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Narratives and Policy

The Quiet Revolution

Bushmeat Biometrics



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Cover Photo: One of the many standing carved poles in SGang Gwaay Innagaay (Nan Sdins)
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Current Conservation

Volume 3 Issue 4

AGNI KLINTUNI BOEDHARTONO



Logging road in the middle of the forests in south-east Cameroon

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Mediating Forest Transitions: 'Grand Design' or 'Muddling Through'

Jeffrey Sayer, Gary Bull and Chris Elliott

Conservation in the tropics is a messy business. Conducting biodiversity surveys, persuading governments to gazette protected areas and adopt conservation laws is of fundamental importance. However, it is a necessary but not sufficient condition for achieving conservation. In many places where conservation is most needed, institutions and the rule of law are weak and conservation outcomes are determined by the daily decisions and actions of numerous local stakeholders. Some are rich and influential and operate above the law. Others are desperately poor and struggle to feed their families; they are more concerned with short term survival than long term environmental problems.

Many biodiversity conservation programmes in the remaining extensive forest blocks of the humid tropics are failing to achieve viable outcomes. Too much emphasis is given to what we term 'grand design'—ambitious and idealistic plans for conservation prepared by outsiders on the basis of purely biological criteria. These plans ignore local realities and the inevitability of change. Conservation institutions need to invest more in understanding and influencing these processes of change. They must constantly adapt to deal with a continuously unfolding set of challenges, opportunities and changing societal needs. The range of conservation options must be enlarged to give more attention to biodiversity in managed landscapes and to mosaics composed of areas with differing intensities of use. The challenge is to build the human capacity and institutions to achieve this.

Conservation plans will not solve these problems; they must be complemented by the sustained support of the people and institutions who will determine forest change on the ground. The serious limitations of pre-planned, time bound projects must be recognised. Threat-based approaches that attempt to preserve the status quo must make way for scenario-based programmes where learning and adaptation are paramount. This requires institutions that can deal with new knowledge, with the challenges of climate change and with the continuous evolution of the peoples' priorities. Conservation organisations need to be stronger in the following three areas:

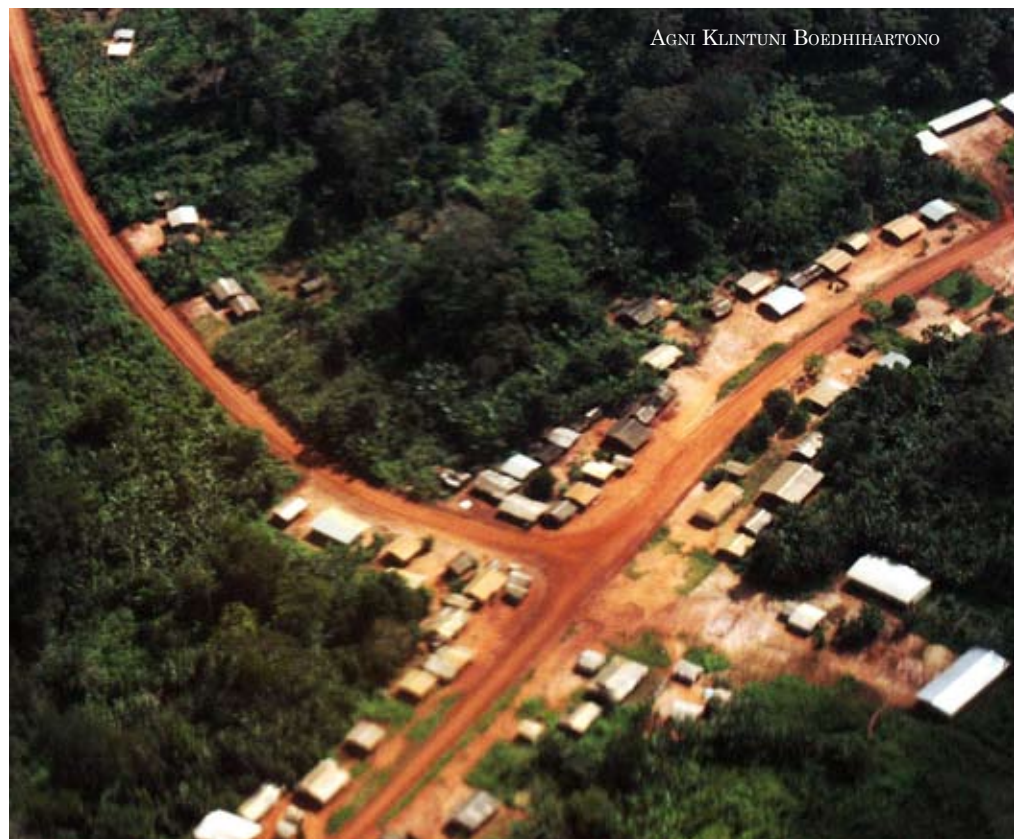
Scenarios, Social Learning and Adaptation
As an alternative to 'one-off' processes of spatial planning there is a need for adaptive management at the landscape

level based upon plausible scenarios. Rather than attempting to resist development it is important to explore the full ramifications of all development scenarios and identify those that are best, or least bad, for biodiversity. Simple simulation models, visualisation and other less formal scenario development tools can greatly assist this process. Building a consensus around a plausible set of compromises may be more effective than taking stands against development threats. Achieving conservation in large diverse landscapes will usually be a long term incremental process.

'Muddling Through' Rather than 'Conservation by Design'

The multifaceted and complex nature of many conservation situations means that uncertainties and unpredictable interrelationships abound and decision-making is difficult. Classic conservation has been a bit like classical music; it has stood the test of time but has been passed down fundamentally unchanged. Managing a complex landscape for multiple functions is more like jazz, a constant process of learning, improvisation and adaptation. Jazz requires just as much skill as classical

Aerial view of logging camp in the forests SE of Cameroon



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music but the skill sets are different. Conservation investments should build the diverse skills and teams to deal with situations that are constantly evolving in unpredictable ways. Landscapes may be subject to long periods of slow change punctuated by abrupt transformations. Soy expansion in the Southern Amazon, and oil palm and fiber plantations in Southeast Asia caught conservationists by surprise and these developments swept all conservation plans before them. Conservation requires institutions and tools that are able to anticipate and engage with these emerging drivers of change.

In 1959 Charles Lindblom published 'The science of muddling through'. It was destined to become a classic and 'muddling through' became a basic concept in the world of public policy. 'Muddling through' is a process of negotiating amongst stakeholders with different objectives and in situations where there is a deficit of knowledge. Lindblom's sequel 'Still muddling; Not yet through' echoes our understanding of the challenges facing conservationists today. We will rarely achieve any steady state that optimises conservation. In the world's major tropical forest blocks, finding the balance between global environmental values and local development values will be a process that unfolds over many decades. Serious investments are needed in building institutions and providing funding that can support these processes for the long haul.

Building Local Capacity for Learning and Adaptation

'Muddling through' will only produce positive outcomes when institutions exist that can establish and negotiate goals and resolve disputes. Agreements have to be enforceable.

There need to be institutions and a policy framework which can favour sustainable resource management in continually changing circumstances. Local people will have conservation objectives but they will often be quite



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Women's group engaged in producing agroforestry plants for distribution to villages in the mountains in the North of Burundi

different from those of international conservationists. As practitioners and researchers ourselves, we note with regret that one of the most serious failures of international conservation has been the failure in recent decades to develop local champions and institutions, and to define conservation in ways that are meaningful and attractive to local constituencies. Much of the funding for forest conservation in the tropics still flows from official development assistance agencies which value the planned delivery of short term project outputs more than building long term adaptive capacity.

Conceptually, we must move on from the myth that there is some kind of 'steady state' idyllic end point to land use change. In reality, change will be continuous in response to changing climates, economic opportunities and societal values. The agents for these changes are entrepreneurial, opportunistic and fast on their feet. In the real world decisions are not

taken on the basis of the objective plans agreed by governments and international conferences but rather emerge from a continuing process of negotiation and deal-making. The conservation movement in the tropics needs less abstract theorising and idealised plans and maps and stronger constituencies engaged with these messy local processes.

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Elephants and the Ivory Trade Ban

G. Cornelis van Kooten

The population of the African elephant (*Laxadonta africana*) declined from 1.2 million to 600,000 during the 1980s. It was listed in 1989 under Appendix I of CITES, thereby banning legal trade in ivory. The ivory trade ban remains controversial. Critics allege that it makes elephant conservation a less attractive activity, inadvertently promoting conversion of elephant habitat to other uses. By reducing or eliminating revenues from elephant management and exploitation, the ban undermines incentives to enforce property rights to elephants (and habitat) and manage stocks sustainably. Supporters of the trade ban argue that enforcing property rights and sustainable harvests is difficult in semi-open access habitats, and that legal trade facilitates the laundering of illegal ivory products and killing of elephants.

Zimbabwe, Namibia, Botswana, Malawi and South Africa have generally opposed the trade ban. In June 1997, CITES permitted Botswana, Namibia and Zimbabwe to sell 50 tons of stockpiled ivory on a one-time basis. In 2002, another one-off sale by Botswana, Namibia and South Africa was approved, but it took a July 2007 agreement before the sale was permitted; the agreement obliged countries to use the funds exclusively for elephant conservation and community development in areas within or adjacent to elephant range. Ivory was sold to Japanese and Chinese traders, and audited by CITES.

Two questions arise: Is an ivory trade ban effective in protecting elephants? Do 'one-off' sales of ivory reverse the benefits of a trade ban by removing the stigma associated with purchasing ivory and facilitating illegal trade? Data are

insufficient to provide definitive answers to these questions. Bulte and van Kooten (1996) use a theoretical model to argue that free trade is effective only if real rates of interest are low, which is not the case for most African range states. Bulte, van Kooten and Swanson (2003) demonstrate that weak institutions, lack of property rights, and general absence of rule of law militate against the use of market instruments to protect elephants. With respect to the role of one-off sales, Bulte, Damania and van Kooten (2006) use (admittedly poor) data on confiscations of ivory at borders and in range states to show that the 1999 sale did not increase illegal activity.

