

Topic 7: Ensuring
Healthy
Environments
Lesson Plans for Children and Youth

Rise Up Against Climate Change!

A school-centered educational initiative
of the Inter-American Development Bank



Rise Up

Against Climate Change

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Rise Up Lesson Plans

Our Climate Is Changing

Energize!

Water to Treasure

Intelligent Consumption

Sustainable Cities for Smart Urban
Growth

You Are What You Eat

Ensuring Healthy Environments

Protecting the Land

People Committed to Fight Climate
Change



Rise Up

Against Climate Change

Rise Up is a climate change education initiative of the Inter-American Development Bank that seeks to encourage children and youth to use their creativity and energy to come up with feasible, sustainable, long-term strategies to mitigate and adapt to climate change. This set of lesson plans is one of nine on different climate change topics that can be used independently or together with the

other lesson plans and materials of the Rise Up initiative, including instructional videos, learning games and a Green School Toolkit. Each set of lesson plans includes an introductory text about the topic that can serve as background material for the teacher or as a text for older students. The lesson plans can be used at the primary and secondary levels of education; they are divided into basic, intermediate, and advanced plans to help each teacher determine what activities are appropriate for his or her students. To find all the Rise Up materials please go to **www.iadb.org/riseup**

*Emiliana Vegas, Chief, Education Division,
Inter-American Development Bank*



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General Introduction to the Lesson Plans

Health is the result of a harmonious relationship of human beings with their bodies, their environments, and their communities. We are the other half of the environment.

—Antonio Gramsci (1891-1937)

A healthy environment is made up of many elements that are indispensable for our physical and spiritual health, our cultural well-being, and our happiness. Among these are, of course, breathable air, drinkable water, and enough food to feed the community—all of which can become contaminated (figure 1).

A healthy environment also includes factors that we don't often think about. Pollution from noise and light (excessive lighting

where there should be shadows or darkness), as well as “visual pollution” (from fences, billboards, tall buildings, and other objects that obstruct visibility), may not harm us as quickly as toxins in our food, water, or air, but, over time, they erode our physical and mental health (box 1).

A healthy environment helps protect us against natural and manmade disasters—earthquakes, hurricanes, volcanic eruptions, and the chaos stemming from human aggression and violence—by providing for our basic needs and enabling us to regenerate lost resources.

But protection is a two-way street. Our environment can protect us only if it remains healthy. When we fail to do our part in protecting the environment, it loses its ability to shelter and nurture us.

Figure 1. Contaminants and human health



Box 1. Everything around us influences our health

Healthy lifestyle choices don't guarantee good health. Exercising regularly, sleeping eight hours per night, eating healthy foods, and refraining from smoking, drinking, taking drugs, and engaging in other risky behaviors, increase the odds for good health. But even people who make the best lifestyle choices may not be able maintain optimum physical and psychological health.

This is true because some factors that influence health are beyond our individual control. We have varying levels of individual control over the factors that influence our health, which include, in addition to our personal habits:

- » **Food**
- » **Culture**
- » **Education**
- » **Housing**
- » **The psychosocial environment**
- » **The physical environment**
- » **Health services**
- » **Employment and working conditions**
- » **Social support networks**

Scientists who study the effects of our surroundings (family, work, environment, and lifestyle) on our health are called epidemiologists. Their work involves determining how much influence genetic and external factors have on the human body and to what extent the effects are reversible. For example, we've learned through epidemiology that gaseous particles and chemicals from waste and many everyday products enter our bodies through food, water, and air.

Contaminants compromise life's most basic resources

Air and water are two of life's most basic resources, yet both are very vulnerable to contamination. Is it possible that humans are destroying the very resources we need to survive? Let's take a closer look at some of the ways we have been polluting our own air and water.

Air

In 2008, exposure to high levels of pollution caused 1.3 million premature deaths in urban areas around the world. As urban populations continue growing, ever greater numbers of people are exposed to high levels of unhealthy gases, exacerbating health problems. Air pollution makes us more vulnerable to gastrointestinal and respiratory diseases, as well as allergies and infections.¹

Gases such as carbon monoxide, sulfur oxides, ozone, and airborne particles produced by the combustion of fossil fuels and other chemicals are among the most common air contaminants. Whether it comes from smoke, industrial chemical substances, radioactive materials from damaged nuclear plants, or another source, airborne particles damage both the environment and human health. Airborne particles are natural or artificial solids or liquids that have been dispersed in the air. In cities, the main source of artificial airborne particles is traffic, which produces particles from engine emissions and the friction of tires against the pavement. Smoke from diesel engines contains fine and ultrafine hydrocarbon particles that are produced during incomplete combustion. Other sources of airborne particles are industrial activities such as mining and manufacturing, and household activities such as cooking and cleaning with products in aerosol cans. Direct exposure to smoke containing toxic gases can cause death, and exposure to secondhand smoke can cause severe lung damage and injury.

For the first time in human history, carbon dioxide levels surpassed 400 parts per million (ppm) in May 2013, according to the Intergovernmental Panel on Climate Change, which is part

¹ World Health Organization and World Meteorological Organization, 2012, *Atlas of Health and Climate*, Geneva: WHO.

of the United Nations. This means that contamination of the air has reached very high levels.²

Although policies and legislation can help control air pollution, they can't solve all our problems; we as a society must take responsibility and make sustainable consumption choices, as well. We must work together to identify ways to improve air quality and counteract pollution. One promising solution is urban agriculture, which both improves air quality and food security.

Water

Although more than 70 percent of the surface of our planet is covered in water, 97.5 percent of that water is salt water, and only 2.5 percent is fresh water. Most of that fresh water is found at the planet's poles and in mountain glaciers, which leaves less than 1 percent available for plants, animals, and the seven billion people on Earth.

Despite government and community efforts to maintain aqueducts and distribution systems, many people in developing countries lack access to drinking water. Although most urban residents have access to water, that water is often poured back into the waterways after use without being treated, creating additional pollution.

Large amounts of solid and liquid wastes from households, factories, and industries flood the waterways daily. These wastes come from various sources—factory dumping, run-off of chemicals used to grow crops, and the disposal of raw sewage and untreated wastewater, as well as the dumping of solid waste.

Solid, liquid, and gaseous wastes accumulate in water sources such as streams, rivers, wetlands, and oceans, causing pollution. Water is polluted when physical, biological, and chemical impurities change its composition and cause it to become impure and, thus, undrinkable. In addition to looking and smelling bad, this polluted water is ingested by wildlife, provoking a range of effects that damage flora and fauna, causing disease, death, and possible extinction. This pollution also impairs human health through poisonings, infectious diseases, and even death.

Particles that cause climate change also affect human health by polluting the water. Heavy metals, carcinogens and endocrine

2 IPCC, 2013, "Summary for Policymakers," in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge, UK, and New York, NY, USA: Cambridge University Press.

disruptors in the waterways expose humans, other animals, and plants to disease, reproductive problems, and cancer.

The story of solid waste could have a better ending if people learned how to handle it well. Instead of dumping waste in a waterway, people can take it to special disposal locations, where it can be reused or made into new objects. With a little imagination, many types of solid waste can be reused to make any number of useful objects at home, at school, or in the workplace.

Disease and climate change

Extreme temperatures caused by climate change affect human health by causing droughts, fires, storms, and floods, which lead to food and water shortages as well as diseases and epidemics. They also affect the human body directly and can even be life-threatening.

Temperature, humidity, and rainfall affect the reproductive capacity of disease-causing microbes and insect populations, which often transmit the microbes to humans. Increasingly warm and wet climates favor the reproduction of the mosquitoes that transmit dengue and malaria, as well as the microbes that cause cholera and other diseases, which kill more than two million people each year. Hot, dry climates are just as harmful, as they are conducive to the development of the deadly disease meningitis.³

As temperatures increase and local weather conditions change, the areas at risk for such diseases are expanding to include temperate zones, as disease-transmitting mosquitoes and insects (known as "disease vectors") move into areas where they didn't exist before.

