



**Prepared by Telesphore Uwabera**

**Course:** Ethics In Software Engineering

**Theme:** Ethical approval for the Eco-Volunteer & Research Collaboration Portal

**Supervisor:** Mr Simeon Nsabiyumva

**Specialization:** Full Stack Web Development

**Institution:** Africa Leadership University

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### **Agreement**

I have considered the ethical implications of my research proposal and will obtain ethical clearance from my university as soon as possible after submitting my proposal and before data collection begins. Here is the link to my research proposal: [Eco-Volunteer & Research Collaboration Portal](#).

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## **Task One: Ethical Considerations**

### **1.1 Procedure and Ethical Considerations**

This study involves human subjects, institutional and ecological data availability, and interaction with current conservation technology. A number of ethical issues must be taken into account to guarantee that the research is carried out sensibly, legally, and with regard for all those involved.

#### **1.1.1 Ethical Approval and Consent Procedures**

The project will obtain ethical approval from the Institutional Review Board (IRB) of African Leadership University before starting any fieldwork or platform testing. The Rwanda Development Board (RDB), Rwanda Environment Management Authority (REMA), and conservation NGOs that provide data will also be consulted for permission. Before participation, all participants—including volunteers, researchers, and rangers—will be asked to give their informed consent. The study's objectives, data use, and participant rights will all be spelled out on consent forms available in both Kinyarwanda and English. Per national rules, approval will be acquired from guardians or community leaders for the elderly and juveniles (those under the legal age).

#### **1.1.2 Data Management and Storage**

Sensitive information such as user profiles, incident reports, geotagged photos, and uploaded research materials would be gathered and managed by the platform. All data will be protected using contemporary security standards (such as HTTPS, JWT, and AES encryption) both in transit and at rest to guarantee data privacy and security. Strict role-based access controls (RBAC) will be in place for the data storage on secure cloud infrastructure (AWS Africa region and MongoDB Atlas). To preserve participant confidentiality, personal identifiers will be anonymised throughout the study.

#### **1.1.3 Use of Pre-existing Systems and Datasets**

The platform integrates datasets from existing conservation technologies such as SMART and EarthRanger, as well as historical data from REMA and RDB. All reuse of data and code will comply with licensing agreements, and proper attribution will be given where open-source components or algorithms are used. This avoids ethical and intellectual property violations.

#### **1.1.4 Potential to Reveal Systemic Anomalies**

Because the platform may uncover gaps or inconsistencies in current conservation workflows, such as patrol inefficiencies or underreported incidents, these findings will be communicated constructively and confidentially with relevant institutions. Care will be taken not to attribute operational flaws to individuals, and any findings that could impact reputations or funding will be handled with discretion.

#### **1.1.5 Protection Against Harm and Labeling**

Surveys and platform features will be designed to avoid stigmatisation or harmful self-labelling (e.g., “I am not useful” or “I lack skills”). The interface will highlight positive contributions and enable participants to see their conservation impact. No psychological profiling or comparative rankings will be used.

#### **1.1.6 Risk to Employment or Social Standing**

Given that rangers, community volunteers, and researchers may use the platform in ways that reflect on their professionalism, data visibility will be limited to their role-based dashboards. Public displays of information will be de-identified, and performance analytics will be used strictly for system evaluation, not for individual assessments.

#### **1.1.7 Sensitive Topics and Deception**

Some reports submitted via the portal may involve sensitive issues such as illegal poaching, human-wildlife conflict, or land encroachment. These submissions will be encrypted and routed only to verified rangers or authorities. No deceptive practices will be used in participant engagement; all research activities will be fully transparent.