I combined an elephant population growth model with an economic trade model to examine the consequences of an ivory trade ban and one-off sales of ivory. The model included four separate elephant producing regions in Africa (and one global buying region), and took into account illegal poaching of elephants and stockpiling of ivory by some range state governments. Also taken into consideration was the stigma associated with purchasing banned ivory (demand for ivory shifted inwards when trade was banned) and the increased costs to poachers of marketing ivory when trade was banned. The bioeconomic model was parameterised using data on elephant populations, ivory carvers, ivory prices, and poaching and enforcement activities.

Scenario analysis indicated that, regardless of whether there was an ivory trade ban, elephant numbers would decline and, in western and central Africa, might disappear entirely. The model also demonstrates

that financial incentives based on the numbers of elephants protected will avert further erosion of elephant herds. Transfer payments from those interested in protecting elephants must necessarily be paid to those who are able to protect elephants, meaning landowners, subsistence farmers or rural communities more broadly. It does not matter whether the financial incentive is the result of transfer payments from those in rich countries or a result of linking elephants to the benefits from tourists, or some combination, although steady-state populations are greatest when payments are constant per elephant. In the absence of incentives, elephants will continue to be poached, regardless of whether ivory trade is banned or not.

In conclusion, a trade ban might not be successful in maintaining elephant herds, even if it increases the costs of marketing ivory and leads to a stigma effect that reduces demand. Indeed, trade in elephant products may offer some hope for the elephant, but only if there exist effective institutions that translate in situ protection into economic values. The problem is that the elephant is similar to the bison that once roamed the Great Plains of North America. It was doomed primarily because the land was much more valuable in cattle than bison production. Likewise, elephant range in Africa is often a less valuable use of land than agriculture. If land in elephant habitat does not somehow become more competitive, elephant populations are bound to decline in the future.

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Organising to Protect: Protecting Landscapes and Livelihoods in the Nicaraguan Hillsides

Helle Munk Ravnborg

Social science literature on protected areas (PAs) has until now mainly focused on how PAs have been implemented at the expense of the interests of people living in and around the PA and how this, in turn, has often resulted in conflict. However, it is increasingly recognised that this view of PA establishment and management often fails to understand that the internal and external interests are much more diverse and complex, and are not exclusively related to issues of conservation. Instead, the establishment and management of PAs have to be understood in a wider context of interest and strategies of the various segments of the population.

This article analyses an example of small scale farmers in Miraflores, Nicaragua, struggling to have their region declared as a PA. On the surface, this struggle represents a paradox, as the small scale farmers thus accept the potential restrictions on land use that the declaration as a PA entails. But, as this article proposes, having the area declared a PA became a way for small scale farmers to make the region less attractive to resourceful people from outside of Miraflores who had started to buy up land in the area. However, these resourceful landowners also tried to

influence the implementation process and promote their own interests. The PA management plan consequently became the 'arena' for negotiation and alliance building between different segments of competing land users, from the virtually landless poor to the landed small scale farmers to the resourceful, largely absentee landowners. In addition to this, national and international external institutions were – knowingly or not – drawn into and took part in this negotiation.

A PA management plan, which is often considered a key instrument in PA management, is thus much more than a technical document building on sound ecological principles. It is created through negotiations between different stakeholders and their inherent interests and is just as much about securing and expanding livelihoods as it is about protecting landscapes and biodiversity. Competing segments of land users try to influence the environmental governance regime emerging from the PA declaration and the corresponding management plan. Therefore, it is important to understand the alliances forged and the discursive strategies employed by the various social actors during the establishment

of PA management regimes, and in particular during the negotiation of the PA management plan.

The environmental authority dealing with the declaration and implementation of the PA management plan needs to understand that there often is such a conflict of interests. Furthermore, it is important that this authority possesses the necessary competencies and legal provisions to promote what are considered to be public environmental concerns, so these are not neglected in the competition for promoting other interests. Thus, it is crucial to identify and address the actors whose practices are in conflict with the environmental objectives for protection and undermine the concept of local participation in PA management. The issue at stake is not only protecting a landscape, but, perhaps more importantly, protecting livelihoods.

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Conservation and the Presence of Threatened Mammals in Native American Folklore

Matthew A. Preston and Alexander H. Harcourt

Many rationales for wildlife conservation have been suggested. One not often mentioned is the impact of extinctions on the traditions of local people. If extinction adversely affects traditions, and conservation of traditions is important, conservationists' might need to consider conserving biodiversity in order to conserve cultures.

As a first step in investigating the case for this rationale, we quantitatively examined folklore literature for the presence and nature of representation of 8 potentially extinct mammals in

Fisher



MARK ELBROCH

the traditions of 48 Native American tribes that live/lived near 11 national parks in the United States.

We found that all of the potentially extinct mammals appeared in Native American folklore. Of the tribes that lived near national parks that once contained the identified mammals, about one-third included the mammals in their folklore (N=45 of 124 tribe x park combinations). Attitudes towards the potentially extinct animals were positive and respectful twice as often as negative or despising. Carnivores were perceived positively more often than were herbivores, perceived neutrally less often, and feared far more often than were herbivores.

Given that preservation of traditions is important, conservation arguments could be strengthened by our finding that potentially extinct mammals are represented in local traditions, often with positive and respectful attitudes. This argument is particularly true for loss of respected species, which have stronger effects on traditions, than the loss of species that are viewed negatively or that are despised.

The sometimes positive attitude of Native Americans towards carnivores might differ from the traditions and attitudes of people in some other regions, such as western Europe and southern Asia, in which negative and fearful attitudes appear to prevail. Perhaps the difference in attitudes



MARK ELBROCH

Mountain lion

between Native Americans and non-industrial peoples of western Europe and southern Asia could be due to the greater use of livestock in Europe and southern Asia, and hence greater damage to livelihood by carnivores.

Our findings, however, are only the first step in developing a rationale for conservation of wildlife based on concerns about impacts on local peoples' cultures. Researchers must

now take the next step and answer questions about the presence of an actual effect of the extinctions on the traditions of Native Americans. This effort will require direct interviews because we found recent accounts of Native American folklore to be rare in the literature.

Outside of North America, the literature indicates mixed results regarding the effects of extinction on traditions. For instance, fear of wolves still persists in western European folklore long after their extinction in much of Europe. By contrast, native Hawaiians consider that with the extinction of the Hawaiian crow, an important part of their traditions will be lost.

Nevertheless, if wildlife is present in peoples' traditions, and if preservation of tradition is important, and if extinction of wildlife might mean extinction of part of a people's traditions, then cultural as well as biological reasons exist for conserving wildlife. In other words, the conservation of biodiversity and conservation of culture can, and probably should, go hand in hand.

Bighorn sheep



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MATTHEW GIBBONS

Lynx

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The Decline of Village Common Lands and Changes in Village Society: South India, c.1850-2000

Haruka Yanagisawa

In nineteenth-century Tamil Nadu, a significant portion of village lands were not cultivated but used by villagers for grazing their livestock, and collecting fuel wood, fodder, manure, etc. Such common lands were, however, not jointly used equally by all villagers but, like the cultivated lands, were controlled by the dominant landholders in the village. Upper class farmers had initiated the conversion of common land into cultivated land by the middle of the nineteenth century, and in effect had privatised a large amount of common land by the end of the century.

The hierarchical structure of landholding and control over natural resources started weakening at the end of the century, and villagers who had been excluded from owning land gradually acquired small pieces of land. Furthermore, probably in the 1920s and thereafter, Dalits and other landless people started cultivating village common land. A similar type of

development occurred in other parts of India. Over the past forty years, Dalits in the Marathwada region of Maharashtra have encroached on village common land and established private ownership there, and from time to time this encroachment has been regularised by the state government.

There seem to be two types of community control of resources in India: the 'elite-dominant' type and the 'egalitarian' type. It may be inferred that in nineteenth-century Tamil Nadu, natural resources, including village common lands, would have been under the control of the elite-dominant type, but as a result of socio-economic changes in the village social structure, the elite failed to maintain this control.

Contrary to the former pattern of control, in some parts of India, in particular in mountainous regions where village society was not very differentiated but composed

mainly of small landholding farmers without a large group of landless people, the use of natural resources was regulated by rules and norms approved in common among the villagers. It may be inferred that the creation of a more egalitarian village social structure could contribute to creating a prerequisite for preservative control of natural resources based on equal participation by all segments of village society. If the acquisition of land by, and the emancipation of, the landless, as witnessed in Tamil Nadu, implies a trend towards an egalitarian-type society, it may be seen as a positive development in the long run, in terms of environmental preservation.

The cases witnessed in Tamil Nadu and some other parts of India after the 1980s suggest that the growth of non-agricultural job opportunities could possibly weaken the pressure on land, and also induce farmers to change cropping patterns, leading sometimes to an expansion in farm forestry. The acquisition of land by the landless, and their emancipation, works toward reducing the supply of labour to the market and contributes to a rise in the wage level and the cost of supervising employees, thus leading to the expansion of farm forestry. Hence, the empowerment of the lower strata of village society may contribute to the conservation of natural resources by tightening the labour market.

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Irrigation tank in a village in Tamil Nadu in south India



Conservation Needs of the Andean Frogs of Peru

Ariadne Angulo

Frogs of the *Batrachophrynus* and *Telmatobius* groups are aquatic and semi-aquatic, mid-to high elevation amphibians that are distributed in the Andes of Ecuador, Peru, Bolivia, Chile and Argentina. Dramatic population declines have been reported for several species, and it is now thought that these Andean amphibians are severely threatened. A number of possible causes have been proposed for these declines, e.g., pollution, human consumption, disease, and climate change. Peru is considered a hotspot for these frogs; it is home to at least 40% of all known species of *Telmatobius* and 100% of all *Batrachophrynus*, so the stakes are high in this country. Given the critical situation faced by these Andean frogs, identifying and quantifying threats and their impact on wild populations is an urgent need in order to better inform conservation action. In this light, and using information from the Global Amphibian Assessment/IUCN Red List of Threatened Species and Peru's Instituto Nacional de Recursos Naturales (INRENA) categorisation of threatened species, the following issues are addressed:

The Current State of Conservation Knowledge of Andean Frogs in Peru

Of a total of 25 species of Andean frogs reported for Peru, 80% are considered to be globally threatened by IUCN, while INRENA considers only 21.73% to be threatened.