A study published in the *Bulletin of the World Health Organization* in 2000 reported a direct association between climate variation and the epidemiology of vector-transmitted diseases. The study states that the expected 1.0–3.5°C increase in average global temperatures by the year 2100 will also increase the risk of vector-borne diseases in new areas.⁴

Although climate change affects the whole world, the poorest populations in developing countries are the most vulnerable to the diseases that it can trigger. Rapid, unplanned urbanization, air and

3 WHO 2012, *Atlas of Health and Climate*, op. cit.

4 WHO, 2000, Climate change and vector-borne diseases: a regional analysis, by Andrew K. Githeko, Steve W. Lindsay, Ulisses E. Confalonieri, and Jonathan A. Patz. www.who.int.

water pollution, rising coastal water levels, flooding and landslides, accumulation of debris, and unsustainable development increase their vulnerability further still. The most vulnerable to diseases caused by climate change are children and the elderly. To protect them, we must be informed and take action to mitigate climate change, as well as find ways to facilitate adaptation to this change.

Emergencies caused by natural threats

Climate change causes extreme natural phenomena such as floods, fires, earthquakes, heat waves, hurricanes, and cyclones to occur more frequently. It also exacerbates human-caused phenomena such as fires and landslides, claiming human lives and destroying ecosystems and infrastructure.

In 2011, 332 disasters were recorded in 101 countries, causing 30,770 deaths, affecting 224 million people, and resulting in US\$336.1 billion in economic losses.⁵ Unknown numbers of people were injured, crippled, displaced, or suffered mental illnesses after the phenomena.

It is projected that natural phenomena stemming from climate change will affect many more people each year. For example, as ocean volumes increase because of thermal expansion, coastal areas and islands will flood and even disappear, causing people to lose their homes and land. In other areas, droughts will reduce food production, contributing to malnutrition.

Heat waves and health

Heat stress is a challenge for public health. In 2003, 70,000 people died from a heat wave in Europe. It has been estimated that just a 1°C temperature increase above the thermal comfort zone may increase mortality by 2–5 percent. Heat waves pose a special risk for children, the elderly, and the poor; those who are sick, homeless, or isolated; and those who work outdoors. Problems related to heat stress are more common and pronounced in cities, which are subject to the “heat island” effect.

UV radiation from the sun

The sun provides more than just heat; it also produces ultraviolet radiation, or UV rays. While exposure to the sun is necessary for human health, since we need it to produce vitamin D, overexposure can lead to wrinkles and even skin cancer. According to the World

Health Organization (WHO), tanning is partly responsible for an increased incidence of skin cancer over the past 40 years. Children are most at risk, because excessive sun exposure at an early age can trigger skin cancer.

Greenhouse gases and chemical emissions worsen the situation by destroying the ozone layer, which protects the Earth from UV rays, thus allowing those rays to enter the atmosphere without a filter. Climate change has made it necessary to be much more careful about using sunscreen and avoiding prolonged sun exposure. As we become aware of the higher risks of sun exposure, it's up to us to share this knowledge with our families, friends, and communities, and to take action to adapt to new conditions and make ourselves less vulnerable.

Development and health

While economic development helps improve the quality of life for everyone, it presents health and environmental challenges owing to increasing demands for technology and fossil fuels, land, and natural resources.

Latin America and the Caribbean have been experiencing a mining boom in recent years. Industries have been extracting coal, gold, oil, gas, iron, silver, and other minerals, fueling worldwide development but also affecting people living in the areas that contain these minerals.

A common practice in gold mining is to use mercury to separate gold from earth and rocks (figure 2). However according to the United Nations Environment Programme, “Mercury and its compounds are highly toxic, especially to the developing nervous system....[It] cannot be broken down or degraded into harmless substances. Once mercury has been liberated from either ores or from fossil fuel and mineral deposits hidden in the Earth's crust and released into the biosphere, it can be highly mobile, cycling between the earth's surface and the atmosphere. The Earth's surface soils, water bodies, and bottom sediments are thought to be the primary biospheric sinks for mercury.”⁶

The Global Mercury Assessment conducted by UNEP in 2013 adds that mercury primarily affects the nervous system and skin,

6 UNEP, 2002, *Global Mercury Assessment*, Geneva. Produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

5 WHO, 2012, *Atlas of Health and Climate*, op. cit.

and that infants, children, and pregnant women are the most vulnerable.⁷ Owing to natural emissions and human activity, mercury is present in rivers and oceans, where it affects the fishing industry, our food supply, and, ultimately, our health.

In January 2013, more than 140 countries adopted the Minamata Treaty (the International Treaty on Mercury Emissions), which aims to reduce the effects of mercury on health. Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the

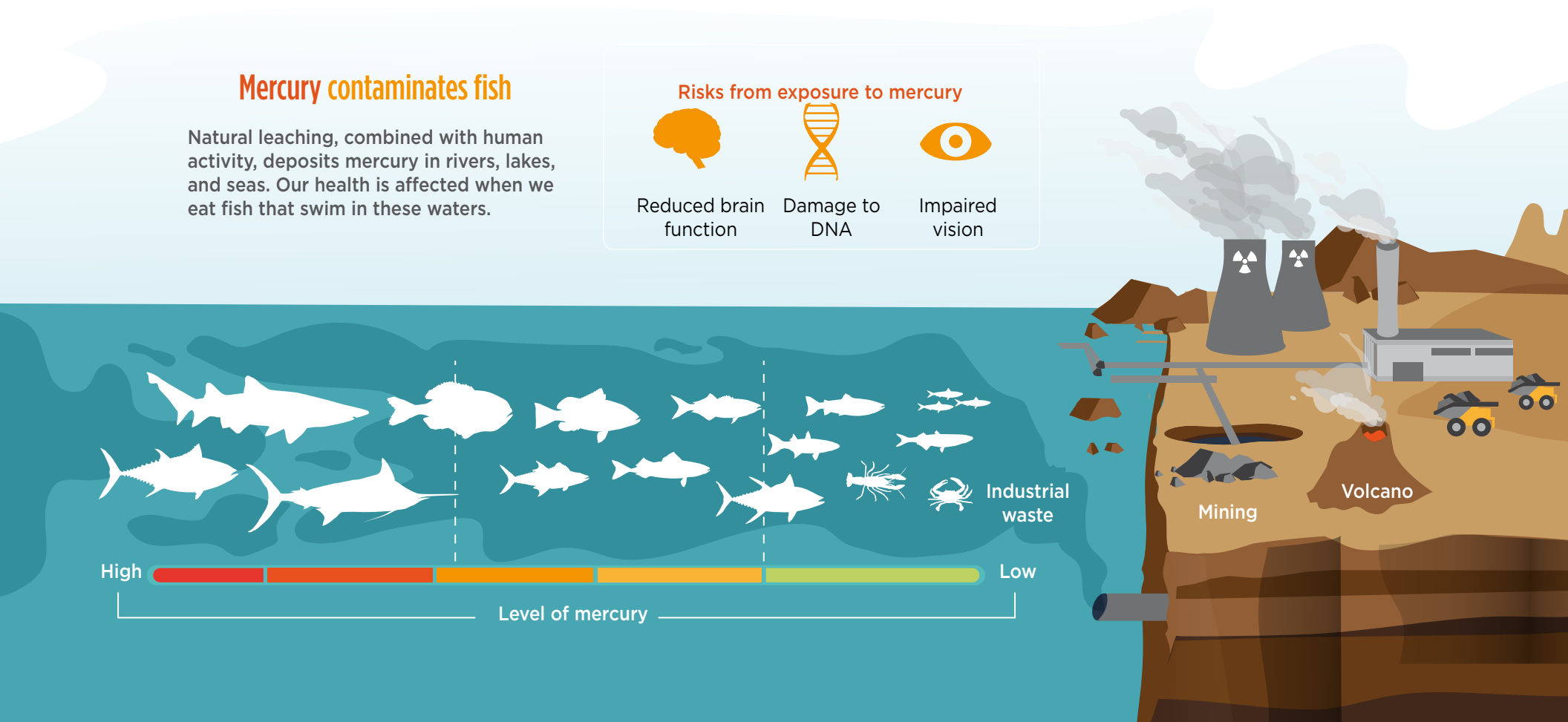
7 UNEP, 2013, Global Mercury Assessment 2013: Sources, Emissions, Releases, and Environmental Transport, UNEP Chemicals Branch, Geneva.

Dominican Republic, Uruguay, and Venezuela were among the countries that signed the treaty.

The treaty establishes a series of protective measures pertaining to mercury emissions in industry, coal-fired power plants, and mining, especially artisanal mining, which most affects the health of people living close by.⁸

8 World Health Organization, “WHO Welcomes International Treaty on Mercury,” press release, January 19, 2013.

Figure 2. Harmful elements in mining: Mercury in gold extraction



Our environment, our health, our responsibility

There are many ways we can improve our surroundings to help ensure the best possible quality of life for our families, our community and ourselves. Individuals and communities can take action every day to promote a healthy environment at home, at school, at work, and in their neighborhoods.

