

# An overdue catalyst: Limitations imposed by COVID-19 improved capacity building in community-led environmental education in Madagascar

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## Abstract

The COVID-19 pandemic caused by the SARS-CoV-2 virus brought many primatology research programs and conservation efforts to a halt. After Madagascar closed its borders during March 2020, many on-site international project leaders and researchers returned to their home countries when their programs were delayed or canceled. Madagascar remained closed to travelers until November 2021, when it reopened to international flights. The 20-month absence of international researchers allowed many local Malagasy program staff, wildlife professionals, and community leaders to step into new leadership roles and responsibilities. Many programs that already had strong Malagasy leadership and meaningful collaborations with local communities flourished, while others either swiftly strengthened these attributes or faced challenges from pandemic-related travel restrictions. Here, we describe how the coronavirus pandemic events of 2020–2021 initiated long-overdue shifts in

outdated models of internationally led primate research and education projects in communities living alongside primates at risk of extinction. We discuss the benefits and challenges of pandemic-induced changes within five primatological outreach projects, as well as how we can use these experiences to improve community-led environmental education and conservation awareness in the future.

#### KEYWORDS

community-based conservation, COVID-19, education, local knowledge, Madagascar, primates

*Locally-based and locally-hired teams, which are native to the communities in which they work, are an essential component of effective and resilient long-term conservation research in Madagascar. As this work expands nationally today, continuing best practices include: (1) conducting all work in the local dialects of Madagascar; (2) co-authoring with all team leaders and members in scientific publications, regardless of university or organizational affiliation, to respect the knowledge that often drives the work; and (3) viewing the connectivity between communities and forests as a strength within the work itself and not a conservation problem to be solved.*

## 1 | INTRODUCTION

The COVID-19 pandemic caused by the SARS-CoV-2 virus (COVID-19) interrupted social and economic connections and disrupted supply chains worldwide while creating insecure work opportunities for people who relied on tourism for income (Gössling et al., 2020; Sigala, 2020). However, COVID-19 also resulted in unexpected positive change in the area of conservation project management. Here, we describe how COVID-19 initiated long-overdue shifts in outdated models of internationally led primate research and education projects in communities living alongside primates at risk of extinction. Our focus is on five projects in Madagascar; however, the issues discussed here are also found in conservation education projects throughout the world. The goal of this commentary is to showcase how large and small research initiatives in Madagascar responded to the pandemic by comparing three main projects to both a COVID-19 resilient program and a COVID-19 paused program. The projects are as follows: (1) "Photography Inspiring Children in Conservation"; (2) "Centre ValBio Health, Education, and Research Program"; (3) "Ecological Storytelling"; (4) "The Sakondry Project," as a resilient program; and (5) "The Red Book Challenge Conservation Education—conservation club in Fort Dauphin, Madagascar" as a paused program during COVID-19. From relatively new programs to on-the-ground efforts that have been nurtured for over 35 years, these programs incorporate

Malagasy perspectives and efforts into novel conservation approaches, while also improving leadership, project management, and teaching skills in communities living alongside threatened primates. (Figure 1)

During the start of COVID-19, onsite international project leaders and researchers returned to their home countries when their programs were delayed or canceled. Many local Malagasy program staff, wildlife professionals, and community leaders stepped into new leadership roles and responsibilities. With a consideration of the learning potential of discussing both successes and failures (Firestein, 2016; Webber et al., 2022), we discuss the benefits and challenges of pandemic-induced changes within five primatological outreach projects in Madagascar, as well as how we can use these experiences to improve community-led environmental education and conservation awareness in the future. Restrictions imposed by COVID-19, such as the ban on international travel, accelerated a shift towards advancing community-based leadership through the absence of onsite international partners. Here we present examples of benefits and challenges that each of our five projects experienced, and how we can use these experiences to improve community-led environmental education and conservation awareness in the future, both in Madagascar and worldwide.

## 2 | BACKGROUND

### 2.1 | Primate conservation projects adaptively tailored during COVID-19 challenges

**Example 2.1.** Photography Inspiring Children in Conservation.

#### 2.1.1 | Building conservation capacity and a passion for protecting primates

Photography Inspiring Children in Conservation (PICC) is a non-profit organization that engages children with the natural world through the creative arts of photography, illustration, and storytelling. The program promotes effective communication skills in storytelling and photography, and uses custom-designed, multi-lingual activity books, workshops, and field experiences to provide information on primate ecology and conservation to participants.



