Brazil Should Facilitate Research Permits

Brazil is home to more species of plants and amphibians than any other country on Earth, and it is among the four top-most species-rich countries for birds, mammals, and reptiles (UNEP-WCMC 2005). Yet the ratio of taxonomists to numbers of species is probably the world's lowest; as much as 40 times lower than in the United States (World Taxonomist Database 2009). Given Brazil's expanding investments in meat and ethanol production and industrial development and climate change it is clear that no matter how effective Brazilian researchers are, they will never achieve the Herculean task of completing a taxonomic inventory of the country or be able to study the complex interactions among species before it is too late.

Despite the clear need for increased collaboration between Brazilian and foreign researchers, the Brazilian government and its environmental agencies have only partly succeeded in welcoming foreign scientists. Applying for a research permit in Brazil is particularly problematic. To further assess this problem, we launched a survey among scientists who have conducted or who have sought to conduct scientific research in Brazil (www.systbot.uzh.ch/static/brazil/questionnaire_form). The responses obtained so far (c. 125) describe both positive and negative experiences. Several foreign researchers have experienced an improvement in the permit application process in recent years, but many report that they still require an excessive amount of time and engagement, especially with their Brazilian collaborators. There is also a general sentiment that the process of obtaining a collection permit impedes scientific research far more than it protects the Brazilian biota.

This situation means Brazil is essentially "shooting itself in the foot" because it is constantly losing unique opportunities for badly needed scientific help. Several scientists reported giving up their plans for research in Brazil because of the prohibitive nature of the permit-application process. To avoid this Brazil could follow the example of Costa Rica and Panama, where permits are required but quickly issued. For these countries, this cooperation has led to increased international collaboration on biodiversity and conservational projects, better knowledge of their fauna and flora, and competence-building among national researchers.

Increasing the accessibility of foreign researchers to biological resources in Brazil involves many social, economic, and political aspects (Vale et al. 2008), several of which center on bioprospecting and "biopiracy." It also partly relies on researchers acting ethically once they obtain research permits. The scarce resources of this developing country would be better spent on protection of fragile ecosystems from illegal exploitation than on the bureaucratic machinery that burdens serious scientific work with excessive administrative requirements. Regulations need to be simple and transparent so they will not be an obstacle to research. A few steps have been taken in this direction, such as enabling on-line applications for certain types of permits, but much more is needed to truly speed up the process and regain the confidence and interest of the world's scientific community.

This is a controversial subject, and we acknowledge that some people may view this survey as interference by outside parties, despite one of us being a Brazilian citizen. Nevertheless, we strongly believe that researchers should play a more active role in science-policy discussions. By sharing our experiences and clearly stating our needs from a scientific viewpoint, we can contribute to the on-going discussions on "access and benefit sharing" within the Convention on Biological Diversity (Jinnah & Jungcurt 2009; www.cbd.int/abs).

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1*10* Most Important Questions

It is quite an achievement to identify the 100 most important questions for conservation biology (Sutherland et al. 2009). Answering these questions should advance conservation outcomes by providing conservationists with a better idea of what they need to do to ensure the protection and recovery of biodiversity and ecological processes. There are some caveats, however. The gathering of better information about the state of the biological world is usually not very appealing to institutional decision makers for a variety of reasons related to their immediate goals of obtaining and maintaining power (Johns 2000) and the insulation they usually enjoy from the long-term consequences of their decisions (Rappaport 1976, Wright 2004).

The 100 most important questions are not confined to biology, of course; many are related to generating knowledge related to policy outcomes and to sustaining desired outcomes over time. Answers to these questions will help, but only if the knowledge is acted upon, which is much more likely if this knowledge is grounded and contextualized by the answers to another set of questions—questions the answers to which get us much closer to influencing decisions. These questions are routine to those who have run campaigns aimed at changing institutional and individual behavior, but may not be so obvious to others.

