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Digital Tools for EUDR Compliance and Risk Benchmarking

INT-Skills-based internships/practical

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1. Introduction

This report is intended to describe the objectives accomplished during the internship timeline in the company GeoCitizen, starting on July 15th to September 9th, 2025.

The European Union Deforestation Regulation (EUDR) introduced new requirements and regulation starting in 2020 for companies and producers to ensure that commodities placed on the EU market are environmentally friendly, and specifically, free from deforestation and forest degradation. Smallholder farmers, who often have limited resources and technical capacity, currently face significant challenges in meeting these requirements.

GeoCitizen focuses its efforts on guiding the smallholder through a compliance workflow where they are be able to spatially locate their plot and obtain a EUDR self-assessment compliance along with additional added value for their area of interest. Thereby, the GeoCitizen platform benchmarks risk analysis platforms to evaluate their suitability, transparency, and consistency for farmer-level geolocation checks. Additionally, by integrating open-source tools such as WHISP and FarmVibes.AI, the project sought to bridge the gap between regulatory compliance and farmer-friendly digital solutions.

2. Objectives

1. Empower farmers with a digital self-check tool by developing the SELF-EUDR tool on the GeoCitizen platform to allow smallholder farmers to assess deforestation risk at their geolocations using WHISP and Earth Observation insights
2. Integrate and enhance risk analysis by incorporating additional data such as vegetation health and land cover change to provide richer, actionable insights for farmers
3. Benchmark deforestation risk platforms by designing a framework to evaluate and compare multiple risk analysis tools based on suitability, transparency, and consistency for smallholder use

3. Work Package Progress

Figure 1. Gannt Chart

WP1: Onboarding and Research

The internship began with a research phase, focused on gaining familiarity with the SELF-EUDR concept, the requirements of the EUDR for the smallholders, and the architecture of the GeoCitizen platform currently in operation. This was followed by a deep research of relevant tools which will subsequently be implemented in the app, in particular What Is in That Plot (WHISP), Segment Anything Model – Geospatial (SAM2GEO), Sentinel-2 Deep Resolution 3.0 (S2DR3), FarmVibes.AI, and Color33. Special attention was paid to data managing, especially for understanding their input and output formats, the data schema required to use the mentioned tools and their respective data dictionaries. This research provided the foundation for the later stages of development.

WP2: SELF-EUDR Tool Exploration and Prototype

The second phase was dedicated to exploring the tools and testing them in a real-world scenario. WHISP was explored through its four available pathways: the WHISP QGIS Plugin, the App, the Earthmap and the python package. For this purpose, sample polygon datasets and API queries were selected, providing risk classifications that could later be integrated into the SELF-EUDR prototype. SAM2GEO was examined with the purpose of enhance polygon shapes provided by the farmers, particularly to increase the quality of the geometry used for the assessment and the accuracy of the added value. S2DR3 was explored as an alternative to enhance quality on satellite images that may go offline afterwards on the app, considering that end users do not always have reliable internet access. The outcome of this phase was a functional blueprint of three customized tools that demonstrated the feasibility of offering smallholders a straightforward way to check their compliance status.

WP3: Risk Platform Benchmarking

The final work package focused on benchmarking deforestation risk analysis platforms. A representative set of polygons from known locations was defined, and automated queries were conducted through different WHISP pathways to identify the most suitable option for integration into the SELF-EUDR app. The outputs were collected and, where possible, compared against results from other available platforms. The benchmarking framework was structured around key criteria including accuracy, usability, transparency, and consistency. As part of the final deliverables for this work package, a GitHub repository was developed containing all notebooks explored and tested with real-world data, a customized WHISP dashboard implemented in JavaScript and hosted as a GitHub app, and comprehensive documentation. This exercise produced a comparative framework that highlighted both the strengths and limitations of the different platforms from a smallholder perspective and provided fully accessible resources to support further development and integration into the farmer-facing tool.

