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Ethnoprimatology: Critical interdisciplinarity and multispecies approaches in anthropology

Nicholas Malone and Alison H Wade
Department of Anthropology, University of Auckland, New Zealand

Agustín Fuentes
Department of Anthropology, University of Notre Dame, USA

Erin P Riley
Department of Anthropology, San Diego State University, USA

Melissa Remis and Carolyn Jost Robinson
Department of Anthropology, Purdue University, USA

Abstract
The emerging practice of ethnoprimatology creates an important venue for diverse epistemologies in anthropology and primatology to interact in an intellectually robust and engaged manner. At the same time that multispecies ethnographies are becoming more common in social anthropology, a subset of primatologists are immersing themselves in approaches that merge ethnographic engagement with primate studies. In these endeavors the distinction between "human worlds" and "nature" is discarded and multispecies entanglements become central aspects of anthropogenic ecologies. By drawing from ecological, biological, ethnographic and historical approaches, ethnoprimatology creates a more robust and accurate methodology for anthropologists and primatologists interested in understanding complex systems of human–alloprimate interface in the Anthropocene. In this essay, we outline what ethnoprimatology is, how it plays out in real-world contexts, and why it is a potentially powerful tool to move past historical rifts in anthropological practice and integrate perspectives in a successful and engaged manner. Finally, we address the practical and ethical considerations of human–alloprimate engagements in both conservation and scientific contexts.

Corresponding author:
Nicholas Malone, Department of Anthropology, University of Auckland, Auckland 1142, New Zealand.
Email: n.malone@auckland.ac.nz

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Introduction

> "The study of nature is powerful, and power is cultural. Engaging cultural issues is essential for understanding science; it is not the antithesis of science . . ." – Jonathan Marks, 2009: 279

Within fragile ecosystems the world over, approximately half of the known nonhuman primate species face extinction – their fates inextricably linked to the welfare and the activities of humans on both local and global scales (IUCN, 2012). Enter the primatologists. Equipped with binoculars and accoutrement, they endeavour to examine the lives of nonhuman primates. Common outcomes of their efforts include gaining comparative insight into the study of human evolution, testing general hypotheses in evolutionary biology and ecology, informing conservation stragies, or some combination of these (Campbell et al., 2011). With identities consisting of ascribed (e.g. ethnicity, gender, and socioeconomic status) and acquired (e.g. education, training, and experiential) characteristics, as well as biases with respect to their conception of research, nature and conservation, primatologists possess the power to affect emerging relationships with both humans and alloprimates (Fuentes, 2011; Haraway, 1989; Latour, 2000; Malone et al., 2010; Marks, 2009). We will argue that critical reflection on these fieldwork moments, and their associated multispecies entanglements, not only provides a venue for diverse epistemologies in anthropology and primatology to interact in an intellectually robust and engaged manner, but is of both practical imperative and temporal urgency (Crutzen and Stoermer, 2000; Kirksey and Helmreich, 2010).

Ethnoprimatology and a blurring of disciplinary boundaries

Ethnoprimatology mixes human social, economic and political elements with a "traditional primatology" which is framed as an objective biological approach used to ascertain causes or formulate laws to explain phenomena (Fuentes, 2012; Fuentes and Hockings, 2010; Fuentes and Wolfe, 2002; Riley, 2006, 2007a; Riley et al., 2011; Sponsel, 1997). In ethnoprimatology, the typically deductive science of primatology meets the inductive approach of social anthropology (Sommer, 2011), resulting in the inclusion of anthropogenic realities as central components of the lives of other primates and their interfaces with humans (Fuentes, 2012). This approach affirms that humans are primates and that humans and other primates are co-participants in shaping shared social and ecological worlds. As such, a tension emerges in the attempt to reconcile the tools (methods) of alternatively

quantitative and qualitative investigations with their juxtaposed justifications (methodologies) of reducing complexity to something measureable, and describing complex phenomena in their entirety, respectively (Blommaert and Jie, 2010; Madden, 2010).

Ethnoprimatology is a hybrid field of study arising from the synergy of at least four lineages: field primatology and primate conservation, animal studies in socio-cultural anthropology, anthrozoology, and the animal welfare movement's critique and engagement with primatology (Fuentes, 2012). Field primatology traditionally values the observation of primates in "naturalistic" settings, which sets up a dichotomy between "naturalistic" locations, those with little perceived human impact, and "disturbed" settings undeniably impacted by human agency. This has resulted in the exclusion of most human–alloprimate interface zones from serious study in primatology and a minimization of the role of the human agent. However, over the last three decades field primatologists are increasingly confronted with significant human presence in their field sites and a growing recognition that human impact matters even in ostensibly "natural" sites (Fuentes and Wolfe, 2002; Wallis and Lee, 1999).

