



Failure is the Greatest Teacher: Embracing the Positives of Failure in Primate Conservation

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Received: 12 April 2021 / Accepted: 27 April 2022
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Abstract

“Failure” is recognised as being vital for success in many fields but is seldom embraced in primate conservation or conservation more generally. In this paper, we use examples from the literature, particularly around reintroduction, to reflect on failure and consider the contribution it can make to primate conservation success. Barriers to acknowledging failure are highlighted and include concerns regarding reputational damage that impact on communication with funders, publishing, and discussing our projects more widely. We also discuss the need for a broader and adaptive approach to include multiple steps of experimentation, reflection, and subsequent learning. This process, which necessarily includes failures and the results of unintended consequences, will require primatologists to use a collaborative, interdisciplinary, and reflective approach to effectively address factors that contribute to failure, including those external to the traditional focus of primatologists. The paper concludes with specific recommendations for progressing in this area, including (i) Funding—funders to incorporate greater flexibility in response to project change and to specifically ask grantees to consider risk, failure, and lessons learnt, and funders and grantees to improve dialogue; (ii) Publishing—journals to have a section that considers failure and lessons learnt and, along with societies, to further engage with researchers from the Global South about the best ways to support with publishing; and (iii) Communication—primate conservationists to lead by example and reflect/discuss failure openly and to create spaces that encourage sharing of these topics. Whilst not exhaustive, we hope that these recommendations will contribute to developing a culture of constructive discussion around failure in primate conservation.

Keywords Lessons learnt · Success · Publishing · Funding · Adaptive management · Primate conservation

Handling Editor: Joanna Setchell

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It seems intuitive to try to learn from and share what does not work to make progress in conservation (Knight, 2006; Redford & Taber, 2000; Sutherland *et al.*, 2004). Indeed, the Open Standards for the Practice of Conservation (Version 4.0, CMP, 2020) specifically state that practitioners should commit to “share both successes and failures with other practitioners around the world” (p. 63). However, there has been little focus on failure in primate conservation, and conservation more generally; whilst some reports or published papers have touched on these issues, few have explicitly examined this topic or communicated findings within this framework in any depth (Catalano *et al.*, 2019; Knight, 2006; Meek *et al.*, 2015; Redford & Taber, 2000). It is possible that in conservation organisations, and project and field teams, this information is known but becomes part of “corporate memory” (P. Norvig in Firestein, 2016, p. 157), whereby it is acknowledged and discussed but not actually documented in any systematic way (Catalano *et al.*, 2019). However, in the long-term, this information will cease to exist and, without the detailed context, will lose its efficacy and power both within organisations and for the discipline more generally. Our paper considers the importance of embracing failure for primate conservation success. We also discuss some of the barriers and structural changes needed to improve in this area, specifically with respect to funding, publishing, communications, defining failure, and the lack of adaptive management and opportunities for reflection. We use examples, especially around primate reintroductions where some progress has been made, to draw out key points and recommendations.

What is Failure and How Can it Benefit Conservation?

“Failure” is an interesting term in the sense that it seems concrete and final, and yet it does not actually have any meaning in its own right. As “a lack of success” or “an unsuccessful person or thing” (Oxford Languages, 2022), failure’s very definition is dependent on success. The terms are intrinsically linked; therefore, it is vital to consider failure as an integral part of the process of achieving success in conservation.

Perhaps inevitably, there is a tendency to view failure only in the negative, as something to avoid at all costs. However, as Edmondson (2011, p. 2) outlined when discussing organisational life, it is more of a spectrum, “sometimes bad, sometimes inevitable, and sometimes even good.” It can drive positive change, and even a complete inability to achieve one’s goals can provide opportunities for reflection and evaluation that may have, ultimately, positive outcomes. In other arenas, outside of conservation, failure is built into the project management approach, e.g., industrial research and development, medicine, and the military (Catalano *et al.*, 2019), and it is a recognised and accepted part of the process of innovation. Indeed, Firestein (2016) describes failure and ignorance as “engines that propel science forward” (p. 3).

Failure also increases resilience, both personally and organisationally and, as such, is a feature of numerous motivational posters and shared quotations from leaders as diverse as politicians, scientists, and writers (Walter, 2013). The key narrative from these disparate sources is that failure is necessary and often inevitable; the measure of success is how one manages or “bounces back” from failure, rather than the event itself. It can be viewed as part of a “growth mindset,” an approach in

education and learning that suggests that individuals can develop intellectual abilities and insight, through effort (Catalano *et al.*, 2019; Yeager & Dweck, 2020). This enables the learner to better cope with challenges and failure compared with those with a “fixed mindset” who will try and avoid it. The word “fail” has even been rebranded as an acronym in some UK schools into a “First Attempt In Learning” to reinforce this approach. Failure also is a way to learn from our own work and that of others to ensure that we can improve and develop in a cost-effective manner, without the need to reinvent the wheel (Catalano *et al.*, 2019; Knight, 2009; Trayford & Farmer, 2012). This is especially important for conservation, because our “crisis discipline” (Soulé, 1985, p. 727) is limited in both time and resources (Gikoumi *et al.*, 2018; Redford & Taber, 2000); 65% of primate species are currently classified as Threatened (Fernández *et al.*, 2021).

