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Advocacy and Activism as Essential Tools in Primate Conservation

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Abstract

Primates are facing a global extinction crisis driven by an expanding human population, environmental degradation, the conversion of tropical forests into monocultures for industrial agriculture and cattle ranching, unsustainable resource extraction, hunting, climate change, and the threat of emerging zoonotic diseases. And, although many primate scientists have dedicated their careers to conservation, 65% of primate species are listed as Vulnerable, Endangered, or Critically Endangered, and >75% are experiencing a population decline. Projections indicate that by the end of the century, an additional 75% of the area currently occupied by wild primates will be lost to agriculture. Clearly, we are losing the battle and must change business-as-usual if we are to protect wild primates and their habitats. This article is a call to action. Primate societies and their membership need to expand their engagement in scientific advocacy and scientific activism designed to educate, inspire, organize, and mobilize global citizens to join together, lobby business leaders and politicians in both primate habitat countries and in consumer nations, boycott forest-risk products, participate in demonstrations and letter writing campaigns, and use social media to effect transformational change. We are the experts, and the more we and our professional organizations drive the public policy debate on wildlife conservation and environmental justice, the more successful we will be in protecting the world's primates from extinction. The time to act is now!

Keywords Environmental justice · Primate extinction crisis · Scientific activism

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"It is time to shift the question from *whether* conservation professionals should be advocates to *how* the expertise of scientists and professional societies can be given greater weight in ongoing discussions regarding policy and management actions that affect biological diversity" (Scott and Rachlow 2011, p. 2. *Emphasis mine*).

Introduction

A May 2019 report of the United Nations Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concluded that "The biosphere, upon which humanity depends, is being altered to an unparalleled degree across all spatial scales. Biodiversity—the diversity within species, between species and of ecosystems—is declining faster than at any time in human history" (IPBES 2019). Some 1 million animal and plant species are currently threatened with extinction, including 65% of the world's 514 nonhuman primate species (strepsirrhines, tarsiers, monkeys, and apes) (Carvalho *et al*. 2019; Estrada *et al.* 2017; IUCN Red List 2020). In 2015, 50.2% of primate species were listed as threatened (Rylands and Mittermeier 2017). This estimate represents an increase of 15% in less than 5 years. Projections indicate that unless transformational change occurs and effective policies and practices are put in place to limit the expanding global trade in forest-risk commodities (commodities that result in the deforestation and degradation of tropical ecosystems); reduce our dependence on fossil fuels and meat-based diets; increase food security for people in the poorest nations of the world; and commit to carbon sequestration, green energy, a dramatic reduction in greenhouse gases, and reforestation, the world will be witness to a mass primate extinction event by the end of this century (Díaz *et al.* 2019; Estrada *et al.* 2018, 2019, 2020).

Based on a business-as-usual exploitation model (i.e., continue our current pattern of unsustainable land-use practices), 10 of 18 primate-rich countries (e.g., countries that contain at least 10 species of wild primates) in the world are expected to have 70–100% of their primate species extinct or threatened with extinction by the year 2100 (Estrada *et al*. 2019; Table I). Of the remaining eight countries, five are expected to have at least 50% of their primate species extinct or on the verge of extinction by the end of the century (Table I).

Given the critically important roles that primates and other tropical fauna play in forest regeneration (Estrada *et al*. 2017), the fact that >75% of food crops globally are dependent on animal pollinators, and that >4 billion people worldwide continue to rely on medicinal plants and other natural products for their medical needs (FAO 2019), we must act now to safeguard threatened and endangered species and ecosystems through actions that promote environmental sustainability and green technologies and that balance the needs of the human and nonhuman communities (Diaz *et al*. 2019; Estrada *et al*. 2018, 2019, 2020). Moreover, as evidenced by the ongoing COVID-19 pandemic, as we continue to degrade ecosystems and erode natural barriers to human–animal contact, emerging zoonotic diseases will find new hosts; disrupt civil society; increase food insecurity, poverty, unemployment, and population displacement; and result in the deaths of millions of people worldwide (Carlson *et al*. 2020; Gillespie and

