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Final document

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Web Application Development

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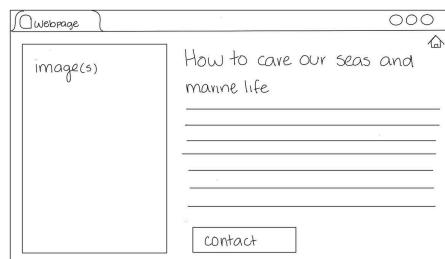
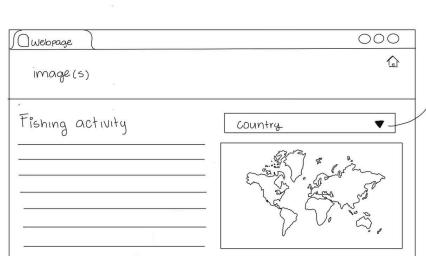
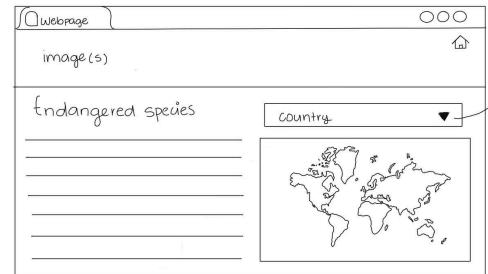
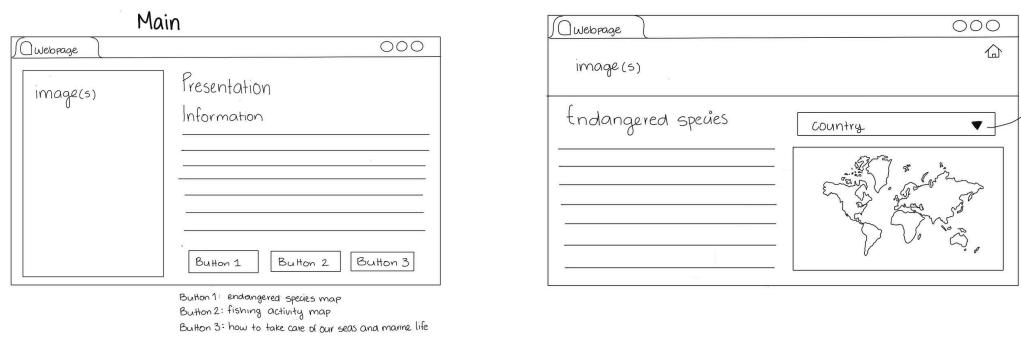
The oceans are part of more than the third part of the Earth surface and are essential for our survival: regulate climate, produce oxygen, absorb carbon dioxide and are home to an extraordinary biodiversity. Despite its ecological, social and economic relevance, it is being affected by human activities such as illegal fishing and lack of sustainable practices. The main problem is the lack of awareness and education about how our actions impact these ecosystems.

Catch the change is a website that integrates technology, community and education to directly contribute to Goal 14 of the 2030 Agenda, focused on protecting life below water. It was created with the mission of reducing the illegal fishing and the extinction of marine species in Mexico by spreading updated information about fishing practices. The goal is to demonstrate that every person, even if they are not an important figure, can be part of the change.

The development of this project was challenging. It involved learning new technologies, working as a team and understanding everything to achieve the quality of work we have now. However, those things allowed us to improve the structure phase by phase and to enhance our development abilities. The development of this project was divided into three phases described below.

