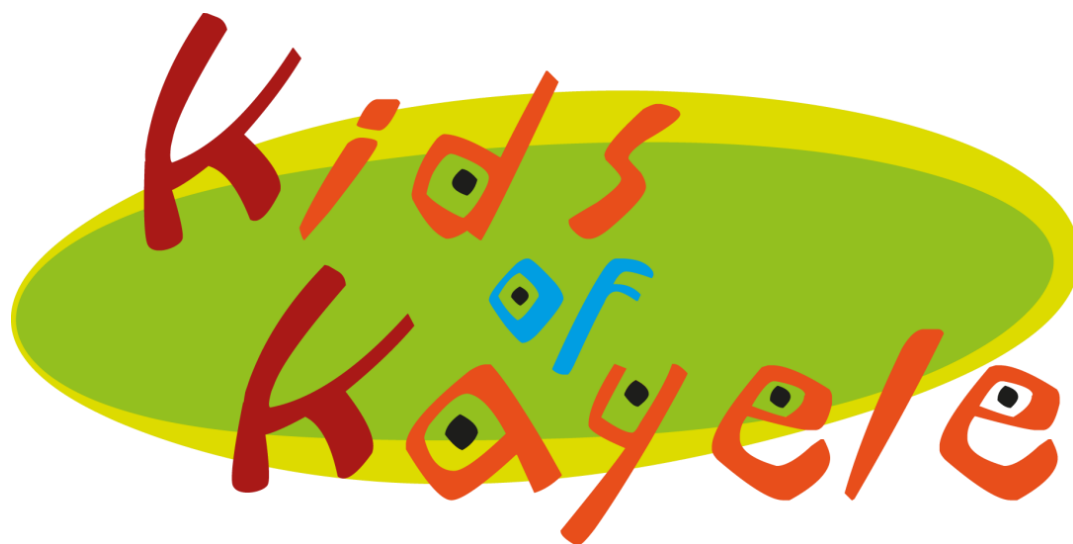


# Kids of Kayele

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Educator's Guide  
September 2013





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# 1 Strategy and Scoring

Strategy is very important to win Kids of Kayele and achieve a good score. Players need to choose a combination of water, sanitation and hygiene actions at the beginning of the game to maximize their score and survive. The actions that are chosen are the most important part of the game strategy. When choosing between the different actions there are some actions that have a higher impact on health, for example, building a latrine, hand washing with soap, water treatment, and safe water storage. These actions have a higher impact on health, according to research about water, sanitation and hygiene interventions.<sup>1</sup> To survive the game, players need to successfully complete some of these actions as their first selections.

Friends' health starts at 80%. Once an action has been successfully completed, friends will take two turns to learn a chore or a habit. Friends will take two turns to teach a habit to another friend. Each friend can do two actions without negatively impacting their health. Once a friend does three actions or more, then you lose points. When a friend's health is 20% or less, then that person becomes sick. When a friend is sick, they take longer to learn a chore or teach habits to their friends.

The final score is determined by:

- Average level of health
- Number of "Test your Knowledge" questions answered correctly
- Number of completed actions

## 1.1 Intermediate Version Scoring

The maximum score for the game is 200 points. The overall score of the game is determined by the following:

- Base score is the total health divided by five which is equal to 100 points.
- Two points are awarded for every correct answer to a question for a maximum of 46 points (23 video tests).
- One point is subtracted for every incorrect answer to a question for a maximum of -23 points.
- Two points are awarded for each action completed for a maximum of 24 points.
- Ten points are awarded for winning the game.
- Two points are awarded for every turn the player finishes early for a maximum of 34 points.
- Zero to three points for answering "Emergency! What will you do?" test questions.
- One point for a correct answer on a WaSH quiz.

Players can also receive bonuses to their health, water quality, sanitation, and hygiene scores throughout the game when answering questions correctly. These bonuses impact the player's health, but do not have a direct impact on the overall score.

Bonus points are awarded when:

- The player completes all the actions
- The player finishes the actions before the 31<sup>st</sup> day
- The player's friends have 100% health at the end of the game

Players win the game when they complete all the actions and all of their friends have 100% health.

## 1.2 Advanced Version Scoring

The maximum score for the game is 200 points. The overall score of the game is determined by the following:

- Base score is the total health divided by five which is equal to 100 points.
- Two points are awarded for every correct answer to a question for a maximum of 46 points.
- One point is subtracted for every incorrect answer to a question for a maximum of -23 points.
- Two points are awarded for each action completed for a maximum of 24 points.
- Ten points are awarded for winning the game.
- Four points are awarded for every turn the player finishes early for a maximum of 20 points.

Players can also receive bonuses to their health, water quality, sanitation, and hygiene scores throughout the game when answering questions correctly. These bonuses impact the player's health, but do not have a direct impact on the overall score.

Bonus points are awarded when:

- The player completes all the actions
- The player finishes the actions before the 31<sup>st</sup> day

Players win the game when they complete all the actions.

---

<sup>1</sup> Fewtrell, L., Kaufman, R. B., Kay, D., Enanoria, W., Haller, L., & Jr, a. J. (2005). *Water, sanitation and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis*. The Lancet Infectious Diseases.

## 2 Key Terms

| Term                  | Definition  |
|-----------------------|---|
| <b>Bacteria</b>       | a group of very small living things that often cause disease (1)  |
| <b>Cholera</b>        | a serious disease that causes severe vomiting and diarrhea and that often results in death (1)  |
| <b>Coagulant</b>      | a substance that causes fluids to become thick and partly solid (1)   |
| <b>Consistent</b>     | continuing to happen or develop in the same way (1)   |
| <b>Contaminant</b>    | something that makes a place or a substance (such as water, air, or food) no longer suitable for use (1)  |
| <b>Critical</b>       | extremely important (1)   |
| <b>Crucial</b>        | extremely important (1)   |
| <b>Effective</b>      | producing a result that is wanted; having an intended effect (1)  |
| <b>Disinfection</b>   | to clean something by using a chemical substance that kills all germs and bacteria (1)  |
| <b>Drainage</b>       | the act or process of removing water from a place or thing (1)  |
| <b>Feces</b>          | solid waste that is released from the body (1)  |
| <b>Filtration</b>     | the act or process of removing something unwanted from a liquid or gas (1)  |
| <b>Habit</b>          | a usual way of behaving; something that a person does often in a regular and repeated way (1)   |
| <b>Helminths</b>      | worms that can live inside humans and other animals, causing harm to them (2)   |
| <b>Hygiene</b>        | the things that you do to keep yourself and your surroundings clean in order to have good health (1)  |
| <b>Inadequate</b>     | not enough or not good enough (1)   |
| <b>Immunity</b>       | the ability to keep yourself from being affected by a disease (1)   |
| <b>Implement</b>      | to begin to do or use something (1)   |
| <b>Infrastructure</b> | the basic equipment and structures that are needed for a country, region, community, or organization to function properly (1)                             |
| <b>Insufficient</b>   | not having or providing enough of what is needed (1)  |
| <b>Latrine</b>        | an outdoor toilet that is usually a hole dug in the ground (1)  |
| <b>Maintenance</b>    | the act of keeping something in good condition by making repairs or correcting problems (1)   |
| <b>Microorganisms</b> | extremely small living things that can only be seen with a microscope (1)   |
| <b>Municipal</b>      | of or relating to the government of a city or town (1)  |
| <b>Pathogen</b>       | something that causes disease (1)   |
| <b>Prevent</b>        | to stop something from happening or existing (1)  |
| <b>Protozoa</b>       | tiny organisms whose bodies are a single cell (1)   |
| <b>Sanitation</b>     | the process of keeping places free from dirt, infection and disease (1)   |
| <b>Sedimentation</b>  | the natural process in which material (such as stones and sand) is carried to the bottom of a body of water and forms a solid layer (1)                   |
| <b>Stagnant</b>       | not flowing (1)   |
| <b>Turbidity</b>      | the cloudiness or muddiness of a liquid (1)   |
| <b>Viruses</b>        | extremely small living things that cause disease and that spread from one person or animal to another (1)   |
| <b>Wastewater</b>     | water mixed with waste; water that has been used in your toilet, kitchen sink and washing machine, including any human waste that comes along with it (2) |