Table I Predicted effects of expanded land conversion to produce forest-risk commodities on the percentage of primate species threatened with extinction or extinct by the year 2100

COUNTRY	No of species	2016	2050	2100
Brazil	116	33	45	***52***
Madagascar	103	**87**	**100**	**100**
Indonesia	56	***67***	**76**	**95**
DRC	49	15	29	35
Peru	44	25	26	30
Colombia	37	48	***51***	***56***
Cameroon	32	28	43	***55***
Tanzania	26	24	34	38
Nigeria	26	42	46	***50***
China	25	**80**	**85**	**97**
Equatorial Guinea	25	36	***57***	**75**
Vietnam	22	**84**	**98**	**100**
Malaysia	20	**70**	**84**	**100**
Gabon	20	30	42	***54***
Lao Republic	18	**83**	**100**	**100**
Thailand	18	***61***	**75**	**85**
Myanmar	17	***65***	**88**	**100**
Cambodia	10	**88**	**100**	**100**

Based on a business-as-usual model and adapted from Estrada *et al.* (2019). Text in **red bold** highlights countries with >70% of their primate species threatened with extinction at present or expected in the future. Text in **blue bold** and italicized highlights countries with between 50% and 67% of their primate species threatened with extinction currently or expected in the future. The modeling approached used in this analysis included six shared socioeconomic pathway (SSP) and representative concentration pathway (RCP) models based on information from the land-use harmonization data set (https://luh.umd.edu/data.shtml). Here we present the results of the business as-usual model for 2050 and 2100. This scenario assumes "continued economic development along historical patterns such that meat and food consumption converge slowly toward higher levels, trade is largely regionalized, and crop yields in low-income regions catch up with high-income nations. In the model, land use changes, however, are incompletely regulated, with continued deforestation (although at a declining rate) between 2016 and 2050" (Estrada *et al.* 2019, p. 25).

Leendertz 2020; Naidoo and Fisher, 2020). Thus, primate conservation and environmental protection are critical matters of global public interest and concern.

A shared goal of primatologists who work with captive and/or wild primate populations should be to combat the impending primate extinction crisis. And so, the questions we face are: What actions should we take? How can we as individuals, and collectively as members of professional scientific societies, educational institutions, and primate centers act effectively to protect the world's primates and their habitats? What role should primatologists and primatological societies play in educating the public and decision-makers? How can we most effectively use our collective expertise and voice to help shape public opinion and public policy? And, as scientists, what are our professional responsibilities to engage in advocacy and activism? It is the aim of this article to encourage primate scientists and their professional societies and organizations worldwide to play a greater role in advocacy and activism for transformational change

that is needed to protect biodiversity and natural ecosystems and save the world's primates from extinction.

Brief History of Conservation in Primatology

Primatologists have always had a strong commitment to conservation, and there are many distinguished primate scientists who have dedicated their professional careers to protecting the world's primates. These efforts include collaborating with nongovernmental organizations (NGOs), and international research teams; establishing long-term field sites; committing to student training, especially students from primate habitat countries; and designing stakeholder partnerships and coalitions that benefit the well-being of local human communities and local primate communities (Chapman and Peres 2001; El Bizri *et al*. 2020; Estrada *et al*. 2012; Garber *et al*. 2010; Horwich *et al*. 2013; Kyes 2011; Santika *et al*. 2017; Strier 2010, 2011; Wright *et al*. 2012). In addition, there are a set of distinguished naturalists and scientific communicators, for example, Jane Goodall and David Attenborough, who have played prominent roles as advocates and activists in educating and inspiring the public worldwide to promote conservation, the ethical treatment of animals, environmental justice, ecosystem's health, human rights, and in helping to improve the lives of people in poor and food insecure communities (BBC 2016; Lindsey and Goodall 1999).

