investigation into where our trash goes. Perfect for your needs, really.

Try hosting an informal screening party for a couple of friends, inviting your roommates, of course. Or if they're likely to bail on that scenario, casually pop it in when everyone's home, place fresh-baked brownies on the coffee table, and when they walk in, snag them by blurting out, "Oh my god, this film is so fascinating, you should totally watch this with me. Here, sit, have a brownie."

You could chirpily let your roommates know its WR Week and say that you'd love, just for fun, to see how little waste your apartment can produce for seven days. Ask them if they'd be into trying it and give them a few ideas on what it would involve, e.g., avoiding takeout, bringing your lunch to work in Tupperware containers, etc.

And be sure to have realistic expectations. You're unlikely to turn them all into a team of eco warriors (at least right away), but if you play your cards right, you could very well influence them to lessen their wasteful ways.

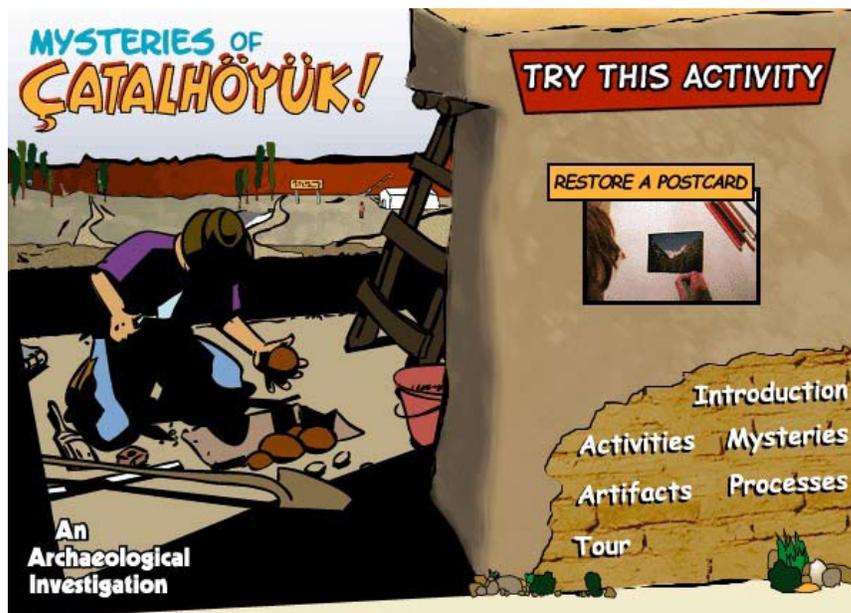


tap water is, on average, 500 times cheaper than bottled water.*
boycott the bottle.



Artifact in Context

Pam Wilson



Grade 4, Integrated Cross-Curricular Unit: Islamic-Centric

2 X 50 minute periods

Overview: To hypothesize how people lived during a certain time, based on archeological sites and artifacts.

Science and Technology – Understanding Earth and Space Systems: Rocks and Minerals

By the end of Grade 4, students will:

2.4 use scientific inquiry/research skills to investigate how rocks and minerals are used, recycled, and disposed of in everyday life (e.g., nickel and copper are made into coins that are out of circulation can be melted down and the metal can be used for making other things; calcium [from limestone], silicon [from sand or clay], aluminum [from bauxite], and iron [from iron ore] are made into cement that is used for roads and buildings; concrete production facilities, and can be recycled; rocks from quarries are used for garden landscaping, and these rocks can be reused; marble is used for countertops and statues).

Sample guiding questions: Where might we find products made from rocks and minerals in our daily life? How might you find out other ways in which rocks and minerals are used in everyday items? Why might some people and groups have concerns about the use of some of these rocks and minerals? What might be some alternative materials that could be used instead

of the rocks and minerals? How are some of the items made from rocks and/or minerals disposed of when they are no longer useful? Which minerals can be recycled or reused in other products?

- 2.5 Use appropriate science and technology vocabulary, including hardness, colour, luster, and texture, in oral and written communication.
- 2.6 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes (e.g., use a graphic organizer to show how rocks and minerals are used in daily life)

Visual Arts

Creative Work

By the end of Grade 4, students will:

Produce two- and three-dimensional works of art (i.e., works involving media and techniques used – drawing, painting, sculpting, printmaking) that communicate thoughts, feelings, and ideas for specific purposes and to specific audiences (e.g., create a poster for display in the school library to commemorate a personal literary hero using an additive form of printmaking).

Critical Thinking

By the end of Grade 4, students will:

- describe how a variety of artists working in different styles and media and in different historical periods have used the elements of design and/or tools, materials, and techniques of their art (e.g., describe buildings made in different

historical periods, such as the CN Tower, a native longhouse, and the Parliament Buildings in Ottawa, and show how the availability of certain materials influenced the designers or architects).

Assessment Strategies:

Since this lesson is introduced early in the unit and the point of the activity is to primarily teach critical thinking in science, not produce perfect writ-

Finally, teachers will incorporate self-assessment too. They will make mental note of parts of the lesson that did and did not go well. Teachers will scrutinize their own ability to provide clarity and make the lesson comprehensible to all students. The teacher may wish to make after-action notes on the typed lesson plan, in order to make decisions about future lessons and communications with students.

	Process:		Product:		Product:
X	Observation		Sketchbook/Journal	X	Presentation/Performance
	Anecdotal Notes		Portfolio Review		Critique
	Checklist/Rubric		Self-assessment	X	Checklist/Rubric
	Interview/Conference	X	Peer-assessment		Other:
	Presentation/Performance	X	Interview/Conference		

ing, the students' completed work will be assessed by the teacher with this in mind. The teacher will give written feedback on students' final drafts that include positive reinforcement, and ask questions to further student thinking. Student effort will be a determining factor in the grade given. The major factor will be the students' attempts to incorporate the criteria listed by the class at the beginning of the unit.

Teachers will also assess student communication, thinking and writing informally during the procedural phase of the lesson. They will note:

- Types of questions students have
- Degree to which students seem able to integrate their knowledge about the past to the present-day site
- The kinds of writing formats students select
- The writing skill of the students (expression, analysis, and conventions)

Students will assess their work during the group discussions using the criteria created as a class. They will give each other feedback that addresses how well they believe the work meets the three criteria.

Individual students will assess their work during the "walk-through-exhibit", and while discussing their work with their peers.

Planning for Learning Differences

Adaptation for ELL: Students who struggle with reading and writing have the opportunity to work in pairs. This style of learning provides some of the additional scaffolding that is often needed to complete class assignments. As a class we talk about what to include and think about in student writing. Teachers can support this further by writing the brainstormed ideas on the board. This allows English language learners who need to translate in their heads, time to process information. Encourage pairs to talk about what to include. Students who struggle to write may choose a less intensive writing format (the cartoon) or focus on the poster illustrations. Prompts can be given to get them started on their writing. If the students are having difficulty writing down their ideas, they could also draw a picture to represent their ideas and share it orally with the class the next day.

Adaptation for Special Learners:

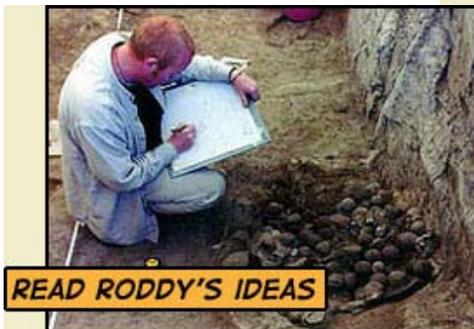
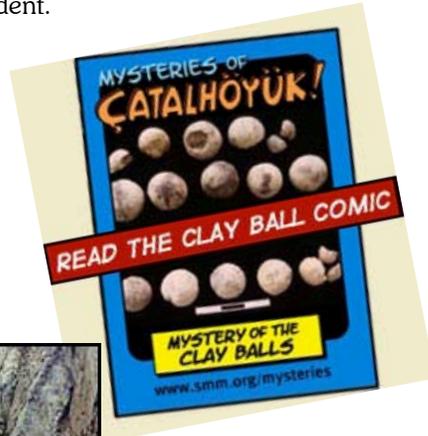
Emotionally Fragile: If this student wishes to work in a pair, teachers may suggest for them either a partner with extensive patience and who is a good team player, or a student who is usually unflappable and easy going. Teachers may provide encouragement with statements like, "take your time."

Type: (check one only)		Accommodations: (check those which)			
	Physical Challenges	X	Increase time for lesson	X	Peer Tutor/Partner
X	Learning Disabled		Increase space available	X	Modify Materials
X	Behavioural	X	Written Instructions		Modify Tools
X	ELL	X	Oral Instructions	X	Extend Lesson
X	Gifted	X	Visual Instructions		Other:

ADHD Students: The oral aspects of this project will assist these students in deciding how to present their ideas, and what information may be important to convey. These students are welcome to move around the classroom to look at the projects and if they need a quiet place to reduce distraction, the teacher can provide a corner desk, library pass, or other place to work. These students may change location within the room several times as they share their work with each other and move from writing to editing and illustrating.