Encouragingly, there has been a small but growing interest in the importance of failure in conservation in recent years from which we can learn and build upon. For example, the Cambridge Conservation Initiative (CCI) currently has a project focussed on “embracing failure in conservation,” which is looking to develop a taxonomy of common areas of failure using questionnaire data. Two of this paper’s authors (AW and GM) presented at webinars associated with the CCI study alongside Wildlife Conservation Society representatives who have created the Failure Factor Initiative, which aims to encourage open discussion around failures in conservation. These are positive developments but moving from recognising the need to consider mistakes and unintended consequences, to embracing and building the examination and discussion of failure into our daily work remains difficult.

Why Primate Conservation?

Many of the barriers and issues considered here will be relevant to conservation projects more broadly. However, there are several reasons why there is a case for focusing on the importance of discussing failure in primate conservation specifically. First, these animals often are flagship species; their physical similarities and appeal to humans are used to attract attention and funding to primate projects and general conservation goals (Koenig *et al.*, 2019; Smith *et al.*, 2012). Potential media attention and public awareness of these projects may make conservationists and researchers particularly reticent to discuss failure in this broader arena. Another reason to focus on primate conservation is that considering success and failure inevitably includes a reflection on power. “Academic” primate conservation is currently skewed to universities in the Global North where the most established and well-resourced primatology courses are based. This is an extraordinary situation given that nonhuman primates are generally not found in these countries, and it has a significant impact on publications and communication that will be discussed later in the paper (Setchell & Gordon, 2018). Perhaps the most persuasive argument for focussing on primate conservation, however, is precisely because it represents issues within conservation more broadly. Structural changes and culture shifts are difficult at the scale of international conservation with its disparate set of disciplinary foci

but using primate conservation to start and lead this process will have an impact more widely.

Barriers to Discussing Failure in Primate Conservation

1) Concerns regarding funding and communication with donors.

There are limited resources for primate conservation, and funding for applied projects can be highly competitive and often short-term. This creates pressure to report success to access the ongoing, long-term funding that is vital for these projects. Primatologists also may believe that smaller-scale approaches without novel methods will be more appealing to funders, because they are perceived as a “safe bet” and less likely to be subject to forces and uncertainty that can impact on the progress of longer-term projects. This avoidance of risk also has the unfortunate potential to remove experimentation, creativity, and ambition, and stifle innovation (Firestein, 2016; Hodge & Adams, 2016; Redford & Taber, 2000), all of which are critical if we are to find workable solutions to conserve primates going forward.

The impact of donor support and the importance of long-term commitment has been identified as key to the success of conservation projects (Bottrill *et al.*, 2011; Catalano *et al.*, 2019; Hodge & Adams, 2016; Meek *et al.*, 2015). The lack of success of a community-led reforestation campaign in northern Madagascar was found to be due, in part, to a repeated focus on short-term outputs rather than evaluation of the success of the project. For 16 years, trees were planted in and around Sahamalaza Iles-Radama National Park to increase habitat for highly threatened lemurs (Randriatahina, 2016 in Saunders, 2017). Unfortunately, these efforts were wholly unsuccessful (Saunders, 2017); however, as a result, conservationists have now completed a project that developed the use of experimental plots and an evidence-based approach to evaluate what works best in this environment (Cotton, 2021). Despite this, recent communications from potential donors for the reforestation project have still focussed on the metric of numbers of trees that can be planted rather than evaluating the success of their growth in the longer term. This demonstrates the need for greater communication with funders to support a switch from short-term outputs to a long-term, outcome-driven view to ensure they are supporting effective and impactful conservation interventions for primates. This will require funding with time for evaluation built in (Gikoumi *et al.*, 2018), not just for reflection but also for learning and development of the project in line with findings. Thus, funders need to embrace the need for evaluation and assessment within the lifetime of the grant, which includes examining failures and reflecting on what has (or has not) worked to adapt for eventual success (Bottrill *et al.*, 2011). However, this is not always possible with a lack of acceptance of adaptive approaches and/or inflexible funding structures that do not allow for amendments after the award is granted (Redford & Taber, 2000).

Evaluation of potential failure should be integral to project planning from the outset, and grantees should be asked to reflect on possible risks and issues. However, a recent survey in the philanthropic sector suggests that this does not happen

routinely: “When it comes to risk, most Funders don’t ask and most Grantees don’t tell” (Open Road Alliance, 2016, p. 5). Furthermore, requirements of key funders within primate conservation are not consistent regarding acknowledgement of failures. We initiated informal discussions with six funding bodies that support primate conservation. It revealed a mixed picture; only half used a reporting structure that explicitly required grantees to consider and reflect on failure and/or lessons learnt. Additionally, funders may routinely collect data in this area but not know how to make it accessible to other researchers or how to use it to benefit primate conservation more generally (S. Mickleburgh, Rufford Foundation, personal communication).