**References:**

1. Merriam-Webster Learner's Dictionary [internet]. Springfield: Merriam-Webster Inc.; [date unknown] [cited 2013 Aug 2]. Available from: <http://www.learnersdictionary.com/>
2. Dictionary and Thesaurus - Merriam-Webster Online [internet]. Springfield: Merriam-Webster Inc.; [date unknown] [cited 2013 Aug 2]. Available from: <http://www.merriam-webster.com/>

### 3 Kids of Kayele Intermediate Lesson Plans

#### Overview



The Kids of Kayele is an online game that uses video, photos, trivia and interactive game play, to teach students about global water and sanitation issues. Players assume the role of exchange students that must maintain the health of their friends, while visiting Zambia. Through the game students learn about human impact on water quality, microbiological contamination, current practices and technologies that affect water quality and problems that require both technological and social solutions. The clues to stay healthy during the game are provided by the Kids of Kayele, a group of youth from a hygiene club in Zambia. This resource includes a lesson plan explaining how to play the video game, as well as a lesson to debrief learning.

#### Background Knowledge



No background knowledge is required.

#### Time Required



60 minutes per lesson. The first lesson should be conducted in the computer lab. The second can be done in class.

#### Grade level



Grades 7-9

#### Subject Area



Science, Social Studies & Language Arts

#### Keywords



Water supply, water quality, Zambia, pathogens, sedimentation, filtration, disinfection, protection, hygiene, viruses, protozoa, bacteria.



**Lesson Plan 1: Kids of Kayele Video Game**60 minutes total **Learning Expectations**

At the end of this session participants will be able to:

1. Discuss similarities and differences between Canadian and Zambian water sources and systems.
2. Identify practices and technologies that affect water quality and health.
3. Prioritize threats related to water, sanitation and hygiene.
4. Develop solutions that could address various local and global water issues

**Materials**

- One computer per students. If this isn't possible one computer for every two students will work.
- Computers require the following:
  - Flash Player 10 or better
  - PC or Mac computer - not tablet or IPAD
  - A web browser and internet access
  - Java script enabled
- Headphones for each student

**Preparation**

- Book a class set of computers
- Ensure that each computer has Flash 10 or better enabled
- Trial the game on school computers
- Write the Kids of Kayele web address on a whiteboard/chalkboard
- Read game instructions and play the game to become familiar with its objectives

**Introduction**

1. Assign each student a computer and ask them to sign in and open a web browser.
2. Instruct the students to use the Kids of Kayele web address to open the game.
3. Explain that the object of the game is to maintain the health of their group of friends. [Note: The game is designed to require minimal teacher instruction. Instructions should be limited to explaining the goal of the game. There is an instructions link on the main game screen that students can look at if they would prefer to have further guidance].

**Topic 1: Game Play**

1. Instruct students to begin the game.
2. Allow for significant interaction for the game. If students die/finish the game, tell them to play it again, and try to beat their original score.
3. Each time a student reaches the final results graph, ask them to print it out so that they can use it in the debrief lesson.

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**Review**

1. Ask students to discuss the following questions with a partner and record their answers. They will be asked to refer to their answers during the debrief lesson.
  - What contaminates the water in Lubuto? Which of these contaminants do we also have in Canada?
  - What technologies and practices did you use in the game to improve water quality and health? Which of these solutions would work both in Zambia and Canada?

## Lesson Plan 2: Kids of Kayele Follow-up

**60 minutes total**

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### Learning Expectations



At the end of this session participants will be able to:

1. Describe the similarities and differences between Canadian and Zambian water sources and systems.
2. Seek solutions to a variety of water issues through learning from diverse populations.
3. Interpret graphical data and explain relationships among the variables.
4. Apply knowledge of water issues and solutions to produce action in one's own community.

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### Materials



- Whiteboard/Chalkboard
- Pens/Chalk
- Copies of Kids of Kayele Handout (see below)

[Note: This lesson is structured around group discussions and is most effective in a classroom setting. You do not need to book computer time]

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### Preparation



- This is a follow-up lesson to the Kids of Kayele video game. Other than the previous game-play, no preparation is required.
- Make one or two copies of the Kids of Kayele questions for each small group.

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### Introduction



1. Ask students to journal about their experience with the game through answering the following questions:
  - What did you learn from the Kids of Kayele?
  - How can you play the game to get the best score?

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### Topic 1: Small Group Response



1. Assign each student to a small group.
2. Provide a “Kids of Kayele” hand-out to each group (see end of lesson for hand-out).
3. Ask each small group to discuss the questions on the handout and record their answers. [Inform the students that they should identify one scribe and one

spokesperson in their group. Also inform students that you will be evaluating their written responses].

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## Topic 2: Class Response



1. Ask each of the questions on the handout to the class and ask one group to report on their answers. Once the first group has given their answer, ask other groups if they have different answers/points to add to the discussion.
2. When you get to the question h, “Identify 3 follow-up questions relating to local or global water issues that were not asked in the game,” ask each group to share their favorite question.
3. Record the questions on the board.
4. Pose some of the interesting questions to the class and discuss possible answers.

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## Review



1. Ask students to return to their journal and write two insights they had during the group discussion period

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## Extension



1. Select two or more videos that could be further examined as a class to investigate local and global water issues and links between Zambia and Canada. Download the videos from the CAWST Wavemakers site:  
<http://wavemakers.cawst.org/index.php/educator-resources>
2. Download the action planning tools from the Wavemakers website. Use these tools to identify local water issues and use the CAWST Action Guide to plan a water action project in your community.

### **Kids of Kayele Handout**

- a. How was the water in Lubuto contaminated?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- b. Which forms of water contamination are found in Canada?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- c. In Lubuto, what steps were taken to make water safe to drink?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- d. Which of the steps used to make water safe in Lubuto do we also practice in Canada?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- e. Refer to the graphs that you printed out at the end of the Kids of Kayele video game. Select a graph from one participant in your group and respond to the following questions:
  - What information does it give you about the health of the group?

- What is the connection between water quality and health?
- f. How are Canadians similar to those who live in Lubuto?
- g. How did Kids of Kayele change your assumptions about Africa?
- h. Africa is a continent of 54 countries. It is full of diversity, unique cultures, languages and histories. Canadians often refer to Africa as being just one country and they assume that all of Africa is the same. What is the danger of this perspective?
- i. The Kids of Kayele are taking action in their community to improve sanitation, hygiene habits and water quality. What actions can you take in your community to work on these issues?
- j. Identify three follow-up questions relating to local or global water issues that were not asked in the game.