Non-compliant Student: This student often thinks deeply about issues but does not want to follow the designated task or write their thoughts down at all. Here the teacher may want to help the student get started by listening to a few of their ideas and jotting them down. The teacher may also want to have this student work in a pair situation in order to peer motivate them.

Gifted Students: These students may wish to write longer, more challenging forms of expression. They may want to write a different piece that relies on their own imagination for the contemporary dilemma (instead of the article provided). Note: More flexible parameters may appeal to the gifted, as well as, the non-compliant student.



Materials & Tools

Projector
Artifacts at Çatalhöyük worksheets

Homework/Communication with Parents:

Go on-line and play with the site.

Delivering the Lesson

Sharing the Objectives

In the introductory lesson entitled *Artifacts 1: What Can We Learn from Artifacts?*, the first of this two-part lesson series, students learn what artifacts are and what kinds of information can be determined about the behavior and physical characteristics of people by looking at these objects.

The second lesson puts students in the role of archaeologist, using the mysterious city of Çatalhöyük to explore how artifacts can give us clues to how people once lived. Students will explore an archaeological mystery that demonstrates the importance of context in learning from artifacts. Factors such as the artifact's location, its proximity to other artifacts, and the number of similar artifacts found can provide strong clues about the possible purpose and origins of the artifact, as well as the physical characteristics and behaviors of people responsible for creating it.

Students will visit the computer lab and look at the *Mysteries of Çatalhöyük* site. The Çatalhöyük activity area of the Science Museum of Minnesota uses the Cambridge University database on the Neolithic site of Çatalhöyük in Turkey to build an interactive space where teachers and students can learn about archaeology. To this is added human-interest material about the researchers and excavations, and a user interface that includes virtual reality images and video. The interface is laid out for grades 3-9, and most of the activities are for grades 3-7. The most useful activities and "mysteries" are for grades 3-7 and revolve around the use of art by the people of Çatalhöyük. These demonstrate problems faced by archaeologists in interpreting art and also the ways in which scientists think in order to generate ideas about the things they study. Especially good are activities that show how complex works of art are reconstructed from fragmentary evidence. And for older students, there is a very interesting discussion between the scientists of the meaning of fertility figurines found at Çatalhöyük.

	Quality Art Education: have you included	Multiple Intelligences: (check off boxes or underline)		
X	Looking at Art (by professional and amateur artists)	X	Linguistic	Musical
X	Talking or writing about art	X	Logical/Mathematical	X Naturalistic
X	Making Art	X	Visual/Spatial	X Intrapersonal
			Bodily/Kinesthetic	
		X	Interpersonal	

Body of the Lesson (Step-by-Step)

Introduction to Çatalhöyük

Tell students that they will be studying the ancient city of Çatalhöyük in an attempt to learn more about how the people in this community once lived. To do so, students will study a variety of artifacts and create a classroom exhibit on the Mysteries of Çatalhöyük. Before they begin their investigation, they will read some introductory material on the ancient city to help give them some context through which to view the artifacts.

Read, or have students read the Introduction (see attached) for the *Mysteries of Çatalhöyük* exhibit from the Science Museum of Minnesota. Here, students will read some general background information on Çatalhöyük that will provide some context for the activities that follow. You may wish to have students locate Turkey on a map so they have some idea of where this ancient city is.

Also, you may want to discuss the following:

- Why are people studying Çatalhöyük?
- What can we learn about how people lived in ancient Çatalhöyük from studying artifacts?

Artifacts at Çatalhöyük

Distribute printouts of the Artifacts page with the Artifacts at Çatalhöyük student sheet attached.

Working in groups of 2-3, have students look at the artifact in each photo and record what it suggests about the physical characteristics and/or behavior of the people of Çatalhöyük. Then, allow groups to visit the Artifacts page online. Students should click on each artifact to learn more about the object and what archaeologists have learned about the people of Çatalhöyük by studying it. As students explore each artifact, have them add to the information recorded earlier on the Artifacts at Çatalhöyük student sheet. They should also record any unanswered questions about the artifacts.

Ask students to share some of their findings and respond to the following questions:

- What kinds of information can we learn from artifacts?
- What kind of information can't we learn from artifacts?

Mysteries at Çatalhöyük

To expand on this idea, have students return to the *Mysteries of Çatalhöyük* exhibit from the Science Museum of Minnesota to read about the *Mystery of the Clay Balls*.

Have students read the description of the clay balls and the archaeologists' ideas.

Extensions:

Students can learn about another famous archaeological site at *Treasures of the Sunken City* where over five acres of underwater artifacts are being mapped off the coast of Alexandria, Egypt. Visit Jean Yves Empereur to read an interesting interview with the archaeologist who excavated the

underwater site. If the computers your students use have *Vivo* or *Real Player*, go to *Unforgettable Moments* to view video highlights of the Alexandria excavation.

Visit the York Museum, it is free. They have First Nation artifacts over 3000 years old. They also have historical programs on pulleys and gears and light and sound.

Reflections

What worked/didn't work and what changes are needed for next time?

Sources

Nelson, Charles M. Science Museum of Minnesota.

Science NetLinks. from:

www.sciencenetlinks.com/lessons.cfm?DocID=52. 2001.

Science Museum of Minnesota. Science NetLinks.

Mysteries of Çatalhöyük. from:

www.smm.org/catal/, 2003.

Pam Wilson is a graduate of OISE/UT

MYSTERIES OF ÇATALHÖYÜK! Introduction ■ Activities ■ Mysteries
Artifacts ■ Processes ■ Tour

Search the Website
[Input Field]
FIND IT!

Current Location
> Artifacts

Examine for yourself what's been found at the Çatalhöyük site since the excavations started. Each area represented here leads to a page with more examples of artifacts.

MURALS POTTERY HUMAN REMAINS OBSIDIAN
ANIMAL BONES FIGURINES CHIPPED STONE TOOLS WORKED BONE
GROUND STONE TOOLS

TOUR THE FINDS ROOM

Listen to Ian Hodder's ideas about the artifacts found at Çatalhöyük

DO YOU PERSONALLY THINK OBJECTS ARE IMPORTANT TO ARCHAEOLOGY?
WILL ARTIFACTS ALWAYS BE IMPORTANT TO ARCHAEOLOGY?

OSEE Awards

The OSEE Awards committee solicits nominations for the following awards to be presented at the annual spring conference.

The criteria for these awards are listed below. If you wish to submit a nomination, please contact the Awards Committee chair, Sherri Owens before April 1st (see form in insert below).

OSEE Fellow

This highest level award is quite difficult to attain. In some years no fellows will be appointed. The evaluation criteria are as follows, the first two being absolute and the next four being more heavily weighted than those remaining. The candidate shall: be a current member of OSEE and have at least ten years of continuous membership in OSEE

- Have done meritorious service to OSEE
- Have done meritorious service at the school board or federation level
- Have shown sustained interest in OSEE as shown by active participation over many years
- Have been an outstanding teacher and leader of environmental educators
- Have contributed to environmental education in Ontario and/or nationwide (including publications)
- Have participated in other scientific and/or geographic societies
- Have been recognized by other organizations, thereby bringing honour to OSEE

Excellence in the Teaching of Environmental Education

May be offered annually to one or more persons who will be selected primarily on the basis of outstanding performance as environmental educators. Outstanding services of the following types might also be considered:

- Active leadership and scholarly endeavor in environmental education over an extended period of time
- Unique and extended accomplishments in environmental education
- Direct and substantial contributions to large scale improvement in environmental education

Leadership in Environmental Education

May be offered annually to one or more persons who have demonstrated outstanding leadership in environmental education for at least five years. This is not an award for recognition of classroom teaching but it does not exclude the selection of classroom teachers. This award is open to university and college faculty, classroom teachers, consultants, supervisors, publishers, and others deemed suitable by the Awards Committee. This award is designed to recognize direct and substantial contributions to the large scale improvement of environmental education at any level in the formal education system.

OSEE Service Award

May be offered annually to one or more persons who have made outstanding contribution to OSEE over an extended period of time. Contributions should include some of the following:

- Several years service on the Executive Committee
- Service on the Conference Planning Committee
- Significant and substantial contributions to *Interactions* over an extended period of time
- Service on the Editorial Board of *Interactions*
- Conducting regional workshops on behalf of OSEE
- Service on provincial curriculum committees as an OSEE representative

OSEE Awards Nomination Form

Please copy the text below and paste into an e-mail addressed to sherri.owen@osee.ca. List "OSEE Awards" in the subject line. In the body of the email fill in the required information.

- Completed forms are due by April 1 (no fooling).
- Nominators will be contacted when a decision is made and invited to inform the winner.

Thank-you for your time and for helping us recognize excellence.