One of the earliest publications to address primate conservation appeared in a special issue of the *Annals of the New York Academy of Sciences* in 1962. In an article titled "The Need for a New Conservation Policy for Wild Primates," Francois Bourlière noted that several primate species had experienced a significant population decline due to human activities such as deforestation, the grazing of cattle, hunting, and capture for the live animal trade. He warned, "there is no doubt that in a few decades they [*primates*] will have disappeared completely from most of their present areas of distribution" (Bourlière 1962, p. 185). The article ended with a warning that "the problem is too urgent and too serious for the discussion to be postponed to a future occasion" (Bourlière 1962, p. 189). Although Bourlière did not present quantitative information on primate population decline, he cited information obtained by Charles Southwick in India and Panama; observations by George Schaller in the Virungas, DRC; his own experience in Madagascar; and the importance of organizations like the World Wildlife Fund in developing policies for protecting wild primates. In the 1970s, several edited volumes were published that focused on primate conservation. These included *Lemur Biology* (Tattersal and Sussman 1975), *Neotropical Primates: Field Studies and Conservation* (Thorington and Heltne 1976), *Primate Conservation* (Rainer and Bourne 1977), and *The Conservation and Biology of the Callitrichidae* (Kleiman 1978). These, along with the creation of the Primate Specialist Group in 1977 by Russell Mittermeier (http://www.primate-sg.org/who_we_are_psg/) and Southwick and Blood's (1979) review paper "Conservation and Management of Wild Primate Populations," highlighted the concerns of many primatologists that wild primate populations and their habitats were declining rapidly.

However, field primatology is a relatively young science (Sussman 2011), and possibly in our enthusiasm to advance our theoretical understanding and collect comprehensive data on the behavior, ecology, biology, mating system, social

organization, cognition, evolution, and adaptations of a broad set of primate taxa, we assumed that this new knowledge was required before we could effectively conserve and protect wild primate populations. As a discipline, we continued to collect these data and were slow to confront the severity of this conservation crisis, even in the face of expanding deforestation and environmental degradation. For example, in the decade of the 1980s, on average only 1% of the manuscripts published per year in the two most prominent primate journals, the *American Journal of Primatology* and the *International Journal of Primatology*, focused on primate conservation (Garber 2019). In the 1990s the number of conservation publications in these two journals accounted for fewer than 5% of yearly published manuscripts.

By the start of the 21st century, however, the focus of field primatologists had shifted significantly and the number of primate conservation publications (in all journals tracked by SCOPUS using the search terms "primates" and "conservation") went from 46 per year in 1999 to 161 per year in 2009 to 239 per year in 2018. And, in the current decade (2010–2019), on average >20% of the manuscripts published in the *International Journal of Primatology* and the *American Journal of Primatology* included a strong conservation component (Garber 2019). Thus, we have turned a corner in recognizing the imperative we face. However, across all primate regions and among virtually all primate taxa, we continue to witness a pattern of significant population decline. Despite our best efforts, we are losing the battle and therefore the *status quo* is not acceptable. If we are to prevent the decline of the world's primates and their habitats, primatologists must engage in strong and effective scientific advocacy and scientific activism.

Defining Scientific Advocacy and Scientific Activism

Advocacy is commonly defined as working for an individual or cause, for example, as a lawyer, a lobbyist, or an employee expecting to receive financial gain or advancement by acting in a predetermined or biased way, even if that bias is in search of the truth (Carney 2014). However, this is not the definition of scientific advocacy. Scientific advocacy is more similar to working as an independent consultant in which the scientist takes full responsibility in using her or his expertise to provide the most accurate information, analysis, and interpretation based on the currently available evidence, including presenting uncertainties and alternative perspectives that then can be used by others to solve a problem, answer a question, create a policy, or obtain new knowledge (Goodwin 2012; Meyer *et al.* 2010). As a scientific advocate, one may have a bias, but she or he needs to be objective and transparent, and inform others of that bias.

