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Scientific Traces of a Hobby: Co-Designing a Platform to Repurpose Wildlife Photography into Conservation

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Abstract — *Wildlife photography has long served not only as a hobby, but also as a medium for storytelling and a source of commercial value. But its potential as a source of scientific data remains largely unexplored. Meanwhile, thousands of photographs captured by wildlife photographers are stored on personal devices, shared selectively on social media, or sold commercially without fully tapping their potential for research. This project explores how participatory design can be used to find ways to utilize such untapped wildlife photography data for wildlife research. Through co-design activities, wildlife photographers and researchers were directly involved in finding a solution that benefited both parties. Collaborative activities such as data extraction exercises, journey mapping, prioritization mapping, and sketching were used to inform the development of prototypes, which were later tested with actual users and refined through iteration. The participatory design process resulted in an online platform that allows photographers to easily upload and get an analysis of their sightings, while researchers gain access to broader, richer datasets collected through many photographers across broader locations and time. This study showed that no single method could capture the full spectrum of the problem; deploying multiple techniques was necessary to progressively build a holistic understanding of user needs.*

Keywords: *Participatory Design; Co-Design; Wildlife Photography*

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I. Introduction

Participatory design is a design methodology that actively involves stakeholders in shaping solutions to the problems they experience. Unlike traditional design processes, which often treat end users as informants or testers, participatory design positions them as co-creators, acknowledging their experiential knowledge as essential to the design outcome. This paper contributes to ongoing discussions about participatory design by reflecting on its application in a novel domain: The use of wildlife photography as a potential data source for conservation research. This research positions design as an active bridge between creative and scientific domains, showing how collaborative design methods can transform personal or hobbyist practices—such as wildlife photography—into meaningful contributions to biodiversity research. While the project context relates to biodiversity and data repurposing, the central aim of this paper is to highlight the unique lessons that participatory design reveals during the process. To achieve this, the paper first looks at the existing knowledge in the domain of participatory design. After introducing the methodology, it explains the used approach and walks through the project step by step, focusing on what emerged from the participatory activities and the lessons they revealed.

II. Participatory Design Practices Used for Similar Studies

Photographic data has long been used for scientific studies in many different fields. In wildlife research, photographic data from trap cameras is used to monitor and study animal behavior, population dynamics, habitat use, and species diversity in a non-invasive and efficient manner (Choo et al., 2020). Similar data could be obtained from photographs taken by wildlife photographers and enthusiasts if large collections were systematically gathered, similar to trap cameras. While the volume of data from such photographic sources presents a significant opportunity for ecological monitoring, the system required for reliable and scalable collecting methodologies remains a challenge (McClure et al., 2020).

Participatory design could be used to address the problem at hand: bridging the gap between photographers who have data and researchers who need them. Rooted in Scandinavian design traditions, participatory design emphasizes collaboration with stakeholders throughout the design process (Pisoni et al., 2021). This methodology empowers users to actively shape the technologies and services they will ultimately utilize, ensuring solutions are practical and user centric. This methodology not only streamlines the transformation of raw photographic inputs into structured ecological datasets but also cultivates a collaborative environment that integrates diverse stakeholder knowledge into robust conservation strategies (Muashekele et al., 2021)

III. Methodology

This study adopted a participatory design approach, involving wildlife photographers and researchers as core stakeholders. The participatory design activities, conducted with six photographers and four wildlife researchers, revolved around one central question: how can the data in wildlife photographs taken by photographers be utilized for wildlife research? The participants were selected through purposive sampling based on a range of expertise levels and

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motivations. This diversity was essential for capturing a range of user needs and shaping the direction of both the workshops and the resulting platform. All participants were informed about the purpose and process of the study and participated voluntarily.

Table 1
Summary of Participant Demographics

Photographer	Demographic Details	Expertise Level	Remarks
Participant 01	32 years, Male	Expert	-
Participant 02	25 years, Male	Beginner	-
Participant 03	25 years, Male	Semi-professional	Works as a tour guide, takes wildlife photographs as a part of his job
Participant 04	28 years, Male	Intermediate	-
Participant 05	28 years, Female	Beginner	-
Participant 06	27 years, Male	Expert	-

Four participatory activities were conducted during the study: (1) data extraction from sample photographs with researchers, (2) journey mapping and folder analysis with photographers, (3) a "Circles of Me" activity to capture photographers' priorities, and (4) group sketching to envision data visualization. Insights from these activities informed the design of prototypes, which were iteratively tested and refined with users.

