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Contents

Editorial	2
<i>R. Cooney, C. Freese, H. Dublin, D. Roe, D. Mallon, M. Knight, R. Emslie, M. Pani, V. Booth, S. Mahoney and C. Buyanaa</i> The baby and the bathwater: trophy hunting, conservation and rural livelihoods	3
<i>J. Stahl and T. De Meulenaer</i> CITES and the international trade in wildlife	17
<i>Y. Vizina and D. Kobei</i> Indigenous peoples and sustainable wildlife management in the global era	27
<i>D. Roe, R. Cooney, H. Dublin, D. Challender, D. Biggs, D. Skinner, M. Abensperg-Traun, N. Ahlers, R. Melisch and M. Murphree</i> First line of defence: engaging communities in tackling wildlife crime	33
<i>J.-C. Nguingiri, R. Czudek, C. Julve Larrubia, L. Ilama, S. Le Bel, E.J. Angoran, J.F. Trebuchon and D. Cornelis</i> Managing human-wildlife conflicts in central and southern Africa	39
<i>N. Yakusheva</i> Wildlife conservation policy and practice in Central Asia	45
<i>N. van Vliet, F. Sandrin, L. Vanegas, L. L'haridon, J.E. Fa and R. Nasi</i> High-tech participatory monitoring in aid of adaptive hunting management in the Amazon	53
<i>M. Silalahi, A.B. Utomo, T.A. Walsh, A. Ayat, Andriansyah and S. Bashir</i> Indonesia's ecosystem restoration concessions	63
<i>M. Rautiainen, J. Miettinen, A. Putaala, M. Rantala and M. Alhainen</i> Grouse-friendly forest management in Finland	71
FAO Forestry	78
World of Forestry	80
Books	81

EDITORIAL

Wildlife management is the focus of considerable international debate because of its importance for biodiversity conservation, human safety, livelihoods and food security. The Collaborative Partnership on Sustainable Wildlife Management (CPW) – comprising a range of international organizations, including FAO – was established in 2013 to increase cooperation and coordination among its members and other interested parties in the sustainable management of terrestrial vertebrate wildlife. Still in the early stages of development, the CPW has plenty to work on.

One of the most controversial topics in sustainable wildlife management is trophy hunting, which is recreational hunting that targets wild animals with specific desired characteristics, such as large size or antlers. There are moves at various levels to end or restrict the practice for ethical and conservation reasons, including through bans on the importation of hunting trophies. In the opening article of this edition, Cooney and co-authors, however, make the case for the positive role of trophy hunting in supporting conservation and local rights and livelihoods, illustrating it with six case studies in Africa, Asia and North America. They conclude that, although the governance of trophy hunting needs reform in many countries, bans and import restrictions would undermine successful conservation and community-driven development programmes that are funded largely by trophy hunting.

The article by Stahl and De Meulenaer reviews the role of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in regulating the international wildlife trade and encouraging sustainable wildlife management. The international wildlife trade is worth many billions of dollars annually and involves thousands of species. About 3 percent of the species regulated by CITES are under threat of extinction, and CITES generally prohibits their trade. The remaining 97 percent are not threatened but could become so if the trade was unregulated. The authors explain how CITES works and present case studies in which CITES regulation has helped promote sustainable wildlife management. Nevertheless, the illegal trade of terrestrial vertebrate wildlife, estimated to be worth up to US\$10 billion per year, can undermine such efforts; there is a continued need, say the authors, to improve the governance of wildlife management and trade.

The role of indigenous peoples has often been sidelined in international debates on wildlife conservation. The article by Vizina and Kobei shows that this is changing, with indigenous voices becoming more audible in forums such as the Convention on Biological Diversity and CITES and through the CPW. Indigenous peoples have acquired a wealth of knowledge over many generations, which they have used to sustainably manage and conserve their lands. Revitalizing this traditional knowledge, say the authors, is an important pathway for long-term wildlife conservation, and one way to do it is to encourage

greater cooperation among indigenous peoples and supporters at the global scale.

Roe and co-authors report on a recent symposium on wildlife management, which concluded that enforcement alone is insufficient to combat the illegal wildlife trade; if done poorly, it can even have major negative consequences. A better approach, according to symposium participants, is community engagement based on listening, trust-building, respect for traditional authority, the development of shared, co-created approaches, and, crucially, recognition of the rights of communities to use and benefit from wildlife.

Following on from these general articles are regional and local examples of efforts to promote sustainable wildlife management. Nguinguiri and co-authors describe recent efforts to better manage human–wildlife conflicts in central and southern Africa, which have become more frequent in recent decades. Among other efforts, a regional partnership of organizations has developed a toolbox of approaches to enable communities to deter wildlife from damaging their crops and property and from posing risks to human lives.

Yakusheva describes an initiative in Central Asia – one of the world's few remaining regions in which large-scale migrations of large mammals still occur – under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals to improve regional cooperation on wildlife conservation. Van Vliet and her co-authors show how indigenous hunters in the Amazon are using smartphone technology to monitor and regulate their hunting. Silalahi and co-authors provide an overview of an emerging form of forest licence in Indonesia that offers companies – including those formed by civil-society organizations – opportunities to restore and manage logged-over forest for biodiversity conservation and to generate local economic and social benefits. Finally, Rautiainen and his co-authors provide an example of best practice in Finland, where forest management is being adapted to accommodate the habitat requirements of grouse species, populations of which had previously declined but are now on the rebound.

Local people have been managing wildlife for millennia, including through hunting. Sufficient examples are presented in this edition to show that sustainable wildlife management is also feasible in the modern era. In some cases, a sustainable offtake – by local people, trophy hunters and legitimate wildlife traders – is proving vital to obtain local buy-in to wildlife management and to pay the costs of maintaining habitats. No doubt the debate will continue on the best ways to manage wildlife; this edition of *Unasylva* is a contribution to that. ♦



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The baby and the bathwater: trophy hunting, conservation and rural livelihoods

*R. Cooney, C. Freese, H. Dublin, D. Roe, D. Mallon, M. Knight, R. Emslie, M. Pani,
V. Booth, S. Mahoney and C. Buyanaa*

There is substantial evidence that the controversial practice of trophy hunting can produce positive outcomes for wildlife conservation and local people.

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Trophy hunting is the subject of intense debate and polarized positions, with controversy and deep concern over some hunting practices and their ethical basis and impacts. The controversy has sparked moves at various levels to end or restrict trophy hunting, including through bans on the carriage or import of hunting trophies. In March 2016, for example, a group of members of the European Parliament called (unsuccessfully) for the signing of a Written Declaration calling for examination of the possibility of restricting all imports of hunting trophies into the European Union.

Above: Elephants bathe in the Chobe River, Botswana

Although there is a pressing need for the reform of hunting governance and practice in many countries, calls for blanket restrictions on trophy hunting assume that it is uniformly detrimental to conservation; such calls are frequently made based on poor information and inaccurate assumptions. Here we explain how trophy hunting, if well managed, can play a positive role in supporting conservation as well as local community rights and livelihoods, and we provide examples from various parts of the world. We highlight the likely impact of blanket bans on trophy hunting and argue for a more nuanced approach to much-needed reform.

WHAT IS TROPHY HUNTING?

Here we define trophy hunting as hunting carried out on a recreational basis (i.e. not “subsistence” hunting carried out as part of basic livelihood strategies) targeting animals with specific desired characteristics (such as large size or antlers). Trophy hunting generally involves the payment of a fee by a foreign or local hunter for an (often guided) experience for one or more individuals in hunting a particular species with desired characteristics. The hunter generally retains the antlers, horn, tusks, head, teeth or other body parts of the animal as a memento or “trophy”, and the local community or the hunter usually uses the meat for food. Trophy hunting takes place in most countries of Europe, the United States of America, Canada, Mexico, several countries in East, Central and South Asia, around half the 54 countries in Africa (Booth and Chardonnet, 2015), several countries in Central and South America, and Australia and New Zealand.

We note, however, that the term “trophy hunting” can be misleading. Hunting takes many forms, and hunters have diverse motivations. Gaining trophies may be a minor or incidental motivation for some hunters, who may also be motivated by, for example, the prospect of obtaining food; managing a population in order to conserve other species of plants or animals

or to enable forest regeneration; being in nature; continuing a culturally important or traditional set of practices; and interacting with family and friends. In many contexts, trophy hunting overlaps substantially with hunting for food. Many deer hunters, for example, may hunt animals with larger antlers if encountered, but will hunt others (for meat) should the desired animal not be found.

A wide variety of species is subject to trophy hunting, from common to threatened. Most are native, but some (e.g. deer in Australia and New Zealand) are introduced. The hunting of introduced species constitutes a small proportion of hunting and raises different conservation issues to those associated with the hunting of native species; it is not discussed further in this article.

Although there is a tendency for the media and decision-makers to conflate “canned” hunting (hunting of usually captive-bred animals in enclosures from which they are unable to escape, or of recently released animals unfamiliar with the area) with legitimate trophy hunting, canned hunting is a limited practice (primarily involving lions in South Africa) and is condemned by major professional hunting organizations. It raises different issues to those associated with the hunting of free-ranging animals and is not discussed further in this article.

Trophy hunting is also frequently (and incorrectly) conflated with poaching for the organized international illegal wildlife trade that is devastating many species, including the African elephant (*Loxodonta africana*) and African rhinos (black – *Diceros bicornis* – and white – *Ceratotherium simum*). Trophy hunting typically takes place as a legal, regulated activity under programmes implemented by government wildlife agencies, protected-area managers, indigenous or local community bodies, private landowners or conservation or development organizations, whereas poaching for the illegal wildlife trade is – by definition – illegal and unmanaged. Poaching for the illegal wildlife

trade is generally far more damaging in both scale and demographic impact, with breeding females and calves often killed. In Africa, for example, 1 342 African rhinos (including both species) were reported poached in 2015 – almost 20 times more than the 69 that were hunted legally that year (Emslie *et al.*, 2016). All revenue from poaching for the illegal wildlife trade flows to criminals; on the other hand, revenues from legal hunting are used in a number of cases to fund law enforcement or provide community benefits that counter the incentives to engage in illegal wildlife trade (see, for example, case studies 1, 2 and 4 later in this article).

In some contexts, all decisions on hunting quotas, species and areas are made by government wildlife agencies (for example in the United States of America – case study 3). In many trophy-hunting governance systems, however, local landowners and community organizations participate alongside governments in deciding these questions and sometimes are the key decision-makers, at least for some species (e.g. in Namibian communal conservancies – see case study 5).

This is not to say that no illegal practices take place – as, to a certain extent, they do in most sectors. Widespread anecdotal reports indicate that regulatory weaknesses and illegal activities exist in the trophy-hunting sector in some countries, sometimes at a very serious scale and sometimes involving official corruption. Such activities include hunting in excess of quotas or in the wrong areas, the taking of non-permitted species, and “pseudo hunting” (case study 1).

The prices paid for trophy hunts vary enormously, from the equivalent of hundreds to hundreds of thousands of United States dollars; at a global scale, such hunts involve a substantial revenue flow from developed to developing countries (e.g. Booth, 2009; Saayman, van der Merwe and Rossouw, 2011). In developing countries, landowners and land managers often negotiate with hunting operators (or “concessionaires”) to decide who will get the

hunting right or concession on their land, and on what terms. Terms may include (and, in some countries, *must* include, if on state land) obligations to carry out anti-poaching and community development activities. The operator, in turn, secures contracts with foreign clients and runs the hunting trips. The fees paid by hunters generally include three things:

1. the operator's costs (where applicable);
2. payments to the local entity (e.g. community, private or state landowner or land manager) with which the operator has the contract; and
3. official government payments of various types (e.g. permits and fees), which typically help finance wildlife management and conservation activities.

In developing countries, generally 50–90 percent of the net revenues (excluding operator costs) are allocated to local entities, with the remainder going to government authorities. The local community benefit can be as high as 100 percent and as low as nearly zero. Meat from hunts is often donated or sold to local community members and can be highly valued locally (Naidoo *et al.*, 2016). In most countries in Europe and North America, a share of hunters' fees usually goes to governmental wildlife authorities to help finance wildlife management and conservation activities.

WHAT IMPACTS DOES TROPHY HUNTING HAVE ON CONSERVATION?

Trophy hunting takes place in a wide range of governance, management and ecological contexts and, accordingly, its impacts on conservation vary enormously, from negative through neutral to positive. Good evidence on the impacts is lacking or scarce in many contexts, making it impossible to fully evaluate the overall effect of trophy hunting.

Negative conservation impacts of poorly managed trophy hunting may include over-harvesting; artificial selection for rare or exaggerated features (e.g. abnormal colour morphs); genetic or phenotypic impacts

(such as reduced horn size); the introduction of species or subspecies beyond their natural ranges (including into other countries); and predator removal.

It is clear, however, that, given effective governance and management, trophy hunting can and does have positive impacts (as shown in the six case studies in this article). Habitat loss, fragmentation and degradation, driven primarily by the expansion of human economic activities, is the most important threat to terrestrial wildlife populations (Mace *et al.*, 2005), along with other threats such as poaching for bushmeat and illegal wildlife trade and competition with livestock. Demands for food, income and land for development are rising in many biodiversity-rich parts of the world, exacerbating threats to wildlife and increasing the urgency of finding viable conservation incentives.

Well-managed trophy hunting can be a positive driver of conservation because it increases the value of wildlife and the habitats it depends on, providing crucial benefits that can motivate and enable sustainable management approaches. Trophy-hunting programmes can have the following positive impacts:

- **Generate incentives for landowners (e.g. government, private individuals and communities) to conserve or restore wildlife on their land.** Benefits to landowners from hunting can make wildlife an attractive land-use option, encouraging landowners to maintain or restore wildlife habitat and populations, remove livestock, invest in monitoring and management, and carry out anti-poaching activities. Policies enabling landowners to benefit from sustainable wildlife use have led to the total or partial conversion of large areas of land from livestock and cropping back to wildlife in, for example, Mexico, Namibia, Pakistan, South Africa, the United States of America and Zimbabwe (case studies 1 and 3–6). This benefit applies to state protected areas as well as to private lands. In

sub-Saharan Africa, lands set aside for wildlife in hunting concessions cover as much land (or more) as national parks (Lindsey, Roulet and Romañach, 2007) and are often part of national protected-area systems (usually in IUCN categories IV and VI).¹ Given the intense and escalating pressures on land in developing countries, particularly to produce food, the future of these lands and the wildlife that inhabit them would be highly uncertain without the benefits flowing from wildlife management.

- **Generate revenue for wildlife management and conservation, including anti-poaching activities, for governmental, private and communal landholders** (see case studies 1–6). In most regions, government agencies depend at least in part on revenues from hunting to manage wildlife and protected areas. State wildlife agencies in the United States of America, for example, are funded primarily by hunters (both trophy and broader recreational hunting) through various direct and indirect mechanisms, including the sale of trophy-hunting permits (Heffelfinger, Geist and Wishart, 2013; Mahoney, 2013). The extent of the world's gazetted protected areas, many of which are in IUCN categories IV and VI and include hunting areas, could decline significantly if hunting areas were to become inoperable. Private landowners in South Africa and Zimbabwe and communal landowners in Namibia also use trophy-hunting revenues to pay guards and rangers, buy equipment, and otherwise manage and protect

¹ The aim of IUCN Protected Area Category IV areas ("habitat/species management areas") is to protect particular species or habitats, and management reflects this priority. The aim of IUCN Protected Area Category VI areas ("protected areas with sustainable use of natural resources") is to conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems (IUCN, 2017).



Hunting for food and trophies overlaps for species such as red deer (*Cervus elaphus*)

The incentives and revenues from trophy-hunting programmes are not just important for the conservation of hunted species: site protection exercises a “biodiversity umbrella” effect and may help conserve non-hunted species, too. Populations of African rhinos and the African wild dog (*Lycaon pictus*) in the Savé and Bubyne conservancies in Zimbabwe are not hunted, but proceeds from trophy hunting support their conservation (case study 4). In the Pamirs in Tajikistan, trophy-hunting concessions for argali (*Ovis ammon*) and ibex (*Capra ibex*) (wild sheep and goats) are showing higher densities of the threatened snow leopard (*Panthera uncia*) than nearby areas without trophy hunting, likely due to higher prey densities and reduced poaching (Kachel, 2014). High densities of snow leopard have also been recorded in a markhor (*Capra falconeri*) conservancy (Rosen, 2014). In the United States of America, the threatened grizzly bear (*Ursus arctos*) population in the Yellowstone National Park region has benefited from the retirement of areas of land from livestock grazing and thus reduced bear–livestock conflicts, paid for partly by revenues from trophy hunting for bighorn sheep (*Ovis canadensis*) (K. Hurley, personal communication, 25 February 2016).

Concern is frequently expressed that trophy hunting is driving declines of iconic African large mammals such as the elephant, rhino and lion (*Panthera leo*). Although there is evidence in a small number of cases – particularly concerning the lion – that unsustainable trophy hunting has contributed to declines (e.g. Loveridge *et al.*, 2007; Packer *et al.*, 2011), it is not considered a primary threat to any of these species and is typically a negligible or minor threat to African wildlife populations (Lindsey, 2015). The primary causes of current and past population declines

wildlife (case studies 1 and 5). Revenues from trophy-hunting operations in Mongolia, Pakistan and Tajikistan are used to pay local guards to stop poaching and to improve habitat for game animals (case studies 2 and 6). Trophy-hunting operators and the patrols they directly organize, finance and deploy can reduce poaching (Lindsey, Roulet and Romañach, 2007).