Scientific activism also is a form of advocacy. Activism and advocacy are part of a continuum of complementary tools or strategies to promote change by reimagining institutions, restructuring relationships, and rethinking ways of investing in a sustainable future (Abson *et al.* 2017) (Fig. 1). However, compared with advocacy, activism is more commonly associated with direct and group-based actions that lend voice and visibility to longstanding issues of unfairness, exclusion, inequality, and injustice that need to be corrected for the public good (Parsons *et al.* 2016). Scientific activism should not be considered a radical endeavor, and has been linked to the concept of

Fig. 1 A word cloud of terms used to describe Scientific Advocacy and Scientific Activism. Terms used in this figure and the relative size of the text are not based on a scientific evaluation. They are presented to highlight both differences and similarities in the meaning of scientific advocacy and scientific activism as used in this article.

"engaged scholarship" (Benderly 2015). Engaged scholarship attempts to bridge the gap between empirically derived knowledge and actively working to address societal and environmental problems at local, regional, and global scales. In this regard many large and influential scientific organizations, including the American Institute of Biological Sciences (https://www.aibs.org/) and the American Association for the Advancement of Science (https://www.aaas.org/member organizations), include in their mission statements a strong commitment to advancing the role of science and scientists in issues of public engagement and public policy.

Scientific activism requires speaking truth to power. It necessitates inspiring, organizing, and mobilizing others to join together and take actions designed to effect change (Fig. 1). This may involve public information campaigns using social media; educating global

citizens, politicians, and lawmakers to the harm that particular products (e.g., palm oil, pesticides, plastics), businesses (e.g., fossil fuel industry and agrochemical companies), and policies (e.g., regulations concerning hunting or carbon emissions) have on biodiversity, human health, and the environment. Scientific activism may include organizing boycotts, recommending alternative and environmentally friendly products, and participating in demonstrations and acts of civil disobedience (Lee *et al*. 2019). To be effective, scientific activism requires command of the scientific data, the ability to convey a sense of collective identity and collective purpose to a larger audience, and a strategic assessment of leverage points within a system that when altered can lead to transformational change (Abson *et al*. 2017; Parsons *et al*. 2016). Examples of scientific activism include climate scientists serving on the board of grassroots activist organizations such as Citizen's Climate Lobby (citizensclimatelobby.org), a national bipartisian group that lobbies in congress for solutions to climate change. On May 7, 2020, more than 1500 scientists from countries across the globe signed a declaration in support of "non-violent direct action against government inaction over the climate and ecological emergency." This letter reads in part, "As scientists, we have an obligation that extends beyond merely describing and understanding the natural world to taking an active part in helping to protect it" (https://docs.google.com/document/d/1FuZYG-gT5EPTLDyvgNnlYIS5dAy43TM1MnvOls48qIc/edit#). In addition, more than 1000 scientists joined the September 2019 Youth Climate Strike and the UN Youth Climate Summit, which provided a platform for young activists from more than 140 countries to present their ideas and concerns to a worldwide audience (https://marchforscience.org/march-for-science-at-the-un-youth-climate-summit/). Although both scientific advocacy and scientific activism are designed to advance beyond the *status quo* and each can take many forms, activism is commonly associated with taking direct actions designed to focus immediate attention on an important issue whereas advocacy tends to be less confrontational in changing attitudes and building consensus (Fig. 1).

Traditionally, primatologists, along with other scientists in other disciplines, have tended to avoid engaging in activism. Instead, we have used the pages of scholarly journals, the classrooms and lecture halls of universities and colleges, and our field sites to inform, advocate, and inspire others to promote environmental justice and protect biodiversity.