IV. Overview

A. Extracting Data from Wildlife Photographs

As the first step of the design study, a participatory activity was done with wildlife researchers to find out how the data value of photos changes with quantity and time. Researchers were provided a set of images and were asked to extract data from them (Figure 1). The process began with providing one image of a single animal, then three images of the animal taken at the same time, and finally three images of the animal taken over a span of two weeks. Through this activity, it was concluded that single images and images taken at the same time have similar value and the value of data increases when a species is captured over time. Further, it was highlighted by the researchers that, to get the full potential of data, they need to have other contributing factors such as the time and location the photograph was taken.

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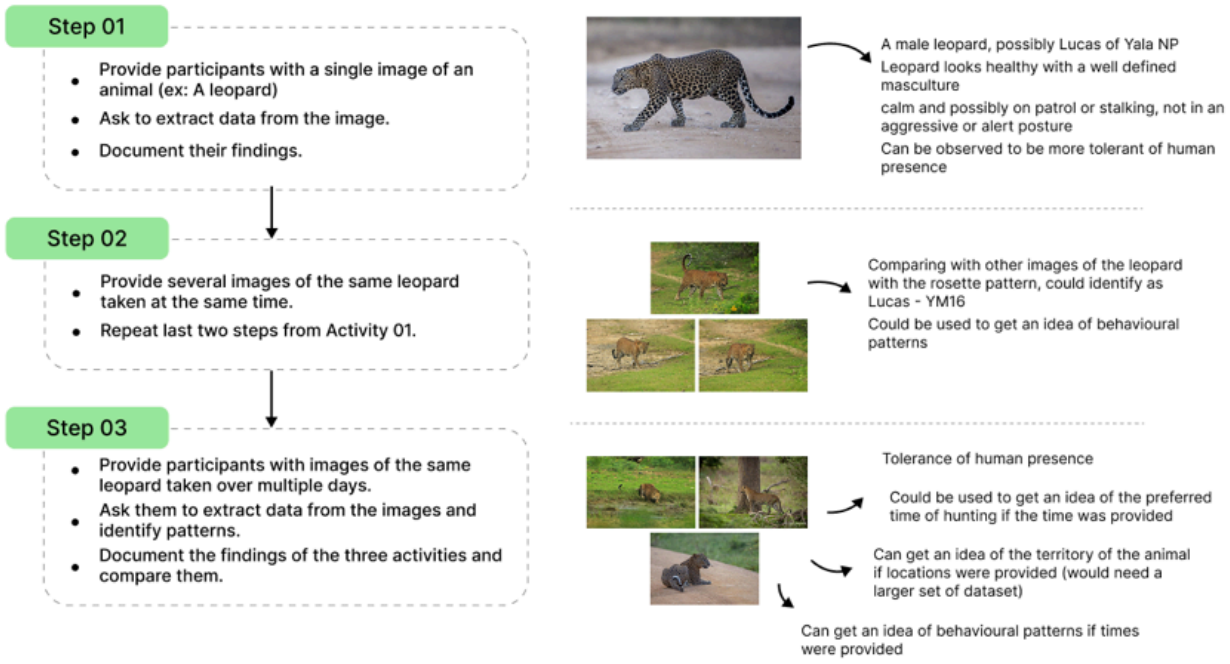
Figure 1
Participatory Design Activity 01



B. Folder Analysis of Wildlife Photographers

With that insight, an observation activity was done with wildlife photographers where their journey was observed and recorded from capturing images to uploading them to social media. The insight derived through this activity was although they capture about 1000 photographs per tour, they only upload around 5 photographs from them to social media. But when the number of recorded species was analyzed, it averaged around 25 per visit. These excess photos were simply stored on their computers or a hard drive and were not being used for any purpose.

C. Circles of Me Activity

A valuable set of data was stored without being utilized for any purpose, so a need was aroused to get hold of these photos from wildlife photographers. The next activity was designed to figure out the needs and objectives of photographers named “Circles of me”. It is a participatory tool that helps people show what matters most to them by arranging their needs and priorities in a set of circles (Figure 2). This visual format makes it easier for participants to express their goals and motivations, and for the researcher to see patterns in what is most important to the group.