## Kids of Kayele Questions: Answer Key

### a. How was the water in Lubuto contaminated?

The water in Lubuto was contaminated with feces, a form of **biological contamination**. Biological contaminants also known as pathogens are microorganisms that can make us sick. They include viruses, protozoa, bacteria and helminthes. In Lubuto, **feces** are a primary source of biological contamination. In Lubuto, because of insufficient sanitation, feces can be found out in the open. This increases the chance of feces contaminating water sources.

### b. Which forms of water contamination are found in Canada?

The water in Canada is polluted by municipalities, industry and agriculture. The pollution from these sources includes:

**Biological Contaminants:** “In Canada, diseases caused by . . . microorganisms are the most common health hazard associated with drinking water” (Pollution Probe, nd). (Pollution Probe, nd). Human and animal waste are the principal sources of this contamination and can come from sewage that is not treated correctly, run off from farms and city streets, and bird droppings. Biological contamination is principally a concern in rural and First Nations communities that rely on untreated private well water (Pollution Probe, nd). , Giardia is a protozoa found in water that is contaminated with feces; it affects many Canadians every year.

**Physical Contaminants:** Physical Contaminants include temperature, colour, smell, taste and turbidity. pH can also be considered a physical contaminant. Most of these contaminants can be noted with the naked eye (nose or tongue) and are often a symptom of biological or chemical contamination. One of the physical contaminants of strong concern is sediment from soil run off which increases the turbidity in water. Soil run off can come from construction sites, erosion, deforestation, agriculture and hydroelectric dams etc.

**Chemical Contaminants:** Chemical contamination includes minerals, metals and chemicals. There are different ways that chemicals get into drinking water. Some are found naturally in ground water, such as arsenic, fluoride, sulphur, calcium and magnesium. Some seep unnaturally into our water sources through human activity. In Canada, nitrates are a common chemical contaminant. Agriculture run-off and leaks from septic tanks result in high levels of nitrates in our water system and this can have negative impacts on health.

Pesticides, pharmaceuticals, heavy metals and volatile organic compounds are other chemicals that are commonly found in Canadian water sources. These chemicals enter our water systems when people flush them down their drains or when they are used in agriculture or industry.

Our municipalities’ water treatment facilities are designed to ensure that our tap water does not have any contamination when it reaches our homes. However, lead pipes in older homes can contaminate what would otherwise be safe water.

*Teacher’s notes: The Kids of Kayele Game does not categorize contamination into the three categories listed above, nor does it focus on contamination in Canada. Instead the game focuses specifically on biological contamination in Lubuto and the pathogens that cause it. You may want to use this question as a teaching opportunity to discuss categories of contaminants and sources of contamination in Canada.*

### c. In Lubuto, what steps were taken to make water safe to drink?

In Lubuto people use the multi-barrier approach to make their water safe to drink. There are five steps involved in this approach:

- 1. Protect the source:** Protecting the source is the process in which preventative measures are taken to ensure that the water source does not get contaminated. In Lubuto the people disposed of their garbage in correctly located garbage pits, built drainage systems and disposed of feces in latrines (outhouses) to protect their water source.
- 2. Sedimentation:** Sedimentation is a process that separates fine particles of dirt from water. In Lubuto, the people let water sit to separate the fine particles or add natural coagulants like moringa seeds to help the dirt settle.
- 3. Filtration:** Filtration is the process in which water is passed through a substance or material to remove pathogens. In Lubuto, they used a biosand filter to remove the pathogens.
- 4. Disinfection:** After removing the dirt and large particles, disinfecting the water will get rid of any of the pathogens that are left. In Lubuto, they used chlorine or boiling to disinfect the water.
- 5. Safe Storage:** Once water is treated and safe to drink, it is important to ensure that the storage container protects the water from being re-contaminated. In Lubuto, they stored water in clean containers that had a secure lid, a narrow spout and a strong base.

*Teacher's notes: The Kids of Kayele Game does not define or use the term **multi-barrier approach**. While the game highlighted each of the five steps independently, it did not provide information regarding the multi-barrier approach as a whole. Teachers may want to use this question as a teaching opportunity as students may not be familiar with this concept.*

#### d. Which of these steps do we also use in Canada?

In Canada municipalities practice the multi-barrier approach at a large scale; in Lubuto it is done at a household level. Each of the steps is practiced in the following way in Canada:

**Protect the source:** Most cities in Canada protect their water source through providing garbage removal services, and establishing infrastructure for proper drainage of waste water and disposal of feces. Citizens also take individual action to protect water sources by organizing clean-ups of rivers and other natural areas. Most cities in Canada rely on municipal regulations and education to maintain the protection of our water sources.

**Sedimentation:** Municipalities in Canada also use sedimentation to provide safe water to our communities. However, rather than doing sedimentation bucket by bucket, our cities use large sedimentation pools in water treatment plants. A coagulant is added to the water to speed up the sedimentation process.

**Filtration:** In Canada, municipalities also filter water to remove pathogens. This happens on a large scale in water treatment plants. Large scale slow sand filters and coal are often used to filter water in municipalities.

**Disinfection:** Canadian water treatment plants also use chlorine to disinfect the water. The chlorine is added to large quantities of water before it is distributed through pipes to households.

**Safe Storage:** As in Lubuto, if Canadian households leave water in open containers, it has a risk of being contaminated. People are encouraged to keep water in clean covered containers



that are easy to pour.

e. Refer to the graphs that you printed out at the end of the Kids of Kayele video game. Select a graph from one participant in your group and respond to the following questions:

- What information does it give you about the health of the group?

Answer will depend on the specific graph that the group chooses to select. For example, if the health line is low on the graph people were sick and some may have died. If the health line falls and then rises again, the friends were originally sick and their health improved over time. The sanitation, water quality and hygiene lines directly correlate with the overall health levels; as sanitation, water quality and hygiene increase, the overall health will increase.

- What is the connection between water, hygiene, sanitation and health?

There is a direct correlation between water, sanitation, hygiene and health. As water quality increases the friends' health increases. When individuals learn to wash their hands, there is a significant increase in health. Similarly, when individuals learn how to dispose of feces correctly, and filter their water, their health improves.

f. How are Canadians similar to those who live in Lubuto?

- We both have to work hard to make sure that water is safe to drink.
- We both take time to learn new behaviors. In the game it took time for behaviors to become habits. Change does not happen quickly. It takes time to learn new things and even longer to incorporate new habits.
- We both use the multi-barrier approach to make water safe to drink (see question C & D).
- We both require community cooperation and education to ensure the safety of water resources.
- We both use chlorine for disinfection.
- We both have untreated garbage and flies that can be a source of disease.
- We both use coagulants to increase the rate of sedimentation.

g. What assumptions do you have about the continent of Africa? How did Kids of Kayele change your assumptions about Africa?

Teachers should help facilitate this question, by asking students to identify their assumptions and then guiding them through the following discussion points:

- People in Lubuto are taking independent action to solve their own problems. We often assume that people in developing countries rely on outside help to solve problems, when in fact; they know how to help themselves.
- People in Lubuto have knowledge. Often we assume that if people are poor, that they do not have knowledge. This is entirely false. People in Lubuto are experts in household water treatment, hygiene and sanitation and we can learn from them.

- Youth in Africa have stories to tell. The Kids of Kayele work hard to make a difference in their community and they should have the opportunity to tell their own story. We often assume that youth stories are irrelevant to our North American context; however, the Kids of Kayele used film to teach us about relevant and inspirational issues.

- h. Africa is a continent of 54 countries. It is full of diversity, unique cultures, languages and histories. Canadians often refer to Africa as being just one country and they assume that all of Africa is the same. What is the danger of this perspective?

