

1 **Special Issue on Long-term Research**

2

3 **Confronting ethical challenges in long-term research programs in the tropics**

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47 **Abstract**

48 Ecologists and conservation biologists conducting long-term research programs in the tropics
49 must confront serious ethical challenges that revolve around economic inequalities, cultural
50 differences, supporting the local communities as much as possible, and sharing the knowledge
51 produced by the research. In this collective article, researchers share their experiences and
52 perspectives in dealing with the ethical issues that arise during research activities and cannot be
53 ignored.

54

55 **Introduction**

56 *Reinmar Seidler, Richard B. Primack*

57 Normative attitudes toward field research in tropical regions have changed vastly over time, and
58 continue to do so today. Field work is almost always time-limited and is generally marked by
59 periodic crises, some anticipated and many others unexpected. Perhaps because such work often
60 demands an intense and narrow focus, scientists may risk seeming oblivious to their impact on
61 people and communities around them (Brittain et al. 2020). As researchers work to keep active
62 research programs functional and productive over the years, conflicts and ethical dilemmas
63 inevitably arise – many of which stem from acute global-scale inequities in funding, access and
64 influence. These potential stumbling-blocks are rarely mentioned in conventional scientific
65 accounts, but in practice, they are nearly unavoidable aspects of long-term research in the
66 tropics. Having dealt with (and overcome) such challenges, experienced researchers can offer
67 practical advice to students and colleagues just beginning tropical research (Riley & Bezanson
68 2018; Chin et al. 2019). However, such advice is generally only communicated privately.

69 We solicited short contributions from the authors in this Special Issue, along with several other
70 scientists, to document the variety of observations they've made and solutions they've explored
71 in the course of resolving ethical challenges. Collectively, the contributors have logged centuries
72 of person-years' experience in managing and participating in long-term research programs. Some
73 of the authors are based in countries in the global North and are visitors to the tropics; others are
74 based in-country and have hosted visitors. We asked authors to maintain an informal style and an
75 anecdotal focus.

76 The first and primary responsibility of anyone visiting and working in another country and
77 culture is to understand cultural differences and adapt to them as much as possible. Our first
78 three contributions present contrasting viewpoints on this fundamental expectation. Goswami's
79 contribution demonstrates how in a large, complex country like India, field scientists—even from
80 within the country—may depend on meaningful partnerships and local adaptation to navigate
81 ethno-cultural heterogeneity in remote or culturally distinct regions. Khaling and Devy report
82 back as experienced hosts of visiting researchers—not all of whom, regrettably, have met
83 minimum ethical standards in adapting to Indian cultural contexts. Corlett's wise advice to
84 scientists visiting China can easily be extrapolated to other parts of the world.

85 A second basic ethical obligation is to be sure the research project brings added value to the local
86 community, beyond simply paying for accommodation and support as would any other visitor

87 (although that is important too!). As a pioneering Ugandan primatology student, Otali benefited
88 from learning opportunities provided by the presence of a long-term research program, and is
89 now enthusiastically extending those opportunities to another generation of students. The
90 program described by Knott and her colleagues in Indonesia is a model of how integrating long-
91 term research into the local and national cultural landscape can stabilize a program and
92 strengthen its impact. Roth's experience in Thailand illustrates the unexpected ways in which
93 sensitivity to cultural attitudes can yield dividends by facilitating the flow of important local
94 information.

95 A third common responsibility among research programs is to share the resulting information
96 and knowledge with local people, students, the scientific community, and government agencies.
97 This, too, often requires extra time and effort, yet it is imperative from both ethical and utilitarian
98 points of view. Connecting with hundreds of partners to integrate plot-scale observations into
99 global-scale networks, Phillips and colleagues in ForestPlots.net have worked hard to unite data
100 producers and users in a mutually beneficial research community, always with an eye to the
101 long-term sustainability of forest monitoring itself. Primack and Wilson describe the patient and
102 persistent development over years of what has become a veritable global network of knowledge
103 production in the form of textbooks on conservation biology, each adapted to national contexts
104 and translated into national languages.

105 Finally, Wrangham's contribution illustrates that for the people who live in the midst of it,
106 "biodiversity" is not always an unalloyed good. Examples of this are not restricted to the tropics:
107 wolves outside Yellowstone, elephants and tigers in South Asia, crop-raiding wild pigs all over
108 the world... The local consequences of conservation efforts – including the successes – may
109 involve increases in human-wildlife conflict, occasionally resulting in loss of livelihoods and
110 sometimes even of life. This is not a reason to scale back conservation efforts, but it is surely a
111 reason to be empathetic when there is push-back from local communities. It is also a reason to
112 work very hard to help reduce and mitigate the risks. Many potential strategies to mitigate
113 human-wildlife conflict, from effective fencing to electronic detection and warning technologies,
114 are relatively expensive by local standards. Biodiversity conservation often involves ancillary
115 financial costs that cannot, and should not, be borne by local communities.