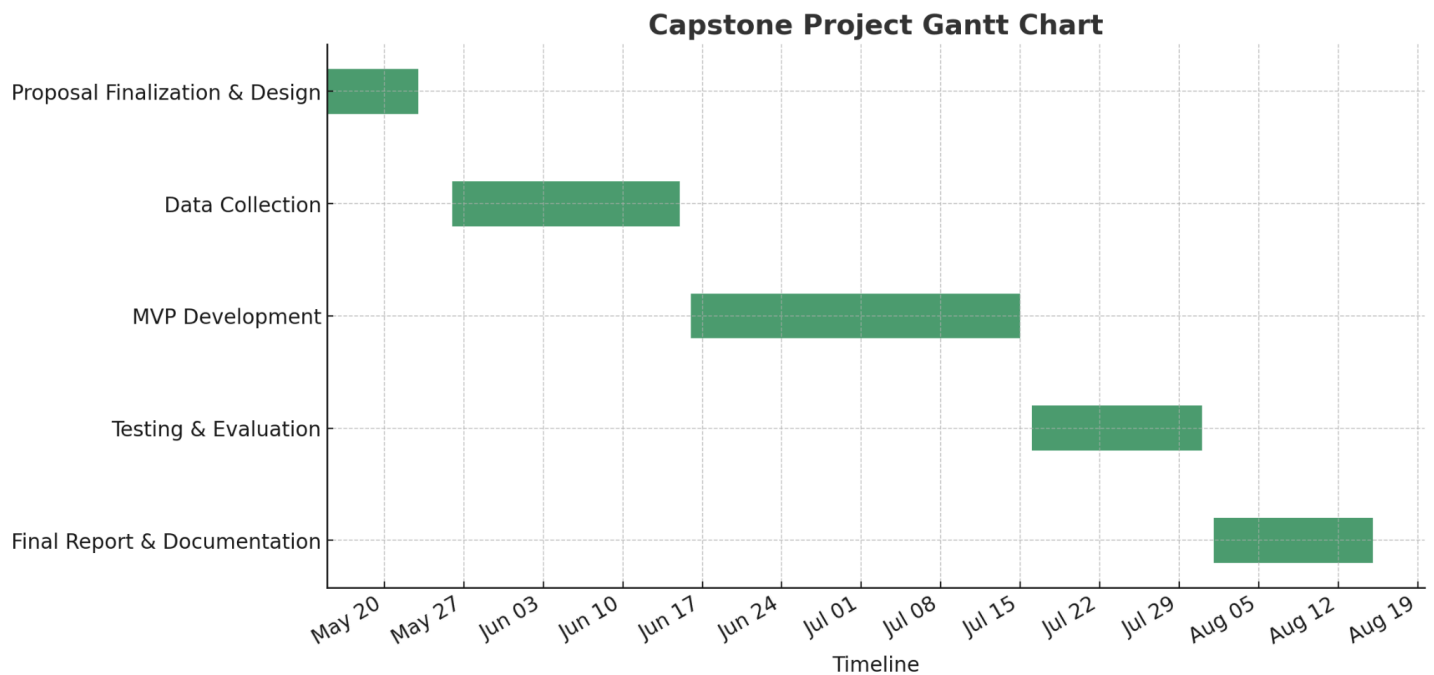
#### **1.1.8 Compliance with Legal and Cultural Guidelines**

The research will comply with Rwanda’s data protection laws and Vision 2050 priorities, including digital governance, environmental sustainability, and community rights. Special care will be taken to ensure all activities respect local customs, particularly when working with elders and village authorities near protected areas.

## Task 2: Integration of Ethical Morals and Professional Conduct into the Capstone Project

### 2.1 Project Plan and Visual Gantt chart

The Eco-Volunteer and Research Collaboration Portal will follow an agile, iterative development process structured into five key phases across three months. Each phase includes specific deliverables, ethical checkpoints, and professional accountability practices.



The Eco-Volunteer and Research Collaboration Portal for Wildlife Conservation in Rwanda capstone project plan is accompanied by this visual Gantt chart. It demonstrates the project's staged methodology in detail throughout five major stages: platform creation, testing, data collection, proposal finalisation, and final reporting. A project activity's start and conclusion dates are shown by each horizontal bar, which is precisely drawn from mid-May to mid-August 2025. In addition to listing technical deliverables and milestones, like MVP development, system testing, and documentation, the chart emphasises how ethical issues are incorporated into each step.

