A YMCA GUIDE TO ENVIRONMENTAL LEADERSHIP

YMCA

We build strong kids,
strong families, strong communities.

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A YMCA Guide to Environmental Leadership

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Activities from each topic area in A YMCA Guide to Environmental Leadership have been piloted by youth groups across Canada. Special thanks to the following Associations and their youth participants, volunteers and staff for their ongoing support and feedback during the development of this resource:

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QUESTIONS? Please contact us at services@ymca.ca

YMCA

Introduction

A healthy planet is vital to the growth and wellbeing of each individual and every community. A YMCA Guide to Environmental Leadership provides the information and resources that can help empower youth to embrace environmental sustainability and lead change. This resource covers a wide range of issues affecting Canada and beyond, and takes a global perspective while allowing for the incorporation of local examples and initiatives. As one of the YMCA Peace Week resources, this guide is intended to promote a sense of responsibility to and respect for each other and the planet that we all share.

WE HOPE THAT YOU WILL BECOME INSPIRED TO SEE HOW EACH OF US HAS THE POWER TO CREATE CHANGE FOR A BETTER TOMORROW.

ymcainspirepeace

THINK IT, SAY IT, DO IT!

How to Use This Resource

Information for Youth Leaders

There are many ways to use this resource guide, and the best approach depends on the age of the youth, their specific interests, their level of interest in environmental issues and where the activities will take place (classroom, camp, etc.). Each activity includes a recommended age range and estimated time that can vary by group at the leader's discretion. The individual topic areas each contain a background information section followed by an average of six activities that include an introduction, instructions and a discussion, and finally, references and a glossary.

The following are a few ways you can use this resource.

- ENVIRONMENTAL THEME DAYS – Highlight national and international environmental theme days, such as those listed in the back of this guide.
- ENVIRONMENTAL LEADERSHIP PROGRAM – Create a multiple-week environmental leadership themed curriculum covering a variety of topic areas. In an effort to incorporate the interests of a wide range of youth from communities across the country, 14 different topics have been developed. These are organized to provide logical connections between topics to allow for easy transition from one topic to the next.
- ONE TOPIC AT A TIME – If the youth are really interested in a specific topic, try four or five activities from that topic area. This approach requires facilitation of the discussions by the leader to ensure that a new conversation is generated for each activity. The discussion questions in each activity provide guidance.
- COMBINATION OF TOPICS – Try one or two activities from a few, or all, of the different topic areas so the youth can learn about a variety of issues.
- REVISIT EACH TOPIC – Complete an activity from one topic area, then return to that topic area the following week to complete another activity. This approach strengthens the youth's understanding of the issue.
- INCORPORATE INTO LEADERSHIP PROGRAMMING – Work some environmental leadership activities into your regular leadership programming.
- MODIFY THE ACTIVITIES – Creatively modify activities to better engage the youth.
  - **Spark imagination.** Create stories or scenarios for the activities so the youth can better imagine the details of the issue being covered.
  - **Create friendly competition.** Increase the degree of friendly competition in the activities to further engage youth.
- PREPARE FOR DISCUSSIONS – Due to the complex nature of many environmental issues, it can be helpful to review the background information and the activity discussion questions beforehand so that you can contribute to the discussion.
  - **Do some research.** If you do not fully understand an issue, do some quick research to prepare yourself for questions.
  - **Incorporate local issues.** It is important to understand how each topic is relevant to your area so that you can present more tangible examples. You can find this information using local media sources.
  - **Share personal experiences.** Encourage the youth to share their personal experiences during the discussion.
  - **Share background information or facts with youth.** Share some of the background information with the youth or highlight some of the key facts to give them a better understanding of the issue.

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CLIMATE CHANGE

Climate Change

Climate refers to temperature, wind and precipitation patterns; therefore, the term climate change reflects not only changes in weather, but in long-term seasonal patterns. Global warming is a term that is often used interchangeably with climate change, yet they refer to slightly different processes. Climate change refers to a change in the trends of our weather patterns due to an increased level of greenhouse gases in the atmosphere, which includes global warming, changes in sea level, precipitation patterns, etc. Global warming refers to greenhouse gases in the atmosphere trapping more heat and warming the Earth's average surface temperature. Therefore, climate change is a term that describes the global climatic effects of the process of global warming.

Ecosystems and environmental cycles are intimately related to climate patterns, therefore, a shift in climatic conditions can cause a wide range of adverse effects in natural cycles around the world. Warmer temperatures result in melting glaciers and ice caps that add increased levels of freshwater to the ocean, potentially disrupting aquatic ecosystems, and in turn causing rising sea levels. A change in temperature and precipitation patterns can affect when ice freezes, how much ice is formed and when and how fast the ice thaws. This then denotes how much fresh water is released into rivers, which determines the quantity and timing of water availability for irrigation, fish spawning or human and wildlife sustenance. Increased levels of carbon dioxide in the atmosphere will cause increased carbon dioxide absorption by oceans, which leads to oceanic acidification that adversely affects marine organisms with carbonate shells, like corals (Trenberth K.E. et. al, 2007). Canada's vast land area and diverse climatic conditions make it particularly susceptible to the changing weather patterns resultant of climate change, including melting ice caps, retreating mountain glaciers, rising sea levels, changing ocean currents and more extreme weather events (droughts, floods, snowstorms, etc.).

The best way for individuals to help mitigate climate change is by reducing their greenhouse gas emissions. Emissions can be reduced in a variety of ways, including taking public transit, biking, walking or carpooling instead of driving on your own; installing energy-efficient appliances in your home, such as dishwashers, clothing dryers and washing machines; or by offsetting your carbon emissions. Planting trees is one way to offset emissions, because trees take in and use carbon dioxide and release oxygen as a by-product. Additionally, various organizations provide carbon offsetting programs, one example being Bullfrog Power, who will inject an equivalent quantity of green energy (wind and hydro-electric) into the grid to offset your home's energy consumption for a small fee.

FACTS:

- Eleven out of the 12 hottest years on record have been witnessed within the past 12 years (Trenberth K.E. et. al, 2007).
- This past decade was the warmest on record (2000–2009) (NASA, 2010a).
- There has been a global increase in category four and five storms since 1970, with increased intensity and duration (Trenberth K.E. et. al, 2007).
- We could cross a temperature threshold this century that would commit the Greenland ice sheet to complete melting, which would eventually raise sea levels seven metres (Meehl G.A. et. al, 2007).
- Small temperature shifts can have huge impacts, as was witnessed in the Northeastern U.S. during the last ice age, when a five to nine degree cooler climate saw the area covered with over 3000 feet of ice (NASA, 2010b).

Greenhouse Gases

Greenhouse gases naturally occur in the atmosphere in small amounts and warm the earth enough to sustain life by preventing some of the sun's solar heat from escaping back out into space. The most abundant greenhouse gases are water vapour (clouds) and carbon dioxide, with a variety of other gases found in smaller concentrations, like methane and nitrous oxide. The abundance of these gases is growing rapidly due to human activities, especially burning of fossil fuels. Carbon dioxide lingers in the atmosphere for more than 100 years, meaning that even if we stopped releasing carbon emissions today, that which is already in the atmosphere will continue to warm the planet for decades to come (Climate Institute, 2010). We must therefore consider the long-term effects of today's decisions and actions and begin to make more responsible choices.

The Greenhouse Effect

When the sun's energy enters the Earth's atmosphere, some energy is reflected back out to space by things like clouds, snow and ice, and some is absorbed by the Earth and later released as heat. The gases that naturally comprise the earth's atmosphere trap some of this heat, preventing it from escaping into the atmosphere, and warming the planet just enough for organisms (including humans) to thrive. This phenomenon is known as the greenhouse effect, because the atmospheric gases perform a similar task to the glass windows of a greenhouse. Human activities such as deforestation, burning fossil fuels and industrial processes have dramatically increased the quantity of gases in the atmosphere, which in turn, are trapping more heat. Many scientists believe that climate change is the result of this excessive build-up of greenhouse gases in the atmosphere.

Is it Warm in Here?

AIM: To understand the process of global warming and the greenhouse effect.

MATERIALS: Bed sheet, 2 large blankets

AGES: 12-14, 15-18

TIME: 10 minutes

Introduction:

Have 2 volunteers sit on chairs back-to-back. They will represent the Earth.
Note: Volunteers must be comfortable being under a blanket.

Instructions:

The facilitator is to hold up the bed sheet and explain to the youth that the sheet represents the natural layer of atmospheric gases responsible for trapping some of the sun's heat energy at the surface of the Earth. This trapped heat warms the Earth enough to sustain life as we know it. Now the facilitator is to place the sheet over the 2 volunteers. Ask the youth if it feels warmer under the sheet. Now explain that recent industrial activities, such as driving cars, is contributing large quantities of greenhouse gases to the atmosphere, trapping more heat at the Earth's surface. Place a blanket over the youth. After a moment, ask the youth if they feel the "Earth" getting warmer. Now explain that carbon dioxide is the main greenhouse gas that humans emit and it can remain in the atmosphere, warming the planet, for about a century after it is released. It is therefore extremely important that we significantly reduce the amount of greenhouse gases we produce or the Earth will continue to grow warmer and warmer. Place the last blanket over the youth. Ask what the temperature is like under the blankets.

Discussion:

The blankets in this activity can be likened to the greenhouse gases that form a "blanket" over the Earth and keep it warm enough to sustain life. These gases are imperative to our survival, yet in high quantities can drastically influence the Earth's weather patterns and consequently our survival.

1. What would happen if we were to keep layering blankets on the Earth?
2. What are some of the effects of climate change or global warming? (Ex. Melting glaciers & ice caps; rising sea levels; drought & flooding; extreme weather events; etc.)
3. What can you do to reduce the quantity of greenhouse gases that you are responsible for creating? (Ex. Walk; bike; take transit; reduce electricity consumption [how?]; recycle/compost; lead by example; hang your clothes to dry; eat less meat; etc.)

Adapted from: "Is It Getting Warm in Here?" YMCA Peace Building Activity Guide 2006

Abracadabra

AIM: To consider how actions in our everyday lives can reduce our carbon footprint and help to alleviate climate change.

MATERIALS: Recycled one-sided paper and pens for each youth

AGES: 12-14, 15-18

TIME: 15 minutes

Introduction:

There are many complex problems surrounding the issue of climate change. There are many factors that contribute to the phenomenon, and many effects that are resultant of it. Due to the complexity and interconnectedness of many of these problems, it can be difficult to see solutions to climate change when looking at the big picture.

Instructions:

Hand out a piece of paper and a pen to each participant, and have them spread out to find their own space. Tell the youth to imagine an ideal world in which they are able to instantly solve 3 problems that contribute to climate change. The youth are to carefully consider which 3 problems they believe to be the most difficult to solve or that have the most significant impact on the climate, and record them on their paper. Next, the youth are to choose 1 of these 3 problems and come up with 3 ways that they can help to solve it. After 5 minutes or so, bring all of the youth together to share their 3 problems and 3 solutions.

Discussion:

Climate change can be an overwhelming issue, but when broken down into smaller problems that contribute to the major issue, it is easier to see how we, as individuals, can make a difference.

1. Did viewing such a large issue as smaller contributing components make it easier to see potential solutions? How can this strategy be useful in other areas of your life?
2. How do you think that you, as an individual, can make a difference in the fight against climate change?
3. What sort of impact would there be if everyone adopted this mindset and did what they could to stop climate change?

Linked

AIM: To appreciate our connection to and reliance upon each other and nature.

MATERIALS: 6 pylons

AGES: 12-14

TIME: 10 minutes

Note: Activity works best with a large group (minimum of 8).

Introduction:

We are all interconnected with and reliant upon one another and the planet's resources for survival. Without the trees to give us oxygen and water to quench our thirst, we could not survive. We are therefore reliant upon each other for protection and care of the environment to ensure that everyone has access to natural resources, such as clean, safe water and fertile land to grow crops. If someone takes more than their share of resources, someone else is left without.

Instructions:

Indicate both a start and finish line on the ground with 3 pylons each. Split the group into 2 teams, and have each team agree upon a 1-syllable team name. Each team is to line up at the start single-file, facing the same direction with their hands on the shoulders of the person in front of them. This will connect each person on the team to form a human chain. The first person in the line jumps forward, then the second person jumps forward and so on down the chain. The last person jumps, then yells out the team name and everyone jumps forward together. If anyone jumps out of turn, the team starts over at the beginning. Repeat the process until the teams cross the finish line.

(For smaller groups, time how long it takes the group as a whole to cross the finish line, then repeat the activity to see if they can beat their previous time.)

Discussion:

The human chain in this activity represents our connection to those around us and to the natural world, as we could not reach our goal (the finish line) without working together. If we continue to make decisions that fuel climate change and destroy the Earth's ecosystems, it will be difficult to survive. We must work together to ensure that everyone on the planet has adequate resources for survival, and to do that, it is important that we halt the effects of climate change.

1. How did it feel to rely on the other members of your team during this activity? When else in your daily life must you rely on others?
2. Why do you think that many of us do not change our behaviours in relation to climate change to have a more positive impact on the environment?

Bye Bye Bias

AIM: To recognize biases in the media so that we become properly informed.

MATERIALS: A variety of different newspapers
(Newspapers can often be accessed for free at your local library or online)

AGES: 15-18

TIME: 30 minutes

Note: A bias is a preconceived feeling or opinion that prevents impartial representation of a topic or issue.

Introduction:

The media can portray events and issues in a biased manner, and therefore when reading or listening to the news, it is important to keep in mind that the information may be presented in a way that favours one point of view over another.

Instructions:

Have youth look through a variety of newspapers (ex. a local, a provincial and a national paper) and find as many environmentally-related articles as possible. As a group, read through the articles and discuss whether or not there are biases. Determine which newspaper is the least biased, and consider favouring this paper in the future for a more balanced portrayal of issues.

Discussion:

It is important to be able to recognize biases when researching issues to ensure that the information being gathered is accurate. Accurately informed citizens can effectively educate others and encourage action on issues of concern.

1. Were you surprised by the presence of / lack of bias in the articles?
2. Was there a difference between newspapers in the level of bias?
3. Is the media the best place to find factual information on environmental issues? Where else could you look for accurate information?
4. How many environmental articles did you find in relation to non-environmental articles? Do you think that this is an accurate representation of the quantity of environmental issues facing the world today? Why or why not?

D.I.Y. BINGO

AIM: To understand the multitude of ways that we can help to mitigate climate change.

MATERIALS: Printed Bingo card & List of Actions per person, extra List of Actions, glue sticks, scissors, a hat or bag, lots of pennies (optional: prizes)

AGES: 12-14, 15-18

TIME: 15 minutes

Introduction:

There are many ways that we as individuals can make a difference and help bring an end to climate change. Some of these ways are suggested in this activity.

Instructions:

Prior to the activity, print off a Bingo card and List of Actions for each youth participating (on recycled paper). Print 1 extra List of Actions, cut it into pieces and set the pieces aside. They will act as the Bingo "numbers" to be pulled from the hat.

Give each youth a Bingo card and List of Actions and instruct them to cut out each action and glue 25 of them in random order onto their card. Let them know that it is advantageous to arrange their actions in a unique way so that no one else will have the same card. Once youth are finished, play Bingo!

Place the actions in the hat and pull them out one by one, calling each one out as you go. Youth are to mark their card with a penny over each action that is called. If the youth get a straight line of pennies on their card, they yell Bingo! and win that round. Continue to play until someone gets 2 lines, and then continue once more until someone has a box of pennies around the parameter of the card.

Discussion:

There are many ways that we can contribute positively toward environmental sustainability, as was suggested in this activity. If everyone were to practice such forms of sustainable living, we would face a much brighter future.

1. How many of the actions do you practice in your daily life? Will you practice more of them? Which ones?
2. Why do you think that everyone does not already practice these actions?
3. How will you encourage other people in your life to live more sustainably?

CLIMATE CHANGE – ACTIVITY 5

LIST OF ACTIONS

REFORESTATION

EDUCATION

PUBLIC TRANSIT

WIND POWER

LOCAL FOOD

WALK

COMPOST

CARBON OFFSETTING

ECOSYSTEM CONSERVATION

RECYCLE

ORGANIC PRODUCTS

LESS MEAT CONSUMPTION

BIKE

SOLAR POWER

CARPOOLING

ENERGY-EFFICIENT APPLIANCES

FAN, NOT AIR CONDITIONER

REDUCE CONSUMPTION

TOWELS, NOT PAPER TOWELS

HANG-DRY CLOTHING

VOLUNTEER WITH ENVIRONMENT ORGANIZATIONS

REUSABLE WATER BOTTLE

SECOND-HAND CLOTHING

COMMUNITY SHARED AGRICULTURE

REUSABLE GROCERY BAGS

REDUCE CARBON FOOTPRINT

HANDKERCHIEF, NOT TISSUE

LESS PACKAGING

TRAVEL COFFEE MUG

MADE IN CANADA

CONSERVE OLD GROWTH FOREST

BUY LESS

SPREAD THE WORD

CLIMATE CHANGE – ACTIVITY 5

BINGO CARD

Believe it or Not

AIM: To learn that it is important to ensure the facts that you hear are true.

MATERIALS: Blackboard & chalk, re-used paper and pens for each group

AGES: 12-14

TIME: 30 minutes

Introduction:

There are a lot of people with a lot of opinions out there, and these opinions are often related to the topic of climate change and global warming. As a result, we are sometimes led to believe that an opinion is actually based on fact, yet that may not be the case. It is important to fully understand an issue before forming your own opinions on it and sharing information with others.

Instructions:

Split the group into teams of 2 or 3 and ask them to discuss what climate change is, what global warming is, and what the greenhouse effect is. The groups are to agree upon definitions or descriptions of the three topics and write them down so that their descriptions are not influenced by the other groups' during discussion. Have the groups come together and read the definitions that they have created.

Ex: **Climate Change:** a change in the trends of our weather patterns due to increased levels of greenhouse gases in the atmosphere and includes factors like global warming, changes in sea level, precipitation patterns, etc. **Greenhouse Effect:** when the sun's energy enters the Earth's atmosphere, some is reflected back out to space by things like clouds, snow and ice, and some is absorbed by the Earth and later released as heat. The gases that naturally comprise the Earth's atmosphere trap some of this heat, preventing it from escaping into the atmosphere and warming the planet just enough for organisms (including humans) to thrive. This is known as the greenhouse effect, because the atmospheric gases perform a similar task to the glass windows of a greenhouse. **Global Warming:** growing quantities of greenhouse gases in the atmosphere trap more heat within the atmosphere and warm the Earth's average surface temperature.

Discussion:

If we all ensured that the information we base opinions on and share with others was factually-based, we would avoid rumors and misinformed citizens, and might be better equipped to find solutions to the problems we face.

1. Were the definitions all similar? Where did each group get their information from? Had any of the participants ever researched the scientific processes behind climate change?
2. How often do you believe facts that others tell you without making sure that they are true? Should you automatically believe what others tell you to be true?
3. Have you heard opinions on climate change that were not scientifically-based? How do you feel when you hear these "facts"?

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Glossary

Bias – a particular tendency or inclination, esp. one that prevents unprejudiced consideration of a question; prejudice

Mitigate – to make less severe

Carbon offset – a compensatory measure made by an individual or company for carbon emissions, usually through sponsoring activities or projects which increase carbon dioxide absorption, such as tree planting

Acidification – to make or become acid; convert into an acid

All definitions from Dictionary.com

RENEWABLE ENERGY

Renewable Energy

Energy production allows for long distance transport, provides us light when the sun has gone down, and keeps us warm in the winter. Energy provides the electricity that drives our economy. There are many sources of energy production; some are renewable meaning they will not run out (like wind and solar), while some are some finite or non-renewable, such as oil, coal and natural gas, and will eventually run out. These non-renewable sources contribute large quantities of greenhouse gases to the atmosphere that disrupt the natural structure and function of the Earth's atmosphere, resulting in global climate change. Therefore, it is imperative that we employ the use of clean, renewable energy to ensure continued economic growth and a stable global climate.

SOLAR

Passive solar energy collection ensures optimum use of the sun's energy for indoor temperature regulation and lighting. Strategically placing a home's windows can help regulate temperature and lighting, while concrete, stone or ceramic walls and floors trap and retain heat from the sun in winter and can cool buildings in the summer. Solar photovoltaics produce electricity when the sun's light photons knock a semiconductor's electrons out of their natural orbit into a higher state of energy, creating an electrical current (Ministry of Energy and Infrastructure, 2010b). Initial solar photovoltaic electricity installation is expensive, but the actual production of energy is very cost efficient. Solar thermal energy production involves converting the sun's energy into heat primarily for heating water, such as pools, augmenting hot water heaters and space heating. Thermal walls and surfaces that attract the sun's energy and convert it to heat can also be used for space heating. The sun provides the Earth each day with more energy than we collectively use over a year (EMPR, 2007).

BIOENERGY

Bioenergy provides electricity through the burning of biomass that consists of organic plant matter or animal waste. This process emits far fewer greenhouse gases than non-renewable sources like coal. Additionally, when organic matter decomposes in landfills anaerobically (without oxygen), it releases a gas consisting mostly of methane and CO2 that can be harnessed to produce heat and electricity in a similar way to natural gas (Ministry of Energy and Infrastructure, 2010a). In 2008, the Clover Bar Landfill in Edmonton captured and used 145,297 tonnes of greenhouse gases, or the equivalent emissions of 36,324 cars (The City of Edmonton, 2010). There are problems surrounding the source of collected biomass, including deforestation, food shortages due to use of staple food crops, soil erosion, loss of biodiversity and land-use conflicts (WWF[a]). When conducted in an environmentally and socially sustainable manner, bioenergy production can provide a fairly "green" and renewable source of energy.

RENEWABLE ENERGY BACKGROUND INFORMATION

WIND

Wind turns the blades of large turbines (like a pinwheel) that spin a generator to create electricity. This process generates no greenhouse gases or waste products, and since the wind will never run out (as long as there is sun), it is considered a renewable resource. Each turbine will produce energy approximately 70 percent of the time when strategically placed, so spread over a large geographic area in high quantities, wind can be a fairly consistent source of energy (CanWEA, 2008). Wind power is extremely effective when paired with another source of energy, such as hydro-electric, to account for any variances in wind availability. On average, one wind turbine will produce enough energy to power 750 homes and will prevent 6,000 tonnes of CO2 emissions each year – equivalent to planting 30,000 trees (The Pembina Institute). Roughly 20 percent of the current electricity demand in Canada could be supplied by wind (SAAEP, 2009). Working turbines are relatively quiet, with a noise decibel of a whisper at 300 meters away and allow for normal conversation at their base (CanWEA, 2008).

GEOTHERMAL

The Earth's temperature increases significantly according to depth, and there therefore exists naturally heated water belowground. Geothermal electricity is generated when heated underground water is converted into steam; a process that generates significant pressure that then passes through and spins a turbine that powers a generator and creates electricity. This process produces only a few trace gases (1000-2000 times less CO2 than burning fossil fuels) and steam (WWF[b]). Geothermal heat pumps can be used to passively heat or cool a building by harnessing the differential temperature underground relative to the air by moving heat out of or into the earth. Underground pipes heat water that is moved into the building's furnace system and distributed throughout the building. The system is reversed for cooling (Manitoba Hydro). Harnessing geothermal energy is extremely reliable and cost efficient, yet can be difficult to source. Roughly 90 percent of Iceland's home energy needs are met with geothermal power, with any remaining energy needs satisfied by hydro, making the country 100 percent energy independent (Van Jones, 2008).

HYDRO-ELECTRIC

Hydro-electricity is produced when fast running or falling water spins a turbine that powers a generator to provide electricity. There are two main types of large hydro-electric facilities; one traps large quantities of water behind a dam and releases it as energy is needed, while the other diverts part of a river into a separate channel that runs parallel to the river, called run-of-the-river, which usually has less of an adverse impact on natural systems. Dams can interrupt the natural flow of a river; trap nutrients upstream; prevent wildlife from moving about freely (ex: fish spawning); and large tracts of landscape and habitat can be flooded. It is easy to accommodate variances in electricity demand as the output of energy can be controlled by the level of water released.

FACTS:

- A tonne of organic waste can produce the equivalent amount of bio-gas energy as a barrel of oil (The City of Edmonton, 2010).
- One wind turbine will produce, on average, enough energy to power 750 homes and prevent 6,000 tonnes of CO2 emissions each year - equivalent to planting 30,000 trees (The Pembina Institute).
- Twenty percent of Canada's electricity demand can potentially be supplied by wind (SAAEP, 2009).

Alternative Fuel

More than 90 percent of urban air pollution is attributed to automobile emissions (UNEP). It is therefore important to adopt the use of alternative sources of fuel. Ethanol is a well-known alternative that burns much cleaner than gasoline and is produced through the fermentation of converted starches or sugars found in various plants (primarily wheat and corn in Canada) (Natural Resources Canada, 2009). When gasoline is mixed with 10 percent ethanol made from corn, it releases three to four percent fewer greenhouse gases (Natural Resources Canada, 2009). There are problems surrounding the production and use of ethanol, as it often uses staple food crops to produce the fuel. Biodiesel is made using various oils, including cooking oils, vegetable oils or animal fats, and can be blended with diesel fuel to provide a cleaner-burning product. It can be produced with waste or surplus oils and fats, and therefore does not impact food crop availability. It is also produced using palm oil from plantations that eliminate and replace natural rainforest ecosystems and are therefore severely damaging to the environment. Hybrid-electric vehicles combine a battery-powered motor with an internal combustion engine, and emit a significantly reduced level of greenhouse gases. There are a few other less prominent alternatives that are not yet technologically advanced enough for wide-scale use, such as hydrogen fuel and fuel cells.

Energy Conservation

Overall, the best way to address climate concerns is to practice more responsible energy consumption, for example, by choosing more efficient means of transportation or controlling home energy usage (turning down the heat). Travelling by intercity bus releases 41 times less greenhouse gases than does travelling via large car, while travelling by rail releases 62 times less greenhouse gases (Natural Resources Canada, 2006). Every day choices can have a significant impact on the quantities of energy that needs to be produced.

Sun, Wind, Water, Waste

AIM: To gain an understanding of different sources of alternative energy.

MATERIALS: Pens, re-used paper, printed copy of the Renewable Energy fact sheet, a pair of scissors

AGES: 15-18

TIME: 30-40 minutes

Instructions:

Split the group into 5 teams and give each team 1 informational section from the Renewable Energy fact sheet (ex: solar energy). Each team is to find their own space to read over the information and develop a case for why their source of renewable energy is the best option to replace fossil fuels. Each team will need an opening statement (1 or 2 sentences), a central argument and a closing statement (allow 10-15 minutes).

Teams are to gather together to begin the debate. Each team provides its opening statement, and then the table is opened up to discussion. The facilitator is to act as a moderator to allow for each group to speak with equal opportunity. Groups that wish to speak are to raise their hand and wait for the moderator to select them. After 15-20 minutes of discussion, each team is to present their closing statements. Next, have a discussion as a group about which source of energy is the most feasible in your community.

Discussion:

All of the renewable resources discussed are important alternatives to fossil fuels that can provide adequate energy to fuel our economy and way of life. Each source of energy has its advantages and disadvantages, and it is therefore important to develop all of these options to fully utilize the potential of nature's resources. Different communities have different geographies and climates, so we should produce energy from whichever local resources are available. Certain areas receive fairly constant wind, while some areas receive more consistent sunlight than others. There are areas more suited to geothermal energy production and hydro-electric requires a body of water.

1. Why is it important that we replace fossil fuel use with renewable energy?
2. Why do you think that we are still focusing on fossil fuels to meet our energy needs?
3. What do you think is the biggest obstacle preventing large-scale implementation of renewable energy in Canada?

Renewable Energy Bridge

AIM: To consider how renewable energy would affect your community.

MATERIALS: 20 medium stones roughly equal size, Popsicle sticks, string, glue, paperclips, pipe cleaners, scissors, egg cartons, other craft supplies if available

AGES: 15-18

TIME: 35 minutes

Introduction:

A bridge is strong and reliable and provides an opportunity to overcome an obstacle, such as a river. Renewable energy can provide the opportunity to overcome the extreme obstacle of climate change that we are currently facing.

Instructions:

Split the group into teams of 2. Teams are to utilize the resources available to them to design and create a bridge that will hold up more weight (stones) than their competitors'. The bridge must either cross a space between 2 surfaces, or lift off of the ground in the middle at least 3cm. Give the youth 30 minutes to plan out and build their bridges. After the 30 minutes, halt all building and begin the weight testing. The facilitator is to instruct the teams to add 1 stone to their bridge at a time, pausing 10 seconds between each stone addition. The last bridge standing is the winner of the competition.

Discussion:

It takes a lot of energy and resources to build a bridge, but once it's finished, it opens up the opportunity to explore new places. Likewise, it takes energy and resources to build the infrastructure that supports renewable energy, but once in place, it opens up the opportunity to fuel our communities in a sustainable, ecologically-friendly manner.

1. Imagine your community powered with coal and oil on one side of a bridge, and your same community powered with wind and solar on the other side of the bridge. How would each community differ? (Ex. Consider air and water quality, vehicles, landscape aesthetics, energy infrastructure, layout of buildings and homes, etc.) Which side would you prefer to live on? Why?
2. How can you help to move your community into a renewable energy future? (Ex. Educate others in your community about the benefits of different energy sources; learn about which sources are feasible in your community; write a letter to your local MP expressing your concerns and interests in renewable energy in your area; etc.)

Square it Up

AIM: To look at our consumption patterns and their resulting effects.

MATERIALS: Printed copy of square template, scissors, 7 envelopes

AGES: 12-14, 15-18

TIME: 30 minutes

Instructions:

The facilitator is to cut each square on the template provided into the indicated pieces and place the pieces into 7 envelopes, sorted by letter (ex. all of the A's go in one envelope). Split the group into 7 teams and give each team an envelope. The objective is for each team to form a complete square out of the pieces of paper without talking. Teams can give a piece to another team, but cannot reach out and take 1.

Discussion:

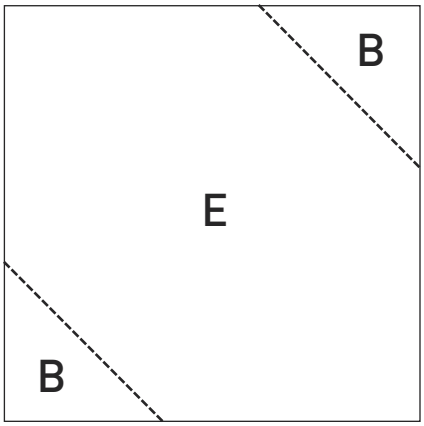
People often tend to be concerned with their individual desires over that which is best for the whole of the population. This may have been evident in the activity if teams were more concerned with constructing their own square instead of working together for the benefit of the group as a whole. This can be likened to our energy consumption patterns, wherein our primary concern lies with fuelling our own consumption desires, so we do not always consider where this energy comes from, whether we are using more than we need to or the impact that this use has on the environment. In this activity, if we had more pieces than we needed, other teams could not meet their needs. It was therefore important to work together to determine how each square was constructed and to share the appropriate pieces. Likewise, we must work together and share resources and ideas to determine which sources of energy are feasible in our communities and bring about new infrastructure while decreasing energy demands.

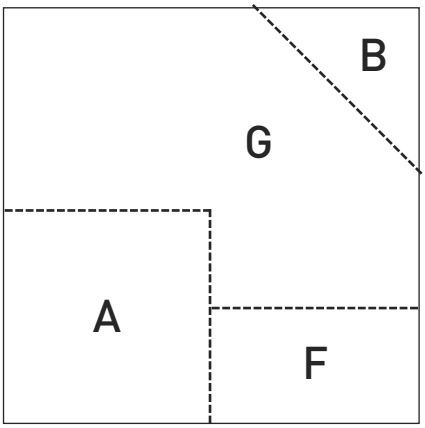
1. Was your objective to complete your team's square or for all of the teams to complete their squares? Was it effective to only be concerned with your own square? Why or not?
2. Is it effective on a global scale to only be concerned with our own, immediate needs? How does this affect people and environments in other parts of the world?
3. Were the square pieces distributed evenly between teams? Are energy resources distributed evenly between countries? Do you think that more people would have access to reliable energy sources if we all switched to renewable sources?