The Most Pressing and/or Pervasive Threat Factors

Five factors have emerged as playing a role in population declines: disease, habitat degradation and destruction, harvesting, introduced species, and pollution. For about half of the species the threats are either unknown or there

is insufficient information from which to draw inferences. Of those identified factors, water-associated pollution and harvesting are the prominent factors affecting the greatest number of species, followed by habitat degradation and destruction, introduced species (trout) and disease (chytrid fungus). In addition, recent research suggests that extreme climatic variation may be a factor impacting high altitude amphibian populations.

Their Conservation Needs

Andean frogs are taxonomically complex and generally poorly understood, so using novel approaches to identify the different species, as well as conducting ecological studies will help in addressing the issues of species identity and the frogs' ecological requirements. In addition, monitoring populations and determining the relative contributions of threat factors are needed for a better understanding of population declines. Some factors (e.g., habitat degradation, pollution and introduced species) are also likely to affect other species and entire ecosystems, so conservation actions addressing these factors are bound to benefit more than just frogs. Multidisciplinary studies would be best suited to address these issues.

Although these research actions can help us understand declines better, these will continue to occur if no immediate action is taken. Emergency conservation measures can preliminarily address the more tangible anthropogenic factors. One measure that needs to be implemented as soon as possible is that of public outreach, where programmes showcasing the frogs, their habitats and the threats they face would help to increase awareness of their plight.



ARIADNE ANGULO

A vendor shows different body sizes and dorsal patterns of frogs sold at her stand

Conservation of Andean frogs will require substantial effort and commitment from a variety of decision-makers and stakeholders. The survival of these unique creatures and the health of their ecosystems will be severely compromised if no action is taken.

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Revisiting the Effects of Captive Experience on Reintroduction Survival in Carnivores

Kristen R. Jule

Over the past several decades, reintroduction has become a popular tool in conservation. Since many wild populations are declining, captive-bred stock are increasingly used to restore or supplement wild populations. Previous investigations into the success of reintroduction projects using captive-born animals found relatively low success rates (means ranging from 11-38%); whereas mean success rates for projects reintroducing translocated wild-caught animals ranged from 31-75%. Disparity between the successes of projects using captive-born versus those using wild-caught animals suggests that there are additional factors contributing to the failure of captive-born animals released into the wild.

These figures are from reviews published in the early 1990s, and since then very little research has sought to

update these figures. The frequency of reintroduction projects over the past 10 to 20 years has markedly increased, thus it seems reasonable to assume that success rates should improve given our increasing experience in reintroduction techniques. In order to have a better understanding of the current success of reintroductions, a review was carried out on carnivore reintroduction projects that published or reported their results post 1990 up to, and including, 2005. However, this review used survival instead of measuring overall project success – which is a subjective measurement. Not only can survival be used as an assay of animal welfare but also as a tool to assess factors contributing to individual successes or failures.

We focussed on carnivores because they are well represented in reintroduction programmes; this can be explained by the taxonomic bias found in

species selected for conservation, where efforts are biased towards mammals, in particular ungulates and carnivores. Carnivores are particularly worthwhile to study in a conservation sense given their rapidly declining wild populations and their relatively poor response to captivity (i.e., high levels of abnormal behaviours and poor breeding success). There are many risks involved in reintroducing captive animals, however a main concern is that animals in captivity often show a loss of natural behaviours associated with fitness in the wild; in carnivores this is particularly with regard to hunting and breeding.

Based on a review of 45 projects of 17 carnivore species, results indicate that less than one in three captive-born carnivores released into the wild is likely to survive (32%) and only 52% of translocated wild-caught carnivores are likely to survive. Looking at survival rates as opposed to subjective measures of project success allows for investigation at the individual level, which will help to identify factors contributing to individual successes and failures. It is important to distinguish not only between survival and mortality of the individuals released, but also between survival and reproductive success upon release. The distinction between project success and survivability also allows for the opportunity to consider the welfare of the animals released, since many captive-born carnivores die of starvation or of direct human contact, e.g., gun shots and motor accidents, and it is important that these factors are taken into consideration when planning a reintroduction. However, the overall

Many carnivores, such as this Amur tiger, display abnormal behaviour (pacing) while in captivity





KRISTEN R. JULE

ABOVE:: Including natural diet is critical for species, such as this red panda, involved in captive breeding for conservation

BELOW: A captive lioness intently watches a pool containing live fish



KRISTEN R. JULE

success of the project is still essential to understanding the combined dynamics involved in successful reintroductions, such as appropriate habitat selection, budgeting financial costs, public support and so on.

Unfortunately, it is difficult to find reintroduction projects which report not only survivability but also reproductive success. Long-term monitoring is often costly and difficult to carry out, but it is essential if our aim is to increase the viability of reintroduction as a conservation tool. Given that survival rates are still relatively low and have not significantly improved over the past few decades, it is vital that we encourage all reintroduction projects (both successful and unsuccessful) to report their results so that we can improve the likelihood of survival for individual animals, both captive-born and wild-caught, as well as increase successful breeding upon release into the wild.

It is critical that there is further investigation into the effects of captivity on survival upon release into the wild as well as the viability of releasing captive-born animals into the wild for conservation purposes. Reintroduction methods and techniques need to be improved and recommendations should become more widely available to international agencies and institutions. Agencies and researchers should collaborate and work in conjunction with each other in order to better future conservation efforts.

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Conservation Issues in the Nanda Devi Biosphere Reserve

Keith Bosak



Herb collectors in the buffer zone of the Nanda Devi Biosphere Reserve, Garhwal Himalaya, India

The Nanda Devi Biosphere Reserve (NDBR) has been called one of the last great wilderness areas in the Himalaya. As such, the region has been designated a UNESCO Biosphere Reserve and World Heritage Site for its unique biodiversity. However, this area was not always under the influence of international conservation programmes. The current management policies came about as a result of the heavy mountaineering activity on the peak of Nanda Devi (7817m) from 1974-1982. The many expeditions to the mountain left behind mounds of garbage and there were also problems with human waste and the cutting of wood for fuel. By 1977 the environmental degradation was being documented, and in 1982 a 625 sq. km area surrounding Nanda Devi was declared a national park and promptly closed to all people including locals. This was a blow to local people who had enjoyed a high standard of living previous to the closure. Locals, known as Bhotiya for their ethnic Tibetan heritage were forced to sell their sheep and goats because

grazing lands were greatly decreased with the closure and many had to return to subsistence agriculture just to survive.

After years of economic hardship, local people began to protest. The first major protest occurred in 1998 when villagers entered the forbidden core zone en masse to symbolically 'take back' the NDBR. Since that time, the Bhotiya have continued to protest and in 2001 formed an organised campaign to resist the conservation policies of the NDBR.

The case of the NDBR serves as an example of the many people-protected area conflicts occurring worldwide. Well-intentioned conservation models such as biosphere reserves that are developed by global agencies (such as UNESCO, IUCN and the WHC) and applied by national and regional governments often meet with resistance from local people living in or around these protected areas. One factor in this conflict is competing conceptions of nature.

Conceptions of nature show themselves through prevailing cultural narratives of human-environment interactions and are associated with material practices such as resource management policies. Differing conceptions of nature can produce competing discourses of nature and ultimately different ideas of how the NDBR should be managed.

The dominant global discourse attempts to reconcile conservation with development and recognise indigenous knowledge. However, this discourse breaks down when policies such as the closure of the core zone reflect a view of nature that presents humans and their livelihood activities as detrimental to biodiversity. At the same time, local people assert their rights to manage the resources of the NDBR according to their view that highlights the exchange between humans and nature. In this case local conceptions of nature such as those of the Bhotiya can be difficult to understand from a western perspective as the Bhotiya conceptualise

nature differently. Understanding that Bhotiya ideas of resource management are based in ideas of a sacred landscape that they identify with through livelihood activities and religious rituals may serve to create conservation policies that will accommodate local people and help to preserve biodiversity. However, policy

makers must be willing to accept and try to understand multiple conceptions of nature and empower local people with resource management schemes that reflect those local conceptions of nature.

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Narratives and Policy – What’s the Connection?

Alex Flynn

One of the most elusive concepts with which policymakers have to contend is the idea of narratives. What are narratives? How do they affect the way we work? And how do they affect the way decisions are made? Elusive they may be, but as banners with which to promote projects they are extremely influential. Indeed, narratives dominate the environmental agenda. The greatest environment and development narrative of them all, that of ‘sustainable development’, is *carte blanche* for the allocation of USD 5.89 billion of World Bank funds, dispersed between 106 ongoing projects.

But what is a narrative exactly? To give an example of what narratives can do, Emery Roe has published some extremely interesting work on the subject, most of it pertaining to the idea of ‘Except-Africa’. ‘Except-Africa’ is a crisis narrative which through various policy documents, newspaper reports and other media channels assails us with the constant idea that nothing is ever going to work, or even get better in the whole continent to which it refers. What then results, is that subject to the constant battering of this collage of fact, semi-fact and spin, policymakers begin to adjust strategy, expectation levels and even areas targeted for funding on the basis of what seems an irrefutable ‘truth’.

What is of great interest to many people in conservation is how these narratives come about in the first place, what makes them stick and what consequences can occur as

a result of their propagation. To answer the first two questions, an unlikely source presents itself with some interesting ideas. Aristotle was a Greek philosopher who was also interested in how stories worked at a basic level. He analysed poetry and plays to produce a list of components which he felt all stories needed in order to function properly and hook the audience. He listed these factors as: a believable plot which recreates the world; the experience of catharsis (empathising with the characters through pity or fear), the need to feel as though you are learning something from the text and most importantly what can be described as ‘emplotted characterisation’ – the author guiding the reader to side with certain characters over others.

What is interesting is that when you analyse successful (widely known) environmental narratives they tend to have the full set of these components. ‘Except-Africa’ for example has a solid believable plot. It is one of the steady irreversible decline of a once rich land. It is also a frightening story, one with which we can empathise. Indeed, even a cursory glance at any news outlet concerning Africa is sure to contain stories of piracy, fires, AIDS, fixed elections, war amputees, plane crashes... And the lack of development and the unbridled environmental destruction is a particularly keen appeal to our fears. Also when listening to these stories we feel as though we are learning something, that we are being informed, but what is

difficult for policymakers is the idea of emplotted characterisation – who is the story encouraging you to side with? The ‘white’ hunter? The ‘black’ poacher? The ‘savvy’ NGO worker? The seemingly ‘ignorant’ pastoralists? At the end of the day, the consequences of action depend on how the stories are phrased and delivered.