116 We see welcome trends in diversity among tropical ecologists and conservationists today. In
117 particular, there is increasing representation of women and of scientists hailing directly from all
118 parts of the tropics, as well as a growing number of training options available to young ecologists
119 in tropical regions. Nevertheless, the diversity of those leading research in tropical ecology and
120 conservation remains far from representative. Several contributors here highlight the need and
121 the opportunity to further involve local people in research programs and to ensure that students
122 and young researchers have access to training and mentoring.

123 Our goal in organizing this paper on ethics for the Special Issue on Long-Term Ecological and
124 Conservation Research in the Tropics is to consider the broader social issues of carrying out
125 research in different countries and cultures. This is an issue frequently addressed by Prof. Kamal
126 Bawa, who has worked hard and argued strongly for increased development of the scientific
127 community in tropical countries. Our hope is that you enjoy the readings that follow, and that the
128 insights provided might stimulate further discussion, appreciation and respect for different points
129 of view.

130

131

132 **1. Understanding cultural differences**

133 **1.1 Perspectives on working in community forests of tropical Northeast India**

134 Varun R. Goswami

135 Megadiverse India is an exciting country to study basic and applied tropical ecology. Across
136 much of India, if your research calls for fieldwork in forests, you will likely require access to
137 protected areas (PAs) or other government-managed areas. State research permits need to
138 precede such fieldwork, over and above the federal clearances that are a usual prerequisite for
139 foreign researchers. Northeast India, a region that straddles two biodiversity hotspots, presents an
140 interesting contrast to working in PAs. Here, a majority of forests in the hill states are
141 community managed, with strong self-governance structures for decision-making. For fieldwork
142 in these forests, you would need approvals from local administrative bodies.

143 What should you be mindful of if you want to work in these community forests? As these forests
144 lie in a remote and relatively unexplored ‘frontier region’, logistical challenges can add to
145 potential language and cultural barriers. You will need local support, be it to find
146 accommodation, obtain research approvals or conduct fieldwork. All of these typically require
147 fairly extensive consultation with community leaders and hinge on mutual trust, often built
148 through sustained engagement. Therefore, a collaboration with a local organisation may be an
149 ideal way to begin. If such collaborations are well aligned, they can build local scientific
150 capacity, and improve and sustain conservation outcomes (Chin et al., 2019). Collaborator-
151 facilitated community engagement can also help find synergy between your research and
152 stakeholder interests, and thereby stimulate greater buy-in for your study. My PhD fieldwork on
153 elephants in Garo Hills, Northeast India, was enabled by a fruitful on-ground collaboration—it
154 allowed me to engage and train an existing team of local field personnel for ecological and social
155 surveys, and yielded conservation-focused scientific outputs (Goswami et al., 2014; Goswami et
156 al., 2015).



157

158 **Fig. 1: Author Dr Varun Goswami and local field personnel collecting elephant dung samples in Garo Hills,**
159 **Northeast India. Photo © Divya Vasudev**

160 What are some pitfalls to avoid? The ethnocultural heritage of Northeast India is diverse, and
161 exotic to many—Nagaland, a state I work in, is home to 16 major tribes for instance, each with
162 their distinct language and culture. While it is important to be respectful of local norms and
163 sensibilities, it is also easy to romanticise the socio-cultural, and by extension, conservation
164 context. Community forests are important ecological systems, but researchers do on occasion
165 overemphasize the value of community-based conservation, which, like PA-centric conservation,
166 is no panacea (Berkes, 2007). Much as exotic tales from the ‘frontier’ make for a good story,
167 your burden as a scientist is to report findings objectively, and strike a balance between ideology
168 and reality. It is also critical that you avoid ‘parachute research’ (*sensu* Chin et al., 2019):
169 researchers arriving abruptly and then leaving without sharing any of their findings.

170 Disseminating results locally is pivotal to communities taking ownership of findings, building
171 awareness and technical capacity, and ultimately, helping shape conservation decisions. If
172 ecologists and communities partner effectively, community forests can be irreplaceable in
173 supporting participatory research and conservation in the tropics.