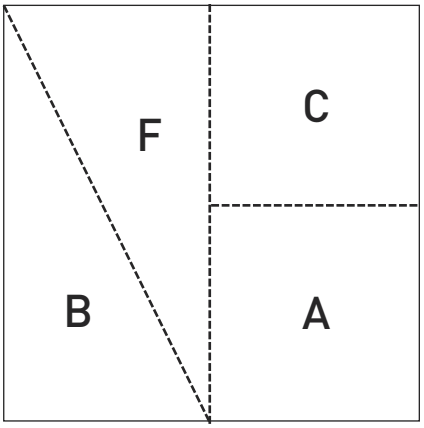
Adapted from: "Getting it Together" Taking the World to Camp, YMCA Canada

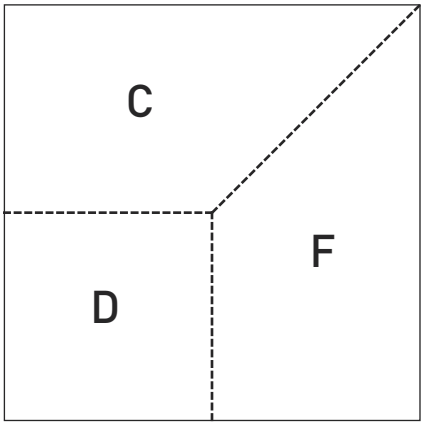
RENEWABLE ENERGY – ACTIVITY 3

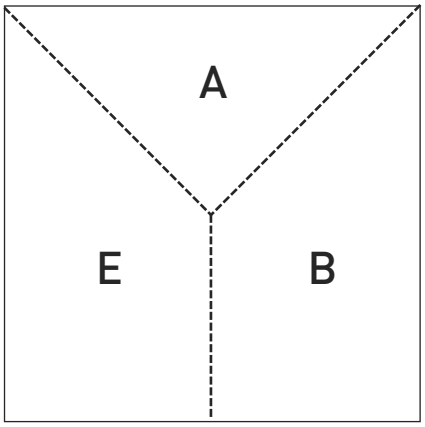
SQUARE TEMPLATE

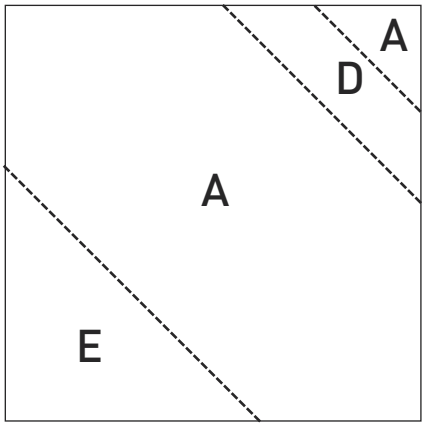


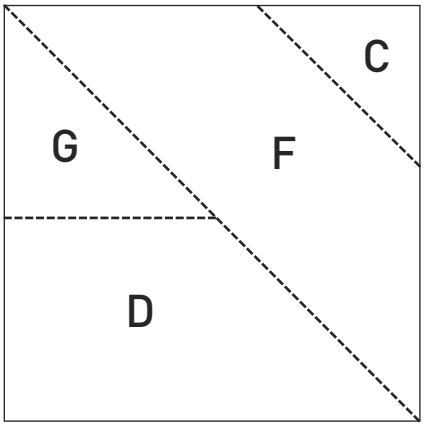












Renewable is Do-able

AIM: To encourage the education of others surrounding renewable energy.

MATERIALS: Large sheets of paper (ex: flipchart), markers, costume clothing (optional)

AGES: 12-14, 15-18

TIME: 60 minutes

Introduction:

Assign teams of 2.

Instructions:

The youth have been hired by a renewable energy organization to design an advertising campaign from a youth's perspective that promotes a renewable energy source (geothermal, wind, hydro-electric, etc.) and its benefits. Teams are to create a poster that highlights their main ideas and messages in a positive light, and should include pleasing visual components. Youth can use the internet or the Renewable Energy fact sheet for information to include on their posters. In addition to their poster, teams can create a television or radio advertisement or a short skit.

Once the youth have finished designing their campaign, have each team present to the group while the facilitators judge whose campaign would be most effective using the Score Sheet provided. You can then display the posters in a main public area so that passersby can benefit from the ideas.

Discussion:

It is important that we educate ourselves and others on the alternatives to non-renewable sources of energy from which we derive the majority of our supply.

1. Do you think that these campaigns would be successful in encouraging the public to advocate renewable energy? Why do you think they would / would not be successful?
2. Why is it important to promote renewable energy in place of sources like coal, oil and natural gas?
3. What renewable energy technologies do you believe could be used to power your community?

RENEWABLE ENERGY – ACTIVITY 4

SCORE SHEET

Poster:

Creativity (How original / creative is the poster?)	____ / 2
Information (Is information relevant? Does it highlight the benefits?)	____ / 1.5
Impact (Would this convince you to use this type of energy?)	____ / 1.5
	____ / 5

Radio/Television Ad:

Creativity (How original / creative is the ad?)	____ / 2
Information (Is information relevant? Does it highlight the benefits?)	____ / 1.5
Impact (Would this convince you to use this type of energy?)	____ / 1.5
	____ / 5

Total Score: ____ / 10

Fun in the Sun

AIM: To enjoy activities that do not require energy consumption.

MATERIALS: Piece of flipchart paper or whiteboard, 3 colours of markers, supplies for outdoor fun (ex: football, soccer ball, Frisbee, skipping ropes, bathing suits, bikes, books or magazines, a picnic, etc.), sunscreen, drinking water, sunglasses

AGES: 12-14, 15-18

TIME: Unlimited

Introduction:

Entertainment can be found in a wide variety of venues and activities, from movies and television to video games to sports to scrapbooking or reading.

Instructions:

Part 1

Have the youth name activities they regularly do for fun and record them on flipchart paper or the whiteboard. Once the activities are listed, circle each one with 1 of 2 colours of marker – 1 colour for activities that use electricity, and 1 colour for activities that do not require electricity. Which category contains more items?

Part 2

Travel to the nearest park or large outdoor space and spend the day doing outdoor activities that require no energy usage, such as throwing a football or baseball, reading, going for a walk or bike ride, canoeing or swimming if available, Frisbee, yoga, skipping, having a picnic, bird watching, building sandcastles, playing soccer, playing cards, painting, etc.

Discussion:

We continue to use ever more energy in our daily activities. Cell phones, iPods, computers, televisions and video games all contribute to our increasing use of energy. There are many other forms of entertainment that allow for us to enjoy the out-of-doors and get some exercise while having fun. These forms of entertainment are environmentally-friendly and do not require energy production or usage, lessening our need for new power supply. As our levels of energy consumption become less, it becomes even more feasible to power our communities with renewable sources.

1. How can you ensure that you spend more time outside and less indoors on the computer or watching television? (Ex. Book club in the park; outdoor sports team; catch with friends; outdoor yoga classes; read outside; gardening; etc.)
2. Why do you think that many people choose to spend their free time / leisure time indoors instead of outdoors?

Energy Jeopardy

AIM: To gain factual knowledge of renewable energy sources.

MATERIALS: Copies of the Renewable Energy fact sheet, 3 desktop bells, blackboard & chalk or whiteboard & marker

AGES: 15-18

TIME: 20 minutes

Introduction:

Distribute the Renewable Energy fact sheet and have the youth read the material. Do not tell them they will be playing Jeopardy.

Instructions:

Collect the fact sheets from the youth, then split the group into 3 teams and designate each team a bell. The facilitator will present the statements on the Jeopardy sheet, and the teams are to answer in typical Jeopardy fashion – hit their bell and answer as a question. If they do not answer with a question, they will automatically lose their turn and the other teams will have the opportunity to ring their bell and answer. Each team will discuss the answer to each question and respond as a single unit. The facilitator is to record the points.

Discussion:

It is important for us to gain a base of reliable facts and knowledge that can be shared with those around us so that we may properly discuss these issues with others. Reliable facts can be quite supportive in convincing another person that your opinions are justified.

1. What is the most interesting fact that you learned during this activity? Will you share it with others to peak their interest in renewable energy? Why or why not?
2. Do you think that we will see Canada switch over to renewable energy as our primary source of energy production in the near future? What specific opportunities or obstacles do you foresee? (Ex. Financial; wide range of landscapes and climates; government approval; community support; etc.)

Jeopardy Questions:

1. Strategically placing a home's windows to help regulate temperature and lighting.
Answer: What is passive solar energy collection?

2. Energy is produced when this substance is collected from landfills and burned.
Answer: What is biogas (gas).

3. The best way to reduce your greenhouse gas emissions.
Answer: What is conserving energy (reducing energy consumption)?

4. A form of energy production that can interrupt the natural flow of a river, trap nutrients upstream, prevent wildlife from moving freely about a river (ex: fish spawning), and can flood large tracts of landscape and habitat.
Answer: What is a hydro-electric dam (dam)?

5. An average wind turbine can supply enough clean energy each year to prevent this amount of CO2 emissions.
Answer: What is 6000 tonnes?

6. More than 90% of urban air pollution is attributed to this cause.
Answer: What are automobile (vehicle, car) emissions?

7. The percentage of electricity demand in Canada that could be supplied by wind.
Answer: What is 20%?

8. Three sources of non-renewable energy.
Answer: What are coal, oil, and natural gas?

9. Heated underground water is converted into steam, a process that generates significant pressure that then passes through and spins a turbine that powers a generator and creates electricity.
Answer: What is geothermal?

10. Two alternative fuel types currently in use today.
Answer: What are biodiesel and ethanol?

11. Travelling by this mode of transportation releases 62 times less greenhouse gases than travelling by large car.
Answer: What is train (rail)?

12. A source of more than a year's worth of energy to the Earth each day.
Answer: What is the sun?

13. This type of vehicle produces significantly less greenhouse gases than conventional vehicles.
Answer: What is a hybrid (hybrid-electric) vehicle?

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Glossary

Biomass – organic matter, esp. plant matter, that can be converted to fuel and is therefore regarded as a potential energy source

Biodiversity – diversity among and within plant and animal species in an environment

Semiconductor – a substance, as silicon or germanium, with electrical conductivity intermediate between that of an insulator and a conductor

Photovoltaics – a field of semiconductor technology involving the direct conversion of electromagnetic radiation as sunlight, into electricity

All definitions from Dictionary.com

URBAN AIR POLLUTION

Urban Air Pollution

Air is a term that refers to the general atmosphere surrounding the earth, composed of oxygen, nitrogen and other trace gases. Air pollution is the result of changes in the ratios or quantities of these gases, or the addition of new elements. It can cause air to become harmful to human health, the structure of the atmosphere and the natural environment. An estimated one billion people are regularly exposed to air pollution (UNEP), which can be largely attributed to:

- Burning fossil fuels
- Industrial pollution
- Energy production
- Consumer choices
- Urban population growth

Urban air pollution is often referred to as smog, which is actually a mixture of toxins in the air that create ground-level ozone, produced mainly from the burning of fossil fuels (Environment Canada, 2007). Health Canada (2006) suggests that air pollution and smog can cause many adverse health effects, including many respiratory and cardiovascular issues. In addition to human health effects, air pollution can cause significant damage to agricultural crops, including spots on leaves, reduced growth, smaller yields and premature death of the plants (Ministry of Agriculture, Food and Rural Affairs, 2009).

Initiatives have been developed worldwide to help reduce the quantity of air pollution being produced and to help mitigate its harmful effects, for example, the Canadian Federal Government's Clean Air Regulatory Agenda sets out a mandatory and enforceable framework wherein industrial sectors will be required to reduce greenhouse gas and air pollutant emissions. Additionally, emissions regulations are being developed for vehicles and fuel, as well as marine, rail and aviation transportation systems (Environment Canada, 2010). The U.S. Environmental Protection Agency (USEPA) has developed national air quality standards for six of the most common air pollutants: ozone, particulate matter (particle pollution), carbon monoxide, nitrogen dioxide, lead and sulfur dioxide (USEPA, 2009). The Clean Air Act was created to help decrease the levels and effects of these pollutants, and its initiatives include reducing levels of the pollutants that cause acid rain and limiting the use of chemicals that can deteriorate the ozone layer (USEPA, 2009). Public education and responsible energy production and consumption are important measures to undertake to improve the quality of the air we breathe.

FACTS:

- Approximately two million premature deaths per year are linked to air pollution (WHO, 2010).
- More than 90 percent of urban air pollution is attributed to automobile emissions (UNEP).
- Agricultural crop losses due to high concentrations of ground-level ozone were valued at $70 million in 2007 (Environment Canada, 2007).

Ozone Depletion

Ozone is naturally produced in the earth's stratosphere and acts to protect the earth from the sun's harmful ultra-violet (UV) rays. It is currently being destroyed due to man-made chemicals and pollutants, such as chlorofluorocarbons (CFCs) and halons. These substances were used in (and sometimes still are used in) items such as fire extinguishers, coolants, aerosol propellants and pesticides. A thinning ozone layer means more UV rays can penetrate the earth's atmosphere, which can increase the instance of immune deficiencies, cataracts and skin cancers, such as melanoma. In addition to adverse human health effects, increased UV radiation can harm crops and crop yields, according to the USEPA (2009). It is also suggested that marine phytoplankton, which form the base of the aquatic food chain, are currently under stress due to increased UV radiation levels (USEPA, 2009). These findings could have direct impacts on the whole aquatic food chain, and consequently on human seafood consumption.

In 1987, the Montreal Protocol on Substances that Deplete the Ozone Layer was adopted to eliminate the production and use of ozone-depleting substances, such as CFCs, at an international level. The 191 Parties who signed and ratified the Montreal Protocol were able to reduce their use of ozone-depleting substances 95 percent by the year 2006 (UNEP, 2007).

Energy Use

Automobiles are Canada's primary source of urban air pollution (Health Canada, 2006). UNEP's Partnership for Clean Fuels and Vehicles stresses that vehicle emissions can have significant adverse effects on human health, the economy, and local, regional and global environments (UNEP, 2010). Our staggering volume of vehicle emissions is largely the result of low fuel quality, inadequate infrastructure, a high volume of older vehicles, and poor maintenance of vehicles (UNEP).

Our homes use large quantities of energy as well, which can be significantly reduced by turning down the heat or air-conditioning, using appliances less often, hanging clothing to dry, improving insulation and heating systems, installing double-paned windows and eliminating drafts around doors and windows. If each household were to make at least some of these changes, the collective impact would be enormous.

The Polluter

AIM: To work together in finding solutions to environmental problems.

MATERIALS: Flashlight

AGES: 12-14

TIME: 10-20 minutes

Introduction:

Activity is to be played in a large, dimly-lit to dark space with multiple places to hide (ideally outdoors).
Note: Caution youth to be careful and not to run as it may be difficult to see hazards.

Instructions:

Hide a flashlight somewhere within the play area. (For an extended version, disassemble a flashlight into 3 pieces [ex. battery, barrel, and lens] and hide the pieces throughout the play area). Select a "Polluter" whose objective is to hide in the dark play area and tag players, making them "sick" from pollution and rendering them inactive and speechless (similar to freeze tag). They can be "healed" by someone other than the polluter tagging them. The players' objective is to find the flashlight and then shine the light on the Polluter, which will force her/him to stop polluting.

The game is finished when all players are sick / frozen, or when the youth shine the flashlight on the Polluter.

Discussion:

When we work together and share ideas we are able to more successfully find and implement solutions to environmental problems like air pollution. In this activity, the solution to the problem of air pollution was finding the flashlight, and the implementation of the solution involved shining the light on the Polluter. Sometimes problems or solutions can be difficult to see (like seeing the Polluter or flashlight in the dark), and we need to work together to identify them.

1. What are some major sources of air pollution?
2. What are some ways to reduce air pollution?
3. How can we encourage polluters to become more eco-friendly?
4. What can you do as an individual to have a positive effect on air quality?

Adapted from: "Grog" Youth Group Games, http://www.jubed.com/

Greenomic Growth

AIM: To understand how energy and economic growth relate to air pollution.

MATERIALS: Printed copy of Greenomic Roles sheet, scissors, hat

AGES: 15-18

TIME: 20 minutes

NOTE: Please print on the back-side of used paper.

Introduction:

Economic growth can be extremely effective in increasing a country's gross domestic product (GDP) and reducing poverty levels, but is often accompanied by increased energy and resource consumption, and in turn, increased pollution and environmental degradation. It is often true that the more money we earn the more material wealth we strive to attain, and the more energy and resources we consume.

Cut the roles into separate strips and place in the hat. Split the youth into teams of 4 or 5.

Instructions:

Each youth selects a role from the hat and breaks off into their team. The teams are to create a skit about how to achieve green economic growth and reduce air pollution (consider, for example: energy production, industrial production, consumerism, etc.) that involves all of the roles that the youth have selected. Each group is to discuss what the viewpoints of each role would be concerning the issue at hand, and then prepare their skit.

Have the youth present their skits to the other groups.

Discussion:

Economic growth can provide new opportunities and increase quality of life for many people, but can also increase energy and resource consumption and cause pollution and environmental degradation. For example, a recent explosion in China's economic growth is resulting in greater energy production and consumption, and increased levels of air pollution. Vehicle ownership is doubling every few years, and Beijing and Northern China's air contains more nitrogen dioxide pollution than anywhere else in the world (ESA, 2005).

1. Were all of the roles able to come to an agreement on how to achieve green economic growth? Why was it difficult to find a solution?
2. How can all members of our society work together to promote economic growth without damaging the environment?
3. How can your consumer choices affect air pollution?

GREENOMIC ROLES:

CAR SALESPERSON

GREEN BUILDING CONSULTANT

COAL MINER

SOLAR ENERGY INVESTOR

TEXTILE FACTORY WORKER

WIND TURBINE MANUFACTURER

MAYOR OF A LARGE CITY

PUBLIC TRANSIT OPERATOR

TEACHER

TAR SANDS WORKER

GREEN BUSINESS OWNER

ENVIRONMENTAL ACTIVIST

NUCLEAR POWER PLANT EMPLOYEE

OWNER OF A RETAIL STORE

Broken Bridge

AIM: To learn from and appreciate the ideas and contributions of others.

MATERIALS: Large wooden boards or paper or mats, various other items (for example: stick, short rope, pylon, rock, etc.)

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

Each rung of the broken bridge represents a source of air pollution. As a team, youth must figure out how to creatively overcome the obstacles to make their way safely across the bridge. At the end of the bridge, the air is clean and the youth will be safe from the pollution.

The facilitator is to lay out a series of flat, wooden boards (or paper or mats) large enough for the group to stand on together. Space the pieces erratically and far enough apart that youth cannot jump from board to board. *Note: You can tape pieces to the floor so they do not slide around when stepped on.*

Instructions:

Youth are presented with 1 source of air pollution at a time, and as a team they must come up with 3 creative, less-polluting alternatives in order to receive an item (ex: a pylon) that may (or may not) aid them in moving to the next rung of the bridge (ex: use pylon to shuffle across the ground). The goal is to cross the entire bridge, 1 rung at a time. They may not repeat the same solutions for each problem. (Examples of sources: industrial chemical plant, commuter car, Alberta tar sands, powering homes (energy creation), coal power plant, SUV, shipping food and goods overseas.) If someone falls off of the bridge (or touches the ground) the team starts over at the beginning.

Discussion:

There are many obstacles to improving urban air quality, so it is important to recognize these obstacles when trying to determine what actions to take and how to implement them. This broken bridge can represent the obstacles we must overcome before we can return to a world where air pollution is not of concern. Working together to cross this bridge is more effective than crossing it alone, because different individuals bring different insights and ideas to a problem. It is therefore important to share our ideas so that we may collectively find solutions.

1. What are 3 ways that you can educate others regarding responsible actions or behaviours that can reduce air pollution?
2. What are 3 daily habits you will try to change so that you can have a more positive effect on air quality?

Follow the Leader?

AIM: To understand the importance of leadership in solving environmental issues.

MATERIALS: None

AGES: 12-14

TIME: 10 minutes

Introduction:

Leaders can present us with new ideas and change the way we look at issues. They can, in turn, influence our actions and choices.

Instructions:

Stand in a circle facing one another. Appoint 1 person to be the detective and send them out of the room. Appoint a leader to lead the group in various actions (stomp feet, clap hands, dance, etc.). Instruct the youth to be discreet about whom the leader is, and not stare at them. Invite the detective back into the room and have her/him stand in the middle of the circle and try to determine who the leader is. The leader is to begin doing various actions, discreetly changing from one action (ex. stomping) to another (ex. clapping). Once the leader has been identified, the leader becomes the detective for the next round.

Discussion:

Each person chooses which path to walk down in life and the values that they live by. Each day presents a series of choices and decisions that reflect personal values, for example, how to travel to work or school or whether to buy organic products. Each individual continually re-evaluates their decisions and values as new information is presented to them. This activity demonstrates that leaders can present new ideas (clapping instead of stomping) and encourage others to reassess the results of their actions (continuing to stomp instead of clap would interrupt the game). Leaders can create change. Encouraging others to make environmentally-conscious decisions and doing the same ourselves can promote change (like by reducing air pollution and having cleaner air to breathe).

1. Is it a good idea to follow what everyone else is doing? If your friends are driving to work/school and over-using their air-conditioner, does that mean you will do the same?
2. What are some actions that you can take to promote change and reduce urban air pollution levels?
3. How will you lead by example in reducing air pollution?

Taking the Time to Care

AIM: To become more effective environmental stewards.

MATERIALS: None

AGES: 12-14, 15-18

TIME: 30-60 minutes

Introduction:

This activity is to be performed outdoors on a clear night away from bright lights or city lights. If you are not able to host the activity at night, an alternative would be to look up at the clouds during the day.

Instructions:

Everyone is to select a spot to lay down on the ground (you can bring blankets or mats if you would like) and look up at the stars (or clouds). Everyone must be close enough together to have a discussion. Take 10 minutes or so to practice conscious relaxation, wherein the facilitator describes one body part at a time to consciously relax, pausing between each part (forehead... eyes... cheeks... mouth... etc.). Think about how each area is relaxing and sinking toward the ground below. Enjoy being relaxed for a few minutes before moving on to the discussion. Next, discuss the stars (clouds) you see and whether you see any constellations (shapes in the clouds). Consider, while looking up at the stars (clouds), what it would be like if there were so much smog or air pollution that we could no longer see them. Discuss each person's feelings regarding air pollution and environmental stewardship.

Discussion:

It is important that we each take time to slow down, relax and allow ourselves to connect with our natural surroundings. If we can appreciate the environment and begin to understand our reliance upon and place within nature, then we will be able to regain our sense of stewardship. After all, without clean air to breathe and clean water to drink, we cannot survive.

1. How can you be a better environmental steward? (Environmental stewardship refers to an ethical approach to environmental sustainability, conservation, management and action.)
2. How does air pollution affect you personally?
3. How will you (or do you) take time each day to relax and connect with nature?

Movie Time

AIM: To understand that change often requires the compliance and cooperation of a number of different parties.

MATERIALS: Television, DVD player, "Who Killed the Electric Car?" DVD

AGES: 15-18

TIME: 1 hour, 32 minutes

Introduction:

"Who Killed the Electric Car?" is a documentary that discusses the creation and roll-out of an electric vehicle by GM, called the EV1. These cars were in great demand and owners spoke highly of their performance. The documentary discusses the decision of GM to recall every vehicle from the entire fleet shortly after they were released.

Instructions:

Make some organic popcorn and enjoy the movie.

Discussion:

1. Do you think that many people in your community would be interested in purchasing an EV1 if it were available?
2. Why do you think that some people choose to drive large vehicles like SUVs over fuel-efficient vehicles and hybrids?
3. What are some alternative methods of transportation other than a car?

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Activity 3

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Glossary

Stratosphere – the region of the upper atmosphere extending upward from the tropopause to about 30 miles (50 km) above the earth, characterized by little vertical change in temperature

CFCs (chlorofluorocarbons) – any of several volatile, inert, saturated compounds of carbon, fluorine, chlorine, and hydrogen: used as refrigerants, foam-blowing agents, solvents, and, formerly, as aerosol propellants until scientists became concerned about depletion of the atmospheric ozone layer

Halons – Any of several compounds consisting of one or two carbon atoms combined with bromine and one or more other halogens. Halons are gases and are used as fire-extinguishing agents. They are between three and ten times more destructive to the ozone layer than CFCs are

Phytoplankton – the aggregate of plants and plantlike organisms in plankton

All definitions from Dictionary.com

DEFORESTATION

Deforestation

Deforestation refers to the complete and permanent removal of trees so that land may be converted for another purpose. It is occurring across the globe at an alarming rate primarily to make way for agriculture and cattle-grazing, and to make way for infrastructure such as roads and buildings. Globally, the equivalent area to 36 football fields is cleared of forest every minute of every day (WWF). When tracts of forest are cleared, habitat is lost and barren corridors can be created that separate previously unified habitat into fragments, which prevents species from moving freely throughout forest areas. Logging is generally more selective in its cutting than deforestation, and can be conducted using sustainable or unsustainable techniques. Logging is performed for a variety of reasons, including supply of raw material for wood and paper products and providing charcoal for fuel.

Rainforests are extremely diverse habitats, home to an estimated 80 percent of the world's documented species (WWF). Sustainably harvesting resources like fruit, nuts, cork, natural oils and resins, spices, latex, rubber, fibers and medicines can help to sustain local communities and excess can potentially be sold on the fair trade market (WWF). Shade-farming (growing crops amongst native trees and vegetation) is a more sustainable alternative to slash-and-burn, monoculture (one single crop) farming, as some forest diversity and habitat can be maintained when crops are planted amongst existent vegetation. Shade-farming maintains soil and water retention and controls soil nutrient levels (Rainforest Alliance, 2010). Additionally, low impact ecotourism activities, like zip-lining, bird watching or hiking, can generate income from intact forests and promote growth in other service sectors, such as restaurants and hotels.

The government of Brazil launched the Amazon Fund in 2008, which aims to raise $20 billion to finance sustainable development and conservation within the country. The objectives of this program are to halt all illegal logging practices and to develop alternative livelihoods for those who rely on deforestation and its by-product industries for a living (Greenpeace USA, 2009). The Nature Conservancy is an example of an organization working toward forest sustainability. It is working to protect extremely diverse rainforest ecosystems through debt-for-nature swaps that relieve some of a developing country's debt to the United States in exchange for long-term preservation of a section of rainforest (The Nature Conservancy, 2010). Another example is the Forest Stewardship Council, which provides an international certification and labeling program that guarantees its forest products are derived from well-managed forests and recycled material (FSC Canada, 1996).

FACTS:

- Only approximately seven percent of Earth's dry land area is covered by tropical forests, but it is assumed that they are home to half of Earth's species (NASA Earth Observatory, 2007).
- Approximately 20 percent of global greenhouse gas emissions are attributed to deforestation (Natural Resources Canada, 2009).
- Nearly 80 percent of the planet's forest cover has been degraded or completely eliminated (Greenpeace Canada, 2006).
- The cattle sector (beef and leather production) is responsible for approximately 80 percent of all deforestation that occurs in the Brazilian Amazon region; that's one acre every eight seconds (Greenpeace USA, 2009).

Ghana: Agro-forestry

Sustained agricultural production and local wood supply are threatened in many areas of Ghana due to rapid deforestation. YMCA Ghana designed a project in 1995 to help alleviate environmental degradation resultant of rapid deforestation. The project aimed to address these issues while conserving the soil integrity, protecting the country's ecology and improving the local economy by raising the output of the farmers. The project educated people on the negative impacts of deforestation and the importance of planting trees to rehabilitate and preserve the environment. Additionally, it aimed to establish a central nursery to grow and distribute seedlings to communities; to promote and support tree-growing as an occupation; to create a 96-hectare woodland; and to plant 240 fruit trees. Over five years, 300 farmers cultivated 650 hectares of tree farms.

(Information from YMCA World: YMCAs and the Environment 2007)

Climate Change & Deforestation

Globally, approximately 13 million hectares of forest are cleared annually, accounting for around 20 percent of global greenhouse gas emissions (Natural Resources Canada, 2009). The Amazon rainforest alone is estimated to house 80-120 billion tonnes of carbon (Greenpeace USA, 2009). Trees take in carbon dioxide through photosynthesis, then store the carbon and release the oxygen into the atmosphere as a "waste" product. Therefore, forest vegetation contains massive quantities of carbon, and when vegetation is slash-and-burned, that carbon is released into the atmosphere, fuelling climate change. Additionally, forests remove significant quantities of carbon dioxide (a greenhouse gas) from the air. Consequently, forests play an important role in controlling our global climate.

Forest Machines

AIM: To consider which actions can result in forest conservation or deforestation.

MATERIALS: None

AGES: 12-14

TIME: 15 minutes

Introduction:

The youth will be creating 2 machines: a Forest-Harvesting machine and a Forest-Conservation-Regeneration machine.

Instructions:

The youth are to build the machines using their bodies and voices. Each person will form a different part of the machine. One at a time, each youth is to come up with 1 motion or action and 1 complimentary sound or phrase and continually repeat it. Each part of the machine is to somehow physically connect to another (the actions do not need to be related to be connected).

Someone will start the Forest-Harvesting machine by deciding on an action and sound related to forest-harvesting or the use of a forest product (ex: moving a power saw back and forth and repeating, "Zzmmm, zzmmm", or yanking off a paper towel and saying, "Oops, spilled something"). One at a time, youth perform their action / sound and connect to the machine. Once all youth are connected, call freeze and determine what each action is and whether there are any connections between the actions (logging for pulp & paper, using a paper towel).

Repeat this activity to build the Forest-Conservation-Regeneration machine. Youth are to perform actions that preserve or conserve forest products (pointing to something imaginary in your hand and saying, "I have my own bag, thanks!").

Discussion:

These machines can represent actions that could be happening to any forest anywhere in the world. Consider how many different actions were involved in both destroying and conserving the forest.

1. How did the 2 machines look and sound different? How did they each make you feel?
2. Which machine would you rather have in your backyard? Why?
3. How can you act more like the Conservation machine in your daily life?

Adapted from: "The Forest Machine" How To's of Global Education: Training Manual for Educators. YMCA Canada

Chain Reaction

AIM: To understand how our actions can affect rates of deforestation.

MATERIALS: Paper, printer

AGES: 15-18

TIME: 15 minutes

Introduction:

Print and cut out each chain reaction square. Keep a copy of the numbered order of the chain reactions handy for reference.

Instructions:

Give each participant 2 (or more) random chain reaction cards. As a group, youth must find the connections between their cards and determine how to form the full chains of events. A few of the cards are interchangeable and can be used in multiple chains. (For a younger group, complete 1 chain reaction at a time).

Discussion:

It is important for us to understand that our choices and actions can have effects both here and in other parts of the world, like in the Boreal forest in Canada or in the rainforest in Indonesia. Our actions can affect a person, community or ecosystem in another country and it is important to consider these consequences and reshape our habits to have more positive impacts wherever possible.

1. Were you surprised by some of the effects that were caused by an action that you might perform?
2. How can you change the events in each sequence to create a more positive outcome?
3. What activities could you change in your daily life to improve your impact on forest resources?

