



The board game that teaches youth about Vancouver's shoreline health

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I. Thank You

We want to thank Angela Danyluk, from the City of Vancouver, and Krista Voth, from the Vancouver Board of Parks and Recreation, for providing us with information to help construct the game's questions and answers. As well, we send our thanks to Gustavo Matoso for helping to create the board design. Additionally, we thank our instructors, Andrew Egan and Mike Smith-Cairns, for their mentorship through the entire process of the project.

II. Project Description

The project consists of creating a life-sized board game for elementary school-aged youth, where players are challenged to answer questions relating to Vancouver's shoreline health. The main topics to be explored in the game are the importance of having a healthy shoreline; the current risks to its health, such as increased tanker traffic, oil spills, water quality, and sea level rise; and making contributions to developing and maintaining a healthy shoreline.

III. Objectives

Our objective is to inform Vancouver's youth about their city's shoreline health through a fun, educational, and interactive ecological game played on a life-sized board.

Players will have fun while they learn the importance of having healthy shorelines. Through the game, youth will learn how people are affecting our shore and how they can help mitigate these effects. In game form, it is intended to bring knowledge to the children, and to change their lifestyle towards an eco-friendly way of living.

IV. Background and Context

Vancouver's shoreline has been facing severe issues in recent decades, and we continually have to mitigate the effects of these issues. With that, the coastal region is more susceptible to adverse environmental impacts, like sea level rise, for example. It is essential that Vancouver's

youth understand in a clear and straightforward manner the causes and effects of these impacts, so they can make sustainable choices to help improve the shoreline.

The project has considerable value because it is targeting youth, whom we believe want to make sustainable impacts on our shore and our world. When kids become excited about a subject, they can encourage their family and friends to engage in making sustainable choices, eventually leading to sustainable habits.

Because children can be a challenging audience, we thought the best way to engage them in a learning activity was employing a board game; the game developed with these in mind. We believe that making a life-sized board will be more engaging for the children; they will be more willing to participate and establish memorable experiences of the game.

V. Challenges to Vancouver's Shoreline

We have identified four main issues affecting our shoreline; these include sea level rise, change in biodiversity, water quality, and erosion. For more details about the issues and impacts, refer to Appendix A on page 8.

VI. Target Schools

We would initially like to test the game with students at Vancouver's elementary schools established near the shore. We feel youth near the coastline will be more interested in learning about healthier shorelines. Schools we would target include Lord Roberts Elementary, Henry Hudson Elementary, Elsie Roy Elementary, Crosstown Elementary, and False Creek Elementary.

VII. Integrating the Game with Vancouver's Plans

Our project's goal fits with many of the City of Vancouver's sustainability initiatives. Through our game, we present problems and solutions related to the City of Vancouver's Greenest City 2020 Action Plan, the Citywide Integrated Rainwater Management Plan, and

Vancouver's Changing Shoreline: Preparing for Sea Level Rise report. We also sourced the Vancouver School Board's Environmental Sustainability Plan and the Vancouver Board of Parks and Recreation's Biodiversity Strategy report. We believe that the game functions as a complement to the implementation of these various plans.

VIII. The Game

Each player or team starts with a collection of stuffed animals and rolls a die to move around the life-sized board. The colour of the space landed on indicates the type of question proposed - green for biodiversity, red for sea level rise, blue for water quality, and yellow for erosion - asked by the person overseeing the game. Refer to Appendix B on page 10 to see a layout of the board.

A correct answer to the question results in gaining a stuffed animal or moving forward on the board, as indicated on the card. Incorrect response to the query results in the loss of a stuffed animal or moving back as shown on the card. After answering the question and results implemented, the next player or team rolls the die and follows the same steps. All players or teams have a turn before going back to the first team. The game ends when all players or teams make it to the finish. The player or team with the most stuffed animals in their collection after everyone has made it to the finish is declared the winner.