Those questions of the 100 that concern human individual, group, and institutional behavior will be answered with most effect in the context of the following questions. Although the questions below do not meet all of the eight criteria established by the authors of the 100 questions, they do meet the overarching criterion in that the answers will have the "greatest impact on conservation practice and policy." Indeed, answering these questions help answer one of the most fundamental questions implied in Sutherland et al.: How can conservationists increase their effectiveness on behalf of biodiversity? Once conservationists formulate clear goals describing what needs to be done to achieve their vision, they need a strategy that will incorporate answers to the following questions (Johns 2009):

1. Who has the power to make the needed decisions (which legislature, chief executive, agency, business, landowner or combination of these)?
2. Do the decisions sought require a structural change in a social system or run contrary to powerful interests?
3. What social groups have the necessary influence to obtain the desired decision from decision makers?
4. What, exactly, is wanted from these social groups and when?
5. How can these social groups be mobilized effectively to bring about the right decision? This requires answering several subsidiary questions: What are their interests and how do they see them? What messages will emotionally resonate with the group and lead to action? How can the message be tied to the group's most fundamental assumptions about the world and therefore be cognitively satisfying? What story is the most effective vehicle for carrying the message? Who is (are) the best messenger(s)? What are the most effective channels to reach the group? What can conservationists offer in return to groups whose conservation support is solicited (quid pro quos, not shared values or goals, are the basis of much politics)?
6. What resources exist or must be obtained to carry out the campaign?
7. Who are the likely opponents of the desired decision, and how can their opposition be minimized so that the relative power of the coalition in favor of the desired solution outweighs the power of opponent?
8. How will progress toward success be monitored and evaluated, especially given the very long time it can take to achieve conservation goals?
9. Question 9 is not a question and there is no question 10. These two circumstances are reminders that overinvestment in expectations and petty norms (like round numbers) can get in the way of effectiveness.

Being observant and open to suddenly appearing opportunities—such as a crisis that weakens opponents or causes decision makers to be more receptive—is critical to success. Rigid adherence to plans or to a particular understanding of the political landscape will cause missed opportunities. We need to "take the tide at the flood" (Shakespeare's *Julius Caesar*).

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Two Cultures of Conservation

Matthew Child's "The Thoreau Ideal as a Unifying Thread in the Conservation Movement" (2009; *Conservation Biology* 23:241–243) is a rare, heartfelt, and emotional clarion call

in the conservation science literature. Nevertheless, we believe that the views espoused are at minimum misplaced and at worst dangerous.

The foundation of the editorial lies in the author's belief that "conservationists need one overarching ideal" and that this ideal is "nature should be preserved because it makes the world a better place." Child goes on to say, "The movement has been sold short" and become "soulless [with] financial rhetoric," and attempts at integrating other rationales for conservation are "settling for trade-offs and weak, diluted moral variety. . . ."

Conservation already has an overarching ideal. It is an ethically based endeavor focused on understanding and protecting the natural world. Contrary to Child, we think our science is firmly based on a culture of conservation that dips back into the romantics, from Thoreau, Muir, and Carson through to Attenborough, and is supported by the millions of members and donors of groups such as WWF, CI, and RSPB. The editorial misses this cultural diversity in its assumption that conservationists and conservation biologists are synonymous. It ignores the fact that the people who do most of the conserving in the world are farmers, landowners, lobbyists, philanthropists, and generally concerned citizens. These actors strive to stem the loss of wild nature and endeavor for biodiversity protection to be central societal goals. We do not believe that holding such motivational values is incompatible with recognizing the need to identify and address hard socioeconomic realities in real-world conservation problems.

Ignoring real-world trade-offs and societal goals (such as poverty reduction) in conservation programs has failed our natural environment; the current woeful state of the world's natural environment is a testament to this. Desertification, deforestation, reef destruction, fisheries exploitation, species and population loss, climate change, and other ills are occurring at an accelerating rate and are inextricably linked to wider societal decision making. Markets, governments, communities, individuals, and society writ large are all involved in complex decision making that drives global environmental change. In many cases, failure to account for wider societal values results in perverse decisions and the uneconomic loss of biodiversity. For example, a decision maker who converts an area of tropical forest to grazing pasture for private economic gain is unlikely to take into account the full social costs and benefits of this decision. Conservationists should fight to improve the structure of our markets and institutions so that the pursuit of private economic gain does not result in biodiversity losses that diminish the welfare of society as a whole. How far can a group of conservationists go at informing complex and multiscale, multivalue decisions by espousing the ideal that "nature should be preserved because it makes the world a better place?"