Adapted from: "Chain Reactions" YMCA Peace Building Activity Guide 2007

DEFORESTATION – ACTIVITY 2

CHAIN REACTION 1	CHAIN REACTION 2	CHAIN REACTION 3
You spill your whole bowl of soup on the floor.	You eat fast food hamburgers 3 times a week.	Your family wants to move from a condo to a big house in the suburbs.
You use 8 paper towels to clean up your soup.	The fast food restaurant increases its demand for cheap beef.	A large section of forest is cleared to create new roads and big suburban houses.
Old growth forest in Alberta is cut down to provide raw material for paper towel production.	A large section of rainforest is cut down and burned to create pasture for cattle-grazing.	Additional habitat is cleared to expand roads into the city for commuters.
Birds and mammals lose their habitat and their homes when the forest is cut down.	Large quantities of carbon dioxide are released into the air from the burning trees.	All of the animals that live in the newly cleared forest lose their homes and must find new ones.
Energy from a coal plant is used to turn the wood from the forest into paper towel, which releases CO2 (carbon dioxide) into the air.	Carbon dioxide in the atmosphere traps more of the sun's energy and warms the earth.	Now that the forest is cleared, there are fewer trees to clean the air.
Carbon dioxide in the atmosphere traps more of the sun's energy and warms the earth.	More of the sun's energy trapped in the atmosphere affects global weather patterns.	People drive further to get to work each day and the gasoline used contributes to global warming.
More of the sun's energy trapped in the atmosphere affects global weather patterns.	The rains have failed and there is drought in Ethiopia.	Fewer trees and more people driving their cars long distances results in smog.
In Honduras, a family hears on the radio that a hurricane is coming.	The drought causes crop failure for local farmers and a community does not have enough food.	A runner experiences respiratory problems.
The family gathers their possessions and relocates inland.	The community is forced to rely on foreign food aid.	

Chain Reactions Answers:

1. You spill your whole bowl of soup on the floor.
2. You use 8 paper towels to clean up your soup.
3. Old growth forest in Alberta is cut down to provide raw material for paper towel production.
4. Birds and mammals lose their habitat and their homes when forest is cut down.
5. Energy from a coal plant is used to turn the wood from the forest into paper towel, which releases CO2 (carbon dioxide) into the air.
6. Carbon dioxide in the atmosphere traps more of the sun's energy and warms the earth.
7. More of the sun's energy trapped in the atmosphere affects global weather patterns.
8. In Honduras, a family hears on the radio that a hurricane is coming.
9. The family gathers their possessions and relocates inland.

1. You eat fast food hamburgers 3 times a week.
2. The fast food restaurant increases its demand for cheap beef.
3. A large section of rainforest is cut down and burned to create pasture for cattle-grazing.
4. Large quantities of carbon dioxide are released into the air from the burning trees.
5. Carbon dioxide in the atmosphere traps more of the sun's energy and warms the earth.
6. More of the sun's energy trapped in the atmosphere affects global weather patterns.
7. The rains have failed and there is drought in Ethiopia.
8. The drought causes crop failure for local farmers and a community does not have enough food.
9. The community is forced to rely on foreign food aid.

1. Your family wants to move from a condo to a big house in the suburbs.
2. A large section of forest is cleared to create new roads and big suburban houses.
3. Additional habitat is cleared to expand roads into the city for commuters.
4. All of the animals that live in the newly cleared forest lose their homes and must find new ones.
5. Now that the forest is cleared, there are fewer trees to clean the air.
6. People drive further to get to work each day and the gasoline used contributes to global warming.
7. Fewer trees and more people driving their cars long distances results in smog.
8. A runner experiences respiratory problems.

Eco-Web

AIM: To understand how deforestation can affect an entire ecosystem.

MATERIALS: Ball of yarn or string, scrap paper, markers, scissors, safety pins

AGES: 12-14

TIME: 10 minutes

Instructions:

Each participant selects a different component of a tropical rainforest ecosystem to represent. (Or the facilitator can assign roles). Examples include: soil, bedrock (which may contain minerals like gold), sun, rain, groundwater, flowers, trees (which produce fruit and nuts), insects, bats, birds, monkeys, snakes, tigers, indigenous persons, local farmers (who practice small-scale cultivation), etc. Youth should each make a small nametag so everyone can remember who is who (someone must represent a tree).

Next, stand in a circle facing each other and throw the ball of yarn/string to someone. Ask that person to identify someone else they are ecologically connected to, and try to describe of all of the ways in which they are connected. That person then hangs on to the end of the string and throws the ball to the next person, solidifying their connection. The next person continues the trend until a web is created with the string. Simulate an episode of deforestation by removing any trees from the circle, having them cut their strings. Anyone who is affected by the cut strings must also cut their strings (and so on) causing a chain reaction of affected ecosystem components.

Discussion:

The different components of the rainforest are elaborately connected as was demonstrated by the web of string. Each component of the forest ecosystem is dependant upon many other components for survival. Deforestation removes the vegetation upon which the whole system is reliant.

1. What happened when the tree was removed?
2. Why does deforestation happen in the rainforest?
3. How would human communities that live near the rainforest be impacted? (Ex: Loss of wood for shelter, fruit and nuts for food; loss of biodiversity)
4. Consider that the vast majority of nutrients in a rainforest are in the vegetation, and there is only a very thin layer of fertile soil. Does it make sense to clear rainforest for agriculture?
5. How can we protect the fragility of these ecosystems?

Adapted from: "Web of Life 2 - Rainforest" Peace Building Activity Guide 2004

Forest or Farm

AIM: To understand the economic implications of deforestation.

MATERIALS: None

AGES: 15-18

TIME: 30 minutes

Introduction:

You live in a small community in rural Indonesia near a lush forest. For decades your village has been using the forest resources for fuel, building materials, food items and medicinal plants. Your community has established 2 small-scale industries: producing hand-made wooden art and guiding eco-tours through the forest. The people in your community make a very modest income but are ensured long-term sustenance from the forest.

A lumber company offers your community a large, one-time financial deal in exchange for permission to clear-cut lumber from the forest near your community to be sold on the international market. They will employ your community members and have offered to burn off the remaining brush to create land for short-term agriculture or cattle grazing which will provide income to the farmers. What do you do? Do you accept the offer from the lumber company?

Instructions:

Have a round-table group discussion on what you, a rural community in Indonesia, would decide: maintain your extremely modest lifestyle and ensure long-term sustainability of forest resources or destroy the forest resources and experience a large, short-term financial boost for you and your community.

Discussion:

Improved financial situations, even if only short-term, can be extremely tempting for small, rural communities like the one in this example. The long-term effects of clearing a forest can be devastating for communities after lumber companies have left and the community must sustain itself on degraded land. The soil often loses nutrients when vegetation is cleared and agriculture cannot be sustained on the land.

1. Was there an obvious "right" decision in your mind?
2. Why do you think that it would be difficult for citizens in communities like this one to make such a decision?
3. How can we help to ensure that the world's forests stay intact?

Apples or Bananas

AIM: To understand how our consumer choices can affect deforestation rates.

MATERIALS: Printer, one-sided paper

AGES: 15-18

TIME: 20 minutes

Introduction:

The choices that we make each day as consumers can have significant impacts on deforestation rates. Consciously selecting products that have been manufactured in a sustainable manner and that are sourced from areas that do not promote deforestation can help to preserve the world's forest ecosystems.

Print out a copy of the "Consumption Issues" handout and cut into strips along the dotted lines.

Instructions:

Divide the group into 5 teams and hand out 1 strip to each team. (If your group is not large enough for 5 teams, select only a few of the scenarios to discuss.) Allow the teams time to discuss the problem presented to them and come up with ways that they can modify their consumer choices to have more positive effects on forests.

Have teams come together to share their consumption issue scenarios and their ideas on how to make more responsible choices and have more positive effects on forests.

Discussion:

Each of the scenarios presented in this activity involved uninformed consumer choices that fuelled destruction of forests in some way.

1. How many of the items discussed do you purchase regularly?
2. Did you know how these items influence deforestation rates and the environment?
3. How would your life change if you were to practice all of the sustainable ideas presented in this activity?
4. How will you change your views and consumption habits as a result of this activity?

Adapted from: "Issues, Rights and Responsibilities" YMCA Peace Building Activity Guide 2006

Consumption Issues

Toilet Paper

A. Toilet paper is made from freshly cut trees whose pulp is bleached, usually with chlorine that is harmful to the environment. Using this type of toilet paper is like taking a living tree, grinding it up and flushing it down the toilet.

B. There are many companies that are now making toilet paper from recycled newsprint and fine paper. Almost 48,000 trees could be saved each year if every Canadian replaced one roll of toilet paper with one roll made from recycled paper.

Bananas

A. Bananas constitute ¼ of all the fruit we eat in Canada. Due to such high global demand for bananas, large areas of rainforest have been cut down to clear land for huge banana plantations. These plantations use vast quantities of chemical pesticides that are dangerous for the workers and for the environment. This is especially problematic when the plantations are in the rainforest, as pesticide residue can spread to surrounding vegetation and disrupt the balance of the ecosystem. Transportation of the bananas over long distances contributes to air pollution and global warming.

B. Many Canadian grocery stores are now stocking organic and fair trade bananas in their produce department. These bananas are produced without pesticides by workers who are paid fair wages and are treated well. Some Canadians try to reduce the air pollution associated with transportation by purchasing locally-sourced products, like apples and pears, that don't need to travel as far to reach their table.

Books

A. Many books are made of paper that comes from the planet's old-growth forests. Nearly 80% of the world's original forest cover has been degraded or completely destroyed. These forests allow for life on Earth to thrive, influencing weather, climate, air quality and freshwater resources. The existence of many of the plants, animals and humans that live in these forests are threatened by deforestation.

B. There are companies that choose to manufacture their books out of ancient forest-friendly paper. Raincoast Books, for example, printed the Canadian edition of Harry Potter and the Order of the Phoenix on 100% recycled and chlorine-free paper. This process conserves water, creates less waste, uses less electricity, reduces greenhouse gas emissions and, of course, saves trees. So far, 35 leading Canadian book publishers have committed to not using paper made from ancient or endangered forests.

DEFORESTATION – ACTIVITY 5

Fast Food

A. The chickens used in many fast food chains across Europe are fattened-up using feed that includes soybean products that have been grown on newly deforested sections of the Amazon rainforest (Greenpeace USA, 2006). Approximately 70% of soybeans produced globally are used to produce meal for livestock consumption (Earth Policy Institute, 2010). If demand continues to increase for fast food and supermarket meat products, Brazilian farmers will likely continue to clear tropical Amazon rainforest for agriculture.

B. In 2006, Greenpeace was successful in convincing McDonald's to stop using soybeans grown on newly deforested Amazon rainforest land for fast food chicken feed (Greenpeace USA, 2006). Organizations like The Nature Conservancy provide protection for these areas of extreme biodiversity. Their debt-for-nature swaps relieve some of a developing country's debt to the United States in exchange for long-term preservation of a section of rainforest (The Nature Conservancy, 2010).

Cattle

A. The cattle sector (beef and leather production) is responsible for approximately 80% of all deforestation that occurs in the Brazilian Amazon region; that's 1 acre every 8 seconds, and 14% of global annual deforestation (Greenpeace USA, 2006). This means that the cattle sector is the largest driver of deforestation in the world, and Brazil has the world's largest export of beef (Greenpeace USA, 2006).

B. Some Canadians choose to purchase only Canadian-grown beef and leather products. It is important to ensure that we are not purchasing these products from areas that have used newly deforested land. The government of Brazil launched the Amazon Fund in 2008, which aims to raise $20 billion to finance sustainable development and conservation, specifically by developing alternative livelihoods for farmers and loggers and halting illegal logging (Greenpeace USA, 2006).

Adapted from: "Sharing the Harvest" Citizen and Immigration Canada, http://dsp-psd.pwgsc.gc.ca/Collection/CI1-10-2005E.pdf
Toilet paper, bananas and book sections' content was sourced from the above document, and can be referenced as such.

Leaf the Forests Alone

AIM: To consider the actions each of us can take as individuals to slow or halt deforestation.

MATERIALS: Markers, paper, scissors, printer

AGES: 12-14

TIME: 30 minutes

Introduction:

Using the leaf template, print and cut out 1 leaf per youth.

Instructions:

Each participant is to write at least 1 thing on their leaf that they will do to help preserve and protect the world's forests. Encourage the youth to decorate the leaves. You can display the leaves in a prominent area so passersby can benefit from the ideas, or youth can take them home to remind them of their commitments.

Discussion:

It is important to not only understand how we can help to conserve and protect forest ecosystems, but to commit to and follow through with actions that will allow each of us to make a difference in whichever ways we see fit.

1. Why did you choose the action(s) that you did to conserve the rainforest? Was it because it's easy to do? Was it because you feel that this action will have the most significant impact?
2. Will you lead by example and encourage other people in your life to perform this action as well?
3. What do you think the impact would be if everyone in Canada were to perform the same action that you chose to? What about every person in the world?

DEFORESTATION – ACTIVITY 6

LEAF TEMPLATE

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Glossary

Habitat – the natural environment of an organism; place that is natural for the life and growth of an organism

Degrade – to become degraded; weaken or worsen; deteriorate

Monoculture – the use of land for growing only one type of crop

Slash-and-burn – of a method of agriculture used in the tropics, in which forest vegetation is felled and burned, the land is cropped for a few years, then the forest is allowed to reinvade

Photosynthesis – (esp. in plants) the synthesis of complex organic materials, esp. carbohydrates, from carbon dioxide, water, and inorganic salts, using sunlight as the source of energy and with the aid of chlorophyll and associated pigments.

All definitions from Dictionary.com

DESERTIFICATION

Desertification

Desertification refers to the loss of a dryland ecosystem's biological productivity through severe degradation, primarily due to poor land use practices and changes in climate. Roughly 41 percent of the Earth's land area is covered by dryland ecosystems; 10 to 20 percent of which have already been degraded (Green Facts, 2009), and around 43 million hectares are currently undergoing some sort of degradation (Addis A, 2008). Considering that it can take 500 years to form just 2.5cm of soil, it is of concern that over the past 40 years, erosion has caused almost 1/3 of global cropland to become unproductive and, consequently, abandoned (UNEP, 2006). Dryland ecosystems are home to approximately two billion people and supply a large portion of the human population with food, water, fuel, building materials and many other commodities. Desertification generally coincides with a reduction in the quantity of arable (farmable) land, and thus a reduction in food production and availability. Desertification, therefore, has negative implications such as poverty, loss of income, chronic hunger and freshwater scarcity.

The causes of desertification are many and wide-ranging. Population growth influences our land-use practices and places pressure on resource productivity and supply-versus-demand capacity, demanding more from ecosystems than they can sustainably supply. Unsustainable agricultural and land-use practices can fuel desertification, for example: converting land from a diverse, functional ecosystem, like a forest, to non-native grassland for cattle grazing; over-grazing of land; not rotating crops; overdrawing of groundwater; clearing land for mining; or diverting streams and rivers to suit human consumption needs. Hotter, drier climatic conditions can cause droughts and intensify or expand the area at risk of desertification to more northern latitudes.

Preventing desertification from occurring to begin with is easier than restoring it later (UNEP, 2006). The United Nations declared 2010 the beginning of the United Nations Decade for Deserts and the Fight Against Desertification, which aims to raise international awareness and action surrounding the issues of drought, desertification, poverty and climate change. The United Nations Environment Programme promotes reforestation to increase the fertility of land and minimize the loss of soil nutrients (SOS Children's Villages Canada, 2010). The Canadian International Development Agency (CIDA) focuses on reducing poverty through sustainable land management, specifically by providing proper training, technical assistance and modest equipment investments (CIDA, 2009). CIDA also supports community-based initiatives, such as education on better grazing and tillage practices to preserve vegetation and topsoil; tree planting to slow erosion and provide communities with income, food, timber and fuel; sustainable methods of irrigation to restore productivity of soil; and identifying the areas that are at highest risk of desertification through environmental monitoring (CIDA, 2009).

FACTS:

- Each year, 351,000 hectares of land in Africa are converted to desert due to over-grazing and over-cultivating (Economic Commission for Africa).
- Between 10 and 20 percent of the Earth's dryland ecosystems have already been degraded (Green Facts, 2009).
- Desertification impacts 1/3 of Earth's surface area and over one billion individuals (IYDD).

Poverty & Environment

"Improved management of the environment and natural resources contributes directly to poverty reduction..." (UNPEI, 2009). An estimated 800 million to one billion of the world's poorest rural people live in arid regions and rely on natural resources, like fields, waterways and forests, for their livelihood (UNDP, 2004). These resources, if sustained over the long-term, can provide a base of assets that can present the opportunity for poor individuals to build wealth and make their way out of severe poverty (WRI, 2005). Improved local resource management can increase the productivity of ecosystems, and when paired with strengthened rights of ownership and control over resources, impoverished people can use this yield as increased income and experience better nutrition and health. Over 1.3 billion people depend on agriculture, fisheries and forest resources for employment, so it is imperative that they be managed well (WRI, 2005).

Soil Salinization

Globally, salinity (saltiness) is one of the most significant causes of soil degradation and desertification, affecting approximately one billion hectares of land (European Commission, 2010). Soil salinization occurs when soils accumulate excessive quantities of soluble (dissolvable) salts causing a reduction in soil fertility. Salinization prevents plants or crops from taking up water, which can prevent growth or can result in death. Salinization is caused by one of two processes: natural accumulation or human-influenced accumulation. Natural accumulation can result from high salt content in groundwater or natural soils, and usually occurs in regions where there are low levels of rainfall and high levels of evaporation, as the salts are not washed out of the soil and they accumulate (European Commission, 2010). Human-influenced accumulation can result from poor irrigation practices like using salt-rich water for irrigation or having insufficient drainage (European Commission, 2010).

Eroding Landscapes

AIM: To understand the process and effects of erosion.

MATERIALS: Shovel, 2 plastic juice jugs, scissors, bucket

AGES: 12-14

TIME: 40 minutes

Introduction:

The roots of vegetation are responsible for holding soil in place, so removing vegetation from an area (for example deforesting land for agriculture) can degrade the land and result in erosion and desertification. Erosion is occurring all over the world, primarily due to poor land management and agricultural practices, and poses a major threat to local and global food supplies. Ethiopia, for example, loses about 2 billion tonnes of soil each year to erosion, and the country's land is 70% desertified (UNV, 2008).

Cut the top half off of 2 plastic juice containers.

Instructions:

On a grassy slope, carefully clear a 1 square-foot area of all vegetation, including roots. Place 1 of the juice jugs at the bottom of the cleared space with the opening facing up and so the side of the jug is flush with the ground. Place the other juice jug below an area of grass that has not been cleared. Pour water down the hill over both the cleared space and the space with its vegetation still intact. Compare the amount of soil that has been washed into each jug. Try to replace any vegetation that has been cleared.

Discussion:

Vegetation keeps soil structure intact so that it does not erode away. When we remove the vegetation, it is much easier for the soil to be washed away by rain or blown away by wind. Considering that it can take 500 years to form just 2.5cm of soil, it is of concern that over the past 40 years erosion has caused almost 1/3 of global cropland to become unproductive and consequently abandoned (UNEP, 2006).

1. What types of activities could result in erosion?
2. Consider the differences between preventing erosion and addressing erosion after land has been affected. Which is easier?
3. Have you seen any signs of erosion in your community?
4. What can you do to help prevent erosion?

Adapted from: "Soil Erosion Experiment" Mother Earth: Our Food Our Home. YMCA Canada

Do You See What I See?

AIM: To understand that we each have different perspectives on environmental issues.

MATERIALS: A copy of "The Blind Men and the Elephant"

AGES: 12-14, 15-18

TIME: 20 minutes

Instructions:

Host a discussion on what the term "to see" means to each participant.

Read the Indian story, "The Blind Men and the Elephant" to the youth.

Discussion:

Even when presented with the real elephant, each man only "saw" what he had previously believed to be the truth. These men were blinded by their points of view, which prevented them from learning from each other. In order to become effective in solving complex environmental problems that involve many different parties and perspectives, like desertification, we must be open-minded and allow ourselves to learn from one another.

Consider these possible perspectives regarding a rainforest: impoverished individuals in a developing community neighbouring a rainforest believe that the best way to provide immediate income is to clear the forest and grow a cash crop, like coffee. Different individuals of that community insist that the best way for the community to ensure long-term income and sustenance is to preserve the forest and harvest its resources sustainably. An environmental organization is convinced that leaving the rainforest as is, is imperative in preventing desertification of the land. A foreign lumber company convinces the government that extracting the valuable lumber and selling it on the international market is the best way to raise the country's Gross Domestic Product (GDP). A foreign investor might claim that clearing the forest to build expensive condominium buildings for tourists will boost the economy and create lots of new jobs. What is the best choice?

1. How would you approach this issue? How would you decide who is right and what actions to take?
2. Were you able to understand the reasons behind each point of view in both of these scenarios?
3. If the men in the Indian story were not blind, would they still have different ideas about what elephants are?

Adapted from: "Blind Men and the Elephant" YMCA Peace Building Activity Guide 2006

Blind Men and the Elephant

Long ago six old men lived in a village in India. Each was born blind. The other villagers loved the old men and kept them away from harm. Since the blind men could not see the world for themselves, they had to imagine many of its wonders. They listened carefully to the stories told by travelers to learn what they could about life outside the village.

The men were curious about many of the stories they heard, but they were most curious about elephants. They were told that elephants could trample forests, carry huge burdens, and frighten young and old with their loud trumpet calls. But they also knew that the Rajah's daughter rode an elephant when she traveled in her father's kingdom. Would the Rajah let his daughter get near such a dangerous creature?

The old men argued day and night about elephants. "An elephant must be a powerful giant," claimed the first blind man. He had heard stories about elephants being used to clear forests and build roads.

"No, you must be wrong," argued the second blind man. "An elephant must be graceful and gentle if a princess is to ride on its back."

"You're wrong! I have heard that an elephant can pierce a man's heart with its terrible horn," said the third blind man.

"Please," said the fourth blind man. "You are all mistaken. An elephant is nothing more than a large sort of cow. You know how people exaggerate."

"I am sure that an elephant is something magical," said the fifth blind man. "That would explain why the Rajah's daughter can travel safely throughout the kingdom."

"I don't believe elephants exist at all," declared the sixth blind man. "I think we are the victims of a cruel joke."

Finally, the villagers grew tired of all the arguments, and they arranged for the curious men to visit the palace of the Rajah to learn the truth about elephants. A young boy from their village was selected to guide the blind men on their journey. The smallest man put his hand on the boy's shoulder. The second blind man put his hand on his friend's shoulder, and so on until all six men were ready to walk safely behind the boy who would lead them to the Rajah's magnificent palace.

When the blind men reached the palace, they were greeted by an old friend from their village who worked as a gardener on the palace grounds. Their friend led them to the courtyard. There stood an elephant. The blind men stepped forward to touch the creature that was the subject of so many arguments.

The first blind man reached out and touched the side of the huge animal. "An elephant is smooth and solid like a wall!" he declared. "It must be very powerful."

The second blind man put his hand on the elephant's limber trunk. "An elephant is like a giant snake," he announced.

The third man felt the elephant's pointed tusk. "I was right," he decided. "This creature is as sharp as a deadly spear."

The fourth blind man touched one of the elephant's four legs. "What we have here," he said, "is an extremely large cow." The fifth blind man felt the elephant's giant ear. "I believe an elephant is like a huge fan or maybe a magic carpet that can fly over mountains and treetops," he said.

The sixth blind man gave a tug on the elephant's fuzzy tail. "Why, this is nothing more than a piece of old rope. Dangerous, indeed," he scoffed.

The gardener led his friends to the shade of a tree. "Sit here and rest for the long journey home," he said. "I will bring you some water to drink."

While they waited, the six blind men talked about the elephant.

DESERTIFICATION – ACTIVITY 2

"An elephant is like a wall," said the first blind man. "Surely we can finally agree on that."
"A wall? An elephant is a giant snake!" answered the second blind man.
"It's a spear, I tell you," insisted the third blind man.
"I'm certain it's a giant cow," said the fourth blind man.
"Magic carpet. There's no doubt," said the fifth blind man.
"Don't you see?" pleaded the sixth blind man. "Someone used a rope to trick us."
Their argument continued and their shouts grew louder and louder.
"Wall!" "Snake!" "Spear!" "Cow!" "Carpet!" "Rope!"
"STOP SHOUTING!" called a very angry voice.
It was the Rajah, awakened from his nap by the noisy argument.
"How can each of you be so certain that you are right?" asked the ruler.

The six blind men considered the question. And then, knowing the Rajah to be a very wise man, they decided to say nothing at all.

"The elephant is a very large animal," said the Rajah kindly. "Each man touched only one part. Perhaps if you put the parts together, you will see the truth. Now let me finish my nap in peace.

When their friend returned to the garden with the cool water, the six men rested quietly in the shade, thinking about the Rajah's advice.

"He is right," said the first blind man. "To learn the truth, we must put all the parts together. Let's discuss this on the journey home."

The first blind man put his hand on the shoulder of the young boy who would guide them home. The second blind man put a hand on his friend's shoulder, and so on until all six men were ready to travel together.

Source: "Blind Men and the Elephant" YMCA Peace Building Activity Guide 2006

Deserted Land

AIM: To introduce some causes of desertification and their affect on farmers.

MATERIALS: Chalk, paved outdoor space

AGES: 15-18

TIME: 30 minutes

Introduction:

Mark out 1 square (or plot of land) per youth on the ground with chalk, plus 1 additional plot.

Instructions:

Each farmer (youth) is to choose a plot of land to farm. They can make farming actions, such as hoeing, ploughing or planting. Designate all famers except 1 to be impoverished farmers who use marginal land (hillsides, drought area, flood plains, coastal areas). The remaining farmer is rich, and sets aside a small plot of land on her/his estate that she/he will rent out to other farmers (the extra plot).

One at a time, the farmers lose their land due to desertification. One farmer clears forest to grow crops, but takes the soil nutrients away with the forest. That farmer must now rent land from the rich farmer. Another farmer's land is on a steep hillside and rain causes the soil to erode away. That farmer now rents land as well. Another farmer's land is in a drought area, so she/he irrigates with local saline (salty) water that causes salinisation of the land, making the soil too salty to grow crops. That farmer now rents land. Another farmer over-grazes cattle on their land and another leaches crucial nutrients from the land by growing the same single crop every year. They both now rent land. The farmers crowd onto the rich farmer's small plot because no other land is available, but the plot, cannot produce enough food for all of the families so the farmers must find other work.

Discussion:

There are many causes of desertification, and most can be attributed to poor land-use practices (clearing land, salinisation, not planting a variety of crops to restore nutrients to the soil, over-grazing, etc.) and climate changes (drought, natural disasters, etc.). Desertification can have negative effects on farmers and communities relying on the productivity of the land.

1. How did you feel renting and sharing such a small plot of land?
2. What are some of the causes of desertification?
3. How can we prevent desertification so that farmers can keep their land?

Adapted from: "The Disappearing Land Game" YMCA World Peace Week 2004

Comic Creations

AIM: To approach overwhelming issues from a more positive perspective.

MATERIALS: Scrap paper, pens, markers, scissors

AGES: 15-18

TIME: 30 minutes

Introduction:

Split the youth into groups of 3 or 4. Have a discussion about desertification using the background information provided as a guide.

Instructions:

The groups are to each design an environmental comic strip about desertification. When choosing a topic, consider the causes of desertification, how it impacts humans and wildlife, its effects on the environment, etc. It might be useful for the youth to review the background information. The issue of desertification should be presented in an educational, yet light-hearted way. Youth are to draw the comic strip and colour it in.

Share each group's comic with the whole group and then display them in a common area.

Discussion:

Sometimes approaching a serious topic, such as desertification (or any other environmental issue), from a humourous perspective can shed a different light and new perspective on the issue. This activity was not intended to imply that these issues are humourous, but rather that a new approach to creating awareness can be very effective. Such an approach may appeal to or be more applicable to a certain audience than a serious discussion or lesson would. Sometimes these issues can seem overwhelming, and it is refreshing to have them presented in a more positive way.

1. Can you think of anyone in your life that would be more receptive to a comic strip about desertification than a discussion about desertification?
2. What are some other ways that you can educate your friends and family about desertification and environmental issues?
3. How can you be a positive role model in your community when demonstrating your concern for desertification and environmental issues?

Adapted from: "Activity # 21" Global Youth Forum Activity Guide 2006. YMCA of Windsor and Essex County, YMCA of Greater Toronto, YMCAs of Cambridge & Kitchener-Waterloo

Tree Planting

AIM: To gain an appreciation of the work involved with and the importance of reforestation.

MATERIALS: Native trees, shovels, trowels, water source, watering can, gardening gloves

AGES: 12-14, 15-18

TIME: 30 minutes

Introduction:

It is important to contact your Municipal Government to find out the by-laws surrounding where you are allowed to plant trees, and to plant them in an area permitting it. You should also contact your local forestry department or a local naturalist group prior to this activity to find out which types of trees are native to your area.

Planting native species is important for many reasons. Native plants will have a positive relationship with other plants and organisms in your yard and garden, whereas non-native species can outcompete and overrun native plants. Native plants also attract local wildlife, like birds and butterflies, as the wildlife has already established relationships and co-dependencies on these plant species for food or shelter. Additionally, native plants grow well in your local climate, they require less watering and are generally less maintenance.

Instructions:

Have a discussion surrounding deforestation and the importance of reforestation.

Visit a local nursery to purchase the tree(s) that you have chosen to plant. Make sure that you ask whether the species prefers lots of sunlight or shade, whether they like moist environments or dry, etc. Ask the specialists at the nursery whether they have advice or tips for you regarding how to plant the tree. Otherwise, refer to a guide, such as, http://www.treecanada.ca/publications/guide.htm, and plant your tree!

Discussion:

Reforestation is an important step in mitigating the effects of desertification. It is important to plant native species to ensure that they will have a positive, beneficial relationship with the species that they will co-exist with.

1. How will the trees you planted benefit the environment?
2. How can you protect your trees from being destroyed or cut down?

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Activity 6

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Glossary

Arable – capable of producing crops; suitable for farming; suited to the plow and for tillage

Arid – being without moisture; extremely dry; parched

Dryland – a tract of land having dry, often sandy soil, as on the floor of a valley

Salinization – the process by which a nonsaline soil becomes saline, as by the irrigation of land with brackish water

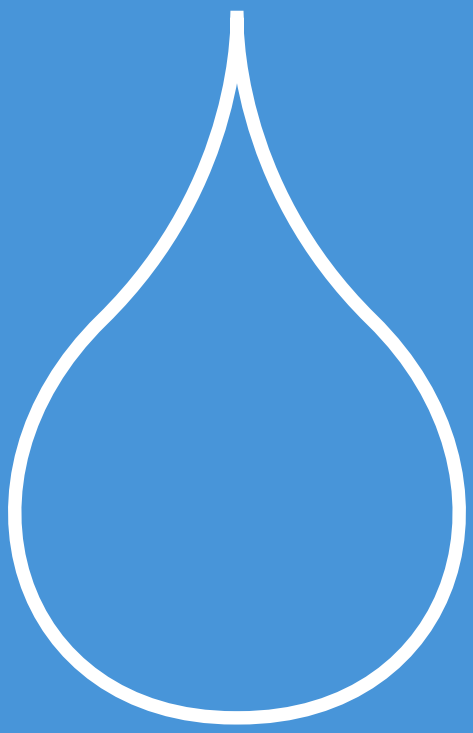
Soluble – capable of being dissolved or liquefied

Sustenance – means of sustaining life; nourishment

Tillage – the operation, practice, or art of tilling land

Degrade – to become degraded; weaken or worsen; deteriorate

All definitions from Dictionary.com



WATER RESOURCE SCARCITY

Water Resource Scarcity

Water is essential to the survival of all life on the planet - from insects to forests to bacteria to humans. The planet is home to vast quantities of salt water, but only 2.15 percent of the earth's water is fresh; 99.5 percent of which is located within continental ice caps (UNEP). Therefore, the quantity of fresh water we actually have access to is extremely limited, and we are degrading or over-using much of what is available.

Population growth, urbanization and pollution are escalating the demand for a resource that is becoming increasingly limited in supply. Industrial, agricultural and residential uses are draining resources faster than they can naturally replenish themselves, and a lack of proper wastewater treatment is causing depletion in water quality (UNEP). As a result, communities are often forced to use water that is unsafe for consumption, and are unable to maintain proper sanitation. Surface and groundwater resources all over the world are being used substantially faster than they are able to naturally replenish themselves (Barlow & Clarke, 2002). There are 31 countries that currently face water scarcity or water stress, with more than one billion people lacking access to safe drinking water and nearly three billion without adequate sanitation options (Barlow & Clarke, 2002). Governance is a major factor in sustainable management, water resource distribution, infrastructure for accessing water and assignment of value to the resources (UNDP, 2004). Good governance and a sense of stewardship amongst citizens are often lacking, and not having proper infrastructure to obtain water from rivers and aquifers leaves nearly ¼ of the global population without a sufficient supply (WHO, 2009).