- **Increase tolerance of wildlife and thereby reduce illegal**

wildlife killings and human–wildlife conflicts. Retaliatory killings and local poaching are common when wildlife imposes serious costs on local people – such as the loss of crops and livestock and human injury or death – and there are no legal means for people to benefit from it. This is a particularly important factor in Africa, where elephants and other species destroy crops and where large cats kill humans and livestock.

of the large mammals subject to trophy hunting – such as the African elephant, African buffalo, white rhino, black rhino, zebra (*Equus zebra* and *E. quagga*), argali, ibex, bighorn sheep and various deer and bear species – are habitat loss and degradation, competition with livestock, illegal or uncontrolled poaching for meat and trade in animal products (e.g. ivory and horn), and retribution killings in human–wildlife conflicts (Schipper *et al.*, 2008; Ripple *et al.*, 2015). For lions, the most important causes of population declines are indiscriminate killing in defence of human life and livestock, habitat loss, and prey-base depletion (usually from poaching) (Bauer *et al.*, 2015). For many of these species, as noted in the case studies, well-managed trophy hunting can promote population recovery and protection and help in maintaining habitats.

TROPHY HUNTING AND INDIGENOUS AND LOCAL COMMUNITY RIGHTS AND LIVELIHOODS

The contributions of trophy hunting to the livelihoods of indigenous peoples and local communities vary enormously by context

Lions: trophy hunting is not considered a primary threat to their conservation and can generate benefits

and region. In many cases, trophy hunting takes place without meaningful community participation in decision-making around wildlife management, without adequate respect for community rights and consent, and with insufficient or poorly functioning benefit-sharing mechanisms, with most value captured by hunting operators or government agencies. In a significant number of trophy-hunting programmes, however, it is clear that indigenous peoples and local communities have freely chosen to use trophy hunting as a way of generating incentives and revenues for conserving and managing their wildlife and improving their livelihoods (case studies 2, 3, 5 and 6). In many other cases, communities have less decision-making power over trophy hunting but nevertheless gain a share of hunting revenues (see Lindsey *et al.*, 2013). Communities can benefit from trophy hunting through hunting-concession payments or other hunter investments, which typically provide improved community services such as water infrastructure; schools and health clinics; jobs as guides, game guards, wildlife managers and other hunting-related employment; and greater access to game meat. Typically, indigenous and local communities in and around hunting areas are very poor, with few sources of income and sometimes no other legal source of meat.

TROPHY HUNTING IN ACTION: CASE STUDIES OF POSITIVE IMPACTS

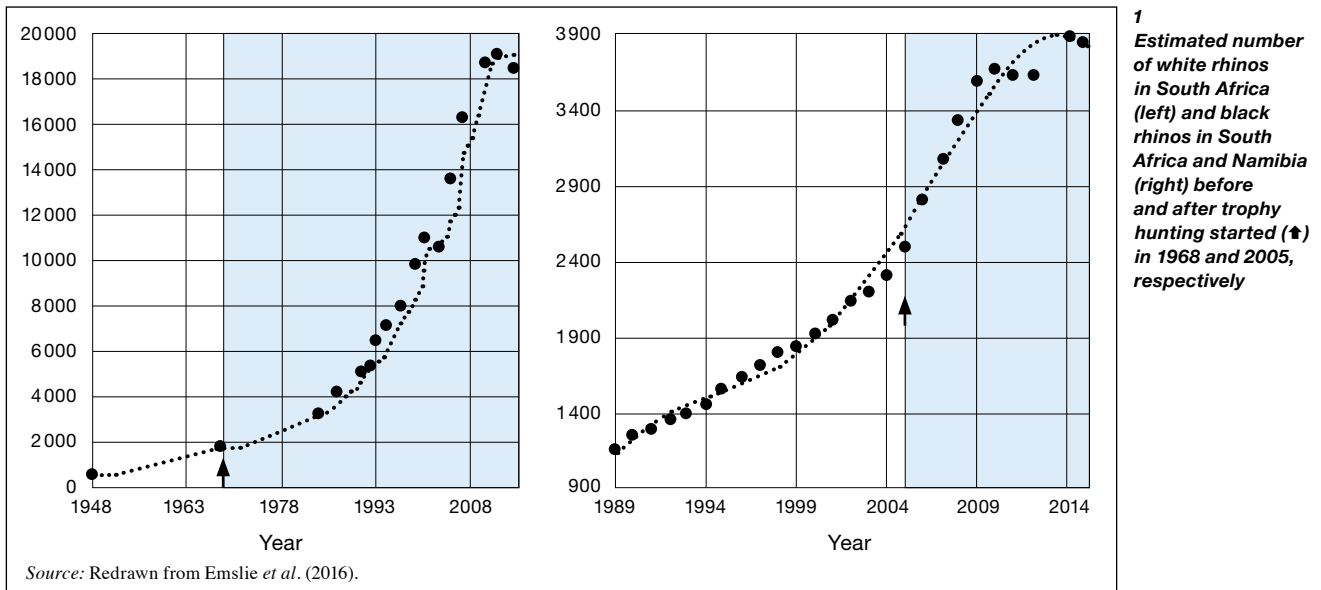
In the intense ongoing debate over trophy hunting, broad statements are often made suggesting that all trophy hunting threatens conservation or is driving declines in species. For this reason, and because many of these examples are not widely known, we set out here a number of case studies where trophy hunting is generating positive benefits for conservation and community rights and livelihoods. Although examples of poor approaches to trophy hunting also exist and deserve similar scrutiny, these typically involve illegal or non-transparent behaviour, making verifiable information difficult to obtain.

Case study 1. Rhinos in Namibia and South Africa

The history of rhino hunting in Namibia and South Africa demonstrates clearly its sustainability in terms of population numbers. Since trophy-hunting programmes were introduced for white rhino in South Africa, numbers have increased from around 1 800 individuals in 1968 to just over 18 400 today (Emslie *et al.*, 2016; Figure 1), with many more individuals also reintroduced to other countries in the species' natural range. Since the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)



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1
Estimated number of white rhinos in South Africa (left) and black rhinos in South Africa and Namibia (right) before and after trophy hunting started (↑) in 1968 and 2005, respectively

approved limited hunting quotas for black rhino in late 2004, the number of individuals in Namibia and South Africa has increased by 67 percent, from about 2 300 in 2004 to about 3 900 today (Figure 1). As of the end of 2015, Namibia and South Africa hosted 90 percent of Africa's total black and white rhino population.

Hunting has played an integral role in the recovery of the white rhino by providing incentives for private and communal landowners to maintain the species on their lands; generating income for conservation and protection; and helping manage and promote the recovery of populations.

In South Africa, the limited trophy hunting of rhinos, combined with live sales and tourism, has provided an economic incentive to encourage more than 300 private landowners to build their collective herd to about 6 140 white rhinos and 630 black rhinos on 49 private or communal landholdings, representing around 1.7 million hectares of conservation land – equivalent to almost another Kruger National Park (Balfour, Knight and Jones, 2016; Emslie *et al.*, 2016). The contribution of trophy hunting to increasing the range and numbers of these iconic species, therefore, is significant (and increasing).

Many private reserves rely heavily on trophy hunting and the sale of white rhinos

(to other reserves) to cover operating costs. For example, one self-funded South African reserve manages an increasing population of 195 white rhinos and many other species.² An analysis of eight years of data showed that only about 18 percent of that reserve's total operating costs was generated from tourism, with trophy hunting generating the bulk (63 percent) of income needed to fund operations. The reserve allocates all the proceeds from rhino hunting to rhino protection and conservation management. The reserve manager has noted that a recent ban on lion-trophy imports by the United States of America has already caused the cancellation of some hunts, with a negative impact on income for conservation (M. Knight, R. Emslie and K. Adcock, personal communication, 18 March 2016).

Increasing security costs and risks due to escalating poaching and declining economic incentives have resulted in a worrying trend, in which some private landowners and managers are no longer keeping rhinos; if this trend continues, it could threaten the expansion of the species' ranges and numbers. Import

² The identity of this reserve is known to the IUCN SSC African Rhino Specialist Group (a highly credible and trusted authority), but we do not reveal it here for rhino security reasons.

restrictions that threaten the viability of hunting would likely further reduce incentives and exacerbate the trend.

Hunting may also directly contribute to population growth by removing males that might (for example) kill or compete with calves and females. The hunting of small numbers of specific individual "surplus" male black rhinos is approved in South Africa only if criteria set out in the country's black rhino biodiversity management plan are met to ensure that hunting furthers demographic and genetic conservation. Generating revenue for conservation is a bonus rather than the main driver of this hunting.

In recent years, "pseudo hunters" have used legal trophy hunting to access rhino horn for illegal sale in Southeast Asia, driving a spike in the number of individuals hunted to a high of 173 in 2011. The introduction of control measures in South Africa in 2012, however, has brought the number of white rhinos hunted back down to previous levels (Emslie *et al.*, 2016).

Case study 2. Argali in Mongolia

Trophy hunting became legal in Mongolia in 1967, with argali, particularly the Altai argali (*Ovis ammon ammon*), the country's most highly valued trophy animal. An inadequate management framework,

however, led to largely unmanaged, open-access hunting. Argali populations declined significantly, possibly with additional pressure arising from competition with a rapidly growing domestic goat population (Page, 2015; Wingard and Zahler, 2006).

WWF Mongolia initiated a community-based wildlife management project in the Uvs administrative region in northwest Mongolia in 2007. The objective was to replace uncontrolled open-access use with community wildlife management by seven local groups, with revenues to be generated by trophy hunting, mainly of the Altai argali. The 12.7 million-hectare Gulzat Local Protected Area was established and an initial ban on hunting was put in place to enable population restoration. With protection from local herders, the population grew from about 200 in the years immediately preceding the ban to more than 1 500 in 2014 (Figure 2). This growth continued as managed hunting was initiated. Twelve Altai argali were harvested in the four years following the lifting of the ban, generating around US\$123 400 in income at the local level (C. Buyanaa, personal communication, 2 March 2016).

Hunting is managed by the Gulzat Initiative, a non-governmental organization formed entirely of local community members, with guidance from experts in wildlife management, including certain hunting companies. Trilateral contracts between hunting companies, the Gulzat Initiative and the district governor enhance transparency and accountability (C. Buyanaa, personal communication, 28 January 2016).

Recent legal developments in Mongolia have established a sound basis for community-based wildlife management, informed by experiences from communal conservancies in Namibia (see case study 5).

Case study 3. Bighorn sheep in North America

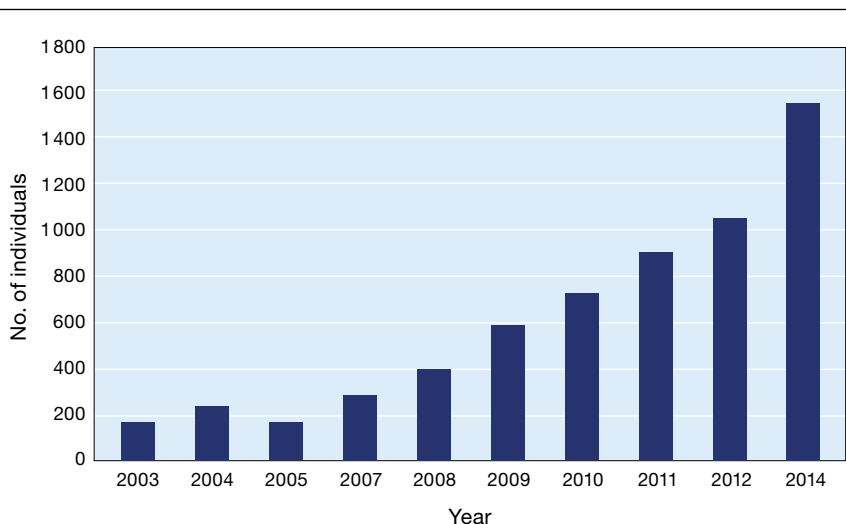
Euro-American settlement and the corresponding surge in livestock numbers and uncontrolled hunting led to a rapid decline in bighorn sheep in North America, from roughly 1 million individuals in 1800 to fewer than 25 000 in 1950. Since then, based primarily on more than US\$100 million contributed by trophy-hunting groups through fees and donations, hundreds of thousands of hectares have been set aside for bighorn sheep and other wildlife, and the bighorn population has more than

tripled from its historic low to roughly 80 000 today (Hurley, Brewer and Thornton, 2015).

Restoration of the bighorn sheep population in Canada and the United States of America was brought about largely by hunters working with provincial and state wildlife agencies to support research, habitat acquisition and management. In the American state of Wyoming, for example, auctions of bighorn sheep hunting tags yield approximately US\$350 000 annually, of which 70 percent goes to conserving bighorn sheep and 10 percent goes to the conservation of other wildlife. These funds were used to cover approximately one-third of the more than US\$2 million paid to producers of domestic sheep to voluntarily remove sheep from 187 590 hectares of public grazing lands (with the other two-thirds of the cost met from fees paid by other hunting, fishing and wildlife groups; K. Hurley, personal communication, 23 February 2016).

Indigenous-managed trophy hunting has also driven recoveries of bighorn sheep in Mexico. In 1975, 20 individuals were reintroduced to Tiburon Island in the Sea of Cortez, an island owned and managed by Seri Indians. The original cause of the extinction of the species on the island is unknown, but the population grew quickly after reintroduction to around 500, probably the island's carrying capacity. In 1995, a coalition of institutions initiated a programme to fund bighorn sheep research and conservation while providing needed income for the Seri through the international auctioning of exclusive hunting permits on the island.

Initially, permits often garnered 6-figure bids (in US dollars). From 1998 to 2007, the Seri Indians earned US\$3.2 million from bighorn sheep hunting permits and the sale of young animals for translocation – funds that were reinvested in Seri



Note: Population figures are the numbers of animals observed in annual transect and point surveys, with a low likelihood of animals being counted more than once; figures therefore represent minimum estimates.

Source: Chimeddorj Buyanaa, WWF Mongolia, unpublished data.

2

Population counts for Altai argali in the Gulzat Local Protected Area, Mongolia



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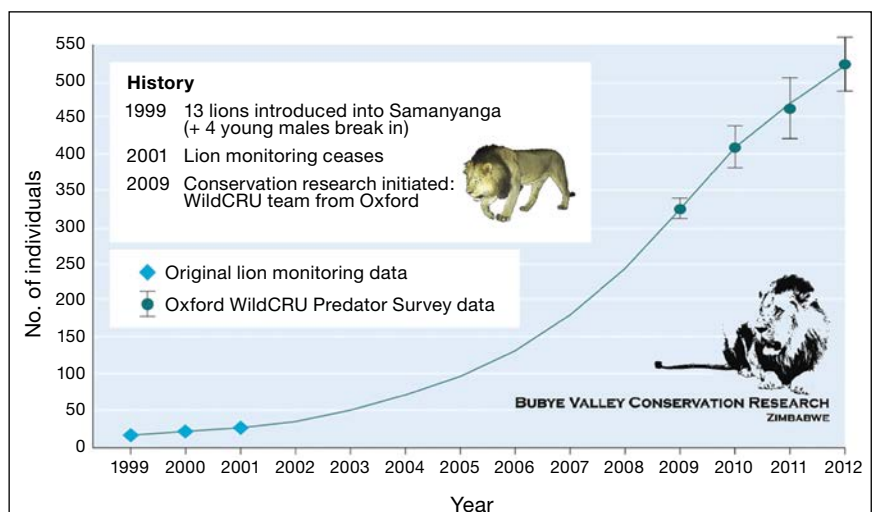
A bighorn sheep, New Mexico, United States of America

community projects, the management of the bighorn sheep population, and the maintenance of the island in an undisturbed state. The funding of the island's conservation through trophy hunting continues, with the Seri recently selling permits for US\$80 000–90 000 each. The island has also been an important source population for the re-establishment of bighorn sheep populations in the Sonoran Desert and elsewhere on the mainland. Many ranchers in the Sonoran Desert have greatly reduced or eliminated livestock to focus on wildlife because of the substantial revenues that can be generated from trophy hunting for bighorn sheep and mule deer (*Odocoileus hemionus*) (Valdez *et al.*, 2006; Wilder *et al.*, 2014; Hurley, Brewer and Thornton, 2015).

Case study 4. Private wildlife lands in Zimbabwe

In Zimbabwe, the devolution of wildlife use rights to landholders in 1975 resulted in a transition in the wildlife sector from

game ranching as the hobby of a few dozen ranchers to, by 2000, some 1 000 landowners conserving 2.7 million hectares of wildlife land, with trophy hunting a primary driver of this change (Child, 2009;



3
The lion population in the privately owned Buby Valley Conservancy, Zimbabwe, 1999–2012

Note: The privately owned Buby Valley Conservancy is on land previously used for farming and depends on trophy hunting to fund wildlife conservation. Samanyanga is an area in the east of the conservancy on the banks of the Buby River.

Lindsey, Romañach and Davies-Mostert, 2009). The number of landholders involved and the area of wildlife land conserved have since declined significantly under the land reform programme; nevertheless, despite the challenging economic conditions in the country today, private conservancies continue to play a crucial role in conservation. The two conservancies described below both rely on trophy hunting as the primary source of revenue and would be unviable without it. Both have made efforts to attract nature-based tourism that does not include hunting (often referred to as photographic tourism), but this does not contribute significant revenue (Zimbabwe's political instability has had far more impact on photographic tourism than on hunting tourism).