To fully evaluate real-world decisions, we need to understand people—their motivations, their needs, and the cost of meeting these needs. This type of understanding is at the heart of economics. Economics is the study of allocating scarce resources across alternative desirable ends (not all of which can necessarily be priced). Conservation is surely about scarce resources; however, the desirable ends are context and culture specific. Therefore, economic arguments are not mutually exclusive of ethical arguments; rather, they are based on them. Although many people in both developed and developing countries possess strong preservationist feelings toward nature, the reality is that these feelings often come in second place to more basic livelihood concerns. It is hard to imagine how the people who inhabit the tropical forests of Brazil or Guyana would be prepared to forgo the welfare benefits of partial deforestation simply because of the need to develop a "culture of care." What we need is an understanding of the lost opportunities from conservation interventions. This is not putting a price on nature; it is putting a price on foregone development.

If it is a culture of care we need, then we need to recognize issues such as the fact that since 1981 the number of people living on less than a dollar a day in sub-Saharan Africa has doubled (Chen & Ravallion 2007). The bulk of these people live outside formal institutional and market arrangements (Hyden 2007), and many of them live in regions that are experiencing rapid population growth. Their lives depend on resource use and hence the exploitation of natural resources. This is hardly unique to Africa. It was just this type of exploitation for livelihood and economic growth that allowed Thoreau to muse while growing beans, and it continues to allow us the academic satisfaction of debating our beliefs in a journal.

Thoreau was committed to the welfare of marginalized peoples: "Do not ask how your bread is buttered; it will make you sick if you do" (*Life without Principle* [1863], but see also *Civil Disobedience* [1849]). However, we live in a very different world than the one Thoreau saw. There are more people living in abject poverty today than the total number of people alive when Thoreau was writing his conservation legacy essay *Walking* (1862). So, when Thoreau says "A town is saved, not more by the righteous men in it, than by the woods and swamps that surround it," he was speaking of both an aesthetic and spiritual value and the services these landscapes provide—explicitly noting the importance of wetlands for soil formation and nutrient retention to aid agricultural production. We are now linking robust ecological and social science to defend these words and elucidate trade-offs.

We would be more sympathetic with Child's editorial if the caution was that a purely *monetary* rationale for conservation can have perverse effects. However, we are alarmed

because it conflates monetary valuation with economic decision making, ignores the multiplicity of values and actors that exist in conservation, and disregards the fact that, in the real world, urgent and complex decisions are being made based on a suite of societal goals and trade-offs.

Understanding and elucidating these trade-offs is not what "has shunted conservation to the sidelines." If conservation is on the sidelines, it is precisely because it has ignored real-world decision making, not acknowledged trade-offs, and has holed up in a position where "nature should be preserved"...period. Science can do a great deal more for conservation than presumptively concluding that more is better.

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Fisher et al. consider my views "dangerous." Good. Conservation needs to become dangerous. Currently we are a toothless watchdog plaintively howling over the planet's destruction. This is an ideological war we are waging—conservation versus consumerism—and we will never win by haggling with industry to put a "price on foregone development." Such phrases do not indicate pragmatism; they reflect defeatism. It is not ignoring "real-world trade-offs" that has failed biodiversity but putting trade-offs at the centerpiece of our endeavor. We must attack the cause that forces us to concede trade-offs: consumer culture. Anything less, and we will still be "walking north on a southbound train" (Orr 2003).

Fisher et al. say that conservation already has an overarching ideal. Where? Ethics that are solely academic do not count. Consumers will not stop environmentally harmful behaviors if the means of moral self-censure remain clouded by capitalist ideology (Bandura 2007). Free-market capitalism and its consequent hyperindividualism have reduced morality to a relic of religious zealots and have commodified virtues into nothing more than corporate brand names and slogans (Sanne 2002). So, it is not enough for conservationists to simply be aware of the various contributors to our philosophical cornucopia; we need to actively re-engage the morally disengaged consumers by recasting the conservation ethic as an alluring alternative to materialism in mainstream culture.