Watching our waste

At home and at school, we can reuse solid waste or separate it according to origin and take it to a place where it can be recycled. We can avoid mixing liquid wastes (such as oils) with water. When appropriate, we can reuse wastewater for other purposes—for example, watering the garden with rinse water from the washing machine.

Washing our hands

We can wash our food and hands thoroughly before eating, and we can eat healthy foods. Washing our hands with soap before eating meals, after going to the toilet, and before cooking is the cheapest and easiest way to prevent diarrheal diseases and acute respiratory infections. Considering that worldwide, these diseases kill 3.5 million children each year, you may even be saving someone's life just by washing your hands. Talk about doing a good deed!

Global Handwashing Day on October 15 aims to raise awareness about the importance of hand washing and to teach children how to make hand washing a regular habit.

Cleaning our homes, schools, and workplaces

Placing used toilet paper and food waste in closed containers and keeping places like bathrooms, the kitchen, and waste disposal areas clean reduces the growth of bacteria and germs and prevents the proliferation of vectors such as insects and rodents. The proliferation of these vectors increases the risk of diseases like malaria and dengue fever, which are transmitted by mosquitoes.

Turning down the volume

Noise or acoustic pollution is a type of pollution that we don't often consider. More than simply a nuisance, noise is a threat to public health.

The ear consists of three parts: the outer ear, the middle ear, and the inner ear. The inner ear is shaped like a snail and has very small cells inside it called hair cells. These tiny cells enable us to hear, but their small size makes them extremely delicate. Exposure to prolonged, loud, or even moderately loud noise can destroy them and the nerves in the ear, permanently damaging our hearing.

Loud noise hurts our health in other ways, too. It causes rapid heart and breathing rates, increased blood pressure and salivary secretion (which may contribute to overweight and obesity), altered muscle tone, inability to concentrate, physical and mental discomfort, and anxiety.

The intensity of sound is measured in decibels (dB). For quiet spaces, the WHO has set a limit of 55 dB during the day and 45 dB at night; and in noisy areas, the WHO limits are 75 dB during the day and 65 dB at night. We can protect the health of those around us as well as our own health by turning down the volume when listening to music, watching television, playing video games, and so on.

Protecting our food

When the air is polluted, we see smog; when the water is contaminated, it often looks and smells unclean. However, contamination in our food is usually hard to detect. Since eating healthy, highly nutritious foods is essential for good health, not only must we make good food choices, we also have to know where our food comes from; how it is grown; and how it is processed, packaged, transported, and stored.

There are many opportunities for dangerous toxins, microbes, and other contaminants to enter our food. Some examples:

- » Using contaminated water to irrigate crops
- » Fumigating fruits, vegetables, and crops with toxic chemicals
- » Consuming fish and seafood from rivers and oceans contaminated with organic matter, metals, and chemicals
- » Buying highly processed foods containing artificial additives such as colorants and preservatives that make food more attractive and retard spoilage but that may harm our bodies.

According to the WHO, at least three million agricultural workers around the world suffer from pesticide poisoning—yet at home we often neglect to wash our fruits and vegetables! Washing our food is a very good thing to do, but it does not remove all pesticide residues. To remove even more, we must also cook our food, since many pesticides will break down when exposed to heat.

Cooking also kills most disease-causing bacteria found in food and thus reduces food-borne illnesses, including food poisoning. Among the most common pathogenic bacteria found in undercooked foods are *Staphylococcus aureus*, *Salmonella enteritidis*, *Escherichia coli*, and *Escherichia campylobacter*.

Staphylococcus aureus is found in human skin. It's relatively easy for staph bacteria to get into foods that require extensive handling. When such foods are not refrigerated or cooked properly, the bacteria can multiply to levels that cause food poisoning in humans. *Salmonella enteritidis* is associated primarily with the consumption of unpasteurized milk and undercooked meat, eggs, and poultry. *Escherichia coli* is associated with the consumption of undercooked hamburger, unpasteurized milk and cheese, as well as unwashed raw fruits and vegetables. *Escherichia campylobacter* can be transmitted by drinking contaminated water or unpasteurized milk, as well as by eating undercooked chicken.

Just as with food, drinking contaminated water may also pose a risk to our health, causing viral, bacterial, and parasitic diseases. Always boil water before drinking it, especially in areas without good drinking water supply systems.

Creating health at every level

Creating and maintaining a healthy environment takes effort on several levels, starting with individual personal responsibility and extending to efforts at the family and community levels. You can help on every level, first by learning how to care for the environment (you're doing that right now!) and then sharing what you've learned with others and motivating them to stay healthy.

In the community, talk to your family and neighbors and encourage them to work together to identify areas that are vulnerable to contamination or that represent health risks. Then, as a community, start a campaign to make others aware of the environment and promote actions to improve conditions in those areas.





Lesson Plans at the

Basic Level

1

Basic lesson plan 1: Healthy environment, healthy body

General objectives

- » Understand that a healthy environment is vital for student development.
- » Understand that pollution, pathogenic micro-organisms, and climate change contribute to diseases.

Class activity 1: Making risk maps

Objective	Time	Place
Identify environmental threats, dangers, and risks at school, at home, and in the neighborhood.	1 hour	Classroom

Materials

- » 3 large sheets of paper per group; colored markers

Step by step

- » Talk about the term *environment* and ask students what it means. Have them write their ideas on the board.
- » Ask: What does being healthy mean? Listen and write their ideas on the board next to the ideas about the environment. Ask: Can living in an unhealthy environment put you at risk? Why? How?
- » Organize students into groups of four and ask each group to draw maps of their school, their neighborhood or town, and of the home of one student, in detail.
- » Ask them to mark places where they play or spend the most time on each map.

- » Using a different color, have them mark the places that are safe to play or live in.
- » Finally using a third color, have them mark the places that have some type of risk or potential to harm them.
- » Then, ask students to use their maps to answer the following questions:
 - How many threats or risks are there in the places where you play and live? How can they affect or harm you?
 - What risks have you experienced? Where? What happens when someone is constantly exposed to a threatening situation?
 - What caused this risk or situation? Is it possible to prevent it?
- » Complete the activity by emphasizing the importance of managing and reducing environmental risks and ensuring that everyone has a healthy environment for playing, studying, and living.

Tip for the teacher

Have students share their ideas about the basic conditions for living a healthy life. Get them to think about how to ensure these conditions for all people.

Class activity 2: Mmm... Let's Eat!

Objective	Time	Place
Relate the origin and production of food to human health.	1 hour	Classroom

Materials

- » Magazines from which to cut pictures; glue, scissors, cardboard (reused), markers

Step by step

- » Talk to your students about the food they consume in a given day. Make a list on the board of the foods they call out. Ask students whether foods such as vegetables, meats, and grains must be cooked before they're eaten. Which foods can be eaten raw and which cannot?
- » Organize students into pairs; ensure that each pair has materials for the activity.
- » Ask them to cut the cardboard in half and write "Raw Foods" on one side and "Cooked and Processed Foods" on the other.
- » Ask them to cut out pictures of a mix of cooked, raw, and processed foods, with at least 10 examples of different foods for each side of the cardboard.
- » Have them glue their pictures to the appropriate side of the cardboard.
- » Instruct them to circle the five foods that they consume most often.
- » For each of the selected foods, ask them:
 - Where does it come from?
 - How do you eat it?

- What needs to be done to prepare it? How do you know it's safe to eat?
- Which of these foods do not need to be cooked?
- » Complete the activity by stressing the importance of knowing where food comes from and how it has been processed before arriving at the table. Emphasize the importance of hygiene and washing food as a prevention against disease. Make sure students know how to determine whether a food is suitable for consumption by checking its color, odor, and expiration date and by ensuring that it is free of mold, insects, or spoilage.
- » Ask the following questions in regard to food preparation:
 - What are the health benefits of cooking our food?
 - What are the implications of not cooking foods thoroughly?
- » Remind students that cooking food aids in the removal of pathogenic bacteria, prevents disease, and eases digestion. However, overcooking food may reduce its nutritional value. It is especially important to wash raw foods very well with clean drinking water before eating them in order to prevent diseases and food poisoning.

Tip for the teacher

Talk to students about how food choices affect physical appearance and health.

Class activity 3: The Happy Drop!