1. PHOTOGRAPHY INSPIRING CHILDREN IN CONSERVATION—2020 PICC students and teacher J. Celestain discovering lemurs in their local ecosystem, Ambodiforaha Village Schools, Madagascar. Photo: P. Elison



2. CENTRE VALBIO HEALTH, EDUCATION, AND RESEARCH PROGRAM—Students learning about reforestation with the CVB Education Team, Ranomafana, Madagascar



3. ECOLOGICAL STORYTELLING—Rhodin Jean Claude Rafidimanandray (L) and Andry Andriamiadanarivo (R) help setup a Zoom interview in front of a green screen for participant Marie Antonine Ravonimboahirantsoa (center)



4. THE SAKONDRY PROJECT—2020 Soccer teams plant wild coastal legume species to reduce soil erosion along coastal trails and support increased community *sakondry* production.



5. THE RED BOOK CHALLENGE CONSERVATION EDUCATION — conservation club members with learning activity, Fort Dauphin, Madagascar.

**FIGURE 1** Five primate conservation projects: (1) “Photography Inspiring Children in Conservation,” (2) “Centre ValBio Health, Education, and Research Program,” (3) “Ecological Storytelling,” (4) “The Sakondry Project,” and (5) “Red Book Challenge Conservation Education Madagascar.”

The goal is to inspire a deeper appreciation for the ecological, cultural, and economic value of protecting primates and their habitats, as well as to encourage students to become conservation leaders in their communities. The PICC program was initiated by K. West in Masoala National Park, a UNESCO World Heritage site that supports much of the mammalian diversity in Madagascar (Kremen et al., 1999; Ormsby, 2008).

COVID-19 provided the opportunity for an ecoguide, village teachers, and community members in Madagascar to elevate their educational and leadership roles in the PICC program. Coauthor and

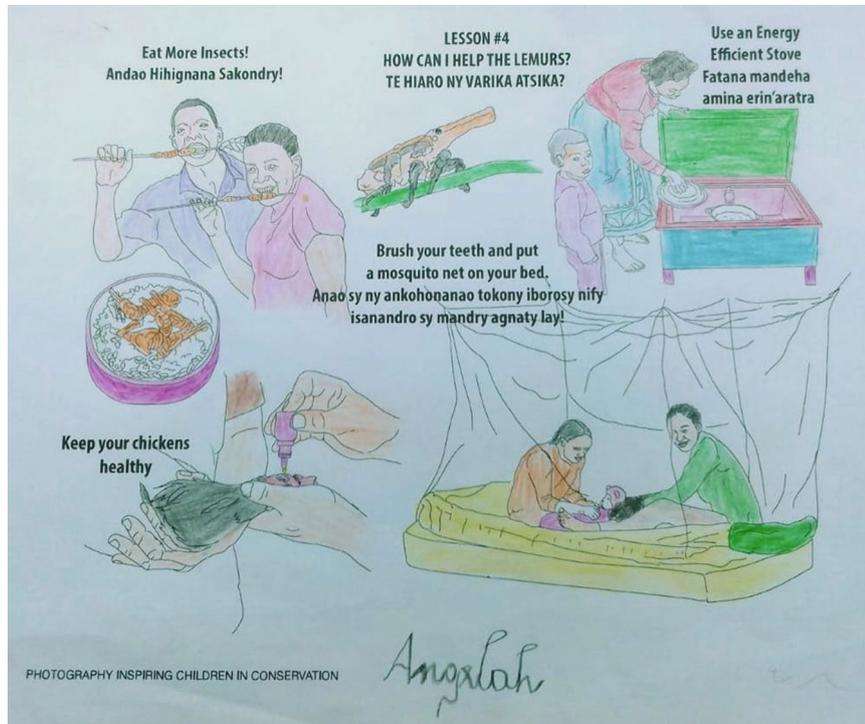
PICC member Pascal Elison, a Malagasy wildlife guide who owns his own tour guide business, serves as an example. Prepandemic, Elison shared his knowledge of the Masoala ecosystem with international clients. During June 2020, Elison and PICC Director Kathy West designed alternative PICC sessions that Elison could teach in remote villages on the Masoala peninsula. Relying on Elison's traditional knowledge and stories about the forest, wildlife, and human-wildlife relationships in the region, Elison and West worked together via email and the cellphone application WhatsApp to engage communities through the development of educational materials (Figure 2), including a coloring book in both English and the local Malagasy dialect (West & Elison, 2020). He developed new skills preparing materials, organizing logistics, and leading the PICC program for more than 230 Malagasy children and community members during seven 5-to-10-day sessions from July 2020 to present day (2023). Elison also developed sustainable capacity in the local teachers through giving them knowledge of the forest, lemurs, and conservation, skills in pedagogy, and continued access to the teaching resources. Of note, Madagascar's National Office of Tourism highlighted Elison's work in a national-level blog (Office National du Tourisme de Madagascar, 2021), sharing news across Madagascar of increased conservation leadership within their communities.