Because my editorial was written for conservation scientists in the journal *Conservation Biology*, I do not know why Fisher et al. surmise that I have lumped practitioners and scientists together. However, this artificial dichotomy between "doer" and "thinker" is detrimental. By compartmentalizing conservation we will never nurture the "interdisciplinary people" that Adams (2007:276) rightly recognizes is needed. Such a division may appear to reflect "cultural diversity" in an aggregate sense (e.g., career diversity), but it has decreased individual cultural diversity by engendering a suspicion of the social sciences and humanities and by enforcing rigid conservation roles. Role rigidity is partly why so little theory gets implemented and why conservationists (scientists or otherwise) may still be seen as undesirable new-age hippies. Meanwhile, conservation scientists, snug in their academic niches, do not deign to interact with mainstream culture on any meaningful level. It is this divide that prompts people to ask me in a bewildered tone, "I'm sorry, what?" when I tell them what I study. Although our fancy new socioeconomic tools and real-world mental models may be fine for fighting the losing battles against business-seduced, bureaucratic governments, conservation is still very much a fringe concept in the cultural processes that determine the consumption behaviors of the few people who have the resources and education to change the way the world works. That is why we fail.

I did not say, however, that holding motivational values is incompatible with the need to address hard socioeconomic realities; I said that we should get our priorities straight. If some conservationists want to put price tags on the priceless, they can go right ahead, but only after we have established the moral imperative of pricelessness. Evils like slavery, child prostitution, and the lack of women's rights were condoned in certain times and places because the prevailing culture viewed these individuals as possessions. Similarly, economic discourse inherently presupposes biodiversity as proprietary. Hence, economic decision making and monetary valuation are not a conflation but a logical consequence:

the process of economizing the value of biodiversity in relation to its "opportunity cost" to "development" directly rifle-grooves the perception of biodiversity as nothing more than a set of discrete products to be purchased (sensu Ferraro et al. 2003). Jargon such as *willingness to pay*, *natural capital*, *opportunity costs*, and *marginal utility* hardly inspires consumers to think about biodiversity in any other way besides consumption. Economics may be the study of scarce resources allocated to alternative desirable ends, but just how long do we wait for the resources to cease being scarce and start being extinct?

So when Fisher et al. contend that "economic arguments are not mutually exclusive of ethical arguments; rather, they are based on them," they have confounded cause and effect. Economic decisions are not based on ethical practices; conversely, economics has come to determine the ethical milieu of consumers (Sanne 2002). Every day we are bombarded with stock-market chaos; thousands of advertisements and magazines command us to create personal wealth so as to buy more stuff; and reality television shows and celebrity news channels deify the lucky economic elite. Such profligate philosophies reach across the world to the poor rice farmer in a third world country who now sees the Humvee as a cultural symbol of a world that is lost to him, but which he should nevertheless desire. Thus, just as surely as corporate America has defined the "alternative desirable ends" for brainwashed consumers, so must we institute desirable ends for anticonsumers. As in ecosystems in which a small set of controlling variables structure the landscape at all scales, in societies there is a small set of consumers with high economic, cultural (and thus social) capital who directly entrain similar consumptive behaviors across socioeconomic divides through a mysterious force called "taste" (Carlisle et al. 2008). It is this core group of trendsetters, cultural icons, public intellectuals, and connectors that conservation needs to reach. If we do not, the Great Lack that fuels dissatisfaction, and thus rampant consumption, will never be challenged.

Fisher et al. missed my editorial's central point. I was not arguing for "more is better," but precisely the opposite. It is our duty to influence Western culture with the Thoreauvian mantra "less is more" to counteract the spuriously linear correlation between material acquisition and happiness. The mantras that Fisher et al. rely on will only add more iPods to the inferno. So when the world is at last one vast conurbation—bursting with listless consumers who are bloated with material well-being—there will be little biodiversity but (thankfully) a scrupulous ledger of its net worth.

Acknowledgment

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Practicing Fisheries Conservation Biology within Harvesting Regimes

In a recent editorial, "When Swordfish Conservation Biologists Eat Swordfish" (Conservation Biology **23:**1–2), Bearzi argues that scientists should practice what they preach (G., not an exact quote from editorial) with regard to their behavior and conservation beliefs. Especially in academia, many of us are focused on research we consider vital, but others might find esoteric at best. Nonetheless, we share a public role as scientists to be advocates for rational decision making in both our professional and private lives. The editorial's perspective has some merit, but it presents an incomplete picture.