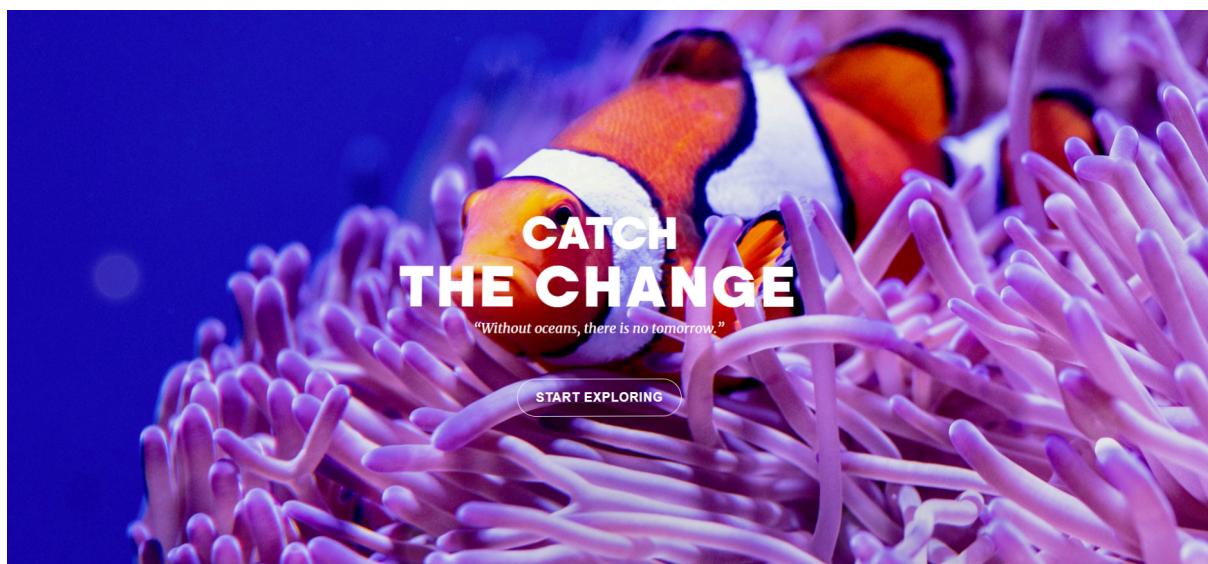
1. Project proposal

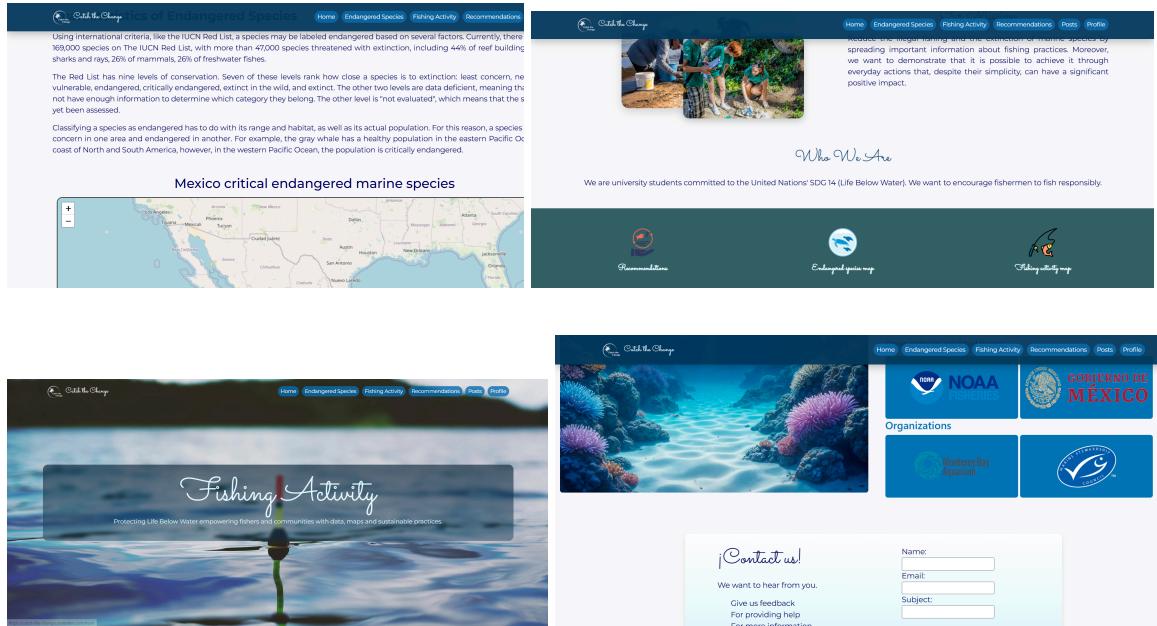
The project initially began with the core structure necessary to communicate key information about marine pollution and its environmental consequences. There would be a map that displayed endangered species information and its location and another one to show information about economic zones. There would be a main page to explain information about us and the cause, a section of the endangered species with information about that and its corresponding map, a section about fishing activities with information and the economic zone map, and a section to share recommendations for being responsible fishers with a Contact form. The sketches delivered were:



2. Project prototype

We started the project by defining its structure with html, js and css. We realized that it needed to have more information so we decided to display it downwards instead of placing it to the left of the maps. Also, we added a landing page to have a better presentation of the project.





