Blue-Cloud Hackathon Winners
Final Report

Please answer the following questions as best as you can

Team Name: Marine Wildlife Trackers
Team Participants: Bryan Vallejo, Sofia Green, Tran Ngo, Ederson Enriquez
Project Name: "Wildlife Tracker for Oceans". Real-time assessment for marine fauna habitat with phytoplankton hotspots
Submission date of this report: 28.07.2022

About your project

1. **About the team:** Describe your affiliation and/or research community and research domain? (max. 50 words)

Bryan Vallejo - University of Tartu (Estonia) – MSc Geoinformatics
Sofia Green – University of Ghent (Belgium) – MSc Marine-biological resources
Tran Ngo – University of Tampere (Finland) – MSc Environmental engineering
Ederson Enriquez – Universidad Tecnológica Equinoccial (Ecuador) – Multimedia engineering

The "Wildlife Tracker" is an idea that started in July of 2021 led by Bryan Vallejo focused on wildlife movement analytics. During the ideation process, Tran Ngo joined the team curious about how the geo-framework can be aligned to a blue economy model. Then, while doing research about the possibilities the team discovered that it is required to include satellite data to explain spatially the wildlife behavior and use it for marine protected areas assessment. In the same year, the team decided to include Sofia Green as a marine scientist on site for a pilot project in the Galapagos Marine Reserve to cook up the usability of the web app for whale shark conservation and marine spatial planning. Once we had the idea we needed to spread it and Ederson Enriquez joined willingly to transmit the message in a visual and clear way. Since then, Bryan has been leading the project as a Geospatial Developer adding features like satellite connections, movement algorithms, and visualizations. Sofia as a Marine Biologist has been in charge of tagging marine wildlife and testing the geo-framework as a user. Tran has been aligning a profitable business model focused on the blue economy and Ederson has been in charge of creating content for digital products that can transmit the usability of the "Wildlife Tracker"

2. **Project summary and milestones/tasks** that have been completed (max. 300 words)

The "Wildlife Tracker" is a geo-framework dedicated to Marine Protected Areas (MPAs) management based on biologging and ocean satellite data. The platform offers a unique opportunity

to overlay the movement tracks of wildlife over eco-geographical layers to observe in near real-time what may be influencing the animal activities and to spatially assess their meaningful habitats as protected marine area.
The product "Wildlife Tracker for Oceans" has reached its desired level. All the required tasks have been completed and they have supported the development of the geo-framework. Starting with the 2 coaching sessions that helped us to narrow down the user segment of our product and to keep developing the algorithms based on the user's needs. Coaching suggested that the best way to know the user's needs is by asking them, so we did a user consultation based on our pilot project and marine scientists provided useful feedback for our future functionalities. Finally, the online event dedicated to the Blue Cloud services implemented in our geo-framework was a success. We showed in our pilot project sited on Galapagos Marine Reserve how the phytoplankton dataset from Blue Cloud supports the Marine Protected Areas management and marine wildlife conservation.

As milestones, an EU private company was founded as "gis4 wildlife movement analytics" that hosts nowadays the "Wildlife Tracker for Oceans". Then, the release of the product v0.3 can retrieve ocean eco-geographical data and overlap it with biologging data. Same version that uses Copernicus Marine Service to retrieve Blue Cloud Chl-a 3D Model. Then, the creation and test of our pilot project on the Galapagos Islands with biologging data of shale sharks was a success. Data was provided from our team member part of the Galapagos Whale Shark Project. We confirmed with the pilot that our product serves real-time wildlife tracking and supports marine spatial planning. Finally, with a new design for our website, we created a knowledge base with our team members by adding articles to our blog and new videos explaining the usage of our product.

3. **Challenges**: Describe the particular scientific, technical, research, or business challenges that you faced. Describe deviations from the initial project plans (max. 100 words)

We faced a technical issue in our cloud framework in June 2022 due to technical changes on the provider's premises. Our product was off for an entire month. Fortunately, by adding some code updates to our product and creating a new environment we managed to send it back again to the cloud in July 2022. We have maintained the product with our financial resources and we are proud it is standing. Generally, we didn't have deviations from our initial plan.