Singing as we wash

Objective	Time	Place
Teach the importance of habitual hand washing.	30 minutes	Classroom and restroom

Materials

- » Markers or ink stamps with happy face drawings

Preparation

Find a short (one minute), dynamic song that appeals to students. The duration is very important, since it will guide students as to the time they must spend washing their hands. Use only the music from the song.

Step by step

- » Ask students to look at their hands and think about the objects, foods, and other items they have touched during the last half-hour, whether purposefully or inadvertently.
- » Ask your students: When did they last wash their hands? Why do they wash their hands? After what type of activities do they usually wash? Before what activities do they wash? What would happen if they didn't wash their hands and then put their dirty hands in their mouths or handled food?
- » Next, ask: Do you like to sing? Does anyone sing in the shower? Then ask: Does anyone sing when they wash their hands?
- » Ask students to compose a one-minute song to sing while they wash their hands, using the music you provide.
- » Tell them that the content of the song should describe the hand-washing process, why it is important to wash one's hands before eating, and what is achieved by doing so.

- » Tell them that there are two reasons for keeping the song short (about one minute): so it's easy to remember, and so they'll know how long to wash.
- » Pretend to wash your hands with your students as you practice the song together. Remind them to wash both sides, between their fingers and under their fingernails. Tell them that they should turn off the water while soaping.
- » Conclude by saying that hand washing is important because their hands come into direct contact with people, objects, food, and so on.

Formative assessment

Before proceeding to the next topic, make sure students:

- » Know the causes of major diseases that can affect their health
- » Understand that pollution, micro-organisms, and climate change cause or contribute to disease
- » Can assemble the healthy environment puzzle shown in figure 3. (Before beginning the assessment, print and cut two copies of the figure.)
- » Divide the class into two groups and place the two puzzles in the middle. One student from each team must put the puzzle together in order to answer a question. The first student to complete the puzzle gets to answer the question. If s/he answers incorrectly, the other student can answer.
- » Ask the following questions:
 - Name five pollutants that can cause disease.
 - How can diseases be prevented?
 - Name five places that are not safe to play in at home.
 - Why is it important to wash our food?
 - Name five places that are not safe to play in at school.
 - Why is it important to know where food comes from?

Figure 3. A healthy environment: Put the pieces together



Integration with other subjects

- » *Science*: Research which microorganisms cause common diseases. How do they reproduce? Draw them and the places where they're found.
- » *Social Studies*: Research the most common diseases in your community and their causes.

Tips for the teacher

- » Learning hygiene and healthy habits is very practical; use examples from students' daily lives to explain their importance and encourage students to apply them.
- » Customizing and using popular games for this purpose engages students and encourages compliance.

Suggested reading and viewing

- » Learn how clean hands save lives. From the UNICEF website, <http://www.unicef.org/>, search on "clean hands save lives."



2

Basic lesson plan 2: A healthy environment produces healthy children

General objective

- » Identify and implement actions that favor healthy environments.

Class activity 1: Prevention through labels

Objective	Time	Place
Understand that simple actions can help maintain a healthy environment.	1 hour	Classroom

Materials

- » Cardboard (reused), scissors, colored markers, paints, brushes, magazines or newspapers, glue, sticky tape

Step by step

- » Ask your students if the environment in their school is healthy. Why or why not? Tell them that they can help create a healthy environment by using their creativity. They will probably ask how. Tell them they will create messages about a healthy environment to post around the school.
- » Organize students into groups of four and give materials to each group.
- » Assign each group activities pertaining to one of the locations below. Each group must draw a cartoon or comic strip without using words and create a poster suitable for the assigned site.

- The restroom: Remind everyone to wash their hands after using the toilet.
- The kitchen: Remind people to wash their hands before preparing food.
- The kitchen: Remind people to thoroughly wash their food and utensils.
- The kitchen: Advise people about adequate cooking times and temperatures for various foods.
- The cafeteria: Remind people to wash their hands before eating.
- The cafeteria: Remind people to separate food scraps according to their composition and origin.
- A site with rubbish containers: Remind people to consider reusing trash before throwing it away.
- A site with rubbish containers: Remind people to dispose of trash in the proper container, depending on its composition and origin.
- A site with rubbish containers: Remind people to cover trash bins with lids to prevent infectious disease.
- At dangerous sites: Remind people to keep out of those places.
- In enclosed spaces: Remind people not to smoke.
- In enclosed spaces: Remind people to speak in a moderate tone.
- » Have each group present its poster to the class.
- » Accompany students as they post their signs around the school.

- » Next, ask students to think about areas at home that require posters and have them make posters to display at home. (Examples include: “pick up toys from the floor to avoid accidents,” “always keep an eye on food when using the stove or oven,” “turn off the tap when not in use.”)

Class activity 2: Experiment

Good air ... bad air

Objective	Time	Place
Cultivate students' appreciation for the air and the environment.	30 minutes (plus monitoring over 1 week)	Outdoors

Materials

- » 2 used wooden boards per group, 2 scraps of used white cloth (1 meter square) per group, rope or twine, scissors, sheets of white paper, markers

Preparation

Before class, find several locations outdoors where students can measure pollution, such as near cars or in a park or green area.

Step by step

- » Ask students to do a breathing exercise: Have them inhale deeply and exhale completely five times. Ask: Is the air you're breathing pure or contaminated? Why do you think so? What kinds of things pollute the air?
- » Ask: How do greenhouse gas emissions affect the air?
- » Divide the class into groups of four and give materials to each group.
- » Ask students to lay the cloth on the board and secure the edges with twine, as shown in figure 4.

- » Tell students to write their names and the names of the sample locations at the top of the board. Example: Site 1 Parking Lot and Site 2 Park.
- » Instruct them to check the cloth on their board every day for a week and to write down any differences in color that they find from day to day in a table such as table 1.
- » Have them cut a white sheet of paper into four parts and write the names of sites 1 and 2 on two of them.
- » Take students to those sites and place their boards on an exposed area of high ground that has direct contact with the air.
- » Have students look for two different surfaces at each sampling site. For example, near plants and by a wall; or on grass and in a window. Have them write the names of each surface on the two white pieces of paper and gently rub the papers over the surfaces they chose, taking care not to tear the papers.
- » Have them compare the appearance of the four sheets of paper and ask:
 - What differences do you see between the surfaces of each sampling site?
 - What do these differences mean?
 - Is the color of the surface you rubbed the predominant color on the paper?
 - Where did the surface colors come from?
- » Conclude by reminding students that suspended particles and gases in the air change the environment, and those changes influence our health. Constant exposure to such substances harms our bodies and internal systems, causing respiratory diseases and allergies.