The Open Road Alliance (2016) also found that there was a disconnect between the perceptions of grantees and funders with the latter thinking that grantees are happier discussing the need for contingency funding to overcome project challenges than they are. Indeed, grantees were reluctant to discuss issues and obstacles due to fear that it would impact future funding. There is likely to be a similar situation in primate conservation; greater and more open communication between funders and grantees is needed for both parties to understand the needs and flexibility of the other. Whilst establishing this will take time, many of us are reviewers for grants and could encourage dialogue on this subject with funding bodies and the grantees themselves to ensure that potential risks and failures are acknowledged from the outset and effective evaluation is integrated into project design (Catalano *et al.*, 2019). The National Fish and Wildlife Federation (NFWF) have developed a risk assessment tool that could be adapted to support this (Lamoreux *et al.*, 2014).

2) Publishing and lack of communication around failure in primate conservation.

Publishing failures could be considered detrimental to individual and institutional success. Therefore, researchers are wary of reporting such findings especially at the early career stage (Catalano *et al.*, 2019; Knight, 2009; Meek *et al.*, 2015). Rather we frame our results as success, sometimes carefully crafting reports to focus on these elements (Redford & Taber, 2000; Bottrill *et al.*, 2011). Primate conservation researchers and practitioners based at academic institutions, particularly in the UK, often are required to focus on impact. Whilst this is a valuable endeavour, emphasis on providing evidence of positive effects makes it difficult to show failure and/or vulnerability. Furthermore, when it is reported, there also is a tendency to focus on “unpreventable failure” (Vernon & Myers, 2021), i.e., political upheaval, extreme weather conditions, or external impacts, because these are areas outside of our control. For example, Beck *et al.* (1991) reported issues regarding the reintroduction of golden lion tamarins *Leontopithecus rosalia* in the mid-1980s, particularly around the death of animals. This sharing of sensitive information should be applauded, but there was still a focus on human impact, despite their own results demonstrating that adaptation to the wild environment led to reduced survival rates (Kierulff *et al.*, 2012). The impact of insufficient training and post-release management has since been examined in

more detail (Stoinski *et al.*, 2003), but it is a useful example of “fundamental attribution error,” whereby we tend to overemphasise the impact of external factors and downplay our role if we fail (but do the reverse for others) (Edmondson, 2011). As Vernon and Myers (2021) outline, “avoidable failure” is the hardest to share but from which we have the greatest to learn. However, failure threatens our ego and often comes with blame (Edmondson, 2011). This self-censorship leads to what Redford and Taber (2000, p. 1568) describe as “a straitjacket of partial truths.” Progressing this will require more than individual attention but an organisational culture shift to accept, communicate, and share information about what has not worked. Interestingly, Balme *et al.* (2014) found that, using leopard projects as an example, findings from applied conservation with all its messy, real-life scenarios and challenges were generally published in higher-impact journals than basic research.

Encouraging primate conservationists to publish failure and lessons learnt also will require the support of key journals from our field. Whilst any forum for these debates is helpful, guidelines for reporting failure may need to be developed so that the results are systematic and useful for subsequent learning (Catalano *et al.*, 2019; Knight, 2006). In addition to agreed terminology, this should be supported by greater documentation of project planning and progress. Several assessments of unsuccessful primate reintroductions/translocations were limited by their lack of information regarding decision making and monitoring (Struhsaker & Siex, 1998; Meijaard & Nijman, 2000; Butynski & de Jong, 2011; for broader reviews across primatology see Beck, 2019 and Cheyne, 2009). Retrospective analysis can be very useful but is difficult if the context is lost; as Butynski and de Jong (2011) highlight in their assessment of a Zanzibar red colobus introduction, “it is not known what ‘success indicators’ [the organisation responsible for the introduction] had in mind” leaving the authors forced to evaluate success based on “probable” goals and presumed criteria for success (p. 169).

IUCN Global Translocation/Reintroduction Perspectives (Soorae, 2021) adopted a useful approach that could be developed and used to communicate failure more widely in primate conservation. They combine monitoring, evaluation, and communication of progress in a structured and accessible way. They are, however, variable in completion; some projects miss the opportunity to evaluate effectively and to reflect on their failures and success. A particularly good example is the report by Humle *et al.* (2013), which discusses the release of western chimpanzees in Guinea, West Africa. The project is reviewed in detail with reflection and frank reference to what is working and what is not, including consideration of technology, funding for monitoring, and human error.

Journal editors and reviewers also could request more information on monitoring and evaluation and routinely examine how researchers have integrated failure and innovation into their project design. Methods should be given in detail and issues with technology or analysis outlined, rather than a cursory mention of the model used (Catalano *et al.*, 2019; Trayford & Farmer, 2012). For example, it has been highlighted how little focus there is on the functionality of commonly used technology and approaches in primate conservation papers, despite frequent issues with these methods (Dore *et al.*, 2020). Reviews do happen (Cunningham

et al., 2015; Dore *et al.*, 2020; Trayford & Farmer, 2012) but rely on full disclosure by researchers and practitioners. For example, the discussion of the failure of GPS collars to drop off in a study on the impact of tourist provisioning of long-tailed macaques (Hansen, 2019) contributed to a review of the efficacy of the use of these collars in primatology and the recommendation to use biodegradable weak links when using this technology (Dore *et al.*, 2020). This information is useful to researchers and practitioners, because it can form the basis of best-practice guidelines and improve outcomes for primate conservation more generally. It also can be included in accessible databases, such as Conservation Evidence (<https://www.conservationevidence.com/>) to support evidence-based decision making.