In the Anthropocene[1] humans are changing global and local ecologies faster than we can study them. Therefore, engaging in an integrated and engaged primatological and anthropological practice, seeing humans and other primates as co-resident in ecological and social landscapes, has become a necessary approach.[2] Ethnoprimatology rejects the perspective that the human–other primate interface is best viewed as a relationship of only conflict and competition, rather we offer the possibility of multiple relationships and engagements. As there are few, if any, ecosystems on the planet where humans have no impact, studying primates in minimally impacted "natural" settings is both unlikely and misrepresentative of most primate populations. Humans are not separate from natural ecosystems and anthropological approaches must be included in behavioral ecological and conservation research on other primates (Fuentes, 2012; Fuentes and Hockings, 2010; Lee, 2010). Integrating subareas of anthropological practice and assessing the mutual ecologies, evolutionary histories, and social lives at the interface of humans and other primates blurs boundaries and, potentially, gets us to better and more accurate (if more complicated) answers.

Social scientists and historians occasionally focus on the relationships between humans and other primates (Corby and Theunissen, 1995; Janson, 1952) and the analysis of other animals' roles in human symbol and myth is known in social anthropology from the 1950s (Ingold, 1988; Leach, 1964; Levi-Strauss, 1963; Shanklin, 1985). More recently the importance of human–other animal relationships has fallen under socio-cultural anthropology's gaze (Cassidy and Mullin, 2007; Mullin, 1999; Ohnuki-Tierney, 1987, 1995; Shanklin, 1985). Seeing alloprimates as interrelated with human lives is now a thread in socio-cultural anthropology. Expanded ethnographic toolkits move past the boundary of the human and attribute symbolic, social, and ecological agency to the human–alloprimate interface (Cormier, 2003; Knight, 2006; Lizarralde, 2002; Sheppard, 2002; Sponsel et al., 1997, 2002). These moves, combined with the multispecies lens and *natural cultural*

criticism (Haraway, 2008; Kirksey and Helmreich, 2010), are contributing methodological and theoretical infrastructure to ethnoprimatology. As such, ethnoprimatology is a central locale for the growing consensus in primate studies that the interface between humans and other primates is more than one of person/subject, and that understanding relationships between researchers and their nonhuman study subjects can be an essential element in primatological practice (e.g. Asquith, 2011; Malone et al., 2010). As a means to demonstrate the ethnographic richness of the human–alloprimate interface, we present three brief case studies from our respective research engagements in Java (NM and AHW) and Sulawesi (EPR) in Indonesia, and the Dzanga-Sangha Dense Forest Reserve, Central African Republic (MR and CJR). Moreover, the three case studies are unified by their explicit connectivity to both theoretical developments and praxis within anthropology.

Java, Indonesia: Wallace's "most interesting tropical island in the world"

Alfred Russel Wallace (1869) opined of Java's significance resulting from the combination of biotic richness, physical geography and complex human history.[3] Indeed those factors endure and are enmeshed in a myriad of social and economic entanglements. However, today's estimated 135 million human inhabitants (Badan Pusat Statistik, 2010) exerts enormous pressure on the remaining areas of forested land, which is estimated at less than 10% of its original expanse (Nijman, 2004; Smiet, 1990). The remaining islands of primary forest are set amongst a sea of agricultural lands and a mosaic of protection and production forests, making biodiversity conservation on Java a complex challenge (Meijerink, 1977; USAID, 2004). The extant community of nonhuman primates includes: the silvery gibbon (*Hylobates moloch*); the grizzled leaf monkey (*Presbytis comata*); the Javan leaf monkey (*Trachypithecus auratus*); the Javan slow loris (*Nycticebus javanicus*); and the long-tailed macaque (*Macaca fascicularis*). With the exception of the macaque, each of these species has a very limited geographic distribution with a current IUCN Red List status of either Endangered or Vulnerable (IUCN, 2012). While the remainder of this case study focuses on the silvery gibbon, many of the dynamics apply to some or all of the other species as well.

The endangered silvery gibbon persists in roughly 30–50 forest fragments across Java, with total population estimates ranging from an optimistic 3000–4000 individuals (Supriatna et al., 2010) to a more conservative 1000–1500 individuals remaining (Wedana et al., 2010). Their socioecology is now informed from studies in both lowland and submontane sites across West and Central Java, with the gibbons known to range from $0 < 1500$ m above sea level (Kappeler, 1981, 1984; Kim et al., 2011; Malone, 2007; Utami Atmoko et al., 2010). There is now confirmation that small group sizes (~3.3 individuals/group) and frugivory (~60% of feeding time consuming fruit) are characteristic of this species across habitat types (Kim et al., 2011). Regulations exist to protect the silvery gibbon and its remaining habitat, yet both continue to suffer from human encroachment. Silvery gibbons are

located in all stages of the illegal pet trade including: private homes, animal markets and wildlife rescue centers (Malone et al., 2004; Nijman, 2005; Sarono, 2004). Additionally, habitat alteration and losses continue, even within the boundaries of protected areas (Malone, 2007).