Figure 4. Collecting evidence of suspended particles

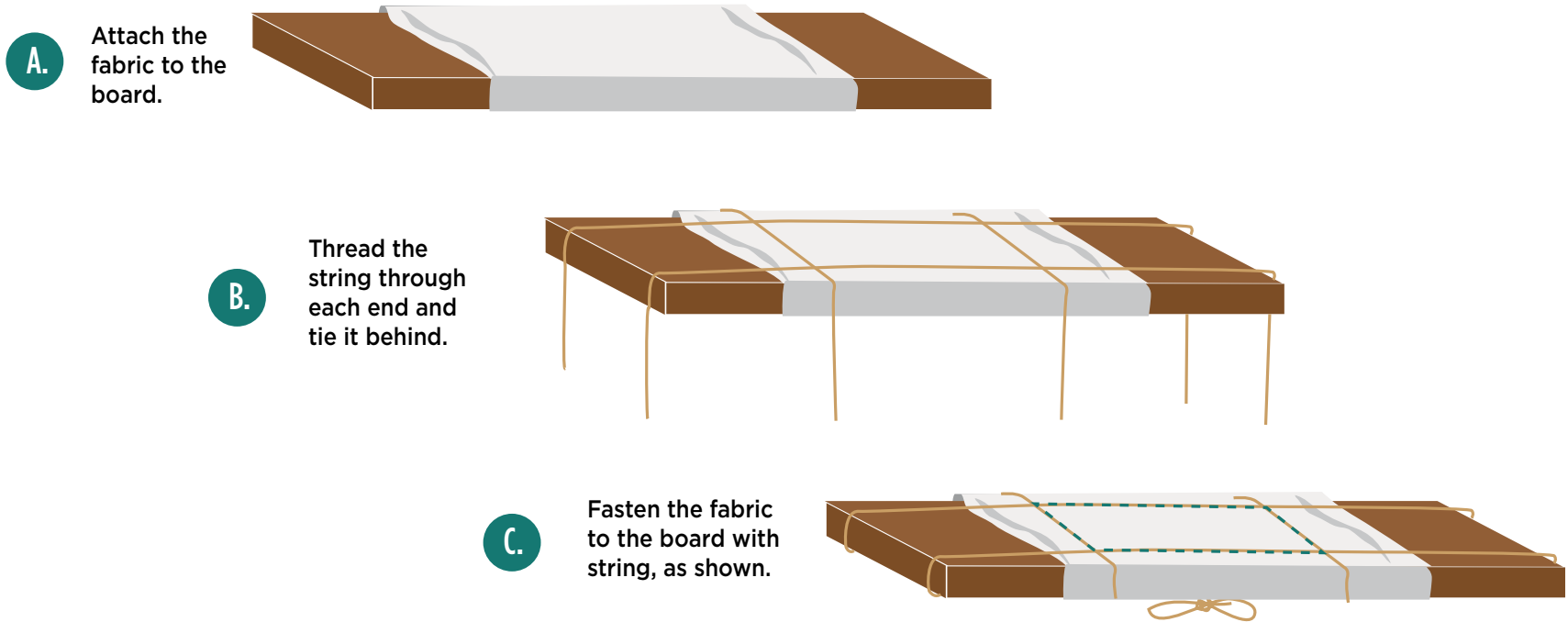


Table 1. Seven-day table of observations

	Site 1	Site 2
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		

Class activity 3: Experiment—Clean water or dirty water? It's up to us

Objectives	Time	Place
<ul style="list-style-type: none"> » Analyze the factors that can affect water quality. » Relate water quality to a healthy environment. 	30 minutes	Outdoors

Materials

- » Transparent plastic bottles (used), rubber gloves (used)—1 pair per group, markers, magnifying glass, glass jars

Preparation

Before class, make sure the materials are clean and find three different sources of water at or near the school, such as a river, a swamp, tap water, rain water, puddles, etc.

Step by step

- » Ask: Who lives near a river or stream? Have them describe it. Is the water clean? Does it have a bad smell? Ask if there is a sewer or sewage canal nearby. Have them describe its appearance and smell. Ask: Where does used water from your home or the school go? Ask: Does sewage discharged into local water sources affect the environment?
- » Divide the class into groups of four and give materials to each group.
- » Ask students to label their bottles: site 1, site 2, and site 3.
- » Take the students to the three different sampling sites. Have one member of the group put on the rubber gloves and take a water sample from each place. Have the students cover their samples and carry them carefully without shaking.
- » Once they have their samples, ask them to:
 - Describe each site, noting the presence of vegetation, insects, animals, and so on, as well as the origin of the water and its potential uses.
 - Do they observe any dumping or tributary? Where does it come from?
 - Use table 2 to describe each sample:

Table 2. Recording observations of water quality at three sites

	Site 1	Site 2	Site 3
Physical characteristics			
Color			
Smell			
Clarity			
Substrate			
Biological characteristics			
Invertebrates			
Plants			

» Finally, ask students:

- What differences do you observe among the water samples?
- How do the physical characteristics of each sample differ?
- Is water that is suitable for other organisms also suitable for human consumption? Why or why not?
- What characteristics make water suitable for human consumption?

Remember

Water is necessary for survival. Altering its characteristics produces an imbalance in ecosystems. Although some organisms will adapt to the change, others will get sick and disappear. Water that is suitable for some animals may not be suitable for human consumption. Even water that appears clean may not be safe to drink.

Formative assessment

Students should be able to:

- » Identify and implement preventive measures to reduce pollution and its impact on humans and the environment.
- » Name five ways to prevent disease transmission and relate them to the environment.
- » Name five sources of water pollution and its possible effects on humans and the environment.
- » Name five sources of air pollution and its possible effects on humans and the environment.

Integration with other subjects

- » *Science*: Research organisms that are associated with an unhealthy environment.
- » *Social Studies*: What sorts of social, economic, and cultural factors make for an unhealthy environment?

Tips for the teacher

Use relevant outdoor activities that allow students to explore, touch, and experience their environment when teaching academic

concepts and discussing environmental concerns. Such activities facilitate learning and help students understand concepts that may be difficult to grasp in the classroom.

Suggested reading and viewing

- » For information on school-led sanitation programs, visit the UNICEF website, <http://www.unicef.org/> and enter “Sierra Leone sanitation program” in the search line. For resources on the status of drinking water around the world, enter “water and childhood.”
- » WHO (the World Health Organization) offers information for families on healthy housing. From <http://www.who.int> search on “strategies for health, sustainable housing.”
- » WHO also has guidelines for water safety. <http://www.who.int/>. In the search box at <http://www.who.int>, enter “WSP manual.”
- » The water website of the U.S. Environmental Protection Agency (EPA) can help you protect your family’s health. For example, for drinking water standards applicable to children, visit <http://water.epa.gov>. In the search line, enter “children and drinking water standards.”
- » “The Treatment of Waste Water,” available on the Science for a Changing World website of the U.S. Geological Survey, discusses what happens to water after it passes through a home. Into the search line at <http://water.usgs.gov> enter “wastewater treatment” and look for “Water Use: Wastewater Treatment.” Other interesting resources will appear, as well.



Lesson Plans at the

Intermediate Level

Intermediate lesson plan 1: A healthy environment for all

General objectives

- » Identify environmental factors that affect our health.
- » Learn how to handle some chemicals and cleaning products.

Class activity 1: Environmental detectives

Objective	Time	Place
Identify factors in the environment that affect our health.	1 hour (plus monitoring over 1 week)	Classroom and home

Materials

- » Environmental inspection form (table 3), pencils or pens

Preparation

Print the environmental inspection forms.

Step by step

- » Divide the class into groups of four and assign each group a topic from the environmental inspection form (example: drinking water, food, etc.).
- » Ask each group to inspect the school and talk with teachers and administrative personnel to gather information for their form.
- » For homework, have each student inspect his/her home using another copy of the form. Students may need to

speak with adults or community leaders to complete the assignment.

- » Back in class, discuss the findings at school and at home. Ask:

- What differences did you find between your home and the school?
- How could you improve the situations you found?
- What actions could be implemented to make the environments healthier?
- How would the conditions you found change if temperatures increased by a few degrees?

- » Discuss the importance of improving the conditions of the place where you live and the impact these adjustments would have on the quality of life. Remind students that rising temperatures will increase the number of disease-causing vectors.

Table 3. Environmental inspection form

Drinking water				
Where does it come from?	Dam	Treatment plant	Wastewater or used water	Natural source
What is it treated with?	A homemade filter	Treatment plant	It is not treated	It is boiled
Food				
Where does it come from?	Countryside	Industry	Home garden	Local markets
What are crops treated with?	Agrochemicals	Insecticides	No chemicals	Unknown
How is it prepared?	By washing it	By cooking it	Unknown	No special treatment
Wastewater				
Where does it go?	River	Pipeline	Wetland	Sea
Is it treated before being expelled?	Yes	No	It is treated, but not adequately	It is boiled

Solid waste				
Where are trash bins located?	Kitchen	Yard	Street	Ground or soil
How is waste disposed?	In different containers	One container for all	On the ground	On the street
How often is garbage collected?	Twice per week	Weekly	Irregular schedule	Never
What do you do with separated waste?	It is reused	It is discarded	It is taken to the factory	It is accumulated
Other waste				
What are fuels used for?	Cleaning	Engines	Kitchen	They are not used
Where does the waste from fuels go?	Containers	Soil	Water	Street
What are chemicals used for?	Cleaning	Industry	They are not used	Medicine and agriculture
Where does the waste from chemicals go?	Containers	Soil	Water	Street
What are oils used for?	Cosmetics and medicines	Engines	Kitchen	They are not used
Where does the waste from oils go?	Containers	Soil	Water	Street

Class activity 2: Chemistry for life

Objective	Time	Place
Learn how to handle some chemicals and cleaning products.	1 hour (plus monitoring over 1 week)	Classroom and home

Materials

- » Spray bottles
- » Household chemicals (brought by the teacher) such as:
 - Toiletries
 - Construction chemicals
 - Kitchen chemicals
 - Motor vehicle chemicals
- » Danger labels for household chemicals (figure 5)

Preparation

- » Bring in commonly used household chemical containers with danger labels.
- » Print danger labels for each group.