There are many organizations that are working to increase access to safe water resources and help solve the water crisis, and since 1990, approximately 1.2 billion people have gained access to safe water supplies (UNICEF, 2007). An example of an organization working toward this goal is DOW Live Earth Run for Water, which hosts 6km run/walk events – the average distance women and children walk daily to find water. The UN International Decade for Action: Water for Life 2005-2015 is working to advance efforts to carry out international commitments on water and water-related issues by 2015 (WHO, 2010). One specific commitment is the Millennium Development Goal of reducing the number of people living without access to safe water or basic sanitation by half by 2015 (WHO, 2010).

FACTS:

- Globally, one in three people lack sufficient water to meet daily needs (WHO, 2009).
- Water usage has increased at twice the rate of global population growth over the past century (FAO, 2010).
- Almost 1.2 billion people live in areas of the world where physical water resources (rivers, lakes, etc.) are scarce (WHO, 2009).
- By 2025, two out of three people could be residing in areas under water stress conditions (FAO, 2010).
- Nearly two billion people lack access to safe sanitation options (FAO, 2010).

Health Concerns

Health is a major concern for people living in areas experiencing water scarcity or poor water quality. Water scarcity can result in plague, typhus and trachoma (an eye infection that can lead to blindness). Poor water quality can lead to water-borne infections and diarrheal diseases, such as cholera, dysentery and typhoid fever. Scarcity promotes the storage of water inside homes, which can provide breeding grounds for mosquitoes that can spread diseases like malaria and dengue fever (WHO, 2009). Approximately 80 percent of illnesses in the developing world can be attributed to poor water quality and sanitation conditions (The Water Project, 2010).

Water Scarcity in Canada

Canada appears to have abundant fresh water resources, because glacial depressions in the landscape collect precipitation runoff to form lakes and rivers. The quantity of fresh water that we can sustainably consume as a country equals that of the annual runoff of the land (Canada Foundation for Innovation, 2006). If we exceed this ratio, water consumption becomes unsustainable. Canada's average per-capita water consumption is 326 litres per day, twice that of Europeans (Canada Foundation for Innovation, 2006). Minimum daily per-capita water consumption to satisfy basic needs is suggested to be 20 litres (FAO, 2010), and WHO (2009) points out that 1/3 of the global population struggles to find adequate water to meet daily needs. As a country, we must focus on conservation and sustainable levels of consumption before Canadian resources run dry.

Reducing Consumption

There are many ways to reduce the amount of water we consume, and some ideas are listed below:

- **Install low-flow toilets and showerheads**
- **Use toilet dams** (If you do not have a low-flow toilet, you can save water by creating a toilet dam. Use a large 1L jar with a lid - like a peanut butter jar, place a heavy object in the jar - like a rock, fill it with water and close the lid really tight. Flush the toilet once, wait for the water to drain, place the jar in the back of the tank away from any moving parts. Replace the lid and save 1 litre of water per flush!)
- **Install aerators on all faucets** (Aerators act as a sieve separating a solid stream of water into many tiny streams, adding air to the mix and reducing flow while maintaining or increasing water pressure)
- **Have staggered showers** (Only have the water on while you get wet and rinse. Turn it off while lathering and shaving)
- **Re-use grey-water for lawns and toilets** (See below)
- **Be conscious of personal consumption**
- **Wash only full loads of dishes in the dishwasher**
- **Use appropriate washing machine water levels for the quantity of clothes being washed**
- **Only water lawns with 2-3 centimeters of water per week using a timed sprinkler** (To prevent evaporation in the sun, water in the morning after dew has dried)
- **Plant native vegetation in your yard that requires minimal or no watering**
- **Collect rain water in a rain barrel for outdoor use, watering indoor plants, flushing toilets, etc.**
- **Check pipes for leaks and repair them** (Most leaks are easily fixed, and can save massive quantities of water)
- **Volunteer with a non-profit organization that focuses on water conservation issues or water resource distribution issues**
- **Any other way of saving water that you can think of!**

How to collect grey water...

Grey water can be collected in a large bowl or bucket in your shower or in a small bowl in your sink whenever you take a shower, wash your hands or do dishes. Keep the bucket or bowl under the tap to collect as much of the water as you can that would have otherwise gone down the drain. This is very effective when you first turn on the tap and wait for it to get warm.

How to flush a toilet with grey water...

Next time you flush the toilet, lift up the back cover of the toilet tank, wait for the water to drain and then for the black stopper to plug the tank. Use your grey water to fill the back of the tank. Do not use water that has food particles in it, but soapy water is okay. (Biodegradable soap is ideal.) Next time you flush the toilet, it will be flushed with grey water instead of newly treated water.

Water Relays

AIM: To appreciate the difficulties that many people experience gathering water.

MATERIALS: Water source, 4 pylons, 4 large buckets, 2 plastic mixing bowls, 4 plastic cups (not disposable), water balloons, 2 sturdy sticks

AGES: 12-14, 15-18

TIME: 20 minutes

Note: Latex balloons are biodegradable.

Introduction:

In many parts of the world, people (primarily women) walk many kilometers each day to gather water for their families. They then need to carry this water home.

Indicate a Start and Finish line on the ground with pylons. Place 2 very large buckets of water, along with the bowls, cups, water balloons and sticks at the Start, and 2 empty buckets at the Finish - 1 for each team. Youth are divided into 2 teams and race to complete a series of relays. Youth may get wet.

Note: Please use this water for irrigation or to flush a toilet when you are finished.

Instructions:

Carry water according to the relay instructions from Start to Finish as fast as possible, avoiding any spillage. At the Finish line, pour the successfully transported water / water balloons into your team's bucket. As each team finishes a task, tell them the next task. The relay ends when the first team finishes all of the tasks, and at that point, the team that has the most water in their bucket wins. If desired, try another round. Relay examples:

1. Carry a large bowl of water on your head, using your hands to sturdy it.
2. Carry a large bowl of water on your head without using your hands to sturdy it.
3. Throw a water balloon to a team member at the Finish.
4. Carry 2 (plastic) cups of water while hopping on one foot to the Finish.
5. Roll a water balloon on the ground to the Finish with a stick.
6. Cup hands together and carry as much water as possible.

Discussion:

This activity demonstrates the difficulty in efficiently transporting water over long distances by foot. Turning on a tap and receiving seemingly unlimited fresh, clean water is a luxury that should not be taken for granted, and it is a finite resource that should not be wasted.

1. Do you think you wasted any water today? How can you use less water tomorrow?
2. What habits could you change to reduce your water consumption on a regular basis?

One Bucket

AIM: To increase awareness of the quantity of water we consume each day.

MATERIALS: 1 or 2 litre bottle, 2 buckets, a glass, a wash basin

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

The quantity of water we use to complete daily tasks differs greatly from those in many other parts of the world. We need to better understand the value of water and how lucky we are to have it readily accessible to us.

Place an empty bucket and a bucket filled with 20 litres of water (minimum daily requirement, see background information) in the middle of the group (if near a lake, scoop water from lake).
Note: Please return water to the lake, or pour onto a garden when finished.

Instructions:

Instruct the youth to determine, as a group, the quantity of water necessary to realistically complete each of the daily tasks listed. Use the glass or wash basin to establish proper quantities. Pour the "waste" water into the empty bucket.

- You need water to prepare oatmeal for your family.
- You need to wash the dishes (use wash basin for measurement).
- You need to do laundry (use wash basin).
- You need to go to the bathroom (1 toilet flush uses 6 - 13 litres of water).
- Your family is thirsty. You need water to drink (use the glass).
- You need to water your lawn.
- You need to bathe.
- You need to mop and clean your home.

Discussion:

It is important to understand how much water we use each day in proportion to people in other parts of the world. Many of us over-use or waste large quantities of water, while others struggle to find enough to sustain their daily needs.

1. Did you have enough water to complete all of your tasks?
2. What would you do if you only had 1 bucket of water per day?
3. Could you have conserved or reused any water by completing tasks differently?
4. What are all of the ways that you use water in a day? (Ex. Shower, brush your teeth, make coffee, use the toilet... etc.)

Adapted from: "How Much Water Do We Use?" Taking the World to Camp: Creative Ideas for International Education at Camp. YMCA Canada

Clean Water

AIM: To appreciate our access to clean, safe water.

MATERIALS: Large, deep bowl, a glass, clear plastic wrap, stones, water, sun

AGES: 12-14, 15-18

TIME: *Part 1*: 15 minutes, *Part 2*: 15 minutes

Introduction:

Clean water is not an accessible option in many parts of the world. Improper or non-existent wastewater treatment facilities, pesticide, fertilizer and sediment runoff from agriculture and industrial waste that is pumped untreated into local bodies of water can all result in unclean, unsafe water. Unsafe water can cause severe health problems and can irreparably damage natural ecosystems and organisms.

Instructions:

Part 1: Follow the instructions to construct a solar water cleaner.

1. In a large bowl, mix a small amount of dirt into a litre of water.
2. Place a clean glass in the center of the bowl (the water line should only come part-way up the glass, and the bowl must be deeper than the glass is high).
3. Cover the bowl with a sheet of clear plastic wrap, securing the edges of the plastic with a large elastic band (or secure to the ground with rocks).
4. Place a stone on top of the plastic over the middle of the glass.
5. Let the water cleaner sit outside in the sun all day.

Part 2:

1. Remove the plastic wrap and you will see that the sun has caused the water to evaporate, rise, and form droplets on the plastic, then slide down the slanted plastic into the glass, leaving behind any impurities in the bowl.

Discussion:

A simple mechanism to clean water, such as this one, can provide individuals with improved health and sanitation. An estimated 80% of illnesses in the developing world can be attributed to poor water quality and sanitation (The Water Project, 2010). Having access to clean, safe water is a privilege that we should not take for granted, and we should strive to make this basic human right accessible to all.

1. How would your life be different if you had to clean all of your water with this type of water cleaner?
2. How can you help to prevent water from becoming polluted?

Adapted from: "A Solar Water Cleaner" Taking the World to Camp: Creative Ideas for International Education at Camp. YMCA Canada

On Guard

AIM: To understand the importance of protecting natural resources.

MATERIALS: 2 - 60cm (2 foot) long pieces of string and 2 balloons per person

AGES: 12-14, 15-18

TIME: 30 minutes

Note: This activity is most easily done indoors in a large room or gymnasium.
Note: Latex balloons are biodegradable.

Introduction:

Tie an inflated balloon securely to the end of each piece of string.

Instructions:

Give each youth 2 balloons, and ask them to write 1 way that they have used water today on each balloon. The youth are then to tie 1 balloon to each of their shoes using the string. The objective is to stomp on everyone else's balloon while keeping yours safe. Once both of yours have been popped, you are out of the game. The last person to remain with an inflated balloon wins.

Discussion:

We are overusing and polluting fresh water supplies way beyond the point of sustainable consumption. We are using too much water and not allowing the resources time to replenish themselves. We are using a renewable resource in a way that is not allowing for it to be renewable, so we must change the way we look at the natural environment, from something we use to a system we are a part of.

The balloons in this game represent our consumption of fresh water. In this game, you tried your hardest to protect your balloons, because without them, you don't get to stay in the game. We should protect and conserve water resources, because without them, we can't stay alive.

Instead of trying to pop everyone else's balloons, we should be protecting them, protecting the resources that we all rely upon. If we are all going to stay in the game, we must respect each other, protect all of the balloons (natural resources) and respect nature.

1. How did you feel when your balloon was popped?
2. How would you feel if you suddenly didn't have access to clean water? How would you feel if once your balloons were popped, you could no longer use water for the purposes you wrote down?
3. Did you develop a strategy for protecting your balloon?
4. What strategies can we develop for protecting our water resources?

An Act of Conservation

AIM: To help youth think about conserving water through their daily actions.

MATERIALS: None

AGES: 12-14, 15-18

TIME: *Part 1*: 10 minutes, *Part 2*: 10 minutes

Introduction:

In Canada, we tend not to think about water conservation, as we generally do not experience any shortage of supply. Water is readily available to us whenever we want it. There are many parts of the world where water is scarce (even in Canada, though most of us aren't aware of it) and we can be more conscious of how we consume this resource.

Instructions:

Part 1: As a group, brainstorm ways that you can conserve water in your day-to-day life.

Challenge the youth to perform 1 action each day that conserves water. Youth should keep track of their daily act, and after a week (or 2) share their acts of conservation with the group.

Host the discussion below on the same day that the group shares their acts of conservation.

Discussion:

Part 2: More conscious consumption can drastically reduce the quantity of water you use each day. Canadians use twice the amount of water Europeans do, and 16 times more water than the recommended minimum water necessary to meet daily needs (20 litres) (FAO, 2010). The average Canadian uses 326 litres of water per day (FAO, 2010). Take time to actually consider these numbers.

1. Do you need to use this much water per day?
2. Which of your conservation actions do you think saved the most water?
3. How can you continue to be conscious of how you are using resources?

Adapted from: "My Act of Peace" Peace Building Activity Guide 2009, YMCA Canada

Heroes

AIM: To understand that we can all be environmental heroes.

MATERIALS: Paper, pens, markers, fabric paint, scissors, glue, old clothing pieces, etc.

AGES: 12-14, 15-18

TIME: 40 minutes

Note: Be careful with the fabric paint – it does not wash out of clothing.

Instructions:

Break into 3 or 4 teams. Each team is to create a superhero that has the power to eliminate water scarcity issues across the globe. Teams are to decide what they want their superhero to look like, what its costume should look like, what its name will be, and what superpowers it will have. Teams can jot their ideas down on recycled paper, and then proceed to decorate old clothing to make a costume for their superhero using the supplies provided. Teams can model their costumes for the other groups. Each team should explain why the superheroes have the features they do and how they will be effective in eliminating water scarcity issues.

Discussion:

We do not need to be superheroes to have a positive effect on water scarcity issues, or any other environmental issues. We can each make a difference; we can each be heroes in our own way, fighting whatever villain we choose to. We can practice water conservation in our daily lives, we can volunteer with a not-for-profit organization that focuses on improving infrastructure and access to resources, or we can undertake any of the other countless initiatives that can help to improve the state of the planet.

1. Why did your superhero have the superpowers that it did? Do you think that if you had those same powers, you could effectively help to eliminate water scarcity?
2. What powers do you personally have that can help solve these issues?
3. Do you / will you use those powers?

Adapted from: "Fantastic Four" National Youth Council of Ireland.
http://www.youthdeved.ie/resources/download_activities/climate_change/fantastic_four

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Glossary

Degrade – to become degraded; weaken or worsen; deteriorate

Glacial depression – an area completely or mostly surrounded by higher land, as a result of glacial movement during the ice age

Grey water – household waste water that can be reused for some purposes without purification, e.g. bath water, which can be used to water plants

Rain barrel – a barrel used as a cistern to hold rainwater

Stewardship – to act as steward of; manage

All definitions from Dictionary.com

AGRICULTURE

Agriculture

Agriculture (farming and grazing livestock) uses 38 percent of the Earth's land area (Rainforest Alliance, 2010), so it is important to use this land in a sustainable manner; meeting agricultural demands of the present without compromising the needs of future generations. The global agricultural industry currently faces three main challenges: to protect and conserve natural resources; to satisfy the growing demand for safe and diverse foods and products; and to improve rural livelihoods, income and food security (FAO of the UN, 2003).

Traditionally, agriculture focused on raising food crops for local consumption and subsistence. Nowadays, many farmers produce crops and animals for commercial sale to generate income, which in turn can replace food crops and force communities to import food. Many farmers opt to use genetically-modified seeds, because they believe that these seeds will increase their crop yields, but they often require vast quantities of chemical inputs, like fertilizers, that the farmers may not be able to afford. When the market value of their product is low and cost of inputs is high, farmers take on debt, because they cannot make enough money to cover production costs. Farmers then prioritize increasing yield and lowering costs, leaving environmental stewardship by the wayside. This can result in the conversion of large quantities of land from functioning ecosystems (like rainforests or savannahs) into single-crop (monoculture) agricultural plots or fields for grazing. Planting the same crop every year depletes the soil of nutrients and even more inputs are needed, as the soil can no longer naturally sustain the crops (desertification). The international market demands uniform, aesthetically-pleasing goods, which puts pressure on farmers to use lots of pesticides and fertilizers to ensure crops meet these standards (Food First, 2010).

Organic agriculture is a sustainable alternative to conventional methods. It takes advantage of natural cycles and uses sustainable practices, such as integrated pest management (ex. introducing beneficial predator insects); eliminates the use of hormones, antibiotics and synthetic chemicals (fertilizers, pesticides, herbicides); cares for the soil to maintain fertility and prevent erosion; and plants a rotation of different crops instead of the same one repeatedly (known as crop rotations) to help maintain soil fertility and reduce the need for chemical inputs. Agroforestry and shade farming both involve planting crops alongside trees and shrubs to maintain wildlife habitats and biodiversity, increase soil and water retention, increase yield and recycle nutrients. Trees can be grown for timber or fruit to increase profits. Organic agriculture can increase cost of production for the farmer, so organic products are often sold at higher prices.

The Rainforest Alliance is an example of an organization working toward sustainable farming, and offers an organic certification program for farms that indicates to consumers that certified products are grown with strictly sustainable practices and workers have been treated well (Rainforest Alliance, 2010).

FACTS:

- Agriculture is responsible for 80 percent of the national water consumption of the United States (U.S. Department of Agriculture, 2004).
- Palm oil production has already eliminated 6.5 million hectares (16 million acres) of Indonesian rainforest with an additional 20 million hectares (49.4 million acres) to be developed in the future (FOE Europe, 2009a).
- The meat production industry uses: 26 percent of the Earth's land area; 33 percent of total farmland; eight percent of global water consumption; and emits 18 percent of global greenhouse gases (FAO of the UN, 2006).
- The Canadian Federal Government has developed a Strategy for Environmentally Sustainable Agriculture and Agri-Food Development, which is working toward incorporating sustainability into every agricultural decision made in Canada (Agriculture and Agri-Food Canada, 2009).

Meat Production

Research has shown that meat production processes exacerbate environmental issues, such as loss of biodiversity, water pollution, land degradation, global warming and air pollution. Grazing livestock occupy 26 percent of the Earth's land area; 1/3 of the total arable (farmable) land produces livestock feed crops; the process uses eight percent of our total global water consumption; and emits 18 percent of global greenhouse gas emissions. The Amazon has seen 70 percent of its deforested land converted to grazing pasture with most of the remaining deforested area being used to grow feed for livestock. Livestock production causes severe water pollution due to animal wastes, tannery chemicals, hormones and antibiotics, pesticides and fertilizers used when growing feed, and sediments from degraded, eroding pastures. Population growth paired with increasing incomes, expanding demand for meat, eggs and dairy and increasing desertification and land degradation due to poor stewardship are causing ever increasing levels of land conversion from functioning ecosystems into grazing lands (FAO of the UN, 2006).

Purchasing sustainably produced meat products, like organic meat, and limiting consumption by including a healthy variety of legumes, grains, nuts and other protein alternatives in our diets can help to mitigate some of these issues.

GMOs

GMOs, or genetically modified organisms, are created by inserting specific genes into a crop or animal's genetic makeup to provide various "advantages", such as pest resistance, herbicide resistance, drought resistance, shorter growth period, increased yield or nutritional enhancement. We require more research into the potential effects of genetically-manipulating our food, because we are currently uncertain as to how these products affect human health, the natural processes of the environment or our food production systems. Countries such as Germany, France and Austria have banned the cultivation of genetically-modified corn within their boundaries (Greenpeace International, 2010). Many countries in Europe require labeling of GMO-free food products so that consumers are able to make educated choices (FOE Europe, 2009b).

Tung Chung Organic Farm

The YMCA of Hong Kong has created the Tung Chung Green Organic Farm - the first of its kind in the Tung Chung district. The project's goals focus primarily on ecological conservation, environmental protection and the promotion of healthy lifestyles. The Farm employs local residents that were unemployed or were having difficulty finding employment, and strengthens the local community by establishing connections amongst schools, residents, community organizations and local governments. Individuals and families are able to become members of the Green Organic Farm and plant and grow their own organic crops.

All above information retrieved from http://www.tc.ymcahk.org.hk/organic_farm/eng/

Supermarket Investigation

AIM: To take a look at the sustainability of the food we purchase.

MATERIALS: Paper and pen, source of transportation, a supermarket

AGES: 12-14, 15-18

TIME: 30 minutes + travel time

Introduction:

Prepare transportation to and from your local supermarket. Walking, biking or public transit is always encouraged.

Instructions:

Tour your local supermarket and investigate the following:
1. How much produce is local or Canadian? Tally local vs. international items.
2. Amount of packaging and whether it's necessary (do bags of cereal need to be in a box?).
3. How does the produce look aesthetically (does it have many imperfections)? Do you think this is how produce naturally grows?
4. Are you given a choice between local products and international ones?
5. How many organic products can you find? Is this an acceptable selection?
6. The price difference between brands.
7. The ingredient list on common packaged products (what percentage of the ingredients do you understand?).

Discussion:

When considering whether to purchase a product, determine whether you agree with the company's operating practices and principles. If not, then perhaps you should spend your money on a different product. Some alternatives for socially and environmentally-sound purchasing, include: buying fair-trade products to ensure the producers of the commodity are paid fair wages for their work (coffee, tea and chocolate are readily available fair-trade); buying locally to support the local economy, to limit emissions associated with long-distance transport and to support the people who grow your food directly; considering how much packaging a product uses and what will happen to that packaging when you are finished with the product; researching the ethical practices of the companies you currently support to ensure they treat their workers and the environment well, and if not, switching to another brand and writing a letter explaining your concerns with their products; buying less by avoiding purchases that you don't really need.

1. Were you surprised by what you found at the supermarket? What were you most surprised by?
2. In what ways can you become a more conscious shopper?

Adapted from: "Supermarket Tour" How To's of Global Education 1995. YMCA Canada

Fresher

AIM: To encourage the purchasing of local food, and to know where your food comes from.

MATERIALS: Pylons, coloured pinnies, large field or gymnasium, 2 long ropes

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

Outline a large rectangular play area on the field using pylons. Designate a "compost" area (or jail) at each team's end using the ropes. Divide the group into 2 teams. It may be helpful to wear coloured pinnies to distinguish teams.

Instructions:

Each team has a garden (or home base) at opposing ends of the rectangular play area. The objective is to collect all of the vegetables (members) of the other team in your compost (jail) by tagging them in the play area. Once tagged, you must go to the opposing team's compost and wait to be rescued by a teammate. You can rescue your team members from the other team's compost by tagging them. As soon as you enter the play area from your garden, you start to become less "fresh". The longer you are in the play area without leaving, the less fresh you become. (Think of real vegetables: once picked, the longer they are out of the garden, the less fresh they become.) You can only tag vegetables that you are fresher than, so they must already have been in the field when you entered. You cannot tag someone who entered after you, because they are fresher than you. By stepping back into your team's garden area, you instantly "refresh".

Discussion:

In this activity, the longer you travelled inside the play area, the less fresh you became and the chance that you would end up in the compost increased. This can represent what happens with our food. The farther away our food is produced, the longer the distance it needs to travel to reach your table, and the less fresh it becomes. Buying local food helps to ensure that there is a shorter distance from the field to our tables, and our food is fresher, healthier and more delicious. We are also supporting our local farmers and reducing the amount of air pollution emitted by shipping products long distances.

1. Which fruits and vegetables grow in Canada? (See the list on the next page and check off ones that the youth name.)
2. Why do you think that most people do not eat local foods?

Adapted from: "Fresh" Youth Group Games, http://www.jubed.com/

AGRICULTURE – ACTIVITY 2

SOME OF THE FOODS GROWN IN CANADA

Alfalfa
Apples (Wild)
Apricots
Asparagus
Barley
Beans (Green / Wax)
Beets
Blueberries
Broccoli
Brussels Sprouts
Cabbage
Canola
Cantaloupe
Carrots
Cauliflower
Celery
Cherries
Corn
Crabapples
Cranberries
Cucumber (Field)
Currants (Red / Black)
Herbs (Annual / Perennial)
Eggplant
Fennel
Fiddleheads
Flax
Flowers (Edible, Assorted)
Garlic
Garlic Scapes
Gooseberries
Grapes (Wild)
Huckleberries (Garden)
Leeks
Lettuce (Assorted)
Muskmelon
Mustard
Nectarines
Oats
Onions (Green / Cooking / Spanish / Red)
Parsnip
Peaches
Peanuts
Pears
Peas (Green / Snow)
Peppers (Green / Sweet / Hot)
Plums
Prunes
Potatoes (Assorted Varieties)
Pumpkins
Radishes
Rapini
Raspberries
Rhubarb
Rutabaga
Rye
Shallots
Soybeans
Spinach
Squash
Strawberries
Sunchokes (Artichokes)
Sunflowers
Tomato (Field / Greenhouse)
Turnip
Watermelon
Wheat
Zucchini

(Kawartha Ecological Growers, 2009)
(The Canadian Encyclopedia, 2010)

Interdependence

AIM: To understand our mutual dependence with farmers all over the world, and the need for adequate, fair compensation for the food we are provided.

MATERIALS: None

AGES: 12-14, 15-18

TIME: 30 minutes

Introduction:

A great majority of the food that we find in our local grocery store does not come from local farms, but farms located all over the world. It is important that all farmers be paid a fair wage that they can live off of for their products, but that is often not the case.

Instructions:

Have a discussion surrounding the following points:

1. What are the most common foods that we eat and where do they most often come from? (Ex. Bananas are one of the most popular fruits in Canada, yet we cannot grow bananas here.) It might be useful to make a list of the most common foods each youth eats, and where that food is grown. Can these items be grown in Canada?
2. How can we ensure that farmers who grow this food and provide a vital service to humans make a fair wage? (Also known as fair trade)
3. What is a fair wage for the farmers? Consider the work involved in and the importance of this work compared with many other jobs in our society and determine a fair wage. How can you ensure these farmers are being paid a fair wage? (Ex. Fair trade products, community shared agriculture, farmer's markets, etc.)

Discussion:

Farmers all over the world are opting to, or are under pressure to produce cash crops (like sugarcane or coffee that are in high demand in developed countries) instead of continuing to grow the staple food items that sustain families and communities. There is increasing competition in this market, driving down commodity prices, forcing farmers to increase the quantity of crops they produce which leads to deforestation and land conversion. Growing the same cash crop year after year degrades the farmers' soils and requires increasing quantities of fertilizers, insecticides and herbicides. It is important to know where our food comes from and how it is being produced. Fair trade is a sustainable alternative.

Protect Your Egg

AIM: To recognize excessive food packaging.

MATERIALS: 1 egg per group, access to a space minimum 10 feet high off the ground to drop the eggs from, lots of recycled materials (newspapers, straws, egg cartons, elastics, plastic bags, anything you can find to reuse)

AGES: 12-14, 15-18

TIME: 30 minutes

Introduction:

Split the youth into teams of approximately 3. Split the building materials up evenly between the groups.

Instructions:

Each group receives an egg for which they must construct protective packaging for it to sit in that can withstand the impact of being dropped from a high place without breaking. Youth can use all, or just some, of the materials provided, and can negotiate trades with other teams.

Once the eggs are in their packaging, the facilitator is to drop each egg from a roof or high place. Once all eggs have been dropped, teams are to open up their protective packaging and see whether their egg survived the fall.

Discussion:

Our food items often travel from far away places to reach our supermarket, and in order to preserve the quality and protect the product (like we protected our eggs), they are often shipped in excessive amounts of packaging. Much of this packaging is unnecessary or could be reduced, as it ends up in landfills after its brief purpose has been served. It is also important to note which type of packaging a product is in – whether it is a foam egg carton (damages the atmosphere), or a recycled paper carton.

1. Do you notice which types of packaging your food comes in? Will you start to consciously select items that have less packaging?
2. Why is it important to avoid purchasing items with unnecessary packaging?
3. How can you ensure that you are throwing out less packaging? (Ex. Purchase loose produce and do not put in plastic bag; buy in bulk; be conscious of what you are purchasing; don't buy what you don't need; etc.)

Sustainable Potluck

AIM: To discover sustainable ingredients and sources of sustainable food items.

MATERIALS: Leader is to provide reusable plates, bowls and utensils for the group, and youth are to bring their potluck creation and serving utensils

AGES: 15-18

TIME: 1 hour

Note: Activity requires preparation and the introduction should be presented the week before the activity is to occur. Discuss any dietary allergies / restrictions.

Introduction:

Youth are to each prepare a potluck dish containing at least 1 of the following:
1. organic ingredients
2. local ingredients
3. vegetarian ingredients

Alternatively, to lower youth's costs, discuss a sustainable menu and prepare the food as a group. The leader is to provide the ingredients for this option.

Instructions:

Have everyone bring in and share their dish with the group. While enjoying the meal, discuss the experience of finding local, organic and / or vegetarian ingredients, and which ingredients were included in your dishes. Share recipes and discoveries of great locations to find ingredients.

Discussion:

Eating organic, local and vegetarian meals is a great way to include more sustainable choices in our daily lives. Organic food production does not use toxic chemical-based pesticides or fertilizers that can pollute soils and waterways and cause health problems, and farmers try to conserve water, preserve biodiversity, maintain soil fertility and prevent erosion. Purchasing locally supports the local economy; limits the distance food is transported and reduces CO2 emissions; and provides us freshly picked produce that has not been shipped across continents.

1. How often do you eat meat-free meals? Will you start to include more in your diet each week?
2. Was it difficult to find local and organic food items? How does it make you feel knowing that you are directly supporting farmers in your community?
3. Organic food items are sometimes more expensive, because it is very difficult to ensure your farm remains completely sustainable and chemical-free. Do you think that this cost difference is worth it? Why or why not?

Tomatoes and Potatoes

AIM: To learn how challenging and rewarding it is to grow your own food.

MATERIALS: Selection of veggie / herb seeds (chives, basil, tomatoes, beans, mint, etc.), potting soil, clean containers from recycling bin (yogurt, etc.)

AGES: 12-14, 15-18

TIME: 30 minutes

Note: Part 2 is to be completed after the food has been grown and eaten.

Introduction:

Part 1: No matter where we live, whether in a house with a big yard or in an apartment with a balcony or bright window, we are able to grow some of our own food. It can be extremely rewarding to plant and nurture a food item and watch as it grows. It allows us to better understand the time and work involved in farming, and to appreciate the fact that many of us do not have to grow our own food.

Instructions:

Each youth is to plant their chosen type of seed in a pot and take care of it according to its specific needs (ex. light, water, etc.). Instructions are usually included with the seeds. Or, the group can work together to grow and care for a few larger plants (like tomatoes).

Discussion:

Part 2: Growing your own food requires time and consistent care that most of us are not willing to invest, so we should, therefore, appreciate the time and work that farmers invest in growing the food that keeps us alive and well. We should be supporting the farmers in our community so that they are ensured a fair and consistent income, and in turn, we will receive fresh, nutritious food that has been allowed to ripen and has not been shipped from the other side of the world.

1. Do you know what food items the farmers in your area offer? How could you find out?
2. How did you feel when you were able to eat the food that you grew? Will you grow more of your own food in the future? Why or why not?
3. How does this experience make you feel about the work farmers do every day?
4. Why should we support local farmers? (Ex. To boost the local economy; to support our fellow community members; to reduce the greenhouse gases associated with long-distance transport; the nutritional benefits of allowing food to ripen on the vine or tree naturally; taste; we have more say in what farmers grow locally when we speak directly with them; we can express our concerns for the environment and interest in organics when speaking with farmers; etc.)