With such large numbers of displaced silvery gibbons, there has been a recent prioritization of integrated rehabilitation and reintroduction programs. In addition to determining the suitability of the habitat for the release of rehabilitated primates, IUCN guidelines also require a socioeconomic analysis of the costs, benefits, and impact of releasing primates into a given area. This includes an assessment of the local residents' attitudes toward the release project (Baker, 2002). Ethnographic research is one way to explore the worldviews of others in an effort to understand why activities such as forest clearing, encroachment, and the acquisition of pet primates occur. Two ethnographic methods that allow consideration to be given to the local human residents are cultural mapping and semi-structured interviews. Cultural mapping involves the collection of social, historical, and ecological data in situ, and facilitates a researcher's understanding of the importance of cultural landscapes as active components in people's lives (Bender, 1993; Morphy and Morphy, 2006). The movement through places is one of the most important elements of cultural mapping as it often adds more detail and sometimes more information than what can be gained during a stationary interview (Strang, 2010). The pliant nature of the semi-structured interview format is effective for maintaining the directedness of the interview, while simultaneously enabling participants to share pertinent information and accommodate tangents (Bernard, 2011).

In a preliminary assessment of a potential release site (Gunung Tikukur) for the Javan Primate Conservation Project (JPCP), one of us (AHW) deployed these ethnographic methods to begin a process of assessing the attitudes of local residents toward the conservation initiative. Cultural mapping and semi-structured interviews were conducted using a purposive sampling method to identify participants whose livelihoods are based in proximity to the forest boundary (Bernard, 2011; Tongco, 2007). Participants of Sundanese ethnicity came from several villages within the district of Patuhua, Ciwidey. Participants were accompanied on a usual trip to the forest, taking note of areas they deem important. Semi-structured interviews (in a combination of Sundanese and Bahasa Indonesia) were used to build upon the information gained from cultural mapping. Land ownership/management in the area consists of privately owned land, land that is leased from the government, and protection forest. Water is an essential resource with all non-protected land existing in a network of hillside terraces to channel the water ensuring each farm has an adequate supply and distribution to grow their crops. The main crop grown in the area is strawberry, which is actively marketed to local tourists in the form of products and gifts. In addition to strawberries, other crops include rice, potatoes, peppers, tomatoes, tea, spring onion, and cabbage. The majority of the water in this area is sourced from a mountain spring that is collectively managed by the people. Its importance was voiced by every participant, usually in relation to questions about conservation or their perceptions of the

forest. One participant clearly illustrated this viewpoint in articulating the importance of "*. . .penghijauan* [reforestation] to conserve water resources. If there is no forest, means no water anymore because the root of the trees preserves water." Additionally, the quality of the water is particularly important and this was of concern to local residents in regards to the establishment of the JPCP, as one of the main water channels runs through the land leased by the project.

In addition to the necessity of water for farming, one participant stated: "to conserve our nature is everybody's obligation for everybody's benefit. If there is no animal we feel inappropriate because we live together side-by-side with animals." A similar response was given by another participant, who said animals should not be hunted on account of the aesthetic value they provide "as ornaments or decorations of the forest." Two participants shared the notion that the animals protect the forest and this is why they should be conserved. Of the participants interviewed in this research the main reason given as to why the forest is important was to conserve their water resources, followed by the protection it offers them from landslides, and the daily needs it provides in terms of food and wood. The participants had an understanding of the term "conservation," although their main focus was to conserve the forest to protect water resources. Only two participants extended the concept of conservation to the animals that reside in the forest.

A combination of historical land use patterns, high human density, and consistent volcanic activity has shaped Java's surface landscapes. This suite of environmental parameters and anthropogenic pressures produce a nearly unparalleled potential for ecosystem degradation. In this context, conservation is as much a political, as it is a scientific endeavor. Conservation tactics and strategies (and prioritizing status assessments) must transcend traditional dichotomies bandied about in the scientific community. For example, Asquith (2001), with respect to the conservation of silvery gibbons, focuses on the differences in diagnostics, strategies, and tactics between the "declining-population" and the "small-population" paradigms within conservation biology. While the former focuses on extrinsic pressures (e.g. hunting and habitat loss) and proposes protecting and managing the largest populations in their natural habitat, to the exclusion of smaller, potentially unviable populations, the latter, or "small-population" paradigm, concentrates on intrinsic threats such as low-levels of genetic diversity and recommends genetic management and periodic supplementation of even the smallest populations (Asquith, 1995; Asquith et al., 1995; Caughley, 1994). Regardless of which paradigm is argued to be more appropriate, both assume a "level playing field" for the implementation of their respective recommendations, and lack a connection to the actually existing will of political entities and local peoples. In fact, Supriatna (2006) argues that legislation providing for regional autonomy, effective January 2001, has opened the door to *both* increased exploitation of natural resources *and* increased participation in management decisions by NGOs, conservationists, and, ostensibly, local stakeholders. By gathering information on both human and nonhuman primate responses to conservation policies and threats, respectively, ethnoprimatological research may offer the slightest hope for a species threatening to follow the orangutan into the extinction history of Java.