Your Name:

Your E-mail:

Include the award from below for which the person is being nominated (delete others):

1. OSEE Fellow
2. Excellence in the Teaching of Environmental Education
3. Award for Leadership in Environmental Education
4. OSEE Service Award

Name of Nominee:

Position the nominee holds that is relative to the award:

Please describe why you have chosen this person to be nominated:

A Letter to Mother Nature

Max More

Dear Mother Nature:

Sorry to disturb you, but we humans – your offspring – come to you with some things to say. (Perhaps you could pass this on to Father, since we never seem to see him around.) We want to thank you for the many wonderful qualities you have bestowed on us with your slow but massive, distributed intelligence. You have raised us from simple self-replicating chemicals to trillion-celled mammals. You have given us free rein of the planet. You have given us a life span longer than that of almost any other animal. You have endowed us with a complex brain giving us the capacity for language, reason, foresight, curiosity, and creativity. You have given us the capacity for self-understanding as well as empathy for others.

Mother Nature, truly we are grateful for what you have made us. No doubt you did the best you could. However, with all due respect, we must say that you have in many ways done a poor job with the human constitution. You have made us vulnerable to disease and damage. You compel us to age and die – just as we’re beginning to attain wisdom. You were miserly in the extent to which you gave us awareness of our somatic, cognitive, and emotional processes. You held out on us by giving the sharpest senses to other animals. You made us functional only under narrow environmental conditions. You gave us limited memory, poor impulse control, and tribalistic, xenophobic urges. And, you forgot to give us the operating manual for ourselves!

What you have made us is glorious, yet deeply flawed. You seem to have lost interest in our further evolution some 100,000 years ago. Or perhaps you have been biding your time, waiting for us to take the next step ourselves. Either way, we have reached our childhood’s end.

We have decided that it is time to amend the human constitution.

We do not do this lightly, carelessly, or disrespectfully, but cautiously, intelligently, and in pursuit of excellence. We intend to make you proud of us. Over the coming decades we will pursue a series of changes to our own constitution, initiated with the tools of biotechnology guided by critical and creative thinking. In particular, we declare the following seven amendments to the human constitution:

Your ambitious human offspring.

© Max More, August 1999

www.maxmore.com/mother.htm

Amendments To The Human Constitution

1. We will no longer tolerate the tyranny of aging and death. Through genetic alterations, cellular manipulations, synthetic organs, and any necessary means, we will endow ourselves with enduring vitality and remove our expiration date. We will each decide for ourselves how long we shall live.
2. We will expand our perceptual range through biotechnological and computational means. We seek to exceed the perceptual abilities of any other creature and to devise novel senses to expand our appreciation and understanding of the world around us.
3. We will improve on our neural organization and capacity, expanding our working memory, and enhancing our intelligence.
4. We will supplement the neocortex with a “metabrain”. This distributed network of sensors, information processors, and intelligence will increase our degree of self-awareness and allow us to modulate our emotions.
5. We will no longer be slaves to our genes. We will take charge over our genetic programming and achieve mastery over our biological, and neurological processes. We will fix all individual and species defects left over from evolution by natural selection. Not content with that, we will seek complete choice of our bodily form and function, refining and augmenting our physical and intellectual abilities beyond those of any human in history.
6. We will cautiously yet boldly reshape our motivational patterns and emotional responses in ways we, as individuals, deem healthy. We will seek to improve upon typical human emotional excesses, bringing about refined emotions. We will strengthen ourselves so we can let go of unhealthy needs for dogmatic certainty, removing emotional barriers to rational self-correction.
7. We recognize your genius in using carbon-based compounds to develop us. Yet we will not limit our physical, intellectual, or emotional capacities by remaining purely biological organisms. While we pursue mastery of our own biochemistry, we will increasingly integrate our advancing technologies into our selves.

These amendments to our constitution will move us from a human to an ultrahuman condition as individuals. We believe that individual ultrahumanizing will also allow us to form relationships, cultures, and policies of unprecedented innovation, richness, freedom, and responsibility.

We reserve the right to make further amendments collectively and individually. Rather than seeking a state of final perfection, we will continue to pursue new forms of excellence according to our own values, and as technology allows.

Taking Action on Climate Change: A Differentiated Instruction Assignment

Brian Lim

This differentiated instruction assignment provides students with a broad choice to demonstrate their understanding of the basic science of climate change, the effects of climate change, and possible courses of action at the individual and societal/governmental levels. The end product could take on a number of different forms, such as a speech to be given at the UN, a storyboard for a public service announcement, or even a song or poem.

It was assigned to students approximately two-thirds of the way through the unit, after the basic science and effects of climate change had been covered, and after some classroom discussion about practical courses of action. Students were given part of one class period to begin planning their piece (or

to check on the suitability of alternative proposals), one full class period to work on their piece, and approximately a week in total (non-semestered) to complete their piece. Students worked individually or in pairs.

This assignment proved to be quite successful in stimulating student interest and effort, particularly among some students with strong artistic gifts. Many products in forms other than written reports or projects (video, powerpoint, song, posters, cartoons) were submitted, displaying much creativity while displaying a reasonable grasp of basic climate change science and awareness of current and proposed courses of action on climate change.

Brian Lim, Rosedale Heights School of the Arts

Seneca
King Campus



April 29, 30, May 1, Seneca College, King Campus

**An Environmental Conference for
K-12 Teachers and other Educators**

Full Three Days: early \$275, regular \$320
Day only (Thur, Fri): \$150
Day only (Sat): \$90
Student: full \$125, \$50/day

**Details and Registration at
www.OSEE.ca**

Interested in presenting?
Contact Bill Thompson, Conference Coordinator
bill.thompson@osee.ca
519-539-8413

Assignment: Taking Action on Climate Change

SNC2D – Climate Change

Assignment Purpose:

The purpose of this assignment is to create a product (e.g. a poster, a letter, a song or poem) which seeks to promote practical, concrete action on climate change at individual and societal levels.

The product **must** contain 3 elements:

1. a clear and accurate presentation of at least 1 aspect of the science underlying anthropogenic (human caused) climate change;
2. an accurate presentation of at least 1 adverse effect of climate change;
3. advocacy for concrete action of some kind on both the individual and societal level (e.g. individual – buy a hybrid car, societal – increase taxes on fossil fuels or offer tax rebates on hybrid cars).

Assignment Format and Guidelines:

- You will be given only 1 class period to work on your assignment, so you must come prepared to work with appropriate notes and materials. Markers, pencil crayons, tape and scissors can be borrowed, but you must provide your own Bristol/poster board, paper.
- You may work either alone, or with a partner.
- You may choose from one of the following assignment possibilities:

1. A letter, or speech, to be read at the General Assembly of the United Nations	2. An editorial cartoon, comic strip or short graphic novel	3. A commercial by an environmental organization or a public service announcement (a script should be submitted, may include a storyboard)
4. A poster or advertisement on behalf of the government of Canada, or an environmental organization	5. A song (lyrics) or a poem for a general audience, or for some kind of climate change campaign	6. A short drama piece or skit for a general audience (a script should be submitted, be prepared to present in front of the class!)
7. A formal report to be submitted to the federal Minister of the Environment	8. A plan for some kind of organized climate change action (e.g. a demonstration at Queen's Park, a school campaign)	9. Your own idea (Please check with me first)

Due date: _____

SNC2D – Climate Change
Name: _____

Partner Name (if working with one): _____

Product: (e.g. poster, speech) _____

Assignment Assessment Rubric:

Criteria	Level 1	Level 2	Level 3	Level 4
Examining the science underlying anthropogenic climate change	Presents 1 aspect of the science, but with problems in clarity and accuracy <2.5 2.5	Presents 1 aspect of the science with some clarity and accuracy 3.0	Clearly and accurately presents 1 aspect of the science 3.5 4.0	Clearly and accurately presents 2 or more aspects of the science 4.5 5.0
Presenting an adverse effect of climate change	Presents 1 adverse effect, but with problems in clarity and accuracy <2.5 2.5	Presents 1 adverse effect with some clarity and accuracy 3.0	Clearly and accurately presents 1 adverse effect 3.5 4.0	Clearly and accurately presents 2 or more adverse effects 4.5 5.0
Advocacy for concrete action	Presents some kind of concrete action, on either individual or societal level. <2.5 2.5	Presents some kind of concrete action on either individual or societal level, with some thoughtfulness and connections to the science or effects of climate change 3.0	Presents thoughtful concrete action on both individual and societal levels, makes connections to the science or effects of climate change 3.5 4.0	Presents thoughtful concrete action on both individual and societal levels, makes clear connections to the science and effects of climate change 4.5 5.0
Overall presentation, effort, and quality of work	Poor effort is evident in the quality and overall presentation (clarity, accuracy, neatness) <2.5 2.5	Fair quality, overall presentation, and effort 3.0	Good quality and overall presentation, good effort is evident 3.5 4.0	Excellent quality and overall presentation, outstanding effort is evident 4.5 5.0

Mark out of 20: _____

What Animal?