Narratives will always be part of how we lead our lives. It is impossible to produce or react to information without taking part in them at some level. So the question becomes, what can be done instead of signing up to narratives like ‘Except-Africa’ which result in conservation projects like Mkomazi Game Reserve in Tanzania that result in the expulsion of thousands of people from their homes? As Emery Roe suggests, new counter-narratives have to be created which can provide policy direction for strategists who disagree with for example, fortress conservation projects. These narratives however, must be created in a certain way if they are to stick, i.e., to be propagated and influence conservation thinking. But importantly, how successfully they stick may well depend on ideas over 2000 years old, but still relevant today.

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Seeking Social Equity in National Parks: Experiments with Evaluation in Canada and South Africa

Joleen A. Timko and Terre Satterfield

Many national parks and protected areas worldwide are operating under difficult social and political conditions, including poor and often unjust relations with local communities. Co-management regimes, an increased emphasis on the involvement of indigenous people in management and conservation strategies, and efforts to address tenure have emerged as a result. Yet, controversy over what constitutes an appropriate role for local people persists, and little research has been conducted as yet to systematically evaluate the extent to which parks are socially (and not just ecologically) effective. Our research was a first attempt to evaluate the efficacy with which a purposive sample of six national parks in Canada and South Africa address three central criteria of equity: resolution of land tenure, maintenance of livelihood opportunities and access rights to park resources, and decision-making authority in park governance. The evaluation utilised a 4-point ordinal scale. All but one of the case study parks is found to be achieving or moving toward equity.

Given the contested nature of a large number of protected areas, as well as their current status in negotiations of redress in some nation states, we anticipated that the settlement of land claims would be the most important criterion in determining overall park equity in this study. If a land claim had been settled, we anticipated that the park would perform very well on all other aspects, including access to resources, employment, and governance. This expectation was not supported by the results. This finding is important as it underscores the need for park managers to provide livelihood and employment opportunities and involvement in park governance processes, regardless of the state of any land claims in process or completed. Parks with settled land claims (however acceptable) must still account for and strive to be effective on the other two criteria.

Pertaining to the access criterion, Waterton Lakes in Canada and the Kgalagadi in South Africa, performed poorly because the neighbouring indigenous groups were

required to pay regular access fees into the park unless it was for a cultural (e.g., vision quest) purpose. This left one respondent feeling like they were being “treated like tourists like anyone else”. In the South African parks, an added hardship emerged in the form of threats to livelihoods due to damage causing animals, a point that was largely irrelevant to the Canadian parks. While several of the Canadian parks had programs to encourage the maintenance of cultural ties to the park lands, there did not appear to be the equivalent type of cultural camp in the South African parks.

Lastly, a few parks have been co-managed in name only. Yet, parks with more comprehensive co-management and support from neighbouring indigenous groups demonstrate higher equity scores across a variety of indicators, while parks with lower levels of co-management do less well. To be considered equitable from an indigenous perspective, protected areas managers must protect indigenous property and access rights, while involving them in protected area management and decision-making (including co-management or its functional equivalent where appropriate) on a fair and equitable basis.

Women from the Champagne-Aishihik First Nations explaining the uses of moose meat from a moose killed by local hunters during a cultural camp called “Healing Broken Connections” in Kluane National Park, Yukon Territory, Canada



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What Does Climate Change Mean for Marine Turtles?

Lucy Hawkes

We now widely accept that our future climate will be radically different from conditions experienced in any of the several hundred thousand years before present. Major changes, including higher temperatures, altered precipitation patterns, increase in strength of extreme weather events (e.g., hurricanes) and sea level rise, are expected and will likely have huge ramifications, including negative effects on tourism, the global financial market, infrastructure, human health and food supplies, including fisheries and agriculture. A special issue of *Endangered Species Research* (Volume 7, Number 2) addresses the issues of how to incorporate climate change in endangered species conservation. In addition to reviewing the literature for birds, mammals, fishes and reptiles, the papers together highlight that much of our confidence in predicting the effects of climate change on endangered species is limited by a lack of data from which to extrapolate. In particular, for marine turtles many baseline data are not yet available.

For example, sex in marine turtles is not determined genetically, rather the temperature at which eggs incubate will determine the resulting proportions of females (warmer conditions) and males (cooler conditions). From limited published work, we now understand that natural sex ratios at many major rookeries appear to be female biased – as much as 99% female hatchlings. The threat of increasing temperatures should serve only to increase the proportion of female hatchlings, perhaps effectively extirpating male turtles altogether. However, it is unclear to what extent this is likely. Even at very hot beaches, some males

could still be produced at the cooler beginning and end of the nesting season, in deeper nests, and in smaller nests (due to reduced metabolic heating). Even so, for the majority of populations, we do not understand the current primary sex ratios that are being produced, how this translates to adult sex ratios and how many male hatchlings are required to ensure adequate fertilisation of the nesting population. Also key to this area is an understanding of the rate at which turtles could adapt to forecast change.

Sea turtles are long-lived, far-ranging species and therefore, arguably more important are the effects of climate change on populations of turtles at large in the Caribbean, Atlantic, Mediterranean, Indian and Pacific oceans. Satellite tracking combined with time-depth sensors and satellite derived environmental data, is beginning to give researchers a picture of the physical rules that govern where, how and why turtles occupy the particular pieces of the oceans.

These studies are limited by sample size but the collaborative sharing of existing data from multiple projects will go some way to help bridge this information gap. Recent work with green turtles in the Galapagos, and loggerhead turtles from the USA, Cape Verde islands and Japan, have highlighted that there may be greater flexibility in foraging and life history strategies than previous science has suggested and is an important research area for future work.

There exist no current data with which to predict the possible impacts of climate change on habitat and diet for any of the marine turtle species. The omnivorous loggerheads and olive ridleys are generally understood to have a wide choice of prey items, while most populations of green sea turtles only eat marine sea grasses, and hawksbill turtles are thought to forage only on sponges. Leatherback turtles are thought to consume only gelatinous prey items. The mechanisms by which climate change may alter

A leatherback sea turtle nests on a beach in Gabon, while excess natural gas burns from oil platforms offshore



IAN NICHOLS

foraging habitat (e.g., sea grass pasture blowouts due to extreme weather events, altered reef competition due to coral bleaching events, different migration patterns for gelatinous prey) are starting to be understood. It may be that species with greater dietary flexibility are better able to adapt to such changes. An individual that can forage on a greater range of prey will undoubtedly have less difficulty gaining the resources (e.g., breeding) than a turtle with a narrower diet. Novel forensic techniques in this field, such as analysis of stable isotopes of Carbon and Nitrogen, can quickly yield much information about the

trophic width of a study animals diet, and are helping elucidate this key life history trait.

The review of the existing knowledge about climate change and marine turtles shows that there is an imperative need for more empirical data to understand how climate change might threaten sea turtles, particularly given that all seven species are of conservation concern. In order for any future management recommendations of any substance to be made, baseline data must be collected, integrated and shared from as wide a variety of geographic regions, species and populations as possible. Given that the combined threats

of climate change, through sea level rise, habitat alteration and altered thermal conditions may supersede all other known threats for turtles, this is a priority for future turtle research programs.

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The Quiet Revolution: How Rural Tanzanians are Winning Back the Rights to their Forests

Tom Blomley

Quietly and beyond the glare of the newspaper headlines, across Tanzania, communities are slowly but surely claiming back their forests and putting them under local control. Already around 4.1 million hectares of forest land in over 2,300 villages are either under, or in the process of being transferred to, local communities across the country. This includes high value montane forests in the Eastern Arc Mountains biodiversity hotspot, coastal forests and mangroves and miombo woodlands that cover large swathes of Tanzania's sparsely populated western regions. These changes have been made possible by changes in the Tanzanian forestry laws in 2002, which, for the first time, recognise and legalise forests owned and managed by village councils and community groups.

Donors such as the Danish, Norwegian and Finnish governments as well as the World Bank have been working with the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism to support village level forestry activities. The law allows two systems of forest management. The first is where communities become owners and managers through their village councils. Forests and woodlands within the village area are declared by village governments, and then registered with the local district council as 'Village Land Forest Reserves'. Once a management plan has been drawn up and approved by the district, the villagers can start actively managing their own forests. The second system covers communities living close to larger

forests managed by either national or local government. Communities become joint managers by signing agreements with the government and in return for actively managing the forests, are able to share the benefits by accessing honey, fuelwood, poles and timber.

The changes in policy have been possible through Tanzania's unique system of local government. Communities in rural areas are divided into villages (of which there are over 10,500 on mainland Tanzania), which are managed by village councils. The councils are accountable to village assemblies consisting of all the adults living within the village area. This system dates back to the mid-1970s, when the socialist "ujamaa" programme of Tanzania's founding President Julius Nyerere gave villages a legal basis, largely as a way to fit scattered and poor rural communities into the country's socialist development agenda. Although unpopular at the time, this political initiative sowed the seeds for rural empowerment through village governments. The Local Government Act of 1982 strengthened

BATTLE OVER KENYA'S TANA DELTA

Mumias Sugar Company Ltd., and the Tana and Athi River Development Authority (TARDA), in a planned private joint venture, are proposing to turn 20,000 ha of the mostly pristine Tana River Delta over to sugarcane. The main features of the Tana Integrated Sugar Project (TISP) are: 16,000 ha of irrigated sugarcane production through estate; 4,000 ha of outgrower systems; water supply to the project; a sugar factory and co-generation facility of up to 34 megawatts power capacity; an ethanol production plant; and livestock supporting activities, including fisheries. On June 11, 2008 Kenya's National Environment Management Authority (NEMA) approved the project's EIA. Environmental organisations are opposed to NEMA's decision citing the impact of the project on the Tana Delta's ecology, biodiversity and local people's livelihoods.