Note: We don't have exact references for that phase; this is just an approximation. It already had a defined style and a landing page, but the functional map wasn't ready yet.

During this phase, we faced challenges with the code working correctly. At first, everyone encountered issues while doing their part, but we were able to solve them by debugging and consulting class presentations, internet information and AI resources. Then, we had problems joining everyone's part into only one project. We used a Github repository to work at the same time, but we didn't know how to use a collaborative repository, so Eduardo explained to Aemi, Jetzuvely and I how to do it and we managed to bring the maps and recommendations sections together. We still had problems with uploading the main page but Eduardo was able to gather the files through another means and then uploaded them to our repo's website. Finally, when we had everything in one project, the webpage stopped working correctly, so we debugged the code and figured out that the problem was in the links. When we wrote them correctly, the webpage started to work again and we achieved the second deliverable.

3. Project beta version

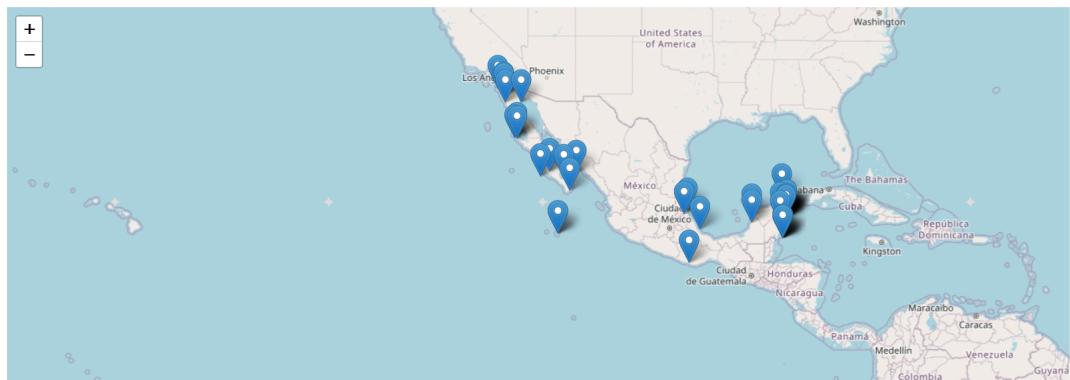
In this phase we added the functionality to our website and solved some problems about responsiveness. We used node and express to obtain data from an API and display it into both maps. We had to investigate technologies to display the maps and send an email to us with the contact information that the user wanted to send to us. Due to our inexperience on APIs, maps and sending automatic emails, this was the most challenging part. We had several problems that we had to solve.

On one hand, regarding the map. We discovered that the best tool for making interactive maps was Leaflet, but we had to ask someone that knew about the topic so that he can explain to us the process, understand better and continue with the workflow correctly. However, when trying to implement the API that we wanted to use since the beginning for the endangered

species, we realized that the information was very disorganized, which made things more difficult to display the information into the map. So we decided to reduce our panorama to only endangered species in Mexico and to solve problems about locating the species into the view, we used AI tools to efficiently locate the geographic coordinates for each species. Finally, we had problems integrating the functional map into the webpage that we already had. The page wasn't rendering properly and it was difficult to identify the source of the problem. We discovered that it was caused by inconsistent file naming (uppercase vs. lowercase), so the solution was to change the capitalization in the EJS filenames.

On the other hand, we also experienced some problems with the contact form. We found that it was possible to send an email to us with the things that the user wanted to say, but it was not secure. We had to allow the algorithm to get into our mails and we thought that exposing our personal information was not the best option. That's why we decided to use a fake SPTM that is used for testing purposes. However, when we uploaded the changes into the public website, the modal that told the user that the message was sent correctly wasn't showing, and it was difficult to find the solution because in localhost it was working ok, but we discovered that the problem was not the program, but the SPTM, which was interfering with the functionality, so for this delivery we the info that the user sends to us was only saved into a json.

Mexico critical endangered marine species



4. Final Version

As the website grew and progressed, we identified opportunities to expand the communication strategy and strengthen the emotional and informative connection with users. This led to the implementation of a blog-style section for publishing comments and environmental updates. The addition of this blog space became a crucial evolution of the platform, transforming the site from a static informational page into a more dynamic and interactive environment where visitors can explore reflections, updates, and actionable practices.