174

175 **1.2 North-South engagement in conservation research: From unequal collaborations** 176 **to equal partnerships**

177 Sarala Khaling and M. Soubadra Devy

178 Over two decades, researchers and professionals from the North have engaged with ATREE
179 (Ashoka Trust for Research in Ecology and the Environment, see also Rai et al., this volume) on
180 research in ecology and conservation in many parts of India. Only a few of these engagements
181 have been equal partnerships that resulted in fruition of shared research/work interests. Others
182 have not been at peer-to-peer levels. For example, qualified young researchers in ATREE have
183 sometimes been confined to doing menial assignments (e.g., digging pits), while researchers
184 from the North were involved in intellectual contributions (research design, analysis, and
185 writing).

186 Another experience is the disregard for legal compliance, where many researchers from the
187 North overlooked the requirement for research permits. Often they took the easy tourist-visa
188 route, though deemed illegal for doing research in India. Obtaining permits—especially for
189 foreigners—takes time. This is often misconstrued as obstruction, and the host institution's
190 efforts to facilitate permits and follow up on them largely goes unappreciated.

191 As local hosts, we have been put in embarrassing situations by insensitivities to local culture of
192 researchers from the North, especially when working or living among rural communities. These
193 range from them not observing local dress codes, to culturally inappropriate personal interactions
194 (specifically overt display of affection in the field sites with other Northern researchers), to not
195 paying for rural hospitality and even trespassing onto personal property. Interdisciplinary
196 research involves interactions with local people, and often these are fraught with insensitivities.
197 For instance, interview questions often venture into personal queries like income sources and
198 amount, type of food, expenditure of income and family and other personal details. Many times
199 researchers have insisted on interview timings that disregarded interviewees' convenience. There
200 was even an instance when an aged sick man was carried out of his bed to address questions of
201 intergenerational experience of climate change! Often, interviewees are not apprised of the
202 objectives of the research and dissemination plan, and no prior consent is sought. Despite our
203 cautions, counterparts from the North have indulged in photography, particularly of young
204 children, without prior consent of the communities.



205

206 **Fig. 2: Research Associate Poonam Rai works with community members outside Singalila National Park, in**
207 **the Darjeeling Himalaya (India), to produce village resource maps to help in mitigating chronic crop-raiding**
208 **by wildlife. (Photo © Reinmar Seidler)**

209 All researchers who come from the North rely on the local host organizations for field work. The
210 time spent by field staff to facilitate this often goes uncompensated; this “chaperoning” is
211 considered part of their work. There have been instances where authorship was denied even
212 when intellectual inputs were contributed; at times ATREE researchers have not even been
213 acknowledged. One of the most critical issues is the publication of sweeping perspectives in
214 leading journals without researchers having spent adequate time in ATREE’s field sites. These
215 instances of extremely short field visits getting translated into compelling perspectives do not
216 reflect ground realities, and in some cases, misrepresent critical issues around livelihoods,
217 poverty, and biodiversity.

218 We feel North-South collaboration should move away from the current snapshot-like
219 publication-centric approach, and towards long-term commitments and engagements. A good
220 place to start would be developing and designing projects consultatively and a more thorough
221 understanding of local issues and needs. Such engagements could contribute to capacity building
222 and provide mentorship for young researchers in India. Lastly, an immersion period is critical for
223 counterparts from the North to help them understand sensitivities of local culture, customs, and
224 norms appropriate for undertaking field research and conservation in India.

225

226 **1.3 Helping to build an ‘ecological civilization’ in China**

227 Richard T. Corlett

228 There are tens of thousands of foreign scientists working in China, from graduate students to
229 senior professors. It is popular because it combines an opportunity to work somewhere different
230 with access to funding, world-class facilities, and stimulating colleagues. Although many
231 foreigners working in China are near retirement, a stay there is particularly advantageous for
232 early-career scientists, who often get more freedom to develop their own research interests than
233 they would at home, and can leave with a CV that stands out from those of competitors. While
234 China can be good for your career, however, there is a danger that you simply fill the foreigner
235 quota at your host institution without contributing much else.

236 For conservation biologists, a key question will obviously be how your stay can contribute to
237 biodiversity conservation in China and to mitigating the impacts of China’s development on the
238 rest of the world. China leads the world in some research areas but not (yet) in conservation
239 biology, where there is no substitute for decades of practical conservation experience. China’s
240 conservation plans, including a new national park system and nationwide ecological red lines,
241 where ecosystem services are protected, are hugely ambitious, and ‘ecological civilization’ is
242 written into the constitution, but achieving these goals requires knowledge and skills that are still
243 being acquired.