The benefit of Blue-Cloud

4. **Blue-Cloud Relevant Outputs.** Summarise how your work is relevant in the context of Blue-Cloud e.g as a user how you leveraged Blue-Cloud outputs and results and the Open Science platform around 100 words)

The Blue Cloud is a key element in our work. Thanks to the Open Science Platform (Virtual Labs) we were able to understand how Chl-a datasets work and the ideation of integration started. Currently, thanks to the research done rooted in Blue Cloud our product version v0.3 can offer ocean datasets. Also, being trusted by Blue Cloud since the beginning makes our product reliable for future use in marine conservation projects.

5. **User feedback**. Please provide your user feedback on the services provided by Blue-Cloud (around 100 words)

The computational environment provided by Blue Cloud is wonderful for processing and It helped in the first explorations. But, the directories are a bit confusing when trying to make work the code of the Chl-a model. I would suggest even something more than notebooks, something like a written manual about how to make the Chl-a model works.
Additionally, as the model has many inputs, it would be nice if you can already provide some of them for a different period so it is possible to test out the model by having different time outputs. Generally, I would suggest adding more educational material because the platform is powerful.

6. **Benefits:** Please describe the main benefits obtained through the use of the Blue-Cloud resources and who benefits from it. (around 100 words)

Fortunately, the Blue Cloud Chl-a 3D Model can be obtained through the Marine Copernicus Service, and this helped to create the implementation of the dataset in the backend of "Wildlife Tracker". Thanks to the API connection it makes a light memory processing with fast visualization.
This implementation benefits all marine scientists that are interested in understanding the historical movements of the wildlife tracking studies. The data provided is obtained from 1998 until 2019 and I hope It can be updated in the future until the present.

7. **Tips & Tricks:** Did you consult any Blue-Cloud training resources or sessions? Do you have any tips & tricks for potential users of the Blue-Cloud resource you used? (max. 50 words) (optional)

Thankfully when I started exploring the datasets I was already familiar with the .netCDF format. What I would suggest for users is to find online material about how to visualize and manipulate this format.

8. **Limitations and future improvement**: What additional features would you like to see in the next version of the resource you used? (max. 50 words) (optional)

I would suggest Blue Cloud has an API that can help to share updated and processed data in a light way. Also, to fix the gaps in the Chl-a data layer so it covers all spaces until coastlines.

Outreach & Impact

9. **Outreach activities/events:** Did you participate in and or organize any outreach activities? Please provide information about the event, the participants, and numbers and links. Are there resources produced that can be reused (no limits)

We organized an online event on July 26th called "Integration of Blue Cloud service on Wildlife Tracker: a success story with the Galapagos Whale Shark Project".
We received five participants in our event and the whole team was present. The event was structured in a way that we started explaining what the Wildlife Tracker is. Then, we talked about

the Blue Cloud integration in the backend so it can be used to overlap wildlife tracking data. Then, we presented the story of the Galapagos Whale Shark Project and how the ocean variables can be used to understand the wildlife movements and use them for the conservation effort. Then, we explained our next steps in the software development and plans for regional demos. Finally, a brief overview of how we are managing our business model as a blue economy closed the event.
The event was recorded and summarized in our blog:
Integration of Blue Cloud services (https://medium.com/gis4-wildlife-tracking/integration-of-blue-cloud-services-on-the-wildlife-tracker-for-oceans-22ba4ddb9ae)

10. **Impact:** What is the impact of your project (activities/outcomes, etc.) on your team and institute? What is the impact on scientists, citizen scientists, government bodies and industries, and the public? (around 200 words)

The "Wildlife Tracker" at the moment has caused a big impact on our team members. Sofia nowadays can use a tool for her marine research and conservation of her whale sharks, Tran is sharpening her abilities for the creation of a blue economy model and business management, and Ederson continues his video creation with the purpose of nature conservation. Myself, I am glad that I can keep developing a digital product that serves ocean conservation and supports marine spatial planning with geospatial analysis.

Our purpose is meaningful. We found out that the "Wildlife Tracker" not only can be used for MPA delimitation based on marine life but also for the conservation effort. Since we started our pilot project we alerted in real-time 3 whale sharks found on land. Having this information as soon as possible promotes quick action, which hasn't happened before. Additionally, we are adding fishing pressure data in areas where delicate marine wildlife can be affected. This new approach causes an impact on government bodies focused on marine planning because it helps to plan fishing activity and to delimitate zones for conservation. The public has also participated, we promote control of fishing activity so coastal communities remain fishing with food security and low environmental impact.