Step by step

- » Display the household chemical packaging on a table so that it is visible to the students. Have them look at the danger labels without touching the packages. Post a “do not touch” sign on the table for emphasis.
- » Analyze and explain the different symbols that appear on the containers.
- » Organize students into groups of four. Give each group a set of illustrations.
- » Ask them to compare the danger labels on the products with the illustrations and write down products that present

physical dangers or endanger human health and/or the environment.

- » Then ask the following questions:
 - Which of these products have you seen at home?
 - Why must we understand product labels?
 - What consequences would handling chemicals cause?
- » Conclude by discussing the importance of knowing which substances are harmful to people and keeping them out of the reach of children. Tell them that adults who handle these chemicals must take protective measures and be aware of the reactions they can cause. In addition, these products should be used only when necessary and must be disposed of in a way that causes the least possible environmental damage.



Figure 5. Danger labels



Class activity 3. Online game: Rise Up Environment

Take students to the computer lab to play the interactive game “Rise Up Environment” that you can find at www.iadb.org/riseup. Ask them to clean and adapt the environment they observe on the screen by eliminating dangerous situations and removing items that are unhealthy.

Formative assessment

Students should be able to:

- Identify at least five environmental factors that affect our health.
- Apply measures for disease prevention and control when prompted with specific risks, such as using home chemical products (such as dish soap, detergents, disinfectants, and insecticides, among others)

Integration with other subjects

- » *Science*: Research water-borne diseases and their consequences.
- » *Language*: Write a story about a boy who lives in an unhealthy environment.
- » *Math*: Read old newspaper articles or talk to people in the community and count the number of situations that have changed in the environment in the past five years; organize them from the most common to the least common.

Remember

Healthy environments have:

- » Health facilities with:
 - Sound infrastructure and sufficient human resources, supplies, and equipment
 - An intercultural approach for attending to childbirth
 - Community outreach and education programs
- » Homes with:
 - Rules for peaceful coexistence and agreed values
 - An adequate kitchen with a stove, food storage areas, and a refrigerator

- Laundry facilities
- Working latrines or toilets
- Well-organized living environments
- Responsible treatment of pets
- Proper management of solid waste

» Educational institutions with:

- Curricula and annual work plans that incorporate health topics
- Lessons for parents that promote healthy environments and practices
- Stimulating learning environments containing spacious, airy, and bright classrooms; recreational areas and green areas; differentiated sanitary facilities with clean water and sewers/latrines; proper management of solid waste; kiosks that sell healthy products

» Communities/municipalities with:

- Adequate services: water and sewage systems (drains), solid waste disposal systems, electricity
- Public policies and legislation that promote child care
- Social protection networks and support
- Organized community risk prevention
- A socially inclusive cultural, sociopolitical, religious, and economic environment.

Tips for the teacher

Encourage students to create a healthy environment and take personal action to transform their homes and school. Remind them that building better living spaces is a group effort.

Intermediate lesson plan 2: To your health!

General objectives

- » Raise student awareness about the impacts of dumping solid waste and wastewater in water sources.
- » Encourage them to reuse solid waste.
- » Discuss the relationship between organisms and tropical diseases.

Class activity 1. Experiment: Cleaning the water

Objective	Time	Place
<ul style="list-style-type: none"> » Raise student awareness about the impacts of dumping solid waste and wastewater in water sources. » Encourage students to reuse solid waste. 	1 hour (plus monitoring over 1 week)	Outdoors

Materials

- » Large plastic container, a clean plastic or glass bottle, clear plastic, tape or rubber band large enough to fit over the plastic container, dark natural food coloring, used water from the washing machine or shower, a small stone, dirt or sand

Preparation

Before class, assign students to collect reused materials for the activity and identify an outdoor location to leave experiments where they will not be disturbed.

Step by step

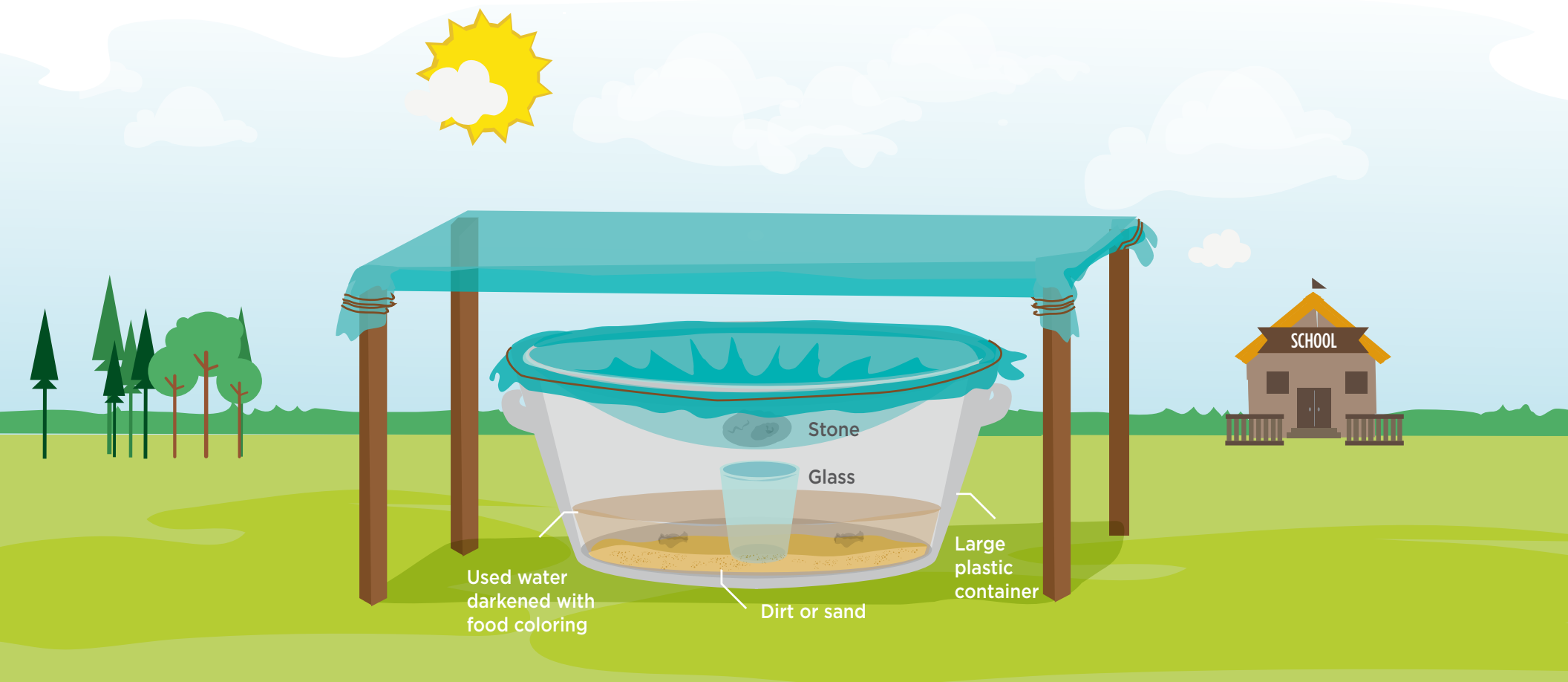
- » Ask your students if they know any ways to clean water. They may suggest filters or chemicals. Ask: Can sunlight clean wastewater?
- » Tell them they'll be doing the following experiment to find out.
- » Divide the class into groups of four and give each group their own materials.
- » Ask students to pour a small amount of wastewater into the large plastic container (approximately 2 cm deep). Then tell them to add food coloring and the sand or dirt and to mix it together.
- » Have them mark the water level on the plastic container.
- » Instruct them to insert the glass into the center of the container with the contaminated water, taking care so that no water gets into the glass.
- » Have them cover the container with clear plastic, taking care not to move the glass. Keeping the plastic a little loose, fasten it securely to the container with tape or a rubber band.
- » Place a small stone in the center of the plastic, directly above the glass.
- » The experiment must be done outdoors. It is important to shelter the container from the rain as well as to place it somewhere where it will be exposed to direct sunlight.

- » Have students monitor their containers for one week and write down what they observe inside.
- » At the end of the week ask them:
 - What color is the water inside the glass? How did it get there?
 - What happened to the level of dark water inside the container? Where did it go?
- » Explain that the sunlight made the temperature inside the container increase, causing the dark water to evaporate. However, the water is the only thing that evaporates; the

other materials stay at the base of the container. After it evaporates, gravity causes the condensed water droplets on the plastic to roll toward the center and fall into the glass.