Abha Mehta, George Pimentel, Jay Prichard, Joana Santos

Science and Technology: Understanding Life Systems – Growth and Changes in Animals

Grade Two

Specific Expectations

- 2.2 observe and compare the physical characteristics (e.g., fur or feathers; two legs or no legs) and the behavioural characteristics (e.g., predator or prey) of a variety of animals, including insects, using student-generated questions and a variety of methods and resources (e.g., observation of live animals in the schoolyard; books, videos/DVDs, CD-ROMs, and/or Internet sources that depict animals in a positive light);
- 3.1 identify and describe major physical characteristics of different types of animals (e.g., insects, mammals, reptiles).

Source:

Science Is... by Susan V. Bosak (2000). Activity: What Animal Am I? (p.99)

Criteria for using the demo:

To classify animal characteristics (i.e. physical appearance, noises they make, habitat, what they eat)

Any required background information/skills that need to be introduced or reviewed prior to performing the demonstration:

Names of animals and corresponding characteristics (i.e. physical appearance, noises they make, habitat, what they eat)

Methodology:

Step 1: An animal is chosen and everyone but one person knows what it is.

Step 2: This person has to ask questions to determine the animal that he or she is.

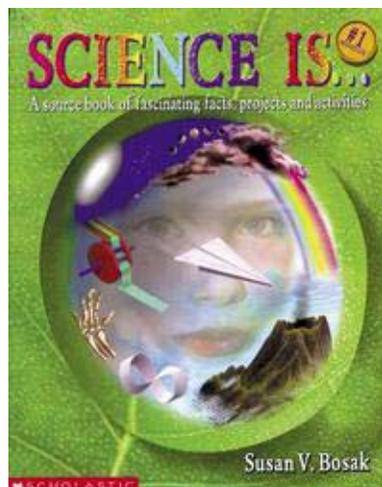
Variations: You can add charades to this activity in order to give it a new dimension and make it more challenging. For example, a player may act out the name of an animal.

Variations: The teacher could pin the name of an animal on the student's back. Students would then have to walk around the classroom asking people questions as to the name of their animal.

Follow-up activities:

A similar activity that may pose more of a challenge for grade two students is to have students act out an animal and have their peers guess what they may be. This will allow students to think about how animals move and what characteristics make them unique.

Another follow-up activity, which integrates visual arts and language, could have students work together to create a mural of a forest, desert, ocean (depending on what the class agrees on). Each student is responsible for learning about a specific animal and will need to draw (and later paint on the mural) a picture and write a couple of basic facts about the animal (i.e. what they eat, what they look like, what they may feel like, where they live).



Abha Mehta, George Pimentel, Jay Prichard, Joana Santos are graduates of OISE/UT

Brrrrrr! Blehhhhhh! Humidex and Wind Chill

Jennifer Dowker

Grade Levels: 5-8

Science and Technology

Meteorology relates to the expectations “Developing investigation and communication skills”, “Relate science and technology to science and the environment” and “Understanding Earth and space systems” in the Grade 1 – 8 curriculum. More specifically;

Gr. 7, Specific Expectation 1.1, sample question a) “Insulated clothing protects our bodies and increases our ability to enjoy outdoor activities in winter...”

Gr. 8, Specific Expectation 2.5, “Investigate the information (e.g. owner’s manual for a car, weather advisories for a region...)” Meteorology studies follow from seasonal observations in earlier grades, and lead into one of the aspects of forces acting on structures, beginning in grade 5. They also support understanding of climate issues.

Social Sciences

Meteorology can be related to grade 7 & 8 Geography. For example, a Specific Expectation for grade 7 includes explaining “the geographic concept of environment (e.g., “environment” refers to physical surroundings and conditions, particularly as they affect people’s lives)”. Grade 8 expectations include the exploration of climate patterns and natural phenomena such as storms.

Students will be expected to understand mathematics skills such as measurements in metric units. Students can practice applying order of operations (with brackets) to the temperature conversion formulae, and unit conversions between different systems of temperature measurement. There is an opportunity to search an archival climate database, for practice in interpreting tables and graphs.

Introduction

Sometimes knowing the temperature forecast isn’t enough to tell you what to expect when you step out the door for the day. When there is a lot of water vapour in the air on a hot day, it can feel like you’re wearing a big, hot, wet blanket, or it might be harder to breathe when you’re running around. On a windy day in winter, it could feel like the wind is blowing right through you, especially if you’ve been soaked by playing in the snow. There is extra

information in some weather forecasts that can help you know what else you might experience that day, besides the temperature on a thermometer or a web page.

Humidity and the Humidex

- Humidity is basically the ability of air to hold moisture (in the form of water vapour). It is reported as a percentage. At 100%, the air is saturated.
- The type of humidity most often reported during the day is the Relative Humidity (RH)
- “Relative humidity is the amount of moisture that the air contains compared to how much it could hold at a given temperature.” (Environment Canada (EC), 2002)
- The perceived effect of high temperature and high RH is called the Humidex. This is a Canadian idea, used since 1965.
- The American version is called the Heat Index.
- On a day with a high Humidex reading, it is important to stay hydrated and have rest breaks in the shade. Sweat cools you by evaporating (turning from liquid water into water vapour) off of your skin. It is harder to cool off by sweating when the humidity is very high, because the air around you will not absorb much moisture.
- High temperatures can cause you to become sick if you can’t get enough water to drink, and your core body temperature rises beyond a safe limit.
- Another effect of high humidity is the large number of water droplets which can form around particulates in the air. When the air becomes saturated, the moisture may appear in the form of fog, smog, rain, or even snow in winter. This unstable weather may also be one of the factors that leads to a thunderstorm.
- Human hair is still used as a humidity indicator.
- Windsor, Ontario has the highest recorded Humidex reading, calculated to have been 52.1 on June 20, 1953.



High humidex: stormy weather? (Broderbund ClickArt, mod.)

Range of humidex: Degree of comfort	
Less than 29:	No discomfort
30 to 39:	Some discomfort
40 to 45:	Great discomfort; avoid exertion
Above 45:	Dangerous
Above 54:	Heat stroke imminent

(Environment Canada, 2002)

Wind Chill

- Wind chill is the perceived effect of wind speed and low temperatures.
- It was originally related to experiments with plastic water bottles performed in Antarctica in 1939.
- A new standard now used by both Canada and the United States is based on experiments with human volunteers.
- Wind chill is reported without units, so the same number means different things in the two countries. Canada uses the metric system (Celsius degrees, kilometers per hour) while the U.S. still uses 'Imperial' measurements (Fahrenheit degrees, miles per hour) in everyday life.
- Environment Canada issues a wind chill warning when frostbite can affect exposed skin within very few minutes. "In most of southern Canada, wind chill is included in the forecast when it reaches -25°, the point where frostbite becomes a risk." (EC, 2002).
- "The coldest wind chill on record in Canada occurred at Kugaaruk (formerly Pelly Bay), Nunavut, on January 13, 1975, when the temperature was -51°C and the wind speed was 56 km/h, producing a bone-chilling wind chill of -78. (EC, 2001)*
- * Other reports, using the same wind speed and temperature, state a wind chill of -92. However, when you plug in the values in the EC windchill calculator (you have to raise the temperature by 1 degree to -50) you get a more believable answer of -77. The same values put into the downloadable calculator give the same result.



A windchill-y day in London, Ontario. (JD)



Brrrrr! The north wind is a cold one! (Broderbund ClickArt, mod.)

Some Windchill examples:

Temperature	Wind speed	Wind chill
- 5°C	25 kph	-12
- 5°C	50 kph	-15
-10°C	25 kph	-19
23°F (≅5°C)	15.5 mph (≅25 kph)	13 (approx.)

(Aguado & Burt, 2007)



Hot. Dog. Water! (Broderbund ClickArt, mod.)

Humidex and Wind Chill
Exercise:

#1. List similarities and differences between humidex and wind chill:

Similarities	Differences

#2. Fill in the blanks by using the conversion formulae

	Celsius	Fahrenheit	Kelvin
Water freezes		32	
Water boils			273.16
Normal body temperature	37		

#3. Conversions (y is the temperature you are converting)

Convert Celsius to Fahrenheit	Convert Fahrenheit to Celsius	Convert Celsius to Kelvin	Convert Fahrenheit to Kelvin
$^{\circ}\text{F} = [(9/5) \times y^{\circ}\text{C}] + 32$	$^{\circ}\text{C} = (5/9) \times [y^{\circ}\text{F} - 32]$	$\text{K} = y^{\circ}\text{C} + 273.16$	$\text{K} = [(y^{\circ}\text{F} - 32) \times 5/9] + 273.15$

#4. Using the calculator at www.gc.ec.gc.ca/meteo/Documentation/Humidex_e.html and the tables at www.msc-smc.ec.gc.ca/cd/brochures/humidex_table_e.cfm, fill in the table:

	Temperature in $^{\circ}\text{C}$	R.H. in %	Humidex
Calculator	25	95	
Tables	25	95	
Calculator	30	90	
Tables	30	90	
Calculator	40	50	
Tables	40	50	

#5. How well do the calculator page answers compare to the table?