In order to facilitate a discussion among your students, use the following statements to help your students feel what it is like to be associated with a stereotype:

- How would you feel if a British person stated that all North Americans are impolite?
- How would you feel if a South African person stated that Canadians live in igloos?
- How would you feel if an American stated that all Canadians are poorly educated...

Every community is made up of the rich and poor, educated people and uneducated people, male and females. Diversity is everywhere. We cannot make broad generalizations about people and cultures. When we do, we compromise each individual that makes up the community or culture. This is unfair.

When we state that everyone in Africa is the same, we dehumanize every African person. By reducing people to a stereotype instead of acknowledging their person, their culture, their language, their history and their own story, we take away their dignity as a human being. This is hurtful, harmful and insensitive.

- i. The Kids of Kayele are taking action in their community to improve sanitation, hygiene habits and water quality. What actions can you take in your community to work on these issues?

Understanding that it is difficult to know how to get involved in the solutions to the problems we face, we have created six action types to demonstrate the variety of actions that are possible. Each action type includes various action opportunities/ideas.

**Action type 1: Educate and Inform** is about teaching yourself and sharing your knowledge with others to motivate them to take action. Examples of this could be preparing a film festival on water issues for other students, or speaking to another class about what you learned from kids of Kayele.

**Action Type 2: Hands On:** Hands On actions involve making changes in your home or you community, or incorporating technologies that will help to conserve water and reduce pollution. Examples of this could be installing a rain-water harvesting barrel in your backyard or a dual-flush toilet in your bathroom.

**Action Type 3 - Consumer Action** is using your purchasing power to support change. It's choosing to buy or not to buy something based on how it will affect the planet. Examples of this could be choosing to buy second-hand clothing (recycling minimizes water used in the manufacturing process) or choosing not to buy disposable plastic water bottles.

**Action Type 4: Lifestyle choice** is about choosing behaviors that will conserve water. These actions can be as small as having a 5 minute shower or picking up behind your dog, or as large as converting to a vegetarian diet.

**Action Type 5: Organize and Influence** is about bringing your community together to work on water issues, and using your political power to influence governments and corporations to protect this important resource. Examples of this could be creating a Facebook group that discusses water issues or signing a petition to advocate for water conservation.

**Action Type 6: Global Cooperation** is about how to extend the influence of any type of action, beyond your community to people in other parts of the world. Examples of this could include learning from a community abroad or researching water issues in a developing country.

*Teachers notes: For more action-related workshops and resources, follow the link to the Wavemakers website: <http://wavemakers.cawst.org/index.php/action-projects/planning-tools>*

- j. Identify three follow-up questions relating to local or global water issues that were not asked in the game.

Answers will depend on the questions that are asked by each group.

Example Questions:

- How do people in rural areas find supplies to build a biosand filter?
- What happens in Canada when you have to drink water that isn't cleaned by a water treatment center? (i.e. Hiking in a remote area)



## Curriculum Links – Alberta

### Grade 7 Outcomes

| OUTCOMES   | Game Lesson        | Follow-up Lesson        |
|--|--------------------|-------------------------|
| <b>Grade 7 Social Studies</b>  |                    |                         |
| <b>1. General Outcomes</b>   |                    |                         |
| <i>Students will listen, speak, read, write, view and represent to explore thoughts, ideas, feelings and experiences.</i>  |                    |                         |
| 1.1 extend understanding of ideas and information by finding and exploring oral, print and other media texts on related topics and themes                                | x                  |                         |
| 1.2 <b>express personal understandings of ideas and information based on prior knowledge, experiences with others and a variety of oral, print and other media texts</b> | x                  | x                       |
| <b>1.3 reflect on own observations and experiences to understand and develop oral, print and other media texts</b>   |                    | x                       |
| <b>1.4 listen and respond constructively to alternative ideas or opinions</b>  |                    | x                       |
| 1.5 talk with others to elaborate ideas, and ask specific questions to seek helpful feedback   |                    | x                       |
| <b>Grade 7 Science</b>   |                    |                         |
| <b>1. Science Technology and Society Outcomes (Unit B)</b>   |                    |                         |
| <i>Identify and interpret relationships among human needs, technologies, environments, and the culture and use of living things as sources of food and fiber.</i>        |                    |                         |
| 1.1 Investigate and identify intended and unintended consequences of environmental management practices  | x                  | x                       |
| 1.2 Identify the effects of different practices on the sustainability of agriculture and environmental resources   | x                  | x                       |
| <b>1. Skill Outcomes</b>   |                    |                         |
| <i>Focus on the use of research and inquiry skills to inform the decision-making process.</i>  |                    |                         |
| <b>MUTUAL RESPECT:</b>   |                    |                         |
| 1.1 Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds                                 | x                  | x                       |
| <b>STEWARDSHIP</b>   |                    |                         |
| 1.2 Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment   |                    |                         |
| <b>Grade 7 Language Arts</b>   |                    |                         |
|  | <b>Game Lesson</b> | <b>Follow-up Lesson</b> |

| <b>1. General outcome</b>  |   |   |
|--|---|---|
| <i>Students will listen, speak, read, write, view and represent to explore thoughts, ideas, feelings and experiences.</i>  |   |   |
| 1.1 extend understanding of ideas and information by finding and exploring oral, print and other media texts on related topics and themes  | x | x |
| 1.2 Express personal understandings of ideas and information based on prior knowledge, experiences with others and a variety of oral, print and other media texts  |   | x |
| 1.3 Reflect on own observations and experiences to understand and develop oral, print and other media texts  |   | x |
| 1.4 Talk with others to elaborate ideas, and ask specific questions to seek helpful feedback   |   | x |
| <b>2. General Outcome</b>  |   |   |
| <i>Students will listen, speak, read, write, view and represent to comprehend and respond personally and critically to oral, print and other media texts.</i>  |   |   |
| 2.1 Experience oral, print and other media texts from a variety of cultural traditions and genres, such as journals, nature programs, short stories, poetry, letters, CDROM programs, mysteries, historical fiction, drawings and prints | x | x |
| 2.2 Justify own point of view about oral, print and other media texts, using evidence from texts   | x | x |
| 2.3 Express interpretations of oral, print and other media texts in another form or genre  | x | x |
| 2.4 Predict and discuss the consequences of events or characters' actions, based on information in oral, print and other media texts   | x | x |
| 2.5 Compare the choices and behaviours of characters portrayed in oral, print and other media texts with those of self and others  | x |   |
| 2.6 Develop, clarify and defend own interpretation, based on evidence from the text with support from own experiences  | x | x |