**Example 2.2.** The Centre ValBio Health, Education, and Research Program.

### 2.1.2 | Saving tourism and building capacity for community and staff

The Ranomafana National Park (RNP), established in 1991, contains 41,000 hectares of continuous rainforest with some of the most unique biodiversity in the world, including 14 species of primates, 5 of which are declared Endangered or Critically Endangered by the IUCN (Wright, 1992; Wright et al., 2014). Research expanded exponentially with the establishment of Centre ValBio Research Station (CVB) in 2002 (Wright and Andriamihaja 2002), a modern station that now includes molecular biology labs, conference rooms, a dining hall, and 48 beds. The main objective of CVB is to accomplish conservation goals through scientific research and community outreach.

The effects of COVID-19 on RNP and the CVB were profound. For the first time in 34 years, there were no international people joining the Malagasy to promote conservation initiatives. Researchers worried that COVID-19 would decimate the local human and lemur populations, and that the communities would have to return to an ecologically unsustainable slash and burn economy to grow food for the survival of their families. Immediately, CVB teams in the global North and South sprang into action. The CVB Board and a small NGO called BeLocal raised funds to buy cloth and sewing machines to make protective face masks, and distributed 10,000 face masks. CVB also transformed local rum into disinfectant, set up hand-washing stations, and is currently developing a recipe for soap using locally



**FIGURE 2** Example of a *Photography Inspiring Children in Conservation* worksheet “How can I help the lemurs?,” highlighting local conservation solutions. Translations by P. Elison.

available ingredients that can be replicated by community members for their villages. This gave staff reassurance that they took what actions they could to hinder viral spread and enabled the local community to improve their preparedness and response for public health emergencies in the future.

Early in the pandemic the biodiversity teams were allowed to do surveys, while masked, to verify the lemurs were still alive. While surveys could be completed, research within the park was still prohibited. Program staff turned this situation into an opportunity. Although CVB has a long-term database on the demography of many species of lemurs over 34 years, scientists never found time to properly clean and check those data. The CVB biodiversity team received training on data entering and data cleaning as well as the use of a secured online database from database experts at Stony Brook University via Zoom. This gave CVB staff the opportunity to set up a data archive that is easily accessible for not only CVB research technicians but also international researchers and students. Over the past 1.5 years great progress was made, and publications authored by CVB staff are underway.

To provide alternative livelihoods for tour guides, team members created a program called “Virtual Tours to Ranomafana National Park.” In the CVB recording studio, the local team set up a green screen with videos demonstrating the biodiversity of RNP. A local guide led live tours on Zoom as if one had just arrived in Ranomafana. Coauthor Jessie Jordan, an American expat artist-in-residence and conservationist, organized the programs and managed the virtual tours. The tours were virtually attended by foreigners as well as by university classes from around the world.

In 2021 the tour guides were funded by Re:Wild to work with the CVB Education team to give forest tours and lectures to local conservation clubs. By conducting these tours, which were typically

given to international visitors before the pandemic, the guides taught and inspired over 100 out of 1000 members of the conservation clubs from local villages surrounding the RNP. These members continue to acquire new skills on how to both receive tourists and promote tourism in their village using local biodiversity.

### Example 2.3. Ecological storytelling.

#### 2.1.3 | Ireo tantaran'ny aty ala: Preserving knowledge of endemic species in Madagascar through storytelling

The Ecological Storytelling project is also based in Ranomafana. The goal of the project is for wildlife professionals in the region to share their history, expertise, and concerns regarding the local ecology. The storytelling project was in development for several years, but in some ways the pandemic was the impetus for it to move forward. First, the pandemic prohibited international project staff from conducting in-person research with lemurs, in turn leaving wildlife professionals with few work opportunities and little income. Second, the University of Arizona School of Anthropology developed a funding mechanism to support new research directions due to the pandemic. Third, video conferencing surged to support safely distanced education, work, and social interactions, which also facilitated our ability to conduct interviews and record stories remotely. The storytelling project team includes representatives from CVB and Association Des Guides Ranomafana in Madagascar, and the University of Arizona in the United States. Project personnel in Madagascar were vital for gathering information used for