Even when failure is discussed, dissemination of results can be an issue. While there is a need for results to be communicated beyond peer-reviewed journals, the current model for sharing the results of valuable information from conservation projects is within the grey literature, which also can be difficult to find, search, and access. This can create immense barriers to knowledge-sharing in situations where decisions need to be made quickly (Meek *et al.*, 2015). Furthermore, domination of the published literature by researchers from the Global North (Catalano *et al.*, 2019; Maas *et al.*, 2021) is a wider issue in conservation. There needs to be greater consideration of how we support conservationists from primate range-states to report their results at all stages of the failure-success lifecycle of the project. This has been highlighted and discussed within primate conservation, but little progress has been made in this area to date. There is an urgent need to try and correct this bias and to create a “safe space” (particularly within academia) where early career researchers and those from the Global South in particular feel comfortable to discuss what has not gone well and lessons learnt, in addition to project success.

This broader communication and space for discussion could be supported by our primate societies and associated conferences. Other disciplines have regular, informal gatherings specifically to discuss failures; these are not necessarily public but allow for frank sharing of experiences and do, ultimately, impact practice (Firestein, 2016). Whilst workshops on evaluating specific tools or approaches are held, i.e., Cunningham (Cunningham *et al.*, 2015) has led sessions at three International Primatological Society (IPS) meetings for capture methods in recent years, national primate societies and the IPS congress could further support with space for more general reflections on failure without blame, fear, or ego. Examination of failure also may take place more informally and on platforms that are suited to the discussion of sensitive topics; for example, CARE International have developed the Failing Forward podcast to share experiences and learn from failure.

It is important to destigmatize failure; key individuals from within the discipline, funders, universities, publishers, etc. will need to show leadership in this area (Edmondson, 2011). We need a “safe-fail” culture (Catalano *et al.*, 2019; Edmondson, 2011; Knight, 2006, 2009; Meek *et al.*, 2015; Redford & Taber, 2000)—a community that embraces failure as a route to learning and is willing to discuss it openly and constructively. Although this is not easy, because many people fear acknowledging the term, there is an appetite for these discussions and

our paper was, encouragingly, the result of conversations held at the EFP-PSGB conference 2019. However, whilst focussing on dissemination and communication is important, particularly for those working in “academic” primate conservation, addressing failure in the planning and management of our projects will be key to enable progress in this area.

3) Inadequate consideration of the definition of failure.

A key consideration when encouraging the examination of failure in primate conservation is how it is defined. In an example documenting the failure of a project designed to reduce crop damage by primates in Uganda, evaluation revealed that stakeholders had different views of success, which would have made it very difficult for the project to work in the long-term. For example, farmers considered the killing of baboons and selling the meat to be a key benefit of the intervention (a live trap), rather than the prevention of crop damage. Thus, many local people saw the traps as ineffective and ceased to maintain them when baboons began to avoid the area, despite this being an anticipated benefit and perceived success of the trap by the project staff who installed them (Webber *et al.*, 2007). Stakeholder identification and engagement, along with “people skills” have been highlighted as a key factor for conservation success; their absence is predicted to lead to project failure (Catalano *et al.*, 2019; Gikoumi *et al.*, 2018; Knight, 2006; Sayer *et al.*, 2013). In the case of the live-trap project, local people were involved, but the trap design was developed externally. Much of the decision-making, and therefore responsibility, was perceived to lie with local elites and external actors (Webber *et al.*, 2007). This led to a lack of ownership and maintenance of the traps. Furthermore, the intervention was conducted without prior evaluation of community support, perceptions, and expectations, which are important for success (Bennett, 2016; Sayer *et al.*, 2013).

In addition to the issues around defining failure/success, we need to consider “who” defines whether something has worked or not. Who has/should have the power to make this decision? Massarella *et al.* (2020) highlights this when examining the evaluation of a REDD+ pilot project in Tanzania. The language and framing of the evaluation were grounded in the technical elements of the project and the fact that it was a test site for the REDD+ process and “trialing of REDD+ payments to test equitable benefit-sharing mechanisms” (p. 4). However, local people focussed on the wider impacts of the project, and some were disappointed that payments ceased despite their commitment to the programme. Multiple meanings of this project as a “pilot” meant that the voices of the local community were lost in the evaluation process. This demonstrates the need for meaningful engagement of all stakeholders so that understandings of success indicators for failure and success, and exit strategies, are acknowledged from the outset (Gikoumi *et al.*, 2018; Ruiz-Miranda *et al.*, 2020; Sayer *et al.*, 2013).