4. Results and Contributions

During the internship, functional tools were developed that will later enrich the SELF-EUDR tool, allowing smallholder farmers to submit geolocation data and obtain deforestation risk assessments using WHISP. Additional insights from Earth Observation data, such as vegetation health and land cover change, were explored to provide richer and more actionable analysis. Although their actual implementation in the SELF-EUDR tool was not completed, these enhancements were identified as future work items. In parallel, a benchmarking framework was created to evaluate multiple deforestation risk analysis platforms based on accuracy, usability, transparency, and consistency. A key deliverable of this work package was a comprehensive GitHub repository containing all notebooks explored and tested with real-world data, a customized WHISP dashboard developed in JavaScript and hosted as a GitHub app, and detailed documentation supporting both the SELF-EUDR tool and the benchmarking framework. These resources were developed as standalone outputs, providing reproducible analyses and demonstrations of the workflow. Collectively, the results advanced the accessibility and reliability of digital tools for smallholder compliance with the EU Deforestation Regulation and contributed to the long-term vision of empowering smallholder farmers with practical compliance tools.

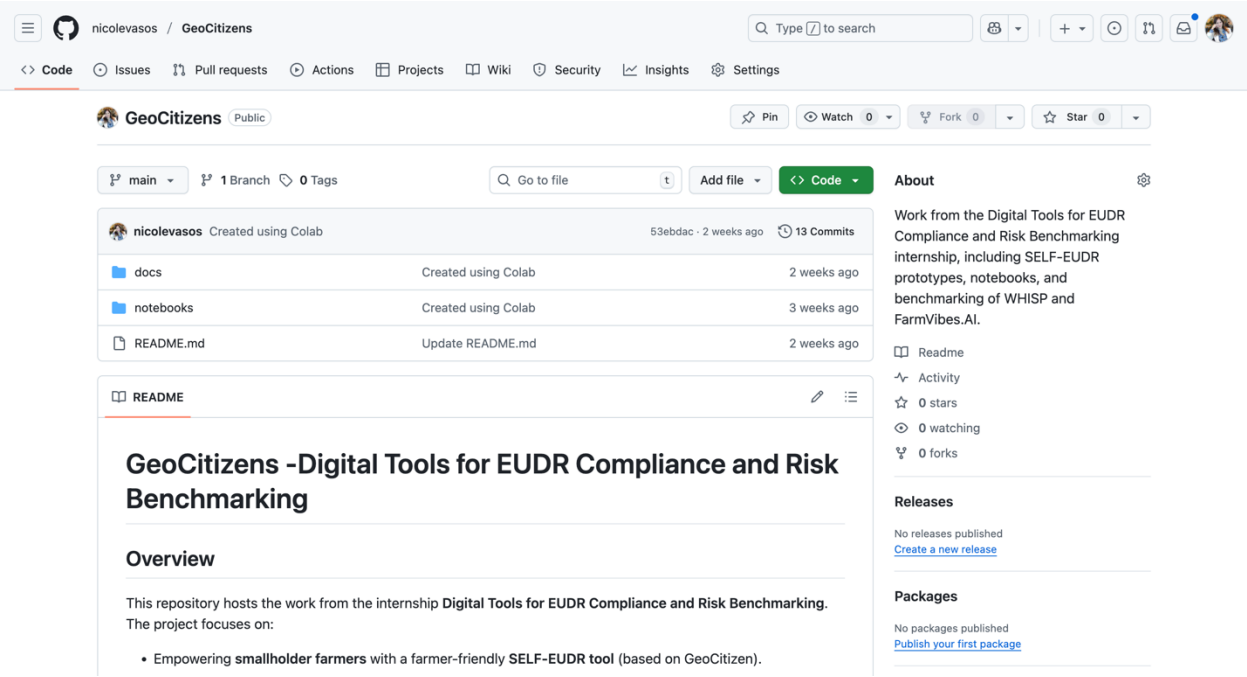

Figure 2. Overview of the GitHub repository containing SELF-EUDR prototypes, notebooks, and benchmarking tools.