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Activity 2

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Glossary

Degrade – to become degraded; weaken or worsen; deteriorate

Genetically-modified – denoting or derived from an organism whose DNA has been altered for the purpose of improvement or correction of defects

Stewardship – to act as steward of; manage

Yield – to give forth or produce by a natural process or in return for cultivation

All definitions from Dictionary.com

DECLINE OF THE FISHERIES

Decline of the Fisheries

Fish are an important source of dietary protein and nutrients for much of the world's population (Sea Choice, 2010), and the fishing industry is economically significant to many coastal communities around the world.

Over 75 percent of global fisheries are currently either depleted, overexploited or fully exploited (meaning that they can not increase in productivity) (FAO, 2006). Approximately 90 percent of large predatory fish, including tuna, swordfish, cod and halibut have been eradicated from the oceans (EDF, 2010). More than 50 percent of highly migratory shark stocks are listed as depleted or overexploited (FAO, 2006). North Atlantic populations of haddock, cod, hake and flounder have dropped around 95 percent over the past 10 years (United Nations). These numbers highlight the importance of urgently strengthening fisheries management. If the current situation does not improve, it is predicted that the stocks of all species used for human consumption will collapse by 2048 (WWF). When the Newfoundland cod fishery collapsed in 1992, 40,000 people suddenly lost their jobs (Davies, R.W.D. & Rangeley, R., 2009).

Many factors contribute to declining fish stocks, including overfishing, pollution, habitat destruction, invasive species, climate change and poor fisheries management. The oceans are a common resource that everyone is free to exploit, which can present conservation issues when, for example, one Bluefin tuna can sell for up to $20,000 at a U.S. dock (NASA). Fishing techniques, like trawling, can destroy seabed habitats and diminish the quantity of life in the area by 20-80 percent, and can catch and kill untargeted species like sharks, corals, turtles, whales, birds and young fish that have not had a chance to reproduce and contribute to the re-population of the species (IRGC, 2009). Advanced modern fishing equipment, including larger vessels and fish-locating sonar, are becoming too efficient and are not allowing stocks adequate time to replenish themselves (Greenpeace International, 2010).

Many organizations recognize the importance of sustainable seafood production. The Marine Stewardship Council (MSC) is the global leader in labeling sustainably certified seafood, using a blue MSC label that indicates to consumers that fisheries are well managed, stocks are being kept at sustainable levels and impact on the environment is minimal. WWF is an example of an organization working to find innovative ways to conserve species, to maintain functioning ecosystems and to provide support for sustainable fisheries and fishers. Another example is Sea Choice, who has created a sustainable seafood list that educates consumers on which species are sustainably harvested and which to avoid.

FACTS:

- Humpback whales in the east coast's Bay of Fundy are suffering from food shortages due to competition with fishing fleets for herring (WWF).
- Approximately 90 percent of large predatory species, including tuna, swordfish, cod and halibut have been wiped out of the oceans (EDF, 2010).
- If practices do not improve, the stocks of all species used for human consumption are predicted to collapse by 2048 (WWF).

Aquaculture

Aquaculture is the practice of farming marine species in a controlled environment, and it is occurring in countries all over the world. Canada has farms in all 10 provinces plus the Yukon (Fisheries and Oceans Canada, 2010). Aquaculture is the source of approximately half of all seafood consumed globally (WWF, 2010), and it can relieve the stress on wild fisheries if the same fishers catching wild fish switch to aquaculture, and if the farmed fish do not require equal or more inputs of wild fish than are produced; for example, farmed salmon require more wild fish input (feed, etc.) than that which is produced by the farming (David Suzuki Foundation). Unsustainable aquaculture practices can have negative effects on surrounding ecosystems, such as destruction of wetland and mangrove forest habitats; introduction of exotic species to an area when farmed fish escape; new diseases introduced to wild fish populations; conflicts arising over water and land use; contamination of surrounding waters by chemicals (such as fungicides, pesticides and fertilizers), faeces and urine, and uneaten food; and so on (FAO, 1994).

There are two main aquaculture farming systems: closed containment and open net-pens or cages. Net pens are situated in the ocean or body of water allowing water to flow freely through the system. Closed containment systems separate farmed fish from wild ecosystems and are generally better for the environment, because they prevent the spread of diseases and sea lice; eliminate the need for antibiotics and chemicals that net pens require; wastes are contained; and farmed fish are prevented from escaping into surrounding waters (Sea Choice, 2010).

Many organizations are working toward widespread sustainable aquaculture practices, for example, WWF, United Nations, World Bank, Food and Agriculture Organization of the United Nations, United Nations Environment Programme, David Suzuki Foundation and Sea Choice.

What's Yours Is Mine

AIM: To understand why commonly-owned resources are often overused.

MATERIALS: 5 hula hoops, 15 tennis balls (or other small objects)

AGES: 12-14, 15-18

TIME: 15 minutes

Note: Activity works best with large groups.

Introduction:

Place 1 hula hoop in each of the 4 corners of a large field or gym and 1 hoop in the middle. The middle hoop represents the ocean, and the 4 corner hoops are populations that rely on fish for sustenance: Sharks, Commercial Fishers, Sea Birds, Local Fishers. Place all of the tennis balls (fish) in the middle hoop.

Instructions:

Split the youth into the 4 groups listed above and assign each group a hoop. The challenge is to get all of the balls (fish) inside your team's hoop. Youth can take fish from any hoop at any time, but each youth may only carry 1 fish at a time. After 4 minutes or so, stop the game, return all of the fish to the middle hoop, and allow teams 2 minutes to discuss a new strategy. Play the activity for another 4 minutes. After the 4 minutes are up, gather all of the fish back in the center hoop, and instruct teams to bring their hoops to the center of the field and place them over the middle hoop (ocean). That is the solution to the activity.

Discussion:

In this activity, the objective was to gather as many fish as possible for your team, even if it meant taking fish that other teams had gathered. This can be likened to people taking as many fish as they can from the oceans without consideration for the next person or for the wildlife that depend on the fish for food. The hoop in the middle contained a common resource that anyone could take, because it was not owned by any single team; just like the fish in the ocean are a common resource so people tend to take as many as they want. The solution to this activity is to share the fish by placing all of the hoops over the ocean.

1. Why do you think that people overuse common resources like water, forests or fisheries?
2. How can we stop this from happening? (Ex. Instill an appreciation for the resources; educate people on sustainable practices and the negative outcomes of unsustainable practices; enforce a quota; close at-risk fisheries; educate the public to control demand; etc.)
3. How can you help to stop overfishing? (Ex. Be mindful of how much fish you consume, because demand is what drives the need for supply.)

Helping Hands

AIM: To consider the outcomes of competition versus cooperation.

MATERIALS: Table, 1 chair per person

AGES: 12-14, 15-18

TIME: 5-10 minutes

Instructions:

Youth are to find a partner with similar arm strength to their own. Next, they are to sit at the table across from one another, place their right elbows on the table and grasp their partner's right hand. Youth are then given the following instructions: You save an aquatic species and score a point each time your partner's right hand touches the table. The person who saves the most species wins. Play one 20-second round, record the point scores, then play another 20-second round using left hands. Record the points and tally the final scores.

Discussion:

In this activity, there were 2 ways to win: overpower your partner repeatedly or cooperate with your partner so that you can both win and save even more species. These 2 options are also applicable to fishing practices, as we are currently competing with one another and with other countries to catch the most fish so that we make the most profit. If instead, we were to cooperate with one another and each be allocated a certain quantity of fish that we can take from the sea, our fishing practices could become much more sustainable and relations could be strengthened between fishing parties.

1. In this activity, was it (would it be) more effective to overpower your partner or to cooperate to increase the number of points you score?
2. Why do fishers compete instead of cooperate? (Ex. Whoever gets the most fish earns the most money; there are no regulations preventing it; they may not be concerned with ecosystem health; a belief that if they don't take the fish, someone else will; poverty; etc.)
3. Why do you think that it is important for fishers to cooperate with one another? (Ex. Stop depleting fish stocks; each fisher would be taking a sustainable quantity of fish from the sea; wealth would be distributed evenly to create more social and economic equity, potential to reduce poverty; potential to reduce tensions between countries; allow the aquatic ecosystem to heal itself; etc.)

Adapted from: "The Hand-To-Hand Game" Taking the World to Camp. YMCA Canada

Goin' Fishin'

AIM: To demonstrate how the quantity of fish in the waters decrease when more and more people are fishing.

MATERIALS: Lots of pool rings (or other small pool items), clock or stopwatch

AGES: 15-18

TIME: 20-30 minutes (depends on number of participants)

Note: Ideally, this activity is done in a pool, so youth will need bathing suits.

Introduction:

If available, this activity should take place in a pool. Alternatively, a large outdoor space or gym will work well, but the time each youth has to fish should be shortened to 10 seconds.

Scatter the pool rings or objects throughout the pool or play area, keeping them spread out. Each pool ring represents a fish living in the ocean. The youth are fishers who are trying to catch as many of the fish as they can.

Instructions:

One at a time, fishers will have the opportunity to dive for (or collect) fish. They will each have 1 minute to catch as many fish as they can. Each time someone finishes fishing, the facilitator is to throw 1 ring back into the water to represent the natural reproduction of the fish population. There must be 2 fish remaining in the water for them to reproduce.

The youth will quickly begin to notice that there are fewer and fewer fish available to catch.

Discussion:

This activity demonstrates that the more people that are fishing, the less fish there will be in the water. Even though the fish population was reproducing (the rings thrown back in the water), the amount of fish in the water was still decreasing, because more fish were removed than could be naturally replaced.

1. What does this activity tell us about what is happening in the oceans? (Ex. Too many people are taking too many fish so fish populations are decreasing quickly.)
2. What would happen to all of the fishers who rely solely on the income from fishing for their livelihood if there were no more fish?
3. Knowing this, why do you think that fishers continue to take too many fish from the waters?

Adapted from: "Gone Fishing!" YMCA Peace Building Activity Guide 2006

Here Fishy, Fishy, Fishy!

AIM: To explore the impact of overfishing.

MATERIALS: A large bag of plain M&Ms, 1 small cup and 1 straw per youth, 1 spoon and 1 medium-sized bowl per group, clock or stopwatch

AGES: 12-14, 15-18

TIME: 15 minutes

Introduction:

Place 25 M&Ms in each bowl. Divide the youth into smaller groups of 3 - 4. Give each group a bowl, and each youth a cup and straw.

Instructions:

Each youth is to pretend that they are a fisher whose livelihood depends on catching fish. Each M&M represents a fish in the ocean, and their straw represents their fishing pole. When the fishing season begins, youth try to catch as many fish as they can from the ocean (bowl) and place them in their boat (cup) using only their straw. The youth cannot touch the bowl or cup. The facilitator says, "Start fishing!" and the youth have 20 seconds to catch as many fish as they can. Each fisher needs to catch a minimum of 2 fish to sell or eat. When fishing ends, count how many fish each youth has caught. The facilitator then goes around to each ocean and adds 1 new fish for every fish remaining, representing the breeding population.

For the next round, groups are each given a spoon, which represents advanced fishing equipment, such as sonar and trawl nets. The facilitator says, "Start fishing!" and the fishers collect as many fish as possible. Do not stop fishers from invading other oceans if theirs is depleted.

Discussion:

1. Did any groups move to another ocean to fish? How did (would) you feel when (if) another group moved into your ocean? Was there (would there be) conflict? How was it (would it be) handled?
2. How does this activity relate to real fishery issues? (Ex. Everyone is trying to take as many fish as they can, and stocks are quickly being depleted.)
3. How can we continue to fish without depleting global fish stocks?
4. How can you help to prevent overfishing? (Ex. Consider the quantity of fish you eat; ensure the seafood you choose is sustainably harvested; request sustainable seafood at your grocery store or favourite restaurant, etc.)

Extension: Play another round of the game, and see if the youth can figure out how to fish in a sustainable manner.

Adapted from: "Fishing for our Future" YMCA Peace Building Activity Guide 2006

Communication Blocks

AIM: To explore the difficulties in communicating with aquaculture farmers.

MATERIALS: Lots of Lego, small bags, printed copies of aquaculture section of the fact sheet (printed on recycled paper)

AGES: 12-14, 15-18

TIME: 20 minutes

Note: The introduction requires a few minutes of preparation before the activity.

Introduction:

Construct a small block of Lego using lots of different sized pieces and colours, with each piece clearly visible within the structure. Place this block in a separate area or room so that the youth cannot see it.

Instructions:

Divide the group into teams of 3 - 5. Give each group a bag that contains all the Lego pieces needed to recreate the block, plus a few extra pieces (all separated and mixed up within the bag). Choose 1 or 2 people on each team to be builders and the rest will be runners. The builders are the only people who can touch the group's Lego pieces, while the runners are the only people who can run to the separate area to see the original Lego block. The runners must go 1 at a time to see the Lego block, then return to instruct the builders where each piece of Lego goes, WITHOUT SPEAKING. The builders construct the block according to what the runners tell them. After 10 or 15 minutes of building, stop the activity.

Discussion:

As a group, read through the Aquaculture information section.

In this activity, the builders can be likened to aquaculture farmers, while the runners are likened to consumers, and the lines of communication between them is difficult and indirect. The builder is forced to interpret what the runner is trying to say, like the farmer tries to meet consumer demands without speaking directly with the consumers. As consumers, it can feel challenging to try and influence our food production system. We can have a great influence over how and what farmers produce by creating or decreasing demand for certain products. If we choose to only purchase sustainably-produced farmed fish products, the demand will increase for these products and this will send a message to aquaculture farmers.

1. How can you find out whether or not the fish you are purchasing was farmed sustainably? (Ex. ASK at grocery stores and restaurants; carry a list in your wallet or purse of which species are farmed sustainably [Sea Choice has a good list]; choose species lower on the food chain, like shrimp, that require less feed inputs; etc.)

Movie Time

AIM: To explore the diversity of marine ecosystems and the importance of preserving them.

MATERIALS: Copy of Planet Earth Disc 3 – Shallow Seas

AGES: 12-14, 15-18

TIME: 65 minutes

Instructions:

Watch the video and enjoy some organic snacks!

Discussion:

The diversity of life in the oceans is astounding. Each species relies on another for food, shelter or survival, making these ecosystems susceptible to significant degradation. If 1 species is overfished and its stocks are depleted, all other species that are reliant on it will be negatively affected as well. Populations of its main food source may increase due to a decrease in predation, and that species' food source may become significantly reduced due to the increased number of predators. Species lower on the food chain are often a source of food for a variety of predators, so a significant reduction in numbers can affect a large number of species.

1. How can you help to prevent overfishing and ensure that ecosystem diversity remains intact? (Ex. Find out which fish species come from sustainable fisheries and which stocks are overfished – SeaChoice.org offers a comprehensive list; voice your concern to others to raise awareness; choose to only purchase products from sustainable fisheries and aquaculture farms; reduce your overall consumption of seafood; etc.)

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Glossary

Deplete – to decrease seriously or exhaust the abundance or supply of

Faeces – waste matter discharged from the intestines through the anus; excrement

Fungicide – a substance or preparation, as a spray or dust, used for destroying fungi

Habitat – the natural environment of an organism; place that is natural for the life and growth of an organism

Trawl – to fish with a net that drags along the sea bottom to catch the fish living there

All definitions from Dictionary.com

OVER-CONSUMPTION

Overconsumption

Overconsumption is the result of living a highly consumption-based lifestyle that cannot be sustained over the long-term by the planet's resources. It refers to the act of consuming more resources and commodities than necessary, such as food, clothing, energy, commodities, etc. We are consuming resources faster than they can be naturally regenerated by the planet, and we are creating more waste (such as CO2) than can be absorbed by the Earth and turned back into usable resources. Such resource depletion can be witnessed in many ways, including the loss of fertile land due to erosion; disappearing forests; the depletion or collapse of countless fish stocks; air and water pollution; and changing climate due to greenhouse gas emissions (Friends of the Earth Europe, 2009).

Globally, the human population uses roughly 140 percent of the resources that the planet is capable of generating in one year (Global Footprint Network, 2009). Thirty percent of the world's population uses 90 percent of the global ecological capacity, while the other 70 percent of the population has an ecological footprint that is less than their per capita share of resources (FCM, 2005). In 2005, the United States used 21 percent of global ecological capacity, demonstrating the significance of the inequalities in resource use (WWF, 2008). Furthermore, there are over one billion undernourished people in the world (FAO of the UN, 2010), and over one billion overweight adults in the world (WHO, 2010).

Massive quantities of advertisements and commercials for products that are manufactured to have a short lifespan fuel overconsumption. The average mobile phone user purchases a new phone every one-and-a-half years to keep up with emerging technologies, which, in 2005 alone resulted in the disposal of approximately 500 million obsolete phones (Friends of the Earth Europe, 2009). Additionally, in many societies, there often exists a perception that the more possessions you have, the happier and more fulfilling your life will become. Research demonstrates that beyond a certain threshold, material wealth no longer improves happiness or satisfaction with one's life. Beyond this threshold, other factors, such as quality of relationships with friends and family reflect levels of happiness (Friends of the Earth Europe, 2009).

If population growth and economic growth continue unchanged until 2050, our demand on nature will be twice the productive capacity of the biosphere (living organisms and their environment) (WWF, 2008). There are many organizations working to promote sustainable consumption in Canada, two examples of which are My Sustainable Canada and The Otesha Project. My Sustainable Canada works to educate the public and promote behavioral changes that can lead to responsible levels of consumerism. The Otesha Project is a Canadian youth-led organization that promotes individual and collective sustainable consumption choices.

FACTS:

- It takes the Earth one year and five months to regenerate the resources that we currently consume in just one year (Global Footprint Network, 2009).
- North Americans make up eight percent of the global population, consume 33 percent of global resources, and create 50 percent of the planet's non-organic waste (Center for Ecoliteracy, 2010).
- If every person on the planet lived the same lifestyle as an average Canadian, we would require 4.3 Earths to sustain our global population (Global Footprint Network, 2009).
- Thirty percent of the world's population uses 90 percent of the global ecological capacity (FCM, 2005).
- Eighty-one percent of people live in countries whose own resources cannot renewably sustain their populations (Global Footprint Network, 2009).

Responsible Consumption

Responsible and mindful consumerism is important in curbing the trend of overconsumption. Calculating one's ecological footprint (the quantity of water and land area required to sustain a person's level of consumption and absorb their waste) is the easiest way to measure the level of demand an individual is placing on nature (Global Footprint Network, 2009).

Some ideas on how to reduce consumption:

- Buy less
- Consider purchasing second-hand / used products. Shop at used book stores, thrift shops, online sites
- Purchase more local, organic, unpackaged, unprocessed foods
- Eat less meat products
- Drive less; plan driving routes for the shortest, most efficient route; carpool; purchase a fuel-efficient or hybrid vehicle; avoid idling
- Use public transit, walk, bike
- Turn down heat, turn up air-conditioning (especially when no one is home)
- Off-set emissions by purchasing green power
- Hang clothes to dry, limit use of appliances, use energy-efficient light bulbs and appliances
- Install low-flow, water-efficient toilets and fixtures
- Reduce, re-use, recycle and compost
- Consider the whole lifecycle of a product before you purchase it. (How and where it was made, product contents, origin of contents, how it got to your market, what will happen to the product when you are finished with it, etc.)

Eco Bike Trip

AIM: To find alternative, non-consumption-based forms of entertainment.

MATERIALS: Depends on nature of activities (food, football, bathing suits, etc.)

AGES: 12-14, 15-18

TIME: Undetermined

Note: Activity requires planning ahead. This can be an overnight trip or a day-trip.
Note: If all youth do not have access to a bicycle, make it an Eco Hike Trip.

Introduction:

Find a park in your community that is within biking/hiking distance of the group's usual meeting place. Map out routes to, from and through the park. Determine what outdoor activities the park offers (canoeing, swimming, hiking, nature walks, etc.). Youth should bring a garbage-free lunch/dinner, or prepare garbage-free meals for an overnight trip. Invite youth to leave cell phones, iPods, etc. at home.

Instructions:

Bike/hike to a local park and enjoy eco-friendly activities. If there are no parks within biking distance, use public transportation to minimize emissions. Bring plant or bird identification books for hikes and stop frequently to identify interesting wildlife. Take advantage of any outdoor activities the park offers, like canoeing, swimming, hiking, interpretive nature walks, etc. The youth can play charades, create overconsumption skits, have sandcastle-building contests, play card games, have a soccer game, throw a football, or any other outdoor activity they choose. Youth can perform the other Overconsumption Activities in a field or open space. If staying overnight, have a campfire and tell stories or sing songs.

Discussion:

Going shopping, watching television, going to the movies and playing video games are not necessarily the best (or healthiest) forms of entertainment. It is important to consider the potential impacts of our chosen forms of entertainment. Getting outdoors and disconnecting from the electric grid can improve our health and reduce our levels of consumption. Many alternative options to common activities exist, such as shopping for second-hand items or organizing clothing swaps; instead of going to a coffee shop, brew a coffee at home in a re-usable mug, bring it to the park and read a second-hand book; play board games or go for a walk after dinner with your family instead of watching television.

1. What are some forms of entertainment that you enjoy that do not involve buying new items or directly using electricity or fuel?
2. What are some activities that you can organize with your friends or family on a regular basis to reduce your collective consumption levels?

The Tree of Giving

AIM: To reduce our environmental impact by reducing our consumption levels.

MATERIALS: Recycled paper/cardboard, scissors, markers, leaf templates, masking tape

AGES: 12-14

TIME: 20 minutes

Note: This activity has a follow-up component.

Introduction:

Create a large tree display out of recycled paper and/or cardboard, and place it in a high-traffic area of your building so that it is highly visible. Create a large sign that says, "What would you give (up) to reduce your consumption and live more sustainably?" Cut out enough leaf templates for everyone in the group, plus some additional leaves to place by the tree so that passersby can add leaves to the tree. Create a few leaf examples to attach to the display.

"To reduce my consumption, I will give up clothes shopping for 1 month."
"To reduce my consumption, I will give my change to help plant a tree."

Instructions:

Each youth can write what they will give (up) to reduce consumption on their leaf, and they can decorate it as they please. Youth can make as many leaves as they want to. Once the tree is on display, encourage members, staff and volunteers to add leaves to the tree.

Discussion:

It is important for us to consider different ways that we can reduce our consumption and to take action toward implementing those changes. Committing to the actions displayed on the leaves is a step toward more conscious and responsible consumerism.

1. Why did you choose to give what you did to reduce consumption?
2. Will you encourage others to give something up to reduce their levels of consumption?

Follow-up in 1-2 weeks:

3. Did you find it difficult to follow through with your commitment?
4. Have you achieved the goal on your leaf up to this point in time? How were you able to be successful / why weren't you able to meet your goal?
5. Did your family and friends support you?
6. Will you make other changes in your life to reduce your consumption?

Adapted from: "The Giving Tree" YMCA Peace Building Activity Guide 2009

OVERCONSUMPTION – ACTIVITY 2

LEAF TEMPLATE

Want it or Need it

AIM: To understand the difference between necessity and overconsumption.

MATERIALS: Printed copies of Want it or Need it cards, scissors, pens

AGES: 12-14, 15-18

TIME: 25 minutes

Note: For younger youth, have the group make decisions together.

Introduction:

A new government is being established in your town that wants to provide all youth with basic wants and needs. The wants and needs that the elected government has drawn up are displayed on the cards, and they have asked the youth to add any items that may be missing from the list.

Instructions:

Youth are to form teams of 2 or 3, and each team is given a set of Want it or Need it cards. The teams are to collectively decide upon 5 additional items to add to the list, and write them on the blank cards provided. Announce to the teams that due to economic and political reasons, the government can now only provide youth with 16 of the items on the list. Teams must now decide which 8 items they are willing to give up, and return these cards to the facilitator. Announce that yet more cuts have been made, and the teams must select another 5 items to remove from their list and return those cards. Final cuts have been made and the youth must give up 3 more cards.

Discussion:

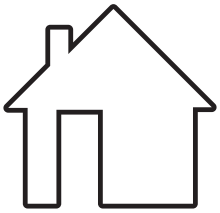
All people share the same basic needs in life, and it is important to ensure that everyone has these needs met before resources are used to produce items from the wants list. Many resources are being degraded or over-used to fulfill wants, while there are people struggling to find enough resources to fulfill basic needs. It is important for us to understand how natural resources are used to produce the items we purchase and for us to all be responsible consumers.

1. What is the difference between wants and needs? Which items on the list were wants and which were needs?
2. Which items did each group eliminate first? Why?
3. Why is it important to understand how the items you purchase are produced and what resources are used? (Ex. Producing some of your wants [electronics] might actually prevent you from having some of your needs [clean water].)
4. How can you reduce your consumption levels?

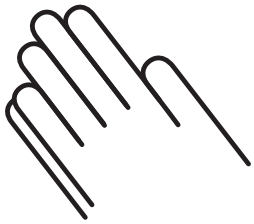
Adapted from: "Wants and Needs" YMCA Peace Building Activity Guide 2007

OVERCONSUMPTION – ACTIVITY 3

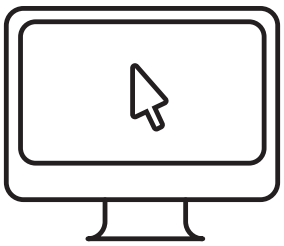
WANT IT OR NEED IT CARDS



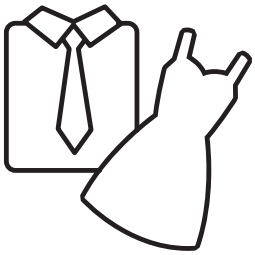
Decent shelter



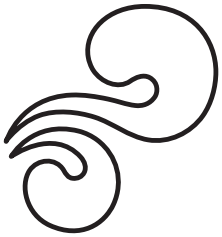
The opportunity to practice your own religion



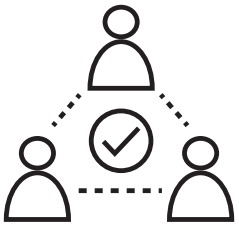
A personal computer



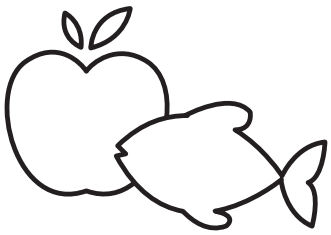
Clothes in the latest style



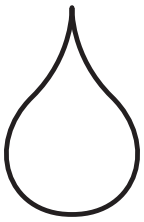
Clean air



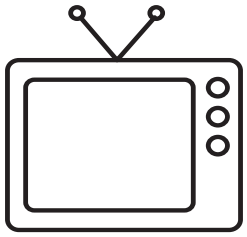
Good relations with friends & family



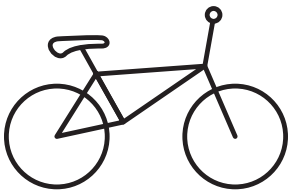
Nutritious food



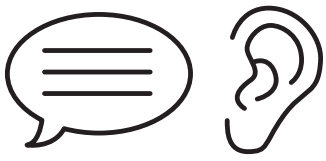
Clean water



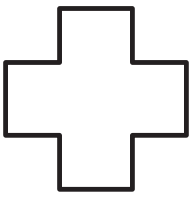
A television set



A bicycle



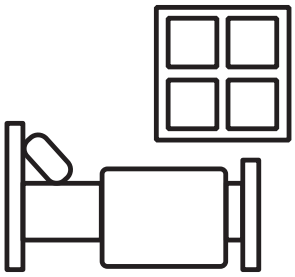
The opportunity to express your opinion and be listened to



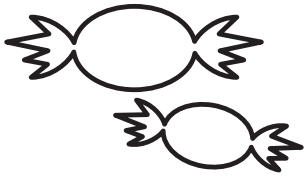
Medical care when you need it

OVERCONSUMPTION – ACTIVITY 3

WANT IT OR NEED IT CARDS

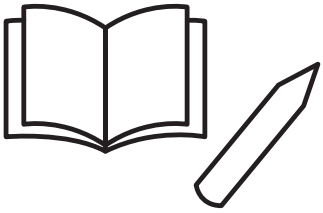


Your own bedroom

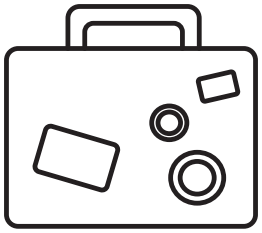


Sweets

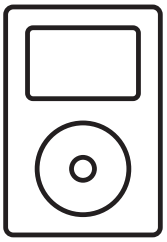
Protection from discrimination



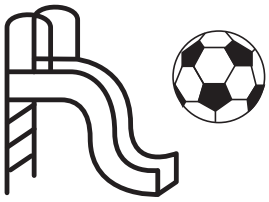
Education



Holiday trips



A personal stereo



Parks and recreation centres

I Am Responsible

AIM: To understand how to be a more responsible consumer.

MATERIALS: None

AGES: 15-18

TIME: 40 minutes

Introduction:

Understanding the global effects of our consumer choices will equip us with the knowledge to make more responsible choices and have a more positive impact on the planet and our global population.

Instructions:

Watch "The Story of Stuff" (www.storyofstuff.com, 20 minutes) and have a discussion surrounding the lifecycle of products (from resource extraction to end disposal), and what responsible consumption really means. Below are some questions to spark discussion.

1. What does responsible consumption mean to you?
2. Why is it important for products to be made from renewable resources?
3. Do you consider where the raw materials for a product were grown or extracted and how they were transported to you before you purchase an item?
4. What are some of the potential environmental concerns surrounding the lifecycle of "disposable" products (like newspapers or plastic packaging)?
5. Why is it important to ask whether a product is fair-trade before you purchase it? (Fair-trade means that workers who produced the item were paid a fair wage and were treated well).
6. What are some questions that you can ask yourself prior to purchasing an item to help you make the best choice as a consumer?
7. Why is buying second-hand products so effective in reducing our impact on the environment?

Discussion:

It is important for us to understand what principles and values guide our choices and behaviours, and how these choices and behaviours impact the world around us. We can then begin to shape our consumer decisions to reflect the values that are most important to us. We can determine what types of changes we wish to see in the world, and lead others by example in making more responsible choices.

Adapted from: "How Do We Impact the Global Environment?" YMCA World Peace Week 2004

A Pea for Me, 2 for You

AIM: To understand how access to resources influences overconsumption.

MATERIALS: 4 bowls, dried peas, teaspoons, straws

AGES: 12-14, 15-18

TIME: 15 minutes

Note: You must know how many youth are participating ahead of time.

Introduction:

Prior to the activity, determine team sizes: split the group into 2 teams at an approximate 4 to 1 ratio (if there are 10 people: 8 in one group, 2 in the other). Multiply the number of people in the large group by 5 to determine the number of peas in each of the 2 bowls. (Ex. if you have 8 people in your large group, you need 40 peas in each bowl [8x5=40, times 2 bowls] for a total of 80 peas.)

Instructions:

Each team lives in a country that is trying to collect enough resources (peas) to sustain their population. Each country has access to different tools for collecting their resources (spoons or straws). Each person needs 5 peas to fulfill their basic needs, and accumulation of any excess peas represents excess wealth.

Each person in the large group gets 1 straw, each person in the small group gets 1 teaspoon, and each group gets 2 bowls spaced 3 meters apart – 1 empty and 1 with peas. Using only the tools (no touching the bowl/peas with their hands), groups must transport as many peas as possible to their empty bowl within 2 minutes.

Discussion:

Roughly 30% of the world's population uses 90% of the global ecological capacity (FCM, 2005). In this activity, a small portion of the group had a large portion of the resources, which can be likened to a small portion of the global population using unsustainable amounts of resources, while the majority struggles to find enough to supply basic needs. The smaller population had more effective tools (spoons) for collecting the resources (peas) and was therefore able to collect them more efficiently. The excess the small group collected can be likened to the excess of resources many developed countries use, fuelled by continually wanting more consumer products.

1. How did you feel when one group had to use straws to transport their peas while the other group got to use spoons? How does this relate to the accessibility of resources globally?
2. Did the small group share with the large group? Why or why not? How does this activity demonstrate overconsumption?

Sit down if...

AIM: To understand how our consumer choices can affect the environment.