As has been found in research in marine conservation (Gikoumi *et al.*, 2018), primate conservation will require a broader focus to effectively build in levels of evaluation, modification, and learning from failure. It will require us to be

more collaborative and to look beyond our own discipline to consider innovative approaches to some of the complex, urgent conservation issues that we face. This will help to go beyond “first-order reasoning” when analysing failure (Catalano *et al.*, 2019; Edmondson, 2011). It is vital that primatologists look beyond their study species to examine projects from a perspective that considers conservation issues more widely, alongside the needs of local people (Bennett, 2016; Meek *et al.*, 2015; Sayer *et al.*, 2013). Understanding of the local and national context, alongside meaningful participation by communities, requires collaborations between conservationists and economists, historians, anthropologists, those working in development and social care, wildlife veterinarians, businesses, etc., in addition to co-researchers and practitioners who are from the area under study. Indeed, primate conservation projects should ideally be led by local people (Kleiman *et al.*, 1986), native speakers who understand the local context, and our discipline needs to make more progress in supporting and building capacity in these areas. This interdisciplinary and collaborative working is particularly important when discussing failure, because it will require a good understanding of cultural norms and communication across the project team. For example, in some cultures, it may not be appropriate or accepted to be seen to shame or embarrass others. Thus, reporting on failures, particularly if it may be perceived as being critical of others or reflecting badly on those who have supported the project, could have significant repercussions for local researchers and communities. It also is important to consider manufacturers and external partners; for example, researchers may not feel comfortable reporting failures with technology if they have agreements in place for reduced prices and support. This does not mean that failure should not be examined, but it is vital to ensure that all involved in the project have been part of discussions and given approval before failure is reported. This dialogue preferably should be part of the project process and revisited throughout.

4) Lack of adaptive management with built-in opportunities for reflection.

Perhaps it is the binary nature of the term that promotes a fear of failure and does not appear to allow for a more nuanced approach. There is a need to move away from this dual framing (Lamoreux *et al.*, 2014), as complex conservation problems require acceptance of multiple achievements and challenges, and a process of learning; there is unlikely to be one solution (Catalano *et al.*, 2019; Gikoumi *et al.*, 2018). In fact, solutions may change over time for the same problem, as local circumstances evolve. It also is harder to define success and failure within projects with multiple stakeholders where trade-offs and compromise may be required (Sayer *et al.*, 2013). As mentioned previously, conservation outcomes should be measured in the long-term, but there needs to be detailed planning and ongoing reflection and evaluation (Bottrill *et al.*, 2011). It is more useful to build in milestones of success and reflect on when challenges appear in this process, rather than just focussing on an end result (Lamoreux *et al.*, 2014; Meek *et al.*, 2015). An adaptive approach (as outlined in the Conservation Open Standards – CMP, 2020) requires this evidence-based feedback on an action and subsequent

evaluation for learning and progress rather than a binary determination of success or fail. Objective evaluation that builds in failure is key for evidence-based conservation (Sutherland *et al.*, 2004). These considerations should also go together with planning effective exit strategies at the outset of project development, should you exhaust all possible solutions and still face failure, or succeed in all your goals (Edmondson, 2011; Lamoreux *et al.*, 2014; Ruiz-Miranda *et al.*, 2020).

The golden lion tamarin conservation programme often is described as a “conservation success story” (Kierulff *et al.*, 2012) but is actually a useful example of a long-term conservation project with a flagship primate and multiple, well-documented failures and successes (Beck *et al.*, 1991; Kleiman *et al.*, 1986). Despite its celebrated status and success in areas including reserve protection, stakeholder engagement, training of conservation professionals, captive breeding, and reintroduction, the project has faced significant challenges. It is currently not clear whether it will be possible to reach its goal of “2,000 golden lion tamarins in 25,000 hectares of protected and connected Atlantic Forest” by 2025 (Associação Mico-Leão-Dourado (AMLD)/Save the Golden Lion Tamarin SGLT, 2020, Kierulff *et al.*, 2012). However, its long duration has allowed for evaluation, reflection, adaptation, and communication of progress. For example, little had been recorded regarding reintroductions before the golden lion tamarin project, and there were no guidelines for pre/post release training at the time (Kleiman, 1989; Stoinski *et al.*, 2003). It was important that the project used an adaptive and iterative approach to manage and learn from uncertainty (Catalano *et al.*, 2019; CMP, 2020; Hodge & Adams, 2016; Lamoreux *et al.*, 2014; Sayer *et al.*, 2013), i.e., stop provisioning in response to reintroduced animals eating more wild foods (Kierulff *et al.*, 2012).

The project also has clear criteria for success, and in association, an exit strategy was formed from the early stages of the project (Ruiz-Miranda *et al.*, 2020). As Ruiz-Miranda *et al.* (2020) outlined, this proved essential, because there have been multiple handovers and transition plans due to cessation of funding with different donors to date. Whilst the captive breeding and reintroduction of tamarins was not the only criteria for success, it became a “springboard” for funding and support of the project more widely (and less attractive elements) (Kleiman *et al.*, 1986). Reproduction in the wild was a key success indicator for this project, and Kleiman (1989) has discussed how reintroductions can be considered a success even if all the reintroduced animals die, if other conservation goals of the project are met. One suspects that continued support would have been difficult with the death of all animals, and it demonstrates the difficult balance between communicating failures and consideration of the perceptions of local stakeholders, funders, and the public more generally. However, this challenge also reflects the need for greater discussion around the measurement of success and failure so that these criteria are better understood. The golden lion tamarin conservation project demonstrates the complexity of a long-term conservation project and should be examined as a model for the reality of primate conservation with flagship species, multiple successes and failures, and ongoing uncertainty.