Advocacy and Activism as a Normative Standard in Primatology

Some primate scientists may feel that in the absence of formal training, they would not be effective in an activist role in engaging in public policy debates and/or communicating meaningfully with the public and political leaders (Garrard *et al*. 2016). And moving forward, it will be important for graduate programs in primatology, biological anthropology, and conservation biology to include one or more courses that focus on the role of scientists in informing public policy. However, there exist many well-established environmental groups, scientific societies, and conservation organizations with a long history of advocacy and activism, including the Union of Concerned Scientists (founded by scientists and students from the Massachusetts of Technology, ucsusa.org) and Green Corps (whose mission is to train environmental activists; greencorps.org) that provide guidance, training, and boot camps for scientists on how to engage and communicate with the public, media, and policymakers (https://www.aibs.org/public-policy/

communications_boot_camp.html?ct=t(Spring_2020_Online_Commbootcamp_033120). Similarly, Rainforest Rescue (a nonprofit environmental activist group, rainforest-rescue.org/about-us) provides support to activist groups; helps organize email petitions and protests designed to protect rainforests across the globe; raises funds to initiate legal actions against corporations, banks, and individuals that violate national and international environmental laws; and collaborates with NGOs in many primate habitat countries. These organizations also publish public policy reports, press releases, petitions, and targeted letters to government officials in multiple languages, with evaluations and recommendations that can be used as a blueprint for taking action on related issues. In addition, scientific journals such as the *Lancet*, *Nature Energy*, and the *Journal of Environment and Development* have made a greater effort to publish articles designed to promote a dialogue between researchers and public policymakers (Ghan 2016; https://www.nature.com/articles/s41560-019-0489-9; https://journals.sagepub.com/description/jed), thus validating the role of scientists as agents of change.

A second concern of many scientists is that advocacy, activism, and engagement in public policy can lead to the perception that one's research is less credible, less objective, and less accurate (Garrard *et al*. 2016; Goodwin 2012; Rose and Parsons 2015). And clearly, one should never defend a position that she or he knows is not defensible, is misleading, or not supported by the currently available data, even if doing so might persuade others to adopt that position. That said, our training in science offers many safeguards to ensure the integrity of our research.

Field primatologists study the behavior, ecology, and conservation of wild primates. collect data over periods of months and years, and analyze the data within a framework of specific research questions and hypotheses. We then interpret the results in order to present a series of justified conclusions. These interpretations commonly rely on a set of assumptions and theoretical perspectives, which in part are value laden because we often have access only to proxy measures for behavioral and ecological variables that we cannot directly measure. The point is that in scholarly publications and academic presentations we promote or advocate for particular theoretical frameworks and make specific recommendations for solutions to conservation, environmental, or societal problems, even as we attempt to be as objective and transparent as possible (Estrada *et al*. 2019; Goodwin 2012; Parsons *et al*. 2016; Scott and Rachlow 2011). We accomplish this by adhering to ethical and professional standards, subjecting our research grants and resulting manuscripts to a stringent process of peer review, sign conflict of interest statements and identify organizations that fund our research, indicate the limitations of our study, and in many cases make our data available as supplementary material or in accessible data archives (Foote *et al*. 2009; Nelson and Vucetich 2009).

We also maintain our credibility by offering different expected outcomes or implications of our research under different sets of conditions or scenarios. For example, many recent publications on primate conservation use modeling approaches to predict outcomes based on optimistic, business-as-usual, and worst-case scenarios and include details of the underlying assumptions of each model (Estrada *et al*. 2018, 2019, 2020; Graham *et al*. 2016; Zhang *et al*. 2019). Finally, we enhance our professionalism by reevaluating our interpretations and conclusions as new data become available.

Thus, as primate scientists, we already possess a number of the requisite skills needed to be an effective advocate and activist (Fig. 2). In many of our scientific publications we *advocate* for primate conservation and recommend *actions* that based

Fig. 2 A framework for advocacy and activism at the individual level and at the discipline level to protect the world’s primates from extinction.

on the scientific evidence are likely to be effective in protecting wild primate populations and their habitats. Why then should we shy away from presenting this information in more public arenas?