MATERIALS: None

AGES: 12-14, 15-18

TIME: 15 minutes

Introduction:

Consumer choices and everyday actions can have an enormous influence over how the environment is managed and how resources are consumed. It is important for everyone to make educated, responsible consumption choices.

Instructions:

Everyone stands while the facilitator reads a list of consumption-related activities 1 at a time (examples below). If youth have completed an activity from the list, they are to sit down. Continue down the list until only 1 person is left standing. That person must state 3 things that they can do next week to consume less. Have everyone stand and repeat the activity, continuing down the list of activities.

Sit down if this week you have:

- Passed up using a dishwasher to wash a small load of dishes by hand
- Composted food waste
- Participated in a carpool
- Purchased a used or second-hand item
- Used energy-efficient light blubs in your room or house
- Collected rainwater in a rain barrel for outdoor use
- Eaten a dinner that did not contain meat
- Taken a shower that is 5 minutes in length or less
- Hung your clothing to dry instead of using a dryer
- Decided not to buy a product that you did not need
- Walked to a destination instead of taking the car
- Eaten something organic
- Given away a personal item that you no longer use (clothing, a book, a piece of furniture)
- Considered the full lifecycle of a product before buying (or not buying) an item
- Known whether there are aerators on your faucets at home

OVERCONSUMPTION – ACTIVITY 6

Discussion:

Current consumption trends are extremely unsustainable and are draining resources faster than they can naturally replenish themselves. This is producing excessive quantities of waste and cannot be maintained over the long-term. Each person must maintain a sustainable level of consumption if we are to live within the planet's means.

1. What are some other ways to lessen your current consumption habits?
2. Choose a way to reduce your consumption for 1 week. Follow-up after a week to see whether youth were able to maintain their chosen action.

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Activity 5

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Glossary

Ecological footprint – the amount of productive land appropriated on average by each person (in the world, a country, etc) for food, water, transport, housing, waste management, and other purposes

All definitions from Dictionary.com

WASTE & LANDFILLS

Waste & Landfills

Waste is "...any material that is considered to be of no further use to the owner and is, hence, discarded" (Taylor & Allen, 2010). The extremely fast rate at which technology is improving fuels a high-quantity, low-quality production of goods with short life-spans. When this is paired with a societal mindset that stresses that the best, most up-to-date products and technological devices make us look and feel more successful, we create a consumption-based society that is producing more waste than the planet can sustain. Humans are the only species that produce waste that cannot be naturally "recycled" by nature, and therefore, we must either destroy or store this waste. In most regions of the world, landfills are the most common method of organized waste disposal, because they are generally the simplest and most cost-effective.

Landfills can present a variety of environmental problems when in close proximity to, or on top of ecologically sensitive areas, such as the contamination of aquifers, farmlands, floodplains, wetlands or marshes, lakes or rivers. (Native Women's Association of Canada). Considering the potential environmental impacts of landfills, it is imperative to increase our efficiency in waste diversion and reduce our consumption levels to limit the quantity of landfills needed.

Composting is one of the primary means of waste diversion, and Environment Canada (2001) estimates that 45 percent of all waste is compostable. Composting involves separating organic materials, such as food scraps and plant matter, from our waste and placing it in an environment that encourages microorganisms to decompose the organic matter. The result is called humus, and can be added to soil to improve fertility. When organic materials are properly composted, they do not release methane, a potent greenhouse gas, as they would if they decomposed anaerobically (without adequate oxygen) in a landfill.

In addition to composting, other effective examples of waste reduction and diversion include increased durability and reuse of products; better product design to allow for complete disassembly and recycling; responsible product selection by consumers; and more effective recycling programs.

FACTS:

- In 2006, Canadians disposed of more than 35 million tonnes of waste, 27 million tonnes of which was sent to landfills or incinerators, with eight million tonnes sent to compost and recycling facilities (Statistics Canada, 2008).
- The European Union disposes of three billion tonnes of waste each year; 90 million tonnes of it being hazardous (European Commission, 2010).
- In Alberta, 31 percent of municipal solid waste is organic, while 34 percent is paper – all of which can be diverted from landfills (Government of Alberta, 2010).

Methane to Energy

When organic wastes decompose in a landfill, they create methane, a greenhouse gas that is over 20 times more potent than CO2 (EPA, 2010a). In the U.S., landfills are the second largest producer of methane, responsible for 22 percent of emissions in 2008. Methane from landfills can be captured and burned to generate electricity, heat or alternative fuel for vehicles (EPA, 2010b). This process provides many benefits, including breaking down landfill methane and preventing it from contributing to global warming; generating consistent, renewable energy while offsetting the use of non-renewable energy sources (such as coal or oil) and their associated CO2 emissions; and creating new jobs and local revenues (EPA, 2010b). Canada's Waste Management system has generated 75 billion kilowatt-hours of energy that can power 700,000 homes every day using landfill methane (WM, 2010).

Ghana Waste Management

The Eastern Regional YMCA of Ghana has developed Waste Management Clubs in some schools to deal with a lack of proper infrastructure for disposal of waste and wastewater. Open dumping of solid waste into a streambed whose water is used for drinking, and disposal of raw, untreated sewage into open pits are two of the problems that need to be addressed. The youth participating in the Waste Management Clubs work to address the problems and identify potential solutions surrounding local waste management, and are empowered to make changes to better the condition of the environment.

(Information provided by YMCA of Greater Toronto and YMCA of Ghana)

Composting in Lebanon

Rural Lebanon was seeing evidence of environmental degradation due to improper household waste disposal up until four years ago, when the YMCA of Lebanon created an environmentally-friendly solution. Sixty-two percent of the household waste the area produces is organic, so they introduced a method called dynamic composting that utilizes ventilated rotating drums that act to speed up the rate of natural decomposition. This method increases decomposition rates from two to three months to just three days, is odorless, natural and non-toxic and the product can be used as a fertilizer. The process requires very little maintenance and is easily managed by the community. The remaining non-organic waste is recycled. This process is now in use in communities across Lebanon. Additionally, the YMCA has developed environmentally-friendly methods for wastewater and sewage treatment and has started environmental sustainability awareness campaigns in schools.

(Information from YMCA World: YMCAs and the Environment, 2007)

Creative Repurposing

AIM: To consider potential alternatives to throwing items in the trash.

MATERIALS: Craft supplies (scissors, needles/thread, hot glue, tape, pens, etc.)

AGES: 15-18

TIME: 30 minutes

Note: Prior to the activity, youth are asked to bring in an item that was once useful to them that they are going to throw away (ex. clothing, toy, magazine, etc.).

Introduction:

When fashion styles change or technology is updated, possessions can seem obsolete and may be disposed of. An alternative to disposal of functional products is to give them away (ex. an "old" cell phone), or repurpose the items to become useful again to the original owner (cut the flare/skinny off your jeans and turn them into capris or shorts). Thinking of creative ways to use non-functional items (shattering a broken vase to create a mosaic) can be fun and can reduce waste.

Instructions:

Assign teams of 2 or 3 to brainstorm ways to repurpose their items.

Examples of repurposing items for facilitator reference:

- Sock with a hole in the toe: dust cloth or sew the hole closed.
- Stack of one-sided used paper: cut each sheet into quarters and make into a notepad.
- Old clothing: cut into squares and sew edges to create handkerchiefs or napkins.
- Old dishes: use as camping dish set instead of disposables.
- Shoe box: paint the outside so it looks nice (use no VOC paint), use as a storage box.

Youth can work together to follow-through with repurposing any items for which the resources are available.

WASTE & LANDFILLS – ACTIVITY 1

Discussion:

We live in a throw-away society wherein items are often disposed of when they become obsolete or break, even if they can be repaired. Many people would not take the time to sew the hole in their sock, and would instead dispose of it and buy a new pair. This trend results in huge quantities of waste that usually end up in landfills. It is important to consider what we are disposing of, and whether it could be fixed or reused.

1. Why should we consider alternate uses for an item before disposing of it?
2. Why are purchasing second-hand items and giving away items that you no longer use important steps in managing our waste?
3. Does cost reflect our willingness to fix an item if it breaks? (Sock vs. TV)
4. Why do you think we are more concerned with cost than the amount of waste we create? (Ex. We don't usually deal with waste once it leaves our curb; we are used to a throw-away society; easier to buy a new item than to fix it; etc.)

Undercover Polluters

AIM: To consider the impacts of landfills and why we should produce less waste.

MATERIALS: Sheet of recycled one-sided paper, a pen

AGES: 15-18

TIME: 10 minutes

Introduction:

The Polluters are attempting to create landfills in local, ecologically sensitive areas. The Environmentalist is trying to save the Ecosystems from becoming landfills, and the Police Officer is trying to arrest the Polluters. The Moderator is the only person able to speak. Youth select 1 of the following secret roles from a hat: Environmentalist, Police Officer, Polluter, Moderator, Ecosystem. (Need 1-2 Polluters; Ecosystems fill any extra roles.) Moderator silently records roles for their own reference.

Instructions:

Everyone except the Moderator sits in a circle facing each other and closes their eyes. The Moderator is the only one able to speak. The Moderator instructs the Polluters to open their eyes and silently agree upon and point to someone that they think is an Ecosystem that they will pollute. The Moderator records the decision and the Polluters close their eyes. The Police Officer opens their eyes and points to someone they believe to be a Polluter and the Moderator nods yes or no. The Environmentalist silently indicates someone that they believe is an Ecosystem and will save. Everyone is to then open their eyes and the Moderator states whether an Ecosystem has been turned into a landfill. If the Ecosystem was not saved, s/he is out of the game. If the Police Officer identified a Polluter, they are to arrest the Polluter and remove that participant from the game. The Moderator is to then select someone to make an accusation of whom they believe is the Polluter and why. The accused will have a chance to defend her/himself before everyone else votes whether or not to keep that participant in the town. Once all Polluters are arrested / relocated, the game is finished.

Discussion:

Landfills can be extremely detrimental to the environment if placed on a fragile or ecologically important ecosystem, such as near an aquifer or marsh.

1. Would you reconsider how much you throw away if you had to store all of your waste in your backyard or on your balcony?
2. Where do you think an ideal place would be to put a dump that won't harm the environment or species that live around it (including humans)?

Campaign Strategies

AIM: To understand the power and influence that advertisements have over us.

MATERIALS: Paper, markers

AGES: 15-18

TIME: 30 minutes

Introduction:

It is possible to change people's mindsets surrounding environmental issues, as can be demonstrated by the Don't Mess With Texas anti-littering campaign that has reduced litter on Texas roadways by more than 1/3 (Don't Mess With Texas, 2010). It is important to educate the public on how to reduce their outputs of waste to minimize the quantity that needs to be stored in landfills. Reducing our electronic waste, or e-waste, is important as it contains hazardous, toxic materials that can contaminate the air, soil and water that sustains communities.

Instructions:

Assign teams of 2-3 (for younger youth assign larger group sizes) and have teams brainstorm a creative and promising potential solution to the current issues of waste production and / or management / storage. (If youth are having trouble with ideas: reduce consumption rates, purchase second-hand items, manufacture items to be durable and fully recyclable, alter consumer mindsets that upgrading electronics for the sake of upgrading is not the "cool" thing to do, etc.) Youth are to develop a strategy for visually portraying their message, and then come up with a visual advertising campaign (poster) to promote their waste reduction strategy.

Discussion:

We see countless advertisements each day in the newspaper, on television, on public transit or walking down the street. Convincing advertisements encourage us to purchase consumer products and can influence our opinions.

1. Have you seen any advertisements today that have influenced your ideas or consumer choices?
2. Do you think that you have seen any advertisements today that you didn't realize you saw or were influenced by?
3. Do you think that your advertisement could influence other peoples' opinions or choices in a positive way?
4. Do you think that your strategy is feasible and would provide an effective solution to waste production / management?

Changes

AIM: To understand how we can change our behaviour to reduce our waste.

MATERIALS: 3 half-sheets of paper & red, yellow, green markers for each youth

AGES: 12-14

TIME: 20 minutes

Introduction:

Reducing the amount of waste we create can be achieved through a change in mindset, for example, thinking twice about whether you need a new cell phone when the one you have works perfectly fine; bringing reusable cloth bags shopping instead of using plastic ones; reaching for a towel to clean a spill instead of paper towels; or purchasing a used t-shirt that is new to you instead of buying a brand new one. There are many behavioural changes that can effectively reduce our output of garbage.

Instructions:

Hand out 3 pieces of paper and a red, yellow and green marker to each youth and have them spread out so that they each have their own space. They are to silently use the red marker to write down 1 of their own behaviours that they have noticed is wasteful would like to stop. With the yellow marker, they are to write down a behaviour that they would like to continue practicing. With the green marker, they should write a change that they will make in their lives to reduce waste levels. Collect the papers and post them on the wall. Spend time reading each idea.

Discussion:

Recognizing and being conscious of how your actions affect the environment and how your behaviours can influence others are important steps in affecting change. Leading by example is an effective way to encourage behavioural changes in the people surrounding you, as is starting a discussion that allows you to educate others on environmental issues and why they concern you. This approach can present new ideas and insight to people that may not have previously considered a topic to be of concern.

1. What are some changes that you can make in your life to reduce the amount of waste that you create?
2. How can you make the people around you aware of those changes?
3. How can you influence others to reduce the quantity of waste they create?

Adapted from: "When your group is feeling explosive" Global Youth Forum. YMCA of Windsor and Essex County, YMCA of Greater Toronto, YMCAs of Cambridge & Kitchener-Waterloo

Categories

AIM: To inspire and share creative ideas on reducing our waste.

MATERIALS: Recycled paper and a pen for each group, watch or clock

AGES: 15-18

TIME: 10 minutes

Introduction:

It seems as though we are never satisfied with what we have. We always want more material goods, which can result in huge quantities of waste.

Split the youth into 2 or 3 teams.

Instructions:

The facilitator is to read out 1 of the following category topics at a time. The groups have 3 minutes to come up with and write down as many words or phrases as they can that relate to the category. Have groups share the ideas they came up with, and whichever team has the most ideas scores a point. The facilitator then reads the next category aloud and youth compete again.

- Things that are more important than newer versions of your possessions. (Ex. Friends, family, clean & healthy environment, a home, food, clean water, a computer that works even if it's not the latest, coolest laptop, etc.)
- Ways that you could reduce the amount of garbage you generate.
- Compostable items.
- Recyclable items. (Don't forget electronics: cell phones, TV's, computers, etc.)
- Negative environmental impacts of producing so much garbage. (Ex. Wildlife caught in or choking on plastics, electronics leaching toxins, landfill runoff contaminating soil or water, methane and CO2 air pollution, creating massive quantities of products uses massive amounts of resources, etc.)
- Things that you could buy second-hand. (Ex. Clothing [shirts, pants, etc.], décor [artwork, vases, etc.], appliances [toasters, mini refrigerators, etc.], electronics, etc.)

Discussion:

It is important for everyone to adopt mindsets that are not focused on personal image or consumption of unnecessary products. Consciously choosing products that are fully compostable or recyclable and avoiding products with excess packaging can drastically reduce the quantity of waste we produce.

1. What actions have you identified that you can do to reduce your waste?
2. Do you think that the waste management systems in Canada are as effective as they can be?
3. Can you recycle and compost everything within your area that you should be able to?

My Way, Not on the Highway

AIM: To consider how our waste should be managed and the effectiveness of our current systems.

MATERIALS: One-sided used paper, markers, pens

AGES: 15-18

TIME: 20 minutes

Introduction:

Across Canada, demand for recycled materials and financial capacity for infrastructure determines what level of programming is in place for recycling and composting initiatives. Additionally, many Canadians don't know what is and isn't recyclable in their area. Individuals can check with their municipality about what is recyclable and learn about proper methods of recycling and composting for their area.

Instructions:

Split the group into teams of 2 or 3. Groups are to come up with what they believe to be the best method / strategy for managing waste. Each team is to find their own space to have a discussion to determine their strategy. Teams can be as creative and ideal in their thinking as they wish. It does not have to be realistic at this point in time, but the plan needs to make sense. Groups can use visual aids and diagrams if they so choose.

Have each group share their ideas and the reasoning behind why they believe their idea presents the best strategy for waste management.

Discussion:

Considering creative and innovative solutions to environmental problems, like waste production and disposal, can get us thinking about ways that we can incorporate smaller-scale changes into our daily lives. Focusing on solutions rather than problems generates optimism and encourages people to find new answers to the problems we face.

1. Were the ideas similar to the waste management systems already in place in your area or did the groups come up with completely new ideas? Do you think that your idea would be more effective than current waste management practices?
2. Do you think that your idea could be effectively implemented one day? Why or why not?

Movie Time

AIM: To note the current, unsustainable quantities of waste being produced.

MATERIALS: DVD player, T.V., wall-e DVD, organic popcorn, bowls

AGES: 12-14, 15-18

TIME: 1 hour 45 minutes

Introduction:

The premise of this movie is very suitable to the theme of waste and landfills. The world's landscape has been essentially converted into a giant landfill, and life can no longer survive off of the land's resources (with the exception of a cockroach), as the natural environment has been overtaken by garbage.

Instructions:

Watch the movie and eat some organic popcorn!

Discussion:

This movie emphasizes the need for us to slow down our consumption rates and focus on producing less waste so that we do not destroy the environment. Humans are the only species that produce waste that cannot be naturally broken-down and recycled by the environment, and that waste usually ends up in landfills. Landfills can have a variety of negative effects on the environment. When organic wastes decompose in landfills, they emit methane gas, which is over 20 times more potent than CO2 as a greenhouse gas (EPA, 2010a). Landfills can also leach wastewater that could contain a multitude of different toxins and hazardous materials into the soil or water.

1. Do you think that the Earth could ever become so overridden with garbage that life as we know it cannot be sustained? (In terms of species that can survive and our regular way of life, not like in the movie where the world becomes desolate and humans relocate into space.)
2. How can we prevent massive mountains of non-organic (not natural) waste from being created?
3. Why is it important that we reduce our waste output immediately?

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Activity 3

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Glossary

Desolate – barren or laid waste; devastated

Humus – the dark organic material in soils, produced by the decomposition of vegetable or animal matter and essential to the fertility of the earth

Incinerator – a furnace or apparatus for burning trash, garbage, etc., to ashes

E-waste – any discarded electronic or electrical devices or their parts; also called electronic waste

All definitions from Dictionary.com

RECYCLING

Recycling

Recycling is a process wherein the useful materials contained in used products are made into new items. Recycling helps to reduce the disposal of good materials and limits the quantity of trash that enters incinerators or landfills, which prevents air and water pollution that is generally associated with these practices. There are many types of recyclable materials, including certain paper, plastic, metal, electronics and glass.

Americans purchase approximately 29.8 billion plastic bottles of water each year, 80 percent of which are disposed of in landfills (earth911.com, 2010a). Recycling one plastic water bottle can save the energy required to power a 60-watt light bulb for roughly six hours, yet less than one percent of our total used plastics are recycled (earth911.com, 2010a). Using recycled aluminum instead of raw bauxite to create new aluminum products reduces both air pollution and energy usage by 95 percent (City of Edmonton, 2007). Additionally, mining for raw materials can be detrimental to surrounding ecosystems and communities in terms of pollution and habitat destruction. Reducing our reliance on and consumption of raw materials for production of new items conserves resources and helps to keep habitats and ecosystems intact. Recycling can reduce consumption of fossil fuels and production of greenhouse gases when compared to manufacturing with raw materials.

There are many organizations across the country that work to recycle a variety of products, including electronics, milk cartons, tires, hazardous household products, paints, etc. For example, the City of Edmonton hosts year-round Eco-Stations that collect household hazardous waste, and in 2006, had 130,000 vehicles drop off waste (City of Edmonton, 2007). Another example is Boomerang Recycled Paint, which collects unused paint and recycles it into a high quality, inexpensive, environmentally-friendly option for consumers. Retire Your Ride is an example of a national organization that recycles old vehicles in an environmentally responsible manner; hazardous materials are removed (such as operating fluids), usable parts are recovered and the vehicle is properly recycled (Retire Your Ride, 2010).

It is important for consumers to participate in recycling programs and to purchase products that contain recycled, post-consumer materials to increase the demand for recycled products and keep these items out of landfills.

FACTS:

- E-waste is responsible for 70 percent of the toxic heavy metals found in landfills (SPEC, 2009).
- By weight, 75 percent of the average car's parts are recyclable (Retire Your Ride, 2010).
- Only 11 percent of global electronic waste is recycled (UBC, 2008).
- Recycling one pound of plastic uses 91 percent less energy than does recycling one pound of paper (earth911.com, 2010b).

E-Waste

There are 20-50 million tonnes of electronic waste (cell phones, computers, TV's, etc.), or e-waste, discarded globally every year (Greenpeace USA). The United States and Canada are creating vast mountains of e-waste by constantly purchasing new, upgraded versions of electronic products and disposing of old or obsolete technology. Only 11 percent of global e-waste is recycled, therefore most ends up in landfills or is shipped to other countries (UBC, 2008). In landfills, toxic chemicals and heavy metals, such as lead, cadmium, mercury and arsenic can leach out of the products and into the soil, air and water (UBC, 2008).

If electronics producers were to manufacture durable products containing no hazardous materials that are designed for safe and proper recycling, there would be a significant reduction in waste. Accessories (like chargers) should be compatible with updated versions and full lines of products, or should be upgradeable without replacement of the full device.

Some progress has been made regarding the proper recycling of e-waste. The Basel Convention is an international agreement intended to address the challenges and problems surrounding the disposal of hazardous waste (Basel Convention). Its main objectives are to minimize the quantity and hazardousness of waste; to reduce the travel of hazardous wastes; and to keep disposal sites as close to the source of origin as possible (Basel Convention). In Canada, British Columbia's provincial government introduced legislation in 2006 requiring recycling of e-waste (SPEC, 2009).

Making Paper in Colombia

Youth at the YMCA of Colombia in Medellin are producing paper products (hand-made cards and notebooks) from local recyclable trash. They use sugarcane bagasse (the fibers leftover after the juice has been extracted), cigarette boxes, hemp vegetable fibers and stalks of elephant grass. The youth sell the items they make to generate a modest income. This project reduces the quantity of waste in the community by using spent materials to produce products that are useful again, it teaches community members and the youth about the importance of recycling and teaches the youth entrepreneurial skills and responsibility.

We're Knot Tangled

AIM: To consider the benefits of simplifying our waste management systems.

MATERIALS: None

AGES: 15-18

TIME: 10 minutes

Introduction:

In Canada, most recycling systems are not well-structured; they vary by area and usually do not include all of the products that they could. Governments should simplify these complicated systems, creating a circular cycle wherein manufacturers take back spent items and reuse these same materials to make new products.

Instructions:

Have youth come up with a recyclable product to represent each hand in the game.

Youth stand in a tight circle facing one another and extend their arms out in front of them, grasping 2 random hands (not the people directly beside them). The group then works together to untangle themselves and form a circle, keeping all hands joined at all times.

With a large group, you can separate into 2 teams and race to see who can untangle their team the fastest.

Discussion:

Our recycling systems are not as well-structured as they could be and would be much more effective and beneficial to the environment if we could better organize them, like the group did when they moved from a knot into a simple circle. Accepting more items into the system and improving consumer education would be beneficial, as would developing a system wherein the manufacturer / distributor takes back all used products and recycles them into new products using the same materials.

1. How do you think that we could improve the current recycling process and allow for more items to be recycled? (Ex. Increased fund allocation toward better infrastructure; consumer education and increased demand for recycled products; change in mindset of manufacturers / distributors; etc.)
2. How can you help to improve our recycling system? (Ex. Recycle properly; choose products that contain recycled materials; increase awareness; increase demand from stores for post-consumer recycled products; etc.)

Responsible Recycling

AIM: To promote proper recycling and composting practices in your community.

MATERIALS: Proper local waste management recycling & composting instructions, chalkboard & chalk, paper & pen

AGES: 15-18

TIME: 30 minutes

Introduction:

Have a discussion surrounding proper recycling and composting practices in your area. You can find this information on your municipal waste management website, or by contacting your local waste management service. *Check that youth understand how to properly recycle before commencing with the activity.*

Instructions:

As a group, brainstorm ways to promote proper recycling and composting practices within your school, community or organization. Some examples would include creating encouraging informational posters; making fun and creative presentations to other youth groups or in schools; making bookmarks that encourage composting; creating contests for schools or organizations that measure quantity of waste diverted from landfills; etc. Once a list of 5 to 10 items has been created, ask the youth to choose 1 activity to implement. Create a simple and realistic plan for execution of the idea to ensure success. Be sure to include a timeline, a list of materials needed, a task list, role allocations and goals for the project.

Discussion:

Actively educating others on environmental issues and potential solutions or alternative choices can encourage long-term behavioural changes, such as choosing to compost consistently.

1. Why did the group select the activity that they did to implement?
2. Do you think that this activity will have a significant impact on its audience?
3. Do you think that your activity will encourage its audience to change their behaviours?

Make sure to assess the implementation of the activity, including what went well, how successfully you organized the activity as a group and what could be done differently next time to increase effectiveness.

The Perfect Park

AIM: To recognize the aesthetic appeal of reducing quantities of trash.

MATERIALS: One-sided recycled paper, pens

AGES: 12-14, 15-18

TIME: 30 minutes

Introduction:

Split the group into 3 or 4 teams, and give each team a piece of recycled paper and a pen.

Instructions:

Your city (or town) is creating a new park in your neighbourhood and they are looking for input from local youth. The teams are to describe (by listing words or drawing pictures) the ideal park to have in their community. Teams must consider all of the different elements of a park, and then the youth will vote on which design to "present to the city".

Once all of the teams have finished creating their parks, have everyone come together to share their ideas, and then vote on which park to present to the city.

Discussion:

Waste, or trash, does not generally fit into our image of an ideal park or landscape and we should therefore ensure that our communities remain as clean as possible. It is important that individuals put in the time and effort to find the proper trash, recycling or compost bin instead of disposing of their litter on the ground. Recycling 1 plastic water bottle can save the energy required to power a 60-watt light bulb for about 6 hours, yet we recycle less than 1% of our used plastics (earth911.com, 2010a).

1. Did the ideal park that you created have litter on the ground?
2. Did the park have trash cans and recycling bins or was garbage not included as an ideal element?
3. How is your ideal park similar or different than the actual park closest to your community?
4. How can we reduce the quantity of litter in parks and in our communities to ensure that the landscape is clean for future generations? (Ex. Produce less waste; buy products with less or no packaging; responsible consumers who place trash in the proper receptacles; education; better waste management systems; etc.)

Taking the Right Steps

AIM: To recognize the value of teamwork and collaboration in solving environmental problems.

MATERIALS: 7 sheets of paper (or stepping stones), masking tape

AGES: 12-14, 15-18

TIME: 20 minutes

Note: Activity requires minimum of 6 youth

Introduction:

Line up 7 sheets of paper on the ground a step apart and tape into place.

Instructions:

Three youth stand on the stones (paper) on the left side and 3 youth stand on the stones to the right. The middle stone remains empty. The youth on the left are recyclable items that have been placed in the trash, and the youth on the right are non-recyclable items placed in the recycling. The objective is for the youth on each side to move into their proper bins. Youth can only move in 1 direction (youth on the left can only move right & vice-versa), 1 space at a time. Youth can also jump a stone if there is a free space on the other side of the person.

Example: I I O I I I

Each "I" is a youth, the "O" is the empty stone. The first "I" could jump the second "I" because there is a free stone on the other side (like checkers). If there are more than 6 youth and the first 6 do not solve it right away and have to start over, switch places with the remaining youth for the second attempt. Any youth that are not standing in the game should contribute ideas toward the solution.

Discussion:

This activity is much easier to complete when everyone participates, contributes ideas and listens to one another. This is also an effective strategy for implementing solutions to environmental issues, like recycling, because when everyone participates we have a significant impact on the quantity of waste that is diverted from landfills. When we share ideas and knowledge, we can help to start recycling programs where they don't yet exist and create a demand for recycled products by purchasing goods made with recycled materials.

1. Did the group succeed the first time they attempted to solve the problem? Why do you think you did / did not succeed?
2. Why is your participation in environmentally-friendly initiatives, like proper recycling, so important? (If everyone participates we will have a significant impact.)

You, Me and We

AIM: To understand our responsibility in being good environmental stewards.

MATERIALS: 2 or 3 bags of random objects, half of which should be recyclable (ex. pop can, rock, newspaper, onion, rubber band, shampoo bottle, spoon, shoe box, penny, etc.)

AGES: 12-14, 15-18

TIME: 25 minutes

Introduction:

Split the group into 2 or 3 roughly equally-sized teams and give each team a bag of objects.

Instructions:

Teams must use all of the items in their bag to create a skit about the personal responsibility of recycling properly and consistently. The items can be used in any way the team chooses, but all items must be utilized. Once teams have been given adequate time to create their skit (10-15 minutes or so), ask the teams to come together and present to the group.

If there are other groups of youth / children (such as child care) in your facility, consider presenting the skits to them.

Discussion:

Viewing environmental problems and their potential solutions in a positive light can make adopting behavioural changes in our every day lives seem easier and more appealing. Change is sometimes difficult to embrace, yet it is essential that we understand the impacts of our actions and take responsibility for them. Our actions will then have a more positive effect on nature and on our communities.

1. Do you recognize that it's ultimately your decision whether or not you practice environmentally-friendly behaviours? Why is this important to recognize?
2. Do you think that the people around you recognize their responsibility in being good environmental stewards (people who take care of the environment)? How can you encourage them to make more environmentally-conscious decisions?
3. Do you think that if everyone took their responsibility seriously current rates of environmental degradation would stop? Why or why not?

Electronic Mountains

AIM: To enhance knowledge surrounding e-waste and its proper recycling.

MATERIALS: Computer with Internet, re-used paper and pens for each youth

AGES: 12-14, 15-18

TIME: 15 minutes

Introduction:

There are 20-50 million tonnes of electronic waste, or e-waste, discarded globally every year (Greenpeace USA). Only 11% of global e-waste is recycled, therefore most ends up in landfills or is sent to other countries for disposal. In landfills, toxic chemicals and heavy metals such as lead, cadmium, mercury and arsenic can leach out of the products and into the soil, air and water (UBC, 2008).

Instructions:

Find approximately 5 e-waste images on the Internet - a good link from Time magazine: http://www.time.com/time/photogallery/0,29307,1870162_1822148,00.html (Time, 2010), or you could type "e-waste images" or "e-waste in China images" into a Google search, for example. Give each youth a piece of paper and a pen. Bring images up on the computer screen, 1 at a time, taking a few moments to quietly view each image. Give youth time to record their thoughts of the image on their piece of paper, then move on to a new photo. Once the group is finished viewing the photos, view each photo again and have youth share their thoughts on each one.

Discussion:

Consumers are constantly updating their electronic devices, which fuels the disposal of vast quantities of e-waste. Additionally, fixing broken devices often costs more than purchasing new ones, which intensifies the problem.

1. Does it surprise you to know how much e-waste is produced?
2. Do you know where to take your electronics to be recycled in your area? (See Additional Resources section for some listings.)
3. Will you learn about where to / how to properly recycle your used electronics if you don't already know?
4. Would you pay more for an electronic product that was built better so it would last you longer, or do you prefer to update your products frequently? What are the environmental implications of each choice?