When the High Court in Malindi issued stay orders against the Tana Integrated Sugar Project in July 2008, conservationists breathed a sigh of relief. With the orders in place, the Delta could continue to serve its ecological functions, support wildlife and local communities. For the time being ...

The groups had a good reason to celebrate. United under the Kenya Wetland Forum, they had engaged the project proponents and the Kenya government in a fierce and spirited media campaign to save the Kenya's largest oceanic delta from being converted into an ecological wasteland. The matter is still in court, and there is no end in sight.

I must say that most of us are wondering whether the battle will be won in the Kenyan courts. Media is still interested in the issue with many local and foreign media visiting the Delta and covering a range of issues. But even as conservationists await the outcome of the court case, many more 'development' projects are being proposed in the Delta by the day. First there is the proposal by MAT International to plant irrigated sugarcane in some 80,000 ha. The Qataris propose to grow fruits and vegetables. Nobody as yet knows the proponents of this initiative, where it will be located, or even where to seek this information. There are also proposals to plant more than 100,000 ha of *Jatropha* in the private ranches bordering the Delta.

It would look like there is a scramble for land in the Delta that is internationally recognised as an Important Bird Area. Twenty-two different species of water birds occur in the Tana Delta in globally significant numbers. The Tana River Red Colobus, one of the world's most endangered primates, is found in some riverine forest fragments. Informal meetings with pastoralists reveal that they are scared of losing their dry season and drought refuge grazing areas.

Back to the conservationists. Everybody expects us to come up with solutions. And we have realised that as long as the Delta is not accorded any form of legal protection, it will continue to attract ill-advised 'development' projects. It will continue to be classified as 'idle land'. This in spite of the results of a cost benefit study, commissioned in April 2008 by Nature Kenya and the Royal Society for the Protection of Birds (the UK BirdLife Partner), that showed that the current benefits to farmers, pastoralists and fishermen amount to Ksh. 3.7 billion compared to the Ksh. 1.2 billion that the Tana Integrated Sugar Project would generate.

The Kenya Wildlife Service (KWS) has reactivated efforts to get the Delta listed as a wetland of international importance under the Ramsar Convention. Nature Kenya has opened a local office in Garsen and employed two staff to be based in the Delta. Discussions on the development of a conservation and development master plan for the Delta have been initiated with the Kenya Wetland Forum and KWS. The development planning process is funded by the IUCN and the Community Environment Facility. The two Nature Kenya staff have the difficult task of establishing a Site Support Group at the site. The group will then be empowered through training to take conservation action and to successfully advocate for the conservation of the Delta. They also need to work with all stakeholders and build consensus for the conservation and development master plan.

Serah Munguti, Communication and Advocacy Coordinator, Nature Kenya

these powers by, among other things, enabling villages to make their own local by-laws. These by-laws are legally binding and enforceable in a court of law, and provide village governments with a powerful tool with which to enforce local forest management rules and regulations.

A second factor which supported the emergence of participatory forestry is Tanzania's size and the remote location of many forested areas. Over time, the government came to realise that it was unable to manage these huge areas - and that some alternative system is needed. Pilot projects, initiated in the early 1990s in Babati and Singida districts and funded by the Swedish government, showed quite clearly that forests under village management could be restored and protected more effectively and at less cost than those under central government control.

But can we be sure that communities manage forests better? Trees grow slowly and therefore it takes time to say with certainty whether a forest is recovering. However, a number of independent reports demonstrate that forests under village management are recovering. A project in the Shinyanga district of north western Tanzania supported the re-establishment of a traditional system used by Sukuma agro-pastoralists for reserving dry season grazing. This management practice, known locally as "ngitili", provided a locally accepted system that was quickly adopted - leading to the restoration of small patches of acacia woodland across what was previously a highly eroded landscape. Between 1994 and 1999, several hundred thousand hectares of eroded land were restored through this project and 152 species of trees, 145 bird species and 21 mammal species were reintroduced across the region.

In a second study, data were gathered

during the past five years from the same set of 13 forest areas in five regions across eastern, central and northern Tanzania. The sample included forests that were managed entirely by village councils, forests that were jointly managed by communities and government, forests under exclusive government management, and one control site in "open access" land owned by a village but lacking forest management objectives. Data was gathered from 20 x 20 m permanent sample plots. In the sample of 13 forests, there were increases in basal area and volume for forests managed with community involvement and declines for both of these variables in forests under government or open access management regimes.

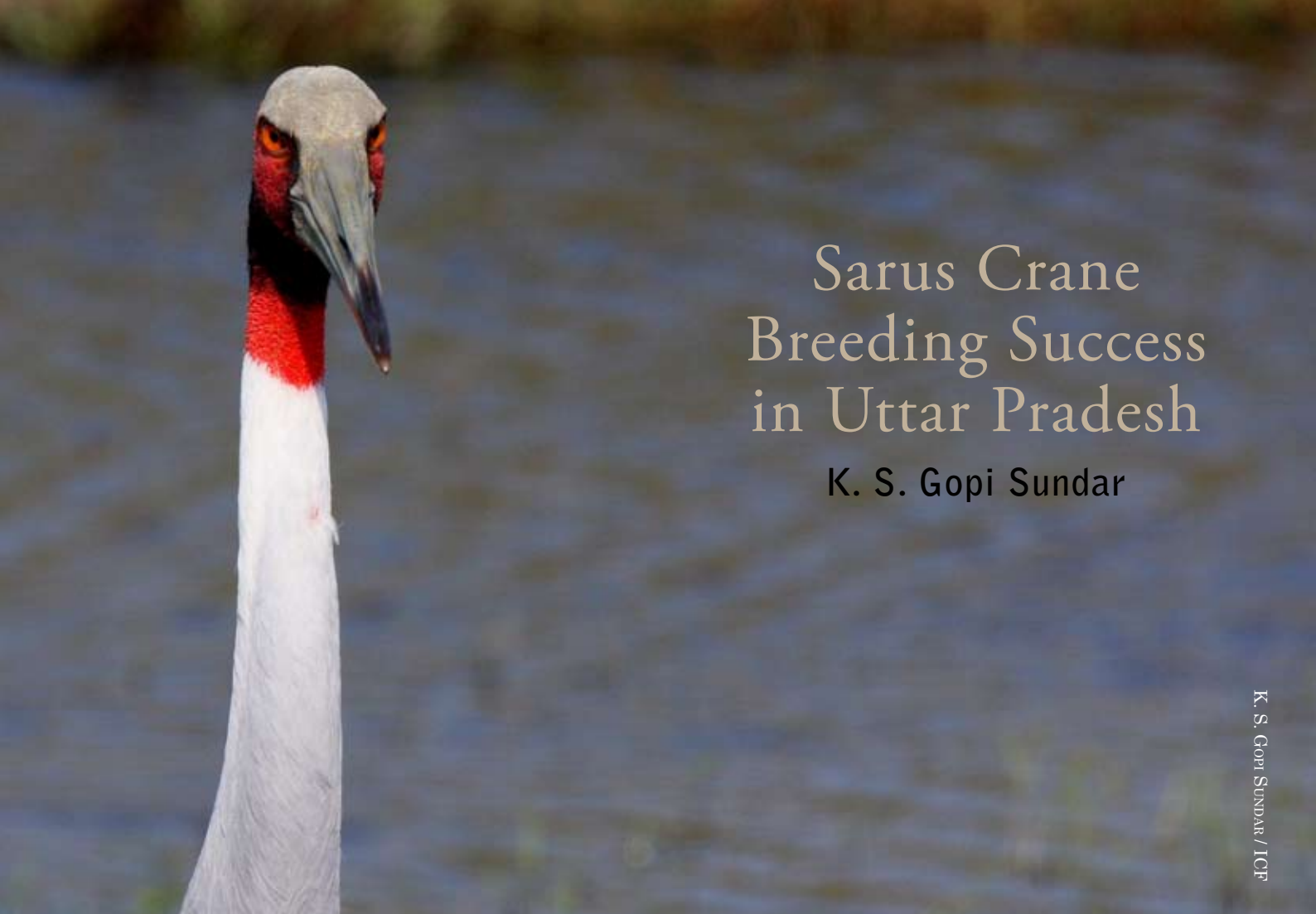
A further indicator of strong local management is that, given the chance, villagers are both willing and able to protect their own forests. Recently, while in Kiteto, the author had a chance to visit the Suledo forest, which is owned by nine Maasai villages and covers about 164,000 hectares. With support from the Swedish-funded Land Management Project, the villagers have been protecting and managing this forest since 1997. At the time of the visit, villagers in Laiseri arrested illegal loggers and confiscated their equipment, vehicle and logs. These goods were then auctioned by the village committee and the funds used to support local development needs and the work of the forest management committee.

Despite this good news there are still many problems and obstacles. Perhaps the greatest is that understanding of the new forest law at village level is still very low. In some areas, the pressure to harvest trees is high and the way in which licences are issued is not always transparent. A new report produced by the environmental watchdog, TRAFFIC, makes this clear and

points out that loggers bribe village leaders, offering a pittance for the timber harvested, and are frequently protected by the local forest officer. In recent years south eastern Tanzania has seen a logging boom and one village, Migeregere, has been in the thick of it. Mr. Kipengeze makes the point: "Everyone is frustrated that the village does not have any influence in the issuing of logging licences. It always comes from the District level, and the payments to us are too small. We want to be empowered to control logging in our land, not just see people harvest the trees then leave".

Under the Mpingo Conservation Project ('Mpingo' is the Kiswahili name for ebony or blackwood) the situation is improving. Villagers are slowly learning the real value of their timber and realising that registering their own village forests, managing them sustainably and protecting them under the law will help them capture this value. Kikole village - in Kilwa District - has already found this out, as explained by Matimbanya: "We are already benefiting. We patrol the forest three times a month, and have collected fines from illegal loggers. Illegal tree felling has now been reduced in Kikole. We have also received compensation from an oil company that felled some of our trees within our village forest". He then adds, "We now have knowledge of the forest and how we can manage it using the law. This will help us with our second village forest that we are preparing, and also we will know what to do if we want to set aside more forest in the future".