The Savé Valley Conservancy (SVC), covering 344 000 hectares, was created in the 1990s by livestock ranchers who agreed that wildlife management could be a better use of the land than livestock. Cattle-ranching operations had eliminated all elephants, rhinos, buffaloes and lions (among other species) in the area. Today,

SVC has around 1 500 African elephants, 121 black and 42 white rhinos, 280 lions and several packs of African wild dog. Hunting on the Sango Ranch, SVC's largest property, yields around US\$600 000 annually and employs 120 permanent workers, who represent more than 1 000 family members (Lindsey *et al.*, 2008; W. Pabst and D. Goosen, personal communication, 9 February 2016; Sango Wildlife, undated).

The 323 000-hectare Buby Valley Conservancy (BVC), also a converted cattle ranch, now has roughly 500 lions (Figure 3), 700 African elephants, 5 000 African buffaloes, 82 white rhinos and, at 211, the third-largest black rhino population in Africa. Trophy fees in 2015 generated US\$1.38 million. BVC employs about 400 people and invests US\$200 000 annually in community development projects (BVC, undated; B. Leatham, personal communication, 17 January 2016).

Note that the revenues generated by trophy hunting protect and benefit many non-hunted species in these ranches, such as the black rhino, white rhino and African wild dog.

Case study 5. Communal conservancies in Namibia

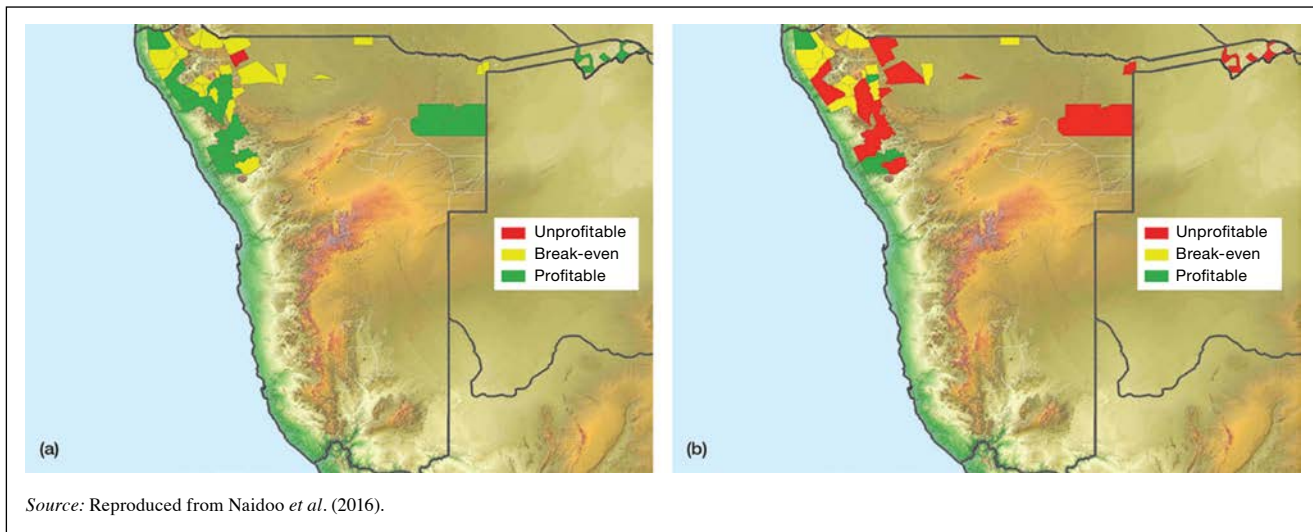
In the early 1990s, many residents of Namibian communal lands viewed wildlife species as detrimental to their livelihoods because they destroyed crops and water installations and killed or injured livestock and people. In 2015, 82 communal conservancies managed 1.6 million hectares for conservation, lands that are also home to around 190 000 people, including indigenous and tribal communities (NACSO, 2015).

Trophy hunting has underpinned Namibia's success in community-based natural resource management. Recent analysis indicates that if revenues from trophy hunting were lost, most conservancies would be unable to cover their operating costs; they would become unviable, and wildlife populations and local benefits would both decline dramatically (Naidoo *et al.*, 2016; Figure 4).

Overall, conservancies generate around half their benefits (e.g. cash income for individuals or communities; meat; and social benefits like schools and health clinics) from photographic tourism and half from hunting. Much of the revenue is reinvested into the management and protection of wildlife. Around half the conservancies gain their benefits solely from hunting, with most of the rest deriving parts of their incomes from hunting alongside tourism. Only 12 percent of conservancies specialize in tourism (Naidoo *et al.*, 2016). Revenues from trophy hunting for 29 wildlife species in conservancies totalled NAD36.4 million (about US\$2.7 million) in 2015 (NACSO, 2015). Communities directly receive payments of about US\$20 000 for each elephant hunted, plus about 3 000 kg of meat (Chris Weaver, personal communication, 18 January 2016).



White rhino: under threat from poaching, but trophy hunting can be beneficial for conservation. This rhino is in the Thanda Private Game Reserve, South Africa



Wildlife populations have shown dramatic increases in Namibia since the beginning of the communal conservancy programme. On communal lands in the northeast, the population of the sable antelope (*Hippotragus niger*) increased from 724 in 1994 to 1 474 in 2011, and the impala (*Aepyceros melampus*) population grew from 439 to 9 374 over the same period. In the conservancy region in the northwest, the population of the threatened Hartmann's mountain zebra (*Equus zebra hartmannae*) increased from fewer than 1 000 individuals in the early 1980s to an estimated 27 000 in 2011, and the number of black rhinos more than tripled, making it the largest free-roaming population in Africa (conservancies are unfenced). The growth of communal conservancies and protection offered by national parks has led to an increase in the population of elephants from around 7 500 in 1995 to more than 20 000 today. The Kunene Conservancy's lion population grew from roughly 25 in 1995 to 150 today, and Namibia now has a large free-roaming lion population outside national parks (NACSO, 2015; C. Weaver, personal communication, 18 January 2016).

Case study 6. Markhor and urial in Pakistan

In Pakistan in the mid-1980s, local Pathan tribal leaders were concerned

that uncontrolled illegal hunting for food had greatly reduced populations of both the Suleiman (straight-horned) markhor (*Capra falconeri megaceros*) (<100 individuals) and the Afghan urial (*Ovis orientalis*) (around 200 individuals). After unsuccessfully petitioning the government to protect these two species, the Pathan leaders developed the Torghar Conservation Project based on a simple concept: that community members would give up hunting in exchange for being hired as game guards to prevent poaching, and the project would be financed by revenues derived from a limited trophy hunt of markhor and urial by foreign hunters. The project covers about 100 000 hectares inhabited by 4 000 people. Between 1986 and 2012, hunting of the two species generated US\$486 400 for the provincial government and US\$2.71 million for the local community, the latter covering the salaries of more than 80 game guards, funding various community projects, including schools and healthcare facilities, and supporting actions to reduce grazing competition with livestock. Illegal hunting declined dramatically: by 2012, the markhor population had grown to an estimated 3 500 individuals, while a 2005 survey of urial estimated the population at 2 541 (Woodford, Frisina and Awun, 2004; Frisina and Tareen, 2009; Mallon, 2013).

4
Revenue generated by trophy hunting underpins the success of the Namibian communal conservancy programme. The maps illustrate the economic viability of community conservancies in Namibia under (a) the status quo; and (b) a simulated trophy-hunting ban

Similar examples exist elsewhere in Pakistan and in Tajikistan (and see also the article on page 17 of this edition). Such developments have contributed to a recent improvement in the conservation status of markhor in the IUCN Red List, where it is no longer listed as Threatened. Outside protected areas, stable and increasing populations are found only in areas where there is sustainable hunting (Michel and Rosen Michel, 2015).

HOW WOULD TROPHY HUNTING BANS AFFECT CONSERVATION AND INDIGENOUS AND LOCAL COMMUNITIES?

Outright bans on trophy hunting, as well as import or transport restrictions on high-value species, especially in the European Union and the United States of America, could end trophy hunting by making programmes economically unviable (see Figure 4). The case studies presented here make it clear that, in the absence of effective and sustainable

**Photo tourism:
rarely a full
substitute for trophy
hunting in Africa**



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alternatives, removing the incentives and revenue provided by trophy hunting would likely cause serious population declines for a number of threatened or iconic species, potentially stopping and reversing the recovery of (for example) some populations of African elephant, black and white rhino, Hartmann's mountain zebra and lion in Africa, markhor, argali and urial in Asia, and bighorn sheep in North America. Populations of threatened species not subject to trophy hunting – such as the snow leopard and African wild dog – could also be negatively affected.

For some indigenous and local communities, making trophy hunting illegal or unviable would mean the loss of cash income from hunting concessions on their

land, less access to meat, and lost employment options. The indigenous Khwe San and Mbukushu (around 5 000 people) in Bwatwata National Park, who are among Namibia's poorest people, have earned around NAD2.4 million (US\$155 000) per year from trophy hunting in recent years (R. Diggle, personal communication, 18 March 2016); stopping trophy hunting would be an enormous setback for them because of both a loss of income and reduced access to meat (and living in a national park means they cannot graze livestock or grow commercial crops). If trophy hunting became unviable, thousands of rural Zimbabwean households that directly benefit from CAMPFIRE³ would collectively lose about US\$1.7 million per

year (already reduced from US\$2.2 million by import bans on elephant trophies in the United States of America) (C. Jonga, personal communication, 27 August 2015). These are substantial amounts of money in countries where the average income of rural residents is a few dollars or less per day. Even more fundamentally, perhaps, unilateral trophy restrictions by importing countries would reduce the power of already-marginalized rural communities to make decisions on the management of

³ The CAMPFIRE [Communal Areas Management Programme For Indigenous Resources] is Zimbabwe's community-based natural resource management programme, one of the first such programmes globally (Mutandwa and Gadzirayi, 2007).

their lands and wildlife in ways that respect their right to self-determination and that best meet their livelihood aspirations.

CAN ALTERNATIVE LAND USES REPLACE TROPHY HUNTING?

Trophy hunting is not the only means of increasing the economic value of wildlife and generating local benefits. It is often assumed that photographic tourism could replace trophy hunting: this is certainly a valuable option in many places and has generated enormous benefits for conservation and local people, but it is viable in only a small proportion of the wildlife areas now managed for trophy hunting. In contrast to trophy hunting, photographic tourism requires political stability, proximity to good transport links, minimal disease risks, high-density wildlife populations to guarantee viewing, scenic landscapes, high capital investment, infrastructure (hotels, food and water supplies, and waste management), and local skills and capacity. Photographic tourism and trophy hunting are frequently highly complementary land uses when separated by time or space. Where photographic tourism is feasible in areas also used for trophy hunting, it is typically already being pursued (e.g. case studies 4 and 5). Like trophy hunting, photographic tourism – if not carefully implemented – can have serious environmental impacts and return few benefits to local communities, with most value captured offshore or by in-country elites (Sandbrook and Adams, 2012).

To be effective, alternatives to trophy hunting need to provide tangible and effective conservation incentives. They need to make wildlife valuable to people over the long term, and they should empower local communities to exercise rights and responsibilities over wildlife conservation and management. Various forms of payment schemes for ecosystem services (PES schemes) have considerable potential for mobilizing investments or voluntary contributions from governments, philanthropic sources and the private sector and motivating the conservation of species and

habitats. An example – albeit limited by the difficulty of obtaining stable funding – is the land-leasing scheme carried out by Cottar’s Safari Service with Maasai communities in Olderkesi, Kenya (IUCN SULi *et al.*, 2015). REDD+⁴ can provide incentives and revenue flows to local communities in some areas, although with many caveats. PES schemes are difficult options and risk donor dependency. A crucial challenge is ensuring that revenue flows are sustainable over the long term and not contingent on highly changeable donor priorities.

REFORMING TROPHY-HUNTING PRACTICES

Despite the positive examples outlined here, we are fully aware that, in many countries, trophy-hunting governance and management have many (typically undocumented) weaknesses and failures, and action by decision-makers to support effective reform should be strongly supported. Import restrictions are often attractive interventions for remote decision-makers because they are easy to implement and can be carried out at low cost to decision-making bodies, which do not bear formal accountability for the impacts of their decisions in affected countries. Conservation success, however, is rarely achieved by single decisions in distant capitals; rather, it typically requires long-term, sustained multistakeholder engagement – in-country and on the ground.

As an alternative to unilateral, blanket restrictions or bans that would curtail trophy-hunting programmes, decision-makers could consider whether specific trophy-hunting programmes meet requirements for best practice (IUCN SSC, 2012; Brainerd, 2007). Where there are governance and management problems, it would be most effective to engage with relevant

countries in addressing, for example, transparency in funding flows, community benefits, the allocation of concessions and quota setting; the rights and responsibilities of indigenous peoples and local communities; and the monitoring of populations and hunts. Hunting stakeholders – importing countries, donors, national regulators and managers, community organizations, researchers, conservation organizations, and the hunting industry and hunter associations – have important roles to play in improving standards.

In certain cases, conditional, time-limited and targeted moratoria aimed at addressing identified problems could help improve trophy-hunting practices. Bans, however, are unlikely to improve conservation outcomes unless there is a clear expectation that improved standards will lead to the lifting of such bans and the country has the capacity and political will to address the problem. It is crucial, at least in developing countries, therefore, that moratoria are accompanied by funding and technical support for on-the-ground management improvements and by a plan to review the status of the initial problem after a specified period.

CONCLUSION

Trophy hunting is increasingly under intense scrutiny and facing high-profile and often-effective campaigns calling for broad-scale bans. There are valid concerns about the legality, sustainability and ethics of some hunting practices, but calls for bans or import restrictions risk “throwing the baby out with the bathwater”, undermining programmes that are having substantive and important positive effects on species recovery and protection, habitat retention and management, and community rights and livelihoods.

In some contexts, there may be valid and feasible alternatives to trophy hunting that can deliver the above-mentioned benefits, but identifying, funding and implementing these requires genuine consultation and engagement with affected governments, the private sector and communities. Such

⁴ REDD+ is the term given to the efforts of countries to reduce emissions from deforestation and forest degradation and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks (www.forestcarbonpartnership.org/what-redd).

alternatives should not be subject to the vagaries of donor funding and, crucially, they must deliver equal or greater incentives for conservation over the long term. If they do not, they could hasten rather than reverse the decline of iconic wildlife, remove the economic incentives for the retention of vast areas of wildlife habitat, and alienate and undermine already-marginalized communities who live with wildlife and who will largely determine its future. ♦



References

- Balfour, D., Knight, M. & Jones, P.** 2016. *Status of white rhino on private and communal land in South Africa 2012–2014*. Pretoria, Department of Environmental Affairs.
- Bauer, H., Packer, C., Funston, P.F., Henschel, P. & Nowell, K.** 2015. *Panthera leo*. The IUCN Red List of Threatened Species 2015: e.T15951A79929984 (DOI <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T15951A79929984.en>).
- Booth, V.R.** 2009. *A comparison of the prices of hunting tourism in southern and eastern Africa*. Budapest, International Council for Game and Wildlife Conservation.
- Booth, V.R. & Chardonnet, P., eds.** 2015. *Guidelines for improving the administration of sustainable hunting in sub-Saharan Africa*. Harare, FAO Subregional Office for Southern Africa.
- Brainerd, S.** 2007. *European charter on hunting and biodiversity*. Adopted by the Standing Committee of the Bern Convention at its 27th meeting in Strasbourg, 26–29 November 2007 (available at http://fp7hunt.net/Portals/HUNT/Hunting_Charter.pdf).
- BVC.** Undated. Buby Valley Conservancy (BVC). Website (available at <http://bubyvalleyconservancy.com>).
- Child, B.** 2009. Game ranching in Zimbabwe. In H. Suich, B. Child & A. Spenceley, eds. *Evolution and innovation in wildlife conservation*, pp. 127–145. London, Earthscan.
- Emslie, R.E., Milliken, T., Talukdar, B., Ellis, S., Adcock, K. & Knight, M.H., compilers.** 2016. *African and Asian rhinoceroses: status, conservation and trade*. A report from the IUCN Species Survival Commission (IUCN SSC) African and Asian Rhino specialist groups and TRAFFIC to the CITES Secretariat pursuant to Resolution Conf. 9.14 (Rev. CoP15). CITES CoP Doc. 68 Annex 5.
- Frisina, M.R. & Tareen, N.** 2009. Exploitation prevents extinction: case study of endangered Himalayan sheep and goats. In B. Dickson, J. Hutton & W.M. Adams, eds. *Recreational hunting, conservation, and rural livelihoods: science and practice*, pp. 141–154. UK, Blackwell Publishing.
- Heffelfinger, J.R., Geist, V. & Wishart, W.** 2013. The role of hunting in North American wildlife conservation. *International Journal of Environmental Studies*, 70: 399–413.
- Hurley, K., Brewer, C. & Thornton, G.N.** 2015. The role of hunters in conservation, restoration, and management of North American wild sheep. *International Journal of Environmental Studies*, 72: 784–796.
- IUCN.** 2017. Protected areas categories. Website (available at www.iucn.org/theme/protected-areas/about/protected-areas-categories). Accessed 13 January 2017. International Union for Conservation of Nature (IUCN).
- IUCN SSC.** 2012. *Guiding principles on trophy hunting as a tool for creating conservation incentives*. V1.0. Gland, Switzerland, International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) (available at https://cmsdata.iucn.org/downloads/iucn_ssc_guiding_principles_on_trophy_hunting_ver1_09aug2012.pdf).
- IUCN SULi, International Institute for Environment and Development, Center for Environment and Energy Development, Austrian Ministry of Environment & TRAFFIC.** 2015. *Symposium report: “Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime”*, 26–28 February 2015, Glenburn Lodge, Muldersdrift, South Africa. International Union for Conservation of Nature (IUCN) Sustainable Use and Livelihoods Specialist Group (SULi) (available at <http://pubs.iied.org/G03903.html>).
- Kachel, S.M.** 2014. *Evaluating the efficacy of wild ungulate trophy hunting as a tool for snow leopard conservation in the Pamir Mountains of Tajikistan*. Thesis submitted to the Faculty of the University of Delaware in partial fulfilment of the requirements for the degree of Master of Science in Wildlife Ecology.
- Lindsey, P.A.** 2015. *Bushmeat, wildlife-based economies, food security and conservation: insights into the ecological and social impacts of the bushmeat trade in African savannahs*. Harare, FAO, Panthera, Zoological Society of London & IUCN SULi.
- Lindsey, P.A., Balme, G.A., Funston, P., Henschel, P., Hunter, L., Madzikanda, H., Midlane, N. & Nyirenda, V.** 2013. The trophy hunting of African lions: scale, current management practices and factors undermining sustainability. *PLoS ONE*, 8(9): e73808 (DOI 10.1371/journal.pone.0073808).
- Lindsey, P.A., du Toit, R., Pole, A. & Romañach, S.** 2008. Savé Valley Conservancy: a large scale African experiment in cooperative wildlife management. In H. Suich, B. Child & A. Spenceley, eds. *Evolution and innovation in wildlife conservation in southern Africa*, pp. 163–184. London, Earthscan.
- Lindsey, P.A., Romañach, S. & Davies-Mostert, H.** 2009. The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa. *Journal of Zoology*, 277(2): 99–105.
- Lindsey, P.A., Roulet, P.A. & Romañach, S.S.** 2007. Economic and conservation significance of the trophy hunting industry in sub-Saharan Africa. *Biological Conservation*, 134: 455–469.
- Loveridge, A.J., Searle, A.W., Murindagomo, F. & Macdonald, D.W.** 2007. The impact of sport-hunting on the population dynamics of an African lion