If we are to save wild primate populations from extinction, each of us must act to make scientific advocacy and scientific activism normative and a professional responsibility, and use our individual and collective expertise to inform global citizens, the business community, and political leaders by directly engaging in issues of public policy (Goodwin 2012). Figure 2 presents a framework for the types of activites and actions that can be taken at the individual level and at the discipline level to promote primate conservation.

Scientific Advocacy and Scientific Activism in Action

Scientific advocacy and scientific activism can result in changing public policy and attitudes (Foote *et al*. 2009; Schaefer and Beier 2013). For example, in fields like medicine, individual researchers and organizations such as the American Medical Association have a long tradition of advocating for public health and safety (Garrard *et al*. 2016). This includes scientifically based policy statements related to gun violence, access to health care, immunizations, opioid abuse, prescription drug pricing, human trafficking, violence against women, and government interference in women's health care, all of which involve complex legal, religious, personal, economic, and cultural issues. A stated goal of the AMA is "to inform lawmakers, guide decision-making and generate support for policies on critical issues that impact physicians, patients and the health care environment at both the national and state levels" (https://www.ama-assn.org/health-care-advocacy). Similarly, in Brazil, Sociedade Brasileira para o Progresso da Ciência/SBPC (Brazilian Society for the Advancement of Science) (http://portal.sbpcnet.org.br/) is a nonprofit, nonpolitical organization of some 5000 members representing 144 scientific societies. And, along with the Brazilian Academy of Sciences (ABC) and the Brazilian Society for the Advancement of Science (SBPC), promotes science education and public policy debates; drafts position papers; and advocates for public health, the role scientists should play in environmental policy, and advances in science and technology that benefit society. Scientific advocacy and action groups are present across many primate-range regions. Examples include the Lemur Conservation Network (https://www.lemurconservationnetwork.org/); Forum Orangutan Indonesia (https://www.forina.org/); West African Primate Conservation Action (https://www.wapca.org/); Landscape Ecology and Primatology (https://go-leap.wixsite.com/home); and the International Centre of Biodiversity and Primate Conservation, Yunnan, China (http://www.icbpc.org/index.html).

As primatologists, we and our professional societies have a responsibility to expand our conservation outreach and lead the public discourse to inform, educate, and motivate citizens worldwide to take action to protect the world's primates. In this regard, both the American Society of Primatologists (https://www.asp.org/) and the International Primatological Society (http://www.internationalprimatologicalsociety.org/) have created task forces and empowered committees to develop official policy statements, approved by their Board of Directors, that recommend specific actions designed to protect wild primates. These include policy statements on best practices in

field primatology, protecting the health of wild primates, guidelines for care and breeding of primates, the use of primates as pets and in media, conservation of wild primates, and principles for the ethical treatment of primates. Each of these professional scientific organizations funds research on primate conservation, provides a list of educational materials on primates, and sponsors an official peer-reviewed journal that publishes original research and review articles on primate conservation. These efforts are important; however, they have been targeted at primatologists and scientists in related research fields rather than at the general public, business leaders, legislators and government officials, and international NGOs. The more active we and our professional organizations are in publically promoting primate conservation, educating political leaders, and joining with like-minded groups to encourage conservation activism, the more likely we will succeed in protecting the world's primates (Garber 2019). For example, Indonesian scientists, primatologists, and activists filed lawsuits and staged protests to block the construction of the Batang Toru hydroelectric dam in northern Sumatra. Dam construction threatens the last remaining habitat of the Critically Endangered Tapanuli orangutan (*Pongo tapanuliensis*), as well as two other Endangered primate species, the siamang (*Symphalangus syndactylus*) and the agile gibbon (*Hylobates agilis*) (Jong 2019; Rochmyaningsih 2019, 2020). Local and international attention brought by activists has resulted in decisions by the World Bank and the Asian Development Bank not to provide funding, and the Bank of China is currently reexamining its funding for the dam (Catanoso 2019).

