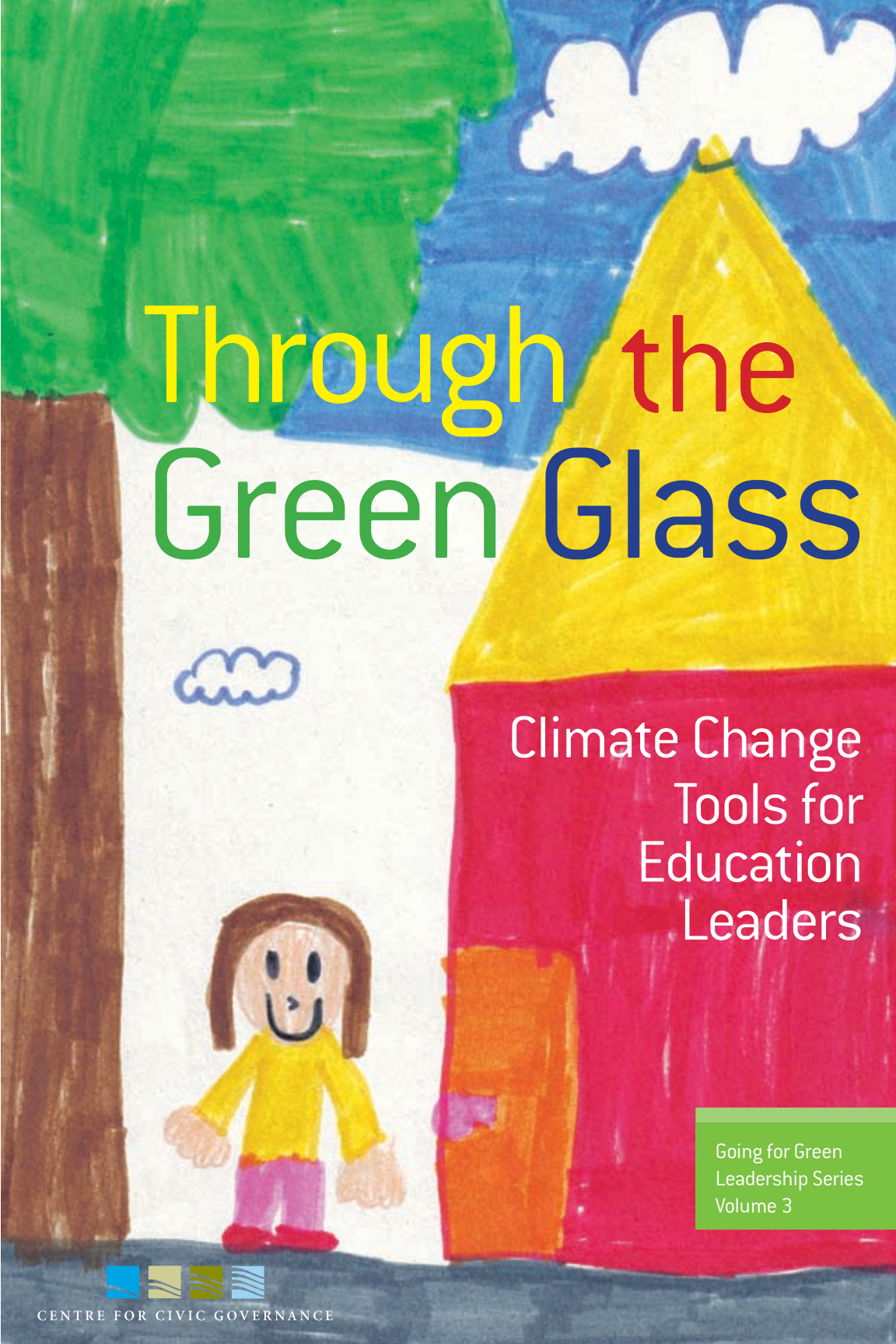

Through the Green Glass

Climate Change Tools for Education Leaders

Going for Green
Leadership Series
Volume 3

CENTRE FOR CIVIC GOVERNANCE

Through the Green Glass:
Climate Change Tools for Education Leaders

Going for Green Leadership Series
Volume 3

Columbia Institute
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Many thanks to the students of Tyee Elementary in Vancouver for creating artwork about schools and the environment for this book – and to their teachers for guiding the effort.

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Foreword

Through the Green Glass is about using a sustainability lens in public education. It is no longer a question that climate change is the biggest global challenge of our time. Current evidence shows that drastic action must be taken immediately in order to avoid potentially disastrous consequences.

As a 12-year school board veteran, I have a sense of the dedication that all of us involved in education bring to our work, and because of that dedication I feel a particular weight around the climate change issue. Educators have a crucial role to play not only in teaching the science of climate change but to influence the attitudes and behaviours of young people: a crucial task if we are to move towards a sustainable society.

This book is aimed at giving those involved in public education – school board trustees, principals, superintendents, teachers, etc. – the tools and resources necessary to begin this sustainability quest. It is heartening to realize there is a whole arsenal of such tools and resources already in existence, being employed and continually improved by a host of knowledgeable and passionate experts. While these stories reflect British Columbia, the ideas and information are widely applicable.

THANKS to the students of Tyee Elementary for creating artwork about schools and the environment for this book, and to their teachers for guiding the effort. ILLUSTRATION BY EVERAN MICHALCHYSHYN, GRADE 4

Through the Green Glass is based on a conference held in January 2008 that brought together over 20 of these experts to speak on a variety of education-related sustainability issues. The goal was to consider key aspects of the education system – from curricula to school design to operations. It begins with an inspiring introduction from Severn Cullis-Suzuki, ecologist, environmental champion, and a role model for young and old alike. The next section provides an understanding of climate change science, explained by Nobel Prize winner Dr. John Fyfe. The following pages detail the many aspects of developing a sustainable school: greening operations, school district planning for sustainability, environmental education programs, designing walkable school neighbourhoods and building low-emissions schools.

It is beyond doubt that climate change is going to have a dramatic effect on the lives of our children and grandchildren. As educators, we have an imperative at this moment in time to work together and take action, before we lose our window of opportunity.

— Charley Beresford
Executive Director, Columbia Institute

Educators: Connectors, Visionaries, Sustainability Revolutionaries

As a 12-year-old, **SEVERN CULLIS-SUZUKI**'s speech to the Earth Summit in Rio de Janeiro established her as an electrifying speaker. Now living on the Queen Charlotte Islands, Severn speaks eloquently about our relationship to the natural world. Her keynote address to the Through the Green Glass Climate Change Symposium outlined the pivotal role educators can play in the sustainability revolution.

I come from a tribe of very strong educators. My family is full of teachers and professors and my grandfather was a proud principal and superintendent in Howe Sound. I went to school in Kitsilano in Vancouver. I believe very strongly in public education!

Schools are the first place in our society that should emerge as sustainable examples.

Schools are for the future. Schools are about teaching the next generation. Today, by necessity, we need to become sustainable. Learning this attitude and means of doing it in school will set future adults up for the practical reality of living with smaller footprints.

Because of this, schools and institutions of learning should be places of innovation in sustainability. The example that springs to my mind is Cochrane High School in Alberta. Two science teachers there got inspired and started a sustainable development project. They got the kids on board and raised enough money to install a wind turbine and solar

panels at the school. The computer system is behind a display case in the lobby and you can see how much energy the turbine and solar panels are producing for the school, as well as how much energy the school is actually using. It's an amazing learning tool that the kids are so proud of. I met kids from Cochrane High School at a youth conference; they were teaching other students about the project and how others could do it in their own schools. This success story is a perfect example of how kids are not afraid of tackling big issues. Youth in schools can be real leaders in our society.

To teach and learn sustainability, we need connection, revolution, and vision.

> CONNECTION

The kids that are in school today will face challenges the world has never seen before. While we might not know what the specifics of global challenges (such as climate change) are going to be, we can certainly help set the stage for understanding the causes and effects of environmental issues and why becoming sustainable matters. One of the most important things we can do, personally and in teaching others, is make the connections between ourselves and the ecological world.

To start, I want to talk about this word, the *"environment."* What's the first thing that comes to your mind when you think of this word? When most people think of "the environment," they might think of the Amazon rainforest or of endangered whales in the ocean somewhere. Maybe they might think of hippies chaining themselves to the trees, recycling, or they might think of the Kyoto Protocol. The environment means something *out there*, something that we don't really have to deal with in everyday life at school, in the city, that doesn't really concern us daily. We don't think of our environment as our schools, dorm rooms, as our kitchens, as our own community, our homes. We don't think of it as our education system. We don't think of it as our economic interactions. We don't think of it as the plastic wrapped produce that came from far away, or the garbage that we put on the curb. We don't think of our environment as what we breathe and eat and what we throw away.

But in fact, the definition of one's "environment" is simply our surroundings. It's everything around us. We are all human animals, acutely dependent and affected by air (which we share), water and food (which comes from around the world), and we are all deeply connected to each other and to a global environment from which everything we have is derived.

GLOBAL CONNECTIONS: We are all human animals, acutely dependent and affected by air (which we share), water and food (which comes from around the world), and we are all deeply connected to each other and to a global environment from which everything we have is derived.

I make this point because the more I learn about indigenous ecology (learning about traditional ways of looking at natural resources and biology) the more I realize that our very *concept* of "environment" or "ecology" or even "nature," is in fact the biggest difference between our Western/scientific view and indigenous views of the world. In the West, there has been a very distinct externalizing of the natural world, as "the environment," whereas in indigenous societies, there is no separation of humans from the environment. In many languages there is no word for "environment" or "nature."

This might not seem very important, but I think it is this separation that is really fundamental to our ecological problem. The idea of being separate from our environment inherently teaches us that the environment is an external thing, and it lets us get out of our connection and responsibility to everything and everyone around us. This separation has allowed us to ignore the realities of cause and effect of our actions on a finite planet. In a sustainable society, the basic elements of our connections and dependence on the biological, ecological world need to be re-taught and emphasized. Working the elements of our "environment" into the things in life we are currently taught are important (like

jobs, economics, politics, culture, food) is an essential practice that will inherently shift what makes logical sense in mainstream culture.

Kids can learn this automatically. Like everyone, I am a product of my childhood education. When I was very little I learned about the natural world both inside and outside the classroom. I learned to love nature. In urban Toronto, one of my strongest memories of Grade 2 was when one of my teachers collected a monarch butterfly caterpillar and brought it into the classroom for us to feed with milkweed and watch it metamorphose into a chrysalis and then a butterfly. That was an incredible experience I have never forgotten. The next year, back in B.C., I spent most of my time as a kid down at the tidepools of Kitsilano. My Grade 3 class did an excursion to the beach at low tide to look at all the organisms and ecosystems. I know that time on that beach is why I eventually found myself studying eelgrass for my master's degree.

I also learned that ecology was relevant to my belly! I think that for my sister and me, our first "environmental" education was about food: we learned pretty early on that eating local was the way to go; we'd catch smelt and flounders right off the seawall on Kits beach that we'd eat for breakfast. And my grandparents, who live upstairs at our house in Vancouver, have always kept a garden and we grew up gardening with Granddad, and eating the salad, vegetables, and fruit that he grew for our family.

I also learned that healthy ecosystems were essential to cultural wellbeing. My parents and grandparents took my sister and me camping and fishing around B.C. and we spent a lot of time in First Nations communities on the coast, with the Heiltsuk of Bella Bella, the Kwakwaka'wakw of Alert Bay, and especially on Haida Gwaii, the Queen Charlotte Islands. After high school I spent time with a Haida woman, Diane Brown, who took me out on the reefs and ocean, and taught me that when the tide is out the table is set – she showed me how to spear sea urchins, find rock scallops, how to catch halibut, cod, and spring salmon, and to give thanks for the food we caught. I learned about nature, the bounty of the resources around us, how it sustains us.

And finally, by simply spending time in small towns in B.C., I learned that ecological health was connected to the economic and social health of small communities in our province. At the same time as having these great experiences in nature, I was also seeing a lot of destruction. Besides the clearcuts and landslides and the struggling fish runs, I could see that in small B.C. communities unemployment was a big problem as the fishing and forestry industries declined. I've watched my friends in small communities leave their hometowns for jobs in the cities, because there's no future in resource extraction.

These experiences taught me the relevance of the problems in our so-called "environment." The "environment" was about food, it was about the jobs of my friends' parents. Issues of environment to me are about understanding how the world works and understanding justice in our society.

In a sustainable education system, the elements of the interconnections between ourselves and the natural world need to be taught. When these connections are made, the case for sustainability becomes crystal clear and the solutions are clearer too. The 20th century was a time of fragmentation – the isolation of parts of the whole. Now we have to put the world back together again. Interconnections have to be the form and content of an education system that actually understands sustainability.

> REVOLUTION

It is finally common understanding that we are living at a time of immense ecological change that no humans before us have lived through. The reality that the Earth is finite is beginning to hit us. There are so many changes occurring that you could say we are living through a time of *revolution*. The word revolution means "a turn around." This may be a change in social or political institutions over a relatively short period of time or a major change in culture or economy. Some revolutions are led by the majority of the populace of a nation, others by a small band of revolutionaries. So a revolution is a big, fast change.

Just as we are experiencing an incredible technical revolution in access to information and to the world, we are also experiencing a negative revolution in terms of *diversity*. The obvious one is a decline in biodiversity: in March 2005 the Millennium Ecosystem Assessment came out, a United Nations report by 1,360 scientists and experts worldwide. The objective of the report was to assess the consequences of ecosystem change for human well-being. One of the findings was that the current extinction rate is up to 1,000 times higher than the fossil record. You might have noticed this yourself in the disappearances of frogs, insects, and other creatures that you used to see when you were a kid. The world is changing very quickly in terms of biodiversity. I've

definitely noticed it myself. The fishing in the places where I used to go as a kid is very different.

There is also a deep connection between biodiversity and cultural diversity: worldwide there is a general revolution in traditional practices and a decline in languages. In studying ethnoecology I am learning that the ethnosphere – the web of human stories and cultures and knowledge about the planet – is shrinking, as the global population urbanizes and moves completely into a globalized money economy. As ecosystems are degraded, more people urbanize, become less self-sufficient, and leave their traditional farming and plant cultivation practices. Apparently 75 per cent of genetic diversity of agricultural crops has been lost since the beginning of the 20th century.[1] This is coupled with a loss of agricultural knowledge on how to harvest that diversity: it's more efficient to mechanize or have people on a production line, so people lose their knowledge of how to farm and produce their own food.

Even our economic diversity is decreasing. You've probably noticed if you go on a trip somewhere, even overseas, that you can probably find a McDonald's or a supermarket with the food you eat at home.

So, who cares that diversity is decreasing? Well, besides making the world a boring place, when we study evolution or genetics, we know that *diversity* is the necessary factor for dealing with unforeseeable challenges to our survival. If you have one huge field of one kind of tomato you are at risk for being wiped out by a single tomato disease or bug. If you have one huge single type of economy in the world and the United States goes into depression, everyone connected will be affected. With more variety and diversity you have more chances of survival. This revolution in diversity is putting future generations at great risk.

This is all especially relevant to the issue of climate change. In the 21st century, we are also undergoing a revolution in climate. Climate change is the challenge of our generation. It will be the context for the rest of our lives. This revolution will affect all aspects of life. Because of this, it will pose issues of security. In 2004, the Pentagon prepared a report that stated climate change has the potential to pose a greater risk to homeland security than terrorism, because it will cause mass migration of environmental refugees and destabilize societies as they will compete over dwindling resources.

Climate change is one of the strongest examples of an *intergenerational crime*: a massive problem created by older generations that their young people will have to deal with. On this issue, those in your schools today have the most at stake.

It is so good to see the huge shift in awareness about climate change that is happening today; in the last two years awareness has been raised to the mainstream. It is essential that this issue be understood widely and it is encouraging to see educators at all levels gathering to discuss it and strategize.

> VISION

Here we are asking everyone – youth and adults – to become more aware that the world is changing, that there are massive global concerns, massive ecosystem revolutions, extinctions, climate change; the 21st century is a pretty intense time to be a young human being. It can be utterly overwhelming. It can be totally depressing. There are a lot of overwhelming global challenges created by previous generations and there is a lot of information out there. Not only do these problems exist, but kids know about them, through the media and Internet. I can remember times as a child, listening to the news, listening to adults talk about the state of the world, and being completely overwhelmed. And I didn't even have the Internet! Kids do take on these issues. How do you deal with kids who are completely overwhelmed by this? Fear and anger without a positive outlet are not good for anyone, let alone youth.

To answer the global crises, we need to have *vision*. Kids today need to face the reality: indeed, there is an ecological crisis. But this is not only a massive challenge we have been saddled with, this is also our *opportunity*. Society doesn't change unless it has to, and now we're at that point: we *have to* change. This is a chance to create and make amazing, positive changes in the world. In his Nobel Peace Prize acceptance speech, Al Gore spoke of the twin elements that comprise the word "crisis" in the Kanji alphabet. He said, "In the Kanji characters used in both Chinese and Japanese, 'crisis' is written with two symbols, the first meaning 'danger,' the second 'opportunity.' By facing and removing the danger of the climate crisis, we have the opportunity to gain the moral authority and vision to vastly increase our own capacity to solve other crises that have been too long ignored."

I think what saved me, as a kid, from getting completely depressed was *a vision* and the belief that I could do something about problems. That if I was angry about something, I was essential to the solutions. That I was part of an incredible movement of people around the planet that was exciting and powerful. That there was a heck of a lot I could do.

ENVIRONMENTAL HEROES: For a child growing up in an era when the world is just waking up to climate change, there is a lot of doom and gloom. Translating that to a kid's point of view, that means there is a lot of evil in the world. The antidote is the opportunity to work with a league of heroes. And this vision is happening.
ILLUSTRATION BY BYRON KONTOU, GRADE 6

As it turns out, pushing for a more sustainable way of living has been the most exciting, motivating feature of my life. Because of this ecological challenge, I have met incredible people, inspiring individuals who are at once regular people and amazing leaders actually changing the world. That faith I learned as a child is definitely the reason that I'm up here on this podium today. I know that I am changing the world; I was taught that as a kid.

For a child growing up in an era when the world is just waking up to climate change, there is a lot of doom and gloom. Translating that to a kid's point of view, that means there is a lot of evil in the world. The antidote is the opportunity to work with a league of heroes. And this vision is happening: there is a whole new way of thinking and talking about our sustainability challenge as exciting. We need to use such language and visions not only to motivate transition for kids, but also for ourselves! We have to find the connections between ourselves and the revolutions, and we have to believe in the reality that we are the solution. In this moment, every person matters. It will take everyone in every sector to take sustainability on as his/her cause. We are lucky to be alive in this time of great change.

All over this country and all over this planet there is evidence of this vision. People are recognizing that they have to take advantage of this opportunity and stand up and affect change. I think of an eight-year-old I heard who gave an amazing speech to a crowd at a sustainability conference, rattling off two dozen things that she and her classmates were doing for the planet. I think of Mr. Raoul, my Grade 9 ecology teacher and also Stephanie Bennett, the science teacher at Cochrane High who initiated the Sustainable Development Project. I think of Alice Waters and the principal of Martin Luther King Jr. Middle School in Berkeley, who established the Edible Schoolyard and kitchen classroom.[2] They cleared an acre of asphalt to build an abundant garden that students tend to, harvesting and preparing the food for the school in home economics. I think of the young people in North America that have come out of our education systems to form a series of education programs of their own, known as the Campus Climate Challenge.[3] I think of Jessica Lax and the Otesha Project, Karen Kun and Waterlution, George Roter of Engineers Without Borders, and Ben Peterson of Journalists for Human Rights.

It is *individuals'* involvement in their communities, stepping up, and believing this vision that pushes forward the progress of human consciousness. This is a time for *creating* the revolutions that we *want*!

If you are someone who shapes education, your power is vast. You are the one who can have the vision; you are the one who can spread it throughout your institution. You can advocate for outlets for your vision. You can find ways to make your school sustainable. You can support the teachers – there are so many out there already doing this work. You can seek out the role models. You can start campaigns for reducing emissions, reducing ecological footprints of classrooms, whole schools, or your own office. You can challenge the members of your institutions to stand up for the futures of the children in their schools.

By picking up this book, you have already decided to be part of the antidote. There are some amazing experts in these pages. Some of the ideas you will learn will be about creating connections. Some will be about how you can make positive revolutions happen in your institutions. All of them will call on your vision to move us a step closer to a sustainable society of which we can be proud.

> NOTES

[1] State of the World, 2005, www.worldwatch.org, p. 62.

[2] www.edibleschoolyard.org.

[3] www.climatechallenge.org.

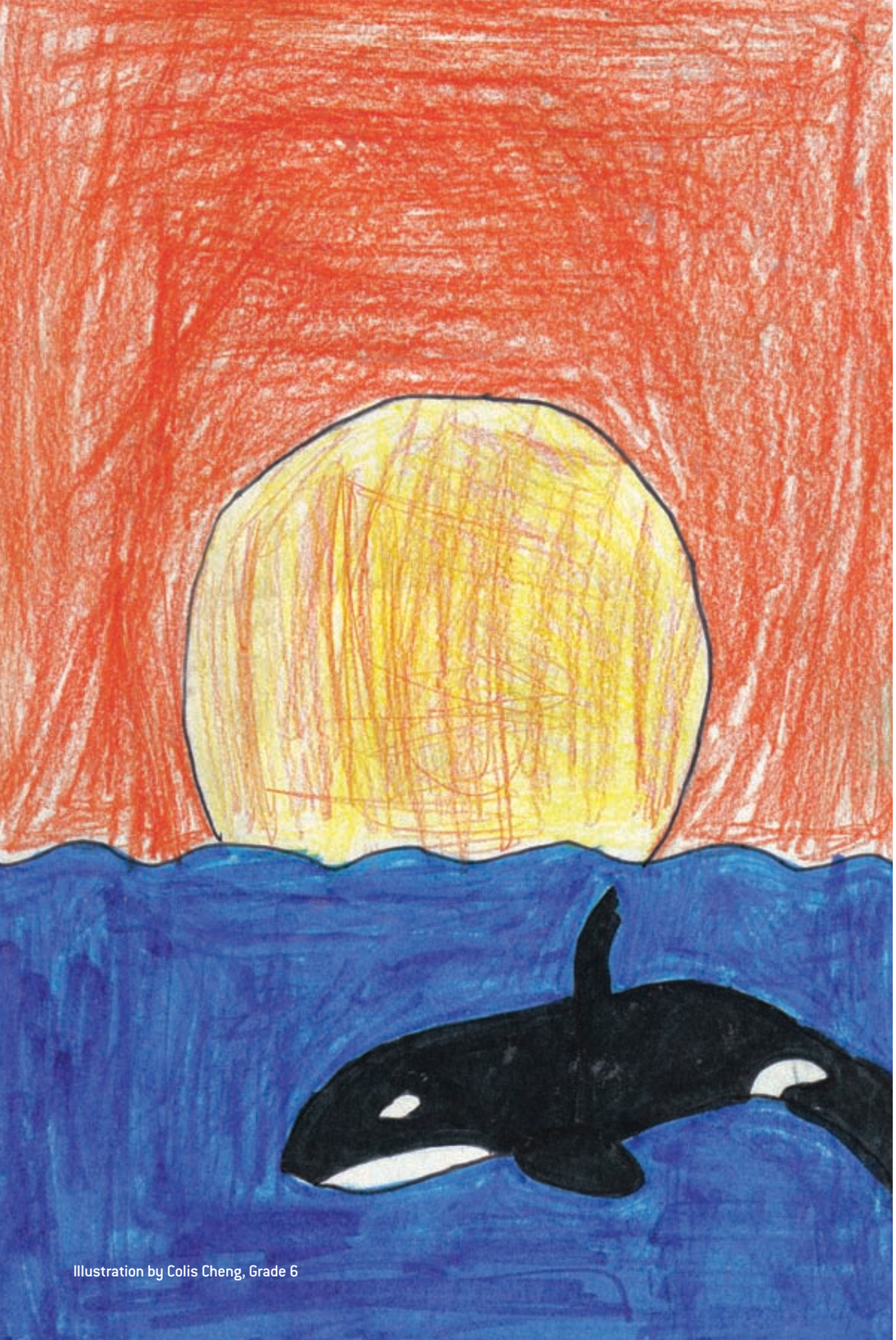


Illustration by Colis Cheng, Grade 6

PART 1

What You Need to Know: A Climate Change Primer

Climate change confusion has kept many people – and even entire nations – from taking decisive action. But the issue is actually straightforward. Climate scientist DR. JOHN FYFE explains what's going on and why everyone, including schools, urgently needs to go carbon neutral.