- population in a protected area. *Biological Conservation*, 134: 548–558.
- Mace, G., Masundire, H., Baillie, J., Ricketts, T., Brooks, T., et al.** 2005. Biodiversity. In R. Hassan, R. Scholes & N. Ash, eds. *Ecosystems and human well-being: current state and trends: findings of the condition and trends working group*, pp. 77–122. Washington, DC, Island Press.
- Mahoney, S.P.** 2013. Monograph: conservation and hunting in North America. *International Journal of Environmental Studies*, 70(3): 347–460.
- Mallon, D.** 2013. *Trophy hunting of CITES-listed species in Central Asia*. TRAFFIC report to the CITES Secretariat.
- Michel, S. & Rosen Michel, T.** 2015. *Capra falconeri*. IUCN Red List of Threatened Species 2015: e.T3787A82028427 (DOI <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T3787A82028427.en>).
- Mutandwa, E. & Gadzirayi, C.T.** 2007. Impact of community-based approaches to wildlife management: case study of the CAMPFIRE programme in Zimbabwe. *International Journal of Sustainable Development & World Ecology*, 14: 336–334.
- NACSO.** 2015. *The state of community conservation in Namibia: a review of communal conservancies, community forests and other CBNRM initiatives (2014/15 annual report)*. Windhoek, National Association of CBNRM Support Organisations (NACSO).
- Naidoo, R., Weaver, L.C., Diggle, R.W., Matongo, G., Stuart-Hill, G. & Thouless, C.** 2016. Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Conservation Biology*, 30(3): 628–638 (DOI 10.1111/cobi.12643).
- Packer, C., Brink, C., Kissui, B.M., Maliti, H., Kushnir, H. & Caro, T.** 2011. Effects of trophy hunting on lion and leopard populations in Tanzania. *Conservation Biology*, 25: 142–153 (DOI 10.1111/j.1523-1739.2010.01576.x).
- Page, L.** 2015. *Killing to save: trophy hunting and conservation in Mongolia*. Independent Study Project (ISP) Collection. Paper 2086 (available at http://digitalcollections.sit.edu/isp_collection/2086).
- Ripple, W.J., Newsome, T.M., Wolf, C., Dirzo, R. & Everatt, K.T., et al.** 2015. Collapse of the world's largest herbivores. *Science Advances*, 1(4): e1400103 (DOI 10.1126/sciadv.1400103).
- Rosen, T.** 2014. Tajikistan brings endangered wild goat from the edge of extinction to the peak of hope. *Cat Watch*, June 11 (available at <http://voices.nationalgeographic.com/2014/06/11/tajikistan-brings-endangered-wild-goat-from-the-edge-of-extinction-to-the-peak-of-hope>).
- Saayman, M.P., van der Merwe, P. & Rossouw, R.** 2011. The economic impact of hunting in the Northern Cape Province. *South African Journal of Wildlife Research*, 41(1): 120–133.
- Sandbrook, C. & Adams, W.M.** 2012. Accessing the impenetrable: the nature and distribution of tourism benefits at a Ugandan national park. *Society and Natural Resources*, 25: 915–932 (DOI 10.1080/08941920.2011.644394).
- Sango Wildlife.** Undated. Research. Website (available at www.sango-wildlife.com). Accessed 17 January 2017.
- Schipper, J., Chanson J.S., Chiozza, F., Cox, N.A. & Hoffmann, M., et al.** 2008. Status of the world's land and marine mammals: diversity, threat, and knowledge. *Science*, 322: 225–230 (DOI 10.1126/science.1165115).
- Valdez, R., Guzmán-Aranda, J.C., Abarca, F.J., Tarango-Arámbula, L.A. & Clemente Sánchez, F.** 2006. Wildlife conservation and management in Mexico. *Wildlife Society Bulletin*, 34(2): 270–282.
- Wilder, B.T., Betancourt, J.L., Epps, C.W., Crowhurst, R.S., Mead, J.I. & Ezcurrea, E.** 2014. Local extinction and unintentional rewilding of bighorn sheep (*Ovis canadensis*) on a desert island. *PLoS ONE*, 9(3): e91358 (DOI 10.1371/journal.pone.0091358).
- Wingard, J.R. & Zahler, P.** 2006. *Silent steppe: the illegal wildlife trade crisis in Mongolia*. Mongolia Discussion Papers. East Asia and Pacific Environment and Social Development Department. Washington, DC, The World Bank.
- Woodford, M.H., Frisina, M.R. & Awun, G.A.** 2004. The Torghar conservation project: management of the livestock, Suleiman markhor (*Capra falconeri*) and Afghan urial (*Ovis orientalis*) in the Torghar Hills, Pakistan. *Game and Wildlife Science*, 21: 177–187. ♦

CITES and the international trade in wildlife

J. Stahl and T. De Meulenaer

The number of species listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora continues to grow, along with the role of the Convention in regulating wildlife trade.

Sustainable wildlife management and the trade in wildlife are closely linked.¹ Trade can be a strong incentive for managing wildlife sustainably, but it can also be a threat to wildlife if it is insufficiently regulated or controlled, poorly monitored or managed, or conducted at unsustainable levels.

A significant amount of the wildlife trade occurs within national borders, but an important volume is traded internationally

and regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Such trade, if legal, sustainable and traceable, can support wildlife conservation and contribute to sustainable development by generating income to support wildlife management and the livelihoods of rural people. This article reviews the role of CITES in regulating the international wildlife trade and encouraging sustainable wildlife management.

¹ In line with the focus of the Collaborative Partnership on Sustainable Wildlife Management, this article mainly addresses terrestrial and semi-terrestrial vertebrates as a subset of wildlife.

An illegal shipment of turtles seized by customs officials in Bangkok in 2013



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VARIETY, VOLUMES AND VALUES OF INTERNATIONAL TRADE IN WILDLIFE

Wildlife is traded in many forms and for multiple purposes, ranging from live animals (for zoos, collections, breeding and ranching, and as pets) to animal parts and products, including wild meat (often referred to as bushmeat in the case of meat from tropical and subtropical forest species), skins, leather, fats, blood, oils (for cosmetics), bones and shells, medicinal ingredients, hunting trophies and tourist curios.

The international trade in wildlife is considerable. CITES regulates international trade in more than 35 000 species of wild animals and plants, including 1 500 bird species, 2 200 invertebrates and 30 000 plant species.

Approximately 3 percent of the species regulated by CITES are considered to be threatened with extinction; these are mostly listed in Appendix I of CITES, and the international commercial trade in specimens of wild origin is generally prohibited. The vast majority (about 97 percent) of CITES-listed species, however, are in Appendix II, which contains species not necessarily threatened with extinction but which may become so unless international trade is strictly regulated. Appendix II also includes a large number of “look-alike” species, which are species whose specimens in trade look like those of species listed for conservation reasons. Commercial international trade in Appendix II-listed species is allowed, subject to strict regulations to ensure that such trade is legal, sustainable and traceable.

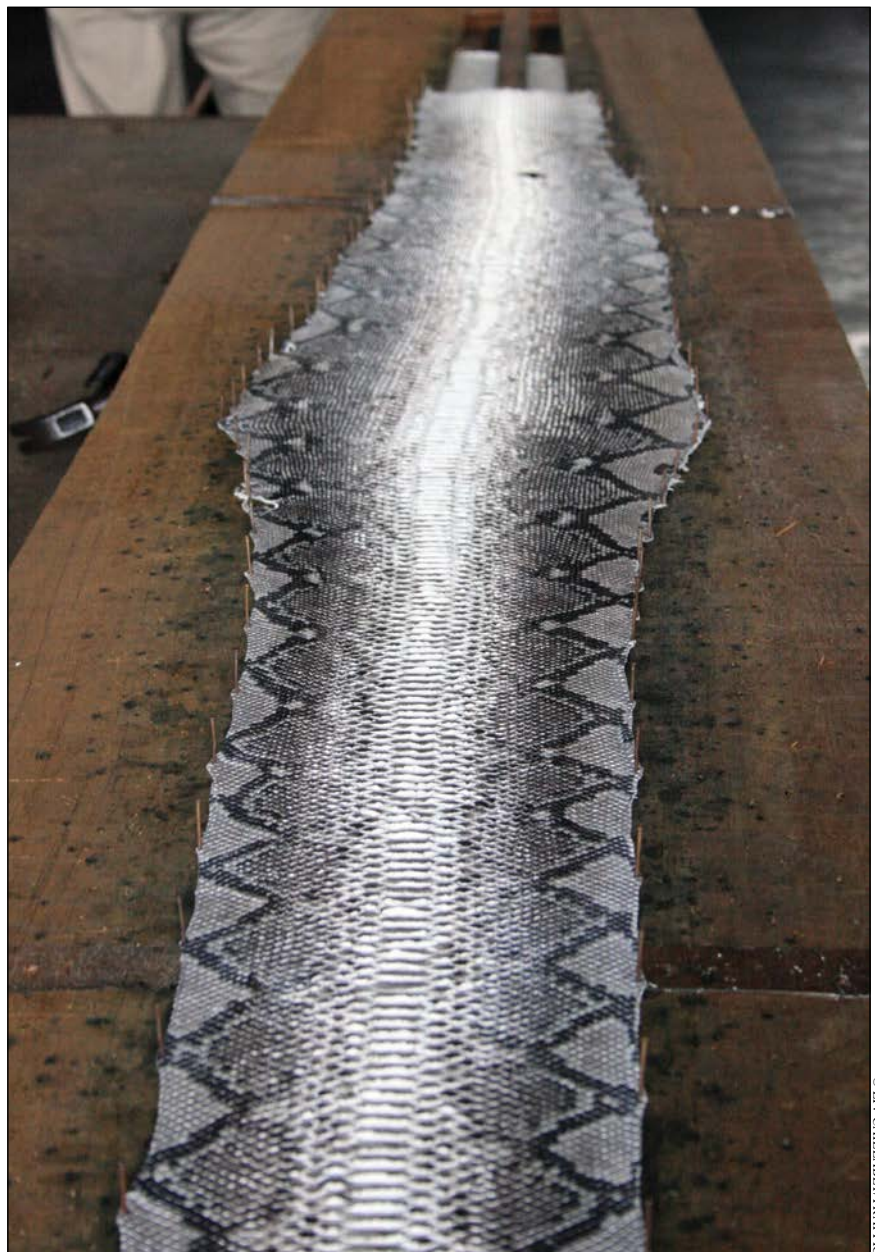
In addition to CITES-listed species, international trade is regulated for thousands of other species under various other instruments (e.g. bilateral, regional and international fisheries agreements, the Convention on Biological Diversity, and the International Tropical Timber Agreement), and the trade in many other

species is unregulated. In terms of both volume and value, timber and fishery products are two of the most highly traded forms of wildlife, but only a small proportion of the vast numbers of fish and timber species in international trade are listed in the CITES Appendices.

Between them, the 182 signatories to CITES register close to 1 million wildlife trade transactions per year. Typically, each such transaction encompasses more than

one individual animal or plant, or products or derivatives of varying volumes. Annual CITES-regulated trade involves more than 317 000 live birds, over 2 million live reptiles, 2.5 million crocodile skins, 1.5 million lizard skins, 2.1 million snake skins, 73 tonnes of caviar, 1.1 million coral pieces and nearly 20 000 hunting trophies, among many other items.²

² Based on data for 2005–2009 (TRAFFIC, 2016).



A tanned python skin, pinned for drying in Malaysia

© LIV CAILLARI/TRAFFIC

A handbag made from sustainably sourced crocodile and python skins



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The overall economic value or importance of the trade in wildlife is not well documented, although some information exists for certain sectors. CITES estimates, for example, that the trade in skins of three species of python from Southeast Asia is worth about US\$1 billion per year, and the estimated value of annual trade in bigleaf mahogany (*Swietenia macrophylla*), a timber species, is estimated at US\$33 million. TRAFFIC estimates that the value of legal wildlife products traded globally (including fisheries and timber) grew from around US\$160 billion per year in the early 1990s to US\$323 billion in 2009 (TRAFFIC, 2016). The value of legal wildlife imports into the European Union was estimated to be worth €93 billion in 2005 and nearly €100 billion in 2009 (Engler, 2008).

The price of a live animal or plant, or product thereof, at the point of import or (re-)export is only one aspect of its economic importance. Incremental value addition throughout the trade chain can add significant amounts to the final

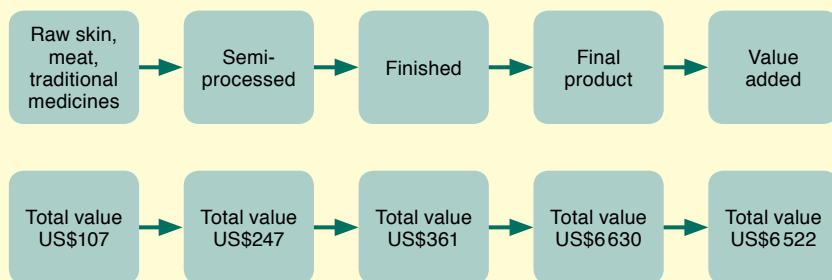
value of wildlife products, as shown in a recent study on the trade in python skins in Southeast Asia (Box 1). The use and subsequent trade of wildlife can also have substantial wider benefits: for example, the manufacturing of species-derived products and the production, processing and handling of wildlife for trade can contribute considerably to local livelihoods

and economies and generate incentives to conserve ecosystems and the services they provide. The average price of an African lion hunting trophy in Namibia, for example, was US\$22 940 in 2011, with daily hunting fees of US\$1 975 and hunting packages requiring a minimum stay of 20 days (Lindsay *et al.*, 2011).

In addition to the legal trade in wildlife, there is a substantial illegal trade. According to TRAFFIC, the enforcement authorities of the European Union made more than 7 000 seizures in 2003–2004 involving more than 3.5 million CITES-listed specimens, and more than 12 000 seizures between 2005 and 2009.³ Quantifying the value of illegal international trade in wildlife is difficult, although Haken (2011) estimated a value of US\$7.8–10 billion per year, excluding timber and fisheries.⁴ Table 1 provides an overview of estimated legal and illegal trade for selected taxonomic groups.

Box 1 Valuing species along the trade chain

A recent study of the trade in Southeast Asian python skins estimated the overall annual value of the sector at around US\$1 billion, of which 96 percent was captured by the European fashion industry (ITC, 2012). Although hunted snakes sold by collectors were reported to fetch just US\$30 per snake, a finished python-skin handbag could retail for up to US\$10 000. The figure below (derived from ITC, 2012) illustrates value addition along the supply chain for a single python, comprising income for leather products, meat and traditional medicines.



³ An ongoing global research initiative by the United Nations Office on Drugs and Crime is expected to produce more recent data in 2017.

⁴ In 2009, the value of the international illegal timber trade was estimated at US\$7 billion (Haken, 2011) and the value of the illegal or unreported fisheries catch was estimated at US\$10–23.5 billion (Agnew *et al.*, 2009).

