



## **ENSE 805 Project report-out & lessons learned**

### **Project: Deforestation Data Platform**

#### **Team Members:**

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#### **Project Sponsor & Course Facilitator:**

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#### **Business Need/Opportunity:**

Deforestation is an increasing problem that has impacts on the environment, economy, and society. We do have tons of information about deforestation, but it is not necessarily accessible and interpretable by non-technical people, such as students or the public. Existing technologies, such as GIS, are very powerful but still need special training, so they are hard to use for many people.

The Deforestation Data Platform addresses this challenge. It utilizes Power BI to build an interactive dashboard that presents deforestation data in a user-friendly way. The platform consolidates data from different sources, including Global Forest Watch, into a repository where users can interact with deforestation trends, drivers, and effects. The website serves bridge to advanced environmental information and those who need it most. By consolidating the information and making it available in an interactive format, the website offers a tool for students, teachers, and anyone wanting to know more about deforestation. It presents an easier-to-use alternative to conventional GIS-based websites, which are less user-friendly for general users.

This app is designed to help with environmental education and awareness. It is a means by which people can interact with deforestation information, discover its causes, and visualize the actual effect. The site is more than a deforestation tracking application—it is an educational, teaching, and inspirational resource to save our forests.

This project answers the call for interactive and accessible environmental data, allowing users to understand complex issues in a meaningful and uncomplicated way.

## Reflections on Project Planning

### UN SDG(s) Selected and Why

The main UN SDGs selected for this project are **SDG 13: Climate Action** and **SDG 15: Life on Land**.



- **SDG 13** revolves around climate change and its effects. As one of the direct reasons for climate change is deforestation due to the carbon dioxide emitted from the disappeared trees, it is directly related to the project objective of avoiding deforestation and its effect on the environment.
- **SDG 15** is dedicated to the conservation, restoration, and sustainable use of terrestrial ecosystems. As forests are a crucial component of ecosystems, this goal directly pertains to deforestation monitoring and education, and therefore creates awareness for forest conservation.
- We have chosen these SDGs because one of the core drivers of climate change and biodiversity loss is deforestation, and our platform will make users aware of these issues to bring about actions that can be utilized to save forests and prevent their destruction.

### Community Research and Requirements Gathering

- Our community research focused on understanding the needs of our primary target audience: **middle school students** and **the public**. We needed to make sure that our site would be beneficial and helpful to these users.
- Key findings from our research include:

The majority of students and the public do not have the background to decipher sophisticated environmental information. Current systems, such as GIS tools, although comprehensive, are too



technical for their use and everyday application. Students, teachers, and the public are more and more interested in learning about environmental problems, yet current tools do not offer the interaction and accessibility required. An interactive website that breaks down complicated deforestation data would bridge the gap, making trends, causes, and impacts of deforestation more accessible to the users.

The inventory of technology setup showed that the tools such as Power BI were perfect to develop a platform that was capable of managing big datasets, representing real-time data, and interactively engaging the users—a central element to bring deforestation data to non-experts.

### **Professional Opinion on Project Planning Processes and Documentation**

- The planning processes and documentation provided in the course were helpful in providing a structured approach to the project. The steps allowed us to define key aspects such as:
  - The SDGs we would focus on, ensuring alignment with global environmental goals.
  - Insights into the needs of students and the public, which guided the platform's development.
  - Selection of appropriate tools like Power BI, ensuring that the platform would meet the accessibility and interactivity needs of our target users.

### **Assumptions Made and Constraints Uncovered:**

#### **Assumptions:**

- We assumed that middle school students and the public would benefit from an interactive platform that simplifies complex deforestation data.
- We assumed that Power BI would be intuitive enough for non-experts to interact with and that it could handle large, complex datasets from sources like Global Forest Watch.
- We assumed the data from GFW would remain regularly updated and accurate enough to present real-time deforestation trends.



### Constraints:

- The datasets provided by Global Forest Watch are rich but require significant transformation and cleaning to make them user-friendly.
- Though Power BI is easily available, to realize its true potential, one needs to understand features such as slicers, drill-through, and filtering, which may prove difficult for mere non-professionals to utilize fully without proper guidance.
- The platform had to manage large data sets well without hindering performance, and so the Power BI model had to be optimized to deliver a seamless user experience.