PART 1

What You Need to Know

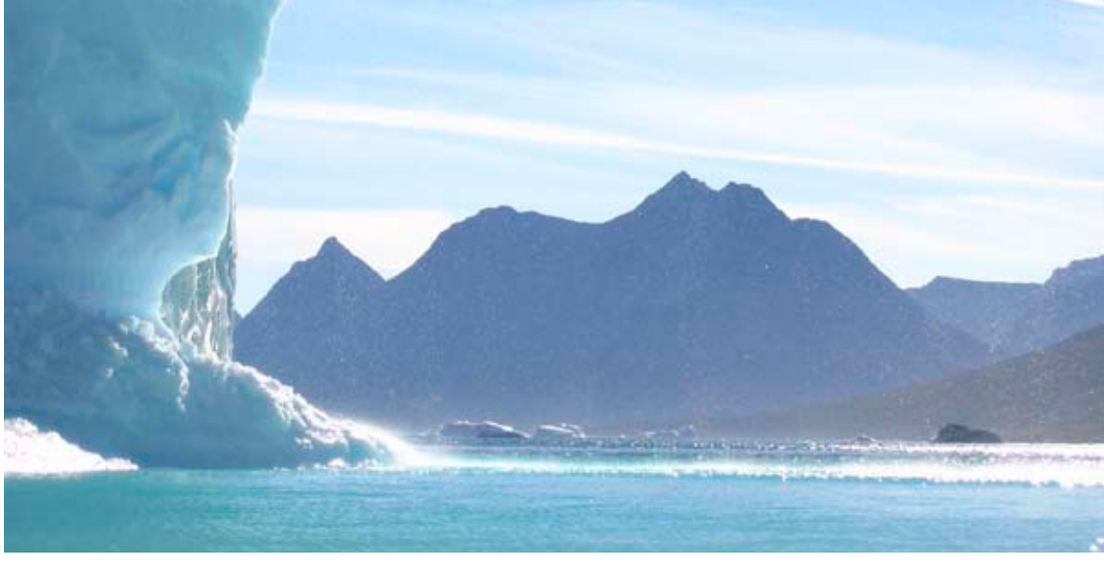
A Climate Change Primer

DR. JOHN FYFE is a research scientist in the Canadian Centre for Climate Modelling and Analysis of Environment Canada and an adjunct professor at the University of Victoria. He is also a lead author of the Nobel Peace Prize-winning IPCC Working Group 1 Fourth Assessment Report entitled "Climate Change: The Physical Science Basis" 2007.

Much of this book is geared towards helping those involved in the education system start to move towards carbon neutrality in their schools and their districts. My job is to convince you that this is crucial. I'll do this in three parts.

First, I describe the dominant changes in the climate system, including the atmosphere, ocean, snow and ice. Next, I explain why we believe these changes are occurring. Finally, I describe what we think is in store for us if we don't curb our appetite for carbon.

Most of what I discuss here comes from the Working Group I Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The report was written by about 150 lead authors, of which I am one. It involved contributions from over 1,000 other leading scientists in the field, from 130 countries. It took five years of work and involved a rigorous review process, involving about 1,000 reviewers. It's being described as the largest environmental assessment of all time, and it is part of the reason why the IPCC, along with Al Gore, was awarded the Nobel Peace Prize in 2007.



HISTORICAL CONTEXT: In the last 150 years, the temperature has risen faster than anything we've seen in the last 1,300 years. This is global warming, which the vast majority of scientists believe is due to human interference.

> PAST VERSUS PRESENT GLOBAL WARMING

It's useful to look back in time and examine the changes that have happened in the distant past, so we can compare them to the changes we've seen more recently: are they similar or dissimilar, and what are their causes?

From analyzing ice cores, we've got a record of the atmosphere's temperature and chemical composition going back 650,000 years, and we know early climate change was primarily due to changes in how close the earth was from the sun, and had nothing to do with human activity.

Within the past 1,300 years or so, we see climate changes like the Medieval Warm Period, or the Little Ice Age of 100 years ago, where Europe skipped a summer. These changes are thought to reflect natural internal variations as well as the influence of solar output and volcanic activity.

But in the last 150 years, the temperature has risen faster than anything we've seen in the last 1,300 years. This is global warming, which the vast majority of scientists believe is due to human interference. Since 1850 we have seen the global average temperature increase by about one degree. The temperature has not only been rising, but the rate of change has been increasing. We're not only warming, we're warming faster and faster, and again this is very likely due to human activity.

Where is this all happening? Warming is happening everywhere on the surface of the earth as well as in the atmosphere 10 kilometres above the surface, and it's happening nearly everywhere on the planet. There's now strong scientific evidence that along with rising temperatures in the atmosphere, the oceans are warming, glaciers, ice sheets, and sea ice are melting, and as a result sea level is rising.

> WARMING OCEANS

Ninety per cent of the new heat that has been going into the atmosphere has been sucked up by the ocean. Otherwise, we probably would have fried a long time ago. The ocean is our great saviour, yet there is emerging scientific evidence that the global ocean is beginning to take up less and less heat because of global warming, which is certainly not a good thing.

> MELTING GLACIERS, ICE SHEETS, AND SEA ICE

We have before-and-after photographs from all over the world, showing that most of the world's mountain glaciers are retreating. The Greenland and Antarctica ice sheets are melting. There is convincing evidence that this melting is accelerating quite dramatically. Artic sea ice is melting too. In 1980, there was seven million square kilometres of Artic summer sea ice. In 2006, there was less than five million square kilometres.

That's very dramatic and unprecedented. We've heard a lot from the media about Arctic sea ice melting for two main reasons. First, the melting has opened up the possibility of a navigable Northwest Passage. Second, it opens up the prospect of easier oil and gas exploration in the North. That's why most northern countries are queuing up to claim sovereignty in the North.

> RISING SEA LEVELS

The warming of the oceans causes seawater to expand, while the melting of mountain glaciers and ice sheets sends more water into the ocean. Sea water expansion, melting mountain glaciers, and melting ice sheets are each responsible for about a third of the total sea level rise. Since 1880 there has been a sea level rise of about 20 centimetres – about the length of a person's forearm. This is not huge, but it's larger in some places than others and we expect that it will rise much more in the future.

> WHY IT'S HAPPENING

We've looked at why these changes are happening by using climate models. These are very sophisticated programs, built on sound physical principles, exhaustively validated, and run on supercomputers. A few years ago, each of the world's top climate modelling groups compared the results.

When the models include increasing greenhouse gases in the atmosphere, the programs show increased global average temperature. When the models don't include increasing greenhouse gas concentrations, they do not show warming — they actually predict global cooling.

That's partly why the IPCC has concluded humans are most likely responsible for most of the warming observed over the last century.

RECEDING GLACIERS: We have before-and-after photographs from all over the world, showing that most of the world's mountain glaciers are retreating.

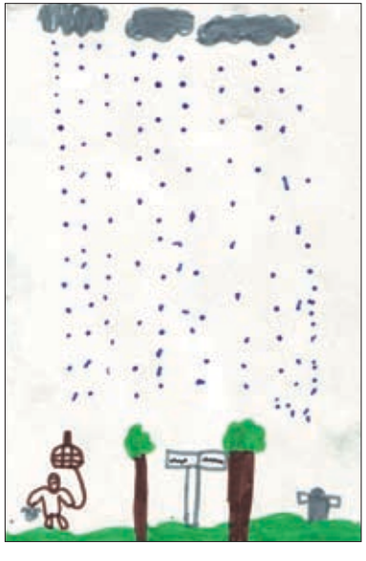
> LOOKING AHEAD

These models predict that regardless of how much we emit, by the year 2025 we will end up at about the same place. We've put so much carbon dioxide into the atmosphere that we must live with the consequences for at least the next 20 years, and that amounts to about another half-degree rise in temperature. But what we emit now will make a big difference in the amount of warming expected by 2100. We could have a one-degree rise, if we have low greenhouse gas emissions, or a four- to five-degree rise if we have high emissions.

So the choices we make today will make a big difference in the lifetimes of our childrens' children. We have to start making changes now. We will need to have made significant emission reductions by no later than 2020 – otherwise we may end up with dangerous climate change.

> CONSEQUENCES FOR OUR FUTURE

What will happen if our greenhouse gas emissions go unchecked? Sea level, of course, will continue to rise, likely by more than a half meter by the end of the century. It will rise more in some places than in others. That is another message from climate scientists: this is a global phenomenon with regional impacts. Different regions will be affected in different ways. Temperature change will be uneven as well. Most warming will occur over land and especially over high northern latitudes. In other words, the dramatic changes seen in the Arctic today will likely carry on and worsen in the future. For this reason Canadians especially need to pay attention to this climate change problem.



RAINFALL CHANGE: Precipitation will change regionally. In general, we expect the atmosphere to become moister, because warmer air holds more moisture. But where the extra water falls out will vary around the globe. ILLUSTRATION BY RONIC PARMAR, GRADE 5

Precipitation will also change regionally. In general, we expect the atmosphere to become moister, because warmer air holds more moisture. But where the extra water falls out will vary around the globe. We expect that in our region and in the rest of the mid- to high-latitude regions, we will have increased precipitation over time. On the other hand, places like southern Europe, northern Africa, and the southern United States will probably see decreased precipitation.

> CLIMATE EXTREMES

The data tells us that when it rains, it will rain more heavily. This would be consistent with what we saw in the winter of 2006/2007 in British Columbia, when we had a sequence of historic storms that brought an unprecedented amount of moisture to our region over a very short period. In the future we should expect this kind of thing to happen more and more often.

On the other hand, in some regions we expect there to be more drought. For example, in summer in B.C., we should expect to have more frequent and longer droughts. Already in Australia we have seen unprecedented drought conditions and wildfires; there was the Atlanta drought in the summer of 2007 and the California wildfires. We should expect more and more of these extreme events in the future if our greenhouse gas emissions go unchecked.

Finally, on the subject of climate extremes we should expect more heat waves like the European heat wave of 2003. We should expect there to be more and more of these kinds of events affecting the environment in far-reaching ways.

> THREE KEY MESSAGES

I have three key messages. The first is that the planet is warming, humans are very likely the cause, and the warming will most certainly continue into the future. Next, mitigation will not substantially affect the warming over the next few decades. And finally, choices that we make now will have a big impact on the climate seen at the end of this century. So it does matter. We have to start going carbon neutral today.

Illustration by Olivia Brocklehurst, Grade 4

PART 2

Building it in and Driving it Home: Green Operations

Can custodians, building operators, and bus drivers be part of environmental education? They not only can be, they should be, according to these eco-educators. As one of the leaders in this section notes, "The most important lesson is to lead by example: students are watching us."

In this section, DARLA SIMPSON describes Destination Conservation, a program that helps move entire school districts toward sustainability by training building operators and kids together. REBECCA FREEDMAN of the B.C. Ministry of Environment outlines school anti-idling programs, while GLENN BRENAN, maintenance supervisor and energy manager for Greater Victoria School District 61, gives a detailed account of his district's impressive conservation initiatives, including everything from urinal flush sensors to computer power-management software.

Destination Conservation: Building it in

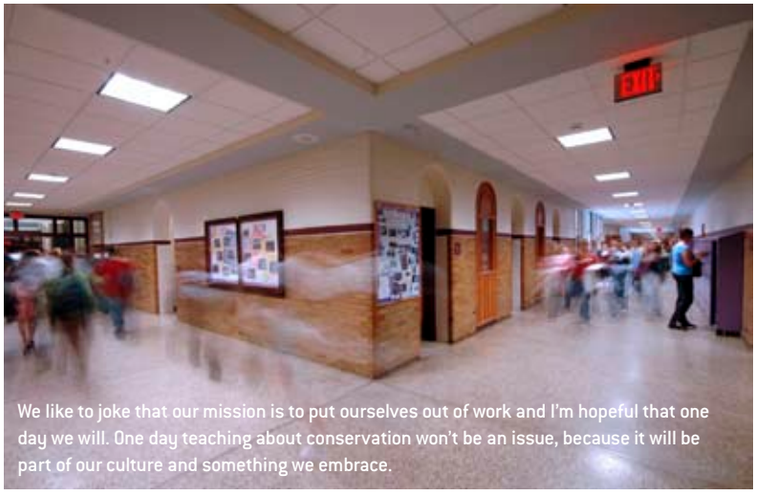
DARLA SIMPSON is the executive director for the Pacific Resource Conservation Society and program coordinator for Destination Conservation.

I've been doing this work for nearly 10 years now. When I started presenting at conferences, people would always come up to me to tell me how glad they were that I was doing it. They'd say, "We need to teach our children, because they're going to be the change." What I hear people saying now is, "I'm so glad I'm here today, because I need to make some changes so that my children don't have to deal with this when they're adults." I can't emphasize enough what a radical change that is to happen in 10 short years and I want to applaud you for picking up this book, because you're part of that change.

> DESTINATION CONSERVATION

Destination Conservation is a conservation education program focused on energy and water conservation and waste reduction. We've been doing this for over 25 years, and have been working in B.C. since 1992. The program has gone through many iterations since then.

Destination Conservation is operated by the Pacific Resource Conservation Society. We're a little different from most non-profits in that we run on an enterprising non-profit model. This means we use a business model to run our program. In other words, we're not looking for charity, but to create change. We take that model out into the school districts as well: we want to create a business case for them to engage in our program.



We like to joke that our mission is to put ourselves out of work and I'm hopeful that one day we will. One day teaching about conservation won't be an issue, because it will be part of our culture and something we embrace.

At our board meetings we like to joke that our mission is to put ourselves out of work and I'm hopeful that one day we will. One day teaching about conservation won't be an issue, because it will be part of our culture and something we embrace.

There are two main streams of the Destination Conservation program, the Building Management Stream and the Schools Program stream.

PACIFIC RESOURCE CONSERVATION SOCIETY

MISSION: To promote the conservation of natural resources by providing education that inspires and empowers individuals and communities towards environmental, social and economic responsibility.

GOALS:

1. To reduce our natural resource consumption and by extension, our environmental impact.
2. To illustrate that it isn't a choice between a healthy environment, economy or society; we can meet all these goals by making better choices.
3. To make conservation manageable by focusing on daily activities with measurable results.

> BUILDING MANAGEMENT STREAM

Our building management program is primarily a custodial training program, and focuses on five different areas: water, waste management, lighting, HVAC (heating, ventilation, and air conditioning), and electrical equipment such as computers and photocopiers. We bring the custodial engineers together with the facilities department and trades people. We don't just teach about new and upcoming technologies to increase energy and water efficiency. We also talk about how to optimize the technologies already in the buildings to make sure they are working at their best and consuming as little as possible. This becomes a discussion between the facilities department and the custodial engineers.

The first building management workshop usually starts out by identifying issues and problems, but it becomes a problem-solving project by the end. The workshop establishes the lines of communication so that problems are being shared and, most importantly, solved.

While the custodial engineers are learning about their buildings and increasing their ecological literacy, so are the students and the teachers in the building. Ideally we're raising the whole level of environmental literacy in the school district at one time.

NATURAL LIGHT: We don't just teach about new and upcoming technologies to increase energy and water efficiency. We also talk about how to optimize the technologies already in the buildings to make sure they are working at their best and consuming as little as possible.

> SCHOOLS PROGRAM STREAM

The schools program mirrors the building management program. In the first year students learn about energy because that's where the business case is for conservation programs in the schools. In the second year they study water, and in the third year, waste.

Most of our schools are already doing recycling but we leave it to the third year because we don't want to tackle waste at the end of the pipe. We don't want to focus on recycling, but on waste avoidance. That means looking at our purchasing habits, how we consume items in our household, and how to stop waste before it even starts.

The research we've done shows that a minimum of three years is needed to create a cultural change in a school that will carry on afterwards. Many of our school districts told us that they were experiencing too much turnover and requested that we extend our programming, so we came up with an additional three years of content. These last three years are where we introduce some of the more complicated, and sometimes controversial, topics around sustainability.

The research we've done shows that a minimum of three years is needed to create a cultural change in a school that will carry on afterwards.

The fourth year deals with conservation at home. We also talk about food sustainability: how buying New Zealand apples has an impact not only on the communities we live in, but on local economies. In the fifth year we talk about the community and in the sixth year, the world. We take the ideas of conservation and expand them to show students that a simple act like turning off the lights can have an effect on climate change.

SCHOOLS PROGRAM STRUCTURE

When we hold a workshop, we try to bring together 10 to 15 schools at a time. We do this for two reasons.

First, there is the business case: Ten schools is the cost-effective point at which you begin to see real savings and create district-wide change.

The second reason is that having a critical mass of schools also provides a chance to share ideas, get a little competitive, and work together on moving the whole district forward. However, bringing 10 schools together can be a challenge in some of our smaller school districts, so we are flexible.

The first workshop of the Schools Program is about identifying the problem. It trains students to do an assessment of their school. It can be an energy, water, waste or transportation assessment, depending on their interests. We teach them to go out, investigate their school building, and use the school as a learning tool. They investigate the school and use that as a starting point for whatever change they want to create in their building.

This is also important because it encourages the students to focus on measurable results. By completing an assessment, they get a benchmark for seeing how much their schools change over time. They don't necessarily have to use our assessments: they can use any kind of measure, but they must be able to show the change they're creating in their school buildings over time.

INVESTIGATE: The first workshop of the Schools Program is about identifying the problem. It trains students to do an assessment of their school. It can be an energy, water, waste or transportation assessment, depending on their interests.

The second workshop of the Schools Program focuses on campaign planning. Based on the research around fostering sustainable behaviour, we've developed eight steps to help change the behaviour in schools. After they identify the problem, they create a strategy for change. They set a goal, identify a measuring tool, and craft a message that will get people engaged and moving on the project.

SCHOOLS PROGRAM IN ACTION

The students are taught to develop a communications strategy based on several questions, such as, "Who needs to know about it?" and "How are you going to tell them?" For example, if you're doing a waste-free lunch, how are you going to communicate it to the parents? Organizing an event to launch a campaign is a common idea and the students have a lot of fun with it. They also need to come up with reminders, because people

ILLUSTRATION BY INAARA NURANI, GRADE 4

do forget. So they need little reminders to encourage them to keep the program going over time. That way by the third year, it's automatic.

We have found that students often need incentives. This can be as simple as sharing with each other the improvements they're making, such as how many tonnes of carbon dioxide or litres of water they've saved. But it can also be candy on the playground. One of our schools had a major problem with school ground litter, so they set up a litter force.

At random, they would give candy to two students, who would go out at lunch time and give the candies to the first 10 students they saw recycling or putting garbage where it belonged. That program cut school ground litter to almost zero, and after that, what litter there was didn't come from the students, but from outside of the school grounds. It was dramatic, incredibly simple, and cost about five dollars a year.

If you think you're too small to make an impact, try going to bed with a mosquito in the room.
— Anita Roddick

The students need measurable results, so at the end they evaluate how they've done. We do this at the school district level, where the facilities are actually monitoring the utilities for savings. Again this creates the business case for the program. At the end of the year everyone celebrates by throwing a party at which we share success stories and have a lot of fun. At the same time everyone involved gets to realize that they're doing some good work and accomplishing a lot – together.

> TANGIBLE BENEFITS OF THE DESTINATION CONSERVATION PROGRAM

Destination Conservation conserves resources. During one lights-out campaign, a school tracked how many hours the lights were off as a result of their work. In only four weeks they had avoided over 1,000 operation hours, which equates to 570-kilowatt hours of electricity and 2.9 tonnes of carbon dioxide. And it saves money.

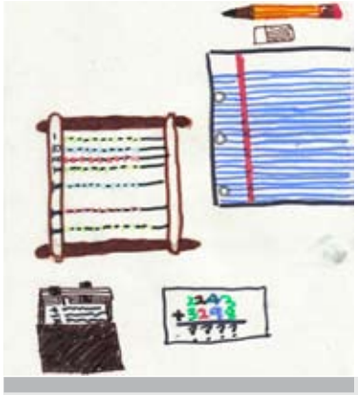
In their first year, with 24 schools in the program, the North Okanagan-Shuswap School District saved $35,000 on electricity and $25,000 on natural gas.

Our most recent study was in the Abbotsford School District, where we found almost $3,000 in savings in each school over one year. Those savings are primarily from changes in behaviour and low-cost or no-cost retrofits. They can be as simple as installing a Vending Miser. The cheapest way to save money is not to install a light sensor, it's to turn the lights off. The schools can then reinvest that $3,000 in bigger and better things over time.

The program also creates leaders. One third grade student, after learning that turning off the tap while she brushes her teeth would save over 6,000 litres of water in a year, challenged all other Grade 3 students in her district to "Turn the Taps Off."

In West Vancouver, the students we worked with five and six years ago are now in the high schools and are the ones driving the conservation programs. They're even being recognized provincially for the efforts they're making. It's incredible how much they've grown and taken this on as a personal issue. As a student, I participated in a progenitor of this program, and I can personally attest to the impact it can have on a young person.

It's not necessarily the traditional leaders who take on these conservation efforts. It's the students that may not have 'A' grades and may be struggling to find their identity. This is something they feel they can do; they can grab hold of this and create real change.



Two students would go out at lunch time and give candies to the first 10 students they saw recycling or putting garbage where it belonged. That program cut school ground litter to almost zero, and cost about five dollars a year.
ILLUSTRATION BY TIFFANY WONG, GRADE 5.

Our program promotes partnerships. We don't want to overwhelm teachers with too many different programs coming at them from different directions. So if we're out in a school district, we want to promote the B.C. Sustainable Energy Association's Climate Change Showdown if that's what students are focused on. Or they might want to work with the Pembina Foundation's GreenLearning online materials or the regional district's water conservation program. We make sure we're tying as many of those as possible into the school program so that it all builds together.

EVERY WATT COUNTS: Vending Miser, a device that is easily installed on existing drink and snack machines, uses sensors to automatically shut the power off when not in use while turning itself on every few hours to keep drinks chilled.

And of course, the program helps preserve the environment. Students learn to make better choices for their health and the environment, including reducing greenhouse gas emissions. Several school districts have already met or exceeded their Kyoto targets.

> DESTINATION CONSERVATION: SUPPORTING TEACHERS

Destination Conservation also supports teachers. We provide each teacher with hands-on activities and resources for use in the classroom, with a club or as part of the students' union. We encourage teachers to contact the office with questions and requests, and if we don't have the answer, we'll find it.

This goes back to the teamwork concept. More than one person needs to be involved. Many people remember a lone teacher who worked so hard to get something going and felt completely unsupported. We need to stop that and we need to make sure that the teachers are supported by the administration. Even if they only get 10 minutes at a staff meeting, it's a dramatic statement to the rest of the staff that this is important.

This must happen not just at the school level, but at the district level, as well. For example, in the Greater Victoria School District 61, Sherri Bell, the assistant superintendent, and Connie Schmidt, the senior management assistant, support the program and make sure it has a profile at the district level. The teachers really need this; they need to know they're supported by their district and administration.

And inevitably, on the facilities side, we have a conservation champion who's tracking the numbers. That person is paying attention to the details and may have been relaying this message quietly for years. They are the silent champions working on conservation issues in our school districts.

> THE KEYS TO SUCCESS

There are certain keys to success for any school sustainability program, not just Destination Conservation. First and foremost, the district must make a long-term commitment to real change. It can be as simple as a statement or the district can incorporate it into the strategic plan. The district should modify it so it works for them, but it is absolutely essential to set some goals about where the district wants to go in the future.

The second key is to monitor utilities through tracking savings at least for energy, and if possible, for water and waste. Those savings will justify the program in the future. The flavour of the month changes and issues could come up in five or ten years that will knock sustainability off the top of the list. Schools have to show the business case for these projects and identify the savings.

Finally, schools and districts need to make sure they're reinvesting their savings in further efficiency measures.

Using the soft savings from lifestyle changes can help to make the hard savings more cost effective. This reinvestment insures the district is continually increasing the savings and maximizing the benefit of the program. So in the distant future, if the soft savings are worn away the hard savings from the retrofits are still there.

A lot of people are talking and working away at their own small projects. Eventually, we're going to create a tremendous amount of change. This is the first wave of change and someday it will swamp the old way of doing things.

> RESOURCES

Destination Conservation is online at www.dcplanet.ca.

The B.C. Sustainable Energy Association's Climate Change Showdown project can be found at www.bcsea.org/ccshowdown.

The Pembina Foundation's GreenLearning materials are available at www.greenlearning.ca.

Driving it Home

School-Based Transportation Emission Reductions

REBECCA FREEDMAN is a non-point-source emission specialist for the B.C. Ministry of Environment.

Point-source emissions come from industry and are generally managed through standards set by regulators. I develop programming to reduce non-point-source emissions, the emissions that come from individuals through the choices they make and the actions they take in their daily lives. The best way to reduce these emissions is through behavioural changes. I work on educating the public and removing barriers to voluntary behavioural change. One of my focus areas is vehicle idling reduction.

> TAKING ACTION FOR HEALTH

Transportation behaviours, such as vehicle idling, can have an impact on our health, environment, and wallets. Hundreds of peer-reviewed studies in the past 10 years have demonstrated the link between air pollution and compromised health. Vehicle exhaust releases carbon dioxide, nitrous oxides, and fine particles into the air. Diesel exhaust contains known carcinogens. Exposure to these pollutants can lead to respiratory illnesses, increased hospital admissions, and premature deaths. Children are especially vulnerable to air pollution because they have actively growing and developing bodies and they breathe in more air per pound of body weight than adults.

> TAKING ACTION FOR CLIMATE CHANGE

Transportation is the single largest source of greenhouse gas emissions and one of the major contributors to urban air quality problems in Canada. It accounts for 40 per cent of B.C.'s total greenhouse gas emissions. Each litre of fuel releases between 2.4 and 2.8 kilograms of carbon dioxide when it burns.