**Grade 8 Outcomes**

| OUTCOMES   | Game Lesson | Follow-up Lesson |
|--|-------------|------------------|
| <b>Grade 8 Science</b>   |             |                  |
| <b>1. Science Technology and Society Outcomes (Unit E)</b>   |             |                  |
| <i>Describe the distribution and characteristics of water in local and global environments, and identify the significance of water supply and quality to the needs of humans and other living things and analyze human impacts on aquatic systems; and identify the roles of science and technology in addressing related questions, problems and issues</i> |             |                  |
| 1.1 describe, in general terms, the distribution of water in Alberta, Canada and the world; and interpret information about water characteristics  | X           | X                |
| 1.2 <b>Recognize that fresh water contains varying amounts of dissolved materials, particulates and biological components; and interpret information on these component materials</b>  | X           | X                |
| 1.3 <b>Identify major factors used in determining if water is potable, and describe and demonstrate tests of water quality</b>   | X           | X                |
| 1.4 <b>Analyze human water uses, and identify the nature and scope of impacts resulting from different uses</b>  | X           | X                |
| 1.5 <b>Identify current practices and technologies that affect water quality, evaluate environmental costs and benefits, and identify and evaluate alternatives</b>  | X           | X                |
| 1.6 <b>Illustrate the role of scientific research in monitoring environments and supporting development of appropriate environmental technologies</b>  | X           | X                |
| 1.7 <b>Provide examples of problems that cannot be solved using scientific and technological knowledge alone</b>   | X           | X                |
|  |             |                  |
| <b>2. Initiating &amp; Planning Outcomes</b>   |             |                  |
| <i>Ask questions about the relationships between and among observable variables, and plan investigations to address those questions.</i>   |             |                  |
| 2.1 Identify science-related issues and problems   | X           | X                |
| 2.2 Identify questions to investigate, arising from science-related issues   | X           | X                |
| 2.3 Select appropriate methods and tools for collecting relevant data and information  | X           |                  |
|  |             |                  |
| <b>3. Performing &amp; Recording Outcomes</b>  |             |                  |
| <i>Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data.</i>  |             |                  |
| 3.1 Research information relevant to a given issue   | X           |                  |
| 3.2 Select and integrate information from various print and electronic sources or from several parts of the same source  | X           | X                |
|  |             |                  |

| <b>4. Analyzing &amp; Interpreting Outcomes</b>  |   |   |
|--|---|---|
| <i>Analyze qualitative and quantitative data, and develop and assess possible explanations.</i>  |   |   |
| 4.1 Apply given criteria for evaluating evidence and sources of information  | X | X |
| 4.2 Predict the value of a variable, by interpolating or extrapolating from graphical data   | X | X |
| 4.3 Interpret patterns and trends in data, and infer and explain relationships among the variables   | X | X |
| 4.4 Identify new questions and problems arising from what was learned  |   | X |
| <b>5. Communication and Teamwork Outcomes</b>  |   |   |
| <i>Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results.</i>  |   |   |
| 5.1 Use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures and results   |   | X |
| 5.2 Communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means |   | X |
| 5.3 Evaluate individual and group processes used in planning, problem solving, decision making and completing a task   |   | X |
| 5.4 Defend a given position on an issue, based on their findings   |   | X |
| <b>6. Attitude Outcomes</b>  |   |   |
| <i>Interest in Science, Mutual Respect, Scientific Inquiry, Collaboration &amp; Stewardship.</i>   |   |   |
| 6.1 Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds                                   | X | X |
| 6.2 Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues  | X | X |
| 6.3 Work collaboratively in carrying out investigations and in generating and evaluating ideas   |   | X |
| 6.4 Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment   | X | X |



**Grade 9 Outcomes**

| Outcomes  | Game Lesson | Follow-up Lesson |
|---|-------------|------------------|
| <b>Grade 9 Social Studies</b>   |             |                  |
| <b>1. General Outcome</b><br><i>Students will demonstrate an understanding and appreciation of how economic decision making in Canada and the United States impacts quality of life, citizenship and identity.</i>                            |             |                  |
| 1.1 Appreciate the impact of government decision making on quality of life  | x           |                  |
| <b>2. Skill Outcomes</b><br><i>Focus on the use of research and inquiry skills to inform the decision-making process.</i>   |             |                  |
| <b>DIMENSIONS OF THINKING</b>   |             |                  |
| 2.1 Develop skills of critical thinking and creative thinking:  | x           | x                |
| 2.2 Develop skills of geographic thinking:  | x           | x                |
| 2.3 Demonstrate skills of decision making and problem solving:  | x           | x                |
| <b>SOCIAL PARTICIPATION AS A DEMOCRATIC PRACTICE</b>  |             |                  |
| 2.4 Develop age-appropriate behaviour for social involvement as responsible citizens contributing to their community  | x           | x                |
| <b>COMMUNICATION</b>  |             |                  |
| 2.5 Demonstrate skills of oral, written and visual literacy   | x           | x                |
| <b>Grade 9 Science</b>  |             |                  |
| <b>1. Science Technology &amp; Society and Knowledge Outcomes (Unit C)</b><br><i>Investigate and describe, in general terms, the role of different substances in the environment in supporting or harming humans and other living things.</i> |             |                  |
| 1.1 Describe the uptake of materials by living things through ingestion or absorption, and investigate and describe evidence that some materials are difficult for organisms to break down or eliminate                                       | x           | x                |
| 1.2 Identify questions that may need to be addressed in deciding what substances—in what amounts—can be safely released into the environment  |             | x                |
| <b>2. Skill Outcomes</b><br><i>Focus on the use of research and inquiry skills to inform the decision-making process.</i>   |             |                  |
| <b>INITIATING &amp; PLANNING</b>  |             |                  |

|  |                    |                         |
|--|--------------------|-------------------------|
| 2.1 Ask questions about the relationships between and among observable variables, and plan investigations to address those questions                                 | x                  |                         |
| <b>PERFORMING &amp; RECORDING</b>  |                    |                         |
| 2.2. Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data solving:                  | x                  | x                       |
| <b>MUTUAL RESPECT</b>  |                    |                         |
| 2.3 Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds                             | x                  | x                       |
| <b>STEWARDSHIP</b>   |                    |                         |
| 2.4 Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment                                       | x                  | x                       |
| <b>Grade 9 Language Arts</b>   | <b>Game Lesson</b> | <b>Follow-up Lesson</b> |
| <b>1. General Outcome</b><br><i>Students will listen, speak, read, write, view and represent to explore thoughts, ideas, feelings and experiences.</i>               |                    |                         |
| 1.1 develop and extend understanding by expressing and responding to ideas on the same topic, in a variety of forms of oral, print and other media texts             | x                  | x                       |
| <b>2. General Outcome</b><br><i>Students will listen, speak, read, write, view and represent to comprehend and respond personally and critically to media texts.</i> |                    |                         |
| 1.2 consider peers' interpretations of oral, print and other media texts, referring to the texts for supporting or contradicting evidence                            |                    | x                       |

**Curriculum Links – British Columbia**

| <b>Subject</b>  | <b>Grade</b> | <b>Curriculum Organizer</b>     | <b>Selected Prescribed Learning Outcome</b>  | <b>Lesson Plan 1: Kids of Kayele Video Game</b> | <b>Lesson Plan 2: Kids of Kayele Follow-up</b> |
|---|--------------|---------------------------------|--|---|--|
| <b>Science K-7 (2005) &amp; 8 (2006)</b>                  | <b>7</b>     | Life Science: Ecosystems        | Evaluate human impacts on local ecosystems   |   | X  |
|   | <b>8</b>     | Processes of Science            | A3: represent and interpret information in graphic form  |   | X  |
|   |              | Life Science: Cells and Systems | B4: explain the functioning of the immune system, and the roles of the primary, secondary & tertiary defense systems               | X   | X  |
| <b>English Language Arts K-7 (2006) &amp; 8-12 (2007)</b> | <b>7</b>     | Oral Language                   | A1: use speaking and listening to interact with others   | X   | X  |
|   |              |                                 | A2: use speaking to explore, express, and present a range of ideas, information, and feelings for different purposes and audiences |   | X  |
|   |              |                                 | A3: listen purposefully to understand and analyze ideas and information  | X   | X  |
|   |              |                                 | A4: select and use strategies when interacting with others   | X   | X  |
|   |              |                                 | A5: select and use strategies when expressing and presenting ideas, information, and feelings                                      | X   | X  |
|   |              |                                 | A6: select and use strategies when listening to make and clarify meaning   | X   |  |
|   |              |                                 | A9: use speaking and listening to improve and extend thinking  | X   | X  |
|   | <b>7</b>     | Reading and Viewing             | B5: select and use strategies before reading and viewing to develop understanding of text  | X   |  |
|   |              |                                 | B6: select and use strategies during reading and viewing to construct, monitor, and confirm meaning                                | X   |  |