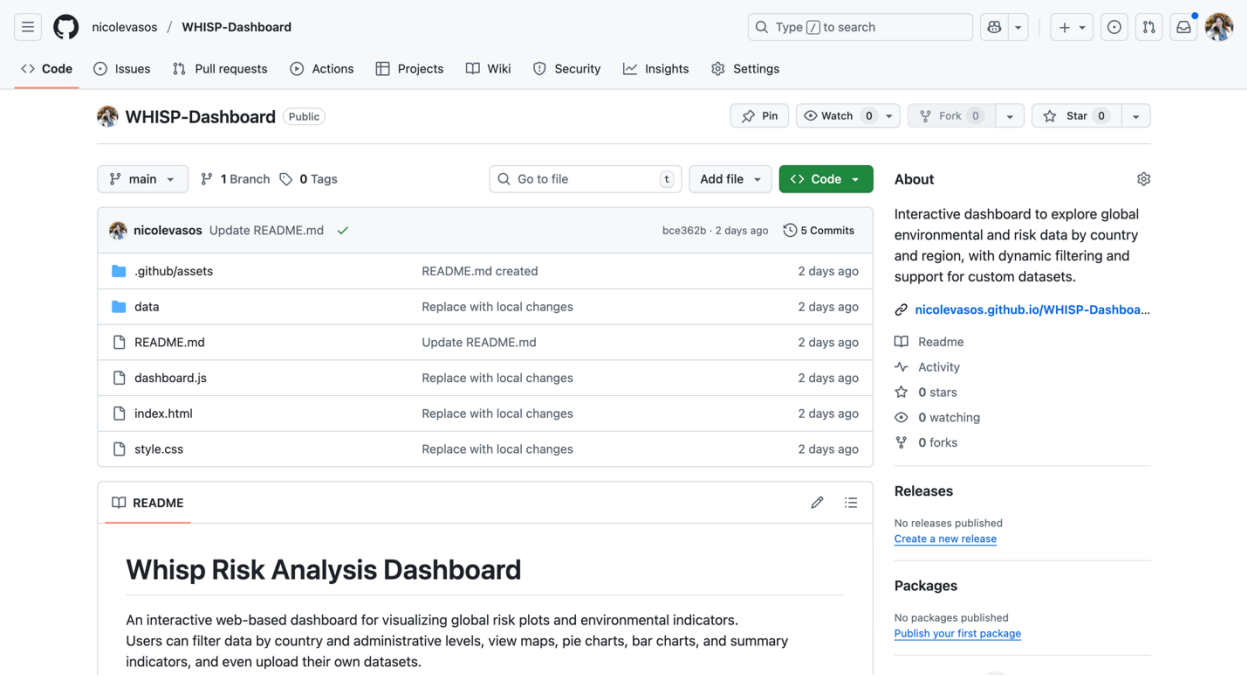

Figure 3. GitHub repository containing the interactive dashboard for visualizing global risk plots and environmental indicators