Human–nonhuman primate entanglements on the "ultimate island" (Sulawesi, Indonesia)

Ecologically, the Indonesian island of Sulawesi is simultaneously regarded as peculiar and remarkable. With its most unusual shape (i.e. a wobbly K, a demented spider), Sulawesi (formerly "Celebes") is the most isolated and geologically complex of the archipelago, and home to a depauperate yet distinctive fauna (Whitten et al., 2002); an ultimate island[4] of sorts. The primates of Sulawesi are no exception. While there are only three primate genera on the island (*Homo, Macaca, Tarsius*), the level of taxonomic diversity for the two nonhuman primate genera is unparalleled compared to the rest of archipelago: there are seven endemic macaque taxa (Fooden, 1969) and $\geq$16 taxa of Eastern tarsiers (Groves and Shekelle, 2010).

Homo sapiens is believed to be the only hominin to ever reach Sulawesi, with the earliest traces of occupation dating to ca. 50,000 ya (Bartstra et al., 1991). Sulawesi's current human population of approximately 16 million people comprises 80 different ethnic groups which are divided in relation to geography, subsistence, language and religion. Traditional forms of subsistence range from swidden agriculture to fishing and/or seafaring (Davis, 1976). Many of the ethnic groups now engage in wet-rice agriculture, and most practice plantation agriculture of cash crops including coffee, cacao, palm oil, and cloves. Large-scale conversion of forest has accelerated in the last four decades due to the emergence of government supported enterprises including commercial logging, the transmigration program, and development of cash crop industries (Whitten et al., 2002). These forms of land conversion combined with a growing human population size have increased the likelihood of human–macaque interactions, particularly in rural areas at forest-agriculture ecotones. One of us (EPR) explored this dynamic at a highland site in Lore Lindu National Park, Central Sulawesi (Riley, 2005).

Lore Lindu National Park, established in 1993 and comprising 217,982 ha, provides habitat for a majority of Sulawesi's endemic mammals, including one endemic macaque taxon, *Macaca tonkeana*, and watershed protection for two major river catchment systems (the Lariang and the Gumbasa-Palu rivers). Situated at approximately 1000 m.a.s.l., the Lindu highland plain is one of two enclaves that are allowed to exist within the park because it is a major rice growing area and has long-established settlements. The people indigenous to the Lindu plain are members of the Kaili ethnic group which is further divided into seven distinct groups on the basis of dialect, with the Lindu form referred to as Kaili Tado' (Acciaioli, 1989). During the designation of the national park, the granting of enclave status meant that the Lindu people were able to maintain their current agricultural fields and continue to engage in small-scale forest production collection.

Throughout the colonial and post-independence eras the Lindu plain remained a relatively isolated area largely due to official government policy of discouraging immigration to the enclave by restricting education and health care facilities (Schweithelm et al., 1992). Over the last 50 years, however, this area has

experienced considerable in migration, including other Kaili from nearby lowland towns who migrated to the area under local resettlement schemes (Acciaioli, 1989) and spontaneously migrating Bugis from South Sulawesi. These migrants are attracted to the area for perceived available land for agriculture, and most recently, for opportunities to participate in the lucrative tilapia fishing industry at the 3000 ha lake situated at the center of the plain (Acciaioli, 2000). Although wet-rice agriculture (*sawah*) predominates in Lindu, and is practiced by both indigenous Lindu and migrants, tree cash crops, such as coffee and cacao, also comprise an important part of the Lindu economy. Cacao (*Theobroma cacao*) cultivation can often be a major cause of deforestation, primarily because new planting along the edges of primary forest is often cheaper than felling and replanting existing gardens when they become exhausted (Donald, 2004). Additionally, the planting of cacao adjacent to forested areas has proven to be disastrous in many areas, as Sulawesi macaques, and other wildlife, are attracted to the crop (Supriatna et al., 1992).

To explore the interface of macaque ecology, human ecology, and conservation in Lore Lindu National Park, it was critical that an *expanded* community ecology perspective be taken—that humans and Tonkean macaques be viewed as members of an ecological community (i.e. "the human–nonhuman primate community"), and that a diverse methodological toolkit be employed. To that end, EPR used primatological and ethnographic research methods to address questions about overlapping patterns of resource use between villagers and Tonkean macaques and how villagers' relationships with and perceptions of nature affect the ability of Tonkean macaques to persist in the park. Primatological and ecological research methods included systematic behavioral observations on Tonkean macaque social groups to determine diet, activity, and ranging patterns and quantitative measurements of cacao crop loss caused by Tonkean macaques (Riley, 2007a, 2007b; Riley, 2008). Ethnographic methods included semi-structured interviews with farmers, focusing on their perceptions of the frequency of crop raiding and its impact on their livelihoods (Riley, 2007a), and semi-structured interviews with a broader sample of villagers to collect information on human forest resource use, knowledge and perceptions of nature and protected area conservation, and human–macaque folklore (Riley, 2007a; Riley, 2010; Riley, 2013).

