MARC

MANGROVE ACTION FOR RESTORATION AND CONSERVATION

TEAM INTRODUCTION

- Aman Galoliya
- Ayush Pathak
- Avani Prajapati
- Shreya Painter

Community Mangrove Watch - (Problem Statement)

- **Mangroves are vital** – protect coasts from storms, store carbon, and sustain biodiversity.
- **Under threat** – illegal cutting, land reclamation, and pollution.
- **Challenge** – weak monitoring, delayed action, and low community involvement.
- **Need** – a participatory system where communities, fishermen, and citizen scientists can report incidents (cutting, dumping, pollution).
- **Approach** – use geotagged photos, satellite data, and AI validation to ensure accurate reporting.
- **Engagement** – encourage participation through gamification (points, leaderboards, rewards).

Supports Biodiversity

Provides shelter, food and nurseries for mrine fauna and flora

Protects Coastlines

Protects coastal communities from storm surges, floods and coastal erosion

Protects Coastlines

Provides food and livelihoods for coastal communities through fisheries, tourism

Ocean Health

Supports overall ocean health through nutrient cycling and bio-remediation

Research on Mangroves

- The area of mangrove habitat in the world was 147,358.99 km^2 in 2020, this represents a linear coverage of 14.93% of the 2,139,308.93 km of the coastline.

- The extent of mangroves in the world has decreased by 5,245.24 km^2 between 1996 and 2020.There were 874,350 mangrove disturbance alerts between January, 2019 and April, 2025

- Mangroves are a type of tropical forest, found at the edge of land and sea and flooded regularly by tidal water. Mangroves are among the most carbon-rich forests in the tropics.

- Sequestration Rate: About 6–8 tonnes of CO2 per hectare per year
  Total Carbon Storage: 900 to 1,100 tonnes of CO2 per hectare

Oxygen-poor, waterlogged soils turn mangroves into nature’s most powerful carbon vaults — that’s what makes them special.

Features

Complaint & Incident Reporting

- **Simple Web-based Form** : Anyone can easily submit complaints through a web form, no app installation required.
- **Detailed Inputs** : Users provide description, attach geo-location, and upload photos/videos of mangrove damage.
- **AI-powered Validation** : Multi-agent AI cross-checks authenticity, detects fake reports, and classifies severity level (low/medium/high).
- **Automated Notifications** : Verified reports trigger instant alerts (SMS/Email) to local authorities, NGOs, and stakeholders.
- **Faster Response** : Ensures immediate attention to illegal cutting, pollution, or reclamation activities.

Gamification & Rewards

- **Points** : Users earn points for each valid complaint, encouraging frequent participation.
- **Leaderboard System** : Transparent ranking highlights top contributors at community, district, and state levels.
- **Reward Mechanism** : Points are converted into measurable “carbon credit savings” based on area of mangroves saved.
- **Monetization Link** : Users/NGOs gain recognition and potential financial incentives from carbon credit partnerships.
- **Sustained Engagement** : Keeps community motivated to consistently protect and report mangrove-related activities.