Questions:

1. What can you do to protect yourself or a pet if the humidex reading is high?
2. How does your hair react to high humidity?
3. How did the method of measuring wind speed differ in the old wind chill standard?
4. How do wet clothes affect you on a day with a large wind chill value?
5. What is the “boundary layer”?
6. Using the current conditions, calculate either the wind chill or humidex value where you are.

If the weather is moderate today, try using the *Climate Online* page to find a date in mid-winter or mid-summer. Choose a time between 9 am and 3 pm, note the temperature and either the relative humidity or the wind speed. Calculate (using the appropriate web page) what either the humidex or wind chill reading was at that time. Does it match the recorded data? Note: this is easier if you can choose a 'weather station' with hourly data.

Use these pages to answer the questions above:

www.msc-smc.ec.gc.ca/cd/brochures/humidity_e.cfm

www.msc.ec.gc.ca/education/windchill/windchill_fact_sheet_aug_10_e.cfm

www.msc.ec.gc.ca/education/windchill/windchill_calculator_e.cfm

www.gc.ec.gc.ca/meteo/Documentation/Humidex_e.html

www.climate.weatheroffice.ec.gc.ca/advanceSearch/searchHistoricData_e.html?timeframe=1&Prov=XX&StationID=9999&Year=2009&Month=11&Day=25 Climate Online

Glossary

Absolute humidity: Actual mass of water vapour per unit of air: g/m^3 [grams of water vapour per cubic metre of air.]

Approx. (approximately): Closely; close to proper value

AQHI (Air Quality Health Index): A scale, from 1 to 10, that describes the air quality in a region and its possible effects on human health. Go to this Environment Canada page to see what the AQHI is in your area: ec.gc.ca/cas-aqhi/default.asp?Lang=En&n=450C1129-1&edit=off

Celsius: Anders Celsius was a Swedish astronomer who described his Celsius (or centigrade) scale of temperature measurement in 1742. Since there are exactly 100 degrees between the boiling point of water and melting point of water ice, Celsius degrees are larger than Fahrenheit degrees.

Concentration: When you are dealing with mixtures of elements and/or compounds, the concentration means how much of the one thing you are measuring is present compared to the amount of the whole mix. For example, if you had 500 mL of milk and dropped a 15 g Oreo into it, the cookie concentration might be described as 15 g per 500 mL (or 3g/100 mL).

Exertion: Physically working hard; working hard enough to sweat

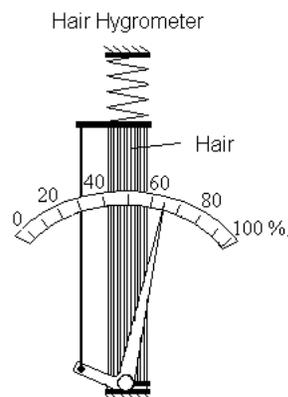
Fahrenheit: Gabriel Fahrenheit, born in Germany, developed alcohol and mercury thermometers, as well as the Fahrenheit temperature scale, in the early 1700s. He assigned 180 degrees between the boiling point of water and the melting point of ice.

Frostbite: You might have this if your skin has turned white and feels numb and hard, after being in the cold for some time. You should warm up the areas slowly, and don't rub them. Skin and some of the 'underlying tissue' (fat, muscles, and even bone) are damaged and if the damage is permanent, the tissue can die and the affected area will become pretty nasty. “Frostnip” is the milder form of frostbite.

Hair Hygrometer: This is a device for measuring humidity. It uses actual human hair attached to a sensitive lever. The hair expands and contracts as it responds to the amount of water vapour in the air. The device is attached to a rotating drum (like the one attached to a

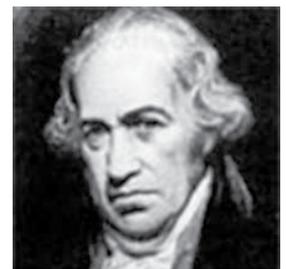


Anders Celsius



Humid air causes the hair to stretch and dry air causes it to shrink.

Hair Hygrometer



Gabriel Fahrenheit

seismograph measuring earth movement) that shows how humidity changes over the time of measurement.

Heat index (Apparent Temperature): The American equivalent of the Humidex, published by their National Weather Service. An online calculator for both the Fahrenheit and Celsius values, can be found here: http://www.crh.noaa.gov/jkl/?n=heat_index_calculator. This page also contains a table of heat index values and the warning categories for them.

Heat stroke: This happens when a person's body can't stop a rise in core body temperature (internal temperature) and goes into hyperthermia. This is related to not having enough fluids to replace what is lost in sweating, or when you get so hot that sweating stops. This is very dangerous. The symptoms include a feeling of confusion, very fast pulse, and a very high internal temperature. "Heat exhaustion" is the milder form of heat stroke, where you can feel sick and weak from the heat.

Hydration; hydrated: In terms of health, this refers to the amount of water you drink (water in other beverages as well as plain water). "Stay hydrated" means to drink enough water to keep your body working properly in hot weather. "Hydration" is also a term used in chemistry.

Hyperthermia: A condition where the core body temperature is much higher than normal. This is also the name of a treatment used to help cancer patients.

Hypothermia: A condition where the core body temperature is much lower than normal. Both hyper- and hypothermia can be very dangerous conditions.

Imminent: "about to happen". This is a case where spelling counts: "Immanent" is a property of a supreme being.

Kelvin: A temperature scale without negative values, most used in science; also called the absolute temperature scale. It was developed by a Scottish nobleman and scientist, William Thomas Kelvin.

0 Kelvin (or 0 K) is also called "absolute zero", and is thought to be the lowest temperature possible. A Kelvin unit is the same "size" as a centigrade degree.

Melting point of ice: The values for boiling water and freezing water actually refer to pure water, at sea level (a standard unit of air pressure). Since the water you see every day is not pure (and most of us are a bit higher than sea level), liquid water can exist at temperatures just below freezing (because of other substances dissolved in it). This means that "the melting point of water ice" and "the freezing point of water" are not exactly the same, and often "the melting point of water ice" is used as the 0°C standard.

Noxious: Harmful, bad.

Particulates: Tiny chunks of solid or liquid matter suspended in the atmosphere; also called 'aerosols'. They range in size from about 0.1 to 100 μm (micrometers) in diameter, and can come from both natural and man-made (anthropogenic) sources, such as volcanoes and car tailpipes. Smaller particulates can clump together to form larger particulates. These larger particles can attract water, which pulls water vapour from the atmosphere and lowers Relative Humidity (RH); we say then that the atmosphere is 'saturated'. This can then lead to fog, rain or snow. When the humidity and particle concentration is very high, this process can also lead to smog.

Perceived: "seen as", understood, observed. For example, windchill describes how wind can make the temperature seem lower than it is.

Percentage: A useful way of expressing concentration or other things that represent a fraction of a whole (a rate or proportion). It is usually based on some fraction of 100, but sometimes it just means a small part of something bigger. The term 'percent' is often used instead when you are sticking to mathematical terms.

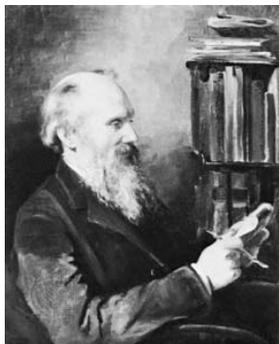
Saturation; saturated: When talking about humidity, this means the point where the atmosphere can't 'soak up' any more water vapour – it is 'full'. When the air is warm, it can hold more water vapour and so the saturation point is higher.

Suspended: "floating", "hanging": in a mixture, particles are said to be suspended when they are not dissolved, but are floating in the fluid (liquid or air).

Smog; photochemical smog; winter smog: Smog is a word formed from the combination of smoke and fog. Smoke is air full of particulates from burning (combustion), so smog is a "noxious mixture of gases and particles" (EC 2004).

- A mix of high temperatures, high humidity and bright sunlight can form photochemical smog from secondary air pollutants (chemicals that become noxious after combining with another substance in the atmosphere). Primary air pollutants go directly into the atmosphere.
- Smog can also happen on calm days in winter, due to particulates from heating as well as other sources. See http://www.ec.gc.ca/cleanair-airpur/Winter_Smog-WSAFF4D58F-1_En.htm for more about winter smog.

Water vapour: Water existing as a gas (one of the three phases of matter).