### Technology Stack Selection

- **Initial Technology Stack:**
  - **Power BI** was selected for dynamic visualizations and ease of use, making it ideal for non-experts.
  - **Excel** and **Power Query** were used for data cleaning and transformation.
  - Publicly available deforestation datasets from **Global Forest Watch (GFW)** and **FAO** were chosen for reliable, up-to-date data.
- **Evolution of Technology Stack:**
  - As the project progressed, we integrated **DAX** for custom calculations and improved data aggregation.
  - Adjusted the data model to better integrate multiple datasets, enhancing filtering and platform responsiveness.
  - Added advanced features like slicers and drill-through for deeper user engagement.

### Drafted Prototypes and Minimum Viable Products (MVPs)

- **Prototypes:**

Initial prototypes revealed basic charts and trends to test layout and presentation strategy. Feedback required adding interactivity features like filters, tooltips, and drill-through.

- **Minimum Viable Product (MVP):**

The MVP emphasized the main facts regarding tree cover loss, deforestation drivers, and country comparisons. The users could filter by regions and time periods in order to analyze the data.

- **Evolution of MVP:**

Rich with interactive features such as tooltips and information cards for presenting additional context. More interactivity, allowing filtering by multiple attributes and showing more detailed information. Simplified the interface for easier navigation.

## Reflections on Project Results

### What We Created

Deforestation Data Platform is an interactive Power BI-powered dashboard that consolidates deforestation data from reputable sources like Global Forest Watch (GFW) and FAO. It is designed to simplify challenging environmental data to make it available to all, including students, so they and the public can easily navigate deforestation trends, the causes and effects. Key highlights of the platform are interactive maps, filters, and dynamic visualizations enabling the users to assess data on global tree cover loss, drivers of deforestation, and regional comparison.

Key images/screenshots illustrating the core functionality:

- **Main Dashboard:** Displaying global deforestation trends with interactive maps and charts for tree cover loss over time.





## The Reality of Our Forests

Forests cover **31% of Earth**, but we're **losing them faster** than ever! *What's causing this?* Tap below to explore some Facts!



"Now that you know forests are disappearing, what do you want to learn next?  
Click below to explore the facts!"



See Where Deforestation is  
Happening



What Causes Deforestation?

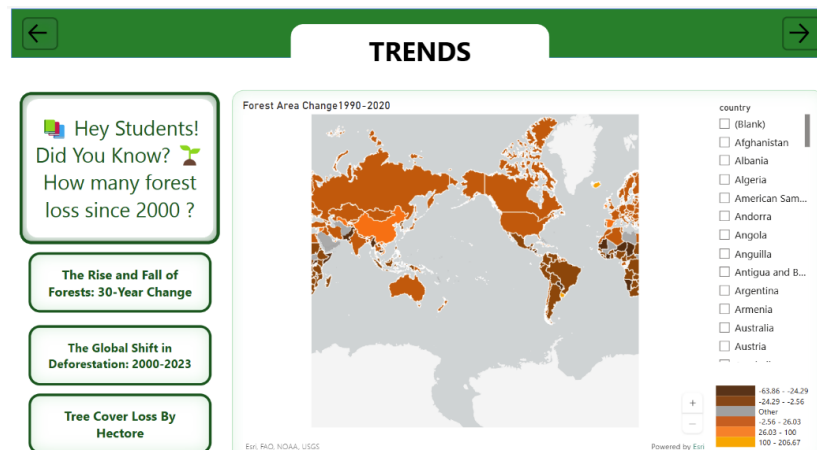
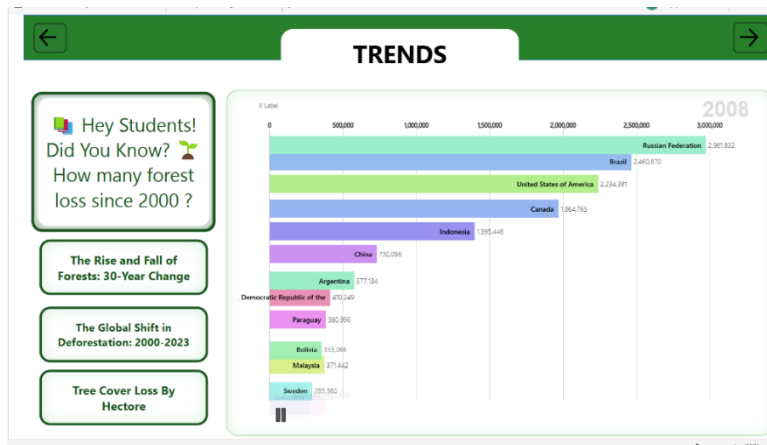


Can We save Our Forest?