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Sarus Crane Breeding Success in Uttar Pradesh

K. S. Gopi Sundar

K. S. Gopi Sundar / ICF

At nearly six feet, the Sarus crane is the tallest flying bird in the world. It nests in wetlands, is strongly territorial, is a slow breeder – raising one or two chicks each year if successful, and is therefore susceptible to rapid population declines. It is suspected that attrition of natural wetlands following intensifying cultivation has forced this species into suboptimal conditions and reduced its breeding success. Though primarily a wetland species, Sarus cranes have been increasingly seen to nest in flooded rice paddies, a crop field that closely resembles wetlands. Farming poses a wide array of threats to breeding birds including mortality from trampling and machinery, reduced prey availability, and increased risk of predation of young birds exposed after the harvest. There have been few comparative studies in natural

wetlands and in agricultural landscapes to ascertain how Sarus cranes are faring under current scenarios of altered land use. I carried out a study to estimate how many nests had at least one egg hatching, and how many hatched broods survived until the subsequent breeding season, and to assess what factors affect these parameters the most.

In India, the globally-threatened Sarus crane lives primarily in agricultural landscapes, especially landscapes with flooded rice paddies. The landscape in the districts of Etawah and Mainpuri in south-western Uttar Pradesh is a mosaic of agricultural croplands (with monsoonal rice and winter wheat) and wetlands that are flooded by seasonal monsoon rains and/or by leakages in irrigation canals. The area has the largest known Sarus crane population

in the world, with populations appearing to be at least stable for the last 150 years despite the change in land use and growth in human populations. Farmers here revere Sarus cranes for their long pair-bonds, and causing willful harm to cranes is tantamount to a crime. Sarus crane pairs here are unique in maintaining year-round territories, which they actively defend against neighbouring pairs. Eggs are laid and chicks are raised inside these territories, and chicks are driven out just before the subsequent breeding season. Both croplands and wetlands occur in territories to different extents, enabling an assessment of how breeding success is affected due to these two habitats. The cranes here use both croplands and wetlands to different extents, making this an ideal place to examine the effect of habitats on their breeding success.

Following the fates of Sarus crane nests at this site over two years revealed interesting patterns. Cranes nested preferentially in wetlands over rice paddies, but size of wetlands did not affect choice of nest sites. Nests were located as close as 3m and 20m to roads and villages respectively. Egg mortality was largely due to people (mostly children, and occasionally, farmers), but a relatively large number of eggs still hatched successfully. What is more, eggs in rice paddies were as likely to hatch as those in wetlands, and variables like height of vegetation or water depth at the nest site did not affect nest success. Proximity to roads, however, did limit nest success, supporting the observation that people were the most important cause of egg mortality. The lack of a habitat effect on nest success is unique to Sarus cranes in this area – it is not known for other birds that nest in agricultural fields, or even for Sarus cranes nesting in other landscapes. The success of nests in agricultural fields here is only possible due to farmers' tolerance for Sarus cranes nesting in rice paddies, despite the considerable crop damage wrought by the birds – nesting cranes use rice stalks to build their large nests.

In addition to following the fate of nests, I also followed the fate of Sarus crane broods for two years in this landscape. Most of the mortality

occurred when chicks were less than 2 weeks old, however, the reasons for this mortality could not be reliably determined. Broods that hatched later in the season had a lower probability of survival if territories were associated primarily with paddy, but not if territories had more natural wetlands. Broods that hatch later in the season are still unfledged when the crop is harvested, and this likely increases the chances of their being preyed upon in cropland. But when wetlands are present there is always some vegetation for chicks to hide in until they can begin to fly, and this can explain why brood survival improves in territories with more wetlands. The nature of these natural wetlands – whether they were perennial or seasonal – did not affect the likelihood of brood survival.

The presence of wetlands, then, did not necessarily affect the success of nests – nests fared equally well in rice paddies. The tolerant attitude of farmers was likely paramount in allowing this result. However, wetlands were very important to improve the likelihood of success of broods.

This study demonstrates that there are two vital ingredients required to improve the chances of Sarus cranes' nests and broods surviving in this landscape. The first, that farmers retain their current positive attitudes

towards cranes nesting in rice paddies. The second, that a patchwork of even very small wetlands is retained amid croplands.

It is also evident that landscapes outside strictly protected areas like national parks and wildlife sanctuaries can, in some instances, be of crucial importance for the conservation of certain species. It is unlikely that entire landscapes in densely populated Uttar Pradesh will ever become available for Sarus crane conservation, and the increase of cultivation at the cost of wetlands is imminent. Yet, some areas are still multifunctional, providing excellent crop produce while also allowing persistence of significant populations of otherwise-declining fauna like Sarus cranes. Conservation interventions in these situations must be carefully considered. Practices popular with conservation agencies, for example, cash compensation, must be avoided to ensure that existing attitudes are not eroded. Working with children and farmers to reduce unnecessary egg damage is already paying positive dividends, suggesting that simple but sustained site-specific efforts are adequate to reduce nest mortality. Attrition of wetlands continues, in part due to governmental policy that designates shallow, water-logged areas as a category of 'wastelands', and in part due to lack of formal initiatives at the village level to encourage their retention. Altering this ethos is critical to ensuring the long-term survival of species like Sarus cranes.

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A Sarus Crane adds material to its nest from a wetland that borders a rice field



K. S. GOPI SUNDAR / ICF

The Future of Wildlife-based Land Uses in Botswana

Peter Lindsey

There is currently uncertainty regarding the future of wildlife management policy in Botswana, which has some of the largest populations of wildlife in southern Africa, including Africa's largest national elephant herd. During late 2008, the government of Botswana expressed an intention to prohibit safari hunting in several Controlled Hunting Areas (CHAs) adjacent to national parks in the north of the country, following the expiry of current leases. Specifically, the government plans to establish a 25 km buffer zone around protected areas in northern Botswana, in which safari hunting is not permitted. This article briefly discusses the potential implications of such recommendations in terms of sustaining Botswana's wildlife populations.

Historical Context

During the 1960s and 1970s, a small group of southern African nations (including Botswana) introduced two key changes to wildlife management practice which had a dramatic impact on the prospects for conservation: landowners were granted user rights over wildlife through legislative reforms, and safari hunting of wildlife was promoted. Those changes resulted in a large-scale switch from livestock to wildlife-based land uses on private land, and stimulated development of Community-based Natural Resource Management (CBNRM) in a variety of communally-owned areas. As a result of financial incentives for conservation resulting from sustainable use, and safari hunting in particular, southern Africa experienced significant increases in the abundance and distribution of wildlife outside of protected areas and the recovery of a number of endangered species. The expansion of wildlife populations was particularly pronounced on private land. For e.g., over 200,000 sq. km of private land has been converted to game ranching

in South Africa. In parts of southern Africa, the achievements are increasingly extending to communal land. In Namibia, for example, wildlife populations are booming on communal land due to the development of communal conservancies. On both private and communal land, safari hunting typically provides the entry point for former livestock farmers to adopt wildlife-based land uses because it enables the derivation of financial returns from small and low diversity populations of wildlife. Botswana has traditionally been a strong proponent of the principles of sustainable use, and the wildlife sector relies heavily on returns from safari hunting. Approximately 74% of the vast (~227,000 sq. km) wildlife estate (and 81% of community land used for wildlife production) is dependent on returns from consumptive wildlife utilisation.

Implications of Restricting Utilisation

1. Community Benefits

Safari hunting currently generates 72% of income for CBNRM programmes in Botswana, and restricting the industry has the potential to severely curtail financial incentives for conservation. The proposal to limit safari hunting represents one component of a broader trend towards centralisation of control of management over wildlife resources in Botswana (as has also occurred in several other parts of southern Africa in recent years). For e.g., a clause in the Botswana CBNRM policy (finalised in 2007) suggests that 65% of wildlife revenues will be centralised into a national trust fund. Similarly, a moratorium was placed on lion hunting (despite the absence of evidence of negative impacts associated with the practice in Botswana), significantly reducing the potential returns to communities from safari hunting. The clearest successes in promoting wildlife conservation outside of protected areas in Africa have been

achieved where authority to manage and utilise wildlife has been devolved to the landholder level. In Botswana, by reducing the freedom of communities to manage wildlife and imposing restrictions on safari hunting, the government risks reducing community buy-in to natural resource management and reducing incentives for conservation.

2. Hunting and Tourism Trade-offs

Safari hunting generates 15% of tourism revenues from only 1% of tourist arrivals, making it one of the lowest impact forms of tourism in Botswana. Safari hunting typically focuses on male animals and results in the removal of 2-5% of ungulate populations and generally has minimal impact on the viability of wildlife populations. The trophy quality for most species has been fairly constant over time in Botswana, indicating that the quotas for most species are sustainable.

Photo-tourism is an important contributor to GDP and to conservation efforts in Botswana. However, there are a number of drawbacks associated with photo-tourism that prevent it from being a panacea for natural resource management and rural development. Most significantly, photo-tourism is generally only viable in areas with very high densities of visible wildlife, and/or spectacular scenery and large areas of Botswana's wildlife estate are not suitable. Photo-tourism relies on visitation by far greater numbers of tourists than safari hunting, resulting in environmental impacts through fossil fuel use and habitat conversion for the creation of tourism infrastructure. Furthermore, inequity in receipt of benefits can undermine the conservation and development benefits of photo-tourism. Phototourism generates relatively little direct employment in Botswana, and most jobs created are in menial support services. Leakage of revenues from the photographic industry is also a serious problem. Approximately 73% of photo-tourism revenues are leaked from Botswana overseas, compared to 25% of safari hunting income. The majority of earnings from photo-tourism in Botswana

are generated via 'enclave' tourism (i.e., tourism operations run by foreign companies with a weak benefit stream to local communities), and comparatively few benefits accrue to CBNRM tourism ventures.

3. Regional Conservation Alliances

During recent decades, Botswana has been a strong advocate for the principles of sustainable use. Unity among southern African nations has been crucial in preventing and limiting the impact of proposals tabled at CITES meetings designed to limit the sustainable use of wildlife in southern Africa. If Botswana, a country traditionally so resolute in its support of the principles of sustainable use, was to impose stringent restrictions on hunting, the impression among other countries may be that such a decision was based on negative environmental consequences associated with hunting (despite a lack of evidence to support such assumptions, and regardless of the clear conservation gains resulting from financial benefits from hunting). Such nations may then be persuaded to vote for proposals designed to curtail sustainable utilisation of southern African wildlife resources at CITES meetings.