Overly broad statements, such as "fisheries scientists advocate for stricter quotas, which would therefore limit consumption, yet they themselves may practice little restraint in their personal consumption of seafood," unproductively criticize an entire scientific field; fisheries science is a wide-ranging discipline covering thousands of species and gear types. Speaking personally, I and many of my fisheries colleagues indeed consider factors such as sustainability in our seafood choices and have shifted our purchasing patterns from unsustainable fishery products to those more ecologically friendly (e.g., farmed tilapia instead of wild-caught red snapper). Having learned the health benefits of consuming fish products, the general public has similarly not simply reduced fish consumption in the face of well-publicized fisheries problems, but rather is learning to consume such products more intelligently. As Bearzi advocated, many scientists are already leading by example when it

comes to fisheries products in the marketplace.

Of more concern is the persistent attitude that shifting the behavior of consumers—whether by market coercion or harvest prohibitions—is the only means by which conservation biologists can effect change for overharvested species. In the United States, we have a participatory fisheries management process in which the general public and outside scientists can provide input at several levels. Should your particular government not allow such public or scientific participation in the management process, a first step could be for you and local environmental groups to ask why they and nongovernment scientists are not included at the decision-making table. As the ones who conduct the research that presumably guides the decisions of those politicians, we should seek to advise them directly, not solely through the ivory tower of academic papers.

If management participation is unpalatable or unwelcome, another method by which our community can effect change in problematic fisheries is through conservation engineering of fishing gear. For example, there is widespread agreement that turtle excluder devices (TEDs) on coastal trawl nets have made profoundly positive changes to the turtle bycatch issue. I have participated in several such conservation engineering projects, including experimental research with circle hooks in the commercial longline fisheries of the United States and Brazil. Although I agree there is rarely one change in any fishing gear type that solves all bycatch problems, much more work could be done in this area. It may not be fashionable in today's quantitative scientific world to spend time at sea on commercial boats, but there are many reasons why it is good to visit the metaphorical trenches.

Although perhaps it reflects an "American" versus "Continental" view of government, I also disagree with the statement "... we would prefer our governments to take care of environmental and ethical issues, rather than having to face difficult choices ourselves." This is the easy dodge of the problem. I posit instead that we lose our moral standing to criticize unscientific government decisions by choosing not to involve ourselves in the science and management process. There may be times when drastic action needs to be taken, such as fleet reductions or even the closure of a fishery, but those options should not be exercised without input from the public. If we, as professional scientists, cannot make these difficult choices or advocate conservation positions on the basis of research and fact, how can we expect the public to do so?

In the sense that we should all seek to make individual changes in our own lives that foster a more sustainable lifestyle, I fully agree with Bearzi, but we should also take the next step and become participatory in larger processes as well. Regardless of particular species, it is often far easier to criticize from the sidelines than to participate in finding practical solutions, and despite the cottage industry increasingly generating them, the scientific analyses that make overly simplistic conclusions such as "X fishery is bad, so it must be closed" are rarely of any use to management.

Finally, even fisheries scientists are occasionally guilty of focusing on the problems rather than cheering management successes, however few they might be. We should use our behavior to proactively support these rebuilt and sustainable fisheries and to avoid those that are still in decline. The choice of swordfish as an example for the editorial was unfortunate because the several stocks of this species are in various states of success and failure; a more dismal picture of a fishery is exemplified by the Atlantic bluefin tuna. After spending years working within both the management and scientific research processes of Atlantic pelagic fisheries issues in the United States, I have seen the North Atlantic swordfish stock rebound to near maximum sustainable yield levels (ICCAT [International Commission for the Conservation of Atlantic Tunas]. 2008. Report of the Standing Committee on Research and Statistics. ICCAT, Madrid Available from http://www.iccat.int/Documents/Meetings/Docs/2008_SCRS_ENG.pdf). I proudly and without hesitation eat domestically caught swordfish.

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In my editorial, "When Swordfish Conservation Biologists Eat Swordfish," I address conservation biologists, not scientists generally. My message is a call to those who work on conservation issues and tell others what to do to solve a conservation problem without participating in the solution themselves. One of the apparent purposes of Kerstetter's response to my editorial is to defend a professional group (fisheries scientists) that I did not intend to criticize above others.

With reference to my editorial, Kerstetter dislikes "the persistent attitude that shifting the behavior of consumers—whether by market coercion or harvest prohibitions—is the only means by which conservation biologists can effect change for overharvested species." There is no such persistent attitude in my editorial. Although market coercion or harvest prohibitions can be powerful conservation tools, I referred to Jacquet and Pauly to argue that "a system of management or conservation based exclusively on purchasing power will not adequately address the problems facing the world's fisheries (or any other global problem)." Moreover, I did not suggest that conservation scientists should seek to advise politicians solely through the ivory tower of academic papers. My point was that *in addition* to being involved in the science and management process one should try to be consistent.

