## PROJECT 1: **Developing a FLINT Forest Monitoring tool using Land Sector datasets.**

### PERSONAL PROFILE

I am excited to apply for the position at Moja Global to work on the development of the FLINT Forest Monitoring tool using Land Sector datasets project. My journey in the contribution phase of working on similar projects has been transformative, especially considering my initial unfamiliarity with geospatial analysis.

When I first embarked on projects involving geospatial analysis, it was a realm I had not delved deeply into before. Understanding the intricate datasets for analysis required a considerable amount of time and perseverance. However, through dedicated effort and a commitment to learning, I gradually grasped the nuances of geospatial analysis and its applications in forest monitoring.

During the early stages, tasks often felt overwhelming and unfamiliar. Yet, as I persisted and gained more experience, particularly during week 2 task 1, I began to find familiarity and confidence in my abilities. This transition was empowering, as I realized the potential impact of my contributions and how my skills could be leveraged to create meaningful solutions.

I am particularly drawn to the opportunity at Moja Global because it aligns perfectly with my professional aspirations. I am keen to continue honing my skills in geospatial analysis and contributing to projects that promote environmental sustainability. The prospect of learning and growing within a team of talented individuals excites me, and I am eager to immerse myself in the FLINT Forest Monitoring tool project.

In terms of technical skills, I am proficient in various tools and programming languages, including VS Code, SQL, NoSQL, R, SPSS, Stata, Power BI, Tableau, and Python. My proficiency in these tools, coupled with my adaptability and eagerness to learn, positions me as a valuable asset to the project team.

Thank you for considering my application, and I look forward to the opportunity to contribute to the success of the FLINT Forest Monitoring tool project at Moja Global.

### Project Understanding and Implementation Strategy: Crafting a Roadmap for FLINT Forest Monitoring Tool Development

#### Step 1: Study the Land Sector Datasets and Sketch Out a Data Workflow

1**. Data Collection and Integration**:

- Gather datasets related to land sectors, including administrative boundaries, soil resources, biodiversity hotspots, bioclimatic zones, agroecological zones, planted forests, and climate zones.

- Integrate these datasets into a comprehensive database for analysis.

2. **Identifying Small Squares of Forest Worldwide:**

- Utilize spatial analysis techniques to identify small squares of forest globally based on the provided datasets.

- Sketch out a workflow that intelligently filters and selects suitable forest squares using criteria such as forest cover percentage, biodiversity richness, and ecological significance.

#### Step 2: Develop Python-Based Tool for GCBM Configurations

1**. GCBM Configuration Generation**:

- Set up a Python development environment using tools like Anaconda or virtual environments.

- Choose appropriate Python libraries for data processing, such as pandas for data manipulation and geospatial analysis libraries like GeoPandas or Fiona for handling spatial data.

- Write code to preprocess input data, extract relevant information, and prepare it for GCBM configuration.

- Develop functions to generate GCBM configurations based on input parameters and data. This may involve parameterizing growth models, specifying initial conditions, and defining simulation settings.

2**. FLINT.Cloud Integration:**

- Interface the Python tool with FLINT.Cloud templates for dispatching simulations.

- Automate the process of initiating simulations for each configured GCBM setup.

#### Step 3: Integrate CI/CD-Based Workflow

1**. Continuous Integration and Continuous Deployment (CI/CD):**

- Implement CI/CD workflows to automate the deployment of generated results.

- Ensure seamless integration with remote MongoDB Atlas instance for storing simulation outputs.

2. **Rules-Based Projections:**

- Apply rules-based projections to refine simulation results, considering factors such as carbon release, decomposition rates, and climate variables.

- Automate the application of projection rules within the CI/CD pipeline.

#### Step 4: Documentation and Template Offering

1. **Documentation on Moja Global Platform:**

- Document the entire workflow, including data sources, methodologies, and implementation details, on the Moja Global documentation platform.

- Provide comprehensive guides and tutorials for users interested in replicating the process.

2. **Template Offering:**

- Offer a template for users to easily replicate the workflow for their own studies.

- Ensure the template includes instructions, code snippets, and configuration files necessary to set up a similar system.

#### Methodologies and Expected Outcomes:

- **Data Analysis**: Utilize various statistical methods, including linear regression, polynomial regression, and nonlinear regression, to analyze decomposition rates and their relationships with environmental factors.

- **Spatial Analysis**: Employ GIS techniques to identify forest squares and assess their ecological significance.

- **Modeling:** Parameterize GCBM simulations based on collected data and run them using FLINT.Cloud infrastructure.

- **Automation:** Implement automation throughout the workflow to streamline data processing, simulation setup, and result dissemination.

- **Documentation**: Thoroughly document each step of the process, including data sources, analysis methodologies, and implementation details, to facilitate reproducibility and knowledge sharing.

By following these steps and methodologies, the project aims to enhance understanding of forest dynamics and their impact on the global carbon balance while providing a scalable and reproducible framework for similar studies.

### TIMELINE

Here's a breakdown of the project steps over the course of 13 weeks:

**Weeks 1-2:**

- *Step 1: Study the Land Sector Datasets and Sketch Out a Data Workflow*

- Gather and review available land sector datasets.

- Sketch out a preliminary data workflow for identifying small forest squares globally.

- *Step 2.1: Design the Python Tool*

- Set up the Python development environment.

- Select and install necessary libraries for data processing.

**Weeks 3-4:**

- *Step 1: Study the Land Sector Datasets and Sketch Out a Data Workflow (Continued)*

- Refine the data workflow based on initial analysis and stakeholder input.

- *Step 2.1: Design the Python Tool (Continued)*

- Begin implementing data processing code to preprocess input data.

**Weeks 5-6:**

- *Step 1: Study the Land Sector Datasets and Sketch Out a Data Workflow (Continued)*

- Finalize the data workflow and prepare for data integration.

- *Step 2.1: Design the Python Tool (Continued)*

- Continue refining and expanding data processing code.

- Start developing functions for generating GCBM configurations.

**Weeks 7-8:**

- *Step 1: Study the Land Sector Datasets and Sketch Out a Data Workflow (Continued)*

- Integrate land sector datasets into a comprehensive database.

- *Step 2.1: Design the Python Tool (Continued)*

- Complete implementation of data processing code.

- Proceed with developing functions for generating GCBM configurations.

**Weeks 9-10:**

- *Step 2.2: Develop Integration with FLINT.Cloud Templates*

- Familiarize with FLINT.Cloud templates and infrastructure.

- Begin writing integration code to interface Python tool with FLINT.Cloud.

- *Step 3: Integrate CI/CD-Based Workflow*

- Plan and set up CI/CD workflows for automation.

**Weeks 11-12:**

- *Step 2.2: Develop Integration with FLINT.Cloud Templates (Continued*)

- Continue writing and testing integration code.

- *Step 3: Integrate CI/CD-Based Workflow (Continued*)

- Complete setup of CI/CD workflows.

- Test automation processes and refine as needed.

**Week 13:**

- *Step 3: Integrate CI/CD-Based Workflow (Continued*)

- Finalize CI/CD workflows and ensure seamless operation.

- *Step 4: Documentation and Template Offering*

- Begin documenting the entire project, including data sources, methodologies, and implementation details.

- *Project Wrap-Up*

- Conduct final testing and quality assurance.

- Prepare project documentation for public release.

This breakdown allocates time for development, testing, and documentation, ensuring that each phase of the project is completed within the 13-week timeframe. Adjustments may be necessary based on the complexity of individual tasks and mentor’s feedback throughout the process.