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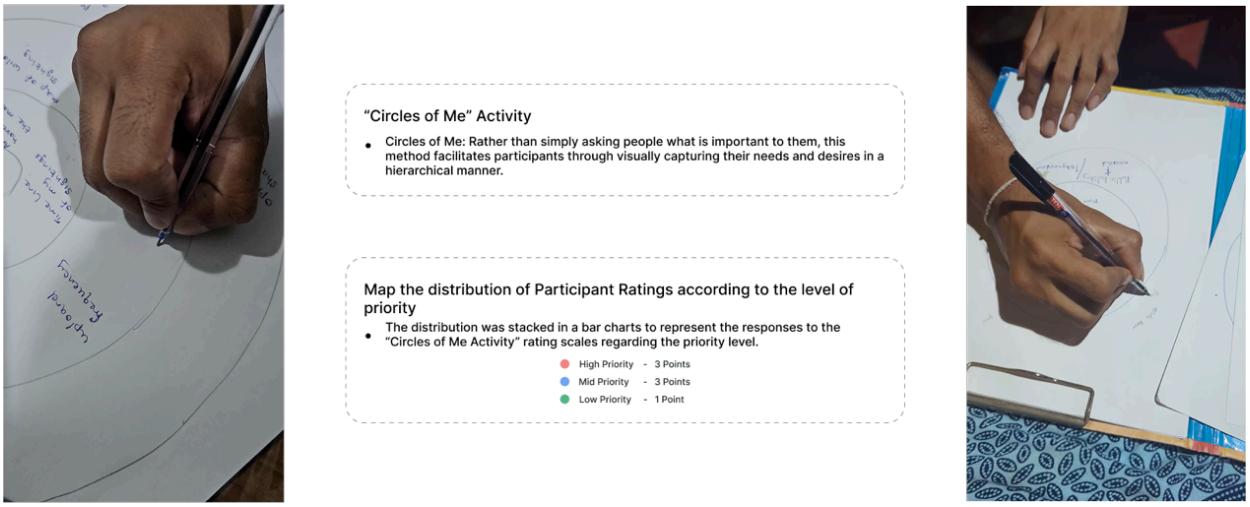
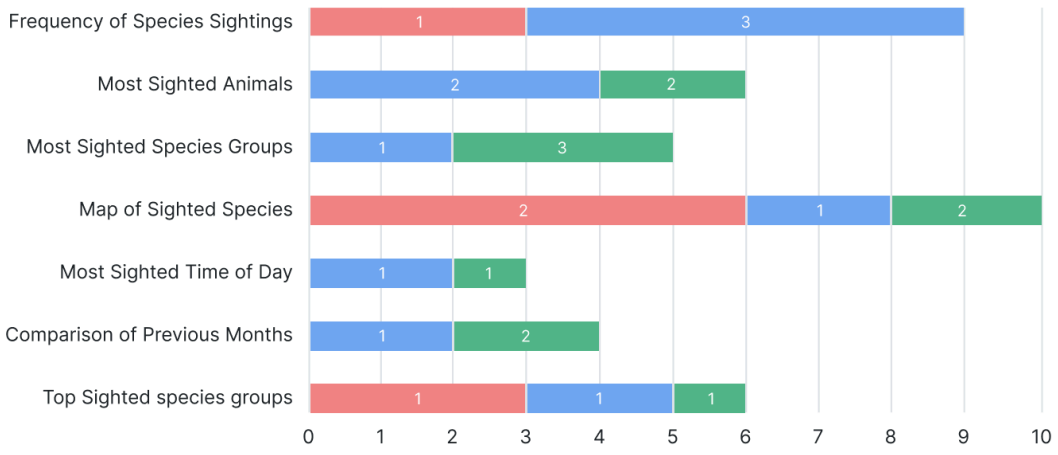
Figure 2
Distribution of Participants Needs



After the photographers visually captured their needs and desires in a hierarchical manner, the responses were mapped considering the priority level to get an idea of the most valued objectives (Graph 1). It resulted in creating a digital platform where photographers will use to keep a record of their sightings - WildDiary. The web application aims to address the need for an analysis of their sightings which will include their trip details, a graph of sighted species groups and a hotspot map of sightings. This will urge the photographers to upload the photographs that would have been just stored on their devices, and they would help researchers to get information on sighting hotspots and statistics such as number of species sighted and the frequency of them being seen.