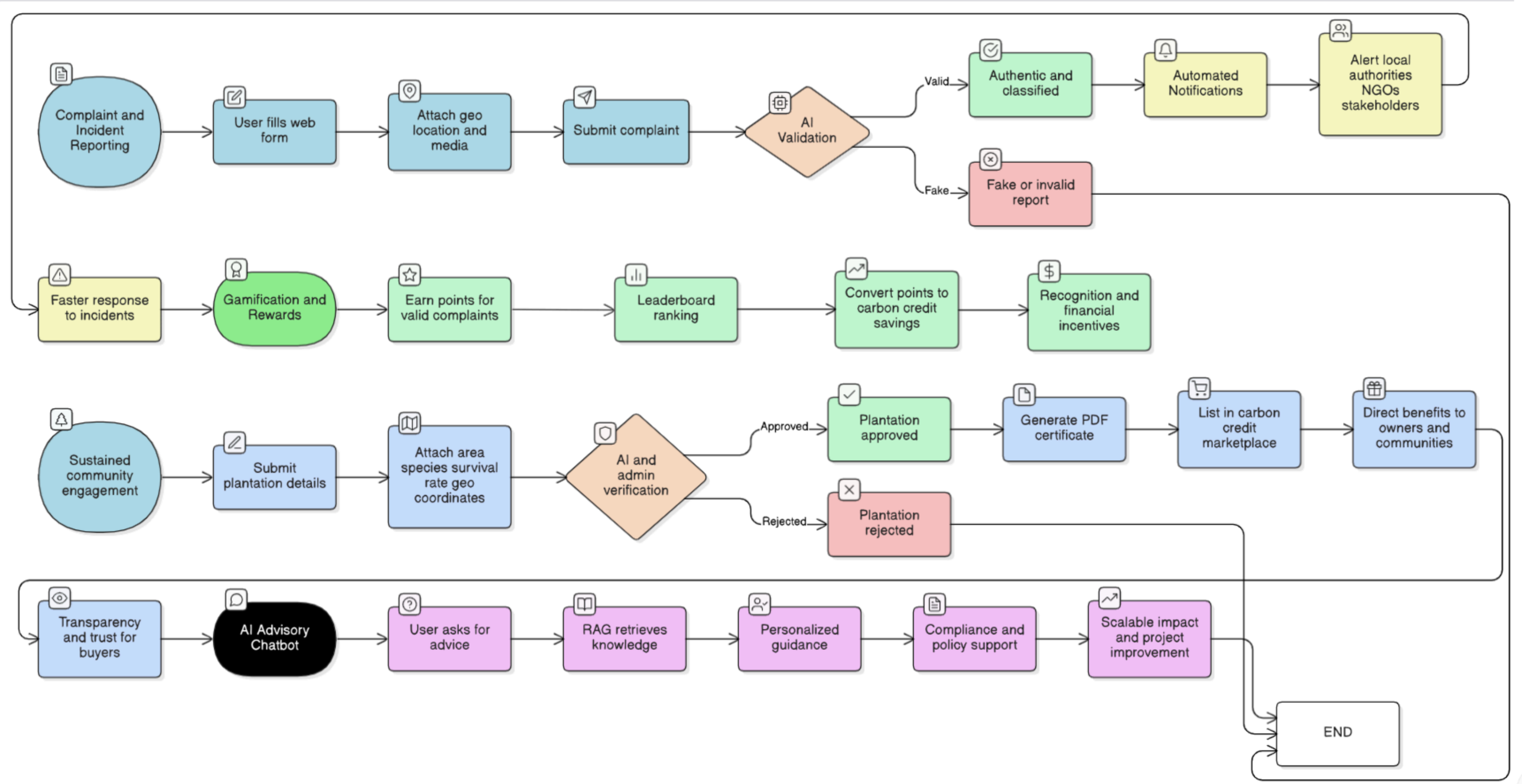
Plantation & Carbon Credit Tracking

- **Community-driven Plantation Reporting**: NGOs and individuals submit details about new mangrove plantations (area, species, survival rate, geo-coordinates).
- **Hybrid Verification**: AI validates satellite/ground data and admin gives final approval for authenticity.
- **Automatic Certification** : Once approved, a professional PDF certificate with verified plantation details is generated.
- **Carbon Credit Marketplace**: Verified plantations are listed in the marketplace for companies to purchase credits.
- **Direct Benefits**: Funds from credit sales go directly to plantation owners/communities, promoting sustainable livelihoods.
- **Transparency & Trust**: Builds confidence for buyers and ensures that every plantation claim is genuine.

AI Advisory Chatbot (RAG-based)

- **Knowledge-driven Assistant**: An AI chatbot trained with both global research and local mangrove conservation practices.
- **Data-backed Responses**: Uses Retrieval-Augmented Generation (RAG) to pull insights from reports, case studies, and verified research.
- **Personalized Guidance**: Provides tailored recommendations to project owners, NGOs, and communities based on their plantation or conservation needs.
- **Claim Rejection Support**: If a user's plantation claim is rejected by the AI/agent, the chatbot explains the reasons and provides guidance on how to meet requirements for resubmission.
- **Scalable Impact**: Helps project owners improve plantation survival rates, expand projects, and maximize their carbon credit potential.

Mangrove Conservation Software System Flowchart



TECH STACK

FRONTEND



BACKEND




DATABASE


DEPLOYMENT


Agentic AI







References

- https://www.thebluecarboninitiative.org/manual
- https://www.thebluecarboninitiative.org/policy-guidance
- https://www.thebluecarboninitiative.org/about-blue-carbon
- https://oceanservice.noaa.gov/ecosystems/coastal-blue-carbon/
- https://www.nasa.gov/centers-and-facilities/goddard/new-partnership-aids-sustainable-growth-with-earth-observations/
- https://www.theoceanagency.org/toolkits/mangroves
- https://www.theoceanagency.org/toolkits/seagrass
- https://www.wri.org/insights/what-is-blue-carbon-benefits-for-people-planet
- https://link.springer.com/article/10.1007/s40725-018-0077-4

THANK YOU

FOR YOUR ATTENTION