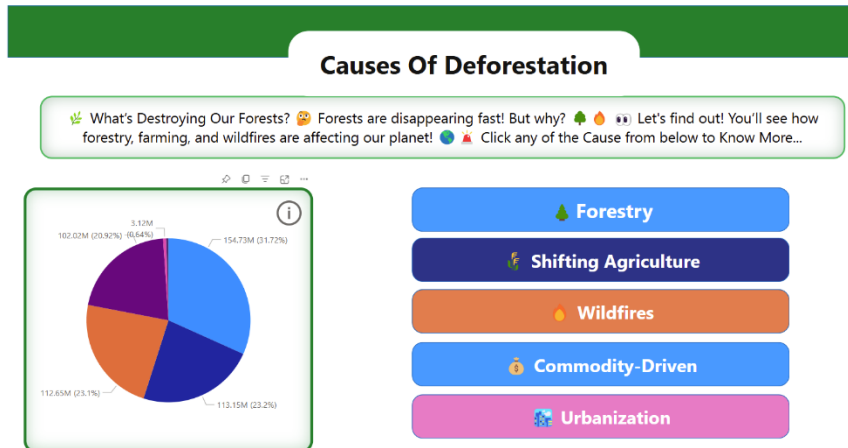


Learn More About Trees

- **Regional Comparison Tool:** Interactive map allowing users to compare deforestation trends across different regions.



- **Deforestation Drivers:** Visual representation of causes such as logging, agriculture, and urbanization, with data filters for deeper insights.



## Review of the Initial “Planning and Initialization” Video

In the initial video, we explained our vision for a platform to simplify complex deforestation data in a way that is easily comprehensible and accessible to all stakeholders, including the public and students. We envisioned creating an easy-to-use tool for studying global deforestation patterns, using real-time interactive capabilities that would allow users to examine the data in the instant.

First, we envisioned a very simple tool with static charts, but as we progressed, we realized how important interactivity would be to drive engagement. Including filters, slicers, and drill-through functionality was an enhancement that added depth to the platform, getting us closer to what we envisioned in the first place—a more interactive and immersive experience.

## Software Design Activities and Findings

The design for the platform was dictated mainly by interaction and accessibility, which were central to our goals. Our initial design was simplicity-oriented and clarity-based to make sure that the information presented itself in a self-explanatory fashion. Moving forward, the primary considerations in our design were:

- **User Interface (UI):** We wanted to have a minimalistic, simple design to avoid overwhelming the users with too much information at a single instance. The interface was designed with multiple sections, each addressing a different aspect of deforestation, e.g., trends, causes, and solutions.
- **Data Interactivity:** In the process of shifting from static charts to more interactive ones, we realized the importance of allowing users to interact with data. This necessitated the addition of interactive features such as slicers by region and time, and drill-through to evaluate more specific insights.
- **Data Model:** There were several datasets that were brought in, and this was a key aspect of focus. We had to ensure the data model would support flexible filtering and data consistency across regions and time periods. This encompassed careful handling of large data sets and relying on Power Query for data transformation and cleansing.

These design ideas were directly linked to the lectures in class regarding user-centered design, data visualization principles, and the need for interactivity in learning platforms. User feedback throughout the development process helped us further develop the design so that the platform was not only useful but also interactive.

## Project Experience

- **What Went Well:**
  - **Interactive Features:** The most successful aspect of the project was possibly the addition of interactive features. The ability to filter data, drill down to single insights, and compare regions enhanced the usability of the system considerably.