Graph 1
Distribution of participants' needs were stacked in a bar chart to represent the responses to the "Circles of Me Activity" rating scales regarding the priority level.



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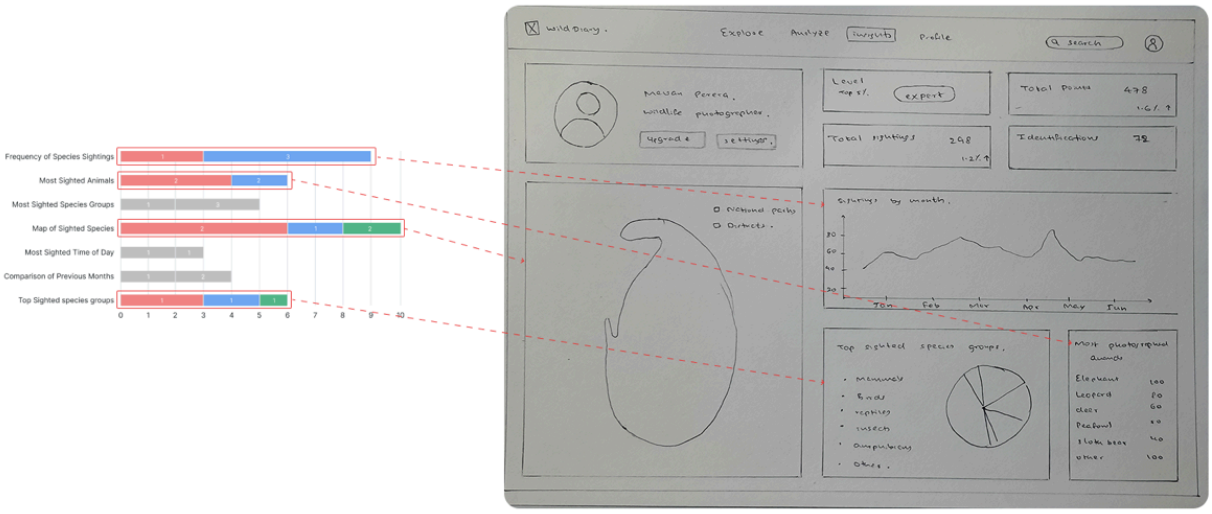
D. Group Sketching

Then, a group sketching exercise was deployed to figure out how they wanted this data to be visualized (Figure 3). A similar process was followed with a few wildlife researchers, focusing on what data they need and how they need to perceive them. Finally, the sketches were analyzed, and the structure and wireframes of a digital platform was created.

Figure 3

The Bar Chart was Used to Get an Idea of What Data was Most Valued by Photographers



E. Design Development

The value of WildDiary lies not only in its functions but in how those functions emerged through participatory activities. The photographers' dashboard, for instance, was shaped directly by the suggestions of photographers, including their preferred modes of visualization. These features were later explored with another group of photographers in collaborative sessions and refined through two rounds of iterations. The prototyping was done using Figma for creating low and mid-fidelity prototypes, which enabled participants to interact with a realistic interface and provide contextually grounded feedback. Work with the mid-fidelity prototype also revealed that the main dashboard created a high cognitive load for researchers. This was addressed by introducing the design principle of progressive disclosure, which presents essential information first and then gradually reveals additional detail as needed (Figure 4). Through these processes, the platform developed less as a generic data tool and more as a translation of user insights, configured by users for their own practices. (Figure 5).

