



HydroData Hub

Make Water OK Team

Malaysia

Tan Peng Teck

Lim Heng Hoe

Agnes Saul

peggy Lee Pooi Qi



1.0 The Big Idea

1.1 Project background and context

The Penang Hill Biosphere Reserve (PHBR) in Malaysia, recognized for its significant challenges and economic importance, is having issues with **severe water scarcity** and **frequent landslides**, making it a critical area of concern for both local government authorities and residents.

There has been a 4.03% annual increase in water consumption at PHBR since 1923, resulting in water scarcity issues. The issues are further exacerbated by low effective capacity of the Teluk Bahang Dam and the fact that Ayer Hitam Dam's water levels dropped to 39% due to reduced rainfall and increased usage. Optimizing water allocation then becomes very necessary to ensure that the available water resources are distributed efficiently and sustainably among the various sectors that require water, including residential, agricultural, and industrial users.

According to history, PHBR has experienced over 300 landslides during a single storm in November 2017, largely due to heavy rainfall, illegal land clearing on steep and high hill lands, beside the fact that it is affecting thousands of people and causing fatalities, the flora and fauna of the sites are also seriously affected by it.

1.2 Project Objectives

Vision Statements

1. **Enable** the government and stakeholders to generate and utilize landslide hazard maps specifically for PHBR, with the potential for future applications in other regions, making such data accessible to the public.
2. **Enhance** data driven decision making processes by integrating disparate data sets from various departments and nongovernmental stakeholders into a unified, thereby improving operational efficiency across various sectors involved in the management of PHBR.

Clearly Defined and Measurable Goals

1. **Development of a Centralized Data Hub:** Create an integrated platform that serves as a centralized repository for biodiversity, water consumption, and landslide hazard data within PHBR. This hub will facilitate the aggregation and analysis of data collected by different departments and stakeholders, promoting a cohesive understanding of the reserve's ecological and environmental status.
2. **Autonomous Hazard Map System:** Develop and deploy an autonomous system capable of identifying potential landslide sites across PHBR. This system will connect to various data sources for real time updates, eliminating the need for manual data entry and allowing for timely hazard identification and mitigation efforts.
4. **Sustainable Water Management Practices:** Conduct a detailed study of water usage within PHBR by integrating data from multiple authoritative sources. This analysis will include the implementation of leak detection technologies and water conservation strategies. Through the goals outlined, the project aims to enhance the efficiency and effectiveness of water management within PHBR. This will ensure a timely response to potential water related issues, promote sustainable usage practices, and support the long term ecological and environmental health of the biosphere reserve.



1.3 Project approach and methods

Our project tackles water scarcity and landslide risks at Penang Hill Biosphere Reserve (PHBR) using a digital first strategy, centered on a centralized data hub - HydroData Hub. This approach enables efficient, informed decision making and environmental risk mitigation through two key digital innovations:

1. **Smart Water Meter (SWM) System:** Automates water usage data collection, feeding into the centralized hub for real time analytics. This helps identify consumption patterns, detect leaks, and manage demand, supporting water conservation efforts.

2. **Landslide Risk Assessment System:** Our system collects essential environmental data as parameters for mathematical modeling. We aim to employ a mathematical model capable of converting these parameters into standardized values. These values reflect the extent to which each parameter influences the likelihood of a landslide occurring. Subsequently, a fuzzy logic system processes these standardized areas at risk of landslides, serving as a crucial tool for emergency planning and risk management.

1.4 Project impacts

Smart Water Meter System:

1. **Efficient Water Management:** Automated data collection provides real time insights for PHBR Team to manage water effectively and conserve resources.
2. **Demand Management:** Real Time analytics aid in understanding water demand trends, facilitating proactive measures for sustainable water usage.
3. **Resource Conservation:** Monitoring and identifying inefficiencies support conservation efforts, promoting responsible water management for ecosystem preservation.

Landslide Risk Assessment System:

1. **Enhanced Risk Awareness:** The system provides a comprehensive understanding of landslide risks, enabling proactive mitigation and emergency planning.
2. **Targeted Resource Allocation:** An interactive hazard map helps prioritize high risk areas for efficient resource allocation and intervention measures.
3. **Improved Decision Making:** Standardized risk figures aid informed decisions on land use, infrastructure, and conservation efforts.