244 Fortunately, China is not a country where you must constantly worry about offending your hosts.
245 There may be sensitive topics but let them set the limits. Helping colleagues publish in
246 international journals can make a real practical contribution (and make you popular). China
247 increasingly dominates English-language scientific publishing, at least in terms of numbers of
248 papers, but most Chinese scientists need help for this. Training courses in new techniques can
249 also be valuable but do find out first what is needed.

250 Things get more difficult when you move out of the English-speaking bubble which isolates
251 many foreigners from the wider Chinese world. Even in your host institution, many good
252 academics will not be able to converse in English, and outside the gates it is simplest to assume
253 that nobody can, including people involved in practical conservation. You can communicate
254 through colleagues, a translator, or phone apps, but this is no more satisfactory than it would be
255 in the USA. Mandarin is not a particularly difficult language to speak—reading and writing is a
256 different matter—but you will not pick it up casually and must make some effort. Particularly in
257 rural areas, a willingness to eat anything and toast with whatever alcoholic poison the locals
258 drink can make up for a lot of communication problems. Some things are difficult for foreigners,
259 such as access to core areas of Nature Reserves, and some near impossible, such as permission to
260 interview people. Be flexible and be prepared to work through local collaborators.

261 Finally, leave something behind. Your data and publications, obviously, but conservation
262 biologists should also explore the opportunities for submitting policy papers—translated into
263 Chinese—to appropriate branches and levels of the government. China is ambitious and self-
264 confident, and there is no stigma attached to taking advice from knowledgeable foreigners.

265

266 **2. Providing local value**

267 **2.1 Learning to do fieldwork in western Uganda**

268 Emily Otali

269 In 2001, when Makerere University chose to invest in the training of more primatologists, I was
270 one of three beneficiaries. I was urged to study blue monkeys, but a chance meeting introduced
271 me to a community of chimpanzee researchers in Uganda and drew my attention to the benefits
272 tapping into their experience. The attraction of having mentors to support me in the pursuit of
273 chimpanzees was too good to resist.

274 I studied the dynamics of social organization by fission and fusion in chimpanzees of the
275 Kanyawara community in Kibale National Park. When I graduated, I was not only one of the few
276 primatologists in the country but also the first woman in Africa to attain a PhD in chimpanzee
277 behaviour. I became both a resource on primate research for the East African region and a source
278 of inspiration for many aspiring female biologists. Today, I know of five more female
279 primatologists in training. This is all made possible by a long-term research facility that I am
280 now managing, the Kibale Chimpanzee Project (KCP). In that role, I have had the opportunity to
281 continue my research, supervise and mentor students, and serve as a cultural ambassador of sorts.

282 Over time, I have learned that the greatest challenge for students coming to work in a new
283 country is not dealing with difficult field conditions but navigating the cultural differences. Even
284 though the research station has a population of mixed nationalities, the local Tooro community is
285 the predominant life force of support staff and research assistants. Like other Ugandan ethnic
286 groups, they are unique in their culture which if lost in translation can lead to pretty
287 uncomfortable conversations.



288
289 **Fig. 3: Author Dr Emily Otali assists in veterinary treatment of a snared chimpanzee, Kibale National Park,**
290 **Uganda. Photo © Andrew Bernard**

291 Thankfully, they are keen to welcome foreigners into their midst. The biggest icebreaker is the
292 *empaako*-giving ceremony. An *empaako* is any of the 12 endearing pet names used by the

293 Batooro to address each other. It is used more often than a person's given name. A newly arrived
294 foreign student is expected to host his or her field assistants to a traditional Tooro meal during
295 which they will be given their pet name. I come from eastern Uganda, so I am regarded as
296 somewhat foreign in western Uganda. I was duly given the *empaako* "Amooti", which means a
297 respectful person. Researchers are also often invited to attend local ceremonies like traditional
298 marriages and the norm is to dress in traditional attire. This is locals' way of accepting
299 researchers into their social fabric. In turn the researchers establish trust by respecting the local
300 culture and having more meaningful conservation impacts through connections to the local
301 community. Local conservation organisations like the Kibale Forest Schools' Program arrange
302 for researchers to participate in primary school activities such as painting murals, taking pupils
303 for nature walks and giving talks.

304 When I started my research in 2001, the local communities generally thought the chimpanzees
305 belonged to foreigners and that we were herding the chimpanzees to raid their crops. Years of
306 community education and trust between local people and researchers have changed this attitude.
307 Now they refer to them as "our chimps".