Idling adds unnecessarily to fuel costs. Five minutes of idling burns a tenth of a litre of fuel. That doesn't sound like much, but once you add that up over a year and over a fleet and take into account rising fuel prices, it's quite dramatic. The incomplete fuel combustion that comes from idling at lower-than-optimal temperatures results in reduced fuel efficiency, stress on the engine, and production of more fumes.

We promote the "10 Second Rule," which says it's better to turn off the engine and restart it than to idle for more than 10 seconds. This promotes savings in terms of both fuel efficiency and vehicle wear and tear.

> SCHOOLS ARE POTENT AGENTS FOR CHANGE

Besides modelling behaviour for students within the school, schools have an important influence on the larger community. Recycling successes have been attributed to students learning about it in school. They take that message home, the word spreads, and recycling becomes part of the culture.

Any opportunity for greening school operations – be it policy development, retrofits and technology fixes, or marketing and outreach – is an opportunity for learning and pedagogy. The sustainability theme can be integrated into the whole school environment, including curriculum,

EXPOSURE: Children are especially vulnerable to air pollution because they have actively growing and developing bodies and they breathe in more air per pound of body weight than adults.

ILLUSTRATION BY KENDRA WONG, GRADE 4

teaching, facilities management, and school governance. Decisions should be shared with the staff and students and links should be made from what they're learning in the schools to the larger picture.

The theory of Diffusion of Innovation illustrates how new innovations spread throughout society in a predictable manner. The innovator introduces an idea, but often it takes the action of an early adopter, usually a known and respected leader, to launch an innovation in a community. The idea spreads to the majority and finally to the laggards.

It takes leaders within a school community to change operations, but the school community as a whole can help change transportation practices within the wider community, building social norms. For example, a number of schools and school districts have implemented idle-free zones where parents and students are instructed to turn off their engines. What they do on the school grounds can become a habit for the rest of their day-to-day lives.

Certain aspects of a change make it easy or difficult to spread through a community. These include the degree to which the change can be observed, the importance of the benefits, and the extent to which the change conflicts with current culture. Idle reduction is something that can be easily observed, especially when attention is drawn to it. The more awareness we build about idling, the more it will become an unacceptable behaviour.

Idling reduction has huge benefits for little cost. We just need to break people of an unnecessary habit.

> GREEN TRANSPORTATION INITIATIVES

A number of school districts around the province have school bus and fleet idling policies that limit early morning warm-up to the manufacturer's recommendations, usually three to five minutes. Drivers must turn their engines off at loading or unloading areas, and may not start them again until they're ready to depart and there's a clear path to their exit. (Schools can provide waiting spaces inside for drivers during cold weather.)

Diesel exhaust has been shown to accumulate both inside and outside of the bus and it poses a risk not just to children, but to the drivers as well.

Model policies can be used by schools and school districts that are just getting started in developing their own idling reduction policies.

NEW POLICIES: A number of school districts around the province have school bus and fleet idling policies that limit early morning warm-up to the manufacturer's recommendations, usually three to five minutes. Drivers must turn their engines off at loading or unloading areas.

Policies are great, but they also need to be supported by education and outreach, with reminders and messages to the bus drivers.

Any sort of constant reminder or prompt for the drivers, such as window decals or stickers, will help reinforce the policy.

Other complementary initiatives can also help reduce school transportation-related vehicle emissions. The B.C. government recently announced a $1.1 million program to retrofit all school buses in B.C. with emissions reduction devices, such as diesel oxidation catalysts, flow-through filters, and crankcase ventilation systems. We know how harmful diesel exhaust is and these retrofits will help clean up our entire school bus fleet.

The province is also promoting alternative fuels. By 2010, B.C. will require an average of 5 per cent renewable content in gasoline and diesel. Biodiesel can be used without problems at the B5 (5 per cent) level. Municipalities and transit fleets in B.C. are using blends up to B20 without significant problems and are testing blends up to B40. As long as the fuel meets specifications and is handled appropriately, school fleets can start using biodiesel where it is available.

Districts can also reduce emissions by implementing green procurement policies. This includes selecting products and services that minimize environmental impacts. Decisions must consider the costs of securing raw materials as well as manufacturing, transporting, storing, handling, using, and disposing of the product. Schools can choose local goods wherever possible to minimize transportation impacts and establish a no-idling policy for service and delivery vehicles.

> BENEFITS FOR ALL!

If a fleet of 50 school buses reduces its idling time by an hour a day, over the school year there would be over $40,000 in savings and over 112 tonnes of carbon dioxide would be prevented from entering the atmosphere. Green procurement can save schools money too by reducing transportation costs.

YUM: Schools can choose local goods wherever possible to minimize transportation impacts.

With anti-idling initiatives the air quality around schools improves. The number of hospital visits and missed school days drop and overall health improves.

School leadership improves as well. Schools are in a terrific position to model social norms for the community. The action that happens inside the school can translate into personal behaviour every day.

Finally, action on school transportation emissions creates an opportunity to foster future environmental citizenship. Schools can connect changes at the operational level to lessons for students and create social and cultural norms among the student population so they can expect – and demand – change. The more we involve the students, the more they will get out of the process and the more they will contribute to it.

Energy Upgrade Program

Greater Victoria School District No. 61

GLENN BRENAN is the maintenance supervisor and energy manager for Greater Victoria School District No. 61.

Greater Victoria School District 61 is in its fourth year (2007/2008) of an ambitious lighting upgrade and energy conservation program for district facilities. Our program has been successful because of the support we've received from our staff, trustees, and senior administration.

> OVERVIEW AND HISTORY

In 2002, we received a grant from Natural Resources Canada for an energy audit. The audit told us both what our total footprint was and how much energy we were using per square metre. We planned our upgrades based on the results, focusing on water, electricity, heating, and education.

In 2003, we became a BC Hydro Power Smart partner, acknowledging a commitment to pursue energy conservation measures and provide awareness training to district custodial staff. BC Hydro has given us tremendous support. Not only have they given us funding through incentive grants, but they have provided training support for our trades staff and the energy manager program. We are about to enter our fourth consecutive year with their program.

From 2003 to 2007, we worked with BC Hydro and the Power Smart Students Program, which involved several groups of our high school seniors. Our district also participated in the junior program and a film-making program with BC Hydro. These are excellent, low-cost programs.

In 2007, 10 of our schools began working with the Destination Conservation Program. The Sierra Club Sustainable High Schools Project is also underway in several of our schools, and many middle schools and high schools have started environmental clubs.

> FACILITIES UPGRADES

Our water conservation upgrades concentrated on the installation of 421 urinal flush sensors at 44 locations. We have achieved dramatic water savings from this project. Using an incentive grant from the Capital Regional District, we have replaced 20-litre-flush toilets with 6-litre-flush toilets in several schools. We have replaced water-cooled freezer condensers with air-to-air units at Esquimalt Secondary, again achieving dramatic savings from this initiative. We have also installed irrigation rain sensors and new controllers at several sites.

We have equipped 55 vending machines with Vending Misers and converted all the district's incandescent exit lights to LED units. We have replaced the heating plant systems at three schools and installed new direct digital control systems at many schools, adding to the 32 schools that already have these systems in place.

We have installed Faronics Deep Freeze computer power-management software and there are many more exciting opportunities to save energy in computer labs.

For example, some new products will allow computer labs to have only one server, which in turn feeds the "slave" terminals that students use, resulting in substantial savings.

> LIGHTING UPGRADES

We have upgraded the lighting systems at 33 schools, saving us approximately $258,000 annually.

The upgrades consisted mainly of the conversion or replacement of fluorescent light fixtures to T8 lamps (30 watts) from T12 lamps (34 watts). We replaced old ballasts with electronic ballasts and we standardized the light fixtures throughout the district. It was really amazing how many different lighting products we had throughout the district – in some cases, 15 products at a single school. Now we use only two or three products.

UPGRADES: It was really amazing how many different lighting products we had throughout the district – in some cases, 15 products at a single school. Now we use only two or three products.

Wherever possible, we have removed incandescent products and we split the light switches in the classrooms so that teachers can turn on only half the lights if they wish.

We have replaced older fixtures with new high-efficiency units and removed redundant fixtures resulting in the most dramatic change of the lighting program with the reduction of over 6,600 light fixtures. The average classroom had 18 fixtures before the upgrade and we have reduced this number to between eight and ten.

INCENTIVE GRANTS TO DATE		
Funding agency	**Amount**	**Purpose of grant**
Capital Regional District	$47,622	Water conservation projects
BC Hydro	$546,181	Electrical upgrades (all lighting, computer software, vending machines, Energy Manager Coordinator agreement, Lighthouse Sustainable Building opportunities)
BC Hydro	$15,000 annually	Extension of Energy Manager Funding support for the fourth consecutive year.

In many rooms we found that the lighting level at the desktop far exceeded current standards. Correcting the light levels to where they should be provides a better environment for our students. Similarly we found many corridors that were substantially over-lit.

Interestingly, the projects that have given us the best returns are those in our newest buildings. We have just finished a complete audit and redesign for an elementary school built in 2000 and we've achieved a 40 per cent reduction in the lighting system's electricity use without taking out any fixtures. The school was simply over lit.

> WORKING TOGETHER

The retrofit projects are primarily completed by our in-house district facilities staff. We have a special agreement to allow for variations in work hours to facilitate lighting program work in the afternoons, after the classroom is empty. This works well for the students and staff.

> BENEFITS

Our electricity use per square metre in School District 61 is currently one of the lowest in the province.

In addition to the financial savings, our program is preventing 1,600 tonnes of greenhouse gases from being emitted every year, equivalent to about 345 cars off the road. We have reduced our maintenance costs by installing extended-life lighting products and reduced the variety of fixtures and lamps to service in our inventory. We have also reduced seismic risk hazards for staff and students by removing pendant lighting fixtures and securing all our new fixtures.

ENERGY SAVINGS	
Water	Over 90 million litres of water per year – equivalent to filling an Olympic pool over 30 times! Over $56,000 per year.
Electricity	Over 3.6 million kWh – equivalent to the yearly needs of 360 homes. Over $258,000 per year.
Heating conversion and controls	Estimated at $12,600 per year

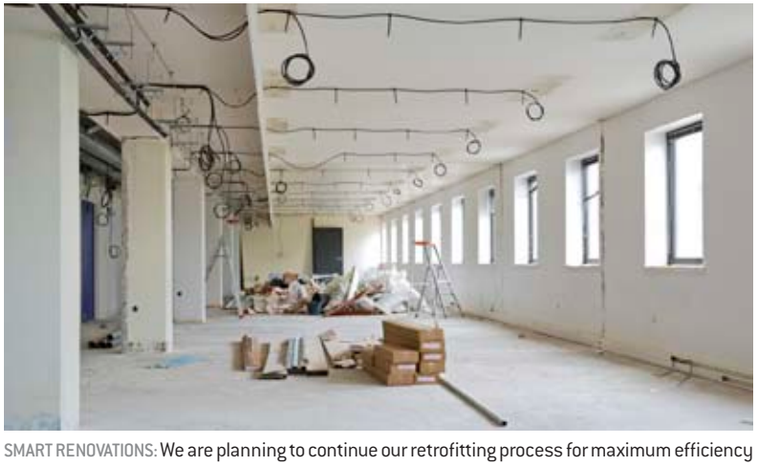
The school community reports that they really appreciate our accomplishments. We have significantly improved the lighting within our buildings and created a brighter atmosphere within our school corridors. The classrooms seem cleaner and less cluttered. Our new controls for heating systems result in more comfortable buildings.

Our teachers appreciate the split switch lighting systems and both students and staff are happy to learn and work in a greener building. Our educational programs for students and staff are helping to develop a personal awareness of the importance of good energy conservation practices.

> FUTURE EFFORTS

In 2008, we will be upgrading the lighting at eight additional schools. We are underway with the review and redesign of the mechanical heating system at Victoria High School, which has one of only two steam systems left in the district. We are installing direct digital control systems at three more schools, converting and/or upgrading the boiler systems at two more schools, and replacing the windows at another two schools.

We are planning to continue our retrofitting process for maximum efficiency and comfort in our buildings, and will insist on logical and efficient designs within our new buildings and renovations. We are going to focus on lighting, keeping in mind that the more natural light you have, the less often you need to turn lights on.



SMART RENOVATIONS: We are planning to continue our retrofitting process for maximum efficiency and comfort in our buildings, and will insist on logical and efficient designs within our new buildings and renovations.

LEADING BY EXAMPLE: Students are watching us in our classrooms. When the sun is streaming in through the window and the teacher makes the effort to think before they turn on the lights, this sets an example for the students.

Our best, most effective opportunity is to help develop and maintain a conservation ethic within students and staff. For example, we have two high schools, both with the same population and building vintage. One school has a very active environmental group, the other to a lesser degree. We recently performed a test using lighting loggers to measure how often the lights were on. The school with the environmental club showed results where the lights were off over 20 per cent more than the other school, translating into thousands of dollars in savings every year.

We are encouraging environmental groups in our schools, and continuing to work with Destination Conservation and the Sierra Club. More and more students are coming forward to join these groups.

But we feel the most important lesson is to lead by example: students are watching us in our classrooms. When the sun is streaming in through the windows and a teacher makes the effort to think before they turn on the lights, this sets an example for the students.

My motto is, “Use only what you need.”

> RESOURCES

BC Hydro’s Power Smart: www.bchydro.com/powersmart.

Natural Resources Canada’s energy-efficiency incentives: www.nrcan-rncan.gc.ca/com/eneene/effeff-eng.php.

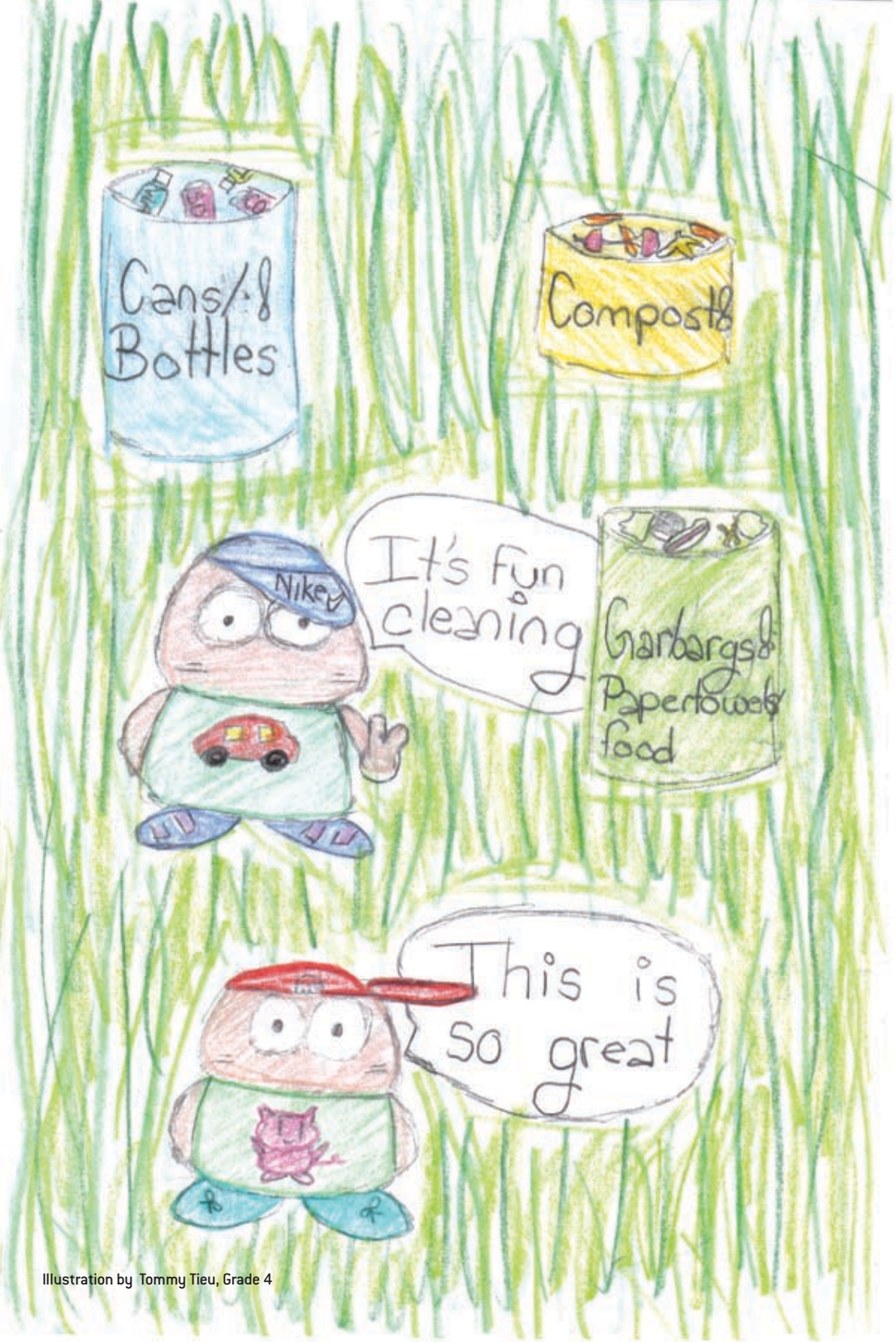


Illustration by Tommy Tieu, Grade 4

PART 3

District Green-up

We have green curriculum, green schools – and now entire school districts are greening up, as carbon neutrality becomes a government mandate. In this section, PATRICK ROBERTSON describes the district of West Vancouver's comprehensive approach, which includes hiring a teacher leader coordinator, and WENDY LIM and ERIC THORLEIFSON of the Richmond School District outlines their region's eight major eco-initiatives.

West Vancouver Ramps Up

PATRICK ROBERTSON is president of the Environmental Educators Provincial Specialists' Association of the BC Teachers' Federation and an elementary educator in West Vancouver.

In British Columbia, our government is beginning to both recognize the importance of environmental sustainability and to support potential solutions related to this challenge with more commitment. Recently, we have seen this "green thrust" begin to play out more broadly across provincial ministries. The Ministry of Education is vigorously pursuing the development and support of green initiatives, notably through sustainability and environmental education.

And, as we're all aware, 2008 legislation is mandating a carbon-neutral future for all governmental institutions, including schools, in the years ahead.

As you hear the deadlines for carbon neutrality – 2008 and 2010 – most of you are probably thinking, how do we get started? We've been invited in as the experts to help you, but the truth is, you're the experts. I'm sure you have some ideas about what you can do today in your school system to start moving towards carbon neutrality. There are all kinds of different ideas out there and many of them are already playing out in our schools. Your own school district probably has many current successes to celebrate in this area. This presentation is about my school district, West Vancouver. We're just getting started, but it's already a success story.

> A FRAMEWORK FOR PROGRESS

We're now three years into the United Nations Decade of Education for Sustainable Development. Canada has signed onto this and made commitments and the federal government is starting to move. We've had the Framework for Environmental Learning and Sustainability in Canada since 2002. These have given us contextual frameworks that we can work within.

Nationwide, we have models in other provinces. There are the Ontario Ecoschools, Manitoba has become a leader in environmental sustainability and environmental education, and Alberta has created a great process model of strategic planning, bringing together over 100 stakeholders to work on sustainability in its school systems and communities.

The ministry is vigorously pursuing the development and support of green initiatives, notably through sustainability and environmental education. And, as we're all aware, 2008 legislation is mandating a carbon-neutral future for all governmental institutions, including schools, in the years ahead.

In B.C., we aren't just aiming for carbon neutrality; we're working on green curriculum as well. A new framework for environmental learning, Environmental Learning and Experience, was launched last year along with other green initiatives, and coordination and leadership have been put in place at the Ministry of Education to guide these important projects. The curriculum foundation is emerging here more every day and there are fully-established networks in B.C. to support these kinds of approaches to learning.

Locally in our school districts, we have great success stories of sustainability in action. For example, the North Vancouver Outdoor School was recently awarded $1 million to build a new environmental learning centre.

The North Vancouver School District also retrofitted its electrical control systems and has saved $300,000 a year. The district has also cut its water consumption by 70 per cent. Meanwhile, the Richmond School District employs a sustainability consultant and has started the Richmond Student Sustainability Action Team (RSSAT) and Network. Their collaborative energy conservation efforts are saving the Richmond School District over $1 million a year and they're giving these savings back to the schools as grants.

> WEST VANCOUVER'S STORY

The West Vancouver School District already has successful programs in our schools focusing on sustainability and environmental education, championed by passionate leaders – students, parents, teachers, and administrators. We have many working partnerships with the community. We've partnered with Evergreen to green our school grounds and our communities. Streamkeepers are very active in West Vancouver

ILLUSTRATION BY CYRUS COVIELLO-JORDAN, GRADE 4

and we work with them on stream restoration and other stewardship initiatives. We hold youth conferences, the most recent of which, "Seeds for Change," was held in November 2007. It was very successful, bringing young people together to talk about the kinds of solutions we're discussing here. The youth are engaged with this – sometimes they're a little ahead of us.

For four years, from 2001 to 2004, we had Destination Conservation in School District 45; the program is being implemented in many other districts.

It started paying off right away: in just the first year, we reduced our electricity use by 8 per cent, saving over $12,000, and there were similar cuts in natural gas and water use. The students I worked with in that program are now in Grade 11 and 12, and they're keeping up their efforts in high school environmental clubs and the like. That legacy of learning may be the greatest gift of all from these programs.

> TAKING IT TO THE NEXT LEVEL

West Vancouver and other school districts are doing lots of things to be proud of, but very few districts have a cohesive plan in place, or any real coordination of this vital work.

In most districts, there is an ad hoc, champions model. There is no higher-level coordination or support of all the great projects that are going on. That makes them fragmented and fragile: the projects' champions retire, burn out, or graduate. If the programs aren't institutionalized, there's nothing or no one to sustain them.

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To begin addressing this challenge, West Vancouver School District Superintendent Geoff Jopson convened a core group of teachers to work on a sustainability action plan in the summer of 2007. The municipality already had a plan and he knew this kind of carbon neutrality legislation was coming. By November, we were ready to make a proposal to the school board. We knew there were three ingredients we needed: commitment, collaboration, and leadership. We presented the broader context and policy foundations at

play, and made five recommendations for change, incorporating these three essential ingredients. These steps provide a good model for school districts to emulate.

- COMMITMENT. We knew we needed to say in writing that sustainability is a priority. We needed to put the language of sustainability, environmental learning, and carbon neutrality into our school district's strategic plan.
- LEADERSHIP. We needed somebody in place to coordinate all the wonderful successes in a way that brings it all together and supports the work that has to happen. That meant hiring someone whose job it is to lead the way.
- CONSULTATION. This is where the collaboration happens, just as it did with the team that put together our proposal. We have to bring in all of the stakeholders – administrators, board trustees, facilities staff, teachers, parents, custodians, students, and community members. We need to ask all of them what they're willing to do to make this happen.
- ACTION PLAN. This is the culmination of the first three steps. By this time, the action plan should be ready to roll, because it's something that everyone developed together and agreed was necessary. It will be based on what people said they were willing to do.
- EVALUATION. Any action plan requires an evaluation process, to make sure that we're doing what we said we were going to do, and what we really need to be doing.

> SUCCESS

We presented our recommendations to the school board in November of 2007 and they responded very positively. The board unanimously passed a motion to put sustainability language into our strategic plan. That language gets to the systems-level change that's needed, linking classrooms with facilities and board rooms and connecting administrators, teachers, and facilities people in a way that is institutionalized, so that if one moves on, there are others to continue the work.

The board also approved a budget to hire a district leadership position to begin the strategic planning process. The coordinator will be a teacher leader who will work with a district administrator and our facilities director. My contacts at the Ministry of Education tell me this is what they hope to see in every district. Importantly, despite the initial budget outlay, our trustees in West Vancouver see this position as potentially cost neutral given the financial benefits that will accrue over the long term.

Following the inclusion of language into our district's strategic plan, a teacher leader was indeed hired to begin coordinating initiatives district-wide around sustainability and environmental education. A district Sustainability Action Team has also been convened to continue the strategic planning and leadership so vital to these efforts.

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In the end, this is really about leadership and all of us have a role to play. Leaders in classrooms, in schools, board offices, government, and across the community need to focus on how we will do it *now*.

That's why our plan was received so well: the trustees, superintendent, and senior staff saw this as a leadership opportunity. Student leaders have also joined in the building of momentum around sustainability and their active engagement in these kinds of initiatives is what we all live for as educators – that spark. The spark that helps us all move forward together, toward a carbon-neutral world of sustainable schools and communities.

> RESOURCES

Environmental Educators Provincial Specialists' Association: Find out more and join EEPSA at www.bctf.ca/eepsa.

Environmental Learning and Experience: The ELE curriculum guide is available at www.bced.gov.bc.ca/environment_ed.

SD45 Sustainability Action Team: For more information on the West Vancouver School District's efforts around sustainability and environmental education, please visit www.enviroaction.wikispaces.com.

Richmond: Enough for All, Forever

WENDY LIM is a district administrator in the Learning Services Department of the Richmond School District.

ERIC THORLEIFSON is manager of facilities for the Richmond School District.