**FIGURE 3** Jocelyn Randrianasolo assists tour guides Emile Rajeriarison (bottom left) and Chantal Bako Rabevahoaka (bottom right) as they create resumés using computers at the Telecentre Ranomafana (Ecological Storytelling project).



participant selection criteria, disseminating project information and materials to participants, coordinating interview schedules and transportation, assisting and translating during interviews, helping the guides create resumés and biographies using templates on computers (Figure 3), and compensating participants. Due to high-speed internet and a recording studio available at the CVB, project personnel were able to use Zoom to conduct and record semi-structured interviews with research technicians (who work on research projects based out of CVB) and tour guides (Figure 1). During each 1-h interview, participants were asked questions about their experience in the forest generally and in their professional role. For example, interviewers may have asked about the following: general perceptions of the local ecology and what they appreciate about it, interesting or surprising observations they have made, how the forest is important to their own lives and the lives of their communities, what they think is most important to learn about the forest and surrounding areas, what research they think is important, and what they want others to know. Participants also used the CVB computers and cyber café in town to create biographies to accompany the videos, and to create resumés for their professional portfolios using a template. Most of the participants had never been interviewed or used video conferencing, and many were new to using word processing software. Twenty-one interviews were conducted, primarily in Malagasy. Interested participants were chosen based upon tenure as a wildlife professional, and an attempt to balance gender representation and the two professions (tour guide and research technician).

The storytelling project is now in its video editing stage, working with Dr. Tsiory Andrianavalona, the Program Officer of ExploreHome Madagascar Science Center. Each video is in Malagasy with English subtitles, with the goal to have all videos edited and ready to show at a public event in Ranomafana in 2023, with participant consent. Each

participant will have a copy of their video to use as they wish. The videos will also be posted to the CVB YouTube channel and the Ranomafana Tours website and shared online as widely as possible. Audio files will be shared with three local radio stations to be broadcast in Madagascar.

Despite the challenges that came with coordinating a program like this, all personnel learned new communication, leadership, team-building, and technical skills (e.g., how to use software programs like Adobe Premiere Pro for video editing, use file-sharing systems, and how to best conduct interviews using virtual platforms). For many on the team, this manuscript is also their first experience writing collaboratively to coauthor a journal article. Perhaps most importantly, all members learned something new about the region's flora and fauna, were wowed by the participants' rich knowledge as they communicated in their first language, and were enormously affected by their connection and dedication to the forest. By sharing these stories in video vignettes and radio broadcasts, Malagasy voices and expertise are amplified in Madagascar's environmental movement.

## 2.2 | COVID-19 resilient primate conservation project

**Example 2.4.** The *Sakondry* Project.

### 2.2.1 | Improving food security and conservation using local ecological knowledge

The *Sakondry* project in Madagascar is part of a community-led effort to harness traditional ecological knowledge of an underused insect, *Zanna*

*tenebrosa*, to help design food security and conservation strategies in rural Madagascar. This insect, known as *sakondry* in Madagascar, is a delicious, traditionally eaten food that was once wild harvested in small numbers and is now sustainably farmed (Borgerson et al., 2021, 2022). Farming methods were co-designed with community members as a way to improve food production within existing community and agricultural lands while increasing culturally relevant, sustainable, and stable sources of meat. This subset of the project was conducted in five communities on the Masoala peninsula before and during COVID-19 (Figure 1).

During COVID-19 the *Sakondry* project was able to pivot to a system composed entirely of community members working within their ancestral homelands, who co-led the concept, design, and monitoring of the project when internal travel stopped within the country. This was primarily possible because the research team had already worked without a centralized office base and was made up of local Malagasy team members who are co-authors on resulting publications. Now that internal travel is again possible, the team also works with other communities in diverse ecosystems and landscapes to adapt methods based on new regional ecological knowledge and teach other communities and NGOs how to farm their own regional *sakondry*.

Locally-based and locally-hired teams, which are native to the communities in which they work, are an essential component of effective and resilient long-term conservation research in Madagascar. As this work expands nationally today, continuing best practices include: (1) conducting all work in the local dialects of Madagascar; (2) co-authoring with all team leaders and members in scientific publications, regardless of university or organizational affiliation, to respect the knowledge that often drives the work; and (3) viewing the connectivity between communities and forests as a strength within the work itself and not a conservation problem to be solved.