- » Conclude by stating that this is an effective method for cleaning wastewater before releasing it back into natural water sources, since it has little impact on the ecosystem. However, the most effective ways to minimize our impact on the environment are to reduce unnecessary waste, avoid using chemicals, and respect bodies of water and other natural spaces.

Figure 6. An experiment in purifying water



Class activity 2: Bug inventory

Objective	Time	Place
Understand the relationship between organisms and tropical diseases.	1 hour (plus monitoring over 1 week)	Classroom and home

Materials

- » Notebook, pencils or pens

Preparation

- » Explain that disease vectors carry and transmit pathogenic viruses, bacteria, and parasites to humans. Inside the human body, these microorganisms cause disease and even death, in some cases.
- » Have students wear protective lab coats and instruct them not to touch any organisms.

Step by step

- » Organize students into groups of four; each group should visit one of the following areas of the school: kitchen, restroom, cafeteria, and yard. Have each group discuss the following questions:
 - Are there any living or dead organisms here? Which ones?
 - Where are they?
 - Make a drawing of any organisms observed.
 - Have you seen this type of organism before? Where?
- » Bring students back to the classroom and discuss what they found at each location.
- » Ask them to describe the characteristics of the organisms found. Are they part of the local wildlife? Are they disease vectors? Or both?

- » Ask students to research the organisms that they observed and find out:
 - Which diseases can they transmit?
 - How do those diseases spread?
 - What do those diseases do to the human body?
 - How can people protect themselves and prevent disease?
- » At the end of the week, have students discuss their findings on each vector. Conclude by saying that preventive measures and hygiene habits are the first form of defense against infectious diseases. Add that they should inform adults if they see these types of organisms and ask the adults to take steps to provide a healthy environment for everyone.
- » Use the table 4 to discuss disease vectors and diseases in greater depth.

Formative assessment

Students should understand:

- » The impact of dumping untreated wastewater into water sources.
- » The relationship between organisms and tropical diseases.

Integration with other subjects

- » *Science*: Research aquatic plants that clean wastewater.
- » *Language*: Write a story titled “The Louse and the Rat.”

Tips for the teacher

Ensure that students apply basic hygiene habits in class, such as washing their hands, periodically checking their heads for lice, and noting their moods and vitality. This encourages students to be alert for signs and symptoms of disease and to seek early treatment.

Table 4. Disease vectors and the problems they cause

Vector	Immediate problems (1–7 days)	Intermediate problems (30 days or more)
Manure flies	Discomfort	diarrhea, dysentery, conjunctivitis, typhoid fever, cholera, maggot infestation, discomfort
Mosquitoes	Sting and discomfort	encephalitis, malaria, yellow fever (urban), dengue, lymphatic filariasis, West Nile virus, discomfort
Rodents	Pain	rat-bite fever, leptospirosis, salmonellosis, infected bites
Lice	Sting and discomfort	epidemic typhus, relapsing fever caused by lice bite, rickettsial fever, sting and discomfort
Fleas	Sting and discomfort	plague, endemic typhus, sting and discomfort
Mites	Sting and discomfort	scabies, rickettsial rash, scrub typhus, sting and discomfort
Ticks	Sting and discomfort	paralysis caused by tick bite, relapsing fever caused by tick bites, Rocky Mountain spotted fever, tularemia, Lyme disease, sting and discomfort
Bedbugs, triatominae	Sting and discomfort	sting and discomfort, Chagas disease
Ants, spiders, scorpions, snakes	Poisoning, sting, and discomfort	poisoning, sting, and discomfort

Source: *Control de Vectores con Posterioridad a los Desastres Naturales* (OPS1982).



Lesson Plans at the
Advanced Level

1

Advanced lesson plan 1: How does climate change affect health?

General objectives

- » Understand how climate change affects the basic elements we need for good health: clean air, clean water, food, safe housing, protection against infectious diseases, temperatures, and the weather.
- » Understand that we must manage our own health—we cannot delegate health management entirely to the public sector.

Class activity 1: Preventing disease and promoting health

Objective	Time	Place
Articles, documents, and images related to climate change and health, disease prevention, and health promotion	2 hours	Classroom with Internet access

Materials

- » Articles, documents, and images related to climate change and health, disease prevention, and health promotion

Preparation

Read the introduction to this unit and use it as a starting point for the activity. Additional details are available in other units of the Rise Up series and in the suggested reading.

Step by step

- » Ask: Does climate change affect human health?
- » Divide your class into five groups. Assign one group to research each of the following topics as it pertains to climate change and health: diseases, emergencies,

hazardous airborne materials, heat stress, and overexposure to UV rays.

- » Give students 45 minutes to gather information.
- » Then ask: What did you find out? Have each group present the impacts of climate change on health based on their topic.
- » Tell students that although the outlook is quite bad, there are things they can do. National healthcare systems can't handle disease prevention and health promotion alone. Local governments, communities, and individuals must also take action to make themselves less vulnerable to disease, adapt to new conditions, and seek ways to ensure the well-being of the local community, families, and themselves.
- » Have students brainstorm about the things national and local governments, the community, families, schools, and students can do to address environmental health risks, become less vulnerable, and promote well-being. Tell them that taking action is called “empowerment” and it is essential for addressing the impacts of climate change on health. Give them 30 minutes to brainstorm and discuss their ideas.
- » Have each group present its proposed measures to the rest of the class.

Tips for the teacher

Youth are the driving force for action. Encourage them to share what they have learned with their families, neighbors, and the school community. Individuals and communities play a vital role in protecting public health.

Class activity 2: Working for our health

Time	Place
1 hour	Classroom

Materials

- » Notebooks or sheets of paper

Preparation

The purpose of this activity is to convey that good health is not merely the absence of illness. Being healthy, according to the WHO constitution of 1946, refers to a “state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”

Step by step

- » Ask your students what “health” means to them.
- » If they mention only the absence of disease, ask: Are people healthy if they’re frequently bored, tired, stressed, uncomfortable, or depressed?
- » Ask students to write an essay about factors in the school environment that may be affecting their health. Give them a few examples, such as their commuting time from home, the lack of communication between home and school, the school’s green areas, bullying, trash on the floor, or anything else that may be affecting the community. Ask them to describe the potential health consequences of these issues as well as potential solutions and who should implement those solutions.
- » After collecting the essays, ask: Why do you think we did this exercise?
- » Conclude the lesson by talking about the importance of empowerment in the adaptation and mitigation of health risks. A community that is empowered—and that thinks about risks and takes action—is a less vulnerable community.

Formative assessment

Upon completion of this lesson plan, students should understand:

- » The concept of health
- » The fact that diseases related to climate change come from infections, emergencies, airborne materials, heat stress and UV radiation from the sun.
- » Health promotion

Integration with other subjects

Social and Cultural Studies: Research diseases that were common 50 years ago and compare them with today’s common diseases.

Tips for the teacher

Review your school’s risk management plan and propose updates. Discuss the plan with your students. (Consult “Managing Risk in the School,” module 9 of the Green School Tool Kit, available at <http://www.iadb.org/riseup>.)

Suggested reading and viewing

- » *Tunza*, a magazine for youth from the United Nations Environment Programme, devoted an issue to Natural Hazards and Disasters (volume 8, number 2). It offers explanations and descriptions of weather events and disaster prevention activities written in such a way to be readily accessible to students. Find it by entering “Tunza” into the search line at www.unep.org.

2

Advanced lesson plan 2: Development and health

General objectives

- » Understand that in addition to protecting the economy and promoting economic development, sustainable development seeks to safeguard culture and ensure peace, security, and environmental protection. Human beings are part of the system we call the environment.
- » Understand that development should not come at the expense of health.
- » Understand the importance of citizen participation in decisions about development in their community.

Class activity 1: Tell, include, prevent

Time	Place
2.5 hours	Classroom with Internet connection and equipment to show a documentary

Materials

- » “Choropampa, The Price of Gold,” a documentary film produced by Ernesto Ceballos and Stephanie Boyd (www.guarango.org)

Preparation

- » Read the introduction to this unit and research the use of mercury in gold mining using the suggested reading.
- » Download the documentary from www.youtube.com in advance to avoid connection problems. The documentary has parts in Spanish and English but includes subtitles. It is 75 minutes long.