Interviews revealed that crop raiding is a long-standing human–macaque ecological interaction in the Lindu highlands; subsistence farmers experienced raiding macaques well before the Dutch conquest in the early 1900s. Today the primary crop raided by macaques is cacao. By using the "human–nonhuman primate community" as the unit of investigation (and hence investigating both sides of the conflict), EPR was able to determine that farmers' perceptions of the severity of macaque crop raiding were inflated relative to actual damage caused (Riley, 2007a). When these results were presented to the farmers many of them agreed that crop losses to macaques were tolerable relative to their total harvest. The ethnographic research component also revealed another important factor that explained some of the villagers' tolerance of macaque crop raiding: human–macaque folklore. For the indigenous Lindu, Tonkean macaques are seen as guardians of *adat* (traditional

law) and play a role in a specific folktale that describes human–macaque interactions (Riley, 2010). For many Lindu, this folktale has resulted in a taboo against harming macaques they encounter in their shared ecological space. On the other hand, most migrants did not convey any cultural interconnections with macaques, and often admitted to shooting at the macaques when encountering them in their gardens. Migrants and indigenous Lindu also exhibited differing perceptions and knowledge of the forest and its conservation (Riley, in review). For example, the Lindu speak to the importance of the forest's existence both in terms of utilitarian value (i.e. for the services and products it provides) and intrinsic value (i.e. for future generations to appreciate). Many migrants, on the other hand, do not perceive value in its persistence, but rather in the space that it occupies (i.e. an area that could be cleared for further agricultural development). A key factor that may explain these differing positions is that in contrast to the Lindu, migrants rarely even enter and experience the forest. It seems then that knowledge about and respect for the forest and its denizens are generated from direct, long-term interactions with them. In Lindu, encounters with wildlife, such as the macaques, results in experiences from which human–alloprimate folklore derives. The outcome of this respect has resulted in local support for protected area conservation and tolerance of macaques despite their destructive behavior.

At the same time, two caveats are warranted. First, cultural conceptions and socioeconomic conditions are never static; therefore, it remains to be known at what threshold crop losses are no longer tolerated and social taboos, and the conservation outcomes they afford, are abandoned. Second, this research illustrates the need to carefully consider *who* it is that we mean by "local" and to understand, address, and attempt to integrate multiple local viewpoints when enacting conservation efforts. Because other "locals" may have no qualms about eliminating raiding macaques, the ability of macaques and humans to coexist in their shared spaces may ultimately require what Rose (2011) refers to as "biosynergies"—conservation initiatives that embrace a convergence of values to achieve the mutual satisfaction of human, alloprimate, and ecosystem needs (Riley, 2010, in review). Overall, the research demonstrates the value of an integrated approach, such as ethnoprimatology, in understanding the ecological flexibility of nonhuman primates that live in human-modified environments, and the key factors that affect conservation in areas where human and nonhuman primate needs are increasingly entangled.

Ethnoprimatology in Congo Basin Forests: Case study Central African Republic

The Dzanga Sangha Dense Forest Reserve (RDS) is considered one of the last remaining strongholds of western lowland gorillas (*Gorilla gorilla*), forest elephants (*Loxodonta africana*), bongo antelope (*Tragelaphus eurycerus*) and regionally elusive chimpanzees (*Pan troglodytes troglodytes*). These forests also contain populations of less charismatic species that are critically important to local human

livelihoods and subsistence—duikers (*Cephalophus spp*.) and monkeys (*Lophocebus albigena, Cercopithecus nictitans, Cercopithecus pogonias, Cercopithecus cephus*). Wildlife is an essential part of nutrition, livelihoods and symbolic life for human communities in the region. Our analysis (MR and CJR) focuses on varied human interactions with those mammals that are cross-culturally most important for tourism and trade in the forests of Dzanga Sangha: gorillas, elephants, and duikers. Using these species as part of a larger integrated analysis in this multi-use protected area provides insight into micro-regional variation in abundance, ecology and behavior. It also suggests the power of empirically grounded understandings of the varied ways in which humans value wildlife, helping to move research, policy and practice beyond dichotomies of ethical versus material value of wildlife and polarized ideas about cultural versus biological consequences of conservation.

The Dzanga Sangha Reserve (RDS) was gazetted as a national park and surrounding multiple-use protected area in 1990 by the Central African Government in cooperation with World Wildlife Fund. Traditional hunting with nets and spears, and regulated shotgun hunting is permitted in RDS reserve zones, alongside of selective logging and safari hunting in zones allocated for these purposes. Several cycles of selective logging have increased the vulnerability of mammals to the hunters who rely on the grid of logging roads and fragmented forests. The Central African Republic is a poor landlocked country, struggling with governmental instability, regional conflict at its North and Eastern borders, low rates of literacy and high mortality and morbidity. People living in the forested zones rely heavily on wild game meat for subsistence, as well as a source of cash. Within the Dzanga Sangha region, BaAka peoples traditionally have made their living hunting and gathering; they have been engaged in long-term trading relationships with local fishing peoples and horticulturalists. However, this frontier zone has also long-attracted migrants from across the country and the region with less forest knowledge that come in search of employment with logging or conservation sectors, or to exploit natural resources (wild game, ivory or diamonds).