### 2.3 | COVID-19 paused primate conservation project

**Example 2.5.** The Red Book Challenge Conservation Education—Conservation Club in Fort Dauphin, Madagascar.

#### 2.3.1 | “How will you share what you have learned?”

Red Book Challenge Conservation Education Madagascar is a Canadian non-profit organization. Its aim is to supplement the education of people living in Southern Madagascar with creative educational projects on the topic of biodiversity and conservation, including films, music, and drawing, with the ultimate goal of protecting lemurs and their habitats (Walker-Bolton, 2022). We run conservation clubs in communities in Southern Madagascar which have local people elected as executives and meet regularly to discuss conservation topics and to conduct good works such as planting trees. In 2012 a conservation club was initiated in Fort Dauphin, Madagascar by the Red Book Challenge program with children the PI met when they were selling souvenirs to tourists at the

Le Dauphin hotel (Figure 1). In 2020, the PI was unable to make her annual trip to Madagascar due to COVID-19. She discovered that funds had been mismanaged, but travel restrictions prevented her from discussing the situation with the current club executive. The PI hired two former Malagasy research assistants to assist with the audit of the conservation club. At the time, neither of these consultants were regular employees of the Red Book Challenge and training was provided through a series of emails on how to conduct the audit. This type of training did not allow for the flexibility and last-minute problem solving that was needed in the situation. For example, the executive that had failed to manage the funds of the club properly was relied upon to spread the message of the new meeting of the conservation club with the auditors present. The club executive was not motivated to have an audit in front of the original club membership and did not invite them. This created a difficult situation where the audit was not as effective as it could have been because only new members eager to join the club were present for the audit. Because of the pandemic, conservation clubs were not initiated again after the original club folded, until 2022. Without a Malagasy manager of the conservation clubs within Madagascar, mismanagement of funds was possible and the clubs struggled to stay active. Today, two new conservation clubs are flourishing with greater oversight built into their structure within Madagascar (Figure 2).

## 3 | RECOMMENDATIONS

Our experiences reinforced the premise that, through shared responsibilities and the shifting of project leadership roles from international scientists to Indigenous people and community-led programs, the long-term success of conservation strategies is strengthened and better able to withstand future challenges (Miller, 2020; Razanatosoa et al., 2021). The highlighted projects showcased the traditional knowledge of Malagasy wildlife professionals as they shared their history, expertise, and concerns regarding the local ecology. The fifth comparison project of the Red Book Challenge conservation club was paused during COVID-19, in part due to the lack of utilizing these relationships built with local Malagasy people who were potential leaders in the organization. In the future we aim to measure success in achieving conservation goals, in part, by determining how well we have met the following three recommendations (Figure 3).

As our first recommendation, we promote the deceptively straightforward concept of establishing trust and respect from the initiation of a conservation education program and maintaining these partnerships as a daily practice. Each of the following successful pivots were accomplished due to the commitment shown by Malagasy program members. This dedication would not have been possible had we not created, as partners, trusting and respectful relationships as described by Covert (2019). The projects supported instruction in a wide range of skills, including: project management, organizational leadership, team-based cooperation, accounting and budget management, conducting and participating in interviews, word processing and other computer skills to build resumés and write

professional reports, scientific illustration, behavioral observation methods, species identification, and the design and communication of marketing materials. Some of the more innovative advances that Malagasy team members accomplished included the following: moving tourism online by conducting fundraising “Virtual Tours”; using local ingenuity and traditional ecological knowledge to develop environmental methodology, concepts, designs, and monitoring techniques for food security; providing onsite eco-tours to local children instead of international tourists; and developing and distributing new creative educational curricula and materials.

Our second recommendation is for international researchers who are applying for grants to work in primate habitat countries to include in their budget funding for the technologies described in this commentary (high-speed internet access, communication tools such as WhatsApp and Facebook Messenger, and File sharing platforms to name a few). Access to technological products and software platforms made international collaborations possible during the pandemic. These technologies are crucial to being able to continue growing capacity within communities living alongside primates but are still unreliable or non-existent in many rural areas of Madagascar despite recently expanded communications infrastructure (The World Bank, 2018). Project participants learned new technical skills in the following areas: data sharing and management, videography, video editing, conducting interviews using virtual platforms, and image sharing. Our five projects had varying levels of access to these technologies. However, some organizations may not have reliable or consistent access to the technologies that we describe. This is one way in which international collaborations are so valuable, as researchers from the Global North are more likely to have access to critical technologies through their institutional affiliations.