William Thomas Kelvin

Similarities	Differences
<i>Perceived effect</i>	<i>Humidex based on temp/moisture, windchill based on temp/wind speed</i>
<i>Both seasonal</i>	<i>Humidex a summer thing, [but relative humidity measured all year long]; wind chill only reported in winter</i>
	<i>Humidex has unit (percentage), wind chill has no units</i>
	<i>Humidex Canadian (heat index different); wind chill co-operative venture US and Canada since 2000</i>

Answers to Exercise #1

Resources:

- Aguado, E. & Burt, J.E. (2007). *Understanding Weather & Climate (4th ed.)*. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Allmeasures.com. (2004). Temperature Conversion Table. Retrieved November 26, 2009 from allmeasures.com/temperature.html [table and online conversion calculator]
- Anders Celsius. (2009). In *Encyclopædia Britannica*. Retrieved November 28, 2009, from *Encyclopædia Britannica Online*: britannica.com/EBchecked/topic/101683/Anders-Celsius
- Daniel Gabriel Fahrenheit. (2009). In *Encyclopædia Britannica*. Retrieved November 28, 2009, from *Encyclopædia Britannica Online*: britannica.com/EBchecked/topic/200226/Daniel-Gabriel-Fahrenheit
- Environment Canada. (2001). Canada's new wind chill index. In *EnviroZine*. Retrieved November 28, 2009 from ec.gc.ca/EnviroZine/English/issues/13/feature1_e.cfm
- Environment Canada. (2002). Environment Canada's wind chill program. Retrieved November 24, 2009 from msc.ec.gc.ca/education/windchill/index_e.cfm
- Environment Canada. (2002). Humidity. Retrieved November 24, 2009 from msc-smc.ec.gc.ca/cd/brochures/humidity_e.cfm
- Environment Canada. (2002). Wind Chill Calculators. Retrieved November 24, 2009 from msc.ec.gc.ca/education/windchill/calculator_e.cfm
- Environment Canada. (2002). Wind chill fact sheet. Retrieved November 24, 2009 from msc.ec.gc.ca/education/windchill/windchill_fact_sheet_aug_10_e.cfm
- Environment Canada. (2004). *Humidex table*. Retrieved November 24, 2009 from msc-smc.ec.gc.ca/cd/brochures/humidex_table_e.cfm
- Environment Canada. (2004). Smog. In *Clean Air Online*. Retrieved November 26, 2009 from ec.gc.ca/cleanair-airpur/Smog-WS-13D0EDAA-1_En.htm
- Environment Canada. (2004). *The Humidex*. Retrieved November 24, 2009 from www.ec.gc.ca/meteo/Documentation/Humidex_e.html. [Humidex calculator].
- Environment Canada. (2005). *National Climate Data and Information Archive*. Retrieved November 26, 2009 from climate.weatheroffice.ec.gc.ca/advanceSearch/searchHistoricData_e.html?timeframe=1&Prov=XX&StationID=9999&Year=2009&Month=11&Day=25
- Environment Canada. (2009). *About the Air quality health index*. Retrieved November 26, 2009 from ec.gc.ca/cas-aqhi/default.asp?Lang=En&n=CB0ADB16-1
- Environment Canada. (2009). *Canadian weather: current conditions*. Retrieved November 26, 2009 from meteo.gc.ca/canada_e.html [weather forecast site: choose location]
- Environment Canada. (2009). *Frequently asked questions*. Retrieved November 24, 2009 from meteo.gc.ca/mainmenu/faq_e.html#weather2c
- Ontario. (2009). *Facts on fluids: how to stay hydrated*. In *EatRightOntario*. Retrieved November 26, 2009 from eatrightontario.ca/en/viewdocument.spx?id=38
- Ontario. (2009). *Heat stroke*. In *HealthyOntario.com*. Retrieved November 26, 2009 from healthyontario.com/ConditionDetails.aspx?disease_id=68
- William Thomson, Baron Kelvin. (2009). In *Encyclopædia Britannica*. Retrieved November 30, 2009, from *Encyclopædia Britannica Online*: britannica.com/EBchecked/topic/314541/William-Thomson-Baron-Kelvin
- Wong, L. (1997). *Temperature of a Healthy Human (Body Temperature)*. In *The Physics Factbook™*. Retrieved November 27, 2009 from hypertextbook.com/facts/LenaWong.shtml

Additional Links:

- www.msc-smc.ec.gc.ca/cd/brochures/forecast_e.cfm general terms used in forecasts
- www.ec.gc.ca/cleanair-airpur/Winter_Smog-WSAFF4D58F-1_En.htm winter smog
- www.tdiclub.com/misc/conversions.html metric-Imperial unit conversions

Alternative Energy Resources

Sandra McEwan

As our present supplies of fossil fuels dwindle, government and industry have increased their efforts to further develop the use of several alternative energy supplies for heating and transportation purposes. These include the renewable energy resources: biomass, geothermal, hydroelectricity, ocean thermal gradients, solar, tidal, wave, and wind. Among the derived fuels being investigated are biofuels (ethanol, methanol, methane), urban wastes, hydrogen gas, and propane.

A practical approach to teaching this broad topic is to have each student research one alternative energy resource and present the findings to the class. Suggested subheadings include:

- Origin of Energy
- Current or Potential use
- Advantages
- Environmental Problems
- Other Disadvantages

The following is a summary of eleven alternative energy resources.

1. Biomass Fuels (wood, methanol, ethanol, methane)

a) Origin of Energy

- through photosynthesis, solar energy is stored as chemical potential energy in plants and later in animal wastes.

b) Use

- burning of wood in homes and industries
- burning organic wastes to produce heat
- fermenting plant materials to produce ethanol, which can be used as a fuel or fuel additive
- animal and human wastes can be digested anaerobically to produce methane gas for heating and vehicular fuel

c) Advantages

- renewable if reforestation occurs
- decrease solid waste disposal
- technology fairly well developed
- storable fuel which can be burned or liquefied
- can be available continuously and

in large supply (e.g. crops, rural animal wastes, urban garbage)

- methane by-products can be used for fertilizers

d) Environmental Problems

- loss of habitat (forests) for wildlife
- possible loss of some wildlife and plant species
- air pollution (particulate matter, gases, waste heat)
- loss of cropland
- degradation of soil (soil erosion, loss of nutrients)
- water pollution from runoff of fertilizers, pesticides and soil
- demand for water would increase
- large land requirements

e) Other Disadvantages

- increase use of pesticides and fertilizers on monocultures
- reduce food supply available to feed animals and people
- may be limited because use cannot exceed sustainable rate of removal and sufficient land is not available in some areas
- recycling will reduce available municipal waste
- low to moderate net useful energy yield
- occupational hazards

2. Geothermal Energy

a) Origin of Energy

- nuclear fission of elements in rocks inside the earth produces heat
- evidence of this energy is seen in hot springs and geysers

b) Use

- producing electricity
- heating buildings and commerce

c) Advantages

- available continuously
- technology is available
- is plentiful in certain areas of the world
- no fossil fuels are used in its generation

d) Environmental Problems

- noise (release of steam)
- possible emissions of significant quantities of noxious/toxic gases

- waste water often contains minerals and salts which when disposed on land or in water can cause problems for plants and animals
- releases waste heat which may cause local climate changes
- subsidence (sinking) of soil in the well area
- air and water pollution while making equipment

e) Other Disadvantages

- hazards from hot, high pressure fluids
- must be converted to electricity on site
- electricity produced is low in efficiency
- source often far from location
- possible disruption of scenic sites
- exploration and drilling is costly
- possible seismic activity (especially for geopressurized brines)

3. Hydroelectricity

a) Origin of Energy

- water gathered in lakes and rivers has gravitational potential energy which is converted to kinetic energy of falling water.

b) Use

- producing electricity by water rushing through turbines which causes generators to spin

c) Advantages

- source of energy is free and renewable
- technology well developed
- low operating and maintenance costs
- low overall supply but plentiful in areas near rivers that can be dammed
- 75 to 90% net useful energy yield
- low in environmental impact on air
- does not contribute to greenhouse effect
- water stored behind dams can be used for irrigation thus increasing productivity of local agriculture
- dams establish lakes that provide a habitat for fish which in turn can be used for food supply

d) Environmental Problems

- destroys land ecosystems behind dam and alters those below dam
- alters aquatic ecology (e.g. disrupt migration of spawning fish such as salmon)

e) Other Disadvantages

- available only in selected areas on a large scale
- most rivers near large population centres have already been dammed
- moderate to very high capital costs
- dams tend to fill up with silt from soil erosion up river thereby reducing their utility within a few decades
- aesthetic loss occurs when natural canyons are obliterated

4. Hydrogen Fuel**a) Origin of Energy**

- produced from heating fossil fuels, biomass, solid wastes or the electrolysis of water

b) Use

- an ingredient in industry
- fuel for space vehicles
- use as an automobile fuel is still experimental

c) Advantages

- non-toxic, posing no direct health hazard
- clean burning (except for NO_x emissions)
- can be stored readily
- fairly easy to transport within countries by pipeline
- capable of being produced in great quantity in Canada from fossil fuels and water
- low molecular weight (lightest element), therefore, disperses readily in event of spill
- a gaseous fuel, therefore, better throttle response and easier cold-weather starting than with gasoline
- technology in late stages of development

d) Environmental Problems

- environmental impact of entire system could be low to very high depending on source of heat or electricity

e) Other Disadvantages

- capital and operating costs will

probably be high to very high depending on source of heat or electricity

- net useful energy yield will be low to moderate depending on source of heat or electricity
- storage and operational problems must be overcome before it can be used as an automobile fuel
- production is dependent upon substantial energy input from another source
- hydrogen molecule extremely small, therefore greater possibility of gas or liquid leakages