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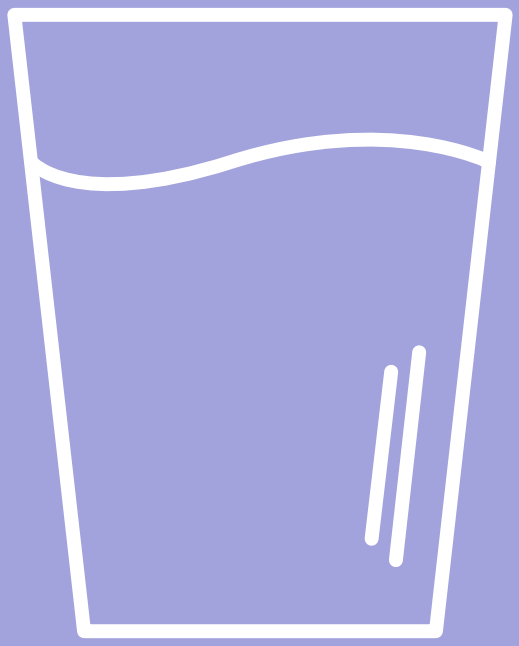
Glossary

Incinerator – a furnace or apparatus for burning trash, garbage, etc., to ashes

Bauxite – a rock consisting of aluminum oxides and hydroxides with various impurities: the principal ore of aluminum

E-waste – any discarded electronic or electrical devices or their parts; also called electronic waste

All definitions from Dictionary.com



WATER POLLUTION

Water Pollution

The United Nations General Assembly declared on July 28th, 2010, that access to clean, safe drinking water and sanitation is a human right. Approximately 2.4 billion people around the world lack proper sanitation facilities, and globally, 20 percent of people do not have access to safe drinking water (UNEP, 2008). Research demonstrates that pollution is threatening all regions of the world's freshwater supplies, for example, ¾ of the rivers in Poland, Slovakia and Czech Republic are so polluted that their waters cannot even be used for industrial purposes, 75 percent of Russia's water has been deemed unsafe for consumption, and the Yellow River in China is so polluted that it should not even be used for irrigation (Barlow & Clarke, 2002).

There are many sources that can pollute the groundwater and surface water that communities and wildlife rely on for sustenance, including landfills, sewage, oil spills, leaky gas tanks, road salt, mine tailings, agricultural runoff (pesticides, fertilizers, manure, sediments), septic tank leaks, etc. (Barlow & Clarke, 2002). Each year, 300 to 500 million tonnes of waste, such as toxic sludge, heavy metals and solvents, accumulate from industrial activities worldwide and 70 percent of that which is produced in developing countries is released into waterways untreated (UNESCO[a]). There are approximately 63,000 chemicals currently being used worldwide, 4500 of which are persistent organic pollutants (POPs) that are not easily broken down in nature and accumulate in marine species' tissues (Greenpeace International, 2010a). These POPs can cause a wide range of health problems when consumed by humans, including cancer, reproductive and developmental problems and can suppress the immune system (Greenpeace International, 2010a). More than 360 different chemical compounds have been discovered in the Great Lakes, including DDT and mercury (SDWF, 2009). A single gram of PCBs (polychlorinated biphenyls) – a substance found in items like cosmetics and pesticides - can render one billion litres of water unsafe for aquatic wildlife (Barlow & Clarke, 2002).

One way to help ensure that Canadian water supplies stay safe and drinkable is to prevent chemicals and pollutants from entering the water systems. Consumers can help to prevent water pollution by making responsible choices, such as purchasing biodegradable household cleaners; not applying pesticides or herbicides to lawns; using compost as fertilizer; ensuring vehicles are running properly and there are no fluid leaks; properly disposing of any toxic chemicals; etc. The Canada - U.S. Great Lakes Water Quality Agreement outlines a commitment from both countries to restore and maintain the integrity of the Great Lakes ecosystem (Environment Canada, 2010). The Jane Goodall Institute is an example of an organization that is helping to clean up Canadian waters through its Great Canadian Shoreline Cleanup - an initiative that encourages volunteers across the country to collect and properly dispose of litter along Canadian shorelines.

FACTS:

- Two million tonnes of human waste are dumped into water bodies each day (UNESCO[b]).
- Around 200 synthetic chemicals have been found in municipal water sources, including PCBs ammonia, arsenic, mercury, aluminum, and chlorinated dioxins (Barlow & Clarke, 2002).
- Much of North American and European commercially-sold bottled water is taken from contaminated water sources containing human, animal and industrial waste (Barlow & Clarke, 2002).
- Each year, approximately two million people die of water-borne diseases resulting from faecal pollution in surface water (UNEP, 2008).

Wastewater

Wastewater is produced by industries and by household activities like flushing the toilet, doing laundry or doing dishes. In the developing world, 90 percent of wastewater is expelled untreated into local rivers and waterways. There are 40 million tons of raw sewage and industrial waste flowing into China's Yangtze River each day, and the Yamuna River in India receives almost 200 million litres of raw, untreated sewage daily from Delhi. In Canada, over one trillion litres of untreated sewage pour into our waterways each year, and the water that is treated still contains a diverse mixture of toxic chemicals, such as PCBs (polychlorinated biphenyls), arsenic, pesticides and metals (Barlow & Clarke, 2002). Many Canadian municipal wastewater collection pipes are connected to storm drain pipes that collect rain water, so when there is a significant amount of rain the treatment facilities are unable to manage the increased volume and the untreated water is released directly into waterways (Ecojustice, 2008). It is therefore important to be conscious about what is put down the drain and to ensure that toxic chemicals are disposed of properly.

Plastic in the Oceans

Trash and pollutants can be washed by rain or blown by wind into storm drains or waterways, where they can be carried out to the oceans and transported long distances by currents. The North Pacific Gyre is a point at which multiple ocean currents meet, and it contains a mass of garbage the size of Texas, wherein plastic is six times more abundant in the water than plankton (Greenpeace International, 2010b). The plastics that wash into the oceans break down into small pieces that marine wildlife often mistake for food. An estimated one million birds are killed each year from consuming plastics that they have mistaken for food or from entanglement in trash (Greenpeace International, 2010b). Additionally, of the plastics found in the oceans, 70 percent are located on the ocean floor where they can smother the marine organisms that live there (Greenpeace International, 2010b).

Colourful Ideas

AIM: To explore different ways of learning about sources of water pollution.

MATERIALS: Recycled paper, blank paper, pens, black markers, paper clip

AGES: 12-14

TIME: 30 minutes

Introduction:

The North Pacific Gyre is a point at which multiple major ocean currents meet, and it contains a mass of garbage the size of Texas, wherein plastic is 6 times more abundant in the water than plankton. The plastics that wash into the oceans are broken down into smaller and smaller pieces that marine wildlife can mistake for food (Greenpeace International, 2010b).

Instructions:

The youth are to each create a page for a colouring book that will emphasize the importance of protecting wildlife by preventing pollution from entering oceans and waterways. Youth are to spend some time discussing different sources of water pollution and how they might affect aquatic wildlife. Youth should write down ideas for their picture on the recycled paper. It might be helpful for the youth to read through the Water Pollution background information. Once the youth have decided on a picture, they are to use the blank paper to draw a large, simple outline in a black marker that children will be able to colour in. Youth can include an educational description of the picture at the bottom of the page. Each drawing will make up a page in the colouring book. Once all of the youth have finished their drawings, fasten them together with a paper clip and give them to a child care or younger group of youth to colour in so they, too, can learn about water pollution.

Discussion:

Eighty percent of life on the planet lives beneath the oceans (Greenpeace International, 2010a). It is important that we develop an appreciation for this diversity of life, and that we understand the impact that pollution can have on these organisms.

1. What picture did you choose to draw? Why?
2. Do you think that the children colouring it in will learn something from it?
3. Why is it important to protect the species living in the oceans?
4. How can you help to protect aquatic wildlife?

Enviro-Wash-A-Thon

AIM: To promote the use of environmentally-friendly products that will not pollute the water.

MATERIALS: Buckets, hose with spray nozzle, sponges, environmentally-friendly cleaning products, water source

AGES: 12-14, 15-18

TIME: Undetermined

Note: This activity requires some preparation in advance.

Introduction:

Many common cleaning and household products contain ingredients that are very harmful to the environment. When washed down the drain or flushed down the toilet, or when they are swept by the rain into storm gutters or waterways, they can pollute our water sources. Environmentally-friendly versions of most of these products exist and they are generally available at stores that sell the more common versions of these products.

Instructions:

Purchase some environmentally-friendly car or dog-specific cleaning products and create a large poster to advertise your event (ex. Environmentally-Friendly Car (or Dog) Wash-A-Thon to raise funds for _____). Create and display a second poster that outlines how your fundraiser is environmentally-friendly and be sure to include some facts about water pollution that you have researched or taken from the Water Pollution background information sheet.

Have a car or dog wash-a-thon to raise money for an event or environmental charity of your choice, ideally one that works locally on water-related issues! Invite people to participate in your wash-a-thon and be sure to use the buckets and a spray nozzle on the hose to conserve water.

Discussion:

Most toxic chemicals in our wastewater (ex. what goes down the drain or is flushed down the toilet) are not removed by our water treatment systems.

1. How can we ensure that our waters do not become polluted with these chemicals?
2. Did you know that you could find environmentally-friendly versions of common cleaning products?
3. Will you purchase / encourage your parents to purchase these eco-friendly products in the future?

Picturing Pollutants

AIM: To understand how the products that we dispose of can pollute the water.

MATERIALS: Whiteboard & whiteboard markers (or flipchart paper & markers), clock with a second-hand, hat, printed list of words, scissors

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

Print out the list of words at the bottom of this page and cut them into individual pieces. Fold the pieces and place them in the hat.

Split the youth into 2 teams: Team A and Team B. Both teams are to imagine that they live in separate towns, and the river running through each town contains water that is so polluted that it is not drinkable. The teams are trying to clean up their rivers by identifying which pollutants are present and helping to stop them from entering the water.

Instructions:

A member from Team A is to select a word from the hat, then has 1 minute to communicate the word to their team by drawing clues, using no verbal or physical communication, and without using letters or numbers. The team must guess the word before the time runs out. If the team is successful in identifying the word, they eliminate that source of pollution from the water and a different member of the team can select a word and play until the minute is up. Each new word selected must be by a different member of the team. Next, Team B plays a round. The first team to eliminate 5 sources of pollution from the water has drinkable water and wins the game.

Discussion:

Our actions can have effects beyond what we can see, so we should always be conscious of where the products that we dispose of might end up.

1. Have you seen anyone dispose of a product today that could eventually pollute the water?
2. Are there environmentally-friendly alternatives to any of the products mentioned in this activity? What are they? Why do you think that a lot of people don't choose these alternatives?

Plastic bag Bleach Gasoline Pesticide Oil Water bottle Perfume Medicine Hair dye Factory Laundry detergent Sewage Electronics Litter Paint Fertilizer Mining Shampoo

Riding the Current

AIM: To explore the global impacts of water pollution.

MATERIALS: Map of the major ocean currents (easily found through a search engine), computers with access to the Internet

AGES: 12-14, 15-18

TIME: 25 minutes

Introduction:

Each youth is to select a different ocean current and research it to find out which path it travels. There are 17 main ocean currents to choose from:
Kuroshio, North Equatorial, Oyashio, California, Alaska, Labrador, Gulf Stream, North Atlantic Drift, Canary, Equatorial Countercurrent, Somali, Agulhas, Benguela, Brazil, Humboldt / Peruvian, South Equatorial, Antarctic Circumpolar (Capital Regional District, 2010). Once the youth have discovered where their current is, they need to find the route that the current travels along.

Instructions:

Youth are to imagine that a rainstorm has washed litter into a storm drain that has carried it out to the sea. Determine where a piece of litter might be carried if it has washed into the ocean from the shores of different countries (ex. Canada's east coast, Canada's west coast, Brazil, Eastern Australia, India, China, Nigeria, Norway, etc.).

Discussion:

The ocean currents carry vast amounts of garbage out to sea, as can be evidenced by the multiple ocean currents that meet to form the North Pacific Gyre. These currents have carried so much waste to this area that there now exists more plastic than plankton in the water (see the fact sheet for more information). Consider the effects of numerous countries all disposing of vast amounts of consumer, household and industrial waste into the oceans and waterways. Waste from another country's industrial plants could be washing up on our shores and vice-versa.

1. How does it make you feel knowing that the waste that Canadians produce could be polluting someone else's shores?
2. What can you do to help prevent garbage from entering the oceans and waterways?

I Can Make a Difference

AIM: To understand that one person really can make a difference.

MATERIALS: None

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

Each individual can have an effect on the world around them, and each person can make a difference in a variety of ways.

Instructions:

The first step toward making a difference is to gain an understanding of the contributing factors and reasons behind an issue. This can then allow for you to make responsible decisions in your life and to lead by example.

Have a discussion surrounding the issue of global water pollution and what we can each do, as individuals, to make a difference.

(Ex. Take a look at what you consume and determine whether or not you need it, and whether it results in water pollution; look for and purchase alternative eco-friendly products that cause less water pollution; buy second-hand items to reduce industrial waste associated with producing new goods; dispose of toxic materials properly – such as electronics, paint, cleaning products, etc.; purchase non-toxic materials, such as natural or biodegradable cleaning products; volunteer with or support organizations that work to prevent water pollution or remediate contaminated areas, for example, Greenpeace or Safe Drinking Water Foundation; etc.)

Discussion:

"UNLESS someone like you cares a whole awful lot, nothing is going to get better. It's not. "Dr. Seuss: The Lorax

1. What would the effect be if everyone were to make the same changes in their life and begin to, or continue to, practice environmentally-responsible behaviours?
2. What happens if everyone leaves the issue to be solved by someone else? What happens if everyone contributes to solving issues like water pollution?

Pollution Preventer

AIM: To consider how your actions and choices can improve water quality.

MATERIALS: None

AGES: 15-18

TIME: 30 minutes

Note: This activity requires a brief follow-up discussion the following week.

Introduction:

We can all have a significant impact on water quality through the products we purchase and how we dispose of them after we are finished using them.

Instructions:

Part 1: As a group, have a discussion surrounding the following questions:
(Refer to the Fact Sheet for some background information)

- What are some different sources of water pollution?
- How can water pollution affect you, personally?
- How does water pollution affect people around the world?
- What will happen if all of the world's fresh water becomes too polluted to use?
- How can you help to improve the quality of the world's freshwater sources?

Part 2: Each youth is to select 1 activity that they will do, or 1 choice that they will make each day next week that will help prevent water pollution. The youth are to each write down the 7 different acts that they will take on, and the follow-up discussion below should take place next week.

Follow-Up Discussion:

The choices that we make each day can have significant effects on our freshwater resources, and can contribute to the contamination or remediation of the substance that we depend on for survival.

1. What were the 7 acts that you chose to do? Why did you choose these specific actions?
2. Was it difficult to follow through with your actions? Why or why not?
3. Will you continue to practice these actions? Why or why not?

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Activity 4

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Activity 6

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Glossary

Dioxin – a general name for a family of chlorinated hydrocarbons, $C_{12}H_4Cl_4O_2$, typically used to refer to one isomer, TCDD, a by-product of pesticide manufacture: a toxic compound that is carcinogenic and teratogenic in certain animals

Faecal – of, relating to, or consisting of faeces

Gyre – a ringlike system of ocean currents rotating clockwise in the Northern Hemisphere and counter-clockwise in the Southern Hemisphere

Persistent organic pollutant (POP) – a toxin resulting from a manufacturing process, which remains in the environment for many years

Polychlorinated biphenyl (PCB) – a family of highly toxic chemical compounds consisting of two benzene rings in which chlorine takes the place of two or more hydrogen atoms: known to cause skin diseases and suspected of causing birth defects and cancer

Plankton – the aggregate of passively floating, drifting, or somewhat motile organisms occurring in a body of water, primarily comprising microscopic algae and protozoa

Solvent – having the power of dissolving; causing solution

Sustenance – means of sustaining life; nourishment

All definitions from Dictionary.com

DIVERSITY & EXTINCTION

Diversity & Extinction

The diversity of life on Earth is extraordinarily complex and interconnected, with each species (including humans) being completely reliant upon many others for survival. Biological diversity (or biodiversity) allows for the proper functioning of the ecosystems that provide us with food to eat, air to breathe, clean water to drink and medicines to heal us, yet our consumption of resources and impact on the environment is causing drastic changes in ecosystems and mass extinctions of the world's species. There are an estimated five to 15 million species living today, with only around 1.5 million named and described by biologists (WWF[a]). Of the world's known mammals, approximately 25 percent are threatened with extinction, as are roughly 20 percent of sharks, 33 percent of amphibians, 25 percent of coniferous trees, and 12 percent of birds (WWF[b]). Species are becoming extinct 1000 times faster today than they were before humans existed with this rate expected to increase to 10,000 times faster by 2050 (Greenpeace International, 2007). Many scientists believe that humans are causing plants and animals to become extinct more quickly than new species are evolving for the first time since the extinction of the dinosaurs (STWR, 2010). The mass extinction currently underway could prove to be even more severe than that of the dinosaurs, because all of the major categories of species on the planet are being affected (Myers N, 1989).

There are five main reasons for these drastic reductions in biodiversity levels: overexploitation of wildlife populations; invasive alien species competing with and over-taking native populations; changes in and loss of habitat by activities such as deforestation and agriculture; pollution from inadequate waste management and irresponsible practices; and climate change (STWR, 2010). Illegal or unsustainable trade of wildlife is also reducing some populations to threatened levels or even extinction. Upwards of 12,000 elephants are killed illegally per year for their ivory, while tiger populations have plummeted 95 percent within the past hundred years (WWF, 2010).

The Green Wave Initiative is directed by the United Nations Secretariat for the Convention on Biological Diversity, and it aims to educate youth on biodiversity and the importance of ecosystem services (Environment Canada, 2009). The government of Canada's Species at Risk Act aims to prevent native species from becoming extinct or extirpated (extinct in a certain native habitat, but existing elsewhere); to aid in the recovery of threatened and endangered species; and to properly manage species not currently at risk to prevent such an occurrence (Species at Risk Public Registry, 2009).

FACTS:

- It is evidenced throughout history that a mass extinction has always accompanied the initial arrival of humans on oceanic islands (Diamond, 1989).
- The leatherback sea turtle - a species that has survived for over one hundred million years – is now approaching extinction, mostly due to fishing fleets catching the turtles unintentionally as by-catch and rising sea temperatures influencing the sex of the turtle eggs (WWF[c]).
- There exist an estimated four to eight million species of insects on the planet today, and approximately 4000 different species of mammals (WWF[a]).
- After the mass extinction of the dinosaurs, it took between three and 10 million years for a significant recovery of diverse species (Myers N, 1989).
- In Canada, the sea otter and the peregrine falcon have both made a comeback from the brink of extinction (WWF Canada, 2008).

Climate & Extinction

Climate change is having significant effects on wildlife populations due to changes in temperature, rainfall patterns, water levels and temperatures, ice formation and duration, plant blooming, pollination, food availability, and so on. Canadian polar bears, the Indonesian orangutan, various tropical frogs and oceanic corals are examples of the many species being affected by climate change. Polar bears are known to swim long distances in search of food and rest on floating ice, and since sea ice is taking longer to form in the fall and is melting more quickly in the spring, there are fewer places to rest and many bears drown due to exhaustion in open waters (WWF[d]). Indonesia's rainforests are facing more extensive periods of drought due to global warming, which is causing more frequent forest fires, reducing the habitat area of the endangered orangutan (WWF[c]). Research has also shown that many species of tropical frogs have become extinct and even more are threatened due to changes in climate (Pounds et. al, 2006). Additionally, since corals are extremely sensitive to oceanic temperature fluctuations, there is concern that warmer ocean temperatures due to climate change could lead to coral bleaching, which can kill the corals and destroy entire ecosystems. (UNEP-WCMC).

Climate change is affecting species in diverse habitats across the planet, so it is evident that environmental stewardship benefits more than just humans.

I Am a Moose

AIM: To understand the challenges to survival that many species are facing across Canada and all over the world.

MATERIALS: 5 pieces of recycled paper, 5 pens, access to Internet

AGES: 12-14

TIME: 10 minutes

Introduction:

Many species are interconnected and rely on each other for survival (the leaves of a tree provide food for an insect, that insect provides food for a bird, the tree provides shelter for both), and if a species becomes rare or extinct, all of those that rely on it will be affected.

Instructions:

Choose 5 Canadian groups of wildlife (ex: polar bear, eagle, rattlesnake, turtle, fox, walrus, moose, salmon, frog, butterfly, etc.) and ask each participant which one they most identify with. Group the youth into their chosen form of wildlife and have them discuss what challenges to survival they are facing as a population (ex. loss of habitat, food scarcity, air/water pollution, hunting/fishing, climate change, etc.) Consider the reasons behind habitat loss (ex. roads/infrastructure, cattle-grazing, agriculture, housing, industry, etc.), hunting (ex. entertainment, demand for skins/pelts, etc.), pollution (ex. industry, poor waste management, etc), and so on when discussing the issues you are facing. If they need to, groups can research their species on the Internet.

Discussion:

There are over 500 species across Canada that are extremely close to becoming extinct (WWF Canada, 2008).

1. What types of environmental problems did you determine that your species is facing? What are the reasons behind these challenges?
2. How can these problems be prevented?

Breakfast Web

AIM: To illustrate the interconnectedness and interdependence between species.

MATERIALS: Recycled paper and markers per team

AGES: 12-14

TIME: 15 minutes

Introduction:

All species on the planet rely on other species for food. We are all interconnected and dependent upon others for survival, so it is important to keep ecosystems and the species within them healthy so that we can all continue to find enough food and water.

Instructions:

Split the youth into teams of 3 or 4. Each team is to create a food chain like the examples found on the Food Chain handout.

Next, as a group, use the food chains that each team created to construct a food web, linking each species to all of those that they are connected with (the eagle from the first example chain would also eat the fish from the second chain). Establish all of the connections between the species in each chain to create a food web.

Discussion:

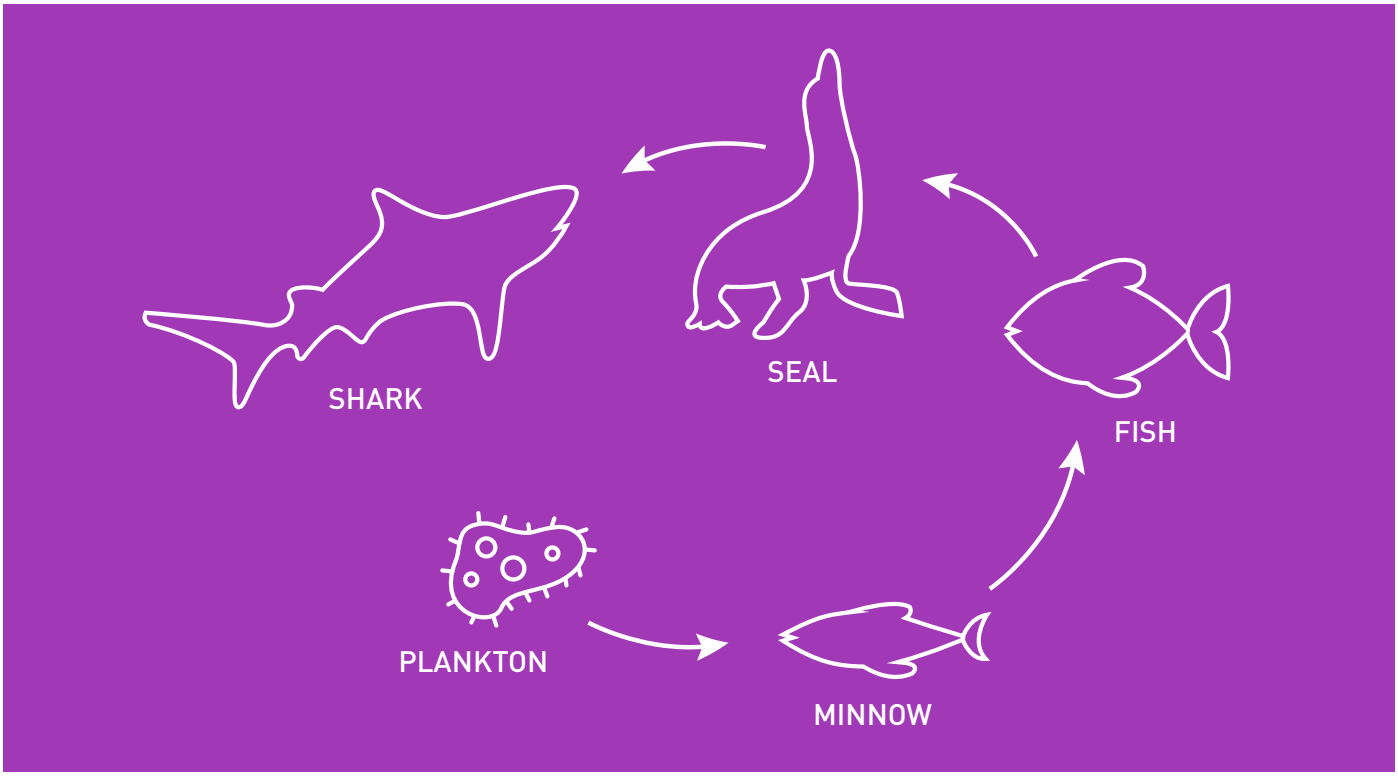
Without functioning ecosystems, we would not have fertile soil, clean air or clean water to drink. We would not have the food that keeps us healthy. It is therefore important to conserve the diversity of species that keep natural ecosystems and resources healthy to ensure that all species can continue to sustain one another in our food web.

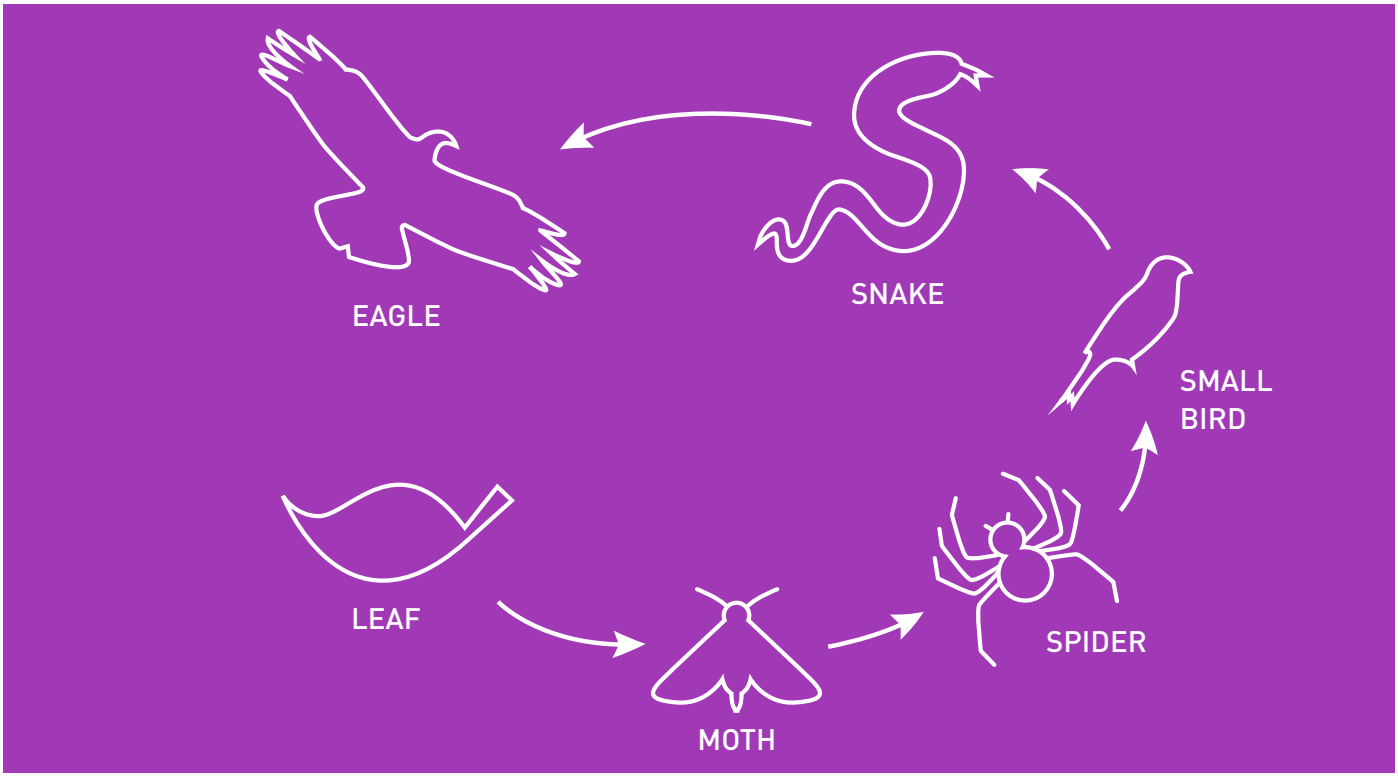
1. What would happen if we eliminated a few of the species in our food web?
2. What would happen if we eliminated a species at the bottom of the web?
3. What about at the top of the web? (Ex. The species below it would grow in numbers, because there is no predator to keep the population size in check. These species would then consume much more of the food at the bottom of the chain that other species also rely on for survival.)

Adapted from: "The Food Chain" Mother Earth: Our Food, Our Home. YMCA Canada

DIVERSITY & EXTINCTION – ACTIVITY 2

FOOD CHAIN EXAMPLES





A See of Trees

AIM: To recognize and appreciate the diversity of life on this planet.

MATERIALS: 1 blindfold for every 2 youth, a forest

AGES: 12-14

TIME: 20 minutes

Introduction:

Split the youth into teams of 2. Outline a small section of forest for the activity using natural landmarks and ensure that the youth stay within it.

Instructions:

Each team is to blindfold 1 member so that they are unable to see. The other member of the team is to lead their partner very carefully through a section of the forest in a variety of directions to disorient them. Be sure to watch out for any obstacles (like rocks or roots) that the blindfolded youth may trip over. They are to then lead the blindfolded partner to a tree, and the blindfolded partner must use their sense of touch (and smell if they so choose) to remember the tree. Their partner is then to lead the blindfolded youth out of the forest in a roundabout way to disorient them once again.

The blindfolded youth are to take off their blindfolds and go into the forest to find their tree.

Next, repeat the activity with the youth in opposite roles.

Discussion:

There is significant biological diversity all around us that is important in maintaining the ecosystems that sustain us. Each species within an ecosystem is unique, as is each individual of each species. As could be demonstrated in this activity, there is plenty of diversity found within a forest. The differences between trees, like the size, type of leaves or type of bark, can provide varied food and habitat opportunities for insects, birds and other wildlife. Differences in nature that can seem very subtle to us, like those between "your" tree and another, can be very important in sustaining ecosystems.

1. Was it difficult to find "your" tree? How did you figure out that it was the correct one?
2. What do you think would happen if we removed all of the trees from this forest ecosystem?

Letters of Diversity

AIM: To explore the diversity of life around us.

MATERIALS: 1 copy of the List of Categories per youth, 1 pen per youth

AGES: 12-14, 15-18

TIME: 15-25 minutes for 2 rounds (time dependent on group size)

Introduction:

Print a copy of the List of Categories for each youth.

Instructions:

Have the youth spread out so that they cannot see each other's paper. The facilitator is to say a letter of the alphabet, and the youth have 2 minutes to come up with a word for each category that starts with that letter.

As a group, go through each category and read all of the answers aloud. Youth receive a point for each answer, but if 2 youth have the same answer, neither of them gets a point. Youth are to record their score on their paper. Play another round with a different letter. Repeat the game as many times as you choose.

Extension: For increased competition, try speed rounds or teams.

Discussion:

This activity demonstrates just how much biological diversity we are aware of, even though sometimes we don't think about how many different species are living in our backyards. Most of the species that exist in the world have not even been named and described by scientists, meaning that there is much more diversity in the world than we know about.

1. Were you surprised at how many different answers you could come up with?
2. Why is it important that we maintain this biodiversity? (Ex. To allow ecosystems to remain functional; to ensure that we will always have food to eat; to ensure that we have clean water and clean air; to preserve the plants and animals that provide us with medicines; to prevent species from going extinct; to stop the mass extinction that is currently taking place; etc.)
3. How can you help to keep ecosystems healthy and preserve biodiversity? (Choose eco-friendly products, such as FSC certified forest products, to prevent deforestation; dispose of toxic products [like paint and household chemicals] properly as to not pollute ecosystems; ensure that plants and animals you purchase are not endangered; volunteer with an organization that works to preserve and protect endangered species; do not plant invasive species of plants in your garden or yard; reduce your greenhouse gas emissions by taking transit, walking or biking; etc.)