The Richmond School District first began considering environmental sustainability an important issue in 1998, creating a policy for environmental stewardship. In 2000, under the leadership of the secretary-treasurer and manager of facilities, the district invested in an energy and natural resource conservation initiative involving 55 schools at a cost of $5.5 million. It has delivered significant energy savings to the district.

Five years ago, district staff from the facilities and learning services departments met to discuss how we might integrate some of the concepts we knew about staff development and student leadership into the district's energy conservation and sustainability initiatives.

> EDUCATION FOR SUSTAINABLE DEVELOPMENT

At that point, we brought our students, custodians, teachers, administrators, and parents to planning meetings and professional development sessions, so they could become the people organizing and designing the programs for our schools. Over the years, we've grown eight major initiatives.

1. SUSTAINABILITY PROFESSIONAL DEVELOPMENT OPPORTUNITIES FOR SCHOOL TEAMS. Introduced in October 2001, our Richmond School District teacher consultants and community organizations have provided training on a variety of topics such as recycling, energy reduction, waste management, greening, composting, and eco-clubs.

2. SCHOOL-BASED ENVIRONMENTAL SUSTAINABILITY PROJECTS. This year, there are 32 proposals requesting funds to support schools in environmental projects that the students, teachers, parents, and administrators are passionate about. From four years of funding school projects, we've recognized that we have groups of schools interested in different key initiatives, including energy reduction, greening, composting and gardening, and eco-club development.

We have been offering $1,000 grants to school teams in the last four years. It's not much, but it goes a long way. When the schools make their proposals, they have to describe what they will do, who is involved to make it happen, and what evidence they'll use to evaluate their project's success. The evidence is key: What data will you use to show you're really making a difference in your school and moving people's behaviour forward? If the schools need to rework their assessment tools, we send the proposals back and help them identify tools that might be used to collect their evidence of behaviour change. The school teams that receive grants present their findings at one of two public events – the Green Gala or Earth Day celebrations.

SCHOOL TEAMS: Richmond School District teacher consultants and community organizations have provided training on a variety of topics such as recycling, energy reduction, waste management, greening, composting, and eco-clubs. ILLUSTRATION BY CODY GEE, GRADE 4

Since October 2004, our district's sustainability teacher consultant has presented environmental-type workshops to support our school-based project teams. In addition, we have many experts within our schools for initiatives like composting, reducing, recycling, and even green buildings. The students at one of our elementary schools were really excited when there was no waste pickup for three weeks – their cans never filled up. Data like this is compelling. When reports of findings are presented they are done by students: they are the ones telling their stories and posing the questions.

3. SUSTAINABILITY SHOWCASES. We start the beginning of the school year with a sustainability showcase at which various environmental groups in the community showcase their resources and materials available to our school teams. The showcases are like mini trade shows and provide opportunities for our staff, students, and parents to connect with the community's environmental program resources and contacts.

4. SUSTAINABILITY NETWORK. In the Richmond School District, an important professional development structure is our after-school district-wide study groups where staff come together on a regular basis to learn, share, and discuss key areas such as leadership, curriculum, effective practice, and current issues. About four years ago, we started the after-school Sustainability Network. Students, parents, teachers, CUPE members, administrators, trustees, city councillors, and members of the Richmond Sustainability Action Team (RSAT) all participate in the network.

5. ECOFEST/EARTH DAY CELEBRATIONS. Five years ago, 50 kids in one of our secondary schools' environmental club, and their sponsor teacher, held our district's very first Earth Day celebration on a Saturday in their school gym. For the first couple of years, there was low attendance at this club-sponsored event. Three years ago, our district sustainability teacher consultant began working with the students and sponsor teacher to coordinate the celebration. As a result of this collaboration, more than 1,000 students, teachers and parents have been attending annually. We have school buses and field trips for this all-day event. It all started with these high school eco-students and their inspirational teacher.

6. RICHMOND STUDENT SUSTAINABILITY ACTION TEAM (RSSAT). In March 2005, with help from a federal grant, we began training secondary students to become community One-Tonne Challenge ambassadors as part of the Richmond Community One-Tonne Challenge. Later the program

IDLE-FREE: Since the training started three years ago, we've had seven training sessions for over 160 student ambassadors. We have nine schools with active, student-led idle-free campaigns.
ILLUSTRATION BY OWEN LANE, GRADE 5

evolved into the Richmond Community Idle-Free Challenge, which we've been growing for the past two years. The capacity-building aspect of this initiative occurs when the secondary idle-free experts train the elementary students from their feeder schools. Since the training started three years ago, we've had seven training sessions for over 160 student ambassadors. We have nine schools with active, student-led idle-free campaigns.

In the training, students learn about climate change, environmental sustainability, social responsibility, ethical decision-making, behavioural change, as well as how to make presentations. The students then participate in school and community events to challenge the people of Richmond not to idle, to learn more about climate change and greenhouse gasses, and to participate in the One-Tonne Challenge.

This is really about kids telling stories and leading. Two of our Grade 7 students went to a Saturday District Student Leadership Conference last year and heard two RSSAT ambassadors talk about implementing an idle-free program in their school. They went back to their own school, recruited their father to help, approached a teacher to sponsor, and founded the Forever Green club. They presented at this year's District Student Leadership Conference and inspired a whole new group of Grade 6 and 7 kids to go and do the same thing in their own schools.

NEW LEADERS: This is really about kids telling stories and leading.

7. ENVIRONMENTAL SUSTAINABILITY GRADE 11 DISTRIBUTED LEARNING COURSE "TAKE ACTION." During the spring of 2007, we started developing a four-credit distributed learning course that would cover environmental ethics, environment and ecosystems, fossil fuel and climate change, ecological footprint, and action plans. In October we received board approval to offer the course. The first lesson was given in January 2008 to 21 students representing five high schools.

8. RICHMOND SUSTAINABILITY ACTION TEAM (RSAT). In October 2004, an informal group began meeting to monitor and coordinate the sustainability activities in our district. It met four times a year to share ideas, plan activities and discuss ways to support school-based environmental projects and student leadership development. RSAT presents summary year-end reports to the school board. RSAT has now evolved into a more formal structure called the Sustainability Secretariat.

> LEADING THE WAY

Richmond School District has become a leader for other districts in promoting environmental sustainability. We have fostered community partnerships with BC Hydro, Evergreen, GVRD/Metro Vancouver, the City of Richmond, YVR/Airport Authority, Natural Resources Canada, Environment Canada, and Passion for Action. We sponsor a UBC Green Cohort of student teachers and we're working with York University on a case study, to share with others our learning journey in the Richmond School District.

We're growing the green, in buildings and in people. Our leadership capacity exists in our organization – educators, administrators, support staff, parents, and students. Through the school-based sustainability projects and student leadership development, we're ensuring ownership of the initiatives by our educators and students.

We're growing the green, in buildings and in people. Our leadership capacity exists in our organization – educators, administrators, support staff, parents, and students.

Illustration by Suchita Raman, Grade, 5

PART 4

A Brighter Shade of Green: New B.C. Curriculum

British Columbia is transforming its school curriculum to integrate environmental education. PATRICK ROBERTSON describes Environmental Learning and Experience (ELE), the new curriculum framework for environmental learning in B.C. he helped develop, while PAUL LUKASZEK, manager of Sustainability and Environmental Education Initiatives for the B.C. Ministry of Education, outlines the new Sustainable Resources 11 and 12 curriculum.

Environmental Learning and Experience

A New Provincial Curriculum Framework

PATRICK ROBERTSON is president of the Environmental Educators Provincial Specialists' Association (EEPSA) of the BC Teachers' Federation.

There is a lake in B.C. that I spend time at and care deeply about. As a toddler, I was tossed into it: there are pictures of me, in those early days, floating around in my life preserver. A few years ago, I tossed my own kids in. It's a multi-generational place: my grandfather built a little shack off the grid there, which still stands today.

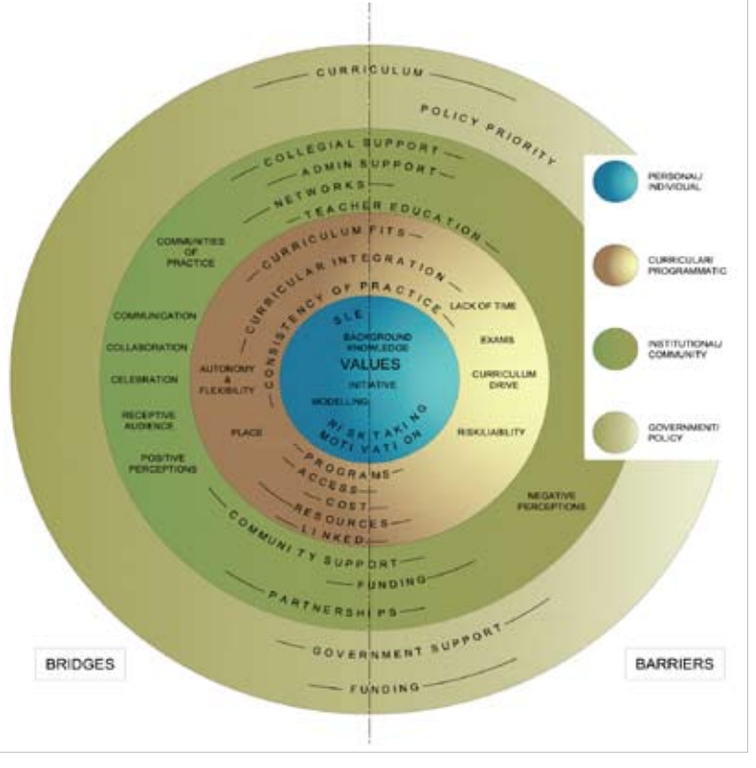
Are there places on Earth that you care about? Did you spend time there as a child? Do you still venture there? Often an ethic of care as an adult comes from early experiences in these sorts of special places.

I'd like to connect care with curriculum. Environmental Learning and Experience (ELE) is our new curriculum framework for environmental learning in B.C. Care is a big theme of this framework, both in content and in intended learning outcomes.

Looking at the bigger picture, I was lead researcher on a recent study about environmental education (EE) in B.C. Based on the input of over 100 educators around the province, I proposed a systems model of bridges and barriers to green learning; that is, things that make it easier or harder to implement environmental education in schools.

This model has various layers to it (see figure below). On the inside is the personal level; those experiences we have as children or adults that motivate us to do the work, to pick up a book like this one. At the next level is curriculum and practice, meaning what we do in our offices or classrooms, why we do it, and what makes it easy or hard. The third circle represents the contextual level of institutions and community. And finally, there is the level of governance, curriculum and policy. At each level there are factors that make it easy or challenging to "teach green."

BRIDGES AND BARRIERS TO ENVIRONMENTAL EDUCATION IN B.C.



At the governance level, curricula, policy priorities, government support, and funding were the main factors that people reported as either bridges or barriers, depending on their teaching context. The good news is that policy priorities and curricula are starting to move towards enabling the kinds of learning we need in our educational settings in B.C. to better support sustainability and environmental education. Some of the other factors are moving in a positive direction as well, such as public perceptions, teacher education, and supportive networks of practice.

> GREEN CURRICULUM

Curriculum was a major element of the systems model of environmental education in B.C. In terms of green learning, there have been numerous positive steps over the last few decades. Here is a snapshot of some milestones in B.C.'s environmental education curricula:

- 1970s and 1980s:
  - BC Teachers' Federation task force on environmental education (1972)
  - Development of Project WILD and other resources
- 1990s
  - *Environmental Concepts in the Classroom* (1995)
  - Numerous "environmental" learning outcomes and cross-curricular integration in new Instructional Resource Packages
- 2000s
  - Most ministry funding for environmental education cut, park interpretation and education cut (2000 to 2005)
  - Revisioning of *Environmental Concepts in the Classroom* resource and revival as *Environmental Learning and Experience* (2007)
  - Ministry of Education release and implementation of *Environmental Learning and Experience* across the province (2007 to present)

In the 1970s and 1980s, a lot of good things started to happen. Project WILD was developed, along with a lot of other resources and programs. There were also all kinds of learning outcomes throughout the curricula, but teachers needed to know what environmental learning and sustainability were and how they fit into curricula. In 1995, the ministry released a document called *Environmental Concepts in the Classroom* that began to help teachers with that process.

The early part of this millennium was challenging in terms of funding and support for green learning. Despite this, in 2005 EEPSA, Simon Fraser University, and various other partners came together and decided to revitalize *Environmental Concepts in the Classroom*. We completed an 18-month consultation around the province, asking educators, administrators, and policy makers what was valuable in the document. With permission from the Ministry of Education, we drafted a new document and by 2007 their permission had turned into support. The ministry has now approved and released the new version, *Environmental Learning and Experience*.

> WHAT IS ELE?

Environmental Learning and Experience is a curriculum resource that offers a conceptual framework for introducing environmental learning in all classrooms, while providing several general principles of teaching and learning to guide teachers in designing integrated activities for their learners. The framework provides a number of perspectives around which environmentally-focused lessons may be developed and can assist teachers of all subjects and grades to integrate environmental concepts into teaching and learning. At its foundations are two core elements: the learning cycle and CARE.

> THE LEARNING CYCLE

The learning cycle comprises four aspects:

- Direct experience
- Reflection
- Conceptualization
- Negotiation

Direct experience is at the foundation of powerful learning. That doesn't mean just getting kids outside, although that's a great way to provide direct experience. It could be hands-on laboratory work, or anything else that provides an experience that deeply engages kids. We know that's what kids need, not more time spent sitting and listening.

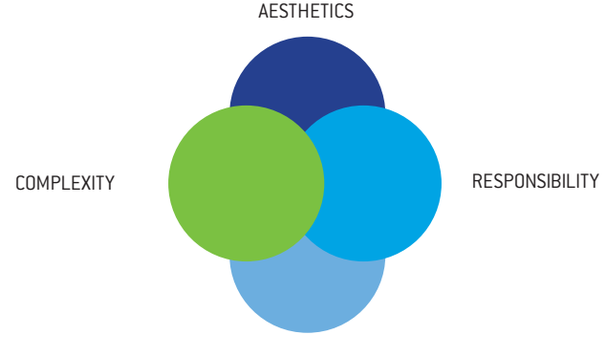
Next, students need to be able to reflect on that experience, then negotiate it in a social setting such as a classroom. Concurrently, they are conceptualizing or, in many cases, re-conceptualizing, as they move around and around this cycle. The learning cycle is supported by considerable educational research and is at the heart of the how-to approach for green teaching and learning.

> CARE

If the learning cycle is the "how," then CARE is the "what," with respect to environmental learning. That is, CARE represents the content strands of the curriculum. What if you took a traditional Instructional Resource Package and recast the curriculum organizers in a different way? These strands would include:

- Complex systems
- Aesthetic appreciation
- Responsibility
- Ethics

ECO-LITERACY: AN INTEGRATED CONSTRUCT



You could then match learning outcomes in just about any subject and grade level to one or more of these themes. CARE becomes the organizer or framework for learning outcomes. Yes, there's a broader meaning: students have to care (and so do we). But it's also a way to organize curricula along these content strands that we know kids need to understand and apply in their lives. In fact, application becomes essential with regard to responsibility and the crucial development of an environmental ethic.

Of course, none of the elements of CARE should stand alone. You can understand complexity, but you have to do something with it in terms of responsibility and action. All four elements are integral to a balanced educational program. In many ways, the zone of convergence between the four elements is what eco-literacy is all about.

Nearly two years ago, one of the participants in my research study told us, "We need to nurture an ethic of care in our youth by developing curriculum with a synergistic (interdisciplinary) focus that can incorporate learning outcomes with real life environmental issues and experiential approaches to learning." Part of that can be achieved through a curriculum that authentically links experiential learning, real-life environmental issues, and experiential approaches with learning outcomes. Linkage with learning outcomes is critical, of course, because they're mandated. Educators need to ask, "How do we make those linkages and bring the issues alive so we begin to nurture greater responsibility and an environmental ethic?"

> IMPLEMENTATION

Environmental Learning and Experience is a great resource, but theoretical documents tend to sit on shelves. So the ministry and partners realized that a number of projects are needed to effectively implement the document – initiatives that didn't happen in 1995. Core implementation initiatives now in progress include:

- **A CURRICULUM MAPPING PROJECT.** We are taking the ELE framework and mapping it across curricular learning outcomes for all K–12 subject areas.
- **PROFESSIONAL DEVELOPMENT (PD) EVENTS AND WORKSHOPS.** Teachers need face-to-face interaction to learn about new curricula and how to effectively implement them. It's one thing to hand teachers a

curriculum document or resource; we also need to bring teachers together to work with it. As such, we've been holding events, starting with a sold-out conference in October 2007 when we released this framework. Since then, events and workshops have been held around the province with a focus on ELE implementation, where teachers work together to learn effective practices from each other.

- **BEST PRACTICES VIDEOS.** The ministry is supporting the development of media to be available online for teachers and as part of the PD workshops. The videos will show best practices, success stories, and ideas for classroom use. Mostly they feature teachers and students showing us what works and about the kinds of things they're doing that others could emulate.
- **COMMUNITY RESOURCE LINKAGES.** We are linking teachers with community organizations and all the great programs in our communities. We're in the midst of developing a web portal to help teachers, wherever they are, find these resources and the other support they need to nurture environmental learning.

We know that teachers need high quality professional development around new curricula and approaches to teaching and learning. EEPSA, the Ministry of Education, and our other partners are deeply involved in this continuing work to support teachers through professional development, multimedia resources, curriculum mapping and community resource linkages.

> MAKING CONNECTIONS

To support the implementation of the ELE, and green learning more generally, we have partners all around the province (see table). There are also established networks of support for sustainability and environmental education. The BC Working Group for Sustainability Education, or Walking the Talk, has a K–12 team, a higher education team, and an informal educators' team. Wild BC is a very established professional development workshop delivery and implementation group that works with facilitators around the province to support environmental education. More locally, Metro Vancouver Education, the Stanley Park Ecology Society, and Metro Vancouver Parks are all high-profile community partners ready to support your educational endeavours around sustainability and the environment.

CURRENT PARTNERS FOR PROVINCIAL ELE IMPLEMENTATION	
Government	**Non-profits**
BC Ministry of Education Metro Vancouver Wild BC	BC Sustainable Energy Association Check Your Head Destination Conservation Environmental Youth Alliance Evergreen Langley Environmental Partners Society North Vancouver Outdoor School Pembina Institute Science World Stanley Park Ecology Society Vancouver Aquarium WildED
Union	
BC Teachers' Federation Environmental Educators Provincial Specialists' Association Other provincial specialists' associations Social Justice Project	
Corporate	
BC Hydro	

NOTABLE ENVIRONMENTAL EDUCATION NETWORKS IN BC
Environmental Educators Provincial Specialists' Association
One of 33 provincial specialists' associations in the BC Teachers' Federation, the EEPSA provides professional development, networking, curriculum support, and leadership in environmental education
BC Working Group for Sustainability Education
A multi-sector, online network for individuals and organizations with an interest in sustainability education
Wild BC
A BC government-sponsored education program providing environmental education resources, programs, workshops, and partnership opportunities

Educators can, and should, find ways to present environmental and sustainability concepts that will allow learners to draw their own conclusions and take action around important environmental issues and the challenges of sustainability. Please contact EEPSA (www.bctf.ca/eepsa or at pabrobo@shaw.ca) for more information on the ELE, professional development opportunities and support for your efforts to nurture environmental learning.

> RESOURCE

The ELE curriculum framework is available at
www.bced.gov.bc.ca/environment_ed/

Ministry of Education Curriculum Development

PAUL LUKASZEK is the manager of Sustainability and Environmental Education Initiatives for the B.C. Ministry of Education.

The Ministry of Education and local boards of education each have roles in curriculum development. The ministry sets standards for all curricula at the provincial level and develops some curricula while many elective courses are developed by local school boards. These local courses are often the most interesting curricula for students, because the teachers on the ground are familiar with the kinds of subjects that interest students. The board-developed courses also tend to be more applied.

No matter who oversees the curriculum development, teachers develop the learning outcomes and achievement indicators. Individual classroom teachers create their lesson plans. Outside learning resources are important because they help individual teachers develop those lesson plans.

Almost all curricula are crowded with content. Often teachers tend to teach the areas that they are most familiar with or they will try a lesson plan provided by someone else. This is especially true of the elementary grades, where one teacher teaches all the subjects. The better the resources are and the better the fit is for the teacher, the more likely it is that a subject will be covered in some depth.

> NEW CURRICULA

Sustainability education programs are a brand new area for the B.C. Ministry of Education. The ministry considers a number of issues when developing curricula, including child development and learning theory; learning styles; the needs, values, and beliefs of society; political trends and interests; equality and diversity; grade alignment and sequencing; input from educators, parents, and students; and input from partner groups and the public.

In 2008/09 there are three completely new curricula from the ministry. This is a rare occurrence, because usually existing curriculum is just being updated. One of the new courses deals with social justice, responding to current trends around equity issues. Another is the English 12 First Peoples course, which uses texts that present authentic First Peoples voices. Finally, we are introducing Sustainable Resources 11 and 12. All three of these courses are responding to societal and political trends as well as equity and diversity issues.

Sustainability education programs are a brand new area for the B.C. Ministry of Education. In 2008/09 there are three completely new curricula, including Sustainable Resources 11 and 12. This is a rare occurrence, because usually existing curriculum is just being updated.

Global warming has been on the radar at the ministry for awhile now. Most students take Social Studies 11 so when we updated that curriculum in 2005, we added a learning outcome related to climate change. In September 2008 a new learning outcome about climate change was added to the Science 10 course that every student takes.

The specific learning outcome for Social Studies 11 asks students to assess the environmental challenges facing Canadians, including global warming, ozone layer depletion, and freshwater quality. In Science 10, students must evaluate possible causes of climate change and its impact on natural systems. Students start by investigating natural phenomena that affect climate, then move into how human activities can affect climate. Next they explore the impacts of climate change on natural systems like polar ice and permafrost. Finally, they study climate change at the human level and learn how it will affect people in Canada, such as the Inuit.

> EDUCATION FOR SUSTAINABLE DEVELOPMENT

UNESCO has proclaimed a Decade of Education for Sustainable Development, which began in 2005. The goal is for the education systems of all countries to focus on sustainability and to integrate the values inherent in sustainable development into all aspects of education and learning.

Education for sustainable development helps students learn about living sustainably and covers issues of climate change, energy, natural resources, and ecosystems. Sustainable development education also teaches about social responsibility and examines social, environmental, and economic factors in relation to quality of life. It provides students with opportunities to analyze issues, problem-solve, and participate in action. It should be interdisciplinary so that it fits into existing curriculum areas. Finally, it has a whole-school approach. That is why the ministry's Green Schools team includes both an education program side and a school facilities side. School operations should be linked to the classrooms.

The newly developed Sustainable Resources curriculum from the ministry includes five key resources that are important to the economy of the province: agriculture, energy, fisheries, forestry, and mining. The ministry has not previously developed curriculum dealing with these resources other than agriculture and forestry as science courses. We are introducing a Grade 11 survey course, which covers all five resource areas. In Grade 12, students can go more in depth, with individual courses that cover four out of the five areas. We do not have a stand-alone energy course because energy is integrated into these and other science courses. The Grade 11 survey course will not only introduce students to resources that are important to the province, but more crucially, will look at them from scientific, technical, environmental, social, economic, and career perspectives. Sustainability is an organizing theme for all of the courses.

The newly developed Sustainable Resources curriculum from the ministry includes five key resources that are important to the economy of the province: agriculture, energy, fisheries, forestry, and mining. The ministry has not previously developed curriculum dealing with these resources other than agriculture and forestry as science courses.

Illustration by Clayton Wong, Grade 6

> SUSTAINABLE RESOURCES 11

When we started developing the Sustainable Resources 11 curriculum, we planned for it to be a typical science course, with some focus about the importance of these resources to the economy. As course development proceeded we added the lens of sustainability in response to the renewed focus on climate change and environmental sustainability. Examples of learning outcomes for the new Sustainable Resources 11 course include:

- Assess current practices related to sustainable management of agricultural resources in B.C.; and
- Analyze the environmental, social, and economic impacts of acquiring mineral resources and hydrocarbons from fossil fuels.

Teachers assess whether students have learned what they are supposed to have learned by using achievement indicators. Often teachers use achievement indicators to build lesson plans. Examples of achievement indicators for the Sustainable Resources 11 course include:

- Assess the impact of various factors on the sustainability of fisheries, such as over-fishing, drift-net fishing, and climatic change; and
- Describe the social, economic, and environmental impacts of generating and transporting energy from renewable and non-renewable resources.

Before students can discuss sustainability for any given resource, they have to understand what the resource is, how it can be transformed and used, and the difference between a renewable and non-renewable resource. The course covers all these issues.

> SUSTAINABLE RESOURCES 12

I'm going to describe the fundamentals for two of our four Sustainable Resources 12 courses: forestry and mining. We have rewritten our original forestry course to include an emphasis on sustainable forestry. The curriculum organizers for the course are: forest resources and society, forest ecology, forest woodlot operations, forest products, and sustainable forestry challenges.

There is a lot of substance for each of these topics. For example, students study the distribution of trees across B.C. and Canada. They learn practical skills for forestry operations, such as mapping and measurement and gathering data about forests. They learn about the use of technology for harvesting and processing trees. They also learn about the economic benefits of forests.

