Designing Peatland.asia: A Gamified Platform about Indonesia Peatland Conservation

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ABSTRACT

Peatlands are wetland areas that cover only about 3% of the world's ecosystems. Despite this small coverage, they play a critical role in regulating the global climate by storing carbon (Humpenöder et al., 2020). Peatlands also support biodiversity and contribute to local economies. Over time, they have sustained surrounding communities by enabling the growth of plantation crops, due to fertile soil conditions that make cultivation easier (Yunus et al., 2024; Yuwati et al., 2021).

Indonesia contains about 47% of the world's tropical peatlands, making it the largest tropical peatland ecosystem globally. However, Indonesia's swamp forest coverage declined from 76% in 1990 to only 29% in 2015 (Abel et al., 2023; Osaki & Tsuji, 2016). This decline has largely been driven by short-term economic incentives, primarily for industrial plantations such as oil palm and pulpwood (Abel et al., 2023). A major challenge comes from human activities, including large-scale land conversion and intensive water extraction through canals built in peatland areas. These actions are often carried out without a full understanding of their long-term environmental consequences (Yuwati et al., 2021). As a result, there is a significant gap in awareness, particularly among local communities, which makes it difficult to communicate the urgency of preserving peatlands as ecological environments.

To address this awareness gap, Peatland.asia was designed as a virtual living lab set in Indonesian peatland contexts. The platform uses gamified mechanics to promote social-ecological learning through playful interaction, as shown in Figure 1. Players navigate a virtual landscape where institutions represent various stakeholders involved in peatland management. Each institution offers interactive tasks and real-life stories, allowing players to understand the complex challenges of peatland conservation while balancing Play, Meaning, and Reality, following the Triadic Game Design (TGD) framework (Harteveld, 2011).

During the design process, three evaluation rounds were conducted with the participation of NGO representatives, user representatives, and academic experts, who provided feedback on the prototype. In the final phase, the prototype was evaluated through an online playtest session in which potential players engaged with the game on their own devices. The evaluation used both a knowledge test and an empathy test, given before and after gameplay, as well as overall experience measurement through the Game Experience Questionnaire (GEQ). The final evaluation showed that Peatland.asia achieved its highest scores in sensory and imaginative immersion. This research demonstrates a new way to enhance players' understanding of complex environmental issues, particularly peatland conservation through playful mechanics while still delivering meaningful learning outcomes.

Figure 1. The landing page of Peatland.asia is set in the deep forest of tropical peatlands.

Keywords: *Peatlands, Product Design, Digital Media, Climate Change, Gamification, Forest Conservation*

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