Our examples highlight the need to offer not only more training opportunities for primatologists on managing with an adaptive approach that accepts uncertainty and builds in success and failure (Bottrill *et al.*, 2011; Hodge & Adams, 2016; Meek

et al., 2015; Sayer *et al.*, 2013), but also on how they can reflect and communicate these findings honestly and without bias. Being reflective is a skill that requires training; thinking and writing in this way is not automatically embraced within primatology or conservation science more generally. Thus, we need to consider how failure is taught within an academic setting (Firestein, 2016). To allow for a focus on limitations and improvements rather than just outcomes, reflections of failures and lessons learned should go beyond course content and be embedded in our assessments. Of course, any training should be wider than just academic, and it is important to have more informal and accessible opportunities (i.e., webinars, mentorships, etc.) as part of primate conservation.

Being reflective also requires objectivity and consideration beyond the self; it is easy to become attached to a project or an idea even when it is clearly not working. For example, the original title for this paper was “‘The greatest teacher, failure is’: embracing the positives of failure in primate conservation.” The opportunity to use a quotation from a well-loved film character in an academic paper was too good to miss. However, as pointed out by one of our reviewers, this language is not accessible to all and is especially difficult for nonnative English speakers. Because the goal of the manuscript was to communicate widely, we had failed. Whilst a superficial example, it gave us the opportunity to reflect on our failure and the reasons for our attachment.

Conclusions

The following are recommendations for integrating and communicating failure in primate conservation. We reiterate that everyone involved in a project should participate in the discussion around failure and approve the sharing of information before it is reported.

- 1) Funders and grantees should communicate often and meaningfully with each other. Donors should consider ways to allow greater flexibility regarding grant funding in response to challenges.
- 2) Funders should include a section in applications that considers risk and a section in project reports that specifically asks grantees to consider failures and lessons learnt; the Critical Ecosystem Partnership Fund (2022) has created a useful example of a guideline.
- 3) Journals should have a dedicated section that includes lessons learnt, and authors should be encouraged to use standardised keywords so that “failures” can be found easily by those wanting to learn about them.
- 4) Journals and primate societies should engage with researchers from the Global South to consider how to best support publishing from these regions, both regarding failure and more generally. This could include mentoring schemes, alongside actively promoting diversity. Whilst IPS regularly run workshops on publishing (and applying for funding) at meetings, meetings themselves can be cost-prohibitive for many; there is still much progress to be made in this area. Thus, acces-

- sible and alternative sharing platforms for other forms of dissemination should be created, and these should be publicised widely, i.e., websites, social media, etc.
- 5) Primatologists and others associated in primate conservation should lead by example, reflect on their work, and share experiences of failure in a constructive way.
 - 6) Those working in primate conservation at all scales (i.e., lab, field teams, organisations, societies) should create safe spaces to discuss failure—conferences could dedicate specific time to this importance practice, but other accessible spaces should be established as well.
 - 7) Primate societies, universities, and other organisations involved in teaching primate conservation should offer opportunities for training in reflective thinking and adaptive management.

More than 20 years ago, Redford and Taber (2000, p. 1568) wrote that “the long-term success of conservation depends on our willingness not only to admit our failures but to share them as well.” We have seen little progress in this area and still face significant conservation challenges. This may not be due to a lack of commitment per se, but rather because it is difficult and requires a reframing of how we consider failure (Edmondson, 2011). We hope that we can create a space and a culture within primatology that enables the discussion of these issues going forward to improve the future for non-human primates and those living alongside them.

Acknowledgments Thanks to all who presented and discussed the topic of “What Works, and What Doesn’t Work? The Challenge of Creating Effective Applied Conservation Research in Human-Modified Habitats” at EFP-PSGB 2019. We have also enjoyed the opportunity to discuss these topics with other conservationists at the Cambridge Conservation Initiative (CCI) Embracing Failures Project and subsequent webinars and workshops. Thanks to Josephine Billany and Emma Baker for supporting with the literature review. We are grateful for the insightful comments from our three anonymous reviewers which considerably improved the focus and quality of this paper.

Author Contributions AW and GM formulated the idea. AW wrote the manuscript. GM and SC provided editorial advice.

Declarations

Ethical Note Ethics approval is not applicable for the paper.

Data Availability Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

Conflict of Interest The authors declare that they have no conflict of interest.