308

309 **2.2 Building Collaboration for Orangutan Conservation**

310 Cheryl D Knott, Erin E Kane, Tri Wahyu Susanto

311 Many countries have laws or regulations requiring foreign scientists to work with and support
312 local scientists. This investment in building in-country capacity should not be seen as an
313 impediment to research, but as 'best practice' for all scientists. The COVID-19 pandemic has put
314 this into sharp relief. In a 'globalized' world, our movements have paradoxically shrunk to our
315 own backyards. This highlights the responsibility of those working outside of their communities
316 of origin to support the development of local expertise. COVID-19 has restricted movement
317 world-wide, with conservation and research projects relying on the expertise of permanent
318 residents where these projects occur. We experienced this first-hand at our field site in Indonesia.
319 At the outset of the pandemic, when foreign staff returned to their home countries, our well-
320 trained and knowledgeable local staff continued their work and assumed new leadership
321 positions in our conservation and research projects. With the relative ease of global travel, and
322 increased human-wildlife contact, future pandemics are likely to recur (Rodríguez-Morales et al.,
323 2020) and make travel to international field sites challenging or unethical (Reid, 2020).
324 Consequently, international researchers must prioritize training and supporting host-country
325 scientists even more than in the past.



326

327 **Fig. 4: Field Research Assistant Muhammad Harissan (left), Researcher Dr Cheryl Knott (center), and Field**
328 **Research Assistant Andi Abdul Sabta Pelari (right), observe and collect data on an orangutan constructing a**
329 **night nest at Cabang Panti Research Station, Gunung Palung National Park, West Kalimantan, Indonesia.**
330 **(Photo © Tim Laman)**

331 Involvement of in-country students, scientists and government stakeholders has been key to the
332 Gunung Palung Orangutan Project's long-term success and viability. Indonesian permit-granting
333 bodies mandate that foreign researchers collaborate with Indonesian research counterparts, and
334 our sponsorship agreements with research institutions and universities facilitate collaboration
335 with Indonesian students conducting research at our Gunung Palung field site. These
336 arrangements have produced a cadre of young Indonesian scientists committed to orangutan
337 research and conservation, and trained to take on leadership roles when opportunities arise. We
338 hire students who have trained with us as field laboratory assistants, research managers, project
339 liaisons, and long-term conservation staff. Partnerships with research counterparts and students
340 at sponsoring institutions are worth the investment: they improve equity of access to resources,
341 provide opportunities for knowledge sharing between researchers of different backgrounds, and
342 help fulfill responsibilities international researchers have to host countries (Lappan et al., 2020).

343 We work closely with the national park service, and research station management became a joint
344 venture between our conservation NGO and the national park in 2014. This partnership led to
345 new investment in the development of the field station, and the Indonesian government's
346 commitment to turn our field site into a model research station. These collaborations improve
347 research infrastructure for international field work while increasing opportunities and access for
348 local scientists and conservationists. Our long-term commitment to the region, demonstrated
349 through national and local partnerships, has built trust with local communities and pride in
350 biodiversity. These connections with local communities, government agencies, scientists and

351 students have enabled continued research, engagement, and conservation of orangutan
352 populations and habitat despite the pandemic. As we face an uncertain future, this is the clear
353 path forward that scientists and conservationists must take to safeguard the future of wildlife.

354

355 **2.3 Ethical Research in Conservation Social Science (Thai Highlands)**

356 Robin J Roth

357 The primary purpose of institutional Research Ethics Boards (REB) is to ensure that
358 conservation social science research does not compromise the safety and wellbeing of
359 participants. Passing research plans through your institution's REB will help ensure adequate
360 safeguards are in place (Ibbett and Brittain, 2020).

361 Ethical research in social sciences, however, goes well beyond obtaining REB clearance. It also
362 requires being reflective about the ethical dilemmas inherent in conservation social science
363 research (like being confronted with knowledge of illegal hunting activity), while creating the
364 conditions for genuine collaboration, building trust and ensuring local benefits (Brittain et al.
365 2020). Genuine collaboration requires the researcher to practice humility and demonstrate a
366 willingness to allow research participants to help shape the research from the beginning. Trust is
367 built by spending time and learning the language and culture as much as possible. Local benefits
368 should emerge from both the products of research (e.g., maps, species lists, recorded oral
369 histories) and the process of doing research (e.g., hiring local research assistants, providing
370 meals). The good news is that ethical social science research also results in better data as well as
371 improved understanding and insight to inform enhanced conservation practice. A story from my
372 PhD research helps illustrate this assertion.



