CoastGuard: Match Problems to Solutions

1. Introduction

CoastGuard is a web-based educational mini-game designed to raise awareness about plastic waste and encourage sustainable habits in Vietnam. The game blends environmental education with playful interaction through a matching-card mechanic where players pair real-world “Problems” (sources of pollution) with their corresponding “Solutions” (practical eco-actions). Players take the role of a digital CoastGuard on a mission to clean and protect Vietnam’s rivers and coasts. By matching each pair correctly, they learn actionable tips such as using reusable lunch boxes, bamboo straws, or joining local cleanup campaigns. The project was created for the Vibe Coding – Play to Impact Challenge, aiming to show how simple web games can promote real-world environmental action through interactive storytelling and gamified learning.

2. Game Theme and Topic Justification

The chosen theme—plastic waste reduction and ocean protection in Vietnam—addresses one of the most urgent environmental issues in the region. According to recent studies, Vietnam ranks among the top contributors to marine plastic pollution due to limited recycling infrastructure and single-use consumption habits. The topic fits the “Social Impact” and “Sustainability” direction of the challenge because it connects directly to everyday behavior change, promotes environmental literacy, and aligns with Vietnam’s National Action Plan on Marine Plastic Waste Management (2020–2030).

3. Potential Impact

CoastGuard aims to bridge awareness and action. Each correct match not only rewards the player but also delivers a short educational tip based on local initiatives, such as community cleanups or recycling programs. Potential positive impacts include:

- Environmental Education: Players gain quick, repeatable exposure to sustainable alternatives.
- Community Engagement: The game can be localized for schools, NGOs, or environmental campaigns.
- Behavioral Change: By linking “Problem” and “Solution” in memory, players are more likely to recall and apply these ideas in real life.
- Low-barrier Accessibility: As a lightweight, browser-based game (no downloads), it runs on any device, making it accessible for classrooms or outreach events.

4. Technology Stack

Front-end Stack:

- HTML5, CSS3, and Vanilla JavaScript for game logic and interaction.
- CSS Grid for responsive layout.
- Canvas API for visual effects like fireworks (win) and rainfall (lose).
- Web Accessibility APIs (ARIA roles, live regions) ensure keyboard and screen-reader support.
- LocalStorage API for optional persistent stats.

Design Language:

- Green palette: #4C763B, #B0CE88, #9FBE77, #043915.
- Emoji icons for universal readability.

AI Tools & Assistance:
- LLM support for code and design refinement.
- AI-assisted ideation for environmental micro-tips and prompt writing.

Web Libraries:
- No frameworks used. Only native browser APIs (Canvas, Dialog, CSS Variables).

5. Overview of Game Mechanics

Main Menu: Players see a welcome card explaining the mission and controls. A small bot roams the screen collecting trash emoji, introducing the cleanup theme interactively.

Card Matching: Players flip two cards to find matching Problem–Solution pairs. Correct matches lock in place and reveal educational tips.

Timer & Lives: A 120-second timer and 5 lives limit create mild urgency.

Win Condition: Matching all pairs triggers a fireworks animation and animated statistics.

Lose Condition: Running out of time or lives shows a rain animation and 'Mission Failed' message.

Accessibility: ARIA roles, keyboard navigation, and live regions ensure inclusive play.

Replayability: Players can restart or return to the main menu anytime with reshuffled cards.

6. Reflection

Developing CoastGuard demonstrated how meaningful change can start from a simple digital interaction. The key challenge was balancing education and fun—ensuring the game stayed engaging while delivering clear messages.

Key Learnings:
- Simplicity improves learning engagement.
- Emotional contrast through visuals increases retention.
- Accessibility enhances inclusiveness.
- AI served as a creative co-designer, improving prototyping speed and idea variety.

Future improvements include adding difficulty modes, localized audio narration, NGO leaderboards, and an AI chatbot educator to explain solutions in more depth.

7. Conclusion

CoastGuard proves that environmental education can be light, engaging, and locally relevant. It combines storytelling, playful mechanics, and accessible technology to inspire action for a cleaner Vietnam. By transforming awareness into interaction, the game turns every player into a digital coast guard—one card flip at a time.