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Figure 4

Solving User Issues through User Testing

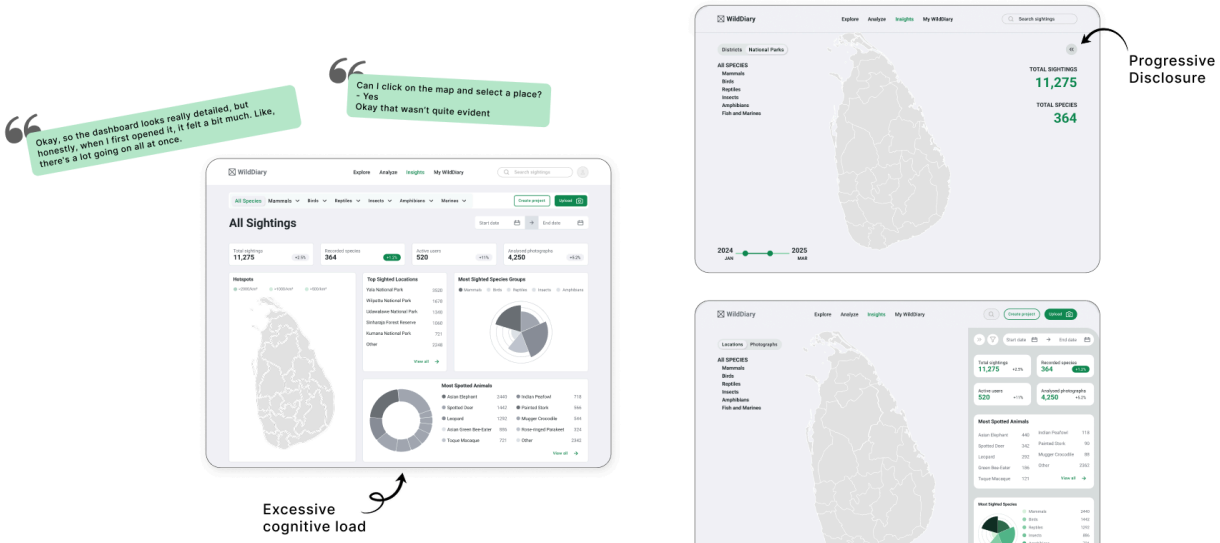
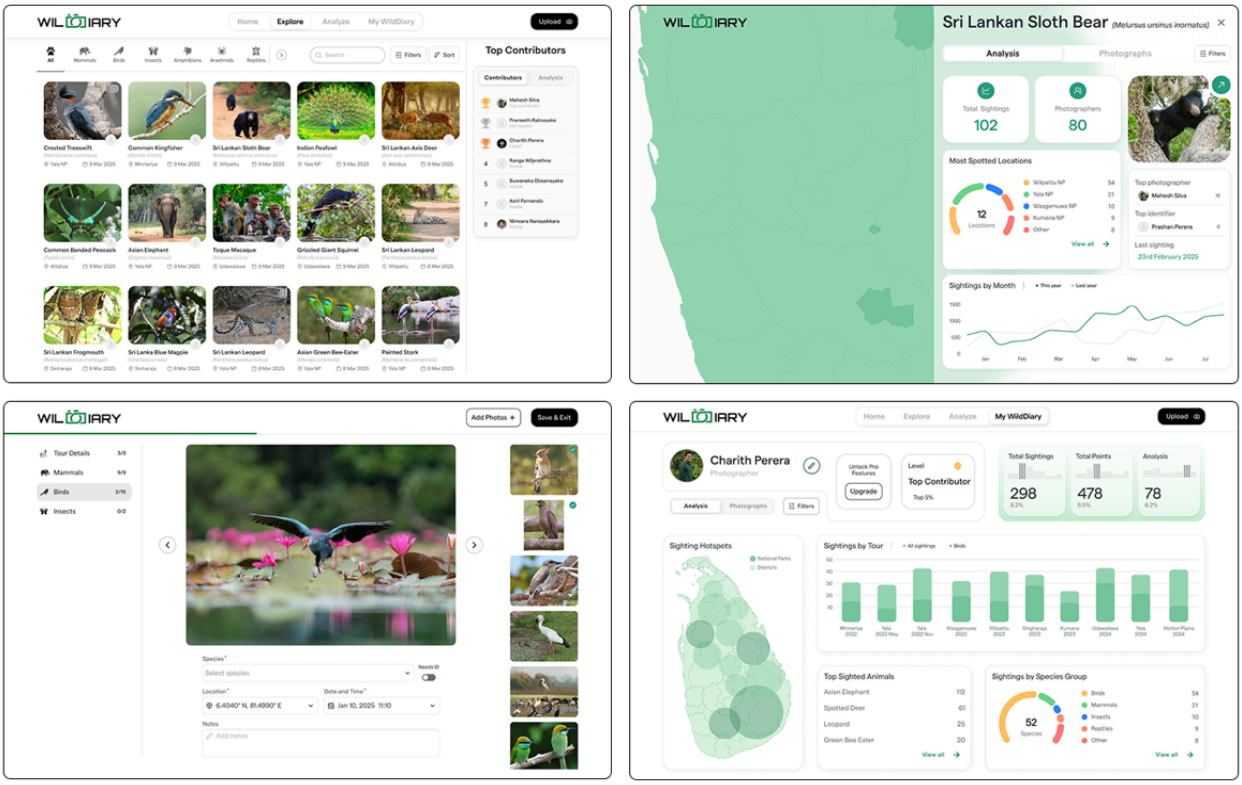