373

374 **Fig. 5: Author Dr Robin Roth, seen here with her one-year-old, conducts an interview with a local knowledge**
375 **holder, in collaboration with Research Assistant Surasit Donjaipraiwan (left). (Photo © Robert Mckenna)**

376 I was working in an Indigenous community in the Thai highlands who were resisting the
377 establishment of a national park in a landscape they relied upon for their livelihood. I made
378 careful efforts to hire local research coordinators, work in local dialects and respond to the
379 request by local leadership to create a land-use map. But after 3 months there were many
380 community members who believed I was mapping their land so that I could buy it from them, or
381 so I could help the government establish a park. At this point, oblivious to the lack of trust, I
382 thought I had developed a good understanding of local livelihood and interactions with the
383 forest. It wasn't until forest rangers entered the village and I was able to provide maps that
384 illustrated why their proposed sub-district station location would endanger the village's
385 livelihood (by cutting off access to the sole source of an important bamboo species), that trust
386 was established. Local community members then became much more eager to participate in
387 creating the map and provided me with more detailed and seasonally sensitive information about
388 the forest-farm matrix upon which their livelihoods depended.

389 The resulting map and survey helped the local leadership describe their livelihood needs in terms
390 the park officials understood. The map informed park boundaries that did not cut off vital
391 livelihood resources and identified areas that park officials and community members could
392 collaboratively manage. Had I left after 3 months, thinking I had near-complete information
393 about local livelihood needs, I might have met the minimum ethics protocol, but I would have
394 missed significant details I was not yet trusted with. The result would have had little practical
395 impact.

396

397 **3. Sharing the knowledge**

398 **3.1 Closing the loop: How should large-scale data users engage with originators of tropical** 399 **ecological data?**

400 Oliver L. Phillips, Tim R. Baker, Corneille Ewango, Euridice Honorio Coronado, Aurora
401 Levesley, Simon L. Lewis, Beatriz S. Marimon, Lan Qie, Bonaventure Sonké

402 Tropical forest plots are long-term science infrastructure for tracking the biodiversity and
403 ecological functions of the most complex ecosystems on Earth. They become more and more
404 valuable the longer they are monitored for – but each one needs a large amount of human effort
405 and skill to deliver! These data are in demand by scientists, Earth Observation agencies, and
406 natural resource managers.

407 ForestPlots.net enables investigators to manage and analyse their plot data - and to share if they
408 want. *It is therefore a unique place where the originators and the users of tropical ecological*
409 *data meet.* This puts ForestPlots.net at the heart of a major challenge in environmental and
410 conservation research: How do we ensure equitable relationships among scientists from the
411 global North, who have often been the users of data, and those in the South, who often play key
412 roles in generating the data?

413 We think that ForestPlots.net can help to reverse centuries of inequity in global scientific
414 endeavour, drive forward better research, support the management and conservation of tropical
415 forest landscapes - and help forest monitoring grow.

416 *So, if you are interested in using tropical forest plot data and want to be part of addressing this*
417 *challenge, here's what we suggest.*

418 **First, know the context**

419 *It's tough to acquire these data, especially in remote locations where a single hectare holds*
420 *more tree species than do whole countries in the temperate zone.* Many prospective users now
421 acknowledge the need to invest in the people and networks that underpin these data, but others
422 do not.

423 *Only with regular funding will fieldwork proceed, plants be identified, students trained, and plots*
424 *maintained.* And, unlike for remotely-sensed data acquired by space agencies or commercially, it
425 is the researchers themselves who need to fund and implement data acquisition and pre-
426 processing. .

427 *Only with support for developing skills, leadership and analyses within tropical forest nations*
428 *will we develop more equitable working relationships.* Compared to many users of tropical data,
429 data originators often have fewer opportunities and may be disadvantaged by nationality,
430 ethnicity, and education. We therefore always ask prospective data users to support data
431 originators and the wider public good, including by investing in data acquisition and
432 management.



433
434 **Fig. 6: The RAINFOR team prepares plot herbarium vouchers together at the end of the day, in Peru's**
435 **Parque Nacional Yanachaga. Photo © Abel Monteagudo**

436 **Second, understand the process**

437 We have a Code of Conduct: <https://www.forestplots.net/en/join-forestplots/code-of-conduct>.
438 We encourage prospective users before requesting data to reflect on their contribution to
439 developing this unique scientific resource and the human development on which it depends.
440 Please ask yourself: *How can I help? How will I contribute to the costs? How will I support data*
441 *collection?*

442 **Third, commit**

443 For your request to be approved by our steering group we require specific, measurable
444 contributions and commitments. If approved, you will then need to get permission to work from
445 the data owners themselves.