Similarly, following an outbreak of sylvatic yellow fever in southeastern Brazil, in which many local inhabitats and the news media falsely believed that howler monkeys were a vector for yellow fever transmission to humans and several hundred were killed, Julio Cesar Bicca-Marques and his students engaged in scientific activism and began a media and public health campaign called "Proteja seu Anjo da Guarda" (Protect our Guardian Angels) (Bicca-Marques 2018; Bicca-Marques and de Freitas 2010). In addition to obtaining the support of 22 scientific, religious, and public health organizations, these primate activists corrected misinformation through social media posts (https://www.facebook.com/Campanha-Proteja-seu-Anjo-da-Guarda-243621236063810/); a YouTube® video (http://www.youtube.com/watch?v=b9VI10R8jkA&feature=related); newspaper, TV, and radio interviews; public presentations; and theatre performances in locally affected human communities. In educating the public about the beneficial role that howler monkeys play as sentinels, warning of impending infectious disease outbreaks, these actions changed the discourse from howlers as vectors of disease to protecting howlers is a matter of public health (Bicca-Marques and de Freitas 2010).

Most recently, in response to international pressure from NGOs, conservation groups, and global citizens, the Cameroon government reversed its plans to allow a logging concession of some 70,000 ha in the Ebo Forest, which is home to many threatened species including Nigeria-Cameroon chimpanzees (*Pan troglodytes ellioti*), western gorillas (*Gorilla gorilla*), drills (*Mandrillus leucophaeus*), and Preuss's red colobus (*Piliocolobus preussi*) (Alberts 2020). This forest also is the ancestral homeland of the Banen Indigenous people and is considered a biodiversity hotspot.

Finally, scientists, conservation organizations, and government agencies initiated a highly innovative citizen scientist project designed to protect and obtain information on Singapore's Critically Endangered Raffles banded langur (*Presbytis femoralis*: Ang *et al*. 2021). By organizing a number of stakeholders and developing training sessions and

workshops, some 245 trained volunteers worked with scientists and recorded information on the location, age/sex composition, group size, and general activity pattern of five groups and sightings of almost half of Singapore's remaining population. Since these primates avoid traveling on the ground, one benefit of this program was that increased monkey surveillance resulted in identifying locations where the installation of rope bridges would permit travel across fragmented habitats (Ang *et al*. 2021). Moreover, in their efforts to attract citizen scientists to participate in this primate conservation initiative, information on the program and images of Raffles banded langurs were commonly shared locally and internationally on social media, leading to increased public awareness.

Moving from Advocacy to Activism

As primatologists, we must act to protect and increase the size and genetic variability of threatened primate populations, and to expand the availability of suitable habitat. And, although this will require conducting additional studies of captive and wild primates, an even higher priority is the need to organize and work with stakeholders including our universities, primate centers, research labs, NGOs, professional societies, the United Nations Environment Program, indigenous communities, and local and national government agencies in primate habitat countries and consumer nations to develop coordinated and effective strategies to promote environmental protection, sustainability, and primate survivorship (Diaz *et al*. 2019; Estrada *et al*. 2019, 2020). Coalition building is an essential tool of successful activism. This will require educating and lobbying the public, business leaders, and politicians, mobilizing their support and incentivizing them to change business-as-usual in order to promote a green and sustainable agenda. Given that wild primates are found in 91 countries worldwide, each with distinct histories, cultures, set of religious practices, lifestyles, norms of behavior, and legally sanctioned forms of expression and dissent, effective strategies and targeted actions to promote primate conservation may best be developed *in situ* by local scientists and community leaders and supported by national and international primate societies. As a discipline, we must prioritize support for conservation organizations, researchers, and activists in primate-habitat countries in ways that empower them to accomplish our common conservation goals. Success in building research capacity, grassroots organizations, and protecting primate populations at the local level can then serve as a model for scaling up conservation efforts at regional and national levels.