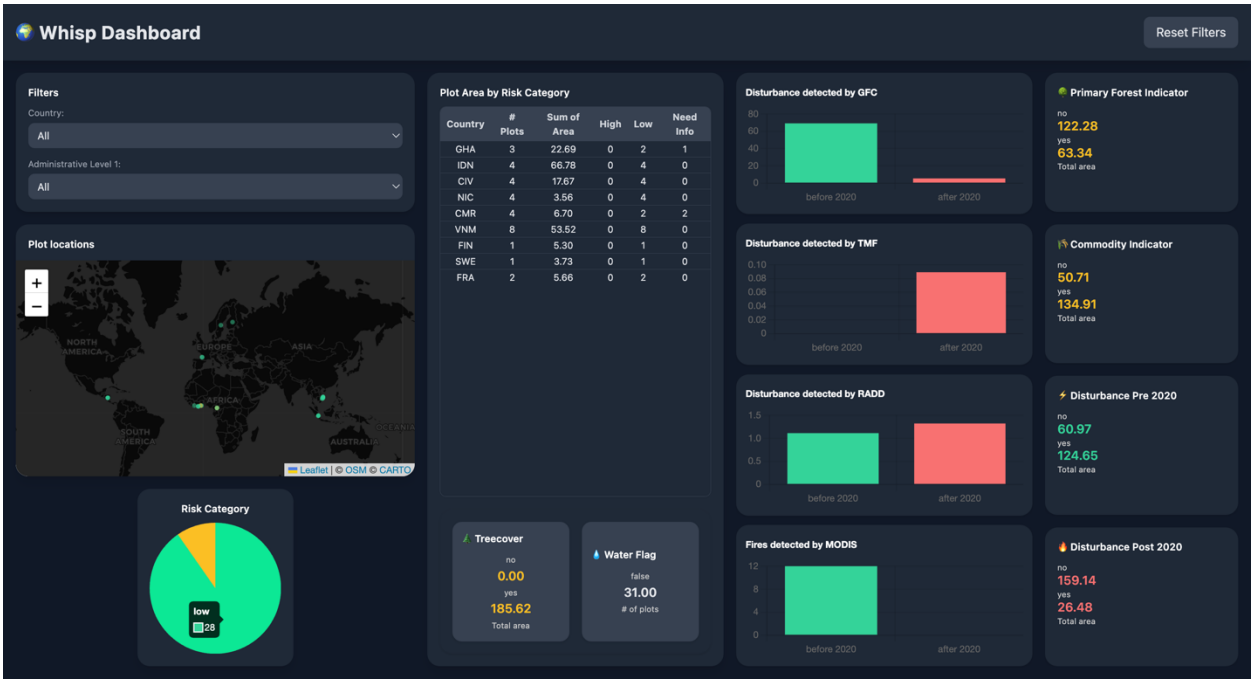

Figure 4. Screenshot of the interactive dashboard displaying global risk plots, environmental indicators, and visual analytics tools.

5. Challenges and Learnings

Several challenges were encountered throughout the internship. Limited or inconsistent API documentation required additional troubleshooting to properly explore WHISP and other tools. Standardizing polygon datasets across multiple platforms was necessary to ensure meaningful benchmarking results. Translating complex technical outputs into simple and actionable insights for smallholders also proved challenging, highlighting the importance of user-centered design. Despite these obstacles, the internship provided valuable learnings, including the significance of developing reproducible workflows and comprehensive documentation. The creation of standalone resources such as the GitHub repository and the customized WHISP dashboard demonstrated that transparency and accessibility are essential for enabling further development and practical application by non-technical users.

6. Conclusion

The internship demonstrated the potential of digital tools to support smallholder farmers in complying with the EU Deforestation Regulation. By developing functional tools, exploring Earth Observation insights, and creating a benchmarking framework, the work provided both practical solutions and methodological insights. The GitHub repository, customized WHISP dashboard, and documentation were delivered as standalone resources, offering reproducible demonstrations of the workflow. Although integration with the SELF-EUDR tool was not completed, the outputs establish a solid foundation for future development and adoption. Overall, the experience emphasized the importance of combining geospatial analysis, regulatory frameworks, and user-centered design to empower smallholders and promote sustainable land management practices.

7. Future Work

Future work will focus on integrating the functional tools and EO enhancements into the SELF-EUDR platform, enabling real-time deforestation risk self-assessments for farmers. Further benchmarking could expand to include additional risk analysis platforms and datasets to enhance reliability and accuracy. User-centered testing with smallholder farmers will be critical to refine the interface, improve usability, and ensure that outputs are actionable. Continued development and iteration on the GitHub repository and the customized WHISP dashboard will support reproducibility, transparency, and potential adoption in wider contexts, fully aligning with the long-term vision of empowering smallholders with practical compliance tools.

8. References

- **GeoCitizen GitHub Repo:** https://github.com/nicolevasos/GeoCitizen
- **WHIP Dashboard – GeoCitizen version:** https://github.com/nicolevasos/WHISP-Dashboard
- **WHISP:** https://github.com/forestdatapartnership/whisp
- **FarmVibes.AI:** https://github.com/microsoft/farmvibes-ai
- **OpenForis:** https://openforis.org/
- **WHISP Dashboards:** https://github.com/forestdatapartnership/whisp-dashboards