5. Ocean Thermal Energy Conversion (OTEC)**a) Origin of Energy**

- solar energy is absorbed and stored in surface waters of oceans

b) Use

- electrical energy may be produced by using the temperature difference between warm surface water and cold bottom water (18°C or higher) in oceans to drive a turbine which is connected to a generator

c) Advantages

- energy supply is free and renewable
- does not contribute to greenhouse effect
- almost infinite supply in certain areas, if ever developed

d) Environmental Problems

- may disrupt ocean ecosystems
- possible release of chemicals and waste products into water

e) Other Disadvantages

- technology in early stages of development
- development costs probably high
- energy efficiency is probably low
- sites with sufficient temperature differences between surface and deep water may be limited
- corrosion of power plant due to salt water
- OTEC power plant may be damaged by stormy seas
- clogging of inlets, ducts and heat exchanges with algae and marine life
- best sites are often located far from centres of power consumption

6. Propane**a) Origin of Energy**

- propane is a by-product of natural gas processing and crude oil refining

b) Use

- vehicle fuel
- home heating
- cooking fuel (barbecues)
- industrial and commercial processes

c) Advantages

- non-toxic and safe to use
- burns more completely than gasoline, therefore, emission levels generally lower
- greater energy efficiency than gasoline due to higher octane rating
- contains no lead
- liquefies readily at low pressures for convenient storage
- readily available in Canada
- technology well developed

d) Environmental Problems

- nitrogen oxide emissions contribute to acid rain
- air and water pollution and landscape alterations associated with collecting and processing natural gas and petroleum

e) Other Disadvantages

- non-renewable resource
- production limited by oil and gas deposits

7. Solar Power – Passive**a) Origin of Energy**

- nuclear fusion of elements on the sun produces large amounts of light and heat

b) Use

- low temperature heating (for homes and water)

c) Advantages

- energy supply is free and renewable
- non-polluting
- very safe energy source

d) Environmental Problems

- none

e) Other Disadvantages

- usefulness depends on climate and building energy efficiency
- supply not available at night so storage systems or other backup systems must also be used

8. Solar Power – Active

a) Origin of Energy

- nuclear fusion of elements on the sun produces large amounts of light and heat

b) Use

- various collector systems and photovoltaic cells convert sunlight directly into electricity

c) Advantages

- energy supply is free and readily available on sunny days
- very safe energy source

d) Environmental Problems

- land area required for storage ponds
- disposal of used cells and working fluids could cause water pollution
- pollution and energy loss while making collectors

e) Other Disadvantages

- non-continuous
- photovoltaic cells made of expensive or rare elements
- fire hazards and overheating of rooftop collectors
- glass breakage hazards
- moderate to very high capital costs
- moderate to low net useful energy yield
- requires large amounts of water for cooling thermal electric systems

9. Tidal Energy

a) Origin of Energy

- tides result from the pull of gravity of the moon and sun on ocean water

b) Use

- produce electricity by damming tidal basins and regulating tidal flow through gates and turbines connected to generators

c) Advantages

- source of energy is free, predictable and renewable
- very small overall supply, but plentiful in areas with very high tidal flows
- no discharge of pollutants into the environment
- create jobs and economic development in the vicinity by the construction and operation of the dam
- technology available
- does not contribute to greenhouse effect

d) Environmental Problems

- inhibit feeding, spawning, and migratory patterns of fish and marine mammals in bays and estuaries
- flood vital feeding grounds (mudflats) for migrating birds
- amplify tidal fluctuations by up to 30 cm along thousands of kilometres of coastline

e) Other Disadvantages

- high capital and operating costs
- few locations available
- corrosion problems of salt water
- non-continuous energy source (generate power only about 12 h a day when tide is receding)
- contamination of wells with salt water due to higher high tides
- lower low tides could create impassable channels and require that piers be extended
- realignment of sand bars and port channels
- coastal storms could be more damaging as a result of higher tides
- damage commercial and sport fishing
- possible increase in fog, cold weather and high winds along the coast

10. Wave Energy

a) Origin of Energy

- derived from wind energy, which in turn is derived from solar energy

b) Use

- electrical energy may be produced

c) Advantages

- energy supply is free and renewable
- non-polluting
- almost infinite supply in certain areas if ever developed

d) Environmental Problems

- interference with transmission of energy to shore
- could disrupt local marine ecosystem

e) Other Disadvantages

- non-continuous
- variability in wave height
- technology in early stages of development
- seawater corrosion
- storm damage
- interference with shipping

- high capital costs
- possibly low net useful energy yields

11. Wind Energy

a) Origin of Energy

- solar energy warms up air masses at different rates which causes the wind to blow

b) Use

- pumping water
- wind turbines generate electricity
- drive ships and sail boats

c) Advantages

- non-polluting
- free, renewable and readily available on a breezy/windy day
- does not contribute to greenhouse effect
- technology available
- can be connected to existing electrical grid with excess electricity being sold to utility companies

d) Environmental Problems

- noise may be disturbing
- change in wind direction if windmills are spaced too close
- air and water pollution while making equipment

e) Other Disadvantages

- variability of wind
- adequate wind levels only available at a few sites for large scale power plants
- requires backup electrical system or expensive storage system unless connected to existing electrical grid
- capital costs moderate to high
- hazards from working on tall structures
- “wind farms” could be an eyesore
- interference with TV and radio transmission
- the large number of windmills and the large area of land needed would result in serious impacts on communities and existing land use
- practical problem for maintenance of so many windmills spread over a large area

Sandra McEwan teachers at Anderson C.V.I., Whitby, Ontario and is OSEE's Archivist. Article reprinted from June '89 *Interactions*

Danny Droplet: Making Learning Fun

Ministry of the Environment

Today's children navigate an endless sea of media, searching for exciting, attention-grabbing information. And what better way to engage young minds than a cartoon? The Ministry of the Environment's (MOE) *Pipe Dreams: The Drinking Water Adventures of Danny Droplet* educational materials can help make learning about water fun through the use of colourful characters, humorous dialogue, appealing animation and interactive activities. The action-packed story follows the adventures of Danny Droplet, explaining how drinking water is treated and how water flows from its source to the tap.

The free materials available to teachers are a poster, comic book and an animated version of the comic book. Added activities, including a word search and a maze, help reinforce key water concepts. All materials are available in English and French online at www.ontario.ca/ONT/portal61/drinkingwater/General?docId=STEL02_054502&lang=en.

The story follows our hero Danny Droplet as he is confronted by a cast of monstrous characters representing five common water contaminants as he races through the pipeline. The "Filthy Five" include Eli Coli, Gerry Giardia, Barry Bacteria, Crystal Cryptosporidium and Pete Pathogen. Along his adventures, Danny eventually meets up with Chloe Chlorine, a character who helps to defeat some of the "Filthy Five" with her disinfectant powers.

The easy to navigate animation, which can be found on the Drinking Water Ontario website, has a voice-over option as an alternative format for a person with a visual, intellectual, developmental or learning impairment, or who is unable to read the printed copy.

Suitable for students in Grades 2-5, the comic book and online animation can be an excellent warm-up activity for a science class and a great resource for a general discussion on water. It can prompt questions about drinking water, such as where it comes from, how it reaches our taps as safe, clean water and what we can do to protect our water resources.

There are also connections to the Ontario Science and Technology curriculum, such as the Grade 2 topic "Understanding Earth and Space Systems: Air and Water in the Environment." Under this topic, students learn about the impact of human actions on the quality of water and about their responsibility to keep water clean. For students in Grade 4, *Danny Droplet* fits into the topic "Understanding Life Systems: Habitats and

Communities," in which they learn to analyse the effects of human activities on habitats and communities.

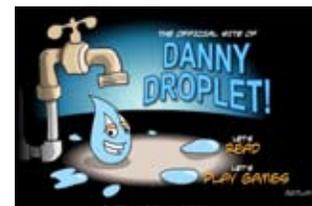
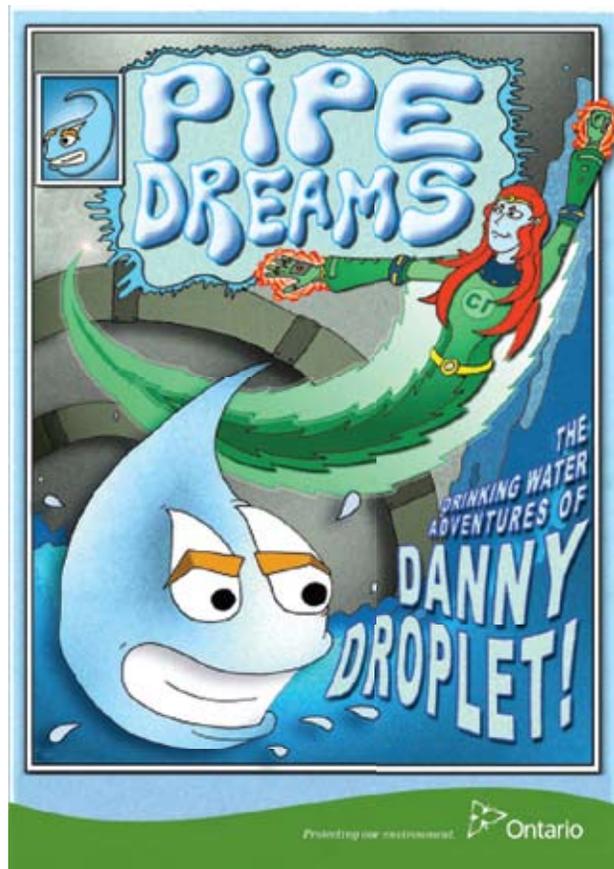
The materials could also be used as an activity to teach the students about the importance of conserving resources under the Grade 5 topic "Understanding Earth and Space Systems: Conservation of Energy and Resources." Students learn how to make choices about using energy and resources, and understand how these choices have immediate and long-term impacts.