Conservation efforts at RDS have included the development of eco-tourism for gorillas and visits for expatriates, nationals from the capital city of Bangui, local residents and groups of school children to the large Dzanga saline clearing where hundreds of forest elephants and other wildlife congregate to bathe, socialize and obtain mineral salts and water. The conservation project provides economic opportunities to locals who are hired as wildlife guards or guides. Since 1997, we (MR and CJR) have aimed to assess the impacts of these varied human activities (hunting, logging and conservation) on the forests and wildlife of RDS and the interdependence of humans and wildlife in Congo Basin forests (Hardin and Remis, 2006; Remis, 2000; Remis and Hardin, 2006, 2007; Remis and Kpanou, 2011). We examine long-term trends in animal abundance, and the problems of conserving large charismatic mammals or encouraging sustainability in an area zoned for multiple uses. Furthermore, we integrate human components into the research as these communities are continuously responding to changing conditions. Such human data include: hunter off-take data and interviews with hunters about

prey preference; changes in hunting practices and concomitantly animal behavioral responses to hunting; and declines in species abundance over time. Combining biological and cultural anthropological field-based approaches and toolkits can successfully elucidate dynamic human–wildlife relationships, and suggest directions for more adaptive conservation management policy and practice. A focus on the ways in which humans and animals are inextricably bound together can point us to the ways human actors can be convened around these values to promote sustainability.

As ethnoprimatologists who focus on the nexus of human–animal interaction we are well positioned to find out what is changing in conservation contexts, and why it is changing. Further, we suggest that ethnoprimatology is well suited to expand to include non-primate species of wildlife (e.g. duikers) whose ecological presence has direct and indirect effects on primate populations. We can better attempt to understand how shifting perceptions about wildlife abundance relate to changes in human–wildlife interdependence and valuation of animals. The value of the ethnoprimatological approach is in its ability to tap into extrinsic and intrinsic valuations of wildlife and stakeholders perceptions as well as what might be needed to mobilize for more effective conservation (Jost Robinson et al., 2011). Using the transvalued species concept[5] (Remis and Hardin, 2009) to capture the relationships between the ecological, economic and symbolic roles that primates, and animals more broadly, play in the lives of sympatric human communities, and the challenges to their protection, places us more firmly in an anthroplogical and ecological real-world context. Primates and other wildlife are central to local, regional and larger economies; and highly visible within popular cultures. The transvalued species concept emphasizing these connections has implications for improving the conservation and sustainable use for animal and human communities. Using this concept can further the development of transnational anthropologies of conservation that capitalize on the long-term strengths of our field in the careful elaboration of relationships among humans, and between humans and animals.

Interpreting primatological data through the lens of transvaluation helps to mobilize diverse stakeholders and provide new methods for monitoring forests—we emphasize the need for nuanced, site-specific approaches that recognize uniqueness of individual situations. For example, hunter knowledge of how animals have changed their behavior, their understanding of where animals are and what they are doing help to focus conservation practice (Jost Robinson and Remis, in review; Remis and Jost Robinson, 2012). At a broader level, in the village perceptions change over time, people talk about wildlife differently—this may influence conservation managements or priorities in censusing.

Gorillas hold global mythical significance, straddling an animal/human boundary. They have also been vulnerable to spears, guns and cameras –and subjects of rituals, folklore and dance. Elephants have been exploited for ritual, along with ivory, meat, trophies and the tourist industry, a focus of hunters and conservationists. Duikers have long been a critical part of local subsistence strategies but have more recently entered the global bushmeat trade. As we focus on adaptive

responses and thresholds of persistence for these transvalued species, our analysis considers wildlife not only as a productive material resource, but also as a profoundly important social one. As biodiversity in the Congo basin declines without large-scale development of alternative sources of food or income, we are acutely aware of the critical human–wildlife interdependence for food security, and health and our current work is investigating impacts of decline in access to wild game on hunter-gatherer diets, nutrition and health.

Studies of hunting provide a window into the ways that humans value animals and how these relationships are (re)negotiated in light of wildlife decline. We note that the rich folktales and stories depicting nuanced wildlife behavior that were so prevalent during early research at RDS (Hardin and Remis, 2006) have become rare, and the stories themselves more impoverished and superficial over time (Jost Robinson, 2012). The sense we have that the storytellers and participants now seem less connected to the forests and its wildlife, and less knowledgeable has broader and deeper ramifications for the symbolic integration of wildlife into people's lives with implications for other aspects of more traditional life in forested areas.

We have been struck by the power of the encounter with animals to transform researchers, tourist and hunters alike. Likewise, we have been impressed by the common impact on understanding of the other and of oneself. Hunters and other residents freely integrate attributes of apes into their depictions and understandings of themselves and of other ethnic groups and researchers. For example, in RDS and other Congo Basin forests hunter-gatherers and horticulturalists commonly associate each other with apes based on ascribed behavioral and physical characteristics: chimpanzees (hunter-gatherer) or gorillas (horticulturalists)(Kohler, 2005; Woodburne, 2011). Moreover, traditional *gano* stories highlight the importance of apes, specifically chimpanzees, as characters in origin stories. Sharing of these stories and perceptions with tourists and conservationists provides incentives for conservation, and insights into new approaches. In the same way, BaAka elders lament the lack of forest knowledge among younger BaAka men as it translates directly into their lack of ability to perform forest knowledge (*gano*). The performance of traditional BaAka ecological knowledge requires the performer to take on the persona of the gorilla or chimpanzee. Such talents for transformative understanding of primates and other wildlife are disappearing in younger generations given the loss of traditional knowledge and emergence of new hybrid ecological knowledge. Moreover, our BaAka research assistants often comment that current generations of research students likewise cannot access the authentic nature of human–wild animal encounters and related forest knowledge, given animal responses to increased hunting and poaching.