We added a new section named "Community Post" where you could log in with Google authentication and edit your profile to see posts from others and create, delete and edit your own posts. This was achieved by the connection with the database on Mongo Atlas for the

creation of posts, And also using google oauth to authenticate the users. We had problems such as the connection with the database, creation of profiles and the ability to edit data and the profile picture. To resolve these issues an addition to the backend APIs was added and connected via the url of the mongo database, and the Google ID client.

We improved the functionality, design and code of our program. We connected the API information to a database, which wasn't so difficult, but we had to see how to integrate it to the code that we already had; we added a loading advice when the data is being displayed in the map, since it was taking too much time. Also, we migrated our project to react, but the pop ups stopped working after the migration, we found out that the CSS wasn't being imported correctly and that there were syntax problems in the code, so we added a necessary L from Leaflet to the functions. Finally, we fixed the contact form: the main problem was to find the best tool to send the mail, but we solved it by implementing [email.js](#), a server that creates an API from your email and sends a mail to the user to tell them that the contact form has been received from us, and the information is saved in our database for us to read later.

On the other hand, when we deployed our project to production on Render, we encountered several unexpected issues. One of the main problems was the separation between the service and the client, since the local concurrent setup we used in development does not work in a production environment. On Render, we had to configure two separate services: a Web Service for the backend and a Static Web Service for the frontend. Additionally, for the

frontend we needed to generate a production build using `npm run build`, and then deploy it using the command `serve -s build`, instead of the local `npm start` script. Finally, we also had to ensure that our package.json properly included the required build and start scripts so that both services could run correctly in the production environment.

This project proved that technology can be a powerful tool for social and environmental transformation and the development process strengthened teamwork, communication, creativity, and problem-solving skills, and demonstrated the importance of persistence and innovation in digital design projects. Here is a reflection from each member of the team.

Eduardo

First of all, I want to thank my team for all the development we accomplished together. Without their support, it would not have been possible to achieve such a complete and professional project. The combination of talents, skills, and above all, the effort and dedication they put in was incredible. I am truly very happy with the progress we made and the way our team worked.

Throughout the development of Catch the Change, I gained invaluable experience in building a full-stack web application that integrates multiple complex technologies and serves a meaningful environmental purpose. This project deepened my proficiency with React for frontend development, Node.js and Express for backend architecture, and MongoDB for database management, while also introducing me to advanced features such as Google OAuth authentication and interactive mapping with Leaflet. I am particularly proud of successfully implementing a secure user authentication system that allows users to create personalized profiles and engage with the platform through a dynamic commenting system, as well as developing interactive maps that visualize endangered species and fishing activity data across Mexico. The integration of these features required me to navigate challenging technical obstacles, including managing state across components, establishing secure API connections, and ensuring seamless communication between the frontend and backend, all of which significantly enhanced my understanding of modern web development practices and reinforced my ability to create applications that combine technical sophistication with environmental awareness and user engagement.

Andrea

For me, this project was very challenging. I had never worked with web development before, so creating something so complete by the end of the semester was difficult. Definitely, this was a project that wouldn't have been possible without my teammates. In the initial stages, I helped with the recommendation interface, and the most difficult part was to make it consistent with the agreed style because I find it difficult to modify things that already have some structure. After that, I fixed some details in the responsiveness and design of the webpage such as the ability of changing size in different devices, and the location of some elements that were displayed. It was interesting to solve because I had to fix sections I didn't develop so I had to look into other people's code to understand it and modify only the parts that were necessary because I didn't want to edit something that broke the program.

In the other phases, I helped with the implementation of the endangered species map, which allowed me to understand new technologies to create interactive maps and to understand the limitations like the need of paying to use it. The truth is that I learned a lot, especially about how to customize the map: adding layers, pop ups, visualization limits, etc. But also about the backend, I was in charge of the first try of sending an email to us with the message from the user that came from the contact form. That was the part that I enjoyed the most because I learned about the sending email process and all the tools that exist to send automatic mails. Also, it was frustrating that the testing part didn't work because we had to change all my work. However, I know that this is part of this type of project and was only for improvement of the project, plus I learned something new.