Under the forestry ecology organizer, students assess the impacts of environmental components and changes to the forest ecosystem. They learn about succession and disturbance within forest ecosystems, the roles of soil, air, and water in forest ecosystems, forest biodiversity, and the effects of environmental changes on forest ecosystems. Students need to understand all this before they can begin thinking about sustainability in the forestry industry.

The curriculum organizers for Sustainable Resources 12: Mining are hydrocarbon and mineral resources in B.C., geology and exploration, extraction and processing, sustainability and environmental issues, and mining challenges. Again, the issues are examined from several perspectives and there are many learning outcomes that embed sustainability. Students must be able to outline environmental assessment processes, identify requirements for site reclamation, discuss the concept of sustainability as it relates to hydrocarbon and mineral resources, and discuss the relationship between consumption and sustainability. The last topic will help students to think about how things that they buy and consume are related to mining operations.

There is a lot of substance for each of these topics. For example, students study the distribution of trees across B.C. and Canada.

The new Sustainable Resources 11 and 12 curriculum was available for implementation in September 2008. We hope that many schools across the province will offer these important courses, particularly the Grade 11 survey course. It is important for students to understand the role of natural resources in the province. It is a great applied science curriculum and it will help students learn about sustainability.

> RESOURCE

B.C. Ministry of Education curricula are available at www.bced.gov.bc.ca/irp

Illustration by Tegan Breker, Grade 2

PART 5

Sustainability from the Ground Up

Green School Buildings, Green School Yards

Teaching kids about sustainability is one thing: having sustainable practices modelled in the very walls and playgrounds around them takes the learning to another dimension. Green school buildings and school yards provide that modelling, not only to kids, but also to parents and to the larger community. Sustainable school buildings and school yards are also healthier, improve learning, and save school districts money.

In this section, IAN THEAKER of the Canada Green Building Council explains the LEED green building rating system, the international certification system for green buildings, and architect LADISLAV HOLOVSKY and school principal PETER WESTHAVER outline the general theory of building green schools and detail its specific application to a state-of-the-art new green school. Finally, DOLORES ALTIN of the Evergreen Foundation explains how greening school grounds not only helps the environment, but also nurtures child development.

PART 5.1

LEED: Leadership in Energy and Environmental Design

IAN THEAKER directs the LEED rating system creation and implementation for the Canada Green Building Council.

We've known about the effects of greenhouse gas emissions for well over 30 years.

According to the best information we have, North Americans must reduce their ecological footprint by a factor of 10 to have any hope of reaching the year 2100 without major catastrophe.

That sounds pretty daunting, but in fact, it's quite doable if we think of it differently. Rather than a huge step – an immediate 90 per cent cut – we can think of it in terms of three steps, each of which cuts our emissions in half. We can even take the first step right now, using available technology. If we're smart about it, particularly with new buildings, we can do it with little to no increase in capital costs. What's more, making those kinds of changes to existing buildings is pretty straightforward. There are a lot of low-hanging fruits, because our buildings are tremendously wasteful.

> THE CANADA GREEN BUILDING COUNCIL

The Canada Green Building Council (the Council) is a non-profit organization founded in 2002. Today, it has over 1,700 members from the development and building operations industries.

We have more than 20 staff members across Canada. The vast majority of our work is done by our members, as volunteers. They run the gamut, from single consultants to some of the largest firms in the country, including Stantec, Public Works and Government Services Canada. Our reach is from sea to sea and our membership includes those whom we see as the leaders in the development and building operations industry, in all sectors.

The Council holds the exclusive licence in Canada to administer the LEED rating system. Since I joined the Council in July 2004, I have been responsible for adapting and implementing the system across Canada. We finished adapting LEED for new construction in 2004, and introduced LEED for commercial interiors in 2007. We also introduced several application guides, including multi-unit residential buildings, campus and multiple buildings, leased space, and core and shell buildings. We provide the credibility of independent certification and review, which is one of the biggest values of LEED certification.

North Americans must reduce their ecological footprint by a factor of 10 to have any hope of reaching the year 2100 without major catastrophe.

> THE LEED RATING SYSTEM

LEED originated in the United States, with the U.S. Green Building Council (USGBC). It's a set of criteria for determining what constitutes a green, energy-efficient, environmentally healthy building. Our role is to provide independent certification of the design, construction, or operations of a building.

There are currently two LEED rating systems in Canada: LEED for New Construction and LEED for Commercial Interiors renovations, the latter of which is applicable to any interior renovation. Over the course of the next 18 months, we're going to be plunging into a whole new generation of LEED applicability as we kick off the LEED Canada Initiative.

There are four levels of LEED certification: Certified, Gold, Silver, and Platinum. Each category comes with a certain number of possible credits and the number of total credits a project receives determines its level of certification. LEED covers a comprehensive range of topics including site selection, water efficiency, materials, and indoor environmental quality. Because no single group of people can think of everything, to

COST-CUTTING THAT MAKES SENSE: Regardless of how a building owner feels about environmental protection, LEED saves money because it reduces life-cycle costs. ILLUSTRATION BY PHOEBE CONWAY, GRADE 5

encourage people to come up with new ideas there's a special category for design excellence and innovation.

Regardless of how a building owner feels about environmental protection, LEED saves money because it reduces life-cycle costs. Building owners that own and operate their own buildings will have them a long time and will be the ones reaping the benefits of better quality up front. Investing that time and energy – and possibly a bit more money – into the buildings at the beginning results in tremendous benefits.

LEED is not just a set of criteria. We offer reference guides with guidance and information on how to green a building. We have a 470-page reference guide for LEED for New Construction and a 430-page guide for LEED for Commercial Interiors. We'll be bringing out several more over the next year and a half.

We're moving towards certifying and engaging buildings across their life cycle, from the planning stage, creating neighbourhoods and site development, through design and construction, to operations at several time points, such as at three or five years after construction. To establish a baseline we are documenting the current performance of buildings across Canada, with our new Green Building Performance Initiative.

> THE LEED CANADA INITIATIVE

The first LEED-certified building in Canada was in Victoria, in Vancouver Island Technology Park on the border with Saanich. It was certified by the USGBC. Now we've adapted the LEED system for Canada and are going further with it.

LEED is the biggest driver of green buildings, energy efficiency, and healthy buildings that I've seen in my career. It's relatively easy for building owners to implement and it has become the de facto language of green design across North America. We created LEED in part to stand up against greenwashing, because a lot of green paint is getting slapped on out there. We have some of the best design and construction teams in Canada doing the reviews.

Since we launched LEED for new construction in 2004, we have registered about 600 projects to use the system. Of these, 80 have been certified at varying levels. The Canadian projects tend to shoot higher than their counterparts in the US: although we're not seeing as many LEED projects, since we're 10 times smaller, of the ones that do exist there are a lot more Silvers and Golds. The very first LEED Platinum building in Canada, the Gulf Islands national parks facility, is located in Sidney on south Vancouver Island.

Some of the largest office building owners and operators across the nation have signed up, including Cadillac Fairview, Bentall, Manulife, and ScotiaBank. The B.C. government now requires that all new government buildings be LEED Gold, as do the governments of Manitoba and Ontario, the cities of Vancouver and Toronto, and school boards in Toronto, Montreal, Calgary, Kelowna, the Central Okanagan, and the Yukon. Not a day goes by that we don't get someone else signing up.

LEADING THE WAY: The Operations Centre for the Gulf Islands National Park Reserve, the first LEED Platinum building in Canada, exemplifies the kind of public facility that could be built in B.C.

Nevertheless, the number of buildings that are registered and certified are a drop in the bucket in terms of market penetration – less than a percentage point. The building sector currently accounts for 30 to 45 per cent of our greenhouse gas emissions.

To make real change, we have to go much bigger, by a factor of 10 or 100. So 18 months ago, our board gave us a new, very audacious goal: to certify 100,000 green buildings and one million green homes by the year 2015. We would like those buildings to reduce greenhouse gas emissions by 50 million tonnes and energy and water use by 50 per cent.

We're going to do this by focusing certification on performance across the entire life cycle of a building. Until now LEED Canada focused almost exclusively on new construction, but we're now adapting for the USGBC's LEED for Existing Buildings Operations and Maintenance. There are a lot of opportunities in the area of building operations. We want to engage and enable the entire building sector – not just construction, but operations and demolitions – to make serious improvements in building performance.

The building sector currently accounts for 30 to 45 per cent of our greenhouse gas emissions.

We're working on becoming a facilitator and a catalyst, giving people the tools to do their own work. The only way we can do that is online through enabling others to make this happen. Builders will submit information over the web and we'll certify over the web. We'll provide the tools and information to make this happen and will offer accreditation to other groups to do certifications.

Our new Green Building Performance Initiative is also in the works, starting with three pilot sectors in the three most important sectors across Canada: commercial offices, government offices, and schools. We're starting by characterizing all the buildings in a pilot sector, then laying them all out and normalizing exceptional energy uses, such as computer labs in schools.

We've already started this process with 250 schools just north of Toronto, collecting data on their baseline energy and water consumption. All of them are schools built in the last 10 years. Their electricity consumption per square metre varies by a factor of three, natural gas use by a factor of four, and water by a factor of five. We're going to ask what's making the best ones so good. We'll learn from those and develop action plans that allow people to spread those lessons across their entire portfolios.

PART 5.2

Green School Design

Royal Oak Middle School in Saanich, B.C.

LADISLAV HOLOVSKY is an architect and partner in Chang Holovsky Architects, Inc., in Victoria, B.C.

PETER WESTHAVER is the principal of Royal Oak Middle School in Saanich, B.C.

A green school provides a healthy environment for the teachers and students, has lower operations and maintenance costs, and protects the environment. It accomplishes this by a number of means: energy-efficient design; use of building materials that are non-toxic, recycled, and renewable; conservation of water and other natural resources; emphasis on waste management; and promotion of a healthy indoor environment, including indoor air quality.

Green schools on average use 30 to 50 per cent less energy, 40 per cent less water, and emit 38 per cent less carbon dioxide. Green, sustainable, and high-performance schools are really all the same thing.

Waste generated during construction is also an issue that must be considered. There is a huge amount of new construction going on in the United States and Canada. New construction creates five to 10 pounds of waste per square foot (45 to 90 kilograms per square metre). Construction of a school the size of Royal Oak Middle School would generate 350,000 to 700,000 pounds of waste. We can't talk about sustainability without dealing with these issues.

> SUSTAINABLE DEVELOPMENT AND INTEGRATED DESIGN

Sustainable school development focuses on site planning, landscape design, and building design. It incorporates renewable energy systems, environmentally sensitive building products, recycling and waste management, water conservation, daylighting, improved indoor air quality, and eco-education. It encompasses all aspects of school design, including lighting and mechanical systems, transportation, and commissioning and maintenance.

Sustainable school development uses an integrated design process. Traditionally, when a building is designed, the architects, consultants, and builders operate within their own separate spheres. Consequently, many buildings end up being disjointed. An integrated design process will involve everyone in a team from the start.

Traditionally, when a building is designed, the architects, consultants, and builders operate within their own separate spheres. Sustainable school development uses an integrated design process.

An integrated design team involves more players than the traditional process. Traditionally, half of all decisions affecting the design and cost of a project are made before

INTEGRATED DESIGN PROCESS

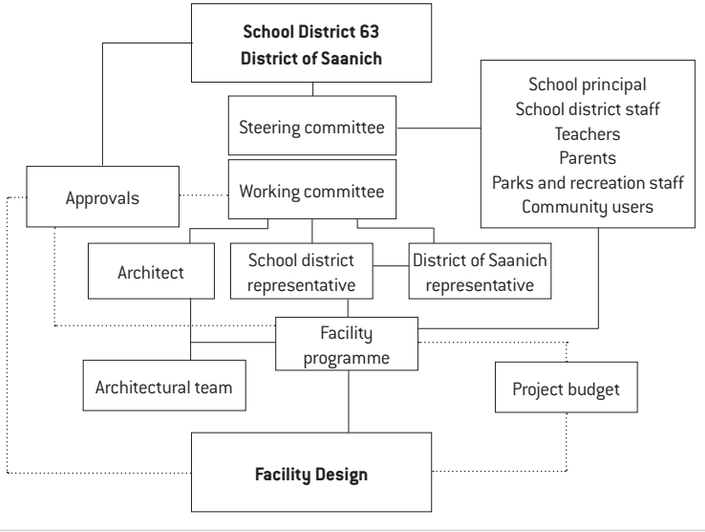


ILLUSTRATION BY GLORIA LEUNG, GRADE 4

the consultants are hired. When the consultants then come onto the project they have to take something that's already half-baked and try to modify it. So the design team must include the commissioning agents and the contractor.

The team also needs to include the intended users of the building: teachers, students, parents, administrators, and maintenance staff. The design process for the Royal Oak Middle School included all those groups plus the municipality and representatives from the community. Having the staff at Royal Oak involved in the design was invaluable, because it gave them a say in how the classrooms would be set up. We even included the students, which was a very positive experience for everyone.

The steering committee for Royal Oak comprised 20 people, but for some of the other schools that Chang Holovsky has designed the committee was much larger. For example, the committee for Richmond High School comprised about 150 people.

To start the integrated design process, we hold a co-design workshop to work out the design concept. This builds a foundation of positive connections and relationships. For Richmond High School we were able to produce the basic schematic approach to the school in a single afternoon with 120 people.

> A NEW FOUNDATION FOR ROYAL OAK MIDDLE SCHOOL

The new Royal Oak Middle School in Saanich opened in January of 2008 and was built on the existing property. The grounds comprised 22 acres, which is quite large, so they were able to build a new school next to the existing one then sell some of the property to offset the costs of the project. The new school was designed for about 600 students on 10 acres (4.2 hectares) of land. The project cost $25.2 million, including furnishings.

The integrated design process provided an opportunity to create a middle school where the foundation was based on relationships. What better way to begin a school? The population of Royal Oak – 620 students – is high for a middle school. The design process helped us make the school feel smaller.

The floors of the school are mirrored with 300 children on each floor. They get to see everyone throughout the day and there's an expectation that if you enter the school in Grade 6 and spend three years in the community, you will get to know everyone there.

Royal Oak Middle School in Saanich, B.C.

> ROYAL OAK GREEN SCHOOL FEATURES

The Royal Oak Middle School was built to the LEED Silver standard. To meet the standard, the school's design incorporated the following features and standards:

- Design exceeds National Energy Code by 30 per cent
- Daylighting
- Natural ventilation
- Displacement ventilation
- LEED commissioning
- Dryswale and bioswale
- Reduced use of materials containing volatile organic compounds
- Recycled building materials
- Regional materials
- High-efficiency heat pump system
- Low water-consumption fixtures
- Storm water roof retention
- Underground retention vault
- Daylighting

SITE PLAN : showing the parking area, student drop-off areas, bioswale, and entrances.

DAYLIGHTING at Royal Oak Middle School, including the lower levels. A recent study showed that students with the most daylight in their classrooms progressed 20 per cent faster on math tests and 26 per cent faster on reading tests.

It's important for classrooms to have the maximum amount of daylight possible. The first one-room schoolhouses had windows on all sides, letting in plenty of light. The old classroom windows were very high in order to supply enough light to the back of the classroom.

The California government hired the consultants Heschong Mahone Group Inc. to study the effect of different environmental variables on students' performance. They tested three variables: the visual environment, the acoustic environment, and ventilation and indoor air quality.

Students with the most daylight in their classrooms progressed 20 per cent faster on math tests and 26 per cent faster on reading tests.

> AIR QUALITY

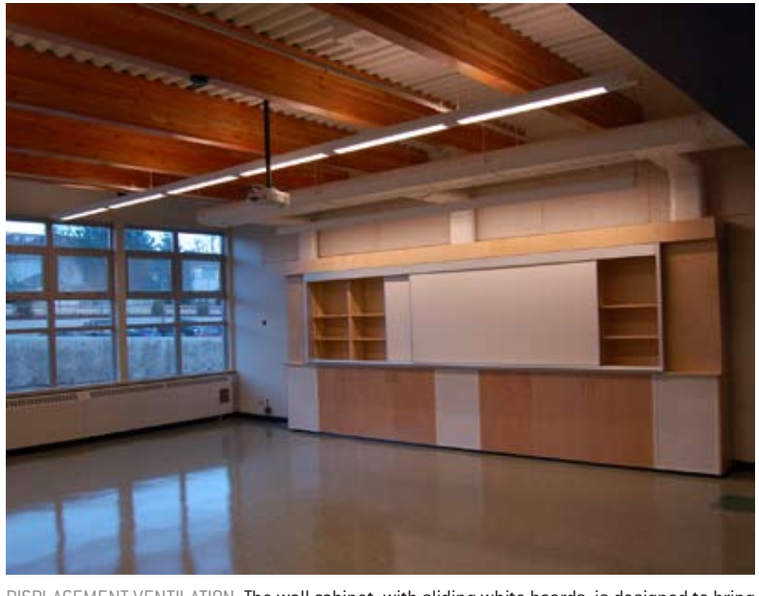
The California consultants found a 20 per cent performance improvement with improved air quality.

Without fresh air flowing into a room, carbon dioxide builds up and students can't absorb information as well. So at Royal Oak we incorporated natural ventilation wherever it was practical. We paid careful attention to shade, the locations of windows, glazing types, roof colours, the building's thermal mass, carbon dioxide monitoring, and enhanced natural ventilation. We used LEED commissioning, which everyone should do even if they're not doing a huge project like this, because it gets rid of things like moulds, making sure you have a healthy building.

Where natural ventilation wasn't adequate, we used displacement ventilation. Traditional ventilation supplies air at the top of a room and uses mechanical means to push it down to where the people are. The fresh air gets mixed with the stale air, diluting the carbon dioxide but never providing completely fresh air. Displacement ventilation, on the other hand, supplies fresh air at the bottom of the room and exhausts it at the top. It doesn't take as much power to move the air, the movement is slower, and the fresh air comes in where it counts – where the people are.

> ACOUSTICAL DESIGN

The California consultants also found that a better acoustical environment resulted in a 20 per cent improvement in student performance. This is why audio voice enhancement systems in classrooms are so important and every teaching space at the Royal Oak Middle School has them.



DISPLACEMENT VENTILATION: The wall cabinet, with sliding white boards, is designed to bring air ducts down to floor level. All classrooms also have audio enhancement systems.

> BIOSWALE

A bioswale disposes of the stormwater from the road and parking area at Royal Oak and an underground storage vault holds excess runoff. The bioswale is also a natural teaching area – it's not just a pond for kids to throw sticks and rocks into and get wet. In the Royal Oak pond, all the runoff filters through the bioswale, which sends "clean" dirty water to the municipal system. The students can do research and investigate this and it relates to their classroom work. They learn the principles in the classroom, then go outside and see it on their own school grounds.

> SCHOOL OF CHOICE

We should be able to teach sustainability in any school. Just because we have a beautiful new building doesn't necessarily mean we'll have great teaching or respect for the natural environment. That's still something all schools need to continually work on.

There are students now that come from Victoria all the way to Saanich just to study in the new building. It has the feel of a small school because of the relationship-building we do. We take full advantage of technology. For example, there are no CRT televisions in our school; everything is LCD. Every classroom has a voice amplification system so that children in the back of the room can hear what's going on up front.

NATURAL VENTILATION in the gymnasium. The vents on the lower walls open to let in fresh air. Stale air is exhausted through the vents in the ceiling.

ROYAL OAK REAR VIEW: There are students now that come from Victoria all the way to Saanich just to study in the new building.

When the students were introduced to the new building, they were amazed at the air quality and daylighting. One student remarked that he had never realized the true colour of his paper. There were so many classrooms in the old building that were dark and dingy, which is not a good learning environment for children. In addition to student achievement, teaching quality improves as well.

All new schools in British Columbia must satisfy the LEED gold standard.

These are just a few of the things we're doing. We're going to continue on our environmental path and continue communicating that to our trustees. The entire district is going to have to start doing things like what we're doing. The entire community is going through a cultural shift. With our old building, we've said goodbye to a lot of old traditions and now we're going to start making new ones around sustainability and vision.

> RESOURCES

The LEED manual, available from www.cagbc.com, is an excellent resource for anyone dealing with LEED projects.

The US National Best Practice Manual for Building High Performance Schools, available at www.eere.energy.gov, is a comprehensive resource for anyone involved in the construction or renovation of a school building.

PART 5.3

Smart School Grounds Design

DOLORES ALTIN is a landscape architect and planner and the Vancouver Learning Grounds Associate for Evergreen.

Previous parts of this book have focused on the performance of the building itself. Here we back out a little bit and look at the school grounds in the context of the community and how they're used. These are considerations for both new and older schools.

Smart school design isn't just about designing intelligently – using new technology, LEED, best practices, and so on – it's also about designing to make the schools themselves smarter. This means combining education and eco-literacy programs with facilities and operations.

> EVERGREEN: IMAGINING CITIES WITH NATURE

Canada is becoming more and more urban: today 80 per cent of Canadians live in cities. This is putting incredible pressure on the public land and green spaces in our cities.

With school grounds being one of those green spaces, it's critical that we preserve, diversify, and utilize them to their highest capability, including considerations like pedestrian connections. School grounds are typically an under-utilized resource.

People need nature. By deepening the connection between people and nature, we empower our students and our citizens to take a hands-on approach and improve their urban environments. We're working on the health of our cities, for now and for the future. People are more apt to look after their environment if they are able to make a connection with nature. We want to reach them at an early age, while they're in school, when they can grow to have an appreciation for nature and to look after it for the future.

Evergreen's role is to inspire action, working with the people who are right on the ground floor. We engage the broader community, as well as the students, staff, teachers, and administrators within the school itself. We assist in planning and design, both for new school facilities and for retrofitting older schools. We cultivate a knowledge of place by making the school ground the first place of inquiry, using local ecological strategies and materials so that people get to know where they are and where they come from. We bring out the best of where we live and apply our natural and cultural knowledge of where we live to our school grounds. Finally we influence policy, to help decision-makers better protect and manage our green spaces.

People need nature. By deepening the connection between people and nature, we empower our students and our citizens to take a hands-on approach and improve their urban environments.

Evergreen has been doing all this for 16 years now. We have offices in Quebec, Toronto, Calgary, Vancouver, and Learning Grounds associates in several major cities across the country. We offer grants of up to $2,000 for individual schools that want to kick-start greening projects.

> THE LEARNING GROUNDS PROGRAM

Evergreen's Learning Grounds program presents a change in the ways we think about, design, and implement our school landscape, and how we treat resources such as energy, water, and land. It's a systems approach to "smart school design."

The program involves increasing the educational use and improving the energy- and cost-efficient design of school grounds and using school grounds to improve children's health and well-being, increase ecological diversity, and nurture child development.

We all want to provide the best possible learning environments for our children.

Too often, school grounds are overlooked as a potential extension of the classroom. We have too many bare expanses of grass, asphalt, or boulder dust. We need to strike a better balance between what our grounds are made of, including native plants and trees, and what they provide for our children.

Even in new schools, often only token gestures are made towards the school grounds. There may be a swale or ditch, but that's all. There's very little diversity in play environments; the grounds don't offer any stimulation for children. Unless a student is involved in a sports game, they really don't have anything to do. Green school grounds have been proven to provide significant mid-level activity for student health.

Children are insulated from their connection with nature. They're highly chauffeured – we drive them from place to place – so often their only interaction with nature is on their school grounds. For example, the United States has wonderful national and provincial parks, but they're not being used as much as they have in the past. We're seeing higher rates of diabetes, attention deficit disorder, and obesity. Purely in terms of the health and well-being of our children, it needs to be a priority to incorporate health, recreation, social responsibility, environment, and energy into school grounds.

Too often, school grounds are overlooked as a potential extension of the classroom. We have too many bare expanses of grass, asphalt, or boulder dust.

What does it mean to improve the energy- and cost-efficiency of school grounds? It means less grass to cut, managing storm water so that puddles don't form where you don't want them, draining parking lots, and planting shade trees. It means best practices and the opposite of high-tech: going back to low-tech and doing things cheaper. We see these brand new schools with only a few trees in the plan. Where will the kids get their shade? Of course it's important to shade the building but if we're talking about going to the upper echelon, getting schools to perform at their very best, then we need to pay the same attention to detail to the school grounds as potential learning spaces.

Typically, with a new school, the construction budget for the landscape is the last thing to be considered. By that point, the school has often exceeded its construction budget. Things start getting cut and the school ends up with a pretty minimal landscape. We want to keep the landscape from being forgotten; it needs to be uppermost in planners' minds as they're working on any new school.

ILLUSTRATION BY KAITLYN WONG, GRADE 3

> OUR DESIGN APPROACH

Research shows that when we green and diversify the school landscape, students are more enthusiastic about learning and teachers are more motivated to teach. Students get experiential learning out of their school grounds, gaining eco-literacy and learning to care for the environment. Their behaviour improves, as does the quality and diversity of their play. Their levels of physical activity increase, along with the social inclusion of all the children.

School ground greening projects don't have to be polished or a huge investment of funds.