In my editorial I explicitly and repeatedly refer to "swordfish or tuna from overfished and declining stocks" and to "Mediterranean swordfish." Even the ICCAT report Kerstetter cites suggests that the Mediterranean swordfish stock is in crisis. So what is the point of criticizing my editorial on the basis that another swordfish stock can be "proudly" eaten because, in Kerstetter's words, it has "rebound[ed] to near maximum sustainable yield levels"?

The government of Greece has recently set the minimum commercial size for swordfish to zero, thus further promoting the removal of juveniles, a policy to which the EU appears complacent. Italy persistently keeps deploying pelagic driftnets targeting swordfish. These nets kill cetaceans, sea turtles and manta rays and are banned from EU countries. Similar examples of mismanagement are found everywhere (with some exceptions of course), and the devastating global impact of overfishing has become so outrageous that it is now featured in high-profile documentary films such as "The End of the Line." Loss of large marine predators and shifting environmental baselines are increasingly well documented worldwide. In such gloomy circumstances, I believe pride should stem from actions other than eating swordfish.

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Sedentarization of Tibetan Nomads

A recent sedentarization program was officially launched by the government of southwest China's Sichuan Province, the so-called "new tent-dwelling life" project (NTDL), which plans to help nomadic Tibetan communities build permanent houses to improve their living conditions. Historically, most of this region was inhabited by Tibetan mobile pastoralists, who lived in felt tents and moved with their herds to different seasonal pastures. Official statistics show that among the 112,000 families of 533,000 Tibetan herdsmen in Sichuan, 219,000 still have no fixed residences and 254,000 are living in shanty houses. It is hoped that the NTDL will benefit those 473,000 unsettled or poorly sheltered herdsmen and their families. According to the government's plan, from 2009 to 2012, Sichuan will spend ¥18 billion (U.S.$2.6 billion) to construct 1409 permanent settlements within a total area of 240,000 km^2 (approximately equivalent to the area of the United Kingdom) in 29 pastoral counties.

It is likely, however, that the NTDL will pose great challenges to the environment, especially in the Qinghai-Tibet Plateau, which is a unique and fragile high-elevation ecosystem (Xin 2008). For ecologically sustainable development on the scale of an entire plateau, we think it is important to study the ecological effects of sedentarization systematically. Similar housing projects have been carried out in the neighboring Tibet Autonomous Region and northwestern provinces of Qinghai and Gansu, but scientists, conservationists, and politicians have overlooked the ecological effects.

The ecological impacts of the NTDL will manifest themselves in several ways. For example, biodiversity and ecological processes in the region may be affected through immediate habitat loss and increased fragmentation of the alpine grasslands. Areas near permanent settlement sites will face more pressures because the ecosystems will be disturbed by human and human-associated activities such as habitat modification, construction works, introduction of new predators or competitors, and overgrazing. That construction of 10,000,000 m^2 of settlements and >12,000 km of roads will lead to additional landscape conversions is inevitable. New road networks will also result in increased accessibility to natural grasslands. In addition, the NTDL will promote local tourism and related economic development, and more people will move to the region and tax an already heavily burdened landscape. Although the development will create excellent opportunities, it will also increase the risk of pollution, habitat destruction, and introduction of exotic species (Liu & Diamond 2005). One particularly important issue for the NTDL is the possible loss of Tibetan pastoral mobility, which is an integral and dominant component of ecosystems in the plateau and is essential to their structure and functioning. Over time this loss will become apparent and will have profound ecological effects on biodiversity and ecosystem functioning.

Undoubtedly, the NTDL will have significant impacts on biodiversity and ecosystem properties in this region, and there is an increasing likelihood that the grassland ecosystems will be degraded and that pastoral systems will become increasingly vulnerable. The outcomes of this program should not go unstudied. We view the NTDL as an extraordinary opportunity to unravel the dramatic and complex effects of sedentarization on the environment on a grand scale. To fully appreciate the multi scale and multidimensional ecological effects, it is critical to establish long-term monitoring programs with permanent field sites and to conduct initial field surveys to establish credible reference conditions for future research.

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