TABLE 1. Overview of available information on species in trade and estimates of legal and illegal trade

	No. of species	Estimates of legal trade	Estimates of illegal trade
Mammals	~ 5 400 species (Wilson and Reeder, 2005) > 1 000 used for food and medicine alone (TRAFFIC, 2010) ~ 900 CITES-listed (UNEP-WCMC, 2015)	CITES trade: an estimated 21 000 “whole” wild-sourced mammals annually Overall, legal international trade, particularly in non-CITES species, appears to be unquantified	No global estimates, but estimates for poaching/illegal trade for some taxa and commodities exist: e.g. 1 215 white rhinos illegally killed in South Africa in 2014 (TRAFFIC, 2015); 17 000 African elephants illegally killed in 2011 at reporting MIKE sites across Africa (CITES document CoP16 DoC.53.1, Addendum); and an estimated 227 000 pangolins killed in Asia between 2000 and 2013 (Challender, Harrop and MacMillan, 2015)
Birds	~ 10 000 species (BirdLife International, 2013) ~ 4 500 used, for example as pets or for food or sport hunting (BirdLife International, 2008) ~ 3 300 traded (Butchart, 2008) ~ 1 500 CITES-listed (UNEP-WCMC, 2015)	CITES trade: an estimated 95 000 “whole” wild-sourced birds annually Several million birds each year in domestic and international trade, particularly finches, weavers, parrots and raptors (BirdLife International, 2015)	No global estimates, although regional estimates for some taxonomic groups exist; many reports of instances of illegal trade in live birds
Reptiles	~ 10 000 species (Pincheira-Donoso <i>et al.</i> , 2013; Uetz and Hošek, 2015) Thousands used and traded (e.g. an estimated 3 500 species/subspecies of reptiles and amphibians imported as pets into the European Union; Newman, 2014) ~ 800 CITES-listed (UNEP-WCMC, 2015)	CITES trade: an estimated 2 million “whole” wild-sourced reptiles annually Overall, legal international trade, particularly in non-CITES species, appears to be unquantified	No global estimates, but estimates for some species and commodities exist; many reports of instances of illegal trade in reptiles, both live and products
Amphibians	~ 7 400 species (Frost, 2014) > 200 used for food, > 260 used for pet trade and many used for medicinal purposes (Carpenter <i>et al.</i> , 2007) ~ 150 CITES-listed (UNEP-WCMC, 2015)	CITES trade: an estimated 15 000 “whole” wild-sourced amphibians annually For example, more than 20 million wild-caught live amphibians (CITES and non-CITES species) were legally imported into the United States of America in 2001–2009	No global estimates, but estimates for some taxa and commodities exist
Timber	~ 100 000 species of trees (BCGI, 2007) – not all produce exploitable timber > 1 600 traded commercially (Mark <i>et al.</i> , 2014) ~ 700 CITES-listed trees; five species and two genera were listed at the two most recent conferences of the parties to CITES (UNEP-WCMC, 2015)	137 million m³ of roundwood, 124 million m³ of sawnwood, 77 million m³ of wood-based panels, 223 million tonnes of pulp/paper products in 2013 (FAO, 2015)	8–10 percent of the value of global wood products (Seneca Creek Associates and Wood Resources International, 2004) In 2004, just under half of all tropical logs, sawn timber and plywood in trade was illegally sourced (Lawson and MacFaul, 2010)

Note: CITES trade statistics are based on exporter-reported figures for 2003–2012 obtained from the CITES Trade Database (CITES, 2016). Trade in “whole” animals or plants refers to terms that reasonably represent a whole animal or plant. Trade is also reported in many other commodities not included in these approximations.

Source: Adapted from UNEP (forthcoming).

CITES AS A REGULATORY FRAMEWORK

CITES is both a trade-related and a conservation convention, and it works alongside the World Trade Organization (WTO and CITES, 2015) and a number of multilateral environmental agreements, such as the Convention on Biological Diversity. CITES uses trade-related measures to achieve its

conservation objective, which is to ensure that wildlife – both animals and plants – is not exploited unsustainably through international trade. CITES has 182 Parties, and its rules on international trade in wildlife therefore carry substantial weight. The Convention is legally binding, and each Party must adopt national legislation to implement its provisions. When a state

decides to trade in a CITES-listed species, CITES specifies that the state must:

- make a legal acquisition finding (i.e. certification that the specimens to be traded were obtained in accordance with national laws);
- make a non-detriment finding (NDF) (i.e. a science-based biological sustainability finding that takes into

account the role of the species in its ecosystem); and

- formally authorize the transaction through the issuance of the appropriate CITES permit or certificate, and report the trade to the CITES Secretariat for compilation and analysis (CITES, 2015a).

CITES trade data show that, of the more than 35 000 species listed in the CITES Appendices, only about 5 percent are commonly traded; about 150 animal species and 1 800 plant species account for 90 percent of transactions under the Convention. Table 2 provides examples of the most commonly traded wild-sourced species for select taxonomic groups in the period 1996 to 2010.

CONSERVATION BENEFITS OF INTERNATIONAL TRADE IN WILDLIFE

CITES recognizes that “commercial trade may be beneficial to the conservation of species and ecosystems, and/or to the development of local people when carried out at levels that are not detrimental to the survival of the species in question”.⁵ Well-regulated trade in wild fauna and flora can be an incentive for wildlife conservation and sustainable management and can have a significant positive economic impact on local livelihoods, as illustrated by the following case studies involving CITES-listed species.

⁵ Resolution Conf. 8.3 (Rev. CoP13) on *Recognition of the benefits of trade in wildlife* at <http://cites.org/eng/res/08/08-03R13.php>

Vicuña

The vicuña (*Vicugna vicugna*), the smallest member of the camelid family, is believed to be the wild ancestor of the alpaca. Its wool, which is five times more expensive than cashmere, is exported worldwide (the price of a vicuña wool scarf starts at about US\$1 000). Vicuñas live in the high regions of the Andes in Argentina, the Plurinational State of Bolivia, Chile, Ecuador and Peru. CITES regulates the international trade in vicuña products, and the five range states adhere to the Convention for the Conservation and Management of the Vicuña (the “Vicuna Convention”), adopted in 1979.

Issue. Hunting reduced vicuña numbers to 6 000 individuals in the 1960s; by 1967, the situation was so serious that some range states declared the species extinct

TABLE 2. Highly traded wild-sourced species for select taxonomic groups, 1996–2010

Species	Wild		Captive-produced		Total	Item in trade
	Quantity	%	Quantity	%		
Mammals						
<i>Lycalopex griseus</i> (South American grey fox) ^{LC}	1 421 900	100	0	0	1 421 900	Skins
<i>Pecari tajacu</i> (collared peccary) ^{LC}	644 274	100	0	0	644 274	Skins
<i>Lontra canadensis</i> (North American otter) ^{LC}	602 975	100	1 270	<1	604 245	Skins
<i>Arctocephalus pusillus</i> (Afro-Australian fur seal) ^{LC}	543 644	100	0	0	543 644	Skins
<i>Lynx rufus</i> (Canadian lynx) ^{LC}	452 487	100	59	<1	452 546	Skins
<i>Ursus americanus</i> (American black bear) ^{LC}	154 922	100	18	0	154 940	Trophies
<i>Equus zebra hartmannae</i> (Hartmann’s mountain zebra) ^{VU}	18 098	98	354	2	18 452	Trophies
<i>Canis lupus</i> (grey wolf) ^{LC}	18 178	100	39	0	18 217	Trophies
<i>Ursus arctos</i> (brown bear) ^{LC}	14 752	100	18	0	14 770	Trophies
<i>Panthera leo</i> (lion) ^{VU}	7 741	66	3 977	34	11 718	Trophies
<i>Loxodonta africana</i> (African elephant) ^{VU}	10 508	100	1	0	10 509	Trophies
Birds						
<i>Poicephalus senegalus</i> (Senegal parrot) ^{LC}	353 617	96	13 503	4	367 120	Live
<i>Myiopsitta monachus</i> (monk parakeet) ^{LC}	333 125	95	17 636	5	350 761	Live
<i>Leiothrix lutea</i> (red-billed leiothrix) ^{LC}	152 552	98	2 524	2	155 076	Live
Reptiles						
<i>Varanus salvator</i> (common water monitor) ^{LC}	8 103 652	100	6 500	0	8 110 152	Skins
<i>Python reticulatus</i> (reticulated python)*	4 533 436	87	686 344	13	5 219 780	Skins
<i>Cuora amboinensis</i> (Malaysian box turtle) ^{VU}	523 663	97	14 128	3	537 791	Live
Timber						
<i>Pericopsis elata</i> (African teak) ^{EN}	316 876	100	0	0	316 876	Timber

Key for IUCN Red List: EN = Endangered; VU = Vulnerable; LC = Least Concern; * = not assessed.

Source: Adapted from CITES Document CoP16 Inf.32.



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Vicuña populations have made an impressive comeback from near-extinction

in their territories. Vicuñas were listed in CITES in 1975.

Success. Some populations had recovered by the late 1980s, thanks to collective efforts under the Vicuña Convention, the prohibition of international trade, and the establishment of natural protected areas. For some vicuña populations, international trade in cloth made from wool sheared from live animals was recommenced in 1987 and, by 2014, the total number of vicuñas had increased to 500 000 (IUCN, 2014). Today, the species is soundly managed, numbers are still on the increase, and indigenous and local communities are benefiting directly from this resource. Nevertheless, continued vigilance and community involvement are required,

with poaching of vicuñas and the illegal commercialization of the species' fibre a persistent problem (IUCN, 2014).

Markhor

The markhor (*Capra falconeri*) is a large species of wild goat found in mountainous terrain at elevations between 600 m and 3 600 m in Afghanistan, India, Pakistan, Tajikistan, Turkmenistan and Uzbekistan.

Issues. Major threats are habitat degradation and encroachment, competition with livestock, and poaching for horns and meat.

Success. Under the auspices of CITES,⁶ a community-based trophy-hunting

⁶ See Resolution Conf. 10.15 (Rev. CoP14) on *Establishment of quotas for markhor hunting trophies* at <http://cites.org/eng/res/10/10-15R14.php>

programme for markhor was initiated in Pakistan in 1998. Twenty percent of trophy fees go to the government and 80 percent go to local communities; over its lifetime, the project has generated more than US\$2 million for community development. Thanks to the success of the programme, the initial hunting quota for markhor was increased from 6 to 12 trophies per year. Under the protection of local tribesmen, paid by funds generated through hunting, the markhor population in Pakistan increased from 700 in 1994 to 5 800 in 2013. In 2015, the conservation status of markhor on the IUCN Red List was changed from Endangered to Near Threatened (Michel and Rosen-Michel, 2015); nevertheless, stable and increasing subpopulations are restricted to those areas with sustainable hunting management and protected areas.

Crocodiles

The Order Crocodylia comprises 23 species of crocodiles, alligators, caimans and gharials occurring in Africa, Asia, Australia and Central and South America. All species in the order are protected under CITES, with some listed in Appendix I and all others listed in Appendix II.

Issue. Uncontrolled hunting of crocodiles and alligators for their skins in the 1950s and 1960s seriously depleted many wild populations, and there was fear that species extinctions would follow. Today, Crocodylia species are threatened in the wild mainly by habitat destruction, pollution, and human–wildlife conflicts that lead to preventive or retaliatory

actions such as killings and nest and egg destruction.

Success. Central America’s Morelet’s crocodile (*Crocodylus moreletti*) illustrates the success of conservation measures for species in this order. Hunted nearly to extinction in the 1970s, Morelet’s crocodile benefited from total hunting and export bans enacted by Mexico, its main range state, and CITES banned international trade in 1975. The species had recovered significantly by 2000, and concerns about extinction declined accordingly. In 2010, CITES reopened closely regulated trade in the species. Several crocodile species have also been the subject of innovative ranching

programmes under CITES for the production of skins and meat, thereby allowing their recovery in the wild.

ILLEGAL TRADE IN WILDLIFE

Illegal trade in wildlife can undermine the positive effects of legal trade, with potentially devastating economic, social and environmental impacts. Among the most obvious environmental impacts are reductions in wild populations due to the overharvesting or illegal killing of target species, driven by consumer demand and the resultant illegal trade. Well-documented cases of this involve African elephants (*Loxodonta africana*) (Wittemyr, 2014; CITES, 2015b), white rhinoceros



If adequately regulated, the trophy hunting of lions can have substantial conservation benefits

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(*Ceratotherium simum*) (TRAFFIC, 2015), pangolins (*Manidae* spp.) (Challender, Harrop and MacMillan, 2015) and parrots (*Psittacidae* spp.) (UNODC, 2016). When illegal offtakes and trade are additional to legal harvesting and trade, the combined impacts on wild populations may be beyond sustainable levels.

More broadly, illegal harvesting and trade can have cascading effects, with the decline of a species in an ecosystem causing deterioration in ecosystem functioning and services. African elephants, for example, play significant roles in seed dispersal (they may consume more seeds from more species than any other large seed-dispersing vertebrate; Campos-Arceiz and Blake, 2011). A significant decline of this species, therefore, could have considerable impacts on tree species diversity and distribution.

The economic and social ramifications of illegal trade in wildlife can also be severe. For example, the value of the illegal trade in pythons is estimated to be equal to that of the legal trade (CITES, 2014), thus depriving indigenous and local communities and governments of much-needed income and also jeopardizing the long-term sustainability of the legal trade (ITC, 2012).

Illegal wildlife offtakes and trade are often driven by organized crime, particularly in industrial biodiversity commodities such as fisheries and timber and a number of specific animal products (such as ivory and rhino horn). As with organized crime in other sectors (to which it is often linked), organized wildlife crime poses a serious threat to security and social and economic stability in many countries and regions.

HOW CAN SUSTAINABLE WILDLIFE MANAGEMENT BE SUPPORTED UNDER CITES?

CITES has put processes and compliance procedures in place to support the sustainability, legality and traceability of trade in the species it regulates and to reduce unsustainable or illegal trade.

The making of adequate NDFs by scientists in exporting countries is the key condition underpinning the sustainable management of CITES-listed wildlife, but it is also one of the Convention's most challenging aspects. Parties have adopted generic guidance for making NDFs and agreed on associated management measures, such as the establishment of annual export quotas, ensuring the involvement of local livelihoods, and principles and guidelines for the sustainable use of biodiversity.⁷ In recent years, specific NDF guidance has been developed for heavily traded taxa, such as snakes, tortoises, freshwater turtles and various marine species, along with best practices, practical case studies, identification materials, online courses and other capacity-building tools designed to support scientists involved in research, monitoring and trade management related to CITES-listed species. Such efforts help increase the sustainability of trade in CITES-listed wildlife.

The two CITES Scientific Committees (one for animals and one for plants) review the levels of international trade in CITES-listed species on an ongoing basis with the aim of identifying and correcting instances in which Parties appear to be allowing the export of certain species at levels that may be detrimental to the survival of that species in the wild. The review process can give rise to species- and country-specific recommendations for improved trade management and to sanctions in instances in which Parties ignore such advice.

Sustainable wildlife management under CITES could be strengthened by the elaboration of best-practice guidance for species for which this is currently lacking. CITES Parties would also benefit from support in undertaking field research, data collection and monitoring of species in trade and in

establishing adaptive management programmes, as well as from socio-economic studies to better understand the incentives and disincentives for sustainable trade. Because the number of taxa protected under CITES continues to grow, including an increasing number of economically very important forest and fishery species, ongoing efforts are required to assist CITES Parties in researching, accessing and applying the best available science in their trade management of CITES-listed species. Such efforts could be enhanced by collaboration with other intergovernmental organizations and multilateral environmental agreements, researchers, scientific institutions and CITES authorities. The making of robust, reliable NDFs requires strong guidance on sustainable wildlife management practices, such as the adaptive management of species in trade; sustainable offtake levels; quota setting; marking and tracking; population monitoring; and the involvement of rural people and other stakeholders. A key area of support is continued capacity building for scientists and wildlife managers involved in CITES, particularly in biodiversity-rich exporting countries.

Another consideration is that the proportion of CITES-listed animal species in international trade reported as having been bred in captivity, born in captivity or ranched has increased steadily for many years: it accounted for more than half of all reported commercial trade in live animals in 2000–2012. A similar trend is evident for CITES-listed plants (including trees in plantations) that have been artificially propagated, as well as in aquaculture. This trend of increasing trade in non-wild specimens of CITES-listed species is expected to continue, particularly if demand for animals and plants remains the same or increases but supplies from the wild become more difficult to obtain. The impact of changing patterns of international trade from wild to non-wild sources on the conservation and sustainable use of the species concerned is poorly known; it requires closer analysis to

⁷ See Resolutions Conf. 13.2 (Rev. CoP14) on *Sustainable use of biodiversity: Addis Ababa Principles and Guidelines*; Conf. 16.7 on *Non-detriment findings*; Conf. 16.6 on *CITES and livelihoods*; and Conf. 14.7 (Rev. CoP15) on *Management of nationally established export quotas* at <http://cites.org/eng/res/index.php>

ensure that CITES trade policies contribute to the conservation and sustainable use of the species *in situ* and do not exacerbate problems.