| Subject  | Grade | Curriculum Organizer     | Selected Prescribed Learning Outcome  | Lesson Plan 1: Kids of Kayele Video Game | Lesson Plan 2: Kids of Kayele Follow-up |
|--|-------|--------------------------|---|--|---|
| English Language Arts K-7 (2006) & 8-12 (2007) | 7     | Reading and Viewing      | B7: select and use strategies after reading and viewing to confirm and extend meaning   | X  | X                                       |
|  |       |                          | B8: respond to selections they read or view   | X  | X                                       |
|  |       |                          | B9: read and view to improve and extend thinking  | X  |   |
|  | 7     | Writing and Representing | C1: write a variety of clear, focused personal writing for a range of purposes and audiences that demonstrates connections to personal experiences, ideas, and opinions |  | X                                       |
|  |       |                          | C2: write a variety of effective informational writing for a range of purposes and audiences that communicates ideas to inform or persuade                              | X  | X                                       |
|  |       |                          | C8: use writing and representing to express personal responses and relevant opinions about experiences and texts  |  | X                                       |
|  |       |                          | C9: use writing and representing to extend thinking   | X  | X                                       |
|  | 8     | Oral Language            | A1: interact and collaborate in pairs and groups  | X  | X                                       |
|  |       |                          | A2: express ideas and information in a variety of situations and forms  | X  | X                                       |
|  |       |                          | A4: select and use a range of strategies to interact and collaborate with others in pairs and groups  | X  | X                                       |
|  |       |                          | A7: use listening strategies to understand, recall, and analyze a variety of texts  | X  |   |
|  |       |                          | A8: speak and listen to make personal responses to text   |  | X                                       |
|  |       |                          | A10: speak and listen to synthesize and extend thinking   | X  | X                                       |

| Subject  | Grade | Curriculum Organizer     | Selected Prescribed Learning Outcome   | Lesson Plan 1: Kids of Kayele Video Game | Lesson Plan 2: Kids of Kayele Follow-up |
|--|-------|--------------------------|--|--|---|
| English Language Arts K-7 (2006) & 8-12 (2007) | 8     | Reading and Viewing      | B3: view, both collaboratively and independently, to comprehend a variety of visual texts                        | X  |   |
|  | 8     | Reading and Viewing      | B5: before reading and viewing, select and use a range of strategies to anticipate content and construct meaning | X  |   |
|  |       |                          | B6: during reading and viewing, select and use a range of strategies to construct, monitor, and confirm meaning  | X  |   |
|  |       |                          | B7: after reading and viewing, select and use a range of strategies to extend and confirm meaning                | X  | X                                       |
|  |       |                          | B8: explain and support personal responses to texts  |  | X                                       |
|  |       |                          | B10: synthesize and extend thinking about texts  | X  | X                                       |
|  | 8     | Writing and Representing | C1: write meaningful personal texts that explore ideas and information   |  | X                                       |
|  |       |                          | C2: write purposeful information texts that express ideas and information  | X  | X                                       |
|  |       |                          | C8: write and represent to explain and support personal responses to texts                                       |  | X                                       |
|  |       |                          | C10: write and represent to synthesize and extend thinking   | X  | X                                       |



## 4 Kids of Kayele Advanced Lesson Plans

### Overview



The Kids of Kayele is an online game that uses video, photos, trivia and interactive game play, to teach students about global water and sanitation issues. Players assume the role of exchange students that must maintain the health of their friends, while visiting Zambia. Through the game students learn about human impact on water quality, microbiological contamination, current practices and technologies that affect water quality and problems that require both technological and social solutions. The clues to stay healthy during the game are provided by the Kids of Kayele, a group of youth from a hygiene club in Zambia. This resource includes a lesson plan explaining how to play the video game, as well as a lesson to debrief learning.

### Background Knowledge



No background knowledge is required.

### Time Required



60 minutes per lesson. The first lesson should be conducted in the computer lab. The second can be done in class.

### Grade level



10-12

### Subject Area



Science, Social Studies & Language Arts

### Keywords



Water supply, water quality, Zambia, pathogens, sedimentation, filtration, disinfection, protection, hygiene, viruses, protozoa, bacteria.





## Lesson Plan 1: Kids of Kayele Video Game

**60 minutes total**

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### Learning Expectations



At the end of this session participants will be able to:

5. Discuss similarities and differences between Canadian and Zambian water sources and systems.
6. Identify practices and technologies that affect water quality and health.
7. Prioritize threats related to water, sanitation and hygiene.
8. Develop solutions that could address various local and global water issues

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### Materials



- One computer per students. If this isn't possible one computer for every two students will work.
- Computers require the following:
  - Flash Player 10 or better
  - PC or Mac computer - not tablet or IPAD
  - A web browser and internet access
  - Java script enabled
- Headphones for each student

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### Preparation



- Book a class set of computers
- Ensure that each computer has Flash 10 or better enabled
- Trial the game on school computers
- Write the Kids of Kayele web address on a whiteboard/chalkboard
- Read game instructions and play the game to become familiar with its objectives

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### Introduction



4. Assign each student a computer and ask them to sign in and open a web browser.
  5. Instruct the students to use the Kids of Kayele web address to open the game.
  6. Explain that the object of the game is to maintain the health of their group of friends. [Note: The game is designed to require minimal teacher instruction. Instructions should be limited to explaining the goal of the game. There is an instructions link on the main game screen that students can look at if they would prefer to have further guidance].
-

**Topic 1: Game Play**

4. Instruct students to begin the game.
5. Allow for significant interaction for the game. If students die/finish the game, tell them to play it again, and try to beat their original score.
6. Each time a student reaches the final results graph, ask them to print it out so that they can use it in the debrief lesson.

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**Review**

2. Ask students to discuss the following questions with a partner and record their answers. They will be asked to refer to their answers during the debrief lesson.
  - What contaminates the water in Lubuto? Which of these contaminants do we also have in Canada?
  - What technologies and practices did you use in the game to improve water quality and health? Which of these solutions would work both in Zambia and Canada?

## Lesson Plan 2: Kids of Kayele Follow-up



60 minutes total

### Learning Expectations



At the end of this session participants will be able to:

5. Describe the similarities and differences between Canadian and Zambian water sources and systems.
6. Seek solutions to a variety of water issues through learning from diverse populations.
7. Interpret graphical data and explain relationships among the variables.
8. Apply knowledge of water issues and solutions to produce action in one's own community.

### Materials



- Whiteboard/Chalkboard
- Pens/Chalk
- Copies of Kids of Kayele Handout (see below)

[Note: This lesson is structured around group discussions and is most effective in a classroom setting. You do not need to book computer time]

### Preparation



- This is a follow-up lesson to the Kids of Kayele video game. Other than the previous game-play, no preparation is required.
- Make one or two copies of the Kids of Kayele questions for each small group.

### Introduction



2. Ask students to journal about their experience with the game through answering the following questions:
  - What did you learn from the Kids of Kayele?
  - How can you play the game to get the best score?