446 You will be expected to:

447 (a) Contribute. Show how you will invest in sustaining the science. Focus on involving field
448 leaders and networks in seeking new funding for re-censuses, new permanent plots, data
449 management, training, as well as involving them in analysis and writing manuscripts.

450 (b) Communicate. Discuss with contributors the research questions that you wish to address as
451 early as possible. Offer to include them at the funding proposal stage, and in authorship of
452 resulting work.

453 Overall, think of this as a long-term relationship with data providers that should grow and
454 progress with time. Look for new projects together. Be prepared to change and develop your
455 contributions in response to the needs of the data originators.

456 **With thought and commitment this often works well**

457 To give one example, in 2020 the Synergize project requested to access and analyse all
458 biodiversity data from Brazilian Amazonia (ForestPlots.net Research Project #84). In less than a
459 year, this large request from Brazilian and UK scientists has already led to database training in
460 Leeds, one virtual workshop in plot data upload run by our trainer based in Brazil, and a second
461 to support Synergize plot workers led by an Amazonian colleague who had been trained by our
462 trainer. A manuscript in preparation is being led by a Brazilian early-career researcher and will
463 include the new plots. Thus, by supporting hubs of knowledge and training data-owners, we can
464 support users, support contributors, *and* grow a communal resource sustainably and equitably.

465

466 **3.2 Producing locally-adapted conservation biology textbooks**

467 Richard B. Primack, John W. Wilson

468 Textbooks are one of the most effective ways to learn about a new field. Conservation textbooks,
469 however, are traditionally expensive, in English, and full of examples and approaches not always
470 relevant to those regions richest in biodiversity, notably the tropics. As a result, students from
471 such regions might not be able to relate to these textbooks, substantially limiting their exposure
472 to modern concepts in conservation biology, ecology, and related disciplines.

473 For the past 25 years, Primack has demonstrated an effective approach to address this issue. This
474 approach begins by inviting conservation biologists from an under-represented country to be co-
475 authors of a new textbook: a locally-adapted version of Primack's widely-used *Primer of*
476 *Conservation Biology*. The authors then seek a publisher willing to produce, publish, and
477 distribute the book locally and at a reasonable price. In consultation with the publisher, the
478 authors then replace study cases, references, photos, and illustrations in the *Primer* with local

479 examples, simultaneously translating the text if warranted. Seeking funding from foundations or
480 government agencies to support the writing and production is sometimes part of this process.
481 Using this approach, there are now more than 38 locally-adapted conservation textbooks
482 available across the world, including such tropical and sub-tropical locations as Latin America
483 (two editions in Spanish, one in Portuguese), Indonesia (two editions), China (five editions), and
484 one each in Vietnam, Madagascar (in French), the Middle East (in Arabic), and South Asia (in
485 English).

486 A locally adapted textbook for African audiences, published in September 2019, presented a
487 novel challenge. Every print publisher we approached was either unable or unwilling to produce
488 and distribute an affordable conservation textbook across dozens of African countries. Our
489 struggle to find a suitable publisher was highly frustrating given the urgency of the work: Africa
490 has some of the world's fastest growing human populations and fastest growing economies,
491 placing an outsized burden on the continent's rich and unique biodiversity.



492

493 **Fig. 7: This conservation biology textbook for Africa is filled with local examples and is available online**
494 **without charge. Photo © Open Book Publishers (openbookpublishers.com/)**

495 We eventually concluded that the African textbook should be produced under a Creative
496 Commons (CC BY) license, and distributed online for free. Due to copyright concerns, we also
497 felt a completely new textbook, completely independent of the *Primer*, had to be written. These
498 realizations enabled us to produce a 694-page text (<http://consbio.africa>) with hundreds of color
499 photos and over 50 “boxes” (case studies written by leading scientists working across the
500 continent). The textbook has been a resounding success: several universities now use it in their
501 conservation courses, and it has been accessed online over 13,000 times (not including copies
502 distributed by teachers on memory sticks) in its first year.

503 There is no doubt that the success of this textbook is due to being an online resource available for
504 free, being dedicated to African audiences, and having African scientists authoring their own
505 case studies. This is also a model for how conservation biologists can work with their colleagues
506 to achieve broader impacts by adapting review articles and other types of publications to be
507 locally relevant.