The concept of transvaluation and its relevance in the symbolic domain is pertinent for researchers as well as tourists and local community members. Those who track and search for large animals in dense forest share unique experiences—in each case, tracking requires intimate knowledge of animal behavior and nuanced awareness, attending to, responding to and adjusting to subtle changes—When lucky enough to encounter the object of desire, the encounter is often filled with

adrenalin and sweat, but also empowering, expanding our vision of our place in nature. Wildlife viewing can also overturn status differentials between those who share the experience (Hardin and Remis, 2006). Our assistants and informants recognized the similarity of our research work with hunting and for some of them we acquire the status and social roles of hunters (Jost Robinson, 2012). Like hunters our livelihoods and sense of self are dependent upon a successful wild animal encounter. On a personal level, we have forged deep connections with those with whom we have worked with in the forest—a bond created by many hours, days, weeks and months of silent searching and sharing information as well as the thrill of animal encounters. We find these shared experiences to be among the most powerful for mobilizing conservation attitudes and practice. Ethnoprimatology's multispecies focus on dynamic human–primate interactions provides unique insight into the creation of new hybrid knowledge[6] often missed in traditional studies both in primatology and anthropology.

Conclusion

We have presented three distinct, but overlapping, case studies providing windows into the shifting nature of primatological research in the 21st century. The emergence several themes is evident, including: multiple meanings and implications for the concept of value; ecological knowledge and the processes that change communities over time (e.g. migration); and the sensitivity of conservation awareness to personal histories and experiences. In response, a growing cadre of anthropologically trained primatologists are immersing themselves in approaches that merge ethnographic engagement with primate studies. By drawing from ecological, biological, ethnographic and historical approaches, ethnoprimatology creates a more robust and accurate methodology for anthropologists and primatologists interested in understanding complex systems of human–alloprimate interface in the Anthropocene. These efforts have produced outcomes that are at once practical and philosophical. The practical merging of anthropological methods and methodologies are providing philosophical insights that may help surmount the barriers of certain persistent dualisms (e.g. human/nature; biological/cultural) and challenge performative norms in primatological and ecological practice.

When primatologists embark upon the study a focal primate species (or a community of species), the socio-cultural and political contexts, and implications of these endeavors matter greatly. The granting of scientific and economic significance to research subjects within the forest often results in an enhanced perception of extractable value from the forest (Malone et al., 2010). While often considered an essential component of conservation in the 21st century (i.e. ascribing a higher value to biodiversity protection vs. biodiversity exploitation), we suggest the potential for negative and/or unpredicted repercussions (e.g. increasing the threat of capture for an illegal pet trade that profits from the perception of rarity and endangered species status) (Malone et al., 2004; Nijman, 2005). Might, for example, the promotion of scientific/ecological value produce short-term results but risk

a wider attraction by those wishing to extract the value that has been added? To this final point, one participant from Java spoke forebodingly about the potential gibbon release site and warned that: ''people from outside the area would be (drawn into) hunting the animals in the forest.'' This specific example emphasizes the general ties that bind the three case studies. That is: a healthy dose of reflexivity (both personal and epistemological) seems essential for the conduct of ethical and efficacious primate science and primate conservation.

In this manner the ethnoprimatological endeavor is firmly situated in an important tradition of critique and contextualization that aims to enrich, expand, and entangle our theoretical and practical engagements (e.g. Marcus and Fischer, 1996; Nader, 1996). We take Jon Mark's observation that ''The study of nature is powerful, and power is cultural'' to heart. As anthropologists we are increasingly confronted with complex realities that require diverse and sincerely integrated toolkits, a cultural shift in the loci of power for many of us. Our methodological and theoretical underpinnings must be drawn from across a range of disciplines and be open to various reflexive critiques and forward looking experiments. Via ethnoprimatological approaches situated firmly in an integrated, and critical, anthropology we hope to find more effective anthropological approaches to the multispecies complexes and dynamic interfaces that characterize the Anthropocene.

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Notes

1. The Anthropocene is a name proposed by Crutzen and Stoermer (2000) to demarcate the present ''sedimentary signature'' of humankinds' alterations of basic biogeochemical processes. However, this new term awakens the old human–nature dualism and, as such, presents both practical and ideological complications, as well as political implications (see Sayre, 2012).