The materials needed for the game include the board, question cards, a single four-sided die, stuffed animals, and a rules pamphlet. The game is aimed at youth around the age of ten and should take around 30 minutes to play. The life-sized board should measure eight meters by eight meters.

In total, there will be approximately 50 questions and answers, including a brief talking point after each response. Questions will be themed towards our four main issues, as discussed in "Challenges to Vancouver's Shoreline." We must note that the inclusion of educators is key to

using the proper vocabulary to present these subjects to youth. Detailed proposed questions can be viewed in Appendix C on page 11.

IX. Budget

Total expenses for creating a table-sized board game prototype was around \$40.00. The printing of the cards cost \$3.50, and materials such as adhesive film, tape, glue, board backing cost \$35.00. These expenses do not include the price of printing the board, which was covered by the instructors or purchasing the die or stuffed animals, which came from our collection.

X. Outcomes

We want youth to be lifelong learners and environmental stewards; use their knowledge to affect those around them positively; engage in volunteer opportunities, such as shoreline cleanups; become members of environmental organizations, and be involved in youth citizen science. As well, we would like the game to become the preferred aide in teaching shoreline health and to have a permanent home at one of Vancouver's public spaces, for example, near the entrance of the Vancouver Aquarium.

XI. Conclusion

We believe that this project has a huge potential to become a powerful learning tool that also entertains kids. The game can be adapted to a wide range of ages, which means that is a versatile way to address important issues regarding shoreline health. As the game is mobile, it could also be taken to different locations such as schools, parks and other public spaces. The next steps include having more accurate questions; as soon as those questions and answers are prepared, they should be revised by school staff. Then, we could start testing the prototype game in one of the proposed schools.

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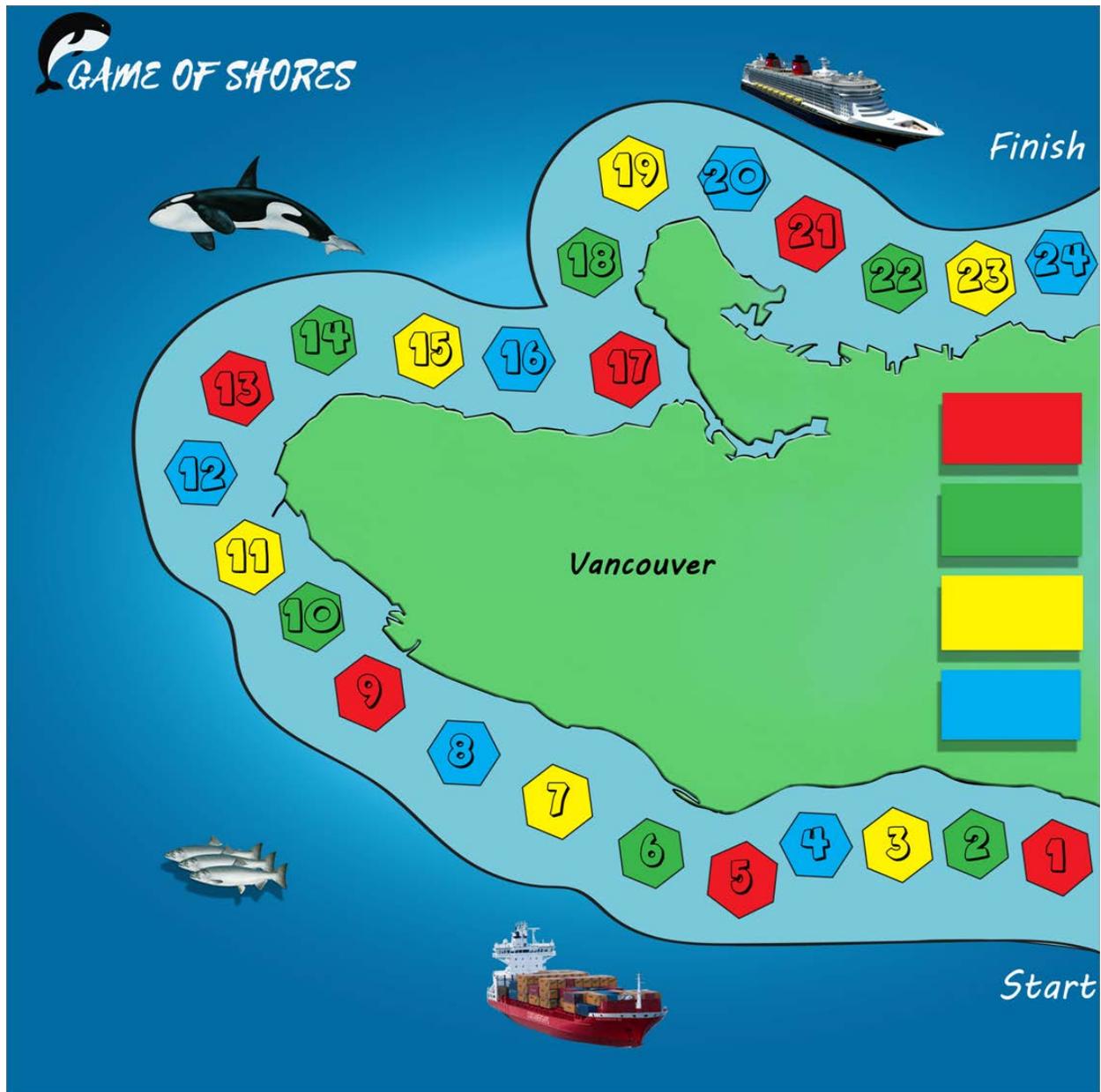
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Appendix A: Shoreline Activities