For the last part, I helped to make the log in section frontend so that it looked visually attractive and consistent to other parts of the work. I also helped to connect the contact form data to MongoDB so that the message that the user sends to us were saved into our database. Also, I added our contact information and fixed some final design details too. Finally, I gave structure to our repo, final document and dev-log of the project. This part was not so challenging, but I had to be meticulous to fix even the smallest design detail and to identify every final detail that was missing to fix it for the final delivery. It was interesting to make a recap of all the work we have done because in that way I could realize that, although it was challenging, it was a great experience that resulted in a complete web application.

Aemi

This project was extremely challenging, but I am genuinely proud of the final result we achieved as a team. At the beginning, we agreed on the overall design of our website, and I was responsible for the Endangered Species page. First, I researched reliable sources to write a brief introduction for that section. Then, I investigated how to create an interactive map for the page; I used *Leaflet*. Our original idea was to display a world map with all endangered species and add filters by country. However, after searching for APIs that contained this information, I ran into several issues. Unfortunately, there are far too many endangered marine species, and loading the entire dataset made the API extremely slow. I discussed this with my team, and we decided to limit the map to species found in Mexico. Still, there were too many species, so I ultimately filtered the data to include only those that are critically endangered.

After that, I implemented the page in EJS and integrated it with the rest of the code, which was quite difficult at the time, but I managed to get it working. Later on, I migrated all the existing code to React. This part was especially challenging for me because I did not fully understand React during class, but by researching, reading documentation, and asking my dad for help, I was able to successfully rewrite the project in React. I then transferred all the API data to my MongoDB database; my dad helped explain how the backend and data worked, and thanks to his explanation, I was able to store the information correctly and ensure that the pop-ups on the endangered species map and the fishing activity areas were loaded properly.

I also worked on the Contact Us form. I researched an easy way for users to receive a confirmation email, and I found *EmailJS*. After reading the documentation, implementing it into our code was straightforward, and I felt very proud of that contribution. Finally I fixed the code so the entire project could run smoothly on Render and be deployed live. There were several issues during this process as well, but by reading documentation and learning from solutions shared by others, I was able to resolve them.

Overall, I am proud of everything I accomplished and of the teamwork that went into this project. The final result clearly reflects all the effort we put in.

Jetzuvely

Honestly, this project taught me what it really means to work as a team. I learned to value the strengths and abilities of each one of my teammates, and I'm genuinely proud of how we supported each other. For me, the hardest part was giving functionality to everything, especially working with APIs and trying to build the posts page. It felt like creating another mini website from scratch. Adding things like Google login was overwhelming, and I'm not going to lie, I did feel frustrated at some moments. It was heavy and stressful, but also a huge learning experience. What I enjoyed the most was the design part. That's where I felt more confident and where I think I stood out the most. I also really connected with the project's theme, understanding the real damage we do to the ocean changed the way I see things. Our phrase "*Without oceans, there is no tomorrow*" means a lot to me, and I chose it because I truly believe in it. Honestly, my team was incredible. They're talented, responsible, and they work super well. I'm taking with me new skills, new knowledge, and a lot of personal growth. I'm proud of what we accomplished. I think our teamwork was great. Everyone contributed something important and helped make the project better. We all had different ideas and combined them really well. Communication was good, and we were always supporting each other during the process. I feel proud of what we created together, and I really liked how we worked with respect, responsibility, and creativity. Overall, it was a really good experience and I'm happy with our results.

Although developing Catch the change was challenging, every problem was worth it. We learned a lot about web development and the wide range of tools available on the internet. It is incredible how much you can impact through the internet, even without being an expert, initiative and dedication can take you far. We are proud of what we accomplished: a complete website built from scratch, from the initial proposal to a fully responsive and globally accessible application. Although there may still be the opportunity for improvement, this project was a great chance to grow and create something meaningful yet it still has room for new features in the future.

For real applications, it could contribute to creating a support network for fishermen to be aware of the endangered species and protected zones so that they can avoid legal problems and reduce extinction of species due to this activity. This would be a space for fishers to share tips, news, to communicate, and be informed about this. By providing accessible information

and fostering a sense of community, we hope Catch the Change will not only raise awareness but also empower individuals to take responsible actions for the oceans. We are excited about the potential impact this project can have, inspiring more people to care for and protect our planet.