### Topic 1: Small Group Response



4. Assign each student to a small group.
5. Provide a “Kids of Kayele” hand-out to each group (see end of lesson for hand-out).
6. Ask each small group to discuss the questions on the handout and record their answers. [Inform the students that they should identify one scribe and one

spokesperson in their group. Also inform students that you will be evaluating their written responses].

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## Topic 2: Class Response



5. Ask each of the questions on the handout to the class and ask one group to report on their answers. Once the first group has given their answer, ask other groups if they have different answers/points to add to the discussion.
6. When you get to the question h, “Identify 3 follow-up questions relating to local or global water issues that were not asked in the game,” ask each group to share their favorite question.
7. Record the questions on the board.
8. Pose some of the interesting questions to the class and discuss possible answers.

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## Review



2. Ask students to return to their journal and write two insights they had during the group discussion period

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## Extension



3. Select two or more videos that could be further examined as a class to investigate local and global water issues and links between Zambia and Canada. Download the videos from the CAWST Wavemakers site:  
<http://wavemakers.cawst.org/index.php/educator-resources>
4. Download the action planning tools from the Wavemakers website. Use these tools to identify local water issues and use the CAWST Action Guide to plan a water action project in your community.
5. Complete the extension questions included in the handout.

## **Kids of Kayele Handout**

- k. How was the water in Lubuto contaminated?
- l. Which forms of water contamination are found in Canada?
- m. In Lubuto, what steps were taken to make water safe to drink?
- n. Which of the steps used to make water safe in Lubuto do we also practice in Canada?
- o. Refer to the graphs that you printed out at the end of the Kids of Kayele video game. Select a graph from one participant in your group and respond to the following questions:
- What information does it give you about the health of the group?

- What is the connection between water quality and health?
- p. How are Canadians similar to those who live in Lubuto?
- q. How did Kids of Kayele change your assumptions about Africa?
- r. Africa is a continent of 54 countries. It is full of diversity, unique cultures, languages and histories. Canadians often refer to Africa as being just one country and they assume that all of Africa is the same. What is the danger of this perspective?
- s. The Kids of Kayele are taking action in their community to improve sanitation, hygiene habits and water quality. What actions can you take in your community to work on these issues?
- t. Identify three follow-up questions relating to local or global water issues that were not asked in the game.

**Extension**

1. In your municipality, which water treatment technologies are used?
2. Compare and contrast the water treatment and sanitation technologies in Lubuto, your municipality and another in Canada. Evaluate each system based on the following criteria.
  - a. Effectiveness
  - b. Appropriateness
  - c. Acceptability
  - d. Cost
3. Identify three additional local water issues we confront on a daily basis. Describe their impact on our community?
  - 1.
  - 2.
  - 3.
4. How can we promote awareness about these local water issues?





## Kids of Kayele Questions: Answer Key

### k. How was the water in Lubuto contaminated?

The water in Lubuto was contaminated with feces, a form of **biological contamination**. Biological contaminants also known as pathogens are microorganisms that can make us sick. They include viruses, protozoa, bacteria and helminthes. In Lubuto, **feces** are a primary source of biological contamination. In Lubuto, because of insufficient sanitation, feces can be found out in the open. This increases the chance of feces contaminating water sources.

### l. Which forms of water contamination are found in Canada?

The water in Canada is polluted by municipalities, industry and agriculture. The pollution from these sources includes:

**Biological Contaminants:** “In Canada, diseases caused by . . . microorganisms are the most common health hazard associated with drinking water” (Pollution Probe, nd). (Pollution Probe, nd). Human and animal waste are the principal sources of this contamination and can come from sewage that is not treated correctly, run off from farms and city streets, and bird droppings. Biological contamination is principally a concern in rural and First Nations communities that rely on untreated private well water (Pollution Probe, nd). , Giardia is a protozoa found in water that is contaminated with feces; it affects many Canadians every year.

**Physical Contaminants:** Physical Contaminants include temperature, colour, smell, taste and turbidity. pH can also be considered a physical contaminant. Most of these contaminants can be noted with the naked eye (nose or tongue) and are often a symptom of biological or chemical contamination. One of the physical contaminants of strong concern is sediment from soil run off which increases the turbidity in water. Soil run off can come from construction sites, erosion, deforestation, agriculture and hydroelectric dams etc.

**Chemical Contaminants:** Chemical contamination includes minerals, metals and chemicals. There are different ways that chemicals get into drinking water. Some are found naturally in ground water, such as arsenic, fluoride, sulphur, calcium and magnesium. Some seep unnaturally into our water sources through human activity. In Canada, nitrates are a common chemical contaminant. Agriculture run-off and leaks from septic tanks result in high levels of nitrates in our water system and this can have negative impacts on health.

Pesticides, pharmaceuticals, heavy metals and volatile organic compounds are other chemicals that are commonly found in Canadian water sources. These chemicals enter our water systems when people flush them down their drains or when they are used in agriculture or industry.

Our municipalities’ water treatment facilities are designed to ensure that our tap water does not have any contamination when it reaches our homes. However, lead pipes in older homes can contaminate what would otherwise be safe water.

*Teacher’s notes: The Kids of Kayele Game does not categorize contamination into the three categories listed above, nor does it focus on contamination in Canada. Instead the game focuses specifically on biological contamination in Lubuto and the pathogens that cause it. You may want to use this question as a teaching opportunity to discuss categories of contaminants and sources of contamination in Canada.*

### m. In Lubuto, what steps were taken to make water safe to drink?

In Lubuto people use the multi-barrier approach to make their water safe to drink. There are five

steps involved in this approach:

- 6. Protect the source:** Protecting the source is the process in which preventative measures are taken to ensure that the water source does not get contaminated. In Lubuto the people disposed of their garbage in correctly located garbage pits, built drainage systems and disposed of feces in latrines (outhouses) to protect their water source.
- 7. Sedimentation:** Sedimentation is a process that separates fine particles of dirt from water. In Lubuto, the people let water sit to separate the fine particles or add natural coagulants like moringa seeds to help the dirt settle.
- 8. Filtration:** Filtration is the process in which water is passed through a substance or material to remove pathogens. In Lubuto, they used a biosand filter to remove the pathogens.
- 9. Disinfection:** After removing the dirt and large particles, disinfecting the water will get rid of any of the pathogens that are left. In Lubuto, they used chlorine or boiling to disinfect the water.
- 10. Safe Storage:** Once water is treated and safe to drink, it is important to ensure that the storage container protects the water from being re-contaminated. In Lubuto, they stored water in clean containers that had a secure lid, a narrow spout and a strong base.

*Teacher's notes: The Kids of Kayele Game does not define or use the term **multi-barrier approach**. While the game highlighted each of the five steps independently, it did not provide information regarding the multi-barrier approach as a whole. Teachers may want to use this question as a teaching opportunity as students may not be familiar with this concept.*

## n. What other kinds of water sanitation technology do we use in Canada?

In Canada municipalities practice the multi-barrier approach at a large scale; in Lubuto it is done at a household level. Each of the steps is practiced in the following way in Canada:

**Protect the source:** Most cities in Canada protect their water source through providing garbage removal services, and establishing infrastructure for proper drainage of waste water and disposal of feces. Citizens also take individual action to protect water sources by organizing clean-ups of rivers and other natural areas. Most cities in Canada rely on municipal regulations and education to maintain the protection of our water sources.