Effective large-scale conservation efforts will require a commitment to scientific activism from primatologists and primate organizations worldwide to lend their voice, expertise, and actions to public events and targeted demonstrations that promote green technologies, biodiversity, and environmental justice. This needs to occur in primate-habitat nations in which public policy debates and political descent are tolerated, and in countries like the USA, UK, EU, Japan, China, Canada, and India, nations that disproportionately consume forest-risk commodities produced in and exported from primate range countries (Estrada *et al*. 2019). Scaling up is especially critical in the time of the SARS-CoV-2 coronavirus as many governments, private foundations, and civil society shift their attention and resources away from environmental protection to the immediate concerns of public health and economic rebuilding. Now is the time for us to act and ensure that environmental protection and sustainability are included as essential

components of public health initiatives and economic rebuilding (UN Sustainable Development Goals 2020). In the wake of the SARS-CoV-2 coronavirus, the world has been forced to reassess the risks that deforestation, industrial agricultural expansion, reducing the boundaries between human–wild animal contact, ecotourism, bush-meat hunting, and wet markets have on increasing zoonotic crossover events between humans and wild animals, including primates, and the kinds of mitigation procedures that must put into place to protect biodiversity (Gillespie and Leendetz 2020; Lappan *et al*. 2020; Melin *et al*. 2020; Schmitt *et al*. 2020; Shan *et al*. 2020). As primatologists, we must be part of this global discussion.

To this end, primatological societies and their membership need to join together, as well as partner with conservation organizations, local communities, and activists, to develop policy statements, position papers, social media platforms, letter writing campaigns, and where and when feasible, organize events targeted to educate the public, business leaders, advocacy groups, and government officials in primate- habitat countries and in consumer nations. Taking action does not undermine our credibility as scientists, educators, and researchers, and allows us to use our expertise and knowledge for the public good (Isopp 2015). As a discipline we need to regularly engage with science journalists and media outlets by drafting press releases that highlight important research findings, conservation priorities, and actions that need to be taken in individual countries and world regions to protect primates. In those instances in which this information may not be easily accessible to scientists, students, or the general public due to barriers of language, the material should be translated into local languages by the membership of regional primate societies and widely disseminated to promote grassroots movements.

Moreover, primate societies will need to develop new funding models, including crowd source funding and large donor funding that can be used to promote conservation education programs and facilitate information sharing and the exchange of educational materials across regions. This will expand the pool of money targeted for primate conservation projects and environmental activism, including emergency funding that can be rapidly awarded to assist in preventing the immediate loss of primate populations and their habitats. Although individual primatologists, primate societies, research teams, and conservation organizations continue to work with local communities to promote primate conservation, if we are to protect the world's primates from extinction, these actions will need to be scaled up to create a discipline-wide infrastructure to educate and motivate a global audience of primate advocates and primate activists. This can be accomplished only if our professional societies and its members exercise their full authority and leadership in promoting and coordinating the kinds of transformational change required to protect the world's primates and their habitats.

In conclusion, assuming business-as-usual, by the end of the century the majority of primate species will become extinct or be reduced to effective population sizes below those required for long-term persistence (Estrada *et al*. 2017, 2018, 2019, 2020; Li *et al*. 2018). If we are to be successful in saving the world's primates, then as primate scientists, we have a professional responsibility to take action and work collectively to become agents of transformational change. This will require an expanded role for our professional societies to organize and lead group-based activities to educate the public, the media, politicians, and business leaders about environmental justice, climate change, and the negative effects that the global trade in forest-risk commodities is having on degrading primate habitats and driving primate population decline. These

same factors are threatening the health, food security, and well-being of many human communities (Estrada *et al*. 2019, 2020). The time for us to act is now!

Ethical Note

The author declares that he has no conflict of interest.

Data Availability Data sharing is not applicable to this article, as no data sets were generated or analyzed during the current study.

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