Working with Wastewater

By: Yeseom Cho, Matthew Mead, Sarah Monthofer, Sebastian Vera, Jason Yoon, and Dr. Kenjiro Quides

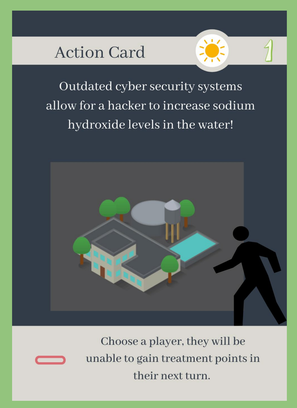
Background:

- Current wastewater treatment methods can be improved upon to increase the quality of the produced effluent.
- We highlight 3 types of wastewater treatment strategies in the game. These will give players their stat changes based on real life pros and cons of the treatment type displayed.
- **Our challenge:** To highlight the advantages and disadvantages of each treatment method in a fun way.

UV treatment also provides an environmentally conscious way of cleaning wastewater but takes a long time.

Algae treatment harnesses the power of microalgae. It can provide a cost effective way of treating wastewater and filter out inorganic materials.

Phosphorus precipitation provides a quick way of cleaning wastewater but creates a phosphorus rich sludge byproduct.



These are some examples of the 20 different types of action cards that are in the game. These cards show a few real life examples that pertain to wastewater treatment and can help you or hinder other players.

Game Overview:

Working with Wastewater is a 2-4 player educational board game designed for ages 12 and up hosted on Tabletopia. Each player is a wastewater treatment company looking to maximize profits while minimizing the waste produced by treating wastewater. Companies will start with a distinct wastewater treatment facility with different assets. Purchase additional wastewater treatment technologies to build your company. Will you grow low maintenance algae that can feed on organic waste, but requires a high initial cost? You might consider environmentally friendly solar treated wastewater with low upfront costs that treats water slowly. Or do you prefer rapid and efficient chemical reactions at the cost of producing potentially profitable waste products? As you build your treatment facility, you can play action cards inspired by real-life events. Attract investors to your algae treatment facility to increase your income, but beware of pollution that could kill your algae. Expose your competitors for illegally dumping waste and be on the lookout for hackers that might try to sabotage your outdated security system! Engage in 10 rounds of wastewater treatment as you mix and match technologies to keep our waterways clean!

Game Link:

https://tinyurl.com/wwwplaygame

This is an example of a company card. This gives each player their starting stat values and symbolizes different competing wastewater management companies

Rulebook Link:

https://tinyurl.com/wwwrules

Game Design and Testing:

- Created the cares related to wastewater treatments and uploaded to *tabletopia.*
- Created a survey that would allow us to track play tester feedback and make adjustments to board game
- Asked questions that both evaluated both the users gaming experience and ability to learn from the board game.
- Utilized Likert scale formatting for responses to provide our team with precise feedback for each question.
- Action cards created in Canva by Sarah
- Other cards were created in Adobe Spark by Jason
- Card information and research is provided in the table at the end of the rulebook
- Game is being distributed to schools for feedback thanks to Professor Lauren Dudley
- Decided to make game fo education as it was researched to be a very effective method for teaching

These cards keep track of players' scores (blue), their waste (brown) and money (green).

Upcoming plans:

- Receive feedback from the tester.
- Incorporate the feedback on the board game.
- Present the posters and boardgame to conference
- Update the changes of the wastewater treatments on the board game.
- Interpret feedback received from survey. A few example questions are shown below with the responses corresponding to the Likert scale

Sample survey questions:

This game effectively taught me about how wastewater treatment works

This game motivated you to learn more about wastewater treatment

There were times in the game where you did not have any good options

Survey Link:

https://forms.gle/CifL3vadAS1pYP4Y6

Acknowledgements:

We thank Dr. Zach Thammavongsy and Dr. Brenna Gormally for mentoring our project. We thank Dr. Lauren Dudley for distributing the game for playtesting. We thank Christopher Youn and Nayeli Castro for being our former group members. We thank Gerald Villoria for offering advice on game design