- **Usability Testing:** Testing with our target population (students and the public) guided areas of improvement for us. The ease of use and clarity feedback on the platform was positive, and our design choices were validated.
- **Data Integration:** Having successfully merged several datasets and ensuring that they interacted well together was a huge milestone. The platform now offers users a clear overview of deforestation patterns worldwide, and thus it is an invaluable resource for environmental education.
- **What Didn't Go Well:**
  - **Performance Issues:** Initially, performance was a challenge due to the large volume of data. The platform was slow to load, especially when users applied multiple filters at once. This issue was addressed by optimizing the data model and applying aggregations to the datasets.
  - **User Understanding:** While the platform was designed to be user-friendly, more effort could have been made to simplify the explanations and provide more educational context within the platform.
- **What Would We Do the Same in Future Projects?**
  - **Iterative Testing:** The iterative process of developing the platform, gathering user feedback, and making improvements was invaluable. In future projects, we would continue this approach to ensure that the final product meets user needs.
  - **Focus on Usability:** The emphasis on creating an easy-to-use, accessible platform for non-experts worked well. In future projects, we would maintain this focus, ensuring that the technology does not overwhelm the user.
- **What Would We Do Differently in Future Projects?**
  - **Enhanced Educational Content:** In hindsight, we could have included more educational content within the platform, such as brief explanations of key terms, deforestation impacts, and solutions. This would have helped users, especially students, better understand the context of the data.



- **Scalability:** For future projects, we would focus on making the platform more scalable, ensuring that it can handle larger datasets and provide more real-time data. We would also look at integrating predictive analytics or machine learning to offer forecasts on deforestation trends.

## Opportunities and Design Ideas for Future Work

Looking ahead, there are several opportunities for enhancing the platform:

- **More Interactive Features:** We could incorporate more interactive elements, such as games or quizzes, to further engage students. These features could test their knowledge of deforestation, its causes, and its impact, helping to reinforce the educational aspect of the platform.
- **Integration of Predictive Analytics:** Integrating machine learning models to predict future deforestation trends could make the platform more valuable for researchers and policymakers.
- **Mobile Optimization:** Given the increasing use of mobile devices, optimizing the platform for mobile users would expand its reach and usability.
- **Expanded Data Sources:** Adding more datasets on forest conservation efforts, reforestation projects, and deforestation mitigation strategies would provide users with a more holistic view of the issue.

## General Reflections on the Class & Project Experience

### **Before Taking ENSE 805, Were You Aware of the UN SDGs?**

We were not aware of the United Nations Sustainable Development Goals (SDGs) before this course. Although we had some idea about the universal problems like climate change, poverty, and education, we never studied these issues in the framework of SDGs. Throughout this course, we have acquired knowledge of how the SDGs are an essential framework for addressing global challenges and how engineers play a fundamental role in making these goals happen with the



technology they engineer. This has helped us to see how our engineering can create a more sustainable and equitable world.

**Typically, Before Taking This Class, When You Engineered Software Solutions, Were You Concerned with Areas Encompassing the UN SDGs?**

We didn't really consider the SDGs when we were developing software solutions before this class. We were more worried about technicalities, such as meeting deadlines, creating functional systems, and ensuring that the software was meeting the client's requirements. We had a sense of ethical standards, but we weren't thinking about how our work could contribute directly to global problems like climate action or education. But going back to reflect on some of our past projects, we can identify that they would have had indirect connections to the SDGs:

- **Example:** Another project we worked on involved creating an educational app, which aligned with **SDG 4 (Quality Education)**, as it aimed to improve learning outcomes.

While we didn't focus on the SDGs explicitly, our projects could have contributed to these goals in meaningful ways.

**Did Learning About the UN SDGs Help You Understand Better Your Role and Responsibility as Engineers to Society?**

Yes, studying the SDGs has totally changed the way we think about our function as engineers. We used to think that our function is more of resolving technical problems and serving the needs of the clients. But now we are aware that engineering can serve society in much wider contexts. Engineers can help tackle the global challenges of the world by developing technology not only to solve the technical problems but also for social, environmental, and economic sustainability.

For instance, when looking at the Deforestation Data Platform, we know that it directly affects SDG 15 (Life on Land) immediately. By sending deforestation information to students and the general population, the platform is assisting with raising environmental awareness and taking measures. This became apparent and brought us to pay closer attention to the wider implications of what we are doing because we plan on continuing to employ engineering solutions for such global problems.