Trade can be a strong incentive for the conservation and sustainable use of wildlife. The legal, sustainable and traceable trade in wildlife exists in many forms and is regulated internationally under CITES. The benefits of effectively regulated trade can be significant – at a local level for indigenous and local communities as well as at the national, regional and global levels. Illegal and unsustainable trade poses an ongoing threat to many species of wildlife; it is important, therefore, to strengthen good governance as a way of supporting CITES and sustainable wildlife management and trade and combating illegal trade. ♦



References

- Agnew, D.J., Pearce, J., Pramod, G., Peatman, T., Watson, R., Beddington, J.R. & Pitcher, T.J.** 2009. Estimating the worldwide extent of illegal fishing. *PLoS ONE*, 4(2): e4570 (DOI 10.1371/journal.pone.0004570).
- BCGI.** 2007. Tree-BOL to barcode world's 100,000 trees. Website (available at www.bgci.org/resources/news/0463). Botanic Gardens Conservation International (BCGI). Accessed 7 February 2015.
- BirdLife International.** 2008. Nearly half of all bird species are used directly by people. Website (available at www.birdlife.org/datazone/sowb/casestudy/98). Accessed 27 January 2015.
- BirdLife International.** 2013. *State of the world's birds: indicators for our changing world*. Cambridge, UK.
- BirdLife International.** 2015. Wild bird trade and CITES. Website (available at www.birdlife.org/worldwide/policy/wild-bird-trade-and-cites). Accessed 27 January 2015.
- Butchart, S.H.M.** 2008. Red List Indices to measure the sustainability of species use and impacts of invasive alien species. *Bird Conservation International*, 18(S1): S245–S262.
- Campos-Arceiz, A. & Blake, S.** 2011. Megagardeners of the forest: the role of elephants in seed dispersal. *Acta Oecologica*, 37: 542–553.
- Carpenter, A.I., Dublin, H., Lau, M., Syed, G., McKay, J.E. & Moore, R.D.** 2007. Over-harvesting. In C. Gascon, J.P. Collins, R.D. Moore, D.R. Church, J.E. McKay & J.R. Mendelson, eds. *Amphibian Conservation Action Plan*. Gland, Switzerland, and Cambridge, UK, IUCN/SSC Amphibian Specialist Group.
- Challender, D.W.S., Harrop, S.R. & MacMillan, D.C.** 2015. Understanding markets to conserve trade-threatened species in CITES. *Biological Conservation*, 187: 249–259.
- CITES.** 2014. *CITES: standing at the intersection of trade, the environment and development*. Keynote address by CITES Secretary General at a side-event at the Eighth Session of the Open Working Group on Sustainable Development Goals (available at <http://cites.org/eng/news/sg/2014/20140212-SG-key-note-address.php>).
- CITES.** 2015a. *CITES and wildlife trade: how CITES works and what it is and isn't*. Keynote address by CITES Secretary-General at the Ilia State University, Tbilisi, Georgia. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (available at http://cites.org/eng/news/sg/keynote_address_cites_secretary_general_Ilia_state_university_tbilisi_20102015).
- CITES.** 2015b. *Monitoring the illegal killing of elephants. Update on elephant poaching trends in Africa to 31 December 2014* (available at www.cites.org/sites/default/files/i/news/2015/WWD-PR-Annex_MIKE_trend_update_2014_new.pdf). Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- CITES.** 2016. CITES Trade Database (dataset). Accessed 1 June 2016. URL: <https://trade.cites.org>. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Engler, M.** 2008. The value of wildlife trade. *TRAFFIC Bulletin*, 22(1): 4–5.
- FAO.** 2015. Forest products statistics. Facts and figures. Website (available at www.fao.org/forestry/statistics/80938/en). Accessed 18 February 2015.
- Frost, D.R.** 2014. *Amphibian species of the world: an online reference*. Version 6.0 (available at <http://research.amnh.org/vz/herpetology/amphibian>). Accessed 29 January 2015.
- Haken, J.** 2011. *Transnational crime in the developing world*. Washington, DC, Center for International Policy.
- Herrel, A. & van der Meijden, A.** 2014. An analysis of the live reptile and amphibian trade in the USA compared to the global trade in endangered species. *Herpetological Journal*, 24: 103–110.
- ITC.** 2012. *Trade in South East Asian python skins*. Geneva, Switzerland, International Trade Centre (ITC), TRAFFIC & International Union for Conservation of Nature (IUCN).
- IUCN.** 2014. *Poaching of vicuña and the illegal commercialization of its fiber: a persisting problem*. Gland, Switzerland, International Union for Conservation of Nature (IUCN) (available at http://cmsdata.iucn.org/downloads/gecs_vicuana_poaching_en.pdf).
- Lawson, S. & MacFaul, L.** 2010. *Illegal logging and related trade: indicators of the global response*. London, Chatham House.
- Lichtenstein, G., Baldi, R., Villalba, L., Hoces, D., Baigún, R. & Laker, J.** 2008. *Vicugna vicugna*. Website (available at www.iucnredlist.org). Accessed 9 December 2015.
- Lindsay, P.A., Balme, G.A., Booth, V.R. & Midlane, N.** 2011. The significance of African lions for the financial viability of trophy hunting and the maintenance of wild land. *PLoS ONE*, 7(1): e29332 (DOI 10.1371/journal.pone.0029332).

- Mark, J., Newton, A.C., Oldfield, S. & Rivers, M.** 2014. *The international timber trade: a working list of commercial timber tree species*. London, Botanic Gardens Conservation International.
- Michel, S. & Rosen-Michel, T.** 2015. *Capra falconeri*. Website (available at www.iucnredlist.org). Accessed 9 December 2015.
- Milliken, T.** 2014. *Illegal trade in ivory and rhino horn: an assessment to improve law enforcement under the wildlife TRAPS project*. Cambridge, UK, TRAFFIC.
- Newman, C.** 2014. Overview of the reptiles trade in the UK. Reptile Forum, London Zoo, 25 March 2014.
- Pincheira-Donoso, D., Bauer, A.M., Meiri, S. & Uetz, P.** 2013. Global taxonomic diversity of living reptiles. *PLoS ONE*, 8(3): 1–10.
- Roe, D., Milledge, S., Cooney, R., ‘t Sas-Rolfes, M., Biggs, D., Murphree, M. & Kasterine, A.** 2014. *The elephant in the room: sustainable use in the illegal wildlife trade debate*. IIED policy brief. London, International Institute for Environment and Development (available at <http://pubs.iied.org/pdfs/17205IIED.pdf>).
- Seneca Creek Associates & Wood Resources International.** 2004. *“Illegal” logging and global wood markets: the competitive impacts on the U.S. wood products industry*. Report prepared for the American Forest & Paper Association. Poolesville, Md., USA.
- TRAFFIC.** 2010. *Biodiversity for food and medicine*. Indicator factsheet 4.5.2. Biodiversity Indicators Partnership.
- TRAFFIC.** 2015. South Africa confirmed 2014 worst on record for rhino poaching. Website (available at www.traffic.org/home/2015/1/22/south-africa-confirms-2014-worst-on-record-for-rhino-poachin.html). Accessed 10 December 2015.
- TRAFFIC.** 2016. Wildlife trade: what is it? Website (available at www.traffic.org/trade). Accessed 22 February 2016.
- Uetz, P. & Hošek, J.** 2015. The Reptile Database (dataset). Accessed 25 March 2015. URL: www.reptile-database.org.
- UNEP.** Forthcoming. *Review of the environmental impacts of illegal trade in wildlife*. United Nations Environment Programme (UNEP).
- UNEP-WCMC, comps.** 2015. The Checklist of CITES Species Website (dataset). Accessed 29 January 2015. URL: <http://checklist.cites.org>. Compiled by United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC). Geneva, Switzerland. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Secretariat.
- UNODC.** 2016. *UNODC World wildlife crime report*. Vienna, United Nations Office for Drugs and Crime (UNODC) (available at www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf).
- Wilson, D.E. & Reeder, D.M.** 2005. *Mammal species of the world: a taxonomic and geographic reference*. 3rd edition. Baltimore, Md., USA, Smithsonian Institution Press.
- Wittemyer, G., Northrup, J., Blanc, J., Douglas-Hamilton, I., Omondi, P. & Burnhama, K.** 2014. Illegal killing for ivory drives global decline in African elephants. *PNAS*, 111(36): 13117–13121 (DOI 10.1073/pnas.1403984111).
- WTO & CITES.** 2015. *CITES and the WTO: enhancing cooperation for sustainable development*. World Trade Organization (WTO) & Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (available at http://cites.org/sites/default/files/i/news/2015/CITES_WTO_Brochure_72.pdf). ◆

Indigenous peoples and sustainable wildlife management in the global era

Y. Vizina and D. Kobei

The empowerment of indigenous peoples is a prerequisite for effective wildlife conservation, and international collaboration has an important role to play.

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Indigenous peoples, like other peoples of the world, face many challenges in developing and maintaining healthy economic, social, environmental and cultural systems. Long-held traditions based on understanding and honouring the complex relationships between humans and wildlife are under stress in both developing and developed regions. For many indigenous peoples, survival is at stake as they struggle to find the means to carry on their traditions in a dramatically changing world.

As part of this struggle, many indigenous peoples have become active in

international forums, speaking out on issues that affect their lives. One of these is the Convention on Biological Diversity (CBD), which brings together nation states and other stakeholders to discuss a broad range of biodiversity-related issues. Representatives of indigenous peoples from seven United Nations-defined regions attend CBD meetings, where they track proceedings and express the views of the people they represent in an effort to

P. Geemi from the Ogiek indigenous community in Kenya hunts for subsistence



encourage positive change. Despite their great diversity, indigenous peoples are united in the view that consideration of traditional cultural practices is crucial to ongoing discussions in the CBD on sustainable wildlife management.

In 2012, the 11th Conference of the Parties to the CBD decided to advance work on issues related to bushmeat and sustainable wildlife management (CBD, 2012). The emergence of the Collaborative Partnership on Sustainable Wildlife Management (CPW) in 2013 provided an opportunity to think through such important issues as wildlife, food security and livelihoods; human–wildlife conflicts; illegal or unsustainable hunting; and the coordination of partnerships and outreach. Specifically, the CPW is on a mission to “increase cooperation and coordination among its members to promote the sustainable management of terrestrial vertebrate wildlife in all biomes and geographic areas, contributing to the conservation and sustainable use of biodiversity and to human food safety and security, livelihoods and well-being” (CPW, 2015). Thus, the CPW addresses issues of vital importance to indigenous peoples, no matter where they live. This article examines the increasing involvement of indigenous peoples in forums on sustainable wildlife management, especially the CPW, and advocates for their greater empowerment in managing wildlife on their lands.

THE LONG-TERM VIEW OF INDIGENOUS PEOPLES

Indigenous peoples occupy traditional lands and territories and have distinct traditional practices for managing their natural resources, which generally have low environmental impact and long-term sustainability (Perez, 2014). Indigenous peoples live in all the world’s regions; it is estimated that, collectively, they own, occupy or use resources across all types of ecosystems on approximately 22 percent of the global land area, which in turn harbours 80 percent of the world’s biodiversity (Nakashima *et al.*, 2012). With

their distinct, intuitive relationships with nature and wildlife, indigenous peoples have acquired a wealth of traditional knowledge over many generations, which they have used to sustainably manage and conserve their lands and natural resources.

The cultures of indigenous peoples are based on sustainable approaches to land management because the consequences of living unsustainably have always been fully and immediately apparent. Such cultures invariably involve the strong stewardship of wildlife (encompassing wild animals, wild plants and other forms of life), without which indigenous communities believe life would be miserable and unsustainable. Experience and long-term planning are essential cultural elements for ensuring the survival of future generations – of both humans and wildlife.

It is imperative to document the best practices of indigenous peoples who have conserved wildlife over generations in their territories. To do so, understanding the value and sociocultural benefits that indigenous peoples attach to wildlife is significant. Many wildlife management practices have been recorded and shared, but others remain unheard, often because they exist within a cultural worldview that differs from science and therefore are misunderstood or undervalued (Cajete, 1999; Aikenhead, 2006). Efforts are being made to address this glaring lack of appreciation for indigenous knowledge. In 2012, for example, representatives of indigenous peoples from around the world met with officials from the United Nations and other national and international organizations in Guna Yala, Panama, to discuss concepts of knowledge and collaboration on biodiversity conservation. Over several days, indigenous, traditional and local knowledge systems were presented as “critical sources of understanding ecosystem dynamics, sustainable practices, and interdependencies between people and nature; sources that often have not informed science and high-level decision making on ecosystem management” (Tengö and Malmer, 2012).

THE IMPORTANCE OF COLLABORATION

For indigenous peoples who continue to uphold their cultural traditions, new relationships spanning regions and other peoples can be a means of reinforcing and extending their knowledge and traditions. A collaborative approach to problem-solving can be useful to indigenous peoples in fostering both short-term and long-term strategies for successful wildlife management that identify, plan and enact a broad range of solutions. Collaboration should not be seen as a gateway for imposing foreign strategies on indigenous communities because these can displace local governance, fail to deliver on theoretical benefits, and create new problems (Blaikie, 2006; Campbell and Vainio-Mattila, 2003; Drew and Henne, 2006). Support for locally appropriate actions is key.

The marginalization of holistic thinking, women’s wisdom and indigenous perspectives and spirituality within global systems has meant the loss of potentially important contributions to a future of living well – ecologically, peacefully and justly (O’Sullivan, 2012). On the other hand, sharing examples of indigenous successes in wildlife conservation is an important way of instilling pride among and engaging with new generations of indigenous teachers and learners. Systemic problems associated with wildlife conservation will require systemic solutions, and maintaining the knowledge, upholding the principles and continuing the practices of traditional cultures requires investment in both formal and informal education systems. Revitalizing management knowledge and practices is an important pathway for long-term wildlife conservation.

INDIGENOUS PEOPLES AND THE COLLABORATIVE PARTNERSHIP ON SUSTAINABLE WILDLIFE MANAGEMENT

Recognition of the wildlife stewardship role of indigenous peoples has led to collaboration with conservation organizations in efforts to maintain biodiversity,



A Maasai man in the eastern Serengeti, Africa

and the CPW has welcomed indigenous perspectives. The CPW brings together international organizations with substantive mandates and programmes for the sustainable use and conservation of wildlife resources. Indigenous peoples are not organizations, but many have been involved in international work concerning the environment and contribute their insights within such forums.

Although the cultural strength and wisdom of indigenous peoples arise at the local level, sharing and exchanging knowledge on wildlife internationally has the potential to benefit indigenous peoples in their territories of residence. The 12th Conference of the Parties to the CBD, held in Pyeongchang, Republic of Korea, in 2014, produced Decision XII/18: “Sustainable use of biodiversity: bushmeat and sustainable wildlife management” (CBD, 2014). Article 10 of this decision encourages Parties to the CBD “to assess, minimize

and mitigate the impacts of illegal hunting on the subsistence hunting and livelihoods of indigenous and local communities, and on other subsistence users of wildlife resources”. Article 11 encourages Parties “to strengthen the capacity of indigenous and local communities to exercise their rights and responsibilities in relation to the sustainable management of wildlife”. Decision XII/18 also encourages Parties to develop, revise or update their regulatory systems to differentiate between subsistence use, illegal hunting and domestic and international trade of specimens of wild species and products; and it requests the CBD’s Executive Secretary, working with the CPW, to analyse the impacts of subsistence wildlife use on the survival and regeneration of wild species. The CPW, therefore, can contribute to the development of technical advice that can be used internationally, and it can also be a source of information for indigenous communities

in their self-determined strategies for sustainable wildlife management.

Indigenous perspectives on the environment, reflected in their traditional knowledge, are as diverse as the ecosystems comprising their territorial homes. Nevertheless, there are many similarities in the cultural principles applied in their environmental management, as well as many common challenges in honouring those principles and defending their rights. Such cultural principles, and their commonalities and differences, can only be understood and reflected by developing relationships and mutual respect through collaboration over time. The CPW is at an early stage of existence, and building such relationships and mutual respect with indigenous peoples will be crucial for achieving successful outcomes in sustainable wildlife management.

INDIGENOUS PEOPLES AND MODERN CONSERVATION

Indigenous peoples encompass a broad range of communities, including fishers, hunter-gatherers, pastoralists, peasants, desert communities and forest dwellers. In Africa, pastoralists graze their herds across plains that often run through national reserves and national parks created to protect wildlife, doing so without hindering such wildlife conservation efforts. Hunter-gatherer communities hunt for subsistence and, most importantly, they do so sustainably. The loss of wildlife to trophy hunters or poachers, who hunt for commercial or other non-subsistence motives, has had detrimental effects on some indigenous communities, including exclusions from protected areas or themselves being labelled as poachers (Blewitt, 2016; Ross *et al.*, 2011).

Traditional practices are being applied globally with considerable success in many protected areas, buffer zones and non-protected areas. Indigenous peoples' and community-conserved territories and areas (known as ICCAs) provide a host of examples and issues (ICCA Consortium, 2015). The strong link between positive environmental outcomes and social justice is based on the premise that "local populations have a greater interest in the sustainable use of resources than does the state or distant corporate managers, that local communities are more cognizant of the intricacies of local ecological processes and practices, and that communities are more able to effectively manage those resources through local or traditional forms of access" (Tsing, Brosius and Zerner, 2005).

Implementing proactive measures with indigenous peoples – such as relationship-building, project development, training programmes, and assessments – is necessary to guard against reactive wildlife protection measures that are detrimental to indigenous communities and their own capacity to manage wildlife. Effective communication is an important part of planning and implementation.

The term "community-based conservation" is used frequently to describe projects and activities carried out by communities; it should be deployed carefully, however, because it can mean different things to different people. Community-based conservation approaches are usually described in one of two main ways: 1) those that focus on common-pool natural resource management and which employ environmental governance practices that have evolved within communities; and 2) those in which resource management agencies promote projects in communities not based on the norms and institutions of those communities (Balint, 2006). Activists, indigenous peoples, development organizations, conservationists and others all have their own interpretations of community-based conservation based on their contextual histories and motivations (Tsing, Brosius and Zerner, 2005).

There have been successes and failures in all types of community-based conservation, and learning from these is the best way forward: it is more helpful to learn about the conditions in which community-based conservation does and does not work, rather than simply to ask whether it works or not (Berkes, 2004). Best practices come through careful consideration and incremental steps that build a knowledge base suitable for the local context. Pastoralists in Kenya, for example,

have lived with and conserved wildlife for generations and they head many of the country's conservancies; in dry seasons, they live in harmony with wildlife in the use of grazing lands and water supplies (Box 1). The culture of pastoralists does not exhibit impulse hunting or the consumption of wildlife.