In addition, Botswana is a signatory to the Southern African Development Community (SADC) Protocol on Wildlife and Natural Resources, the primary objective of which is to: "*establish within the region and within the framework of the respective national laws of each state, common approaches to the conservation and sustainable use of wildlife resources*". Increased centralisation of control over wildlife management, and restrictions on the freedom on communities to derive benefits from wildlife via safari hunting is contrary to both the SADC Protocol on Wildlife and Natural Resources, and to harmonised trans-boundary management of wildlife populations.

Conclusion

Botswana's conservation policies during recent decades have been largely progressive and effective, resulting in

the conservation of a vast wildlife estate and increasing community involvement in wildlife-based land uses. This success has been achieved through a blend of protection and sustainable use. Restricting consumptive wildlife utilisation would represent a retrogressive step and a top-down imposition that would reduce the profitability of wildlife-based land uses in many rural areas, and reduce community earnings and buy-in to natural resource management. Restricting hunting would not likely be associated with compensatory increases in earnings from photo-tourism and the net impact would probably be reduced incentives for people to conserve wildlife. Instead, policy-makers in Botswana should maximise the diversity of options for generating income from wildlife; allow market-forces, community preferences and the characteristics of individual areas to determine the ideal form of wildlife uses outside protected areas; and focus attention on key issues affecting conservation in Botswana such as blockages to migration routes created by veterinary fencing, and livestock subsidies which discourage wildlife-based land uses.

Further Reading

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The 'entomological laboratory' in Miao that is supposed to cater to malaria diagnosis for the entire sub-division

Healthy Forests and Healthy People: A Problem of First among Equals

Prashanth N. S.

Yuthi was in his twenties when he passed away. In the hinterland of India's largest tiger reserve, few people keep track of their age; nobody here registers for social welfare, they do not have a doctor who asks them to fill up their age on a case sheet. Cystic fibrosis did not dry up his lungs. No, he was not killed by any of those diseases that strike the young. Diseases we study so much about in medical school; diseases with articles written about them in journals, and their correlations to genes with numbers like the latest version of MS Windows. Each has its 'disability adjusted life years' (DALY)¹ index to emphasise its importance for inclusion in new programs that the State might decide to launch. But Yuthi was not affected by any of these rare and publishable afflictions. Yuthi died of malaria. It is quite ironic that a country

with nuclear power still has anaemic mothers and malaria deaths!

Yuthi's home was in Gandhigram, a remote corner in the state of Arunachal Pradesh in north-east India. He used to carry luggage for people like my friends and me, who were working on health and wildlife conservation in the forests around his village. I have been to Yuthi's village a few times with wildlife scientists who work there. His village happens to be surrounded by one of the northernmost primary rainforests of the world. On one side is one of India's largest tiger reserves, the Namdapha Tiger Reserve, and on the other, Myanmar's Hukawng Valley Tiger Reserve, perhaps the world's largest protected area (about 6000 sq. km). The place teems with biodiversity; in the past few years, the forests of Arunachal

Pradesh have witnessed descriptions of a new species of bird, and even a primate. Although it is the tiger that has given this area its protected status, it is not the tiger that this and many forests in Arunachal Pradesh are known for. It is for their rich biodiversity, including several endemic insects, butterflies, birds and plants, that these forests are important. Such rainforests play a central role in wildlife conservation. However, climate change and global warming are distant issues for the Lisus and other tribes living in and around these forests. Tigers are not. Today there is a public debate on tiger deaths in India. Tigers and tribals are being pitted against each other in the hallowed chambers of policy-making conferences. Co-existence of tigers and tribals is being questioned.

In a situation where health care is financed literally out of people's pockets, the fate of the tiger and the health of the people can

¹DALYs are a health gap measure increasingly used in contemporary public health literature to prioritise health conditions for intervention

get intertwined easily. Hunting becomes a means of supporting any unplanned and sudden catastrophic expenditure. Health invariably falls in this category of unplanned and sudden expenditure. With poor access to primary health care or community health workers, people in such remote regions often find that hunting can finance their long journeys to towns. And it does not help matters that private providers with expensive secondary level care and irrational practices are the first line health providers. The Lisus travel through about 150 km of thick forests, interspersed with rivers (often in spate), to reach 'civilisation'. From there, they take a 6 hour bus journey to reach a town where they inevitably see a private provider. Roads, understandably, are a bigger concern than chloroquine, the antimalarial drug.

I work with another indigenous tribal people in south India, the Soligas. The forests around the Soligas have shrunk, leaving just a 540 sq. km area, that still remains only due to its legal protection by the State. The Soligas were semi-nomadic people, until they were forced to settle due, in part, to the shrinking forests, and in part, to the legal protection accorded to their forests; they couldn't hunt anymore. However, a doctor who settled in these hills 25 years ago began to provide them health care. He went a step further and set up an NGO to assist them with education and livelihoods, in addition to healthcare. Today, the elderly Soligas talk about how climate has changed. They do not question it and do not need evidence. They see how their forests are getting choked from the outside.

These two contrasting cases, from north-east India and south India, exemplify the problems faced by people living in and around forests in India. However, the key is access to basic health care and livelihoods. Wildlife scientists today see this connection between people's basic needs and their conservation ethic. In fact, a group of wildlife biologists started a community health care program and an

education initiative among the Lisus. I went there to train a group of tribal youth in basic health care. Among other things, I wanted these youth to be able to identify and institute treatment against malaria. It was indeed satisfying that wildlife biologists had thought outside the box, and had looked beyond their paradigm of biodiversity conservation. Sadly, those of us in health care are yet to make this connection. A glance at our curricula reveals the level of medicalisation that we undergo. A glance at our policy shows how fragmented and restricted it is.

Shrinking forests are an important reason for climate change, and so are forests devoid of their biodiversity. People living in and around forests depend on them for their livelihood and daily needs. And when there are financial pressures for any of their needs, they turn to their resources, forests, finding themselves in the position of villains accelerating deforestation and emptying the forests. Isn't this what our forefathers did? Can we blame them for destroying forests, just because we have now thought of legal protection for forests? Can we blame them for destroying forests, just because we are now concerned about climate change?

As urban India contends with population pressures and urbanisation, rural and tribal India face a different problem: of access, both physical and financial. It is time for health planners to consider the special needs and contextual factors affecting tribals and others living in or dependent on forests. It would be presumptuous of us to imagine that the widely publicised national programs for any of the diseases will change the situation of these people. Lisus or Soligas or for that matter others like them are not asking for malaria control programs or early cancer detection programs. They are asking for basic health care; financial and physical access to a person who can cure them of their illness and can help them live a healthier life. A malaria program for them is of even lower priority than a road or a source of livelihood, simply because



Yuthi, the young Lisu

they have accepted malaria deaths as their destiny. It is perhaps time to think beyond programs, and address health as a need in itself rather than health as a consequence of our programs.

Yuthi died of malaria in his early twenties only because he was born in a place where climate change and biodiversity mattered more than his life. In many areas the world over, where human-wildlife conflict prevails, the situation is similar. How are we going to prioritise between biodiversity conservation and the needs of people? Are our politicians and policy-makers even seeing this problem of 'first among equals'? The global health research agenda needs to gear up to answer these difficult questions – questions that matter to people dying of malaria in this age, when in many countries research is addressing carpal tunnel syndrome.

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Toco Toucans are a Double-edged Sword for Endangered Macaws

A Conservation Paradox in Brazil Shows the Importance of Ecological Interactions for Conservation

Nathan Brouwer

Conservationists often focus on preserving endangered, flagship, or charismatic species. Recent research in Brazil by Marco Aurélio Pizo of the Universidade do Rio dos Sinos and his colleagues indicates that a broader perspective may be necessary for successful conservation of some species. Their research illustrates the importance of considering multiple species and their interactions when developing conservation plans.

Pizo and colleagues studied the hyacinth macaw (*Anodorhynchus hyacinthus*), the world's largest species of parrot. The hyacinth macaw is found only in the forests of central Brazil, woodlands within the Pantanal of Brazil, Paraguay and Bolivia, and an enclave in the Amazon basin. Considered endangered by the ICUN, it is threatened by habitat loss as well as trapping for the pet industry. The macaw nests in cavities within large trees that have been excavated by other

animals, enlarging them to suit their needs. Otherwise suitable forests may lack nesting sites if their trees are too small, limiting the macaw's habitat options.

To better understand how to conserve the species, Pizo and colleagues studied its nesting ecology in the Brazilian Pantanal. The Pantanal is a vast wetland in south-central South America. The Pantanal is severely threatened by the intensification of agriculture and the conversion of wetlands and woodlands to pastures. Its uniqueness has earned it classification as a UNESCO Biosphere Reserve.

Seed dispersal is a central aspect of forest regeneration. Maintaining the processes that spread seeds throughout the forest is therefore essential to creating and maintaining macaw habitat. On the other hand, nest predation is one of the leading causes of death for young birds. In the short term, it is therefore necessary to know what predators are killing young macaws.

Hyacinth macaws in this region rely on manduvi trees (*Sterculia apetala*) 60 years or older for their nesting sites. Pizo's team sought to identify which species of animals disperse manduvi seeds, and which prey upon the macaw's eggs and hatchlings.

Over the course of four years, Pizo and his assistants spent over 250

An endangered hyacinth macaw in the Brazilian Pantanal



hours observing which species visited manduvi trees, and whether they removed fruit. This part of the study revealed that by far the bird that most frequently visited manduvi trees and removed fruit was the toco toucan (*Ramphastos toco*). Toco toucans made up 64% of all visitors to the trees, and committed 86% of the fruit removal. These toucans therefore have the most opportunity to spread manduvi seeds away from their mother tree.

The importance of seed dispersal to the macaw's ecology was assessed by finding the location of manduvi seedlings around current nest sites. The distance from each seedling to the nearest adult tree was measured, indicating that most seedlings were located near adult trees. More than 50% of all adult trees, however, were greater than 30 m from each other. Pizo and his colleagues concluded that manduvi seeds are most likely to grow into suitably large trees only if they are dispersed away from other trees. Additionally, Pizo's team found that there is typically 30 m

between trees that have been colonised by the macaws, indicating the birds' preference for a bit of isolation from their neighbors.