Quantify:

- **Biodiversity Increase:** Targeting a 10% biodiversity index increase in five years enhances ecosystem resilience, mitigating disasters like landslides.
- **Water Scarcity Reduction:** Aiming for a 15% decrease in water scarcity incidents within three years improves water availability, supporting ecosystems and communities sustainably.
- **Landslide Risk Reduction:** Realtime hazard mapping aims to cut ecosystem damage from landslides by 40% over five years, enabling immediate action for risk mitigation and resident protection.

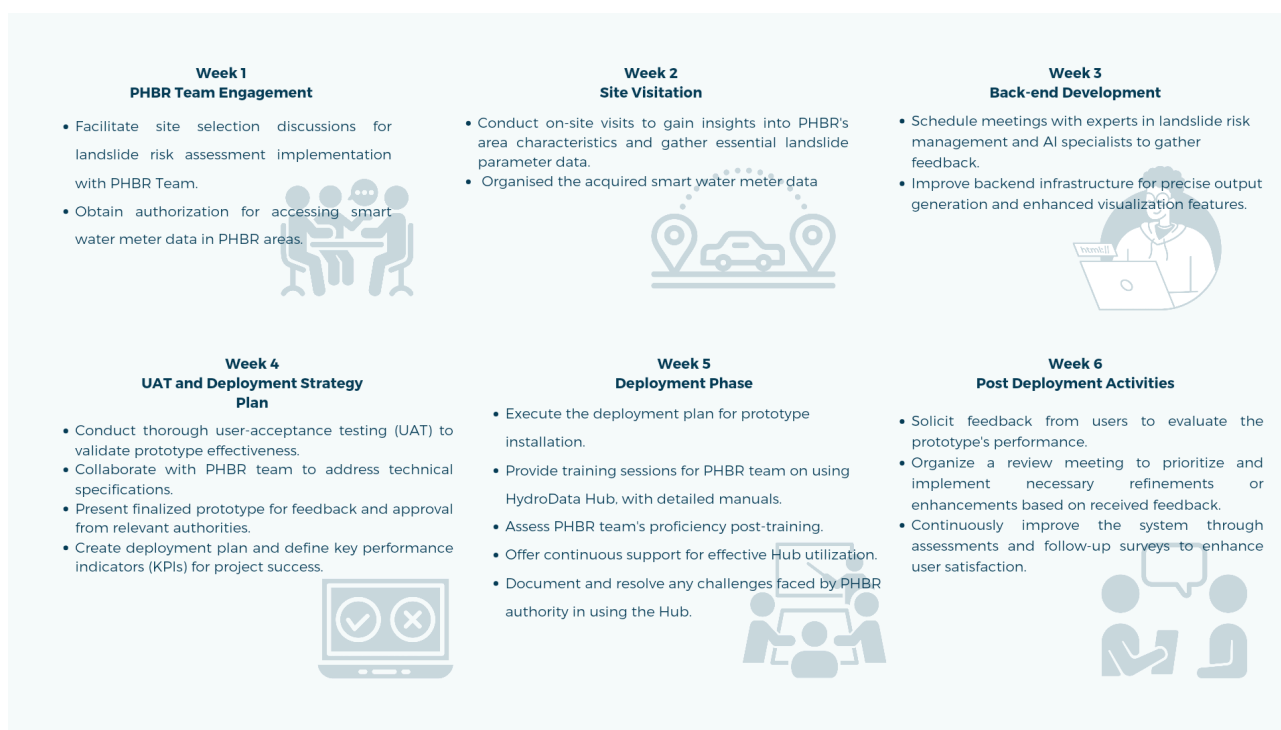


2.0 THE PILOT

2.1 The Pilot Project

In the initial six-week phase of our project, we will focus on a specific site within the PHBR framework. This site is already equipped with smart water meters, and our objective is to analyze real-time data from these meters. By creating visualizations, we aim to gain insights into water usage patterns, identify conservation opportunities, and highlight areas for improvement. Simultaneously, we will assess landslide risk at a carefully chosen location, refining our methodology and validating its effectiveness. This targeted approach will serve as a foundation for future scalability and impact in subsequent project phases.

2.2 Pilot Project Timeline



2.3 Stakeholder Mapping

These are the potential stakeholders to whom we will market our model, aiming to help them achieve the goals that we have set for the Penang Hill Biosphere Reserve.



2.4 Budget Plan

NO.	Budget Plan	DOLLAR (\$)	QUANTITY	USD (\$)
1	Bluehost Website Service Provider Host	14 per month	2 months	28.00
Total cost				28.00