Major Activities	Aspects	Environmental Impacts	Examples of Mitigation Measures
Vessels traffic	Oil spill	1. Loss of biodiversity	<p>* Examples include decreasing the use of cars, fuel switching, and increased use of walking, biking, and public transit. More efficient industrial and commercial business processes. Less gas means less transportation of oil.</p> <p>* Government: enforcement (policies, procedures, operational plans, etc.) to increase preparedness for and response to spills.</p> <p>* Public: Report a spill through the Spill Reporting Line (1.800.663.3456).</p>
		2. Decreased water quality	
		E.g., MV Marathassa cargo ship oil spill on Burrard Inlet in 2015.	
		3. Loss of access to nature	
		4. Affect people's health	
	Noise	5. Disrupt communication of whales and other animals that use echolocation	* Decrease vessel speed even lower near shorelines.
	<i>E. coli</i> outbreaks	1. Loss of biodiversity	* Require all marinas to have pump-out stations for raw sewage.
3. Loss of access to nature		* Enforce penalties on those who do dump into the ocean.	
E.g., https://globalnews.ca/news/4383629/bacterial-bloom-means-three-vancouver-beaches-closed-to-swimming-again/		* With some exceptions, the discharge of untreated sewage into all Canadian inland waters and Canadian coastal waters within 3 nautical miles of land (ship less than 400 tons) and 12 miles of land (ships larger than 400 tons) is now banned: https://www.tc.gc.ca/eng/marinesafety/0ep-environment-sources-sewage-2247.htm	
4. Affect people's health	E.g., https://vancouver.sun.com/news/local-news/more-metro-vancouver-beaches-closed-because-of-e-coli		
Greater wake	6. Coastal erosion	* Decrease vessel speed even lower near shorelines.	