> ADOPTING A PARTICIPATORY PROCESS

The community participates in these projects, particularly parents, who have a direct impact on what their kids are doing in their schools and on the school grounds. They want to get involved and they're often championing the project. The students also get involved in the planting, care, and maintenance of the projects. If they're a little older, they can also help with the planning and design.

Food gardens are another important opportunity on school grounds, combining community with education. When community gardens are on school grounds, the children can be involved in the maintenance and harvest over the school year and the community can potentially look after the garden in the summer months. There are so many multi-family homes and condominium towers near some of these urban schools that these projects are really welcome in the communities.

> TORONTO'S ECOSCHOOLS

On the one hand, we have goals for our facilities such as energy efficiency, waste minimization, and reduced water use. On the other, there is a wonderful population of energetic kids that can help make it all happen. The students are the means; they provide the action to reach our green goals. Then more efficient facilities can generate operational savings that can go back into eco-literacy programs and school grounds. This is just one way of marrying the goals for facilities and school ground greening.

The Toronto School District has an innovative model of sustainable education using these principles called Ecoschools. The program has

KEEN KIDS: When we green and diversify the school landscape, students get experiential learning out of their school grounds, gaining eco-literacy and learning to care for the environment.

four focus areas, all under a framework of climate change. The schools choose their projects from a number of approaches and accumulate a set of points to obtain a certification. Awards and incentives are the cornerstones of the program's growth.

Evergreen has been an active participant in the Ecoschools program since the beginning. We have supported the program with workshops, resources, staff support, training, student advisors, design consultations, reviews, and by bringing our funding network to focus investment on Ecoschools.

The strength of the Ecoschools program is that it is a comprehensive framework that organizes all the sustainability programs and efforts within a district and pushes for achievement. It is an integrated model that encompass the goals of eco-literacy, social responsibility, and school ground greening. Finally, the program promotes strong partnerships between facilities and education.

> RESOURCES

Evergreen: www.evergreen.ca.

Toronto Ecoschools program: ecoschools.tdsb.on.ca.

Illustration by Mina Elza, Grade 7

PART 6

Schooled for Sustainability – By Design

Schools are so much more than just buildings. They are models, community hubs, and hothouses for our future citizens. As such, they are also key staging grounds for creating sustainable communities. This section offers three approaches to creating those sustainability staging grounds.

CHEEYING HO of Smart Growth BC takes a big picture view, outlining principles for designing sustainable schools within sustainable communities. ARTHUR ORSINI of Urbanthinkers tackles the path to class, explaining the importance of the active school commute and how to make that commute as self-propelled as possible for kids, parents, and staff. Finally, KEN MARTIN of Passion for Action describes an innovative education program that teaches sustainability principles, introduces sustainability design as a career option, produces educational tools, and educates the public.

Smart (Growth) Schools

CHEEYING HO is the executive director of Smart Growth BC.

Founded in 1999, Smart Growth BC is a non-profit, non-governmental organization with a mandate to create more liveable communities in British Columbia. Although we are an independent organization, we are networked with other Smart Growth organizations in the United States. We work with communities, citizens, local governments, developers, and design professionals to promote more sustainable land use planning and land development. Our activities include research, advice and assistance, policy alternatives, outreach and community engagement, professional development, program implementation, and advisory services.

Smart Growth is a collection of development strategies that enhance our quality of life, protect our environment, and use tax revenues wisely. It's about managing our growth more efficiently and providing choice in where we live and how we get around. It's not against cars or roads, but it's about building vibrant cities and suburbs and making the communities we live in better.

SMART GROWTH…	
…IS	…IS NOT
More transportation choices and less traffic	Against cars and roads
Vibrant cities, suburbs and towns	Anti-suburban
A wider variety of housing choices	About telling people where or how to live
Well-planned growth that improves quality of life	Against growth

> WHAT HAPPENED TO THE NEIGHBOURHOOD SCHOOL?

Whatever happened to the neighbourhood school? The beautiful two-story building with a large playground that kids walked to for school or for weekend sports? What happened to children walking? What's happened is the way we've been planning since the 1950s. We've separated residential areas from retail and office areas. This has created an automobile-oriented design where the only way to get around is by car. We often lack walking, cycling, and transit facilities, and many of our communities are planned with low densities and large distances between destinations. All of that combined is what we call sprawl.

> WHAT'S WRONG WITH THIS SYSTEM?

A "lollipop" development pattern puts houses like lollipops on the ends of "sticks" – the ubiquitous cul-de-sac. It's not necessarily low-density, but definitely segregates uses to create purely residential areas. If you live in one of these places, the only way you can get out is through your driveway in your car. Usually people leave their house through their garage, into their car, drive onto a road, which feeds into a highway. Often there are sidewalks, but there is nowhere to walk. This all results in traffic congestion.

This development pattern also promotes highway-oriented retail: big box stores that are getting bigger and bigger. As a result, many of our downtowns and locally-owned businesses are no longer thriving.

When one of these developments encroaches on farmland, the roads often simply dead-end at the farmland. That makes it very easy to extend the roads just a little bit more and pave over more and more farmland, the future of our food security. Other environmental impacts of this kind of development include air pollution, excess pavement, habitat loss, the need to dispose of used cars and parts, and increased greenhouse gas emissions.

The financial impacts are very extensive as well. Over the next 25 years, Canadian taxpayers will pay $70 billion to build and repair roads, bridges, parking lots, storm water systems, and other sprawl-related infrastructure. The Canadian Auto Association estimates that the average Canadian pays $8,000 a year to buy, insure, maintain, and fuel their vehicles. Often families own two or three cars now. People find they can't afford to live closer to downtown because they can't afford the housing, but they're not taking into consideration the cost of owning and operating two or three cars. Vehicles are the second biggest family expenditure after housing.

People find they can't afford to live closer to downtown because they can't afford the housing, but they're not taking into consideration the cost of owning and operating their cars.

The social impacts of sprawl include a loss of community identity and uniqueness. Often houses in a neighbourhood are identical to one another and neighbourhoods all look the same. People who live in the neighbourhood only have one transportation choice: their cars. The streets are not friendly for anyone, particularly children and the elderly.

> SPRAWL AND CLIMATE CHANGE

The Urban Land Institute and Smart Growth America published a report at the end of 2007 entitled *Growing Cooler: the Evidence on Urban Development and Climate Change*. The report found that although the money governments are putting into transportation technology is a great step, vehicle fuels and fuel efficiency are only two legs of the stool. This third component is to reduce the miles people are driving.

Illustration by Nicola Froese, Grade 2

The report also found that compact development could reduce driving by 20 to 40 per cent. Shifting 60 per cent of new growth to more compact patterns would save up to 85 million tonnes of carbon dioxide every year by 2030. The savings over that period would be equal to a 28 per cent increase in federal vehicle efficiency standards by 2020. The average in-town house still outperforms a "green" suburban house with hybrid cars in terms of carbon emissions, because of reduced vehicle travel.

> SPRAWL AND HEALTH

We've known for a long time about the problems with air pollution, traffic, and traffic accidents caused by sprawl development. Now research is showing the problems with the lack of physical activity and the increasing obesity due to a more sedentary lifestyle. In the last 20 years, child obesity rates have quintupled in Canada, according to the Centre for Health Promotion Studies. This is directly related to children's activity levels. The Centre has also found that the number of fast food outlets decreases as neighbourhood wealth increases, so poorer families have greater access to fast food. According to the Heart and Stroke Foundation, while in 1981 10.6 per cent of Canadian boys and 13.1 per cent of Canadian girls were overweight or obese, by 2000 and 2001, those numbers had risen to 29 per cent of boys and 27 per cent of girls, and were still rising.

In the last 20 years, child obesity rates have risen to the point where one of every four Canadian children are now overweight or obese. This is directly related to children's activity levels.

Doctors and health professionals recognize this link between urban form and public health. The *Report on Public Health and Urban Sprawl in Ontario*, from the Ontario College of Family Physicians, states that, "People who live in spread-out, car-dependent neighbourhoods are likely to walk less, weigh more, and suffer from obesity and high blood pressure and consequent diabetes, cardiovascular and other diseases, as compared to people who live in more efficient, higher density communities."

It's significant that doctors are speaking up and talking about urban form and its link to our health. The Heart and Stroke Foundation report *Has the American Dream Gone Sour?* states that, "Car-dependent Canadians get far less physical activity and are at increased risk of being overweight or obese… Individuals living in moderate-to-high density neighbourhoods that have community and commercial services within walking distance of where they live, are 2.4 times more likely to meet this 30-minute daily minimum [recommendation]." In walkable neighbourhoods, people get that minimum from walking to the store or the bus stop, not necessarily going to the gym for a workout.

> SMART GROWTH

Smart Growth BC has found that the three most important factors linked to increased walking are density, land use mix, and street connectivity. Residents of smart growth communities walk and bicycle more and drive less than residents of more isolated, automobile-dependent locations. This results in measurably better physical fitness and a reduced likelihood of obesity.

Increased density reduces distances between destinations and the portion of destinations that can be reached by active modes of transportation such as walking and cycling. As density increases, per capita hours and miles of automobile travel tend to decline. It also becomes more economically feasible to provide good transit systems and built-in bicycle facilities.

WALKABLE NEIGHBOURHOODS: People who live in higher-density, well-serviced neighbourhoods are more likely to get the exercise they need – from walking, not going to the gym.

Land use mix is the second factor in smart growth. In the "lollipop" development pattern discussed earlier, land uses are separated. It's very important to have a mix of land uses that includes offices, residences, shops, and schools, so that it's easy to get to your destination by walking. People tend to walk more and drive less when land uses are mixed.

However close proximity isn't good enough unless you also build in walkability, so street connectivity is the third component of smart growth. Even if things are close together, if they're separated by a highway, it's impossible to cross the street. A more connected roadway, walkway, and bikeway system reduces the distances that must be travelled to reach a destination, which is especially important for children and seniors. People like cul-de-sacs because of perceived safety, but it's very difficult for kids to walk around those kinds of neighbourhoods.

A lot of research demonstrates links between a school's locations and how people get to them. The figure below graphically illustrates how neighbourhood design can greatly influence how a child may travel to school. Programs to promote physical activity in schools have met with only limited success. The only way to incorporate physical activity into a daily routine is to incorporate it into a lifestyle, so building the opportunity to be physically active into daily routines is the most effective way to improve community fitness. This gives kids habits that stay with them for life.

STREET CONNECTIVITY

Examples of walking distances in two urban neighbourhoods. A represents home, and B represents the school. The two points are the same distance apart in both images. A student must walk 2.0 kilometres to get to school in the neighbourhood on the left, and only 0.8 kilometres in the neighbourhood on the right.

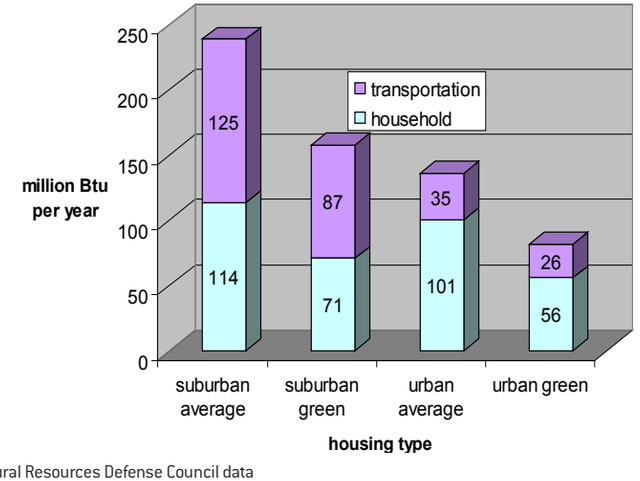
> SMART GROWTH PRINCIPLES

Smart growth is about building more vibrant, walkable, compact communities. We have 10 principles for achieving this:

- Mix land uses.
- Build compact, walkable neighbourhoods.
- Provide safe transportation choices and efficient public transit.
- Create diverse housing opportunities.
- Encourage growth in existing areas.
- Preserve open spaces, natural beauty, and environmentally sensitive areas.
- Protect and enhance agricultural and working lands.
- Utilize smarter and cheaper infrastructure and buildings.
- Foster unique neighbourhood identities.
- Nurture engaged citizens and students.

Every neighbourhood should have a range of housing options, from single-family homes to townhouses, apartments, and secondary suites, as well as a range of affordability. We want to think about whether the neighbourhood will be some place where our parents can grow old and

GREEN NEIGHBORHOODS BEAT GREEN HOMES



Natural Resources Defense Council data

our kids can grow up, or whether they will be forced to live somewhere else because there aren't enough housing choices.

Lots of communities in B.C., from small towns to big cities, are redeveloping existing neighbourhoods with retail on the ground floor and residences on the upper floors. This encourages dense, walkable neighbourhoods and protects farmland and green space. "Lollipop" developments are particularly difficult to retrofit for smart growth, so the process for them takes a long time. Communities can start by redeveloping main streets, putting in community centres, and connecting cul-de-sacs with walking trails.

> SCHOOLS AND CLIMATE CHANGE

During the 2005/06 school year, 650,000 students and 64,000 staff went to school each day in B.C. It's easy to imagine the environmental impact from schools due to transportation, buildings, and consumption. The Collaborative for High Performance Schools found that the average school produces nearly 1,000 tonnes of carbon dioxide each year.

When we build new schools we tend to build them on the edge of town. Because of this, the largest single contributor to greenhouse gas emissions in schools on an ongoing basis is transportation to and from school.

School size in B.C. is dictated by capacity utilization thresholds, so schools tend to be large, and they have to be filled up. As a result, when we build new schools we tend to build them on the edge of town. Because of this, the largest single contributor to greenhouse gas emissions in schools on an ongoing basis is transportation to and from school. It also gives kids fewer opportunities to walk, cycle, or take public transit to school. Distance and walkability are the two main factors that determine whether children will walk to school. In order for the province to work with schools to start meeting the ambitious new greenhouse gas reduction targets, it is going to have to look again at the capacity utilization regulations.

School funding formulas favour new construction over renovating existing facilities, because there is a lot of misinformation out there about the cost-effectiveness of new construction over renovation. The leading-edge builders and designers now understand that you can save a lot more by recycling or reusing existing schools and materials. Designing and building new schools produces between five and seven times as much greenhouse gas as the average school would emit during seven years of operation.

> SMART GROWTH AND SCHOOLS

If we applied the principles of smart growth to schools, all neighbourhoods would have quality public schools. No one would have to drive their children to a distant neighbourhood so they could go to a good school. The schools would offer transportation choices for the students and their parents, allowing students to walk or bike there. The housing choices in the neighbourhood would include families of all incomes.

A smart growth school acts as an anchor in the neighbourhood. It's not deserted at 3:30 in the afternoon, because the community uses the facilities as well. It fits in well with the surrounding neighbourhood and makes good use of existing resources, such as historic school buildings. There is a big movement in the United States from the National Trust for Historic Preservation to preserve historic school buildings by renovating them and greening them.

Smart growth schools tend to be small in size and are not so overwhelming. People know each other better. The main determinants of school achievement, aside from educational leadership, are class size and school size. When schools are smaller, children perform better.

We can create smart growth schools by renovating existing schools, building well-designed new schools in existing communities, or retrofitting a non-educational facility for use as a

SMART GROWTH schools tend to be small in size and are not so overwhelming. People know each other better. When schools are smaller, children perform better.
ILLUSTRATION BY KATHERINE SANTOS, GRADE 1

school building. Pomona, California retrofitted a shopping mall that was being under-utilized and turned it into a high school. Of course, any of these choices should be implemented using green building standards.

According to *Greening America's Schools* by Gregory Katz, green schools in the US save builders about US$74 per square foot, while it costs only an additional US$3 per square foot to go green. Ian Theaker discusses the Leadership in Energy and Environmental Design (LEED) rating system for buildings elsewhere in this book. The US Green Building Council has developed a LEED rating system for schools. North Charleston Elementary School in North Carolina is one of the schools following this trend. It's part of a sustainable neighbourhood and the kids are involved in monitoring energy and water usage. They grow food in the school garden. It's a living classroom.

We can make schools smarter by providing incentives, such as free transit passes for teachers and students in conjunction with instituting paid parking, supporting school programs for walking and biking to school, and getting kids and teachers learning about smart growth. To facilitate that, Smart Growth BC offers an online course for students in Grades 9 and 10 about smart growth and community involvement.

> RESOURCES

Smart Growth BC: www.smartgrowth.bc.ca

Smart Schools Initiative: www.smart-schools.org

Smart Growth America Children and Schools:
www.smartgrowthamerica.org/children

Funders' Network for Smart Growth, *Education and Smart Growth: Reversing School Sprawl for Better Schools and Communities,*
www.fundersnetwork.org/usr_doc/education_paper.pdf

Why Johnny Can't Walk to School:
www.nationaltrust.org/issues/downloads/schools_why_johnny.pdf

Planning for School Facilities. *Journal of Planning Education and Research,* Vol. 26 No. 4:478–496 (2007).

PART 6.2

The Active School Commute: Why it Matters

ARTHUR ORSINI is the founder and director of programs for Urbanthinkers, a Vancouver-based organization that promotes child and youth engagement in walking and biking to schools.

I have worked for city and regional governments and non-profit organizations on school transportation strategies. I have also worked as a consultant on these issues. To set the context, I'm first going to explain why the active school commute matters. Then I'll discuss what we should look for on the road bike path ahead, and what's already out there and available. Finally, I'll talk about five things you can do in your own community to promote walking and biking.

Sustainable transportation simply means fewer car trips to school; this can include school buses, public transit, carpooling, or non-vehicle travel. What it doesn't include is the single-student vehicle. And carpooling with just dad, a high school student, and an intermediate student isn't carpooling, because that car enters both school zones. Within the discussion of sustainable transportation we often refer to the term active transportation: walking, cycling, and other means of non-vehicle travel, such as in-line skating and skateboarding.

The active school commute, of course, ties in with climate change, but in essence it's about the independent mobility of children. In addition to the health and fitness benefits, when our kids walk and cycle to school they get an opportunity for an entirely new level of education.

To some, it might appear that we're already doing a lot for pedestrians and cyclists. If you were to drive past a school, you might see the crosswalk and bike racks, but at many schools in our region, the absence of cycling and pedestrian infrastructure is evident in the details; crosswalks may have a sidewalk on one side of the street but nothing on the other side and bike racks are often located in out-of-the-way locations (i.e. on the opposite side of the parking lot) rather than in places with high visibility that can be seen from the office windows. When bike racks are well located, they are used.

> WHAT'S WRONG WITH DRIVING TO SCHOOL?

In B.C., almost half of our children travel to urban and suburban schools in a car. That's up from a third 10 years ago. Most of these trips are less than one kilometre. This trend often reflects parents' concerns for their children's well-being, but increased driving creates serious safety, environmental, and health hazards around schools.

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It matters when we reduce the number of car trips to schools. The environmental concerns are self-evident: we reduce automobile idling, improve air quality, and lower greenhouse gas emissions. But safety is another major concern. When traffic congestion around schools increases, it generates a feedback loop where greater road safety concerns lead to fewer students walking or cycling and more parents driving their children. This leads to fewer "eyes on the street" and, therefore, a greater fear of stranger danger.

Children cannot learn road safety sitting in the back seat of a car. When parents say their neighbourhood is too dangerous for their kids to walk, I say, "Then it would be worth it for you to walk with them. Your children need to know the best alternatives in your neighbourhood, so walk with them and teach them the safest way for them to navigate it."

School staff and parent volunteers are also putting more and more time into traffic management. Traffic congestion around school property leads to wasted time for school staff, office staff, parent volunteers, police, and public health officials, and when these people need to enforce safety precautions, they are susceptible to incidents of road rage in the drop-off zone. Engine idling and reduced air quality contribute to irate parents and neighbours and punctuality issues develop. Habitually driving to schools also creates auto-dependent children.

> THE ACTIVE SCHOOL COMMUTE

An active school commute makes children more mobile and independent. They arrive at school more alert and ready to learn. Even if they're walking slowly, there are health benefits simply because they're spending less time sitting. Reduced traffic means fewer injuries. The sight of bikes helps encourage more kids to use bikes. More children and parents get to meet and interact with one another.

The community also benefits from improved infrastructure for walking and biking around schools. Active school commutes also support smart growth, since they require less space for parking and drop-off zones.

> SCHOOL TRAVEL PLANNING

School travel planning (STP) creates a set of practical actions to improve road safety and reduce car trips to school. STP addresses the issues of sustainability, safety, and health associated with the school commute by using a collaborative, community-based approach. It's currently being used in the United Kingdom, United States, Australia, and New Zealand.

STP is similar to Canada's Active and Safe Routes to School programs, such as B.C.'s Way to Go! school program (which became a web-based program in July 2008), but it requires national or regional policy. This embodies goals and objectives already consistent with government policies at every level relating to health, fitness, greenhouse gas reductions, and community engagement. Currently in B.C., school transportation policies are done voluntarily. Hopefully, we will soon begin requiring schools to have a transportation plan.

STP also requires practical, ongoing, and comprehensive support from regional implementation agencies. It should bring in traffic engineers, planners, principals, health professionals, environmental educators,

and researchers. These groups need to have budget items to allow and encourage them to contribute to the planning process.

I worked for a year and a half in Auckland, New Zealand on school travel planning. Auckland had 25 STP staff per million residents, compared to two per million in Vancouver. Vancouver's staff weren't even really involved in STP in its true sense, because our processes are still voluntary and fragmented without the on-the-ground support that schools desperately need.

STP requires funds for walking and cycling safety improvements such as crosswalks, sidewalks, crossing guards, and signage, and for retention of experienced and qualified staff. In contrast, a lot of projects in Canada get short-term pilot funding, and when that ends, the program doesn't continue, or has to re-invent itself when it starts up again.

In B.C. we already have the last essential element of STP: community interest and engagement from teachers, parents, students, and neighbourhood groups. The difference is that we don't have the entire, comprehensive framework for the whole process.

The people who are doing the work need to have credibility and the capability. I like to make parallels with drinking and driving, and second-hand smoke. Both have become socially unacceptable, so it's easy now to speak out about them. However, if you're a volunteer parent helping to guide traffic, you don't necessarily have the broad support of the drivers going through the drop-off zone. Once it becomes a larger community process, the people doing it gain that credibility.

AN ACTIVE SCHOOL COMMUTE makes children more mobile and independent. They arrive at school more alert and ready to learn. Even if they're walking slowly, there are health benefits simply because they're spending less time sitting. Reduced traffic means fewer injuries. The sight of bikes helps encourage more kids to use bikes. More children and parents get to meet and interact with one another.

The school travel planning process starts with the school, municipality, and transportation district sitting down together. They research how people are already travelling to school and they do an infrastructure assessment with the traffic engineer. Next, they make a plan for prioritizing and addressing the issues they identified. What is most critical here is assigning responsibility for each part of the plan – everyone at the table has to make a commitment. Finally, they implement the program and engage in ongoing monitoring of their results.

> WHAT'S AVAILABLE NOW

There is an STP pilot project going on now in Canada. I am working on the project with Port Moody and Coquitlam, B.C., in collaboration with my counterparts in Calgary, Waterloo, and Halifax. As we develop resources, we will make them available for all schools. We plan to finish the final report for March 2009.

We're seeing school leadership developing in Canada, too. This has huge potential and is under-tapped as a resource. We have an initiative in B.C. called Environmental Coalition of High School Organizations (ECHO) which originated with four student leaders who attended a TransLink meeting. These impassioned, articulate youth wondered why they hadn't met each other before, even though their schools were doing the same thing. They proposed an ECHO conference on a district professional development day for student leaders to come together to build confidence, share successes, and encourage and empower each other.

SCHOOL TRAVEL PLANNING: PORT MOODY AND COQUITLAM, B.C. PILOT PROJECT	
29 February 2008	Schools selected and working groups assembled
7 March 2008	Baseline data collected
October 2008	School travel plans written and implementation begun
March 2009	Data collected
20 March 2009	Final report and case studies written

A third program that's available now is a professional development program for teachers and educators called CTSC: Cycling Training for the School Community. As the ability to ride a bike safely and confidently in traffic is fundamental to the choice of a bike for transportation, we offer cycling training to adults because educators and school staff are commuters, making daily trips to high-traffic destinations.

In the City of Vancouver, approximately 2 per cent of commuters cycle to work and this is one of the highest rates in the country. This means that for young people, cycling is virtually invisible. Adults in schools are role models for students and the community, so if we get more teachers and school staff cycling to school then we open up students' worldview to include cycling. It makes a huge difference if there's an enthusiastic teacher who is cycling to school. The CTSC program increases the staff pool of eager and knowledgeable users of active transportation.

The first day of the CTSC course covers commuter cycling skills. There is an in-class portion that teaches you how to check the safety of your bike, ride at night and in the rain, plan your route, and negotiate turns. Participants spend part of the day in the parking lot learning basic bike skills. The last part of the day is spent on the road, learning how to ride competently in traffic. The second day involves a two- or three-hour seminar about mapping and other elements of cycling, learning ways to make it easier to bring the new skills into a school's culture.

After the workshops, we see a substantial rise in the number of participants cycling to work. I think the most interesting thing to come out of this is that a lot of people started riding a couple of days per week. If they had commitments on some days that kept them from cycling, they could still do it the other days and still serve as that role model. We encourage people who are already cyclists to sign up for training as well.