2. Perceiving humans and other primates as co-resident in ecological and social landscapes, has become both a necessary *and* efficacious approach. By recognizing this, recent studies across a variety of taxa have successfully documented the development of primate behavioral and ecological strategies in response to habitat alterations by humans (e.g. Campbell-Smith et al., 2011; Hockings and McLennan, 2012; Strum, 2010). Data from these studies are achieving salience in both evolutionary analyses and management/conservation contexts.
3. Wallace spent just over three months on Java in 1861. Contextualized by extensive travels throughout insular Southeast Asia, Wallace (1869) surmised:

> "Taking it as a whole, and surveying it from every point of view, Java is probably the very finest and most interesting tropical island in the world . . . scattered through the country, especially in the eastern part of it, are found buried in lofty forests, temples, tombs and statues of great beauty and grandeur; and the remains of extensive cities, where the tigers, the rhinoceros, and the wild bull now roam undisturbed."(76)

   Today the Javan tiger (*Panthera tigris sondaica*) is extinct, the remaining rhinos on Java (*Rhinoceros sondaicus sondaicus*) number approximately 50, and the wild bull (*Bos javanicus javanicus*) is limited to four or five subpopulation "strongholds" (~200 individuals) that are currently in decline.
4. Van Oosterzee (1997) regards Sulawesi as "the ultimate island" due to its long history of separation, as evidenced by the deep sea trenches (600 m) that separate it from neighboring Borneo, and its distinctive mix of Asian and Australasian flora and fauna.
5. The transvalued species concept (Remis and Hardin, 2009) is meant to encompass the articulation between economic, ecological and symbolic valuations of wildlife species across cultural, economic, and geographical boundaries. For example gorillas appear prominently in western as well as BaAka folktales and are personified in both cultures. Encounters with gorillas can provide monetary benefits but regardless are significant and often life-altering for tourists, researchers and hunters alike. Emphasizing the connections between different ways of valuing wildlife and integrating social as well as ecological research can reinvigorate global and local populations, providing a way forward for conservation.
6. The term new hybrid knowledge is used to describe new variants of traditional ecological knowledge (TEK) that have been (re)created and negotiated as a result of globalization, migration and changing technology (see Iskandar and Ellen, 2007).

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Author Biographies

Nicholas Malone is anthropologist with a broad interest in the social and ecological lives of primates, especially those of apes and humans. Specifically, he seeks to understand how the observed patterns of variability within and between taxa are simultaneously shaped by, and act as shaping factors of, evolutionary processes.

Additionally, he strives to contribute to primate conservation through a commitment to engaging with local and extra-local efforts. Finally, he wishes to situate the study of primates within the broader contexts of anthropology, history, and research ethics. Malone's writing is informed by research experiences in Indonesia and the Democratic Republic of the Congo.

Alison H Wade is a PhD student in biological anthropology at the University of Auckland. Her current research will be examining the ecological interrelationships between local communities and the Cross River Gorilla in Cameroon, and how human activities that shape these interrelationships are affected by broader political and economic processes.

Agustín Fuentes is a Professor of Anthropology at the University of Notre Dame. His current research includes cooperation and community in human evolution, ethnoprimatology and multispecies anthropology, evolutionary theory, and interdisciplinary approaches to human nature(s). Fuentes' recent books include "Evolution of Human Behavior" (Oxford) and "Race, Monogamy, and other lies they told you: busting myths about human nature" (University of California).

Erin P Riley is an Associate Professor in the Department of Anthropology at San Diego State University where she teaches undergraduate and graduate courses in biological anthropology, anthropological primatology, and anthropological research design. Drawing from primate socioecology, conservation biology, and environmental anthropology, her research primarily focuses on primate behavioral and ecological flexibility and the ecological and cultural interconnections between human and nonhuman primates (ethnoprimatology). She has published across an array of fields with notable publications in *American Anthropologist*, *American Journal of Primatology, Evolutionary Anthropology,* and *Oryx*. Riley currently serves as chair of the Conservation Committee of the American Society of Primatologists and of the Ethics Committee of the American Association of Physical Anthropologists.

Melissa Remis is a Professor of Anthropology at Purdue University (PHD Yale 1994) She studies gorilla behavioral ecology, human–wildlife interactions and effects of conservation on human and wildlife communities with 25 years of research experience at the Dzanga-Sangha Reserver, Central African Republic. Her collaborative biological and cultural research includes Remis, M.J. and R. Hardin (2009) Transvalued Species in an African Forest. Conservation Biology v. 23(6):1588–1596 and Hardin, R and Remis (2006) M.J. Biological and Cultural Anthropology of a Changing Tropical Forest: A Fruitful Collaboration Across Subfields American Anthropologist v 108 (2) 273–285. Remis, M.J. and C.A. Jost Robinson (2012) Reductions in primate abundance and diversity in a multi-use protected area: synergistic impacts of hunting and logging in a Congo Basin forest, American Journal of Primatology 74: 602–612.

Carolyn Jost Robinson is an Assistant Professor of Anthropology at the University of North Carolina, Wilmington. Her research uses integrated anthropological and ecological methodologies to examine how wildlife populations and human communities respond/adapt when confronted with changing technology, migration, and new economies of wildlife. Such topics include assessing ecological census methods of nonhuman primates and ungulates, as well as the application of hunter knowledge and behavior to establish adaptive management systems in Congo Basin forests.