Responses to the comic book version of *Danny Droplet* have been extremely positive. Teachers across the province cite this exciting new tool as an educational asset to the environmental studies taught in class. As one teacher enthused, "My students really enjoyed this cartoon and I appreciate the resources the Ministry provided to us [the teachers]."

Pipe Dreams. The Drinking Water Adventures of Danny Droplet was developed with input from the MOE's program areas, municipalities, conservation authorities and schools.

To order copies of these free bilingual materials, contact the MOE's Public Information Centre at 1-416-325-4000 or 1-800-565-4923 or by email at: picemail.moe@ontario.ca. The comic can also be downloaded and printed directly from www.ontario.ca/ONT/portal51/drinkingwater under the publication number PIBS # 6582 for the booklet and PIBS # 6583 for the poster. The animated version can be accessed through the *Pipe Dreams* website at:

www.ene.gov.on.ca/pipedreams/english/index.html



OSEE Executive and Board 2009-2010



Executive Members: President:
Sherri Owen



1st Vice-President:
Cathy Grant



2nd Vice-President:
John Howden



Secretary:
Linda Borland



Treasurer & Membership:
Urvi Shah



Executive Members: Editor of *Interactions*:
Bill Thompson



Editorial Chair of *Interactions*:
Mike Morris



Web Coordinator:
James Creech



Past President:
Liz Straszynski



Regional Directors: Eastern Region:
Diana Brushey



Central Region:
Ellen Murray



South Western Region:
Anne Dahmer



Northern Region:
Holly Groome



Far Northern Region:
Beth Dasno



Directors-at-Large: Ray Clement
Toronto



Diane Beckett
Ottawa



Emily Addison
Peterborough



James Borland
Windsor



Katie Gad
Guelph



Gwen Layton
Uxbridge



Ad Hoc Positions: Conference Chair:
Bill Thompson



French Consultant:
Holly Shaw



University Liason:
Sylvie Bardin



Archivist:
Sandra McEwan



OTF Rep:
Liz Straszynski

Meanders

Mike Morris



Right Now, I Am Not a Spider Man

I have a spider plant (*Chlorophytum comosum*) that I've had for maybe ten years. I've had it for so long, I forget who gave it to me. Every winter, I fear that this one may be the last for my spider plant. Every winter, I lose many large leaves off my plant and many of the spiders turn brown. This winter is no different for my plant.

Yes, I water my spider plant. Yes, I give it some of those fertilizer sticks that you press into the soil. I speak to it in a nice voice. I give it sunlight. But, let's face facts, my thumb isn't green. I believe that my thumb is black. Keeping plants alive isn't my strong suit. I've had to throw out many deceased plants over my career as a plant enthusiast.

I love it when the green thumb brigade tells me that spider plants are "one of the easiest houseplants to grow" and "they are almost impossible to kill." That gives me some confidence that my plant can make a big comeback.

Even those of us without a green thumb can achieve great success growing these hardy houseplants. Spider plants, also known as airplane plants, make excellent hanging baskets, and their ornamental features add a great deal of beauty to a home. Mine is in a hanging basket.

Spider plants are available in solid green and variegated yellow or creamy-white striped varieties. They have long ribbon-like leaves that look like ornamental blades of grass that gently arch over the sides of the planter.

Healthy spider plants boast long trailing stems that bear tiny white blooms, followed by spider-like plantlets. The plantlets are miniature replicas of the parent plant. They can be removed and rooted to create new plants, or left in place for added structure and beauty.

Spider plants aren't demanding houseplants, but they have a few requirements for optimal health and growth. They require bright indirect sunlight, and they can be grown beneath artificial lighting if necessary.

If you want your spider plant to produce plantlets, artificial lighting should be limited to daytime hours to naturally simulate the shorter days of autumn. This is the time of year when plantlets begin to emerge.

Maintain consistently moist soil during spring and summer months, and avoid saturation. Spider plants have tuberous roots that are prone to rot if constantly drenched. During fall and winter months, watering should be reduced since it won't evaporate as rapidly.

If your water comes from a municipal water supply, consider buying distilled water, or collect rainwater for your spider plant. Chlorinated water that also contains fluoride will cause the tips of the foliage to turn brown. This winter, I gathered some snow and melted it so I would have some clean water for my plant. I am optimistic that this new source of water will help my spider plant. I also plan to mist my spider plant occasionally.

Half-strength water-soluble houseplant fertilizer can be applied bi-weekly. Consult product labels for specific instructions, precautions, and recommendations. Maybe my fertilizer sticks aren't the best idea for feeding my spider plant.

Spider plants have very strong roots, and when a plant becomes root bound, the roots can crack the pot. Don't wait for your spider plant to outgrow the container. Repot the plant before the roots become overcrowded.

I'm hoping that my spider plant will come back and thrive, and grow for many years to come. With some luck, I can become a real spider man.



Mike Morris is Chair, Editorial Board, *Interactions: The Ontario Journal of Environmental Education*

Constitution Changes

The following changes to the constitution are being proposed by the OSEE Board of Directors. It is posted here for viewing by members so they can be voted on at the AGM at the annual conference April 29th. To view the current constitution, go to osee.ca, or click on the link at the bottom of this page.

Motion #1: That the following change be made to Article 3: Goal of the Constitution of OSEE: “The goal of environmental education is to develop a population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones (UNESCO Occasional Paper 31). OSEE will strive to abide by this goal.

The general expectations for students and the aims through which OSEE will attempt to accomplish this goal are included in Appendix A (see page 7). Appendix A is part of this constitution and has the force of the constitution.”

Be changed to: “The mission of OSEE is to support and inspire educators teaching environmental education in Ontario”

Rationale: This is a simple, clear statement that the board feels is much more appropriate to the needs of teachers and other educators in Ontario. The previous goal and appendix were large, unwieldy and much of the content did not reflect the needs of educators.

Motion #2: That the following change be made to the By-Laws of OSEE under Elections and Terms of Office item #2: “The terms of office of the Past President, President, First Vice-president, Second Vice-president will normally be two (2) years, with expected rotation to the presidency from First-, then Second-vice president. These terms may be extended for one additional year provided the extension is approved by a two-thirds majority of the members of the Board.”

Be changed to: “The terms of office of the Past President, President, First Vice-President and Second Vice-President will be two (2) years.”

Rationale: upon reflection the board feels that a rotation of positions should not be set out in the constitution, the membership is free to elect whomever they feel is best for any open position.

Motion #3: That the following change be made to the By-Laws of OSEE under section Elections and Terms of Office item #3. “The terms of office of the Secretary, Treasurer, Chair of the Editorial Committee, Membership Coordinator, and Directors will be three (3) years, normally renewable once.”

Be changed to: “The terms of office of the Secretary, Treasurer, Chair of the Editorial Committee, Membership Coordinator, and Directors will be three (3) years.”

Rationale: upon reflection the board feels that the membership should be allowed to elect whomever they feel is best suited for an open position without limitation on number of terms.

Motion #4: That the following change be made to the By-Laws of OSEE under section Elections and Terms of Office item #6: “Members must appoint an auditor to hold office commencing at each annual meeting. No members of the Board shall be eligible to act as auditor. The audited financial statement will be published in *Interactions* or by direct communication.”

Be changed to: “The board must appoint a member to rectify the account and report to the membership at the AGM. The rectifier may not be a signing officer. The rectifier is expected to review the accounts of the board to ensure they are correct and report his or her findings. The rectified statement will be made available to all members at the AGM or upon request.”

Rationale: The services of an auditor are not required for the small budget of OSEE and are very expensive. This change ensures that the finances are being reviewed and reported on without undue expense.

Motion #5: That the following change be made to the By-Laws of OSEE under section Financial item #1. “Signing officers for all financial business or contracts will be the President or the Treasurer.”

Be changed to: “Signing officers for all financial business or contracts will be two of the following: President, Treasurer or First Vice-President.”

Rationale: Requiring two signatures will protect the organization from possible mishandling of funds. Having three signing officers provides a guarantee that if one officer is ill or otherwise unavailable, two signing officers remain and payments may continue.

http://osee.ca/new/index.php?option=com_content&view=category&layout=blog&id=11&Itemid=10