Phase	Timeline	Key Deliverables	Ethical Considerations
Proposal Finalization & Design	May 15–23, 2025	Final proposal document, wireframes, and ethical approval draft	IRB application, informed consent protocols, and role-based data access mapped
Data Collection	May 26–June 15, 2025	Survey results, requests, field interviews, and SMART data integration	Consent from participants, anonymization of data, special care for elders/juveniles
MVP Development	June 16–July 15, 2025	Functional platform prototype (authentication, incident reporting, dashboards)	Encryption protocols, secure backend, ethical data visualization design
Testing & Evaluation	July 16–31, 2025	User feedback, performance reports, stakeholder focus group summaries	Feedback transparency, participant empowerment, and correction mechanisms
Final Report & Documentation	Aug 1–15, 2025	Project impact report, refined ethical summary, code repository	Clear acknowledgment of contributors, compliance report, and professional citation of tools

## 2.3 Stakeholder Impact

The Eco-Volunteer and Research Collaboration Portal will have a multi-dimensional impact on a wide range of stakeholders actively involved in or affected by Rwanda’s conservation sector. The platform is designed to ethically and meaningfully engage these stakeholders by aligning with both local needs and international best practices in environmental governance and digital inclusion.

### **2.3.1 Local Communities**

Local communities, particularly those living in buffer zones around protected areas such as Volcanoes and Akagera National Parks, often face the consequences of human-wildlife conflict but lack consistent participation in formal conservation strategies (REMA, 2022). The portal empowers these communities through real-time reporting tools, multilingual interfaces (English and Kinyarwanda), and participatory volunteer features. In line with the African Union's Agenda 2063 and Rwanda's Vision 2050, the project reinforces inclusive, community-led conservation and promotes environmental stewardship as a shared responsibility (African Union, 2015; Government of Rwanda, 2020).

### **2.3.2 Park rangers and conservation staff**

Park rangers and conservation staff are integral to biodiversity protection efforts and will benefit from streamlined reporting and integrated dashboards that improve patrol coordination and response time. The inclusion of tools like SMART and EarthRanger within the platform reflects current best practices and will support ranger-led verification workflows while safeguarding their identities and operational data through encrypted role-based access (SMART Partnership, 2022; Vulcan LLC, 2022). Ethical data-handling protocols ensure that their professional performance is not exposed to public scrutiny, protecting their employment security and dignity.

### **2.3.3 Researchers and conservation scientists**

Researchers and conservation scientists will gain from enhanced access to shared ecological data, research papers, and geospatial analytics tools. The system promotes cross-institutional collaboration and reduces data silos by offering centralised repositories and collaborative tools. Attribution frameworks will ensure proper recognition of intellectual property and encourage responsible data sharing by international research ethics guidelines such as the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979).

### **2.3.4 Government agencies**

Government agencies such as the Rwanda Development Board (RDB) and the Rwanda Environment Management Authority (REMA) stand to gain high-level oversight and real-time ecological insights to inform policy. The system supports digital transformation goals set out in Rwanda's Vision 2050 by contributing data for evidence-based environmental management (Government of Rwanda, 2020). By integrating regulatory data feeds (e.g., from SMART), the platform strengthens institutional transparency and accountability.



### **2.3.5 Eco-Volunteers**

Eco-volunteers, including students, local citizens, and tourists, are central to the platform’s collaborative model. The portal will create new opportunities for volunteer engagement while ensuring their efforts are recognized and documented in personal dashboards. Ethical engagement practices, such as informed consent, opt-out options, and non-competitive contribution scoring, will prevent harmful self-comparisons or labeling. These practices are grounded in the principles of respect, justice, and beneficence as recommended by the Belmont Report (1979).