**What Was Your Experience in Engineering Your Specific Software Solution to Address the UN SDG(s) Selected?**

Development of the Deforestation Data Platform project was an eye-opener since it provided a doorway to directly address one of the SDGs—SDG 15 (Life on Land)—through our software. Our platform gathers and presents deforestation data in a form that is easily accessible to middle school students and the public alike, raising awareness of deforestation and making informed choices.

This project also gave us an experiential learning about how software can be designed to educate and involve users on pressing global topics. It reaffirmed the fact that engineers don't just have to work on technical projects but also consider the bigger picture their work can do. By creating a tool that facilitates easier interpretation of complicated environmental data, we assisted in bringing about environmental literacy and allowing users to act against forest destruction.

**What Was Your Experience in Engineering Your Specific Software Solution to Address the UN SDG(s) Selected?**

Developing the Deforestation Data Platform was a fulfilling and educational process. We began by simplifying complex deforestation data, which immediately helped contribute to SDG 15 (Life on Land). Along the way, we needed to think about how to best represent the data and how to make it easily accessible and understandable to a non-expert audience, namely high school students. This mindset inspired us to simplify and display the information in interactive visualization that would both captivate and engage users in their learning.

- The challenge was ensuring that the software was both functional and engaging.
- We had to focus on clarity in communication and the importance of social impact in software development.

**As a Future Engineer, What Are Your Thoughts on the UN SDGs as a Whole? Do You Think They Can Help or Hinder Our Work as Software Engineers?**

As future engineers, we discover that the UN SDGs provide a helpful guide to inform our work. They make our projects relevant to global ambitions and ensure that they are tackling key issues. Far from limiting our work, the SDGs provide a clear indication of areas where technology can have an impact



that is meaningful and lasting. For our project, SDG 15 (Life on Land), the SDGs helped us concentrate our efforts on a project that addresses a real-world issue, which is deforestation.

Far from being restrictive, the SDGs help us keep our feet on the ground on what matters and push us to innovate in a way that can be helpful to society and the environment.

### **Should We Use the UN SDGs to Guide Our Work or Is Our Work Dependent on Customer Requests, Regardless of the UN SDGs?**

Even though the customers' demands are applicable, we believe that the UN SDGs have to have a significant bearing on our work as engineers. Software solutions in most cases, especially in the environmental sector, could be mapped into the SDGs even if the customer has not demanded it specifically. Having alignment with the SDGs ensures we address bigger society and environmental problems and create products that give back.

The SDGs provide a handy reference to ensure that projects remain relevant to global issues, including climate change and deforestation. With the SDGs in mind, we can steer our projects in a direction that solves real-world problems and meets customers' satisfaction.

### **Will You Use Your Understanding of the UN SDGs in Engineering Solutions in the Future?**

Yes, we will apply our knowledge of the UN SDGs in engineering solutions in the future. This project has shown us the potential for software solutions to be genuinely meaningful when coupled with global goals. As engineers, we are fortunate and obligated to create tools that can be part of positive environmental, social, and economic impacts. Moving forward, we will bear the SDGs in mind while conceptualizing and creating our projects so that our solutions have a broader, beneficial impact. Whether addressing climate change, education, or other global challenges, the SDGs will be a key reference in guiding our work.

### **Will Your Experience Learning About the UN SDGs Inform Your Career Path Decisions in the Future?**

Yes, this experience has influenced our career path options. Before taking this course, we were largely interested in the technical aspects of software development. But through studying the SDGs, we are now conscious of how engineers can be part of addressing global problems.



Now we are coming to realize the need to combine technical expertise and a socially responsible approach. In the immediate future, we will seek challenges in which we apply our engineering expertise to deliver work that aligns with the SDGs and contributes to driving a positive change for society.

**Provide Any Other Comments on the Project**

This project has been a great experience that has enlightened us a lot on the possibility of technology being used to solve global issues. It has been an education to learn that engineering is not all about coming up with functional software; it's all about thinking of the larger good our efforts bring to society and the world.

- The Deforestation Data Platform has deepened our understanding of how technology can be applied to address critical issues such as environmental conservation.
- This project has inspired us to continue exploring solutions that can make a tangible impact on the world, aligning with the SDGs.