Environmental governance

The conditions for successful conservation can be complex, and the immediacy of threats to wildlife can limit the time available for developing long-term wildlife management approaches that are agreeable to indigenous communities and other stakeholders. Despite such challenges, investment in long-term relationship-building, respect for local leadership, and adherence to community protocols are crucial; over time, these practices will help build environmental governance capacity, which, in turn, will both enable the development of long-term management plans and help address immediate wildlife management issues.

The effectiveness of governance processes and institutions has been a central focus of many development institutions. Transparency, accountability, access to information, rule of law, the efficiency of bureaucracies, and control of corruption are all dimensions of governance identified as adaptable indicators

Box 1 The Il Ngwesi conservancy in Kenya

Indigenous peoples have demonstrated that they can coexist harmoniously with wildlife while living and supporting their own pastoral lives and cultures. The Il Lakipak Maasai ("People of Wildlife") in the northern part of Mount Kenya, own and operate Kenya's only community-owned rhino sanctuary, the Il Ngwesi conservancy. Recent changes in climate in Kenya have reduced rainfall, leading to increased human-wildlife conflicts because, during drought, wild animals searching for water, prey and pasture are overlapping increasingly with human activities. Among other things, the Il Lakipak Maasai have reduced their bush-cutting to ensure more fodder for wildlife on their lands and to reduce degradation. In ongoing human-wildlife conflicts in other parts of Kenya, communities are less organized for wildlife protection and conservation.

of programme governance. Governance affects community-based conservation projects at the local, regional and national levels. Weak local governance results in only limited community participation and the expropriation of benefits by local leaders and others. Democracy – rule by the people – can also be overwhelmed by corruption, human-rights abuses, misinformation and public manipulation, poor leadership, and the suppression of minority rights (Sernau, 2009). Where regional- or national-level governance is weak, agencies and officials may assert authority inappropriately or divert community benefits. Effective governance promotes and expands the rights of citizens (Balint, 2006).

Methodologies, tools and approaches identified as appropriate for community-based conservation include instilling pride in an area's natural value; building diverse relationships and engaging local communities authentically; ensuring that science is transparent; demonstrating how success can be achieved; providing educational and employment opportunities; linking benefits to local systems of value and power; and engagement and dialogue (Campbell and Vainio-Mattila, 2003; Drew and Henne, 2006). The participation of local people and the decentralization of control and decision-making are two key steps for authentic community-based conservation that bridge internal and external forces (Campbell and Vainio-Mattila, 2003; Blaikie, 2006). There are occasions when, in policies, biological concerns should take precedence over social issues, but this should only occur after the careful analysis and consideration of impacts (Chan *et al.*, 2007).

Some opponents of the devolution of wildlife management see community-based conservation as a threat, fearing that empowered communities will discontinue support for existing conservation projects, turn to more lucrative economic ventures not in keeping with conservation goals, and disempower conservation professionals (Campbell and Vainio-Mattila, 2003; Blaikie, 2006). But with human population

growth and increasing threats to wildlife, the involvement in wildlife conservation of traditional land users – who are best positioned by their proximity and knowledge to protect and manage wildlife – is imperative. A crucial part of such involvement is the devolution of authority, which in turn requires that indigenous peoples have the capacity to maintain and expand their own traditional knowledge as part of the process of conserving biodiversity.

CONCLUSION

The international symposium, “Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime”, held in South Africa in 2015, made a range of recommendations on community rights and responsibilities and for strengthening community voices, partnerships and the evidence base (IUCN SULi *et al.*, 2015). As indicated by the title of the symposium, the effort to conserve wildlife must go beyond enforcement because that strategy is not working. Communities must be empowered to act – with help at the national level and from the international community (see also article on page 33).

The urgent challenges we all face in maintaining biodiversity worldwide require that indigenous peoples are empowered – through the CPW and other forums, and locally – in discussions and actions on wildlife management. Indigenous peoples must play a central role in systematic, inclusive processes that facilitate the respectful integration of indigenous cultural traditions in conservation. ♦



References

- Aikenhead, G.** 2006. Towards decolonizing the pan-Canadian science framework. *Canadian Journal of Science Mathematics and Technology Education*, 6(4): 387–399.
- Balint, P.J.** 2006. Improving community-based conservation near protected areas: the importance of development variables. *Environmental Management*, 38(1): 137–148.
- Berkes, F.** 2004. Rethinking community-based conservation. *Conservation Biology*, 18(3): 621–630.
- Blaikie, P.** 2006. Is small really beautiful? Community-based natural resource management in Malawi and Botswana. *World Development*, 34(11): 1942–1957.
- Blewitt, J.** 2016. *Understanding sustainable development*. 2nd edition. New York, USA, Routledge.
- Cajete, G.** 1999. *Native science: natural laws of interdependence*. Santa Fe, USA, Clear Light Publishers.
- Campbell, L.M. & Vainio-Mattila, A.** 2003. Participatory development and community-based conservation: opportunities missed for lessons learned? *Human Ecology*, 31(3): 417–437.
- CBD.** 2012. COP11 Decision XI/25. Website. Convention on Biological Diversity (CBD) (available at www.cbd.int/decision/cop/?id=13186). Accessed 3 February 2016.
- CBD.** 2014. COP12 Decision XII/18. Website. Convention on Biological Diversity (CBD) (available at www.cbd.int/decision/cop/default.shtml?id=13381). Accessed 2 February 2016.
- Chan, K., Pringle, R., Ranganathan, J., Boggs, C., Chan, Y., Ehrlich, P., Haff, P.K., Heller, N.E., Al-Khafaji, K. & Macmynowski, D.P.** 2007. When agendas collide: human welfare and biological conservation. *Conservation Biology*, 21(1): 59–68.
- CPW.** 2015. Collaborative Partnership on Sustainable Wildlife Management [CPW]. Website (available at www.fao.org/forestry/wildlife-partnership/88804/en). Accessed 3 February 2016.

- Drew, J.A. & Henne, A.P.** 2006. Conservation biology and traditional ecological knowledge: integrating academic disciplines for better conservation practice. *Ecology and Society*, 11(2): 34.
- ICCA Consortium.** 2015. Examples and issues. Website (available at www.iccaconsortium.org/?page_id=34). Accessed 26 January 2017.
- IUCN SULi [International Union for Conservation of Nature Sustainable Use and Livelihoods Specialist Group], IIED, CEED [Centre of Excellence for Environmental Decisions], Austrian Ministry of Environment & TRAFFIC.** 2015. *Symposium report, "Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime", 26–28 February 2015, Glenburn Lodge, Muldersdrift, South Africa*. London, International Institute for Environment and Development (IIED) (available at <http://pubs.iied.org/G03903.html>).
- Nakashima, D., Galloway McLean, K., Thulstrup, H., Ramos Castillo, A. & Rubis, J.** 2012. *Weathering uncertainty: traditional knowledge for climate change assessment and adaptation*. Paris, United Nations Educational, Scientific and Cultural Organization (UNESCO) and Darwin, Australia, United Nations University (UNU) (available at www.ipmpcc.org/wp-content/uploads/2012/06/Weathering-Uncertainty_FINAL_12-6-2012.pdf).
- O’Sullivan, E.** 2012. Deep transformation: forging a planetary worldview. In E.W. Taylor & P. Cranton, eds. *The handbook of transformative learning: theory, research, and practice*, pp. 162–177. San Francisco, USA, Jossey-Bass.
- Perez, E.** 2014. Indigenous peoples’ and local communities’ valuation and values regarding pollinators: a Mayan perspective. In P. Lyver, E. Perez, M. Carneiro da Cunha & M. Roué, eds. *Indigenous and local knowledge about pollination and pollinators associated with food production: outcomes from the Global Dialogue Workshop*. Paris, United Nations Educational, Scientific and Cultural Organization (UNESCO) (available at <http://unesdoc.unesco.org/images/0023/002338/233811e.pdf>).
- Ross, A., Pickering Sherman, K., Snodgrass, J.G., Delcore, H.D. & Sherman, R.** 2011. *Indigenous peoples and the collaborative stewardship of nature: knowledge binds and institutional conflicts*. Walnut Creek, USA, Left Coast Press, Inc.
- Sernau, S.R.** 2009. *Global problems: the search for equity, peace, and sustainability*. 2nd edition. Pearson.
- Tengö, M. & Malmer, P. eds.** 2012. *Dialogue Workshop on Knowledge for the 21st Century: Indigenous Knowledge, Traditional Knowledge, Science and Connecting Diverse Knowledge Systems. Usdub, Guna Yala, Panama, 10–13 April 2012*. Workshop Report. Stockholm Resilience Centre (available at www.dialogueseminars.net/resources/Panama/Reports/Panama-report_English_small.pdf).
- Tsing, A.L., Brosius, J.P. & Zerner, C.** 2005. Introduction: raising questions about communities and conservation. In J.P. Brosius, A.L. Tsing & C. Zerner, eds. *Communities and conservation: histories and politics of community-based natural resource management*, pp. 1–34. Toronto, Canada, Altamira Press. ♦

First line of defence: engaging communities in tackling wildlife crime

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An international symposium has concluded that recognizing the rights of communities to use and benefit from wildlife is an essential complement to law enforcement in efforts to reduce illegal wildlife trade and to manage wildlife sustainably.

Above: Horns of the greater kudu (*Tragelaphus strepsiceros*) and waterbuck (*Kobus ellipsiprymnus*) and the wire snares that poachers used to catch the animals, Limpopo National Park, Mozambique

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Illegal wildlife trade (IWT) is at the top of the international conservation agenda. A surge in poaching is ravaging populations of iconic animals such as rhinos and elephants: for example, the number of African rhinos (black – *Diceros bicornis* – and white – *Ceratotherium simum*) poached in South Africa increased from 13 in 2007 to over 1 200 in 2014 (Save the Rhino, 2014). Many other lesser-known species of wildlife – such as pangolins (Manidae), turtles, fish, birds, reptiles, primates, medicinal plants and timber species – are also heavily affected.

The global policy response to this surge has emphasized three broad strategies: 1) increase law enforcement; 2) reduce demand; and 3) engage local communities. A symposium held in February 2015, “Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime” (IUCN SULI *et al.*, 2015), examined the third of these strategies. This article presents some of the key findings of that symposium.

THE ENFORCEMENT APPROACH

Literature on community-based natural resource management accumulated over decades shows increasing recognition of the role of indigenous peoples and local communities in the governance of natural resources, including species traded illegally. Yet this role has largely been overlooked in discussions around actions to address the urgent threats posed by the spate of poaching and IWT. To date, interventions in countries where wildlife is poached have placed far more emphasis on intensified law enforcement than on community-based approaches (Challender and McMillan, 2014; Roe *et al.*, 2014). Even when community-based programmes have attracted support, they have often lacked solid legal frameworks or have focused on developing “alternative” livelihoods (as a distraction from perceived or actual unsustainable wildlife use), rather than reaching out and engaging directly with communities to address wildlife crime and increasing the incentives for

local people to steward and sustainably manage wildlife.

Law enforcement is a crucial ingredient for successful conservation. Indeed, beyond formal legal systems, local people themselves have a wide range of social and cultural norms and values by which they regulate their own natural resource use. In the context of IWT, however, enforcement approaches have focused mainly on state-led or private-sector-led policing, often in very militaristic operations (Duffy, 2014; Carlson, Wright and Donges, 2015). Concerns were expressed at the Beyond Enforcement symposium that strategies focused predominantly on state-led or private-sector-led enforcement may have limited effectiveness, particularly in the longer term. The continued depletion of high-value species such as elephants and rhinos – despite great increases in

A male Sunda pangolin (Manis javanica) in Viet Nam rescued from the illegal trade



© DAN CHALLENGER/SAVE VIETNAM'S WILDLIFE



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enforcement – confirms the limitation of such approaches. The symposium found that:

- Not only have enforcement-dominated approaches proved ineffective for conservation, they have had other worryingly negative social consequences. In the worst cases, enforcers have perpetrated human-rights abuses, including killings, rapes, torture and the deliberate destruction of property. In less extreme cases, poorly targeted enforcement activities have undermined local confidence in conservation authorities and the perceived legitimacy of the legal system, resulting in further disincentives for communities to conserve wildlife.
- Even when enforcement is successful at a specific site, it may have the effect of displacing the poaching threat to areas where enforcement is weaker and local communities are sufficiently poor or disenfranchised to have an incentive to engage in wildlife crime. Many populations of high-value species coincide with areas of high poverty, and heavy enforcement cannot be applied everywhere at all times; IWT, therefore, will likely continue to move along the path of least resistance.
- Addressing IWT does not simply mean punishing non-compliance with wildlife laws. In some cases, the laws and policies surrounding land tenure and the use of land and wildlife

A tiger skin seized by customs officials in the United States of America. The illegal wildlife trade is a major threat to many iconic wildlife species

resources can themselves be part of the problem. For example, conservation policies may prevent local people from deriving economic benefits from wildlife protection, thus removing a major motivation for safeguarding and sustainably managing wild species. When wildlife stewardship offers no or only low economic returns, wildlife habitat is often converted rapidly to other more lucrative uses. This dynamic drives habitat loss, which is the primary driver of wildlife decline globally.

IS COMMUNITY ENGAGEMENT THE ANSWER?

Beyond the IWT context, there are decades of experience worldwide in community-based conservation, with numerous examples ranging from forest management in India and Nepal (Bowler *et al.*, 2010) to wildlife management in southern Africa (e.g. Child, 1996a; Child, 1996b; Child and Barnes, 2010; Naidoo *et al.*, 2016). But just as sole reliance on law enforcement is unlikely to be effective in tackling IWT, so it is with community conservation efforts: they are generally inadequate, on their own, to stem the surge in wildlife-related crime — especially given the escalating value of wildlife commodities, the militarization of poaching, and the involvement of heavily armed gangs and sophisticated trafficking networks (Biggs *et al.*, 2016; Challender and MacMillan, 2014; Phelps, Biggs and Webb, 2016).

Members of communities that share land with wildlife may be involved in IWT in various ways. Some may be poachers, and others may participate in the trade indirectly by, for example, helping outsiders locate wildlife, sharing information on patrol locations, and providing poachers with accommodation, food and the means to transport illegal wildlife products. Efforts to combat IWT need to understand and address the incentives and motivations of all the major players, including members of local communities. Local people's motives for contributing to IWT can be diverse, including poverty, redressing former injustices, thrill-seeking, and revenge for damage done by wildlife, and responses to IWT need to reflect these. For example, if the illegal killing of elephants is being driven by anger and frustration at trampled crops, then doing something to reduce the costs associated with living with wildlife is likely to be more effective than penalizing people for the killings. Similarly, the incentives for wildlife stewardship and conservation are varied, including financial rewards, the

Box 1 A tale of two elephant projects

In Mali in West Africa and the United Republic of Tanzania in East Africa, two different approaches have been used successfully to engage local communities in protecting elephants from poachers. The Ruvuma Elephant Project in the United Republic of Tanzania, supported by the PAMS Foundation, operates in an area where the poaching challenge has been significant. Game scouts recruited from local villages are trained to work alongside government rangers, and they receive performance-related rewards. Local villagers also inform law-enforcement efforts by reporting poaching and other suspicious activities to rangers. But this kind of engagement comes with risks to individuals and sometimes the community — not least reprisals from poachers, who have been known to shoot innocent people. The project requires good relationships and trust, so it has reciprocally tackled issues of concern to local people, particularly conflicts between humans and elephants. Chilli fencing has been used effectively to deter elephants from farmers' fields, and it also produces a cash crop. The net effect has been a dramatic reduction in poaching and an improvement in the protection of crops (Jenes and Lotter, 2015).

The Mali Elephant Project employs local people as guards and informants in surveillance brigades (*brigades de surveillance*), for which payments are made in food. In this case, the crucial ingredients for success are ownership, pride, self-esteem and an improved natural resource base in which livestock can co-exist with elephants. Elephants are highly valued culturally, and they are seen as an indicator of broader ecosystem health and therefore as a foundation for sustaining the livelihoods of local pastoralists. Before a political coup in 2012, and despite the presence of armed insurgents, the project had managed to successfully deter poaching, even when it was a problem elsewhere. Poaching became a problem after a breakdown in stability following the coup, and the involvement of local people was even more important in preventing it from escalating completely out of control. The emphasis on locally developed solutions will likely remain central to success (Canney and Ganame, 2015).

recognition of cultural values, and moral or ethical considerations. Understanding which incentives are most likely to work in different contexts is crucial.

SYNERGIES IN PAIRING EFFECTIVE ENFORCEMENT WITH COMMUNITY ENGAGEMENT

The nature and scale of IWT pose fundamental challenges for both law enforcement and community-based conservation approaches. To step up the efficacy of enforcement, interventions to tackle IWT need to be made in partnership with local communities. Local people are well placed to engage in poaching because of their proximity to wildlife and their local knowledge. For the same reasons, however, they are also uniquely placed to

support and participate in law-enforcement efforts. As first lines of defence, they can be the eyes and ears of enforcement agencies — as scouts, informants and guides (Box 1).

Community engagement cannot be delivered on demand or through intimidation. It must be based on listening, building trust, respecting traditional authority and developing shared, co-created solutions. Such engagement must also be backed by effective law enforcement: local people do not have the power of arrest and are at risk of reprisals from poachers if the response of law-enforcement authorities is slow or poorly executed (Wilkie, Painter and Jacob, 2015).