DIVERSITY & EXTINCTION – ACTIVITY 4

LIST OF CATEGORIES

MAMMAL:

PLANT:

ENDANGERED OR EXTINCT SPECIES:

BIRD:

TREE:

SPECIES THAT LIVES IN THE OCEAN:

TYPE OF ECOSYSTEM:

INSECT:

FLOWER:

WAY TO PROTECT BIODIVERSITY:

SPECIES THAT LIVES IN CANADA:

LIST OF CATEGORIES

MAMMAL:

PLANT:

ENDANGERED OR EXTINCT SPECIES:

BIRD:

TREE:

SPECIES THAT LIVES IN THE OCEAN:

TYPE OF ECOSYSTEM:

INSECT:

FLOWER:

WAY TO PROTECT BIODIVERSITY:

SPECIES THAT LIVES IN CANADA:

Who is Awake?

AIM: To appreciate the diversity of creatures active in the night.

MATERIALS: 1 flashlight per person, a forest or pond or natural space with established trails for walking

AGES: 12-14, 15-18

TIME: 30 minutes

Note: It can be fun to bring along wintergreen mints to chew in the dark, because they make visible sparks.

Introduction:

Nature comes alive at night with a surprising diversity of life. While many species are sound asleep in the dark of the night, there are countless creatures hard at work finding food and building shelter.

Instructions:

Quietly walk through a nearby forest or along a nature trail once the sun has set and it is completely dark outside. Walk slowly and very carefully using the flashlights so that you do not trip over any roots or obstacles on the path. It is important to remain quiet so that you are able to listen to all of the different organisms that are active. Pause every few minutes and turn out all of the flashlights so that you can listen to the active creatures around you. Try to guess which organisms are making which sounds. It is surprising what types of sounds you can hear at night, for example, tree frogs are very small in size, but make a very loud and unexpected sound.

Discussion:

It is important to establish an appreciation of and connection to the natural world so that we feel compelled to help protect and preserve its ecosystems and the species living within them.

1. Were you surprised by how many different species you heard?
2. Take some time to consider how you would feel if your walk was silent, because all of those species had gone extinct or the ecosystem had been paved over. What are some ways that you can ensure that this area remains protected from "development"? (Ex. Make use of the area recreationally as often as possible and encourage others to do the same to show that the space is important to the area's residents; write a letter to your MP explaining how much you enjoy the space; request that your local government make the area into a park if it already isn't one; etc.)

Can I Fly?

AIM: To consider the rates of extinction the world is currently experiencing.

MATERIALS: Wildlife cards printed on fairly thick, recycled paper & cut out

AGES: 12-14

TIME: 10 minutes

Introduction:

Print the cards out on recycled paper that is thick enough that you cannot see what is printed on it when placed upside down.

Instructions:

Place the wildlife cards face down on a table. Each youth is to select 1 card and place it on their forehead without looking at it. Youth are to start asking each other yes or no questions to try and figure out what species they are. Answers can only be yes or no. If someone asks you a question, they must then answer a question for you. Once the youth figure out who they are, they are out of the game. The last person to figure out who they are becomes extinct. If you have enough cards leftover, play another round!

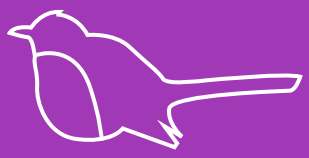
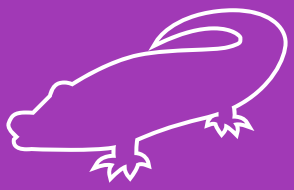
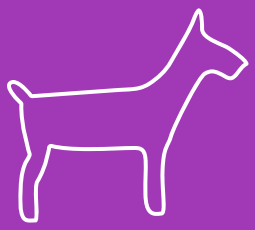
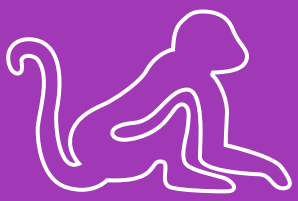
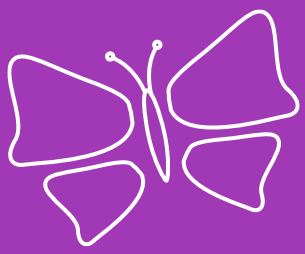
Discussion:

We are currently witnessing a mass extinction of the world's species; roughly 25% of the world's mammals, 20% of sharks, 33% of amphibians, 25% of coniferous trees, and 12% of birds are being threatened with extinction (WWF[b]). According to Greenpeace International (2007), species are becoming extinct 1000 times faster today than they were before humans existed, and this rate is expected to increase by 2050 to 10,000 times faster. The 5 main reasons for this drastic rate of extinction are: overexploitation, invasive alien species, habitat change and loss, pollution and climate change (STWR, 2010).

1. How can you personally help to prevent or slow the rate of extinction? (Ex. Know where your food and commodities come from to ensure they are not harvested in ways that are threatening the survival of species; do not plant species in your yard or garden that are foreign or invasive; promote the protection of wilderness areas; reduce your consumption of polluting products, including electronics, household chemicals, fuel, etc.; reduce your greenhouse gas emissions by taking public transit or riding your bike; do some research to learn about which species are endangered and how you can help protect them; volunteer with an organization that works to protect species at risk; etc.)
2. How can this high level of extinction affect you? (Ex. It can make the ecosystems that are responsible for giving us food and cleaning our air and water less functional; you can no longer enjoy viewing these species – ex. tigers are on the verge of extinction; you may no longer be able to eat foods that you enjoy – many fish stocks are on the verge of collapse; etc.)

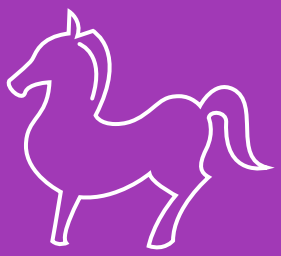
DIVERSITY & EXTINCTION – ACTIVITY 6

WILDLIFE CARDS

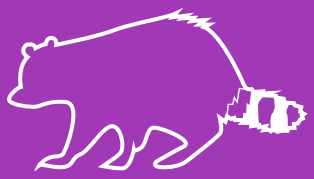
 ROBIN	 ALLIGATOR	 FLY
 BEETLE	 SHARK	 DOG
 LION	 STARFISH	 ZEBRA
 MONKEY	 FLOWER	 BUTTERFLY

DIVERSITY & EXTINCTION – ACTIVITY 6

WILDLIFE CARDS



HORSE

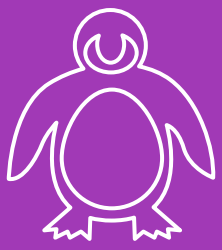


RACOON

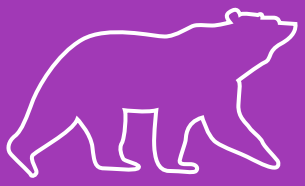
TREE

WORM

BLUE JAY



PENGUIN



BEAR

SEAWEED

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Glossary

Biodiversity – diversity among and within plant and animal species in an environment

By-catch – unwanted fish and other sea animals caught in a fishing net along with the desired kind of fish

All definitions from Dictionary.com

INVASIVE SPECIES

Invasive Species

Invasive species are those introduced to an environment other than that in which they originate and they can out-compete native species in the struggle for habitat, food and resources; often disrupting entire ecosystems and replacing native species. Environment Canada (2009) describes invasive alien species as those that pose a threat to biological diversity, can be economically and environmentally damaging, and can pose a threat to human health. Species are sometimes introduced to new environments intentionally for habitat restoration, natural biological control of pests, authorized fish stocking (MNR, 2009), or for ornamental, culinary or medicinal purposes. Most species, though, are introduced accidentally, such as through farmed fish escaping into natural waterways; the use and release of live bait; the opening of canals and waterways; unauthorized stocking or sea wildlife transfers; in ship ballast water; or through international exchange of goods (MNR, 2009). Invasive species are difficult to control due to high rates of reproduction, the ability to flourish in a variety of environments and few natural predators (Invasive Species, 2009).

A lack of natural predators can allow introduced species to flourish and devastate native species populations by consuming too much of a native species' food source, by occupying their breeding or shelter space or by feeding intensely on native species themselves (Transport Canada,2010a). Invasive species have already altered the dynamics of many Canadian ecosystems. Zebra mussels, introduced to the Great Lakes, filter-feed on phytoplankton, which increases water clarity and threatens species adapted to cloudy waters, like the walleye (Transport Canada, 2010a). The Kudzu vine is an invasive plant recently discovered in Canada that is capable of growing up to 30cm per day, taking over and killing native vegetation (Environment Canada, 2010). Sea lampreys have been destroying native populations of whitefish, lake trout and chub that are economically important in terms of commercial and recreational fisheries (Transport Canada, 2010a). In addition to ecological and economic problems, human health can be negatively affected by species introductions. Zebra mussels can absorb hazardous chemicals from the water through filter-feeding, such as polychlorinated biphenyls (PCBs), which can be transferred up the food chain to humans (Transport Canada, 2010a).

The federal government has developed an Invasive Alien Species Strategy for Canada that strives to identify and respond to invasions, prevent new invasive species from becoming established and contain control or eradicate existent invasive species (Environment Canada, 2009). Individuals can prevent invasions by not releasing pets or animals (ex. live bait) into a natural ecosystem; not bringing food, firewood or live plants / animals over international borders; inspecting and removing insects from boats, trailers, recreational vehicles, fishing equipment, etc. when travelling long distances; planting only native species in yards / gardens and removing any invasive species; and so on.

FACTS:

- Invasive species in the Great Lakes are causing a loss of approximately $200 million per year in commercial and sport fishing and industrial operating costs (Great Lakes United, 2009).
- An estimated 10 percent of all plants in Canada are invasive species (Invasive Species, 2009).
- In the Great Lakes Basin, there exist more than 200 different invasive species (MNR, 2009).
- Millions of ash trees have been killed by the emerald ash borer (beetle) since its introduction to North America (Natural Resources Canada, 2008).

Ballast Water

An estimated 65 percent of the invasive species in the Great Lakes were introduced via ship ballast water (MNR, 2009). Since cargo ships are built to carry heavy loads, they will take on water, called ballast, if their load has been delivered or if it is not full in order to continue operating efficiently - keeping the ship heavy enough that the propeller and rudder are underwater and the bow remains low in the water during intense weather conditions. When ships take up freshwater ballast in one region and then release it into a different body of freshwater, organisms can be transferred to the new environment. The Canadian federal government has created voluntary guidelines that encourage ships to exchange their freshwater ballast for saltwater en route before entering Canadian waters so that the saltwater species released into the freshwater will not survive. Alternatively, they can treat their ballast water before discharge (Transport Canada, 2010b).

Trespassers

AIM: To learn about invasive species in Canada.

MATERIALS: Access to a library or multiple computers with Internet, Bristol board sheets cut in half – 1 half per person, craft supplies (markers, glue, construction paper, scissors, paint, etc.)

AGES: 12-14, 15-18

TIME: 60 minutes

Introduction:

Invasive species are species that are introduced to a new environment and can out-compete native species in the struggle for habitat, food and resources.

Split youth into teams of 2 or 3 (for younger youth, have larger teams).

Instructions:

Each team is to select a different invasive species from the following list:

1. Zebra mussel
2. Garlic mustard
3. Sea lamprey
4. Gypsy moth
5. Purple loosestrife
6. Dandelion
7. Asian long-horned beetle
8. Common periwinkle
9. Asian carp
10. Queen Anne's lace
11. Emerald ash borer
12. Round goby
13. Baby's breath
14. Jointed goat grass
15. Rusty crayfish

Teams will research their species and compete to develop the most creative poster, including a picture, the species name, where in Canada it lives, the type of environment it lives in, how it was introduced to its new habitat, what impact it has on other wildlife and how we can stop its spread. Have the youth vote on the posters and then display them in a public area to educate others on invasive species.

Discussion:

It is important that we are aware of what types of invasive species exist around us so that we can help to reduce their abundance and prevent further spread.

1. How can you help to reduce the quantity of and stop the spread of invasive species? (Ex. Educate others; do not purchase foreign plants, pets or insects and release them in the wild; do not plant non-native species in your garden; remove any invasive species in your yard before they spread; write a letter to your local MP requesting stricter regulations on ballast water from ships [see fact sheet: Ballast Water]; volunteer with an organization that works to address these issues; etc.)

A Day in the Life of a Bug

AIM: To explore the impact that bugs can have on an ecosystem.

MATERIALS: An outdoor space (like a garden)

AGES: 12-14

TIME: 20+ minutes

Introduction:

Insects are important members of terrestrial ecosystems, critical to their proper functioning. They can have significant impacts on plants and other wildlife in terms of what they eat and who they provide food for. There are approximately 11,000 species of ants alone, and their biomass is 4 times more than all land vertebrates combined (birds, mammals, amphibians, reptiles) (Wilson & Holldobler, 2005). Therefore, it is easy to imagine what sort of impact invasive insects could have if they did not have natural predators and their numbers could not be easily controlled.

Instructions:

As a group, go outside into a natural space. Spread out and sit or lay down and examine the ground closely, looking for insects. If you find an interesting bug, watch it for a while. Examine an ant hill and watch what the workers are doing. If anyone finds an interesting bug, show the rest of the group.

Discussion:

Bugs are fascinating and extraordinary creatures that play important roles in keeping nature in balance. For example: bees and butterflies pollinate flowers and many of our food items; worms aerate the soil to allow vegetation to grow better; ants cycle nutrients into the soil; spiders control insect populations; and many different bugs provide a valuable food source for many other creatures, such as birds. It is important to preserve these native bug populations.

Invasive bugs can have an equally significant impact on the environment, but in a negative way. When new species are introduced, they have no natural predators and can often multiply out of control. The emerald ash borer and the Asian long-horned beetle are 2 invasive beetles that have caused significant damage to North American trees, burrowing into the trees and killing them at alarming rates.

1. How can you ensure that you are not contributing to invasions of foreign bugs? (Ex. Do not transport firewood or other unprocessed woods over long distances; do not bring food, wood, animals or plants across international borders; before going on or coming from trips or recreational outings, clean and inspect all equipment, such as fishing gear, boats, vehicles and trailers that could be transporting insects; etc.)

My Pet, Monty

AIM: To understand why you should not release pets or animals into the wild.

MATERIALS: None

AGES: 12-14

TIME: 15 minutes

Introduction:

One way that foreign species are introduced to Canadian ecosystems, is by people releasing their unwanted pets or animals (like live bait). According to National Geographic (2004), the Florida Everglades now have an established population of Burmese pythons that can grow up to 6 metres (20 feet) long. Some believe that the population could be as large as 30,000 snakes, and they are known to prey upon rare species of wildlife that live in the Everglades (The Nature Conservancy, 2010).

Instructions:

Everyone is to stand in a circle facing one another with their eyes closed. The facilitator can tell the youth a story about travelling around the world and bringing back a pet snake who escaped into the wilderness. The facilitator is to select someone to be the Snake by walking around the entire circle and quietly touching 1 person on the shoulder. No one but the person selected should know who the Snake is. Everyone is to open their eyes and the facilitator selects someone to be the Snake Catcher, who will stand in the middle of the circle and try to figure out who the Snake is. Everyone else will be native wildlife species.

The Snake is an invasive species that is out-competing Canadian wildlife, so the Snake Catcher is trying to catch it to prevent it from reducing the biodiversity in the area. The Snake's objective is to freeze, or out-compete, the native wildlife by discretely sticking her/his tongue out at them. Those targeted are to wait 10 seconds and then be very dramatic as they "expire". The game ends when everyone is expired or when the Snake has been caught. For round 2 of the game, choose 2 Snakes, but do not tell any of the youth that there are 2.

Discussion:

The round played with 2 snakes demonstrates the difficulty in controlling species once they become predominant. An effective way to help to prevent problems and invasions is to avoid purchasing non-native plants (like vines or trees) or animals.

1. How can you find out what you should do with unwanted invasive plants or animals? (Ex: Do some quick online research; call your pet store or garden centre to find out what the proper method is for giving away your pet or plant; ask your bait supplier what to do with leftover live bait; etc.)

Searching for Invaders

AIM: To become familiar with some of the invasive species in Canada.

MATERIALS: 1 copy of the Word Search & 1 highlighter per youth

AGES: 12-14, 15-18

TIME: 20 minutes

Introduction:

It is important to become familiar with the invasive species found in Canada so that we are able to identify them and avoid contributing to their spread, for example, by avoiding planting them in gardens or yards, or spreading them through recreational activities, like fishing.

Instructions:

Find all of the words in the word search to become familiar with some of the invasive species found in Canada.

Discussion:

Ivy is an example of an invasive plant that tends to take over all of the diversity in the area that it grows, and so the insects, birds and mammals that were reliant on the native vegetation will be forced to relocate. This means that in planting this in your yard, you are reducing the amount of wildlife that will visit, like birds and butterflies. This example can give you a more tangible understanding of why these species are called invasive, and why you should remove them from your garden or yard.

1. Have you heard of any of the species in this activity? Have you seen a vine, such as English ivy or kudzu growing anywhere in your neighbourhood? (English ivy is extremely common in most parts of the country, because people will often plant it intentionally for aesthetic reasons.). What happens to all of the other plants in the area that the vine is growing? (Ex. Small plants are usually eliminated and only the vines remain.)

INVASIVE SPECIES – ACTIVITY 4

WORD SEARCH

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

Word List

1. **Garlic mustard** – edible plant tasting of garlic and mustard, introduced for culinary purposes

2. **Sea lamprey** – parasitic jawless fish, attaches to and feeds on other fish, usually kills its prey

3. **Gypsy moth** – insect whose caterpillars extensively defoliate trees, accidentally introduced in wood from Japan (Natural Resources Canada, 2010)

4. **Purple loosestrife** – attractive flowering plant, disrupts water flow and biological diversity by outcompeting native species

5. **Zebra mussel** – freshwater mussel, accidentally introduced in ship ballast water, clogs pipes, outcompetes native filter-feeders and changes ecosystems by clarifying water (Government of Manitoba)

6. **Green crab** – crab that affects commercial fisheries by preying on commercially valuable species and competing with them for resources, introduced through various shipping practices (Fisheries & Oceans Canada, 2009)

7. **Dandelion** –a beneficial, edible plant that is viewed as a nuisance and is often the target of toxic herbicide applications

8. **Asian long-horned beetle** – insect that tunnels into a wide range of trees and kills them, accidentally introduced from China (Natural Resources Canada, 2010)

9. **Asian carp** – fish that is currently being kept out of the Great Lakes by a barrier that could be breached with heavy rains - if breached, will be ecologically devastating, outcompeting many native species (EPA, 2010)

10. **Emerald ash borer** – beetle that burrows into and kills ash trees

11. **Jointed goatgrass** – plant genetically-related to and very similar to winter wheat so it is difficult to separate from the crop, reducing yield and lowering grade of wheat produced (Canadian Food Inspection Agency, 2010)

12. **Round goby** – a small, aggressive fish, competes with native species for food and nesting areas and preys on native fish eggs, introduced in ship ballast water (MNR, 2009)

13. **Kudzu vine** – vine that grows extremely quickly and covers over native plants and trees, killing them and changing ecosystems

14. **Rusty crayfish** – aggressive freshwater crayfish outcompetes native crayfish and kills many aquatic plants

15. **Norway maple** – tree that releases chemicals into the soil to discourage growth of other plants (City of Toronto, 2004)

16. **English ivy** – plant that effectively outcompetes native vegetation and overtakes solid blocks of landscape, often grown ornamentally

Plant Patrol

AIM: To learn which plant species are native to your area.

MATERIALS: A large natural space (like a field or forest), a few different plant field guides from the library – ex. wildflowers, trees, edible plants, plants specific to your area or the habitat you are exploring

AGES: 12-14, 15-18

TIME: 60+ minutes

Introduction:

In the interest of efficiency, it might be helpful to have a few copies of different plant field guides so that multiple people can look up a plant at the same time.

Instructions:

Go on a nature walk through a large natural space, like a field or forest, and examine a variety of different plants along the way. Look up each new plant and tree in your field guides to find out its name and some information about it. Learn whether these plants are native or invasive, and take note of the quantity and distribution of each species of plant.

Discussion:

It is important to only grow native plants in our yards and gardens so that we do not introduce or spread invasive species. It is also very important to only grow native plants indoors, because many non-native plants, like some cacti, are picked in the wild and shipped to Canadian stores. Some of these plants may be endangered in their native habitats where they are being picked, and removing wild plants can disrupt ecosystems. If you are looking for an ornamental or edible plant that is not native to your region, make sure that the specific plant you are purchasing was grown in Canada for household use, and dispose of any clippings or plant material by putting it in the garbage or burning it – do not compost it.

1. Do any of the plants or trees that you identified grow in your yard or neighbourhood?
2. Why is it important to be able to identify these species? (Ex: So that you are able to recognize invaders and remove them or report them before they spread; so that you develop an appreciation for the species that share the environment with you, and that clean your air and water; so that you can help to protect and preserve native species; etc.)
3. How many plants were native vs. invasive? Does this surprise you?

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Activity 2

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Activity 3

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Activity 4

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Glossary

Aerate – to expose to the action or effect of air or to cause air to circulate through

Biomass – the amount of living matter in a given habitat, expressed either as the weight of organisms per unit area or as the volume of organisms per unit volume of habitat

Culinary – of, pertaining to, or used in cooking or the kitchen

Defoliate – to strip (a tree, bush, etc.) of leaves

Habitat – the natural environment of an organism; place that is natural for the life and growth of an organism

Parasitic – of, pertaining to, or characteristic of parasites

Phytoplankton – the aggregate of plants and plantlike organisms in plankton

Plankton – the aggregate of passively floating, drifting, or somewhat motile organisms occurring in a body of water, primarily comprising microscopic algae and protozoa

Polychlorinated biphenyls (PCBs) – a family of highly toxic chemical compounds consisting of two benzene rings in which chlorine takes the place of two or more hydrogen atoms: known to cause skin diseases and suspected of causing birth defects and cancer

Restoration – a return of something to a former, original, normal, or unimpaired condition

Tangible – real or actual, rather than imaginary or visionary

Terrestrial – of or pertaining to land as distinct from water

Vertebrate – having vertebrae; having a backbone or spinal column

All definitions from Dictionary.com

Links to Ontario Ministry of Education Curriculum

In addition to being used by youth leadership groups, A YMCA Guide to Environmental Leadership can also be used by classroom teachers to meet the Ontario Ministry of Education expectations at the Primary, Intermediate and Secondary level. Individual classroom teachers should consult the individual modules and the Ministry curriculum documents to effectively use these resources to meet the overall and specific expectations for their particular course.

Teachers from the YMCA Academy (www.ymcaacademy.org) indentified curriculum links to the following courses and strands at the Secondary level, mostly in the Science curriculum and Canadian and World Studies curriculum (Geography courses):

GRADE	COURSE CODE COURSE NAME STREAM	CURRICULUM STRAND
Grade 9	CGC1D Geography of Canada Academic	Geographic Foundations: Space and Systems Human-Environment Interactions Global Connections Understanding and Managing Change Methods of Geographic Inquiry and Communication
Grade 9	CGC1P Geography of Canada Applied	Geographic Foundations: Space and Systems Human-Environment Interactions Global Connections Understanding and Managing Change Methods of Geographic Inquiry and Communication
Grade 9	SNC1D Science Academic	Sustainable Ecosystems
Grade 9	SNC1P Science Applied	Sustainable Ecosystems and Human Activity
Grade 10	CHV2O Civics Open	Active Citizenship
Grade 10	SNC2D Science Academic	Climate Change

GRADE	COURSE CODE COURSE NAME STREAM	CURRICULUM STRAND
Grade 10	SNC2P Science Applied	Earth's Dynamic Climate
Grade 11	CGD3M The Americas: Geographic Patterns and Issues University/College	Human-Environment Interactions
Grade 11	CGF3M Physical Geography: Patterns, Processes, and Interactions University / College	Human-Environment Interactions Global Connections Understanding and Managing Change
Grade 11	CGT3E Geographics: The Geographers Toolkit Workplace	Loose links only, if plans are modified to incorporate Geotechnologies
Grade 11	CGG30 Travel and Tourism: A Regional Geographic Perspective Open	Human-Environment Interactions
Grade 11	SBI3U Biology University	Diversity of Living Things
Grade 11	SBI3C Biology College	Plants in the Natural Environment
Grade 11	SCH3U Chemistry University	Matter, Chemical Trends and Chemical Bonding Chemical Reactions Gases and Atmospheric Chemistry
Grade 11	SVN3M Environmental Science University/ College	Scientific Solutions to Contemporary Environmental Challenges Human Health and the Environment Sustaining Agriculture and Forestry Reducing and Managing Waste Conservation of Energy
Grade 11	SVN3E Environmental Science Workplace	Human Impact on the Environment Human Health and the Environment Energy Conservation Natural Resource Science and Management The Safe and Environmental Responsible Workplace

GRADE	COURSE CODE COURSE NAME STREAM	CURRICULUM STRAND
Grade 12	CGW4U Canadian and World Issues: A Geographic Analysis University	Geographic Foundations: Space and Systems Human-Environment Interactions Global Connections Understanding and Managing Change Methods of Geographic Inquiry and Communication
Grade 12	CGU4U World Geography: Human Patterns and Interactions University	Human-Environment Interactions Global Connections
Grade 12	CGR4M The Environment and Resource Management University/ College	Geographic Foundations: Space and Systems Human-Environment Interactions Global Connections Understanding and Managing Change Methods of Geographic Inquiry and Communication
Grade 12	CGO4M Geomatics: Geotechnologies in Action University / College	Loose links only, if plans are modified to incorporate Geotechnologies
Grade 12	CGU4C World Geography: Urban Patterns and Interactions College	Human-Environment Interactions
Grade 12	CGR4E The Environment and Resource Management Workplace	Geographic Foundations: Space and Systems Human-Environment Interactions Global Connections Understanding and Managing Change Methods of Geographic Inquiry and Communication
Grade 12	SBI4U Biology University	Population Dynamics
Grade 12	SCH4C Chemistry College	Organic Chemistry Chemistry in the Environment
Grade 12	SCH4U Chemistry University	Energy Changes and Rates of Reaction Electrochemistry
Grade 12	SES4U Earth & Space Science University	Recording Earth's Geological History

Environmental Theme Days

February 2	World Wetlands Day
March 21	World Forest Day
March 22	World Water Day
April 7	World Health Day
April 22	Earth Day
May 1-15	National Fair Trade Weeks (Transfair Canada)
May 21	Endangered Species Day
May 22	International Day for Biological Diversity
June (1st Week)	Environment Week
June 2	Clean Air Day
June 5	World Environment Day
June 8	World Ocean Day
June 15	Global Wind Day
June 17	World Day to Combat Desertification and Drought
August 12	International Youth Day
September 16	International Day for the Preservation of the Ozone Layer
September (4th Sunday)	World Rivers Day
October (1st Monday)	World Habitat Day
October (2nd Wednesday)	International Day for Natural Disaster Reduction
October 16	World Food Day
October 17	International Day for the Eradication of Poverty
November 21	World Fisheries Day
December 5	International Volunteer Day

Additional Resources

The organizations mentioned in this resource guide are included for illustrative purposes and are intended to provide examples of the work going on in the world to combat some of these issues. They are well-established national or international organizations that are working toward environmental sustainability and are not necessarily endorsed by the YMCA.

Air Pollution:

GEORGIA BASIN/PUGET SOUND INTERNATIONAL AIRSHED STRATEGY

British Columbia-based initiative to reduce air pollution.

pyr.ec.gc.ca/airshed/index_e.htm

THE MONTREAL PROTOCOL

Copy of the Montreal Protocol, which aimed to reduce the use and production of ozone-depleting substances.

unep.org/OZONE/pdfs/Montreal-Protocol2000.pdf

THE PARTNERSHIP FOR CLEAN FUELS AND VEHICLES

Reducing vehicular air pollution in developing countries.

unep.org/pcfv/

Climate Change:

CLIMATE CHANGE EFFECTS

A comprehensive list of how climate change will affect the Earth, including air quality, agriculture, sea level rise, human health, extreme weather, etc.

www.climate.org/topics/index.html

TAKINGITGLOBAL

Free, downloadable toolkits educating youth on climate change.

www.tigweb.org/resources/toolkits/view.html?ToolkitID=1531

Diversity & Extinction:

THE IUCN RED LIST OF THREATENED SPECIES

Provides a comprehensive list of vulnerable, threatened and endangered species.

www.iucnredlist.org/species-of-the-day

Species in Canada: http://www.iucnredlist.org/apps/redlist/search

General:

THE OTESHA PROJECT

Youth-led organization that equips young Canadians to create local and global change by encouraging responsible individual and collective choices.

otesha.ca

UNITED NATIONS ENVIRONMENT PROGRAMME

Worldwide environmental issues. Section for children and youth.

unep.org/Tunza/

UNITED NATIONS ENVIRONMENT PROGRAMME'S PLANT FOR THE PLANET: BILLION TREE CAMPAIGN

Individuals from all aspects of society are encouraged to make pledges online to plant trees and then go out and plant them. The goal is to plant a minimum of one billion trees per year.

www.unep.org/billiontreecampaign/about/index.asp

Invasive Species:

INVASIVE SPECIES LIST

List of invasive species in Canada and more information on each species.

www.invasivespecies.gc.ca/english/LinkSearch.asp?x=1&formAction=ViewListing&ID=11&DeptID=&SubtopicID=

Overconsumption:

CARROTMOB

Consumer activism-based organization that encourages corporations to make socially-responsible decisions.

carrotmob.org

GLOBAL FOOTPRINT NETWORK

Resource to calculate your ecological footprint.

footprintnetwork.org

SUSTAINABLE COTTON PROJECT

Works to help farmers and manufacturers reduce their use of chemicals in their production of cotton and cotton products. The result is called "Cleaner Cotton".

sustainablecotton.org

Recycling:

CAR RECYCLING PROGRAMS

Canada – www.retireyourride.ca/home.aspx

Retire Your Ride is partnered with the following provincial car recycling organizations:

Alberta – www.climatechangecentral.com/

British Columbia – http://www.scrapit.ca/

Manitoba – www.mb.lung.ca/

New Brunswick & PEI – www.nb.lung.ca/html/Programs/Outdoor_Air_Quality/vehicle_scrappage.htm

Newfoundland & Labrador – www.nf.lung.ca/

Nova Scotia – www.clean.ns.ca/

Quebec – www.aqlpa.com/

Saskatchewan – www.saskwastereduction.ca/, http://www.environmentalsociety.ca/

E-WASTE RECYCLING WEBSITES

Canadian provincial programs:

Alberta – www.albertarecycling.ca

British Columbia – www.encorp.ca

Nova Scotia – www.acestewardship.ca

Ontario – www.ontarioelectronicsstewardship.ca

Saskatchewan – www.sweepit.ca

Waste & Landfills:

DO WHAT YOU CAN

Comprehensive list of locations to recycle e-waste in Ontario.

www.dowhatyoucan.ca/Default.aspx

ELECTRONICS PRODUCT STEWARDSHIP CANADA

Information on manufacturer's recycling programs.

www.epsc.ca/r_links.html

Water:

LIVE EARTH

A non-profit organization that is working to solve the water crisis. Hosts a 6km Run/Walk.

liveearth.org/en/

THE RYAN'S WELL FOUNDATION

A young boy's dream to help bring clean water to people in need gave rise to this charity.

ryanswell.ca

THE WATER PROJECT

A non-profit organization that is working to bring clean water to everyone.

thewaterproject.org

WATER WARS – VANDANA SHIVA

A book highlighting the inequalities of water distribution and use.

Water Pollution:

HOME MADE COSMETICS INGREDIENT LIST

David Suzuki Foundation's list of environmentally-friendly and safe ingredients to make your own cleaners, shampoos and lotions.

www.davidsuzuki.org/publications/downloads/2010/homemade-cosmetic-ingredients.pdf

Additional Information:

For simplicity in referring back to the instructions during an activity, all numbers in each activity have been written numerically.

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www.mplc.org/aboutLaw.php

YMCA

We build strong kids,
strong families, strong communities.