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References

- Associação Mico-Leão-Dourado (AMLD)/Save the Golden Lion Tamarin (SGLT). (2020). *Golden Lion Tamarin (Leontopithecus rosalia) Strategic Plan 2016-2025*, Annual Progress Report.
- Balme, G. A., Lindsey, P. A., Swanepoel, L. H., & Hunter, L. T. B. (2014). Failure of research to address the rangewide conservation needs of large carnivores: Leopards in South Africa as a case study. *Conservation Letters*, 7(1), 3–11.
- Beck, B. B. (2019). *Unwitting Travellers: a history of primate reintroduction*. Salt Water Media.
- Beck, B. B., Kleiman, D. G., Dietz, J. M., Castro, I., Carvalho, C., Martins, A., & Rettberg-Beck, B. (1991). Losses and reproduction in reintroduced golden lion tamarins *Leontopithecus rosalia*. *Dodo, Journal of Jersey Wildlife Preservation Trust*, 27, 50–61.
- Bennett, N. J. (2016). Using perceptions as evidence to improve conservation and environmental management. *Conservation Biology*, 30(3), 582–592.
- Bottrill, M. C., Hockings, M., & Possingham, H. P. (2011). In pursuit of knowledge: Addressing barriers to effective conservation evaluation. *Ecology and Society*, 16(2), 14.
- Butynski, T. M., & de Jong, Y. A. (2011). Zanzibar Red Colobus on Pemba Island, Tanzania: population status 38 years post-introduction. In P. S. Soorae (Ed.), *Global re-introduction perspectives: 2011. More case studies from around the globe* (pp. 168–174). IUCN/SSC Re-introduction Specialist Group and Abu Dhabi, UAE: Environment Agency-Abu Dhabi.
- Catalano, A. S., Lyons-White, J., Mills, M. M., & Knight, A. T. (2019). Learning from published project failures in conservation. *Biological Conservation*, 238, 108223.
- Cheyne, S. M. (2009). The Role of Reintroduction in Gibbon Conservation: opportunities and challenges. In S. Lappan, & D. J. Whittaker (Eds.), *The gibbons. Developments in Primatology: progress and prospects*. Springer Science.
- Conservation Measures Partnership – CMP. (2020). *Open Standards for the Practice of Conservation v4*.
- Cotton, S. (2021). *Growing links for lemurs: towards an effective reforestation of Sahamalaza-Iles Radama National Park*. Final Report. IUCN.
- Critical Ecosystem Partnership Fund (2022). Lessons Learned Guidelines – English. <https://www.cepf.net/sites/default/files/cepf-lessons-learned-guidelines-english.pdf>. Accessed 18 February 2022
- Cunningham, E. P., Unwin, S., & Setchell, J. M. (2015). Darting primates in the field: A review of reporting trends and a survey of practices and their effect on the primates involved. *International Journal of Primatology*, 36(5), 894–915.
- Dore, K. M., Hansen, M. F., Klegarth, A. R., Fichtel, C., Koch, F., Springer, A., Kappeler, P., Parga, J. A., Humle, T., Colin, C., Raballand, E., Huang, Z.-P., Qi, X.-G., Di Fiore, A., Link, A., Stevenson, P. R., Stark, D. J., Tan, N., Gallagher, C. A., et al (2020). Review of GPS collar deployments and performance on nonhuman primates. *Primates*, 61(3), 373–387.
- Edmondson, A. C. (2011). Strategies for learning from failure. *Harvard Business Review* [online] Available at <https://hbr.org/archive-toc/BR1104>. Accessed 12 May 2022
- Fernández, D., Kerhoas, D., Dempsey, A., Billany, J., McCabe, G., & Argirova, E. (2021). The current status of the world's primates: Mapping threats to understand priorities for primate conservation. *International Journal of Primatology*, 1–25. <https://doi.org/10.1007/s10764-021-00242-2>.
- Firestein, S. (2016). *Failure: why science is so successful*. Oxford University Press.
- Gikoumi, S., McGowan, J., Mills, M., Beger, M., Bustamante, R. H., Charles, A., Christie, P., Fox, M., Garcia-Borboroglu, P., Gelcich, S., Guidetti, P., Mackelworth, P., Maina, J. M., McCook, L., Micheli, F., Morgan, L. E., Mumby, P. J., Reyes, L. M., White, A., et al (2018). Revisiting “success” and “failure” of marine protected areas: A conservation scientist perspective. *Frontiers in Marine Science*, 5, 223.
- Hansen, M. F. (2019). *Ecology and conservation of long-tailed macaques in a human-macaque interface*. PhD thesis. Copenhagen Zoo and University of Copenhagen. Copenhagen: Denmark.
- Hodge, I., & Adams, W. M. (2016). Short-term projects versus adaptive governance: conflicting demands in the management of ecological restoration. *Land*, 5, 39.