Figure 5

Screens of the Web Application



To summarize the design reasoning and trace how insights from participatory activities informed the final platform features, the following table outlines key user insights, their design implications, and the resulting components of the WildDiary platform (Table 1).

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Table 2
Summary of User Insights, Design Implications, and Platform Features

User Insights	Design Implications	Resulting Platform Features
1. Photographers often store large collections of unused wildlife photographs on personal devices.	Need for a system that encourages systematic uploading and utilization of photographs.	Upload and record-keeping function enabling photographers to log sightings and trips.
2. Photographers value personal documentation and visual summaries of their work.	Provide visual and analytical feedback to sustain motivation.	Personalized dashboards showing trip summaries, species graphs, and hotspot maps.
3. Researchers require temporal and locational data for meaningful analysis.	Integrate metadata capture and structured data presentation.	Automated extraction of time, date, and location details from uploaded photos.
4. Researchers found high cognitive load in early prototypes.	Simplify data visualization using hierarchical information display.	Implementation of progressive disclosure in researcher dashboard.

IV. Challenges and Discussion

Representation is a persistent dilemma in participatory design, since a small group of participants cannot fully capture the diversity of the wider user community. Can the needs and desires of these six photographers reflect those of the wider photographer community? Acknowledging this partiality and negotiating it transparently is an important step in participatory design. In this project, the issue was addressed in later iterations by recruiting a more diverse set of wildlife photographers, thereby reducing bias and strengthening the design outcomes.

Participatory design can be used as a means of surfacing scientific value within datasets that are not originally collected for research purposes. This was further emphasized in the data extraction activity, where multiple people actively discussed and shared knowledge, resulting in a more refined and reliable outcome.

A critical insight was uncovered by observing and mapping the journey of photographers; from capturing images to storing them and occasionally sharing them online, thousands of photographs remain archived on personal devices without being put to further use. This realization might have gone unnoticed in a traditional design process. This highlighted the importance of actively engaging users directly in the design process from the beginning to the end.

No single activity was able to capture the full range of user needs. Different participatory design activities exposed different layers of insight throughout the project. The “Circles of Me” exercise helped photographers express and prioritize their motivations for systematic record-keeping, while the group sketching activity enabled collaborative envisioning of how data should be visualized. Taken together, these methods demonstrated that varied participatory activities are necessary to progressively build a holistic understanding.

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V. Conclusion

WildDiary illustrates how the traces of a hobby can be reconfigured into scientific contributions when photographers and researchers design together. What began as scattered, underutilized images became the basis for a shared platform, reminding us that participatory design is not only about building tools, but about re-seeing practices and repurposing them for new forms of knowledge. Yet, demonstrating that PD can produce better outcomes when designed together is not, in itself, novel. The more pressing question is how far participants' creative autonomy can be extended—beyond shaping individual features toward influencing the overall direction and governance of a project. In our case, photographers shaped dashboards, visualizations, and priorities, but the larger architecture and trajectory still rested with the design team. An ideal level of participation would allow users to determine not only how their contributions are represented but also how the platform evolves, circulates, and is sustained. Future work should therefore examine mechanisms for extending participation beyond workshops into stewardship, decision-making, and infrastructural embedding.

Future research could explore how platforms such as WildDiary might be scaled to include a broader network of contributors and institutions. Integrating the system with national biodiversity databases or conservation authorities could create a unified pipeline where photographic records directly support long-term ecological monitoring. Further investigation is needed to understand how participatory infrastructures can sustain engagement over time, ensure data credibility, and balance community ownership with scientific goals.

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