Major Activities	Aspects	Environmental Impacts	Examples of Mitigation Measures
Development s of and around the shoreline	Remove vegetation	6. Coastal erosion	<ul style="list-style-type: none"> * Promoting constructions using infiltration (e.g., pavements made by materials that let the water pass through to the ground). * Treat the water before it ends into creeks, lakes, etc. * Reuse the water. *More riparian forest.
	Increased runoff	7. Increased contamination of rainfall water (debris, chemicals, sewage, and other pollutants) As a result of lack of infiltration plus outdated system (rain and sewer combined)	
		8. Floodings	
	Change the landscape	4. Loss of access to nature	
1. Loss of biodiversity			
Industrial Activities and also our homes	Sea level rise (GHG emissions)	6. Shoreline erosion E.g., the increased erosion of the Point Grey Cliffs at UBC.	<ul style="list-style-type: none"> * Vegetation as a useful tool for improving soil stability. E.g., bushes, shrubs, and tree roots (Red Alders - fast-growing trees with extensive and fibrous roots). * Engage the public and build awareness. * Engage the population in all steps of the process. Hear what they have to say and their concerns.
		8. Floodings E.g., Fraser River area - 400+ homes, 280 commercial and industrial buildings potentially impacted.	
		9. People Displacement	
		4. Loss of access to nature (Coastal squeeze)	
	Contaminant s seeping into the water	2. Decreased water quality	* Enforce penalties on those who do dump into the ocean.
1. Loss of biodiversity		* Building codes that include the best available options of sewage collection.	

Appendix B: The Game Board



Appendix C: Example Questions, Answers, and Talking Points



What natural disaster affects the Fraser River, Spanish Banks, Downtown Vancouver, and False Creek?

FLOODING.

These areas have lower coastal elevations. They will be the first areas to be flooded because of rising sea levels.

Correct Answer: move forward 1 space.
Incorrect Answer: move back 1 space.



How high is the water expected to rise around Vancouver by 2100?

1 METRE (OR 100 CM).

Warmer temperatures are causing ice caps and glaciers to melt. This will create more fresh water in our oceans, causing the sea level to rise and the flooding of Vancouver's shorelines with lower elevations.

Correct Answer: move forward 1 space.
Incorrect Answer: move back 1 space.



List two things you can do to decrease your impacts on the environment?

There are many answers including planting a tree, walking or cycling to school, cleaning up your dog's poop, recycling, putting your trash in the garbage.

Correct Answer: add 1 animal.
Incorrect Answer: remove 1 animal.



Why were some of Vancouver's beaches closed this past summer?

POOR WATER QUALITY.

Jericho Beach, English Bay, and Sunset Beach were some of the beaches closed due to high levels of E. coli. Increasing water temperatures are allowing bacteria to multiply faster, causing higher E. coli counts.

Correct Answer: add 1 animal.
Incorrect Answer: remove 1 animal.





Which one of these is not an effect of tanker traffic?

- A. Increased oil spills.
- B. Increased noise pollution.
- C. Decreased air pollution.
- D. Increased wave action erosion.

C. DECREASED AIR POLLUTION.

Oil spills, noise pollution, and wave action erosion can lead to poor water quality, loss of biodiversity, coastal erosion, and interfere with echolocation.

Answer A: add 1 animal.
Answer B or C: remove 1 animal.



While exploring Stanley Park, you noticed an insect you haven't seen before. You checked on the internet and discovered it is a Japanese Beetle. What do you do?

- A. Report it to the City of Vancouver or Parks Board.
- B. Kick back and relax, research is tiring!

A. REPORT IT!

You can help local authorities control invasive species by reporting it. Foreign plants & animals, such as the Japanese Beetle, compete with native species for resources, causing a loss of local biodiversity.

Answer A: add 1 animal.
Answer B or C: remove 1 animal.




Why must the University of British Columbia be concerned with beach and cliff erosion?

THEY ARE SO CLOSE TO THE OCEAN.

UBC is situated in Point Grey, an upland area that has been naturally eroding for the past 10,000 years. Sea level rise is dramatically increasing this rate of erosion.

Correct Answer: move forward 1 space.
Incorrect Answer: move back 1 space.



When a building is constructed by the shore, there must be awareness for beach erosion. What is a great way to reduce this risk?

PLANT TREES, GRASS, OR BUSHES.

Plants grow roots into the ground, keeping them in place. The roots also help increase the stability of the surrounding soil, reducing erosion.

Correct Answer: move forward 1 space.
Incorrect Answer: move back 1 space.