- Humle, T., Colin, C., Laurans, M., Danaud, C., & Raballand, E. (2013). Release of the Western subspecies of chimpanzee in Guinea, West Africa. In: Soorae, P. S. (Eds.), *Global re-introduction perspectives: 2013. Further case studies from around the globe*. IUCN/SSC Re-introduction Specialist Group and Abu Dhabi, UAE: Environment Agency-Abu Dhabi. xiv + 282 pp.
- Kierulff, M. C. M., Ruiz-Miranda, C. R., Procopio de Oliveira, P., Beck, B. B., Martins, A., Dietz, J. M., Rambaldi, D. M., & Baker, A. J. (2012). The golden lion tamarin *Leontopithecus rosalia*: a conservation success story. *International Zoo Yearbook*, 46, 36–45.
- Kleiman, D. G. (1989). Reintroduction of Captive Mammals for Conservation: guidelines for reintroducing endangered species into the wild. *BioScience*, 39(3), 152–161.
- Kleiman, D. G., Beck, B. B., Dietz, J. M., Dietz, L. A., Ballou, J. D., & Coimbra-Filho, A. F. (1986). Conservation Program for the Golden Lion Tamarin: captive research and management, ecological studies, education strategies and reintroduction. In K. Benirschke (Ed.), *Primates: the road to self-sustaining populations* (pp. 959–979). Springer-Verlag.
- Knight, A. T. (2006). Failing but Learning: Writing the Wrongs after Redford and Taber. *Conservation Biology*, 20(4), 1312–1314.
- Knight, A. T. (2009). Is conservation biology ready to fail? *Conservation Biology*, 23(3), 517.
- Koenig, C. M. R., Koenig, B. L., & Sanz, C. M. (2019). Overrepresentation of flagship species in primate documentaries and opportunities for promoting biodiversity. *Biological Conservation*, 238, 108188.
- Lamoreux, J., Chatwin, A., Foster, M., Kakoyannis, C., Vynne, C., Wolniakowski, K., & Gascon, C. (2014). Overcoming the funder's dilemma. *Biological Conservation*, 175, 74–81.
- Maas, B., Pakeman, R. J., Godet, L., Smith, L., Devictor, V., & Primack, R. (2021). Women and global South strikingly underrepresented among top-publishing ecologists. *Conservation Letters* 14(4): e12797.
- Massarella, K., Sallu, S. M., & Ensor, J. E. (2020). Reproducing Injustice: why recognition matters in conservation project evaluation. *Global Environment Change*, 65, 102181.
- Meek, M. H., Wells, C., Tomalty, K. M., Ashander, J., Cole, E. M., Gille, D. A., Putman, B. J., Rose, J. P., Savoca, M. S., Yamane, L., Hull, J. M., Rogers, D. L., Rosenblum, E. B., Shogren, J. F., Swaisgood, R. R., & May, B. (2015). Fear of failure in conservation: The problem and potential solutions to aid conservation of extremely small populations. *Biological Conservation*, 184, 209–217.
- Meijaard, E., & Nijman, V. (2000). The local extinction of the proboscis monkey *Nasalis larvatus* in Pulau Kaget Nature Reserve, Indonesia. *Oryx*, 34(1), 66–70.
- Open Road Alliance. (2016). *Contingency Funding in Philanthropy: open road alliance survey*. [online] Available at: <https://openroadalliance.org/resource/risk-in-philanthropy-funders-don't-ask-non-profits-don't-tell-2015-survey-report/>. Accessed 12 May 2022
- Oxford Languages (2022). *Failure*. Oxford University Press.
- Redford, K. H., & Taber, A. (2000). Writing the wrongs: developing a Safe-Fail Culture in conservation. *Conservation Biology*, 14(6), 1567–1568.
- Ruiz-Miranda, C. R., Vilchis, L. I., & Swaisgood, R. R. (2020). Exit strategies for wildlife conservation: Why they are rare and why every institution needs one. *Frontiers in Ecology and the Environment*, 18(4), 203–210.
- Saunders, J. E. (2017). Is reforestation an effective conservation strategy for the threatened vertebrate fauna of the Sahamalaza Peninsular, northwest Madagascar? MSc(R) thesis, University of Bristol, UK.
- Sayer, J., Sunderland, T., Ghazoul, J., Pfund, J.-L., Sheil, D., Meijaard, E., Venter, M., Klintuni Boedihartono, A., Day, M., Garcia, C., van Oosten, C., & Buck, L. E. (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences*, 110(21), 8349–8356.
- Setchell, J. M., & Gordon, A. D. (2018). Editorial: editorial practice at the *International Journal of Primatology*: The roles of gender and country of affiliation in participation in scientific publication. *International Journal of Primatology*, 39, 969–986.
- Smith, R. J., Verissimo, D., Isaac, N. J. B., & Jones, K. E. (2012). Identifying Cinderella species: Uncovering mammals with conservation flagship appeal. *Conservation Letters*, 5, 205–212.
- Soorae, P. S. (Ed.) (2021). *Global conservation translocation perspectives: 2021. Case studies from around the globe*. Gland, Switzerland: IUCN SSC Conservation Translocation Specialist Group, Environment Agency - Abu Dhabi and Calgary Zoo, Canada. xiv + 353 pp.
- Soulé, M. E. (1985). What is Conservation Biology? *Bioscience*, 35(11), 727–734.

- Stoinski, T. S., Beck, B. B., Broomsith, M. A., & Maple, T. L. (2003). A behavioural comparison of captive-born reintroduced golden lion tamarins and their wild-born offspring. *Behaviour*, *140*(2), 137–160.
- Struhsaker, T. T., & Siex, K. S. (1998). Translocation and Introduction of the Zanzibar Red Colobus Monkey: success and failure with an endangered island endemic. *Oryx*, *32*(4), 277–284.
- Sutherland, W. J., Pullin, A. S., Dolman, P. M., & Knight, T. M. (2004). The need for evidence-based conservation. *Trends in Ecology and Evolution*, *19*(6), 305–308.
- Trayford, H. R., & Farmer, K. H. (2012). An assessment of the use of telemetry for primate reintroductions. *Journal for Nature Conservation*, *20*(6), 311–325.
- Vernon, N., & Myers, J. (2021). Acknowledging and learning from different types of failure. *Environmental Health Insights*, *15*, 1–4.
- Walter, E. (2013). *Thirty powerful quotes on failure*. Forbes. Available at <https://www.forbes.com/sites/ekaterinawalter/2013/12/30/30-powerful-quotes-on-failure/>. Accessed 16 February 2022
- Webber, A. D., Hill, C. M., & Reynolds, V. (2007). Assessing the failure of a community-based Human-Wildlife Conflict Mitigation Project in Budongo Forest Reserve, Uganda. *Oryx*, *41*(2), 177–184.
- Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies. *American Psychologist*, *75*(9), 1269–1284.

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