MOBILE-BASED "CINTA MANGROVE" APPLICATION DESIGN IN KOTA PARI VILLAGE USING THE WATERFALL METHOD

Hermansyah[1] *, Rian Farta Wijaya[2], Sri Wahyuni[3], Agil Dwi Putra[4]
Universitas Pembangunan Panca Budi, Medan, Indonesia

Keywords:
Application Design, Cinta Mangrove, Mobile, Kota Pari Village, Waterfall Method, Mangrove Preservation

***Correspondence Address:**
hermansyah@pancabudi.ac.id

Abstract: This research focuses on the design of a mobile application, "Cinta Mangrove," aimed at supporting the preservation of the mangrove ecosystem in Kota Pari Village. The application is developed using the Waterfall method, which consists of the phases of requirements analysis, system design, implementation, testing, and maintenance. During the requirements analysis phase, data collection was conducted through observations and interviews with local communities to identify the needs and issues related to mangrove conservation. The system design phase involved creating an intuitive user interface and functionalities to support mangrove condition reporting, education, and tracking conservation activities. The implementation phase included the development of the application using the latest mobile programming technologies. Additionally, the application integrates educational elements such as videos, images, and quizzes to facilitate interactive learning. Testing was conducted to ensure the application functions according to the specified requirements and meets user needs. The outcome of this research is a mobile application that can be used by the people of Kota Pari Village to contribute to mangrove preservation, increase environmental awareness, and facilitate coordination of conservation activities. This application is expected to serve as a model for the development of similar technologies in other regions with mangrove ecosystems.

INTRODUCTION

The mangrove ecosystem plays a crucial role in maintaining environmental balance, particularly in coastal areas such as Kota Pari Village. Mangrove forests are coastal forests that grow in coastal areas or near river estuaries. These forests are influenced by tidal seawater (Rahmad et al. 2020). Mangroves not only function as a barrier against coastal abrasion but also serve as habitats for various types of flora and fauna and as

effective carbon sinks (Cahyo Wulandari 2023). However, mangroves are often threatened by irresponsible human activities, such as illegal logging and land conversion into residential or agricultural areas. These conditions create an urgent need for conservation efforts involving active community participation.

To enhance community awareness and participation in mangrove conservation, effective and easily accessible educational media are needed. With the advancement of technology, mobile applications have become a promising solution. Mobile applications can provide information, education, and interactive tools that can be accessed anytime and anywhere. One example of a rapidly evolving telecommunications tool is mobile devices using the Android operating system (Wijaya et al. 2019). Through Android, developers can leverage its features to build mobile e-learning systems known as mobile learning (Fadhilla, SUheri, and Khaliq 2021).

This study aims to design a mobile-based learning application, "Cinta Mangrove," which is expected to support mangrove conservation efforts in Kota Pari Village. The application design adopts the Waterfall method, consisting of systematic and sequential stages, including requirements analysis, system design, implementation, testing, and maintenance (Hermansyah, Wijaya, and Utomo 2023). This method was chosen for its structured and controlled development approach, ensuring the results align with user needs.

The "Cinta Mangrove" application is designed to provide educational information on the importance of mangroves, ways to preserve them, and interactive features. With this application, it is hoped that the people of Kota Pari Village will better understand the significance of mangroves and actively engage in their conservation efforts.

This study focuses not only on the technical aspects of application development but also on the social and educational aspects, aiming to create a sustainable positive change in community behavior and environmental awareness (Mahmuda et al. 2023). The research employs Adobe Flash Animate CC as supporting software for Android-based mobile learning media (Rahmad et al. 2020).

RESEARCH METHODS

This research adopts the Waterfall model in designing the mobile-based learning application "Cinta Mangrove" in Kota Pari Village. The Waterfall model was chosen as

it provides a systematic and structured framework, allowing each phase to be fully completed before moving on to the next. Below is an overview of the research methodology employed:

1. Requirements Analysis Phase

This phase aims to understand and document user and system needs by gathering data from local communities, environmental managers, and other stakeholders to identify educational and mangrove conservation requirements. It involves direct observation of the mangrove ecosystem and conservation activities in Kota Pari Village, as well as reviewing previous research and other relevant sources.

2. System Design Phase

This phase includes planning the application's architecture and interface. It involves defining the application structure, including main components, and designing a user-friendly and visually appealing interface with a focus on intuitive navigation and optimal user experience. The design model utilizes UML, a tool or model used for creating object-oriented application designs (Wahyuni et al. 2023).

3. Implementation Phase

This phase involves developing the application based on the created design. It includes building the user interface using appropriate technologies and integrating all application components to ensure they function as a cohesive system.

