



LETTERS

Edited by Jennifer Sills

Inclusive chimpanzee conservation

In their Report “Human impact erodes chimpanzee behavioral diversity” (29 March, p. 1453), H. S. Kühl *et al.* find that chimpanzees in modified landscapes show low behavioral diversity and propose the establishment of “chimpanzee cultural heritage sites” to safeguard behavioral variation. We are concerned that their conclusion propagates a view that some populations are not worth conserving.

At sites with highest modification, such as agricultural landscapes where people and chimpanzees share spaces entirely, human activities are driving chimpanzee behavioral flexibility and diversification, including novel behaviors (1, 2). However, extinction risk in these areas is higher as a result of population isolation and anthropogenic-driven mortality (3). Conservationists also have incomplete data; not all chimpanzee behaviors in the wild are demonstrably socially learned and transmitted—and therefore cultural.

We agree that it is important to protect the behavioral diversity of culturally rich wildlife (4), but such populations should

not always be given blanket priority over those living in closer contact with humans. We must ensure that apes living across the anthropogenic continuum are given a fighting chance.

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Response

We agree with Hockings and McLennan that, ideally, all wild chimpanzee populations would be equally protected. We do not presume to suggest that culture should be the sole basis for chimpanzee conservation efforts. Rather, we advocate a more integrative approach to conservation in which behavioral diversity of populations is another variable that can be described and quantified and can ultimately contribute to

The proximity of chimpanzee populations to human activity is just one factor in conservation priorities.

the protection of wildlife (1). Cultural and behavioral diversity should be prioritized alongside population size, genetic diversity, and demographic viability.

Hockings and McLennan are correct that chimpanzees exhibit remarkable behavioral flexibility when living in human-dominated landscapes. To take advantage of new foraging opportunities and increase their chance for survival in fragmented and degraded habitats, chimpanzees have incorporated agricultural crops into their diet (2) and nest construction (3), as well as adapted their activity patterns to be more nocturnal (4). However, such behaviors represent evolutionarily novel traits compared with the behaviors we investigated, which have previously demonstrated cultural (5, 6) or population variation [e.g., (7–9)]. Of course, larger comparative datasets that include chimpanzees living in human-dominated landscapes will make possible the study of fundamental mechanisms of behavioral and cultural diversification.

We agree with Hockings and McLennan that it is difficult to know the true cultural repertoire of all chimpanzee communities and that, when faced with limited information, we should err on the side of caution

when considering conservation actions. However, if we want to protect chimpanzee cultural heritage, which is to protect historically significant traits originating from the past, then we must protect populations in pristine, less-disturbed habitats.

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Romanian carnivores at a crossroads

In October 2016, in an unexpected move, the Romanian government provisionally suspended the hunting of brown bears and wolves, shaking the decades-old wildlife management system of regulated hunting (1, 2). This decision provided an opportunity to reset Romanian wildlife management and conservation and to implement science-based management. A year later, a new management system was implemented, allowing only the removal of problem animals at the epicenter of human-wildlife conflict, based on a case-by-case approval process (3). However, there is increasing pressure, fueled by a politically charged climate and a negative campaign focused on wildlife damage, to substantially reduce the abundance of large carnivores (4, 5). The role of scientific evidence is still missing from the discussions about protecting Europe's largest large-carnivore populations, which is not an uncommon situation for wildlife management systems (6). Romania should seize this opportunity to enhance the scientific knowledge about carnivore ecology and human-carnivore coexistence (7) and enact science-based policy.

Past management of large carnivores in Romania has been based on biologically unrealistic data collected through a flawed methodology lacking scientific oversight. As in other countries, misguided strategies have highlighted data gaps and the need to infuse science into large-carnivore management (8–10). In recent years, Romania has been building up the science around carnivore population ecology and habitat conservation (7, 11, 12), yet nationwide data critical for management, such as population size or demographic structure, are still missing. The absence of reliable biological and ecological data makes it difficult to prioritize the best management and conservation measures to promote long-term viability while alleviating human-wildlife conflict.

Resource managers, hunters, environmental groups, and citizens should work together with Romanian and foreign academics to set up a long-term large-carnivore research program, which should be backed by the Romanian government and the European Union. Such a program could combine regional initiatives (7) with national-level monitoring (4). It could address long-term ecological and social science questions as well as immediate needs for solving human-carnivore conflict and enabling science-based policy. Transparent science accepted by all parties could be the catalyst for Romania to reconcile its own large-carnivore conservation strategies. We are at a crossroads. Romania can either serve as an example of human-carnivore coexistence in the European Union or become a cautionary tale of politics driving wildlife management and miss an opportunity to safeguard Europe's last wild frontier.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Global pattern of nest predation is disrupted by climate change in shorebirds"

Martin Bulla, Jeroen Reneerkens, Emily L. Weiser, Aleksandr Sokolov, Audrey R. Taylor, Benoît Sittler, Brian J. McCaffery, Dan R. Ruthrauff, Daniel H.

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Kubelka *et al.* (Reports, 9 November 2018, p. 680) claim that climate change has disrupted patterns of nest predation in shorebirds. They report that predation rates have increased since the 1950s, especially in the Arctic. We describe methodological problems with their analyses and argue that there is no solid statistical support for their claims.

Full text: [dx.doi.org/10.1126/science.aaw8529](https://doi.org/10.1126/science.aaw8529)

Response to Comment on “Global pattern of nest predation is disrupted by climate change in shorebirds”

Vojtěch Kubelka, Miroslav Šálek, Pavel Tomkovich, Zsolt Végvári, Robert P. Freckleton, Tamás Székely

Bulla *et al.* dispute our main conclusion that the global pattern of nest predation is disrupted in shorebirds. We disagree with Bulla *et al.*'s conclusions and contest the robustness of their outcomes. We reaffirm our results that provide clear evidence that nest predation has increased significantly in shorebirds, especially in the Arctic.

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ERRATA

Erratum for the Report “Conformationally supple glucose monomers enable synthesis of the smallest cyclodextrins” by D. Ikuta *et al.*, *Science* **364**, eaay0378 (2019). Published online 17 May 2019; 10.1126/science.aay0378

Erratum for the Report “Protein assemblies ejected directly from native membranes yield complexes for mass spectrometry” by D. S. Chorev *et al.*, *Science* **364**, eaax7485 (2019). Published online 26 April 2019; 10.1126/science.aax7485

Inclusive chimpanzee conservation—Response

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