ROLE MODELS: In Vancouver, only 2 per cent of commuters cycle to work and this is one of the highest rates in the country. This means that for young people, cycling is virtually invisible. Adults in schools are role models, so if we get more teachers, staff and parents cycling to school, we open up students' worldview to include cycling.

> WHAT *YOU* DO MATTERS

We're in a very different place now in terms of walking and cycling than we were five years ago, and I think we'll be in yet another very different place five years from now. Here are five things you can do immediately.

1. To get the infrastructure we need to support active school commutes, we need to drum up thousands of letters from teachers, students, and parents. Write your letter of support and facilitate other letters.
2. Regardless of where you work or what infrastructure you have to access, take a bike training course. If you're in the Lower Mainland, you can take it from us. It will also make you a better driver.
3. Bike periodically, even if it's only for a short ride during lunch, because you are a role model and you-on-your-bike is a visible declaration of active and sustainable transportation.
4. If you are an administrator or facilities manager, make space for bike racks, lockers, and showers in your facilities, and involve cyclists in the planning and site selection for them. If you are not an administrator, bring these items to their attention.
5. Include images of bikes and pedestrians in your communications, newsletters, and web sites.

> RESOURCES

Urbanthinkers: www.urbanthinkers.ca.

School Travel Planning pilot project: www.waytogo.icbc.bc.ca.

If you are in the Lower Mainland, sign up for a cycle training or find out how to bring one to your school at www.vacc.bc.ca/schools.

Teaching Communities by Teaching Kids

KEN MARTIN is the founder of Passion for Action and an instigator of the East Clayton sustainable neighbourhood Grade 10 education program.

> EAST CLAYTON SUSTAINABLE NEIGHBOURHOOD GRADE 10 EDUCATION PROGRAM

East Clayton is a new neighbourhood in Surrey, which is historically the urban sprawl capital of British Columbia. Four or five years ago, East Clayton was a big piece of rural land that was very difficult to develop due to drainage issues. In order to build, the developers had to incorporate a lot of smart growth principles into the project. They built wide sidewalks, no garages in front of the houses, front porches – all those fundamentals for making a neighbourhood walkable. The driveways were permeable to allow drainage and there were gravel drainage swales.

The challenge was that none of the residents knew about these design features. People were starting to do things like pave over the driveways and solder shut the drainage outlets. There was a fundamental lack of understanding of the ecological limits of the area.

East Clayton sustainable neighbourhood Grade 10 education program is a partnership between Clayton Heights Secondary and the City of Surrey. It's a semester-long program that teaches the kids and the neighbours about sustainability principles, teaches the kids about sustainability design as a career option, produces educational tools for other classes and schools, and creates a public education mechanism through student involvement.

The program is a multi-session module and includes an online walking tour, interactive water system drainage simulator, and coursework on sustainability design. The program is project based, so the students work as a team to create an outreach initiative for the public or for elementary school classes. This can involve exhibits, videos, or walking tours. The city is supporting the program with guest speakers such as a city planner.

Students can use interactive web tools that let them zoom in on the development and access video clips of the city planner talking about the different design features. There is a water runoff simulation kit, where students turn the "rain" on and watch it run through the whole system down to the creek. They can modify the flow based on the kinds of features they build in for sustainability.

The developers had to incorporate a lot of smart growth principles. They built wide sidewalks, no garages in front of the houses, front porches – all those fundamentals for making a neighbourhood walkable. The driveways were permeable to allow drainage and there were gravel drainage swales.

The project was funded through residual funding left over from a federal grant to deal with education in the neighbourhood and the school. The current pilot project will finish in spring of 2008 and all the resources will be available online in the fall of 2008.

> HASTE – HUB FOR ACTION ON SCHOOL TRANSPORTATION EMISSIONS

HASTE is a single-source resource centre specific to implementing school transportation-related emissions reduction programs in B.C. It facilitates partnerships between groups such as the school districts, municipalities, TransLink, the Ministry of Health, BCAA, and ICBC. It involves facilitating some advocacy in the school system and provides training, online resources, celebrations, fundraising, and we hope provision of funding. HASTE is not designed to deliver programming, develop curriculum, or act as a regulatory body.

The project started in April 2007 when the Ministry of Education offered a small amount of money for anti-idling initiatives. The Minister of Transportation also had a small grant available for greenhouse gas reduction. Rebecca Freedman from the Ministry of Environment developed a working committee that represented the Ministry of Environment, Ministry of Transportation, Ministry of Education, the BC Climate Change Secretariat, Environment Canada, Fraser Basin Council, and Passion for Action.

We asked what it would take for the school system to reduce emissions from trips to and from school: How would we do it and how much money would it take? We spent the summer doing research. We talked with a lot of people who had something to do with the various programs, including many teachers, school administrators, and school trustees. Based on that, we developed a set of recommendations, which resulted in funding for the development and operation of HASTE, with a plan to go live at the start of the 2008/2009 school year. Our research found a lot of good things going on. There was a lot of activity happening on many fronts, with over 30 non-profit organizations delivering programs focusing on some aspect of school emissions. We found a growing variety of funding resources and growing interest from people within the school system.

SYSTEMS: We asked what it would take for the school system to reduce emissions from trips to and from school: How would we do it and how much money would it take?
ILLUSTRATION BY JACKSON BROCKLEHURST, GRADE 2

We also found a lot of challenges. There is no standardized way to measure results and what does exist is largely subjective and anecdotal. I've seen five or six proposals for emissions calculations. So we need to push for some kind of standard measure of reporting. There are a lot of great groups out there working on these issues, but they overlap in a lot of areas and are competing for funds. Our mechanisms for knowledge sharing are very limited.

HASTE is being created for district and school administrators, parent advisory groups, teachers, transportation supervisors, health and safety and environmental stewardship committees, student leadership, and environment clubs. HASTE is a collection of all the projects going on in the province, all the groups doing it, and all the sources of funding.

HASTE will offer workshops, both regionally and online, designed to help educators select or design the appropriate emissions reduction program for their needs.

HASTE will offer workshops, both regionally and online, designed to help educators select or design the appropriate emissions reduction program for their needs. The workshops will cover how to design and implement an emissions reduction program, background, reasons, resources available – such as non-governmental organizations and non-profit delivery partners and governments, where to get funding, and what kind of results to expect.

We're developing a resource showcase using Google Maps, showing all the delivery partners, classroom or school programs, and municipal programs. The database for the showcase will have a simple user interface to make it easy to enter program information.

We envision that most of the money we collect will actually flow back out to support our regional delivery partners. We intend for 30 to 40 per cent of our budget to be devoted to incentive funding for things like classroom projects, parent advisory committees, and school environment clubs. These are small grants of a few hundred dollars or less. Over the longer term, we would like to have a larger pool of funds so that we can offer grants for especially innovative or promising programs.

> RESOURCES

Hub for Action on School Transportation-Related Emissions (HASTE) www.hastebc.org

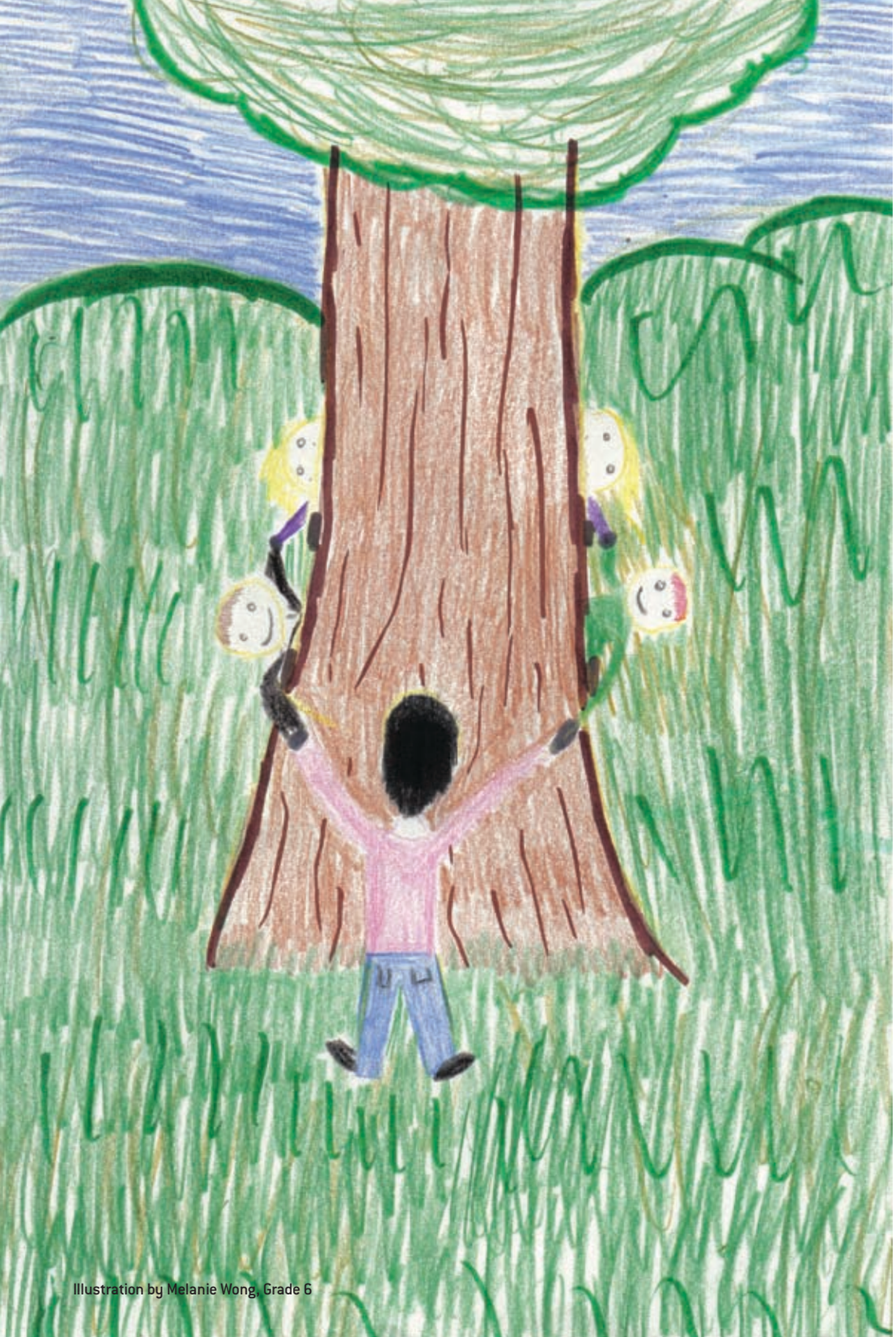

Illustration by Melanie Wong, Grade 6

PART 7

Eco-ed Classroom Takeover

Wondering how to squeeze sustainability into schools with an already-packed curriculum and overloaded staff?

The SIERRA CLUB's Sustainable High Schools project will facilitate eco-education for you, coming into your classroom with their interactive, critical thinking-based program. SEEDS Green Schools program offers flexible resources that work with established learning objectives and don't require additional funding. CHECK YOUR HEAD's Vancouver Sustainable Schools program walks busy schools through the process of creating and implementing a climate change action plan: it has led to school solar panels and a 100-mile diet-oriented cafeteria, among other successes. Finally, the PEMBINA INSTITUTE's GreenLearning materials provide contemporary, interactive eco-ed approaches, from making functional windmills to analyzing the climate change impact of their school's lighting.

All of these school-honed programs promise to make integrating sustainability easy, entertaining, and effective.

Sustainable High Schools Project

EMILY MENZIES is the Sustainable High Schools coordinator for the Sierra Club of Canada.

The Sustainable High Schools project was started by young people in the Sierra Youth Coalition. It offers an engaging, year-round interactive program.

There is a lot of dubious information and misinformation put out by activists on environmental issues, especially surrounding climate change, and there are few places where people can go to fact check what they are hearing. Our program, therefore, emphasizes the development of critical thinking skills. It uses interactivity and role playing, so that people take on different roles than they normally would, helping them realize these are multifaceted issues.

> WHY SUSTAINABLE HIGH SCHOOLS?

A sustainable high school community is a centre of education that inspires its students and staff to model sustainability by reducing their ecological impact, making ethical purchases and investments, and ensuring a safe and supportive community.

Young people in our society are growing up in an environment where people often do not think about the ecological and social impacts of their daily actions. They're growing up in a society that assumes economic growth is the primary way to ensure well-being. We act as if our ecological and human communities can deal with our ever-growing exploitation, waste, and inequality.

Some of the young people understand these issues very well. They are the student leaders in their schools, trying to take action in their own lives. They are trying to make a difference because they have had experiences in their own lives that connect them with these issues. They're forming clubs because they often feel isolated and helpless. The Sustainable High Schools project empowers them to adopt long-term sustainability initiatives for their school.

A sustainable high school community is a centre of education that inspires its students and staff to model sustainability by reducing their ecological impact, making ethical purchases and investments, and ensuring a safe and supportive community.

How can we create a way of life that is sustainable? We all have to take actions, both big and small. We need to move towards the place where all students in their own lives, along with the teachers, the districts, and the province, make all their decisions in a way that doesn't give up ecological integrity for economic prosperity. Every decision needs to reflect social, economic, and environmental values.

There are so many wonderful projects out there where students can make a difference, on every possible issue, but they can be bombarded with information. At the age of 13 or 14, they're just starting to learn about all the things wrong with the world, like trafficking in children and ecological degradation. Adults have had years to filter through all the information and decide what they can deal with and focus on. Teenagers are just learning about it and it makes this a very traumatic, exciting, and terrifying time.

These issues can be traumatic for adults as well. Our program can help teachers who are uncomfortable dealing with these issues by having someone else come into the classroom to talk about them.

Youth are still trying to figure out who they are, what the world is about, and what their role is in it. Billions of dollars go into convincing them, as early as possible, that their role is to be a consumer and to define themselves by material objects. We can support teachers, parents, and administrators in working with youth and teaching them to take responsibility for their own actions and their communities, starting with high school.

When I do interactive presentations for high school students, I ask them if they have heard the word sustainability and what it means to them. They always have lots of ideas about that. Then I ask if they have heard the word used in a way that really didn't fit what they understood the concept to mean. We look at what is meant by the ability to sustain, because what it really means is up to the speaker and the audience. I would say that when we talk about sustainability, we're talking about our ability to sustain our entire way of life. And our way of life may not be so sustainable.

We bring in media images of "greenwashing" ads from energy or car companies. We ask them to think about who came up with the ad, how it makes them feel, and whether they believe what they're being told. Then we provide them with a bit more information to help them analyse what they're seeing. It can be interesting to watch the changes they go through, because at first they accept what they're seeing.

Creating a sustainable high school is a three-step process. It starts out with looking at what's happening right now in the school. The project leaders create a sustainability advisory committee and perform an assessment of current practices. Next, the committee chooses priorities for change and begins planning for action. Finally, the students are ready to take action on their plan.

THINKING AHEAD: The Sierra Club's definition of sustainability is the current generation meeting their needs without compromising the ability of future generations to meet their own needs.
ILLUSTRATION BY ISAAC SCHMIDT, GRADE 3

STEP ONE: THE SUSTAINABILITY ADVISORY COMMITTEE. Sustainability is a collaborative process. It requires buy-in from the people making decisions, the people implementing those decisions, and the people affected by the decisions. The goal of forming a sustainability advisory committee is to create an organized and inclusive representative body that can develop, guide, and direct the sustainability initiatives of the school. The committee should include representatives from the student body, student government and clubs, teachers and staff (including custodians, food service workers, and clerical staff), administrators, and parents. It may also include people such as district facilities managers, alumni, coaches, and others.

STEP TWO: THE SUSTAINABILITY ASSESSMENT. The sustainability assessment is designed to create data that capture the ecological and social values determined by the advisory committee. The use of an assessment allows schools to monitor their progress over time and compare results among schools, using a common language. It allows the committee to concretely understand the impact the school is having and what is working and what needs to improve. The assessment includes both ecological and social indicators.

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We know that what we measure matters. We tend to measure things that we value and we can't manage what we can't measure. Usually schools make decisions based solely on economic costs, even though many school charters and plans state that they want to uphold ecological and social values. The assessments provide them with a way to track their success on these indicators. Moreover, establishing a baseline of how sustainable a school is allows a clear selection of priorities. The team can create projects that are more meaningful and effective, because they are based on concrete information.

STEP 3: ACTION PLANNING. The action planning process is what started the Sustainable High Schools project. The process can be adapted for larger classes and for adults. Based on asset mapping, visioning, and the assessment results, the school community then picks priorities for

change. Classes, clubs, the sustainability advisory committee, and the administration design and implement projects, policies, and infrastructure upgrades to improve their priority areas.

We're not just talking about running around picking up pop cans – we're talking about real, transformative change. If a district is planning to rebuild a school, they need to follow certain principles. Why not have a consolidated process, getting students involved in creating a vision of an ideal school?

Our program is a series of iterations: assessing where you are, planning for action, and creating projects. Then it repeats the process, each year renewing the commitment to sustainability and mentoring new leadership. It's important to take the grade levels of the students into account, to be sure they are able to retain the knowledge from the program.

> HISTORY OF SUSTAINABLE HIGH SCHOOLS

When Sustainable High Schools started, many of the youth that became involved were really frustrated with their high schools. They were working on sustainability projects that they had to do on their lunch hour and they weren't getting any school credit for it. They felt isolated; no one seemed to care about what they were doing.

In 2005 some of these youth attended the Sustainable Campuses conference in Vancouver. Sustainable Campuses was a project taking place at university campuses around the country. Students were building committees with their administrators and staff and were making concrete changes. At the conference we spent about five hours with them creating a plan, a little dream of how they could take this huge project for post-secondary institutions and adapt it for high schools.

HIGH SCHOOL SUSTAINABILITY ASSESSMENT INDICATOR	
ECOSYSTEM: WATER	
Indicator	Measurement Units
W-1: Potable water consumed	Total annual volume of potable water consumed by the school for all uses, divided by the total number of school community members.
W-2: Efficiency of fixtures	Total number of new water fixtures installed annually that are of the highest possible water efficiency rating for that year, divided by the total number of new fixtures installed in that year
W-3: Pollution	Total volume of non-biodegradable and toxic cleaners and other fluids disposed of into water system, divided by total number of school community members.
W-4: Drinking water quality	Percent of classrooms that are less than 20 metres from a source of free water that meets or exceeds the Guidelines for Canadian Drinking Water Quality.

They spent eight months pouring through the assessment for campuses and selected 20 indicators they thought were the most critical for high schools. With some youth who were working on similar issues in Victoria, they organized the first Sustainable High Schools symposium. They invited teachers, parents, and students from high schools all over the province. In all, representatives from nine high schools came to the symposium, which was hosted at Vic High. The goal was to find out which schools had sustainability projects underway and whether there was a recognized need for this kind of work. The answer to the second question was a resounding "Yes."

Two key priorities arose from the conference. One, of course, was to reduce the ecological impact of the schools. The youth were very well aware that their schools emitted a huge amount of waste on a daily basis. The teachers couldn't change the thermostats, so they would just open the windows and let the heat out. The students were throwing everything away, whether it was bottles or paper, and the photocopy machines wouldn't make double-sided copies.

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The other priority was for the schools to make ethical purchases and investments. This may surprise you that this is something high school students are thinking about. The students wrote a piece about sweatshop-free clothes. Of all the things that schools buy, it's a safe assumption that unless it's labelled as union made or sweatshop-free, it's made by people working under terrible conditions. On the investments side, one of the student groups found out that the Ontario Teachers' Association pensions were invested in energy funds. So they started a campaign called "It's My Future," and they went and talked to their teachers. They said, "If you care about us and are devoting your life to teaching us, don't make investments that can threaten our future."

> OVERCOMING THE OBSTACLES

Creating a sustainable high school is a challenging process for youth. Usually by the time students have built the awareness, skills, experience, confidence and connections they need to make their school sustainable, they are graduating. They are impatient; they want to see immediate change. They lack decision-making authority and sometimes are not taken seriously. Meanwhile, teachers, administrators, and parents are already very busy. They often see environmental solutions as expensive or inconvenient and they are invested in the status quo. They may fail to consult with the students and with each other.

Another thing that makes sustainability so challenging to achieve is leadership. It's essential to encourage transitional leadership, because our students learn so much but then leave for university. So our program encourages mentorship. When I work with Grade 12 students, my main message is for them to teach the younger kids.

I also encourage students to reach out to their administrators, staff, and parents, and realize that they probably all want the same things as the students. Quite a few kids look at everything wrong in the world and they think the adults are responsible, but they can create so much more change if they sort out where their interests coincide with those of their community.

> YOUTH ARE MAKING A DIFFERENCE

The most important thing to do for youth is to emphasize that they *are* making a difference. They don't have to save the world, they just have to make sure that the kind of difference they're making in the world matches their own values. They're making a difference with what they're choosing to study, what careers they want, and every decision they make each day. Educators can help them create the kind of world the students want to see and be a part of.

> RESOURCES

Download a comprehensive, youth-friendly *Sustainable High Schools Kit* at www.sustainablehighschools.ca.

The SEEDS Foundation

Society, Environment, and Energy Development Studies

CAROL BATYCKY is an educational advisor with the SEEDS Foundation.

The SEEDS Foundation has a 30-year history of providing bias-balanced resources to communities, schools, educators, and students across Canada. I am an experienced user of SEEDS materials in the elementary classroom as I used their programs for many years before I retired from teaching and they worked well for me. I offer my comments here in hopes that some of the experiences people had in the program can be of benefit to today's educators.

The SEEDS Foundation was initiated by the energy industry and was incorporated as a non-profit educational organization in 1976. The Foundation's mission is to support Canadian educators in promoting student literacy and active personal and societal responsibility for energy, sustainability, and the environment. Its mandate is to create school programs that provide balanced, realistic, non-judgmental energy and environmental teacher resources that fit the curriculums of all provinces and territories. The SEEDS board is national and includes representatives from the business, environmental, and academic sectors.

The SEEDS Green Schools Program supports the concept of "learners in action" and its materials are designed to support students regardless of individual differences, capabilities, or learning styles. The goal is to help the students develop a broader understanding of energy, the environment, and the necessity for environmental stewardship. The SEEDS Green Schools program promotes a sense of collective

responsibility for our planet by empowering learners across Canada to make positive contributions to current environmental interactions and issues by assuming responsibility for their own actions. Whether it is through litterless lunches, school naturalization projects or waste management, participation in the Green Schools program helps to foster environmentally responsible schools.

As of January 15, 2008 about 5,800 schools across Canada were actively involved in the SEEDS Green Schools program. Over a million environmental projects, from small to quite large, have been completed over the 30 years of the program. That in itself speaks to the conviction children have to seek ways to improve the health of our planet and their willingness to commit to environmental stewardship. But not unlike any other type of learning, children need support and some direction to enable them to succeed in this area. The Green Schools program provides a way of doing this without adding to existing workloads in the classroom.

Over a million environmental projects, from small to quite large, have been completed over the 30 years of the SEEDS program.

Much of the SEEDS Green Schools success is related to the program's collection of flexible, interdisciplinary resources that compliment the skills and knowledge descriptors in disciplines such as language arts, social studies, fine arts, science, and health. The materials do not add to the learning objectives that teachers already have to meet and they do not require additional funding. The program focuses on environmental citizenship by promoting collective responsibility and creating an environmental culture for the school. Rewards and incentives recognize efforts in the program. Teachers are encouraged to "pick and choose" ideas as they fit with the group they are working with.

> BECOMING A GREEN SCHOOL

To become a Green School, the children themselves decide which activities they feel are most important to help them reduce their own ecological footprint. Giving students such choices helps them to feel empowered to act and it contributes to positive feelings of worth in helping to solve environmental and energy issues of which they are keenly aware from both the media and their own investigations. By logging 100 activities, schools earn the right to be called a Green School.

The Green Schools start-up kit contains a binder with sheets for logging stewardship activities. For each project, the participating students use the log sheets to sign their names, give a one- or two-sentence description of their activity, and paste in a piece of memorabilia, such as a picture. We provide an activity chart, which they can use to track their progress in reaching 100 environmental activities. It serves as both an incentive to move forward and a sense of pride in what has already been accomplished.

The activities do not have to come from the idea book contained in the Green Schools kit. Students are encouraged to think of projects on their own, or work with groups such as River Watch, Destination Conservation, or the Bateman Society. Our message to them is that we're all in this together. They just register their ideas, and when they get to the point where they can say they have completed 100 activities, they can feel really good about saying they're a Green School. We don't act as judges; they don't have to send their logbook binder back to SEEDS or obtain approval for their action choices. They simply let SEEDS know by fax or telephone that they've reached their goal and we send them a recognition banner to hang in their school.

After becoming a Green School the students are encouraged to reach for higher goals. With the completion of 250 activities they become a Jade School and get a badge that they can sew onto their Green School banner. At 500 they become an Emerald School and get another badge. At one 1,000 activities they become an Earth School and receive a beautiful new Earth banner. For each 1,000 activities after that, a new level is added to their Earth School status – Earth 2, Earth 3, and so on. Currently, three schools in Canada have Earth 3 status. The first one was in Chase, B.C.