Each group’s unique needs and risks, and integrating both technological solutions and ethical safeguards, will help to build the platform and ensure that stakeholder participation is not only inclusive but also empowering, sustainable, and compliant with both national priorities and international research ethics.

## **2.4 Relevant Ethical Frameworks Guiding the Research**

The ethical foundation of this capstone research is grounded in a combination of Rwandan national regulations, African Union protocols, and globally recognised research ethics frameworks. These frameworks provide both moral guidance and legal direction for the collection, handling, and dissemination of data involving human participants, ecological systems, and institutional records. Rather than being theoretical references, they serve as active decision-making tools throughout the project lifecycle—from design to deployment.

### **2.4.1. Rwanda’s National Research Ethics Guidelines & Vision 2050**

Rwanda’s national ethics framework, developed under institutions like the Rwanda National Ethics Committee and REMA, emphasises community engagement, respect for participant rights, and data confidentiality. Vision 2050 outlines the need for inclusive, citizen-centred innovation, particularly in environmental governance and technology (Government of Rwanda, 2020). In practice, this means all user data collected via the platform (e.g., geotagged reports, researcher uploads) will be stored securely, encrypted, and anonymised for any form of external reporting. Consent will be sought using Kinyarwanda/English forms, and vulnerable groups such as elders and youth will be approached with culturally sensitive procedures approved by local authorities.

### **2.4.2 Rwanda Environment Management Authority (REMA) Guidelines**

The project integrates ethical considerations drawn from the Rwanda Environment Management Authority (REMA). REMA promotes ethical access to and use of environmental data, especially in protected ecosystems like Volcanoes and Akagera National Parks. Given that the platform will utilize geospatial data and historical

patrol reports from systems like SMART, formal data-sharing agreements will be established to ensure that all institutional data is accessed and used responsibly. Research findings and system analytics will also be shared back with REMA and other national bodies to support evidence-based policymaking, reinforcing a two-way ethical relationship with regulators (REMA, 2021).

#### **2.4.3 Rwanda ICT and Data Protection Policy (2019)**

The project complies with the digital ethics and data protection guidelines set forth in Rwanda's ICT and Data Policy Framework (2019). The significance of user privacy, secure data infrastructure, and individual ownership of personal data across all technology platforms is emphasised by this policy. The Eco-Volunteer Portal will use role-based access control to safeguard information visibility, secure authentication systems, and end-to-end encryption for sensitive data like incident reports in order to achieve these standards. In order to maintain accountability and conformity with Rwanda's developing digital governance model, users will continue to have complete control over their data, including the option to amend or remove their profiles and submissions (Ministry of ICT and Innovation, 2019).

#### **2.4.4 African Union Convention on Cybersecurity and Personal Data Protection**

This convention provides a thorough legal-ethical framework for the responsible management of digital data, although not yet been ratified by all African countries. It emphasizes the right to be forgotten, individual data ownership, and restrictions on unauthorised cross-border data flows. The Eco-Volunteer Portal allows users complete control over their data through this protocol. All data transfers, including those from tools like SMART, will only take place through official, secure data-sharing agreements, and they have the freedom to remove their accounts or submit reports whenever they want. By doing this, user identities and contributions are safeguarded, and no information is disclosed to outside parties without the express approval of the user.

#### **2.4.5 The Belmont Report (1979)**

The Belmont Report (1979), published by the U.S. National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research. It establishes three key principles, which are Respect for Persons, Beneficence, and Justice, that are central to the ethical treatment of human participants. Within this project, Respect for Persons is demonstrated through the use of informed consent procedures and the provision of an opt-out option at every stage of data collection. Beneficence is applied by minimising risk to participants; for example, ranger reports will be anonymized to protect job security, and sensitive user data such as volunteer logs will be encrypted. Justice is reflected in the fair selection of research participants: community members

living near national parks are chosen not due to convenience but because of their deep and direct engagement with conservation challenges, ensuring the benefits of the research are shared equitably (National Commission, 1979).

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