Our third and final recommendation is to integrate host-country members at every level of a conservation education program's infrastructure. Including host-country members at every level of a conservation initiative is not a new idea (Baker et al., 2019; Covert, 2019; Fernández-Llamazares & Cabeza, 2018; Hill, 2002; Waters et al., 2021; Western, 1994). What is new is that COVID-19 has brought about an unprecedented challenge to primate conservation initiatives (Lappan et al., 2020; Reuter et al., 2022). COVID-19 was the unexpected and overdue catalyst that tested every conservation program on the degree to which host-country participants were fully integrated into the program.

## 4 | CONCLUSION

Primatology programs were not exempt from disruptions from COVID-19. Indeed, our projects illustrate how pandemic-induced restrictions severely affected primate research, conservation, and outreach but ultimately led to positive shifts in strengthening community-based capacity and conservation. Post-pandemic, we urge researchers to partner with local community members, guides, conservationists, and universities. By sharing technology and leadership roles with international staff and locally-based and locally-hired teams, and treating those staff with trust and respect, primatologists

can support more effective and sustainable progress towards global conservation initiatives.

## AUTHOR CONTRIBUTIONS

**Kathy West:** Conceptualization (lead); funding acquisition (lead); investigation (equal); methodology (equal); project administration (lead); resources (equal); supervision (lead); writing—original draft (lead); writing—review & editing (lead). **Stacey Tecot:** Conceptualization (lead); funding acquisition (lead); investigation (lead); methodology (equal); project administration (lead); resources (equal); supervision (lead); writing—original draft (equal); writing—review & editing (supporting). **Amber D. Walker-Bolton:** Conceptualization (equal); data curation (supporting); funding acquisition (supporting); methodology (equal); project administration (equal); writing—review & editing (lead). **Cortni Borgerson:** Conceptualization (lead); data curation (lead); formal analysis (lead); funding acquisition (lead); investigation (equal); methodology (equal); project administration (equal); resources (equal); software (equal); supervision (equal); writing—original draft (equal); writing—review & editing (supporting). **Patricia C. Wright:** Conceptualization (lead); data curation (lead); formal analysis (lead); funding acquisition (lead); investigation (lead); methodology (equal); project administration (lead); resources (equal); software (equal); supervision (lead); validation (equal); visualization (equal); writing—original draft (supporting). **Lovaso Razafindravony:** Conceptualization (equal); investigation (equal); methodology (equal); project administration (equal); supervision (equal); writing—original draft (equal). **Andry Andriamadanarivo:** Investigation (equal); project administration (equal); writing—original draft (equal). **Dina Andrianoely:** Project administration (equal); writing—original draft (equal). **Jean Celestain:** Investigation (supporting). **Pascal Elison:** Methodology (lead); project administration (equal); resources (equal); supervision (equal). **Jessie Jordan:** Investigation (equal); methodology (equal); project administration (equal); supervision (equal); writing—original draft (equal). **Arielle Liu:** Data curation (equal); investigation (equal); methodology (equal); project administration (equal); writing—original draft (equal). **Ramanorintsoa F. Milliase:** Investigation (equal). **Rhodin Rafidimanandray:** Data curation (equal); methodology (equal); project administration (equal); writing—original draft (equal). **Tolotra Ranaivoson:** Investigation (equal). **Clara Randimbiamanana:** Data curation (equal); investigation (equal); methodology (equal); project administration (equal); writing—original draft (equal). **Be Noel Razafindrpaoly:** Investigation (equal); methodology (equal); project administration (equal). **Madison Soule:** Writing—review & editing (supporting). **Jaclyn R. Aliperti:** Writing—original draft (supporting); writing—review & editing (equal).

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### CONFLICTS OF INTEREST STATEMENT

A conflict of interest exists in the fact that Kathy West is also the director of the non-profit Photography Inspiring Children in Conservation, while Cortni Borgerson is the cultural liaison, and Jaclyn R. Aliperti is the science and partnerships lead. Patricia C. Wright is the founder and executive director of Centre ValBio, while Lovasoa Razafindravony is the head of environmental education. Amber D. Walker-Bolton is also the director of the non-profit Red Book Challenge Conservation Education Madagascar.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available upon reasonable request.

### ETHICS STATEMENT

Each of the research projects described in this commentary adhered to the American Society of Primatologists (ASP) Principles for the Ethical Treatment of Non-Human Primates. This research adhered to the legal requirements of the Malagasy Republic.

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