

# EcoLoop

Smart Waste & Recycling Management System

**Reduce. Reuse. Reward.**

*A technology-driven approach to sustainable waste management*

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# 1. Problem Statement

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Waste management is a critical part of maintaining clean, healthy, and sustainable communities. However, in many environments, the system is inefficient, uncoordinated, and difficult for everyday users to navigate.

Most households generate waste daily but face uncertainty in how it will be collected. In many cases, there is no clear information on who will collect the waste, when it will be collected, or whether it will be collected at all. This lack of structure creates confusion and inconsistency in waste disposal practices.

Because of this uncertainty, many people resort to improper disposal methods such as dumping waste in open spaces, drainage systems, or burning waste. While these methods offer temporary convenience, they lead to long-term environmental problems such as pollution, flooding, and poor public health conditions.

In addition, although a large portion of household waste is recyclable, most users do not separate or manage recyclable materials properly. This results in valuable materials being lost instead of being reused or processed into new products.

There is also limited awareness and education on proper waste handling, recycling practices, and environmental responsibility. As a result, waste management remains a reactive and poorly understood process rather than a structured system.

Overall, waste management currently functions as a broken loop:

*Waste is generated » collection is uncertain » improper disposal is used » recyclable value is lost » awareness is low » the cycle repeats.*

## 2. Proposed Solution

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To address these challenges, this project proposes EcoLoop — a smart waste and recycling management platform that connects households, waste collectors, and recycling partners into a unified system.

EcoLoop transforms waste management into a structured and continuous loop by introducing predictability, transparency, incentives, and education into the process.

The application allows users to schedule and request waste collection services based on predefined community collection days. It also supports premium on-demand pickups for urgent needs.

Beyond general waste collection, EcoLoop introduces a recycling system where users can submit recyclable materials such as plastic, paper, metal, and glass. These materials are collected, measured, and converted into monetary value based on predefined rates, which are credited to the user's in-app wallet.

To encourage sustainable behaviour, the platform includes environmental education content that teaches users how to properly manage waste, separate recyclable materials, and understand the environmental impact of their actions.

By integrating waste collection scheduling, recycling incentives, and environmental education into one system, EcoLoop creates a complete and self-reinforcing waste management loop.

## 3. Features of EcoLoop

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### 3.1 User Registration and Profile Management

Users can create and manage accounts on the platform.

**Features:**

- User registration and login
- Profile setup
- Location and address management
- Contact information storage

**Purpose:**

Ensures users are properly linked to their local collection areas.

### 3.2 Smart Collection Calendar

The Smart Collection Calendar provides users with structured waste and recycling schedules based on their location.

**Features:**

- View scheduled waste collection days
- View recycling collection days
- View upcoming pickups
- Receive reminders and notifications
- View completed collection history

**Purpose:**

Removes uncertainty around collection timing and improves planning.

### 3.3 Waste Pickup Request System

Users can request waste collection services easily through the app.

**Features:**

- Request waste pickup
- Select waste type
- Choose from available scheduled community days
- Add notes or instructions

- Premium on-demand pickup available outside scheduled days (extra charge applies)

#### **Purpose:**

Provides a reliable and structured way for users to dispose of waste.

### **3.4 Recycling Pickup System**

Users can request collection of recyclable materials through a structured schedule. Before scheduling, users can use the built-in Recycling Calculator to see estimated weights and expected earnings for their materials.

#### **Features:**

- Select recyclable material type (plastic, paper, metal, glass)
- View available recycling collection days based on location
- Schedule recycling pickup on predefined community days
- Premium on-demand recycling pickup available outside scheduled days (extra charge applies)
- View recycling history

#### **Recycling Price Calculator:**

Before scheduling a pickup, users can input what they want to recycle and in what quantity. The app calculates the estimated total weight and expected wallet credit based on current rates.

| Material          | Est. Weight/Unit | Rate per kg | Example Earning  |
|-------------------|------------------|-------------|------------------|
| Plastic Bottle    | ~30g             | ₦50/kg      | ₦1.50 per bottle |
| Cardboard / Paper | ~200g/sheet      | ₦30/kg      | ₦6.00 per kg     |
| Metal (Cans)      | ~15g             | ₦120/kg     | ₦1.80 per can    |
| Glass Bottle      | ~200g            | ₦20/kg      | ₦4.00 per bottle |

Example: A user selects 10 plastic bottles + 2kg of cardboard. The app shows an estimated earning of ₦15 + ₦60 = ₦75 credited to their EcoWallet upon confirmed pickup.

#### **How it works:**

Recycling pickups follow predefined community collection days assigned to each location. Users can only schedule pickups on available days at no extra cost. If a user needs a recycling pickup outside of their assigned days, a premium on-demand option is available at an additional fee.

#### **Purpose:**

Encourages proper separation and recovery of recyclable materials while giving users full transparency on what they stand to earn before committing to a pickup.

### 3.5 Pickup Tracking and Status Updates

Users can track all collection activities in real time.

**Features:**

- View request status (Pending, Accepted, Scheduled, In Progress, Completed)
- See assigned collector details
- Receive live updates and notifications

**Purpose:**

Improves transparency and user trust.

### 3.6 Waste Collector Management

Collectors manage assigned jobs through the platform.

**Features:**

- Accept or reject jobs
- View scheduled routes
- Update pickup status
- View job history

**Purpose:**

Organises collection operations efficiently.

### 3.7 EcoWallet — Recycling Rewards System

Users earn rewards from recyclable materials submitted.

**Features:**

- View wallet balance
- View earnings history
- Receive credit from recycling submissions
- Use wallet for waste services (optional)

**Purpose:**

Encourages recycling through financial incentives.

### 3.8 Environmental Learning Hub

Provides educational content to improve awareness and behaviour.

**Features:**

- Waste disposal guides
- Recycling tutorials
- Environmental awareness tips
- Best practices for sustainability

**Purpose:**

Builds long-term behavioural change in users.

### 3.9 Notifications and Reminders

Keeps users informed about all activities.

**Features:**

- Collection reminders
- Status updates
- Recycling confirmations
- Educational alerts

**Purpose:**

Improves engagement and reduces missed pickups.

### 3.10 Environmental Impact Dashboard

Shows users their contribution to environmental sustainability.

**Features:**

- Number of pickups completed
- Amount of waste collected
- Recycling contribution
- Earnings from recyclables
- Environmental impact summary

**Purpose:**

Encourages continued participation by showing progress and impact.

## 4. System Loop Summary

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EcoLoop functions as a continuous, self-reinforcing environmental cycle:

*Waste is generated » Users check collection schedule » Waste is collected » Recyclables are separated » Users calculate expected earnings » Recyclables are converted into wallet credit » Users learn better practices » Improved behaviour reduces environmental damage » Cycle repeats*

***EcoLoop — Closing the loop on waste.***