Step by step

- » Gather your students in the classroom where you will show the documentary.

- » Ask: How does mining affect human health? Which element is commonly used to extract gold? Explain that mercury helps separate metal from rocks and soil.
- » Show the documentary.
- » Ask: Based on the documentary, what happened in Choropampa in 2000?
- » What were the causes of this health emergency?
- » What symptoms did people feel?
- » What does mercury do to human health? What chemical reactions does mercury cause when it spills?
- » How is mercury removed from floors, walls, air, and even the human body?
- » Based on what we learned about health promotion previously, were any components missing from the set-up and operation of this mine? It is important that students mention the lack of precautions taken prior to transporting such a dangerous material, the precarious health care system in the area, the dangerous working conditions, the government's inefficiency, the powerlessness of the people in the legal system, and, above all, peoples' ignorance about health hazards and proper handling procedures.
- » Ask: Does the community have a right to know about mining or industrial activity taking place nearby?

- » What options does the community have to reduce potential risks?
- » How can the community play an active role in making important decisions about industrialization and development? Should they resort to violence? Emphasize that if the community is proactive about becoming involved in the planning and decision-making process, there will never be a need for violence.

Class activity 2: Learning and asking questions about industries that affect us

Objective	Time	Place
Understand the concepts of weather and regional weather forecasts	2.5 hours	Classroom

Materials

- » Articles and documents about air, water, and soil pollution caused by industrial or mining activities; documents on industrial and mining activity in your area.

Preparation

- » Look for articles about air, water, or soil pollution from industrial and mining activity. Research industrial and mining activities in your area and potential health effects from these activities. Ask your students to do the same.
- » Contact personnel (industrial safety personnel, if possible) from the most important sectors or companies and invite them to talk to the class.

Step by step

- » Ask: What industrial or mining activities are nearby? Which generate the most pollution? Can their activities make us sick? Why?
- » Have students name the main air, water, and soil pollutants produced by these activities. If necessary, add to their list.
- » Divide students into groups of four or five and assign each group a different industrial or mining project in your area. Ask them to research the project's planning, set-up, waste products, and any processes that may be affecting the population's health. This can be done through online research in class or as homework.
- » Invite representatives from each industry or mining company to talk to the class and allow students to ask questions. If possible, invite someone from industrial safety and make sure that the representatives talk about the safety measures that their companies have implemented prior to and during operations, both for the environment and human health.
- » Allow students to discuss freely the activities taking place in the area, including how they can affect health and how the companies are responding to and resolving ongoing problems.

Class activity 3: Effects of climate change on public health: Setting up an observatory

Objective	Time	Place
Understand the concepts of weather and regional weather forecasts	2 hours	Classroom

Materials

- » Wood panels, paper, markers, masking tape (all materials can be recycled)

Preparation

- » Print multiple copies of the text in box 1.
- » Research information that may help students set up a Center for Health and Climate Change.

Climate change has affected all countries, but to a much greater degree it has impacted nations with less access to technological resources and that have contributed less to the emission of pollutants.

This is a great injustice, and if we do nothing, it will be a great shame for our civilization.

These impacts also seriously affect the health of today's children and future generations, which is also an injustice.



Box 1. Health threats posed by climate change

One of the most renowned newspapers of the medical field, *The Lancet*, joined forces with the University of London to research global health threats related to climate change. The study concluded that climate change is the biggest global health threat of the 21st century, primarily because it:

- » Changes patterns of infection and disease caused by insects and increases deaths from heat waves
- » Reduces water and food security, causing malnutrition and intestinal diseases
- » Increases the frequency and magnitude of extreme weather events (hurricanes, cyclones, and storms), causing flooding and direct damage
- » Intensifies the vulnerability of people living in precarious neighborhoods, homes, and settlements
- » Intensifies the displacement of populations.

Box 2. "Environmental refugees"

People who are forced to leave their homes because of environmental factors are considered to be a new type of refugee.

Some reports predict that rising sea levels, desertification, soil erosion, and declining freshwater supplies, all exacerbated by climate change, could create up to 50 million environmental refugees over the next 10 years. Environmental refugees, however, are not currently recognized by the UN Refugee Convention nor any other international agreement.

Yet the Red Cross has said that more people are displaced by environmental disasters than by war. Moreover, some argue that the homes of the displaced are being destroyed by the environmental and economic policies of developed countries, that creating environmental refugees is equivalent to "environmental persecution," and that the displaced deserve legal protection.

Migration related to the environment has been most evident in Sub-Saharan Africa, but it also affects millions of people in Asia and India. Europe and the United States have been affected by the increasing pressure of people forced to leave North Africa and Latin America as a result of the deterioration of soil and water conditions.

Source: www.globalfootprints.org/issue/refugees/environmental.



Step by step

- » This is a reading, interpretation, and reflection activity that may be done in groups. Provide students copies of the text in box 1 and give them 10 minutes to read it.
- » After reading the text, take some time for clarification. For example, ask: Are there any questions about the relationship between climate change and the health threats that were presented in the text? Do you have any comments about the claims made in the text? Do you agree or disagree?
- » Have students elaborate on the relationship between climate change and population displacement. In particular, ask them to discuss:
 - Water shortages and population displacement
 - Food shortages and displacement
 - Disease-transmitting vectors as a cause of displacement
 - Water and air contamination as a cause of displacement
- » Share the text of box 2 with your students:
- » After discussing the text and answering any questions, propose setting up a "Health and Climate Change Observatory" at school. The class should select various topics to monitor in their country, region, city, or town and define a time scale for the project, such as three months, six months, or a year.
- » Students can start with the indicators suggested in the text, such as:
 - Number of cases of disease caused by insect bites
 - Number of deaths from heat waves
 - Number of cases of disease caused by contaminated water and food
 - Number of people who become homeless and deaths caused by extreme weather events (hurricanes, cyclones, and storms)
 - Number of people living in precarious neighborhoods, homes, and settlements
 - Number of migrants displaced by disasters or extreme weather conditions

- Number of immigrants as a result of disasters or extreme weather conditions
 - Other categories
- » Rather than monitoring the city or region, the class may choose to focus on situations affecting students, employees, and families associated with the school.
 - » Post the observatory board in a place that is visible to the whole school and announce its creation and purpose.
 - » Assign one group to bring in news related to the selected indicators each month and to update the numbers whenever a new event occurs or a new study is published.

Formative assessment

After this activity, students should comprehend the following concepts and ideas:

- » The relationship between climate change and the reproduction of disease-carrying mosquitoes
- » The relationship between climate change and undernourishment, subnutrition, and malnutrition
- » The relationship between climate change and disasters
- » The relationship between climate change, displacement, and migration
- » Risks associated with poorly managed mining activities for workers and the surrounding communities
- » The current state of health in the area, as well as diseases and social impacts caused by climate change
- » Materials and substances that are harmful to our health.

Integration with other subjects

- » *Biology*: Research the symptoms and prevention of diseases caused by climate change. Research the life cycle of a mosquito.
- » *Geography*: Discuss which countries face public health risks due to water contamination and which do not.
- » *Statistics*: Use the observatory to show how statistics are managed and used for decision making. For example, have

students pretend they are part of the local government and use the tables prepared in the observatory to create a series of policies to reduce the risk of contracting diseases caused by climate change.

- » *Cultural Studies*: Watch documentaries on the lives of miners around the world.

Tips for the teacher

- » Contact the health department of your city or town and invite professionals who work with vaccinations to talk to parents, students, and teachers about health and the proliferation of epidemics.

Remember

- » Waste minerals or materials from industrial and mining activity are very harmful to human health.
- » Two of the leading causes of infant mortality in Latin America and the Caribbean are complications from diarrhea and acute respiratory infections. These are directly related to substances to which children are exposed every day at home and at school.
- » Many diseases result from climate change.
- » Empowering communities and individuals is critical to ensuring a healthy environment.

Suggested reading and viewing

- » Communities in developing countries face increasing health and environmental risks linked to exposure to mercury, according to studies by the United Nations Environment Programme (UNEP). Learn more by entering “mercury” into the search line at www.unep.org. For example, a January 2013 press release on the subject is entitled “UNEP Studies Show Rising Mercury Emissions in Developing Countries.”
- » The Regional Health Observatory of the Pan American Health Organization provides information on health in the region, including interesting facts and statistics. www.paho.org.





2016

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Lesson Plans for Children and Youth

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Rise Up Against Climate Change!

A school-centered educational initiative
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