508

509 **4. Working to reduce risks**

510 **4.1 Conservation dangers in Uganda**

511 Richard Wrangham

512 The biggest animals are especially appealing to the conservation-minded public. Unfortunately
513 for their futures, however, they have low population densities, they need large living areas, and
514 their meat, tusks, horns and infants make them attractive targets for poachers. To make matters
515 worse, many large species are dangerous to humans. The risks they bring understandably
516 undermine enthusiasm for conservation among local people.

517 We faced this problem in Uganda in the first decade of the Kibale Chimpanzee Project. Between
518 1994 and 1998 eight children were attacked by a chimpanzee. Attacks were made out of sight of
519 adult humans, often as the child went to fetch water. Five of the children were killed. These sad
520 events were consistent with the ordinary hunting behavior of chimpanzees preying on primates
521 (Wrangham et al. 2000).

522 The attacks happened only a few kilometers away from where we had been habituating
523 chimpanzees since 1987. As a result people often accused us of being responsible for making
524 chimpanzees fearless of humans. Eventually we learned, however, that the attacks were due to a
525 single adult male who did not belong to our study community. Apparently he was the last
526 surviving male of a population that had had its forest territory cut down and converted into
527 gardens of plantains and maize. Similar attacks have now been documented in many African
528 countries. They probably occur wherever chimpanzees and humans are neighbors, made more
529 frequent by forest loss (Hockings et al., 2010; McLennan and Hockings, 2016).



530

531 **Fig. 8: Researcher Dr Jess Hartel takes data on 16-year-old adult male chimpanzee Lanjo in Kibale National**
532 **Park, SW Uganda, 2011. Lanjo's facial expression shows that he is starting to give a long-distance 'pant-hoot'**
533 **call. As of July 2020, the Uganda Wildlife Authority requires researchers studying chimpanzees to maintain a**
534 **10-meter distance and to wear a face-mask due to COVID-19. (Photo © Suzi Eszterhas)**

535 As conservationists we were faced with an ethical dilemma. For several years we had been
536 conducting afternoon seminars in villages to persuade our neighbors what a meaningful and
537 valuable species chimpanzees are, and to ask for support in protecting them. So we were
538 reluctant to compromise our message by trying to kill any chimpanzee seen in the area where
539 children had been attacked. But we had to protect children. We appointed a member of our team
540 to patrol the villages every day in an effort to help keep them safe, we searched for the elusive
541 villain or villains, and with official permission we armed our conservation rangers. In the end,
542 the killer chimpanzee solved the problem for us. One evening he took a baby off her 5-year-old
543 sister's hip, climbed into one of the few tall trees in the area, and gave a loud call. Spear-carrying
544 men were around the tree by the time he came down, and our rangers arrived in time to dispatch
545 him. Unfortunately the baby did not survive.

546 Ideally the killer might have been removed to a location where he could do no harm. But given
547 the hostility of male chimpanzees to strange males, not to mention the fact that all chimpanzee
548 habitat in Uganda is already under pressure, the sad reality is that when an ape becomes a killer
549 there are no good solutions. Balancing the decision to kill the offender with the message of care
550 and respect for the species will always be a challenge.

551

552 **Discussion**

553 In this article, ecologists and conservation biologists carrying out long-term tropical research
554 have described ethical issues they have confronted. Direct conflict between humans and wildlife,
555 as documented by Richard Wrangham, can be one of the harshest of ethical challenges
556 associated with biodiversity conservation in densely populated regions of the tropics. However, it
557 is only the extreme case in a system that too often still saddles local people with high incidental
558 costs of protecting biodiversity. These costs are often layered on top of opportunity costs, which
559 are incurred through the absence of rural economic development and may themselves be very
560 high (Green et al. 2018). Hence, finding ways to *minimize local costs* while *maximizing local*
561 *benefits* is the fundamental challenge addressed in different ways by each of the contributors to
562 this collective article.

563 Many of the ethical issues arise from chronic underfunding of tropical scientific research (e.g.,
564 Barbier et al. 2018), leading to lack of training and employment for in-country scientists, lack of
565 opportunities for rural people, and lack of continuity for projects. Is it possible that many of the
566 ethical dilemmas cropping up in research programs in the tropics can be traced back to
567 fundamental discrepancies between what wealthy nations want (global biodiversity protection)
568 and what they have been collectively willing to pay for? And if so, can long-term tropical
569 research-action programs act effectively to reduce this structural imbalance, at least in specific
570 locations? These are some of the fundamental ethical questions that tropical ecologists and
571 conservation biologists must grapple with as they try to do the best science possible.

572

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