To determine which species were entering hyacinth macaw nests and eating eggs, Pizo and his assistants monitored over 300 nests for five years. Blame for any harm done to the nest was assigned based on actual observation of the act, feathers or other signs left behind, or by the occupation of the nest by another animal.

In addition to the usual suspects of jays, opossums, and coatis, toco toucans emerged as an unexpected predator. Overall, 23% of the eggs that were monitored were destroyed by predators. Among the destroyed eggs, toucans were responsible for half.

The authors conclude that any efforts to conserve the hyacinth macaw must address its ambiguous relationship to the toucan. In the short term, toucans are a major source of mortality, while in

the long term they promote the creation of new habitat. The fate of the macaw is therefore intricately tied to the toco toucan. Based on their experience, Pizo and his colleagues encourage other researchers and managers to be aware of the consequences of such complicated interactions.

Further reading:

The hyacinth macaw:
http://en.wikipedia.org/wiki/Hyacinth_macaw
Parrots:
<http://en.wikipedia.org/wiki/Psittacidae>
The IUCN Red List:
<http://www.iucnredlist.org/details/142575>
The Pantanal:
<http://en.wikipedia.org/wiki/Pantanal>

Summarised from:

Pizo, M.A., C.I. Donatti, N.M.R. Guedes and M. Galetti. 2008. Conservation puzzle: Endangered hyacinth macaw depends on its nest predator for reproduction. *Biological Conservation* 141: 792.

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Bushmeat Biometrics

Biologists Take a Critical Look at How Bushmeat Hunting Should be Assessed

Nathan Brouwer

Wild game is a major food source for many people in the tropics. Rural population growth and an increasing urban demand for meat have made hunting a major threat to biodiversity. Most researchers investigating this problem assume that the impact hunters have on wildlife is somehow proportional to the amount of time and effort they exert in hunting. But

how do you calculate their effort? According to Janna Rist and her colleagues from London's Zoological Society and the Imperial College of London, different researchers employ a myriad of methods. In order to gauge hunting effort and derive impacts on wildlife, different calculations may integrate days spent hunting, distance traveled while hunting, or distance traveled to a hunting location.

With so much variation in how, where, and what is hunted, Rist and her colleagues question whether there is a consistent relationship between the time hunters spend in the field and the number of animals harvested. After evaluating numerous studies, they found that the significance of these potential sources of variation has not been assessed. From the literature, the authors identified nine assumptions

that commonly occur in the bushmeat literature. They then formulated these into hypotheses, that they tested with data from an intensive 15-month study of hunting in West Africa (Table 1).

The study was based in Midyobo Anvom, a remote jungle village in Equatorial Guinea. Most hunters work from camps located up to 13 km from the village; the rest hunt within a day's hike from home. Wire leg snares and neck traps of various sizes are located in trap groups around the camp; a few hunters also used guns. Hunters leave the camp each week to sell game to traders from the regional capitol of Bata.

Rist or her assistants observed 225 hunting trips, recording every detail. They timed the durations of all aspects of the hunt, including travel to hunting camps, active hunting, and resting. They also recorded the time it took to remove animals from traps or retrieve animals that hunters had shot. Different types of traps catch

different animals, so the number and proportion of each trap type was noted. The identity of every animal killed, whether it was useable for food or not, was also recorded.

Of the nine assumptions, Rist and her colleagues rejected four of them outright (Hypotheses 1, 4, 7, 8). Many researchers assume that the amount of time spent actively hunting is proportional to the total time spent away on a hunting trip (Hypothesis 1). The number of days or hours spent out hunting can therefore be used to calculate the impact of the hunters. Rist's data, however, indicates that the time spent actively hunting varied with the distance of the camp from the village. Similarly, it is often assumed that the time spent checking traps is always the same for all hunters (Hypothesis 2). In the field, Rist found that hunters based in the village spent 10% less time checking their traps because they spent more time travelling from home to their hunting sites than

hunters based from camps. Another common assumption is that hunters always use the same number of traps, and the same portion of trap types (Hypothesis 7). In fact, Rist's data indicates that hunters use different mixes of traps at different locations in the forest. Finally, researchers often assumed that traps are not species-specific (Hypothesis 9). Rist, however, found that leg and neck traps target different species.

Only two common assumptions were found to be true in this study (Hypotheses 3 and 5). As many researchers assume, the handling of prey does not take up much of a hunter's time. It is therefore not necessary to account for handling time when calculating hunting effort. It is also assumed that the number of traps set by hunters does not vary between hunting sites. Rist's data supports this, making it acceptable to estimate hunting effort from the number of trap groups set without knowing the exact number of traps. The remaining three hypotheses had equivocal evidence (Hypotheses 2, 6, and 9).

Table 1: Hypotheses tested by Rist *et al.* (2008: 2092)

	Common assumptions / hypotheses in bushmeat literature	Conclusion
1	The time spent checking traps is a consistent proportion of the total time spent on a hunting trip	Rejected
2	Hunts all last the same amount of time	Mixed support
3	The time spent removing animals from traps, or retrieving them after they have been shot, does not represent a significant amount of time	Accepted
4	Hunters spent the same portion of their time checking traps on every hunt	Rejected
5	The number of traps set in a group does not vary between location	Accepted
6	The length of a hunt or the time spent checking traps depends on the number of traps in a trap group	Mixed support
7	Hunters always use the same number of each type of trap	Rejected
8	All species are caught equally by all trap types	Rejected
9	Few animals go to waste	Mixed support

Trap groups are a set of traps set by a hunter in the same area of the forest

Through their literature review and their detailed study of this African hunting system, Rist and colleagues have been able to systematically identify sources of bias in bush meat studies. Information on the activities of hunters is relatively easy to collect and is therefore a popular tool for assessing the impact of bushmeat hunting. Rist's detailed fieldwork will help future researchers collect data that accurately translates into impacts on prey populations.

Summarised from:

Rist, J., M. Rowcliffe, G. Cowlishaw and E.J. Milner-Gulland. 2008. Evaluating measures of hunting effort in a bushmeat system. *Biological Conservation* 141: 2086-2099.

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Deforestation's Indelible Genetic Mark

Habitat Loss Leaves its Signature on the DNA of Lemurs

Nathan Brouwer

Madagascar has faced rapid and extensive deforestation since it was colonised 2000 years ago. Approximately 90% of its original forest cover has already been lost; the rest highly fragmented. The habitats of forest-dwelling species have been significantly reduced; what remains is chopped up into disjointed patches.

European researchers Gillian Olivieri, Victor Sousa, Lounès Chikhi and Ute Radespiel are using this unfortunate situation as a natural laboratory for studying the effects forest fragmentation on the genetics of mouse lemurs. Mouse lemurs form a group of 18 small primate species found throughout Madagascar. On Madagascar's western coast, *Microcebus ravelobensis*, *M. bongolavensis*, and *M. danfossi* occupy adjacent regions, separated only by large rivers.

Prior to forest fragmentation, Olivieri and colleagues conjecture that there was likely a consistent pattern of genetic variation among these species. Neighbouring populations of each species were likely to be genetically similar, while more distant populations showed genetic differences. Migration between adjacent populations would have allowed genes to move back and forth, preserving the relationships between populations.

Olivieri and colleagues examined the effects of fragmentation on these genetic structures by using microsatellite markers in *Microcebus*. DNA samples were taken from populations of *M. ravelobensis*, *M. bogolavensis*, and *M. danfossi* occupying both large forests and small fragments. Some populations inhabit adjacent forests, while others reside over 60 km apart. Several of the *M. ravelobensis* populations were from the continuous and large Ankarafantsika National Park.

The team's analyses show that past deforestation has left a genetic imprint on all three species. Regardless of the species, almost all study populations bear the genetic mark of a relatively rapid and recent population crash. Their analyses indicate that this crash occurred within the last 500 years, which coincides with the acceleration of both Malagasy population growth and deforestation. This rapid loss of habitat apparently caused the populations of all three species to quickly decrease. According to the researchers' calculations, each species likely had effective population sizes between 10,000 and 20,000 individuals before the crash. Post-crash, the populations decreased by about two orders of magnitude. Even populations in the interior of the Ankarafantsika National Park showed evidence of a collapse. This indicates that fragmentation can affect populations in even large forest stretches.

Olivieri and colleagues also found vestiges of the past genetic structure in *M. ravelobensis*, the species for which they had the most samples. Neighbouring populations had similar microsatellite patterns. Differences increased with increased distance between populations, a pattern known as isolation by distance. This adds additional strength to the author's argument that deforestation occurred recently; if it had occurred further in the past, isolated populations would have already drifted off in random genetic directions. This genetic drift could eventually erase or disturb the geographic pattern in genetic structure.

Olivieri and colleagues were able to detect further genetic effects of forest fragmentation. Their analyses revealed unique genetic characteristics for each *M. ravelobensis* population that occurred in the forest fragment. In comparison, populations within Ankarafantsika National Park still resembled each other genetically.

Findings such as these help conservationists use genetics to inform conservation decisions. For example, Olivieri and colleagues' data indicates that there is a long-standing pattern of diversity throughout the range of *M. ravelobensis*. While the Ankarafantsika National Park protects a portion of this diversity, populations further away have their own genetic characters that warrant protection.

This study also illustrates the demographic effects of rapid deforestation in the form of population crashes. The genetic signature of these population crashes was created by the random loss of microsatellite alleles occurring in the lemurs that died because of habitat loss. While microsatellites have no known biological function, alleles of other genes should also have been lost in the same event. As a consequence, these mouse lemur species are now facing a changing environment and climate with reduced genetic diversity that may ultimately limit their potential to evolve and adapt.

This study is part of the growing field of conservation genetics. In addition to major conservation journals, studies such as this which investigate the hidden – but extremely important – genetic consequences of fragmentation appear in the journals *Conservation Genetics* and *Molecular Ecology*.

Summarised from:

Olivieri, G., V. Sousa, L. Chikhi and U. Radespiel. 2008. From genetic diversity and structure to conservation: Genetic signature of recent population declines in three mouse lemur species (*Microcebus* spp.). *Biological Conservation* 141: 1257-1271.

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