4. Testing Phase

The testing phase ensures the application functions according to specifications and is free of bugs . It involves testing each application component individually to ensure proper functionality, conducting overall application testing to verify that all features work as intended, and engaging end-users to test the application and provide feedback for improvements.

5. Maintenance Phase

Conducted after the application is launched, this phase ensures the application continues to function properly and meets user needs. It involves identifying and fixing errors or issues that arise after user deployment and updating the application to improve functionality and add new features based on user feedback.

RESULTS AND DISCUSSION

The mobile-based "Cinta Mangrove" application in Kota Pari Village, designed using the Waterfall method, aligns with the needs analysis conducted with local communities, environmental managers, and other stakeholders. This analysis identified the educational and mangrove conservation requirements to ensure effective implementation within the village environment. Based on the life cycle described earlier, the following research stages were adapted to the Waterfall method:

Unified Modeling Language (UML) Design

UML serves as a tool to aid in the description and design of software systems, particularly those built using object-oriented programming (Nistrina and Sahidah 2022). Below is the UML diagram used to develop the "Cinta Mangrove" application.

4.1 Use Case Diagram

The use case diagram is a type of diagram used in software development to represent the scenarios or activities that the system can perform (Supiyandi et al. 2022). In the use case diagram for the system being developed, there is one actor: the user. The following figure illustrates the use case diagram:

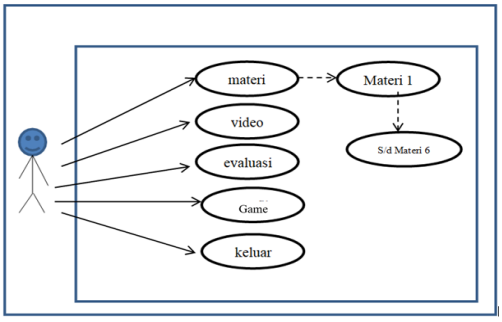

Figure 4.1 Use Case Diagram for the Application

Use Case Diagram Description:

Table 4.1 Description of Use Case Diagram

Name	Description
Material	This menu presents learning materials or clarifies the content delivered through interactive media.
Video	This material combines 2D animation with the content found in the Evaluation and Practice menu.
Evaluation	This menu provides evaluations and practices based on the overall content of "Cinta Mangrove."
Game	A game menu designed to sharpen skills in a fun & entertaining way.
Exit	A menu for exiting or closing the application.

4.2. Activity Diagram of the Application

The activity diagram simplifies understanding the workflow steps by modeling the workflow of a use case. It helps identify who is responsible for each activity and the objects involved in the workflow (Santoso and Pebriyani 2017).

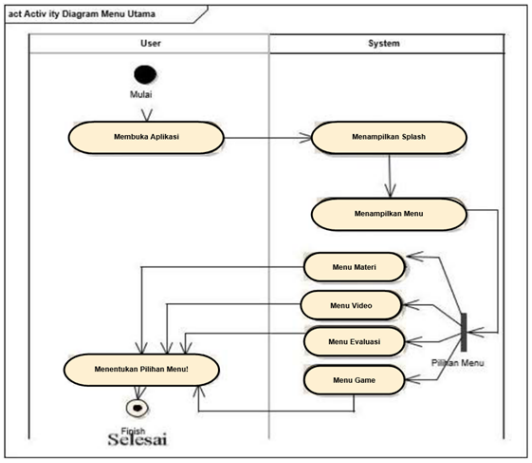

Figure 4.2. Actifity Diagram Aplikasi

4.3. Navigation Structure

The navigation structure is the sequence of information flow within a multimedia application (Satria, Septiana, and Ramadhan 2022). By using an appropriate navigation structure, a multimedia application will have a clear guideline and direction for its information. Below is the navigation structure of the "Cinta Mangrove" application:

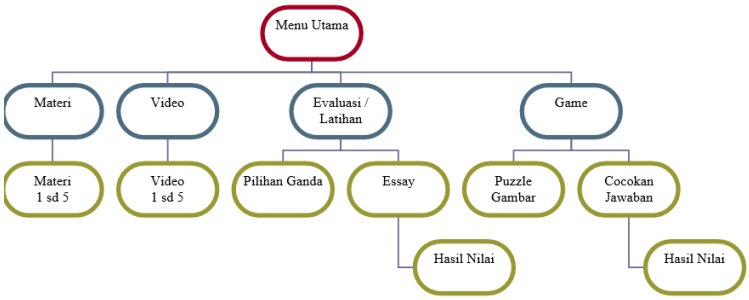

Figure 4.3. Application Navigation Structure

4.4. Interface Design

The User Interface (UI) design is the process used by designers to create the visual layout in software or computerized devices, focusing on appearance or style (Putra et al. 2024). The goal of UI design is to create an interface that is easy and enjoyable for users to interact with. Below is the interface design of the "Cinta Mangrove" application.