**Sedimentation:** Municipalities in Canada also use sedimentation to provide safe water to our communities. However, rather than doing sedimentation bucket by bucket, our cities use large sedimentation pools in water treatment plants. A coagulant is added to the water to speed up the sedimentation process.

**Filtration:** In Canada, municipalities also filter water to remove pathogens. This happens on a large scale in water treatment plants. Large scale slow sand filters and coal are often used to filter water in municipalities.

**Disinfection:** Canadian water treatment plants also use chlorine to disinfect the water. The chlorine is added to large quantities of water before it is distributed through pipes to households.

**Safe Storage:** As in Lubuto, if Canadian households leave water in open containers, it has a risk of being contaminated. People are encouraged to keep water in clean covered containers that are easy to pour.

- o. Refer to the graphs that you printed out at the end of the Kids of Kayele video game. Select a graph from one participant in your group and respond to the following questions:

- What information does it give you about the health of the group?

Answer will depend on the specific graph that the group chooses to select. For example, if the health line is low on the graph people were sick and some may have died. If the health line falls and then rises again, the friends were originally sick and their health improved over time. The sanitation, water quality and hygiene lines directly correlate with the overall health levels; as sanitation, water quality and hygiene increase, the overall health will increase.

- What is the connection between water, hygiene, sanitation and health?

There is a direct correlation between water, sanitation, hygiene and health. As water quality increases the friends' health increases. When individuals learn to wash their hands, there is a significant increase in health. Similarly, when individuals learn how to dispose of feces correctly, and filter their water, their health improves.

- p. How are Canadians similar to those who live in Lubuto?

- We both have to work hard to make sure that water is safe to drink.
- We both take time to learn new behaviors. In the game it took time for behaviors to become habits. Change does not happen quickly. It takes time to learn new things and even longer to incorporate new habits.
- We both use the multi-barrier approach to make water safe to drink (see question C & D).
- We both require community cooperation and education to ensure the safety of water resources.
- We both use chlorine for disinfection.
- We both have untreated garbage and flies that can be a source of disease.
- We both use coagulants to increase the rate of sedimentation.

- q. How did Kids of Kayele change your assumptions about Africa?

Teachers should help facilitate this question, by asking students to identify their assumptions and then guiding them through the following discussion points:

- People in Lubuto are taking independent action to solve their own problems. We often assume that people in developing countries rely on outside help to solve problems, when in fact; they know how to help themselves.
- People in Lubuto have knowledge. Often we assume that if people are poor, that they do not have knowledge. This is entirely false. People in Lubuto are experts in household water treatment, hygiene and sanitation and we can learn from them.
- Youth in Africa have stories to tell. The Kids of Kayele work hard to make a difference in their community and they should have the opportunity to tell their own story. We often assume that youth stories are irrelevant to our North American context; however, the Kids of Kayele used film to teach us about relevant and inspirational issues.

- r. Africa is a continent of 54 countries. It is full of diversity, unique cultures, languages and histories. Canadians often refer to Africa as being just one country and they assume that all of Africa is the same. What is the danger of this perspective?

In order to facilitate a discussion among your students, use the following statements to help your students feel what it is like to be associated with a stereotype:

- How would you feel if a British person stated that all North Americans are impolite?
- How would you feel if a South African person stated that Canadians live in igloos?
- How would you feel if an American stated that all Canadians are poorly educated...

Every community is made up of the rich and poor, educated people and uneducated people, male and females. Diversity is everywhere. We cannot make broad generalizations about people and cultures. When we do, we compromise each individual that makes up the community or culture. This is unfair.

When we state that everyone in Africa is the same, we dehumanize every African person. By reducing people to a stereotype instead of acknowledging their person, their culture, their language, their history and their own story, we take away their dignity as a human being. This is hurtful, harmful and insensitive.

- s. The Kids of Kayele are taking action in their community to improve sanitation, hygiene habits and water quality. What actions can you take in your community to work on these issues?

Understanding that it is difficult to know how to get involved in the solutions to the problems we face, we have created six action types to demonstrate the variety of actions that are possible. Each action type includes various action opportunities/ideas.

**Action type 1: Educate and Inform** is about teaching yourself and sharing your knowledge with others to motivate them to take action. Examples of this could be preparing a film festival on water issues for other students, or speaking to another class about what you learned from kids of Kayele.

**Action Type 2: Hands On:** Hands On actions involve making changes in your home or your community, or incorporating technologies that will help to conserve water and reduce pollution. Examples of this could be installing a rain-water harvesting barrel in your backyard or a dual-flush toilet in your bathroom.

**Action Type 3- Consumer Action** is using your purchasing power to support change. It's choosing to buy or not to buy something based on how it will affect the planet. Examples of this could be choosing to buy second-hand clothing (recycling minimizes water used in the manufacturing process) or choosing not to buy disposable plastic water bottles.

**Action Type 4: Lifestyle choice** is about choosing behaviors that will conserve water. These actions can be as small as having a 5 minute shower or picking up behind your dog, or as large as converting to a vegetarian diet.

**Action Type 5: Organize and Influence** is about bringing your community together to work on water issues, and using your political power to influence governments and corporations to protect this important resource. Examples of this could be creating a Facebook group that discusses water issues or signing a petition to advocate for water conservation.

**Action Type 6: Global Cooperation** is about how to extend the influence of any type of action, beyond your community to people in other parts of the world. Examples of this could include learning from a community abroad or researching water issues in a developing country.

*Teachers notes: For more action-related workshops and resources, follow the link to the Wavemakers website: <http://wavemakers.cawst.org/index.php/action-projects/planning-tools>*

t. Name three other local water issues we are faced with on a daily basis.

Answers will depend on the questions that are asked by each group.

Example Questions:

- How do people in rural areas find supplies to build a biosand filter?
- What happens in Canada when you have to drink water that isn't cleaned by a water treatment center? (i.e. Hiking in a remote area)

## Extension

Here are some additional questions you may want to explore with your students.

1. In your municipality, which water treatment technologies are used?
2. Compare and contrast the water treatment and sanitation technologies in Lubuto, your municipality and another in Canada. Evaluate each system based on the following criteria.
  - a. Effectiveness
  - b. Appropriateness
  - c. Acceptability
  - d. Cost
3. Identify three additional local water issues we confront on a daily basis. Describe their impact on our community?
  - 1.
  - 2.
  - 3.

4. How can we promote awareness about these local water issues?

Here are additional resources to support you to explore global and local water and sanitation issues with your students:

- Environment Canada  
<http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=65EAA3F5-1>
  - How to Take Action and Make it Count  
<http://wavemakers.cawst.org/index.php/educator-resources>
  - Household Water Treatment and Safe Storage Fact Sheets  
[http://resources.cawst.org/package/household-water-treatment-and-safe-storage-fact-sheets-detailed\\_en](http://resources.cawst.org/package/household-water-treatment-and-safe-storage-fact-sheets-detailed_en)
  - Household Water Treatment and Safe Storage Manual  
[http://resources.cawst.org/package/household-water-treatment-and-safe-storage-manual\\_en](http://resources.cawst.org/package/household-water-treatment-and-safe-storage-manual_en)
  - Latrine Fact Sheets  
[http://resources.cawst.org/package/latrine-fact-sheets\\_en](http://resources.cawst.org/package/latrine-fact-sheets_en)
  - Low Cost Sanitation Manual  
[http://resources.cawst.org/package/introduction-low-cost-sanitation-manual\\_en](http://resources.cawst.org/package/introduction-low-cost-sanitation-manual_en)
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