GREEN SCHOOL SUCCESSES

Level	Number of activities	Number of schools in Canada (Jan/08)
Registered	N/A	5,874
Green	100	2,210
Jade	250	785
Emerald School	500	473
Earth 1	1,000	260
Earth 2	2,000	14
Earth 3	3,000	3

> GREEN SCHOOL "CHALLENGES"

SEEDS offers a number of "challenges" through the Green Schools program. These challenges operate two or three times per year and usually do not repeat any content within a given three-year period.

The Canadian Literacy Challenge is an example of one of the challenges that SEEDS offers. At first glance, literacy and environmental stewardship may not seem a likely match, but they actually are great partners. When a student is reading, writing, viewing, listening to, or otherwise communicating information about management of the Earth's energy and resources, they are really connecting with the environment and building their background for stewardship action. When children participate in the literacy challenge, they send a write-up of their choice to SEEDS. In return, on a monthly basis, they receive collectible stickers of different species of animals, such as polar bears and owls.

The Take the Plunge Challenge consists of suggested actions that conserve and preserve Canada's freshwater resources. The school or a class can tally any water-related activities done in science, language arts, social studies, fine arts, or by the school's environment club.

Take the Plunge also includes simple experiments for the students. For example, a bottle cap will float in a glass of water, but adding the smallest drop of detergent will make the cap sink. This helps children understand that the amount of detergent they use really does make a difference, because many insect larvae can't float if the water tension is broken. Experiments like this one help students make connections and understand why they might take certain actions.

Children in Grade 4 cannot renovate their homes. However, in Take the Plunge, they learn that a garburator uses a glass of water every second and that they should try to make sure that the dishwasher and washing machine are fully loaded before operating them. Cleaning and transporting all that water to homes has an impact on electricity use, which often comes from fossil fuels, so students are given hints on how to limit the amount of water they waste.

Take the Plunge contains a module called Kitchen Water Cops, which gives doable suggestions for water conservation in the kitchen. For example, putting an aerator on the kitchen tap can reduce water use by a third. Another module, Lost in the Wash, tells students about washing in cold water and how much water you can save by wearing some clothes an extra time or two.

A recent web-based Clean Air Challenge helped to connect children to their use of electricity, water, and vehicle fuel, and how many greenhouse gasses each of those creates. They can see how much carbon they save by doing one simple thing, such as turning off the lights in one room for an hour each day for a year. Through small actions like these, the students try to come up with a tonne of carbon savings – not by changing what they do, but by doing it smarter.

> BIRDS, CLOUDS, SATELLITES

A truly green school will encourage active learning through quality outdoor experiences. To facilitate that, SEEDS operates the Bird Challenge from the end of April through the beginning of June. Students record bird sightings for up to 48 hours. We can report the sightings to organizations such as the Bateman Foundation, the Audubon Society, and Parks and Environment Canada, who can use the sightings in their own research. The Bird Challenge is active science, with a real benefit to other people in the community.

The SEEDS CloudWatch challenge offers a chance for children in Grades 4 through 8 to connect with CloudSat scientists from the Canadian Space Agency and NASA. The CloudSat program studies clouds and the water cycle, which are closely connected. The children provide ground-truthing data for the satellite: when the satellite is overhead they go out and take measurements of precipitation, temperature, and cloud cover. They send their measurements online to the Canadian Space Agency, which uses the data to verify the satellite's readings. Students can see the comparison on NASA's CloudSat web site.

OUTDOOR CLASSROOMS: A truly green school will encourage active learning through quality outdoor experiences. To facilitate that, SEEDS operates the Bird Challenge and CloudWatch.

The CloudWatch challenge supports curriculum outcomes and student achievement in both science and technology. It emphasizes the importance of accurate observations, extends and sharpens student investigative skills, and supports technical literacy and competencies. It's compatible with models of inquiry and collaborative learning and it provides meaningful, authentic, and contemporary educational experiences, with real-life applications and a real-world focus. This program brings students and teachers together with scientists: students can even communicate directly with the scientists by sending them their questions over the Internet. The satellite's key components are completely Canadian built, in partnership with NASA, so the CloudWatch challenge offers a fantastic way for students to learn about career pathways and be volunteers for their own country. Instead of just cruising the web, they are generating new scientific information.

> ENERGY STUDIES

Creating a Climate of Change is a program directed at secondary schools, taking issues like climate change to a higher level. It encompasses science and social studies, geography, environmental science, and global education. It includes six video modules, a teachers' resource guide, transparencies, and CD and DVD media.

SEEDS also offers the Energy Literacy Series for Grades 7 to 12, a web-based, interactive program that explores the sources, uses, technologies, and issues of different kinds of energy. The series teaches students about every energy source in Canada, explaining where it originates and how the energy is converted to electricity. It provides graphic and animation-based instruction and matches required science learning outcomes.

HOW SEEDS KEEPS IN TOUCH WITH SCHOOLS

- *Seedling Review* mailed in September to 14,000 schools
- Website
- Attend teacher, environment, and energy-related conferences
- Teacher workshops and focus groups throughout Canada
- Emails 6,500 teachers in the database
- Toll-free contact number
- Encourage faxed responses from teachers
- Student and school incentives, certificates, and banners
- Random draws

> HOPE FOR THE FUTURE

The SEEDS programs are leaving a great legacy. Last month, four high school students who had gone through the program approached SEEDS about starting their own programs to work with younger children in their communities. This gives me great hope for the future. I believe we are entering a new age of enlightenment, approaching a significant change in our way of thinking on the magnitude of the one that happened in Galileo's time, and it's because of the way our children are educated today.

Traditional education has been about memorizing and repeating. Now at a very early age, children are learning to use decision-making models that involve looking at the alternatives to an action and considering the consequences of their decisions. Learners today are taught to get information from a variety of sources, evaluate it, internalize it, and consider where it applies to their lives. By giving this sort of education to children, we are preparing them to answer the questions of the future, whether they're about biotechnology or climate change. Today's methods of teaching are really about critical thinking, creativity, and skill development and such methods apply no matter what the grade level. The SEEDS Green Schools Program and its challenges and teaching modules compliment such an approach. They are not difficult or time consuming and teacher/volunteer leaders need not be experts in environmental studies to become facilitators of SEEDS programs. Leading students from awareness to actively seeking ways to improve the health of planet Earth simply requires an open attitude and willingness to help students commit to environmental stewardship.

The key to the SEEDS programs is helping the students celebrate their accomplishments. The children, never adults, host the rewards ceremonies.

> RESOURCE

The SEEDS web site is www.seedsfoundation.ca, and the toll free number is 1-800-661-8751. Fax in a request, and a start-up kit will usually arrive within 10 days.

Sustainable Schools in Vancouver

KEVIN MILLSIP is the founder of Vancouver's Sustainable Schools project and the founder and executive director of Check Your Head.

My organization, Check Your Head, is historically known for holding workshops in high schools on global issues such as sweatshops and concentration of media ownership. Soon we'll be holding workshops around the province on public health care.

Another current project is called Step Up, which is working with students to develop a curriculum to take into schools to educate other students about poverty and poverty-reduction measures. It will be a curriculum designed by and for high school students and participation will be linked to program requirements for graduation.

During my term as a trustee on the Vancouver School Board, I represented the board in a City of Vancouver process called "Cool Vancouver," developing a climate change action plan for the city. Despite the pivotal role that public schools can play in shifting our culture towards sustainability, at that time the Vancouver School Board did not have any comprehensive discussion similar to the Cool Vancouver process. I started working on those issues as part of the Vancouver School Board and then brought the idea as a project to Check Your Head.

> SUSTAINABLE SCHOOLS IN VANCOUVER

Our focus is strictly on the Vancouver School District. Vancouver's school system is divided into 18 "families" of schools, each of which consists of a high school and all the elementary schools that feed into it. The pilot project for Sustainable Schools took place in the 2006/07 school year, involving two families of schools and one Adult Education Centre.

We start by designing a climate change action program for an entire school family.

The vision and design of the program is linked to environmental action in the geographic community of the schools. This structure encourages students to think about building a better world, both within the walls of their school and in the community as a whole. We want to build the expectation with students that if they begin working on sustainability in Grade 5 or 6, they can continue the work when they graduate to high school.

Vancouver's school system is divided into 18 "families" of schools, each of which consists of a high school and all the elementary schools that feed into it. We start by designing a climate change action program for an entire school family.

Last year we worked with two families of schools. This year we're hiring two new coordinators and are expanding to five families of schools. We're in the process of forming a partnership with the Vancouver School Board for multi-year funding so that within three years, every family of schools in the district will be part of the sustainable schools process and on its way to implementing its own vision.

> THE SUSTAINABLE SCHOOLS PROCESS

Our commitment to our funders is that we're not developing a program, but a process that we'll make available to anyone who's interested. By the end of our pilot year we had developed the *Sustainable Schools Action Guide*, which walks a school group through the process of creating a climate change action plan for its community. The guide links them to resources such as curriculum and web-based materials. Using the *Action Guide*, any high school can come together and work on sustainability based on whatever its needs are.

Many schools are already doing amazing things around issues like recycling, transportation, air quality, and cycling to school. All the pieces are there; however, it is common for one teacher in a school to be doing something powerful and innovative, but for no one else to know the project exists, because teachers are all so busy.

In fact, one of the first things we hear whenever we go into a school is that everyone is excited about our program, but feels they just don't have the capacity to take on anything else. Part of our process, therefore, integrates concepts of sustainability into what people are already doing.

We start by bringing everyone to the table – students, teachers, and parents – and set out to build their capacity, supporting them as much as we can. We lead them through a visioning process to find out what the ideal sustainability scenario will look like for their school community. From there we work backwards: out of the vision, we come up with project ideas. Once we have the projects we look at what the barriers are to implementing them and what resources and tactics the school will need to carry them out.

Twice a year, in the spring and fall, we plan to bring everyone in the sustainable schools process together with people from other schools who want to become involved. At these meetings, everyone can share their vision, dreams, projects, and challenges, and take inspiration from one another. The meetings will also start to build a collective accountability within the Vancouver School District: when everyone comes back, they can check in with each other on how their projects are coming along and start to have conversations about how they can support one another in the process.

> MAKING CONNECTIONS

Check Your Head plays the very important role of connecting schools' needs to the resources that can meet those needs. If a school group wants to work on a specific issue, such as cycling, they can contact us and we'll connect them with a local organization doing the work.

We had a group working on a visioning process at King George Secondary. The principal said he would like to install solar panels at the school. Someone else at the meeting knew about a program that was helping access public funds to put solar panels on public buildings and we connected the school with a solar engineer who designed a Grade 8 and 9 science curriculum that linked science requirements to solar technology engineering. Today there are solar panels on the roof of King George Secondary and a display on the main floor of the school that walks you through the process of solar technology. The conversations that led to all this happened on their own; we just needed to provide the space where they could happen.

King George Secondary is really on fire now. They didn't have to turn on the school boilers or the power system for the entire month of August, because the solar panels provided enough energy. Although school isn't in session in August, there is still a lot going on in a Vancouver West End high school. The success of that project has spurred all kinds of activity in the school. The director of the school's food services is starting a school garden to grow food for the cafeteria. She has become focused on the 100-mile diet and is getting the students hooked on the concept.

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In another success story, we have supported teachers and students who are advocating a district recycling program, which the Vancouver School Board does not currently have. Because of the efforts of those teachers, parents, and students, the district has committed to starting one.

> BEYOND HIGH SCHOOL

Today the high school students we've worked with are starting to go back into elementary schools to be mentors. We're trying to demystify the jump from elementary to high school, training high school students to be bridges from the elementary schools and developing champions within the schools. We'd like to develop kids in elementary school who are really excited about this kind of work and start to find ways to support them before they reach high school.

Finally, to follow up with that process, we plan to work with students on sustainable post-secondary opportunities. For example, we will start working with trade unions that are involved in producing solar energy and insulation, to develop jobs that provide economic opportunities for students while simultaneously addressing climate issues.

DEVELOPING LEADERS: We want to build the expectation with students that if they begin working on sustainability in Grade 5 or 6, they can continue the work when they graduate to high school. ILLUSTRATION BY DEVIN RUTLEDGE, GRADE 7

Check Your Head's work centres around issues of social inequality and social justice. I have faith that we will actually deal with the climate change crisis, but I fear we'll do it in a way that will leave us with a societal structure at least as inequitable as our current one. Our efforts to address climate change provide us with a pivotal moment of hope and opportunity to address issues like poverty, racism, inequality, and social injustice. In the United States some groups are calling this "climate justice" and they're developing economic models based on something called the "green column economy." There is amazing work coming out of Oakland, California on this concept.

The most popular approaches are based on a psychology that we're going to buy our way out of this problem – but we can't.

Part of our work, therefore, is actively questioning the culture of consumption in which we're entrenched and talking about how to shift away from that, so we can address issues of inequality at the same time as the environmental crisis. In sustainable schools, we're marrying the concepts of social and environmental justice.

We're giving kids the skills to make social change happen in their lives and their communities.

> RESOURCE

The *Sustainable Schools Action Guide* is at www.checkyourhead.org.

GreenLearning: Energy and Climate Change Education

JOHAN STROMAN, the B.C. director of GreenLearning for the Pembina Institute, taught high school sciences and math for 12 years and has worked with Environmental Educators Provincial Specialist Association as a volunteer executive since 2000. He recently completed an MA in Environmental Education at Royal Roads University.

The Pembina Institute is a non-profit organization focused on sustainable energy solutions. It was founded in Alberta shortly after the Lodgepole sour gas blowout that resulted in two deaths and spewed 280,000 tonnes of sour natural gas into the air for weeks. Labelled Canada's largest industrial disaster, Lodgepole resulted in a government public inquiry. A small group of committed citizens, several of them public school teachers, got involved and led the way to changing Alberta's policies on sour gas wells. Empowered by the positive experience of citizen-led action, the group founded the Pembina Institute in 1985.

Today, the Pembina Institute focuses on advancing sustainable energy solutions through innovative research, education, consulting, and advocacy. Since 1995, the organization has met its education mandate through GreenLearning initiatives. In 2007, GreenLearning won the Alberta Emerald Foundation Award for Excellence in Environmental Education.

> WHY WE NEED ENVIRONMENTAL EDUCATION

In Canada, seven in every 10 adults cannot define *sustainability*. Yet when its meaning is made clear – when Canadians understand that sustainability means meeting the needs of the present without compromising the ability of future generations to meet their needs – 82 per cent of Canadians rank sustainability as a top-priority goal.

On average, today's children spend less than 10 minutes playing outdoors each day, but five or more hours per day with electronic media. The simple act of taking students outside and engaging them in an educational activity can be a meaningful experience for many students. Students are typically eager to learn about the Earth and its ecosystems in the classroom. Luckily for teachers in B.C., the Ministry of Education's recent release of the Environmental Learning and Experience (ELE) document clearly supports opportunities for students to gain environmental literacy. The document provides an excellent framework for teachers that emphasizes direct experience and a reflective learning cycle. The power of ELE is that it supports teachers in reframing how teachers do what they do, rather than adding more content.

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> THE GREENLEARNING APPROACH

GreenLearning supports busy teachers by providing easy-to-use, flexible, and comprehensive curriculum-linked resources that meet required learning outcomes. Our resources are web-based and allow for diverse approaches. Teachers always play an instrumental role in the development of our resources. As part of our development and evaluation process, we conduct focus groups and pilot workshops we well as online evaluations of the fit, design, and approach of our resources. Teacher involvement throughout the development process allows us to ensure that our resources meet and exceed teachers' expectations.

GreenLearning resources help students participate in their own learning, with a focus on personal, holistic, and hopeful perspectives on complex energy and environmental issues. Our resources are designed to give students classroom opportunities for critical thinking and reflection on climate change and other energy issues. Building on students' perspectives and providing them with hands-on, experiential learning, our lessons and activities support students in taking action on energy and climate change.

GREENLEARNING resources help students participate in their own learning, with a focus on personal, holistic, and hopeful perspectives on complex energy and environmental issues. ILLUSTRATION "INDIGO BUNTING" BY ROAN REIMER, GRADE 6

GreenLearning hosts two- to three-hour workshops that engage teachers directly in their own challenges and perspectives. Teachers try lessons and they work with the online materials, assessment tools and curriculum tables. We provide follow-up workshops to support their use of the materials, encourage them to share their successes and challenges, and explore different approaches. We have had excellent feedback on the workshops.

We are currently exploring different ways to build capacity within districts and provide workshops to individual schools. We work with a number of different groups, such as Destination Conservation, EEPSA, Passion for Action, Science World, the David Suzuki Foundation, and Wild BC to support teachers and students in engaging with these resources.

> ORIGINAL GREENLEARNING MATERIALS

GreenLearning published Canada's first comprehensive environmental education resource directory in 1995 and produced a *Climate Change Awareness and Action Education Kit* for high schools a few years later. The *Action Kit* was developed in Alberta but also reached many high schools in British Columbia via Wild BC workshops. Designed for high school curriculum, the best of these print resources will be made available in an updated form for download in 2009 in our new Grade 10 Climate Change program.

The *Climate Change Challenge* game was designed to engage students (and adults) in a dynamic online game show that quizzed them on their knowledge about climate change, energy efficiency and renewable energy. It was a big success at the United Nations Children's Conference in Victoria a few years ago, where international students involved in environmental issues dominated the dozen terminals set up by Environment Canada.

Our early initiatives also include four resources that were originally based on Alberta's curriculum: *Real World Electricity* for Grade 5, *Real World Ecosystems* for Grade 7, *Real World Energy* for Grade 11 and *A Sustainable Future for a Small Planet* for Grade 11. As we adapt these popular modules for B.C., we are finding that many teachers in the province are already using them.

> NEW GREENLEARNING MATERIALS

GreenLearning's newest resources include Re-Energy, eCards, and EnerAction.

RE-ENERGY: RENEWABLE ENERGY PROJECT PLANS TO BUILD WORKING MODELS

Re-Energy teaches environmentally friendly design and involves operating basic solar cars for the younger students and water mills or windmills for the older students. The models actually generate electricity and students can build them in the classroom. The younger students like to blow like mad on the windmill to see if they can activate the light and really enjoy "producing" so much body energy. Our Solar Oven Challenge is also hugely popular. Teachers can download comprehensive Re-Energy building plans from www.re-energy.ca. The needed materials are readily available and are included in the cost of Re-Energy workshops. We get as many as 40,000 downloads from this site each month.

The success of this program is in part because of the very detailed and thorough yet easy to understand instructions. Complete materials lists and trouble-shooting guides are also included.

ECARDS: RESEARCH, WRITE, DESIGN, SEND

eCards is a student-centred, teacher-moderated activity that harnesses the dynamic youth culture of social networking and brings it into the classroom. This premiere e-learning resource was launched in the Fall of 2007 for Grades 7 through 10. On the eCards website, students research a renewable or non-renewable source of energy, create an electronic card with their own message and graphics, and then email the card to a friend, family member, principal, business or political leader.

> **"I was impressed at the variety of lessons and activities – great job at tying it to so many IRP learning objectives in so many different ways."**
> **— Teacher feedback**

Everything students need to create their eCards is available on the secure and stand-alone eCards website. Teachers monitor student progress, make revisions online, and approve each eCard before it can be sent.

Currently, eCards offers five energy-related topic resource centres for student research: Wind Power, Solar Energy, Nuclear Power, Energy Success Stories, and Arctic Glaciers. The topic resource centres include written information that is age appropriate and timely as well as introductory videos, photographs, and figures. During the research phase of eCards, students also have access to an "Ask an Expert" feature that allows them to pose questions individually or as a group to an energy expert at the Pembina Institute. Later, during the writing and design phase, students can access online information on effective communication and advocacy.

eCards has been popular with teachers seeking powerful, curriculum-linked e-learning materials. While it has obvious applications to

E-CARDS CURRICULUM	
Grade 7	Geography, Language Arts, Fine Arts, Information Technology
Grades 8 to 10	Social Studies, Language Arts, Science

geography and science, eCards has also received an enthusiastic response among language and socials studies teachers. Students sent more than 250 cards within the program's first few months online.

Teachers led the development of eCards. The concept grew out of a four-day retreat with teachers, curriculum consultants, and GreenLearning staff.

ENERACTION: LESSONS AND ACTIVITIES IN ENERGY CONSERVATION

In the Fall of 2007, GreenLearning also launched EnerAction, a diverse and comprehensive resource that supports students in conserving energy at school and at home. EnerAction includes 11 lessons with rubrics, curriculum tables for Grades 4 to 7, unit planning materials, a carbon calculator, backgrounders, and a teacher's guide.

EnerAction was designed to provide students with a rich educational experience in energy. In doing so, the 11 lessons approaches energy from three perspectives:

- What is energy? How do we use it? Where does it come from?
    1. Playing with energy
    2. Acting on energy
    3. Where's the power?
- What are the current problems and issues around energy use? How does our energy use affect the environment? How do we define our own energy ethics?
    4. Walk a mile in my shoes
    5. Exploring our energy ethics
    6. Puzzling over energy issues
- What can we do as individuals and as communities to use energy more wisely? What choices can we make? What actions can we take?
    7. Lighting at school
    8. Bright ideas
    9. The home of the future
    10. Changing our ways
    11. Taking the lead

EnerAction suggests a number of ways for teachers to integrate the lessons and the carbon calculator into their classes, namely by subject area, topic, learning approach, or number of lessons. At GreenLearning, we know that giving teachers the flexibility to meet the needs of their classes supports more effective learning for students.

The online carbon calculator helps students and teachers analyze the carbon generated by their school's lighting. They input the types of lighting they are using, how many of each type there are and how many hours the lights are turned on, and then the calculator generates an estimate of energy use. Students suggest the way they will change lighting at school, and the calculator shows them what that would mean in savings – both in dollars and in greenhouse gas emissions. The calculator also shows students the savings that could be achieved if other schools implemented the changes that they suggest.

> "I am so thrilled with the whole EnerAction program. My Grade 4 science students ... are excited ... to use a carbon calculator that can be understood at their grade level." — Teacher feedback

The Carbon Calculator is framed on a thematic story that includes the characters Electra, EnerGuy, Sparky, and the Carbon Critters. Students try to help Electra with her challenge to shrink the huge feet of Carbon Critters whose feet grow as they use more energy and shrink as they use less. This play on the concept of the ecological footprint is also highlighted in one of the lessons, where it helps students personalize the concept and bring it home.

> UPCOMING GREENLEARNING INITIATIVES

We are expanding eCards and EnerAction. eCards will include new topic resource centres for student research. EnerAction will see a refined pilot version of a results tracker for students to keep track of the benefits of the actual actions they take. We are also developing a new transportation module for EnerAction that includes new lessons and interactive online components.

GreenLearning is also developing the Redfish School of Change, a six-week field school that will pilot in Spring 2009 in B.C. This intensive experiential program is designed for young people focused on taking leadership in achieving greater ecological sustainability and social equity in their own lives and communities. In partnership with Pearson College

GLOBAL SOLUTIONS: A lot of the downloads of re-energy.ca materials come from India, where people are downloading plans to make a biogas generator that creates methane from animal waste. People who live in villages have used the plans to create stoves that do not require wood.
RURAL SCHOOL "BUS" IN INDIA, MCKAY SAVAGE PHOTO

and the University of Victoria, this unique accredited program includes field trips and seminars, service learning, action projects, nature immersion, a diverse learning community, mentorship and follow-up support. Participants (youth aged 19 to 26) will develop a deeper understanding of the state of the world and elements of solutions for social change. Through a participant-driven process, they will gain the skills to think critically and creatively, assess options, make decisions, take positive action, and influence others. A mixture of site-based and wilderness components, these young people will learn from several bioregions across southern B.C.

Another unit that GreenLearning is developing is an online collaborative community for teaching and learning about climate change, built around Grade 10 provincial curricula. It will include online interactive components, a diverse and well-balanced set of information, and a series of active and student-centred lessons with applications to current science and emerging social issues.

We look forward to working with teachers, school districts, and other educators to increase environmental literacy and inspire student-driven and school-driven action on climate change and sustainable energy solutions.

> RESOURCES

Visit GreenLearning at www.greenlearning.ca. To fully access our resources, take a moment to register – registration is free to teachers.

Through the Green Glass

Climate Change Tools for Education Leaders

Through the Green Glass is about using a sustainability lens in public education. It is beyond doubt that climate change is going to have a dramatic effect on the lives of our children and grandchildren. As educators, we have an imperative at this moment in time to work together and take action, before we lose our window of opportunity. It is heartening to realize that there is a whole arsenal of tools and resources already in existence, being employed and continually improved by a host of knowledgeable and passionate experts. While these stories reflect British Columbia, the ideas and information are widely applicable.

In this book you will find:

- A climate change primer – the dominant changes in the climate system, including the atmosphere, ocean, snow and ice
- Compelling arguments for action, and
- Real models and tools for change.

Through the Green Glass: Climate Change Tools for Education Leaders is the third volume in the Columbia Institute's Going for Green series.

Illustration by Ruby Mann, age 9

Through the Green Glass is beautifully illustrated by the students of Tyee Elementary in Vancouver, where young artists and budding environmentalists took the time to make art about schools and sustainability for this book.

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