Figure 4.4. Interface Design

CONCLUSION

The design of the mobile application "Cinta Mangrove" aims to provide an interactive and educational learning framework about the importance of mangrove conservation to the residents of Kota Pari Village. The design will include information on mangrove ecology, the significance of preservation, and ways to get involved in conservation efforts. The Waterfall method was chosen for the development of this application. This approach involves a series of linear stages, starting from requirements analysis to testing and implementation. It enables a clear mapping of user needs and a structured development process. This application is expected to raise public awareness about the importance of mangrove conservation and encourage active participation in preservation efforts. By providing easy access through mobile devices, the application can reach a wider audience and promote sustainable learning.

REFERENCE

Cahyo Wulandari. 2023. "Potensi Ekosistem Mangrove Untuk Mewujudkan Kawasan Pesisir Berkelanjutan Di Desa Wedung, Kecamatan Wedung, Kabupaten Demak, Jawa Tengah." *Jurnal Pengabdian, Riset, Kreativitas, Inovasi, dan Teknologi Tepat Guna* 1(2): 81–92.

Fadhilla, Aulia, SUheri, and Abdul Khaliq. 2021. "Aplikasi Mobile Learning Berbasis Android Untuk Belajar Huruf Hijaiyah." *Jurnal Nasional Teknologi Komputer* 1(1): 28–36.

Hermansyah, Hermansyah, Rian Farta Wijaya, and Rahmad Budi Utomo. 2023. "Metode Waterfall Dalam Rancang Bangun Sistem Informasi Manajemen Kegiatan Masjid Berbasis Web." *KLIK: Kajian Ilmiah Informatika dan Komputer* 3(5): 563–71. https://djournals.com/klik/article/view/756.

Mahmuda, Rozi, David Aritonang, Evitrisna, and Meilinda Suriani Harefa. 2023. "Mengatasi Dalam Rehabilitasi Di Kawasan Mangrove Di Paluh Marbau, Tanjung Rejo, Kabupaten Deli Serdang." *Jurnal Ilmiah Multi Disiplin Indonesia* 2 (E-ISSN : 2809-1612, P-ISSN : 2809-1620): 553–65.

Nistrina, Khilda, and Lisna Sahidah. 2022. "Unified Modelling Language (Uml) Untuk Perancangan Sistem Informasi Penerimaan Siswa Baru Di Smk Marga Insan Kamil." *Jurnal Sistem Informasi, J-SIKA* 4(1): 17–23.

Putra, Randi Rian, Fahmi Kurniawan, Yanti Yusman, and Aldi Alvin. 2024. "Desain User Interface Sistem Informasi Digital Dalam Menigkatkan UMKM Desa Pertumbukan Kecamatan Wampu." *JURNAL MAHAJANA INFORMASI* 9(1): 33–40.

Rahmad, Yefri, Albian Mubarak, Elfrida, and Mawardi. 2020. "Keanekaragaman Tumbuhan Mangrove Di Desa Alur Dua Tahun 2019." *Jurnal Jeumpa* 7(1): 341–48.

Santoso, Bodi, and Okky Pebriyani. 2017. "Aplikasi Pembelajaran Do'a Harian Untuk Anak Usia Dini Berbasis Android." *Jurnal Informatika Universitas Pamulang* 2(4): 220.

Satria, Eri, Yosep Septiana, and Rizda Ramadhan. 2022. "Rancang Bangun Game Edukasi Pengenalan Bagian-Bagian Tumbuhan Untuk Siswa Sekolah Dasar Berbasis Android." *Jurnal Algoritma* 18(2): 633–41.

Supiyandi, Supiyandi, Muhammad Zen, Chairul Rizal, and Muhammad Eka. 2022. "Perancangan Sistem Informasi Desa Tomuan Holbung Menggunakan Metode Waterfall." *JURIKOM (Jurnal Riset Komputer)* 9(2): 274.

Wahyuni, Sri, Rahayu Mayang Sari, Muhammad Zen, and M.Praja Kelana. 2023. "Implementasi Sistem Informasi E-Library Berbasis Web Pada Perpustakaan SMAN 1 Binjai." *INTECOMS: Journal of Information Technology and Computer Science* 6(1): 275–82.

Wijaya, Rian Farta, Rahmad Budi Utomo, Debi Yandra Niska, and Khairul Khairul. 2019. "Aplikasi Petani Pintar Dalam Monitoring Dan Pembelajaran Budidaya Padi Berbasis Android." *Rang Teknik Journal* 2(1): 123–26.