The Beyond Enforcement symposium concluded that recognizing the rights of

communities to use and benefit from wildlife is fundamental to engaging them in tackling IWT. When local people develop a collective sense of ownership of wildlife, poaching is viewed as stealing from the community rather than stealing from the state, and local people are therefore likely to become as protective of “their” wildlife as they are of their cattle, goats, fish and other assets. Such ownership is built through policies that enable communities to exercise options and opportunities to benefit from wildlife and that build their motivation and capacity to steward wildlife. This applies to domestic policies and laws in countries with wildlife populations under threat from illegal trade as well as in other countries that influence what happens in the home ranges of such species. For example, unilateral (and indeed multilateral) bans on imports of certain wildlife products can effectively shut down important markets for what might otherwise be a sustainably produced product that benefits both conservation and local communities.

Such bans may thus unintentionally undermine the benefits that accrue to local people and remove an incentive for wildlife conservation. Trophy hunting, for example, has been the subject of much heated discussion, particularly since the killing of “Cecil the Lion”, resulting in some countries banning the import of trophies and airlines refusing to transport them. The industry is perfectly legal, however, and, when well regulated, it can provide crucial conservation incentives for local people. It is estimated that if trophy hunting in Namibia were to stop, revenue losses to communities would be in the order of US\$1 million per year. It would also profoundly affect the financial viability of most of Namibia’s conservancies (areas of communal land set aside for conservation), which earn up to 80 percent of their income from trophy hunting (Naidoo *et al.*, 2015; see also the article on page 3, which presents the case for trophy hunting as a form of sustainable use).

THE WAY FORWARD

International deliberations on how to curb IWT should not continue to disregard or underplay community-led approaches. The findings of the Beyond Enforcement symposium show that communities often hold the key to finding lasting solutions to such illicit trade. Both the Kasane Conference on Illegal Wildlife Trade in 2015 and the Hanoi Conference on Illegal Wildlife Trade in 2016 reiterated the importance of balancing enforcement with community engagement and sustainable use. To make further progress against IWT, a step change is needed in the way governments, non-governmental organizations and other stakeholders work with the local people who live alongside wildlife and who ultimately hold its future in their hands. This includes:

- supporting and upholding community rights and responsibilities for managing wildlife and tackling illegal wildlife trade (including recognition of the distinction between illegal and unsustainable trade and the legitimate and sustainable use of wild resources);
- strengthening partnerships between communities, state and private law-enforcement agencies, and conservation non-governmental organizations;
- increasing knowledge and understanding of the wide range of motivations and drivers behind IWT and the effectiveness of different responses in diverse contexts;
- encouraging effective communication between communities on best practices to address common issues, such as those associated with livelihoods and tenure; and
- strengthening community voices in international debates on IWT, including in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Recent moves were made in this direction at the 17th Conference of the Parties to CITES in October 2016, at which

a decision was taken to establish a working group to explore how to effectively engage rural communities in CITES processes. ♦



References

- Biggs, D., Cooney, R., Roe, D., Dublin, H.T., Allan, J.R., Challender, D.W.S. & Skinner, D.** 2016. Developing a theory of change for a community-based response to illegal wildlife trade. *Conservation Biology*, 31(1): 5–12.
- Bowler, D., Buyung-Ali, L., Healey, J.R., Jones, J.P.G., Knight, T. & Pullin, A.S.** 2010. *The evidence base for community forest management as a mechanism for supplying global environmental benefits and improving local welfare*. CEE review 08-011 (SR48). Environmental Evidence (available at www.environmentalevidence.org/SR48).
- Canney, S. & Ganamé, N.** 2015. The Mali Elephant Project, Mali. In D. Roe, ed. *Conservation, crime and communities: case studies of efforts to engage local communities in tackling illegal wildlife trade*. London, International Institute for Environment and Development (IIED).
- Carlson, K., Wright, J. & Donges, H.** 2015. In the line of fire: elephant and rhino poaching in Africa. In G. McDonald, E. LeBrun, A. Alvazzi del Frate, E.G. Berman & K. Krause, eds. *Small arms survey 2015*. Geneva, Switzerland, Small Arms Survey.
- Challender, D.W.S. & MacMillan, D.C.** 2014. Poaching is more than an enforcement problem. *Conservation Letters*, 7(5): 484–494 (DOI 10.1111/conl.12082).
- Child, B.** 1996a. The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme. *Biodiversity and Conservation*, 5(3): 369–398 (DOI 10.1007/BF00051780).

- Child, B. & Barnes, G.** 2010. The conceptual evolution and practice of community-based natural resource management in southern Africa: past, present and future. *Environmental Conservation*, 37(3): 283–295 (DOI 10.1017/S0376892910000512).
- Child, G.** 1996b. The role of community-based wild resource management in Zimbabwe. *Biodiversity and Conservation*, 5(3): 355–367 (10.1007/BF00051779).
- Duffy, R.** 2014. Waging a war to save biodiversity: the rise of militarized conservation. *International Affairs*, 90(4): 819–834.
- IUCN SULi, International Institute for Environment and Development, Center for Environment and Energy Development, Austrian Ministry of Environment & TRAFFIC.** 2015. *Symposium report: “Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime”, 26–28 February 2015, Glenburn Lodge, Muldersdrift, South Africa.* International Union for Conservation of Nature (IUCN) Sustainable Use and Livelihoods Specialist Group (SULi) (available at <http://pubs.iied.org/G03903.html>).
- Jenes, M. & Lotter, W.** 2015. The Ruvuma Elephant Project, Tanzania. In D. Roe, ed. *Conservation, crime and communities: case studies of efforts to engage local communities in tackling illegal wildlife trade.* London, International Institute for Environment and Development (IIED).
- Naidoo, R., Weaver, L.C., Diggle, R.W., Matongo, G., Stuart-Hill, G. & Thouless, C.** 2016. Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Conservation Biology*, 30(3): 628–638 (DOI 10.1111/cobi.12643).
- Phelps, J., Biggs, D. & Webb, E.L.** 2016. Tools and terms for understanding illegal wildlife trade. *Frontiers in Ecology and the Environment*, 14(9): 479–489 (DOI 10.1002/fee.1325).
- Roe, D., Milledge, S., Cooney, R., ‘t Sas-Rolfes, M., Biggs, D., Murphree, M. & Kasterine, A.** 2014. *The elephant in the room: sustainable use in the illegal wildlife trade.* London, International Institute for Environment and Development (IIED) (available at pubs.iied.org/17205IIED.html).
- Save the Rhino.** 2014. Poaching statistics. Website (available at www.savetherhino.org/rhino_info/poaching_statistics). Accessed 23 January 2016.
- Wilkie, D., Painter, M. & Jacob, A.** 2015. *Rewards and risks associated with community engagement in anti-poaching and anti-trafficking.* USAID Biodiversity Technical Brief. Washington, DC, United States Agency for International Development (USAID) (available at http://pdf.usaid.gov/pdf_docs/PA00M3R9.pdf). ♦

Managing human–wildlife conflicts in central and southern Africa

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The first steps in a coordinated approach to the issue are generating useful lessons and tools for scaling up efforts.

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Human–wildlife conflict (HWC) is not a recent concern in Africa. Several wildlife species cause important damage to crops and live-stock systems, with impacts on human food security, safety and well-being. In extreme cases, attacks by wildlife species such as elephants and crocodiles can cause human injuries and death (Manfredo and Dayer, 2004; Woodroffe, Thirgood and Rabinowitz, 2005; Le Bel *et al.*, 2011).

HWCs have become more frequent and severe in Africa in recent decades due to increasing competition for land in previously wild and uninhabited areas (Lamarque *et al.*, 2009). The underlying causes include human population growth,

increasing demand for natural resources, and the growing pressure for access to land, such as for the extension of transport routes and the expansion of agricultural and industrial activities. Despite low population densities in certain rural areas in central Africa, many forest ecosystems are subject to agriculture and logging, causing negative direct impacts on fauna and fragmenting habitats.

Wildlife and people will continue to share landscapes and resources in central and southern Africa, and it seems certain

Above: Local farmers in the lower southeast of Zimbabwe are introduced to the Human–Wildlife Conflict Management Toolbox

that HWCs will worsen unless action is taken. In several countries, inadequate compensation for the damage caused by wildlife has angered local communities, who want solutions urgently, thus bringing HWCs to the political forefront. In some countries in central Africa, HWCs – and demands for solutions to them – were key issues in recent presidential elections.

The conclusions of a review of HWCs in Africa by FAO and the International Foundation for the Conservation of Wildlife (Lamarque *et al.*, 2009) formed the basis of discussions at the 17th Session of the Working Party on Wildlife Management and Protected Areas, held back-to-back with the 16th Session of the African Forestry and Wildlife Commission in Khartoum, the Sudan, in 2008. The Working Party recommended that FAO should support the efforts of countries to manage HWCs by facilitating networking among stakeholders for sharing information; generating guidance on best practices; providing technical guidelines for the development of national policies; and implementing field activities. Since then, several actions have been initiated at the subregional and national levels in Africa. Are we moving in the right direction? This article examines the work underway and points to the way forward.

STRATEGIC PLANS FOR ADDRESSING HUMAN–WILDLIFE CONFLICTS

Although most countries in central and southern Africa have committed to mitigating HWCs, the necessary political will is not always evident. HWCs should be considered in the development of policy frameworks in the forest and agriculture sectors, but many decision-makers are unfamiliar with the issues, and they often fail to take them fully into account in planning and policy formulation processes.

Nevertheless, there has been progress: since 2008, efforts have been made to develop strategic plans for addressing HWCs in Cameroon, Gabon and Mozambique. Gabon and Mozambique both now have such strategies, and the process

TABLE 1. Subregional and national strategies for human–wildlife conflict management developed since 2008 in central and southern Africa

Year	Country	Name of strategy	Comment
2010	Subregional	Central Africa Subregional Human–Elephant Conflict Mitigation Strategy	Developed with technical support from the Central African Protected Areas Network
August 2009	Mozambique	Human–Wildlife Conflict Management Strategy	Approved by a resolution of the Council of Ministers
October 2012	Gabon	National Strategy and Action Plan for Human–Wildlife Conflict Management (Ministère des Eaux et Forêts, 2012)	Approved by the Council of Ministers
Ongoing	Cameroon	National Strategy and Action Plan for Human–Wildlife Conflict Management	Not yet approved by government

TABLE 2. Handbooks in the Human–Wildlife Conflict Management Toolbox

Handbook topic	Description
Wildlife	Presents a list of 17 groups of species involved in human–wildlife conflicts
Conflict	Presents the five main categories of conflict caused by wildlife (agriculture; people's health and lives; disturbances to village life; livestock; and access to water)
Solutions	Presents a total of 45 practical solutions
Legislation	Provides information on laws in various countries as well as on international conventions
Evaluation	Proposes a human–wildlife conflict monitoring and evaluation strategy

to develop one is ongoing in Cameroon. In addition to national strategies, the Central Africa Subregional Human–Elephant Conflict Mitigation Strategy was developed in 2010. Table 1 summarizes the subregional and national strategies at the policy and planning levels.

THE HUMAN–WILDLIFE CONFLICT MANAGEMENT TOOLBOX

Despite (albeit limited) progress at the strategic level, the lack of on-the-ground implementation and impact remains a major concern. A dearth of tools and low technical capacity are significant issues for the staff of wildlife services, who are supposed to assist farmers in addressing HWCs. A significant challenge, therefore, is to improve and facilitate access to such tools.

The first prototype of an HWC toolbox was developed for southern Africa jointly by FAO, CIRAD (the French Agricultural

Research Centre for International Development), the BIO-HUB Trust¹ and other partners (Le Bel, Mapuvire and Czudek, 2010). In 2012, FAO, the Central African Protected Areas Network (RAPAC) and CIRAD decided to adapt the prototype to central Africa. The adaptation process had three steps:

1. production and critical review of the toolbox;
2. a test phase conducted in collaboration with WWF, the Wildlife Conservation Society, and Agence nationale des parcs nationaux du Gabon (Gabon

¹ The BIO-HUB Trust is a regional platform developed in Zimbabwe by a consortium (WWF, the African Wildlife Foundation, CIRAD, CIFOR, the Campfire Association and the People and Nature Trust) with a mission to integrate conservation and natural resource management with development through a partnership promoting the innovative transfer of skills, appropriate technologies and knowledge.

Box 1

Testing the Human–Wildlife Conflict Management Toolbox in Cristal Mount National Park, Gabon

In 2015, the Wildlife Conservation Society Gabon helped a local community find ways to prevent human–wildlife conflict in the Cristal Mount National Park in Gabon. We used a smartphone equipped with the KoboCollect app to obtain and transmit data to the Central African Forest Observatory for analysis, which showed that animals were destroying entire crops. The frustration of farmers – whose livelihoods depend on such crops – is understandable, and rules forbidding them to hunt protected animals for meat or to protect their crops are difficult to explain and justify.

The toolbox – especially the handbook on solutions – sets out options for preventing, blocking, pushing back or eliminating fauna that damage plantations. The solutions we believed would be most feasible and effective in the case of the Cristal Mount National Park were: fencing the plantations to block animals from reaching the crops; making fires or noises to scare the animals away; and posting guards to keep watch on the plantations at night. We considered these solutions to be best because they were easy to set up and did not require funds (which were unavailable). The lack of funds meant we were unable to offer farmers hi-tech solutions – such as the use of electric fences – that might have been more effective, because it was important that villagers could put the solutions in place and maintain them without ongoing assistance.

We observed that some of the proposed solutions were ineffective, showing the importance of testing different combinations of approaches best suited to local conditions and the capacity of communities to implement them.

Source: Angoran (2015).

National Agency for National Parks) at 11 pilot sites in four countries in the subregion (Angola, Cameroon, the Congo and Gabon, see Box 1); and

3. development of an improved version of the toolbox based on field-test results.

“La Boîte à outil d’atténuation des conflits homme-faune” (Human–Wildlife Conflict Management Toolbox)² is a set of five thematic illustrated handbooks (Table 2) assembled in a canvas carry bag. It provides information on HWCs in central Africa, the species involved, and guidelines on the steps that can be taken to address such conflicts.

An effective solution for HWCs involving elephants proposed in the toolbox is the use of chilli-pepper dispensers, which were developed and tested in Mozambique, Zambia and Zimbabwe (Le Bel, La Grange and Drouet-Hoguet, 2015). These dispensers fire “bullets” containing chilli-pepper oil at elephants, which are first surprised by the noise and later disturbed by the pepper, making them flee.



Community artisans receive training in the manufacture and use of EL@OUT, an “ambush” version of a chilli-pepper dispenser made of wood designed to discourage elephants from damaging crops*

² The toolbox, which is available only in French, can be downloaded at <http://ur-forets-societes.cirad.fr/produits-et-expertises/produits/boite-a-outil-bo-CHF>

* All reproduction and distribution rights of EL@OUT are reserved. Videos on the production and use of EL@OUT are available at <http://ur-forets-societes.cirad.fr/produits-et-expertises/produits/el-out-elephant-box>



© GEORGES MARVILLE

Damage caused by elephants to a plantain plantation in Remboué, Gabon

To promote this tool, FAO, in collaboration with CIRAD, the Ministry in Charge of Wildlife in Gabon and Fruitière Numérique (a not-for-profit organization), organized a capacity-building session in Gabon to provide local artisans with know-how on the manufacture and use of pepper dispensers. The aim was to stimulate the low-cost, local manufacture of the tool and to train local communities in its use. Despite the significant progress made, the tool is still largely at the experimental stage, and farmers require additional support in efforts to prevent and mitigate HWCs.

MONITORING HUMAN–WILDLIFE CONFLICTS USING SMARTPHONES

Sharing information and experiences is essential for preventing and mitigating HWCs (Madden, 2006), and CIRAD has developed a monitoring system using smartphones to collect, manage and report on HWCs (Le Bel, Chavernac and Stansfield, 2016). The first tests used FrontLine SMS in the framework of HWC projects in Mozambique and Zimbabwe. An improved monitoring system that uses smartphones and the KoBoCollect application³ was launched in April 2014 in central Africa with the support of CIRAD, FAO,

³ https://kc.kobotoolbox.org/ofac_chf; see also article on page 53.

RAPAC and the Central African Forest Observatory (OFAC). Data on HWCs are entered directly onto a form generated by the KoBoCollect app (either offline or online) and sent from the smartphone (via Wi-Fi or a mobile phone network) to the OFAC server, thereby centralizing all collected information. The HWCs are geolocated using either the automatic or manual recording of global positioning system coordinates, and the information is encrypted (with logins and passwords) to protect it. OFAC hosts the collected data and also processes and analyses them and disseminates the results via a monthly newsletter. KoBoCollect is an innovative approach to managing HWCs, with its user-friendly features, precision

**The Human–Wildlife
Conflict Management Toolbox**

through geolocation, and simplified data entry (Ilama, 2015).

The monitoring system is being tested at about 30 HWC observation sites in seven countries: Cameroon, the Central African Republic, Chad, the Congo, the Democratic Republic of the Congo, Equatorial Guinea and Gabon. A network for sharing monitoring information among HWC managers is envisaged in the future.

**COMMUNITY-BASED HUMAN–
WILDLIFE CONFLICT MANAGEMENT**

The various tools now available can enable communities to take action and to be the driving forces in finding solutions to HWCs. To help communities use the Human–Wildlife Conflict Management Toolbox efficiently, a six-step guide was prepared for the development of community action plans for HWC management

**1
The six steps in developing
community action plans for human–
wildlife conflict management**



(FAO, 2016; Figure 1). The aim of the guide is to help communities in planning their use of the toolbox and the tools therein; it will also help them develop a shared vision of preventive measures for HWCs and to organize, facilitate and coordinate actions to mitigate them. To date, five HWC community action plans have been developed in Angola, the Congo and Gabon.

LESSONS LEARNED

The recent experience acquired in HWC management has generated the following lessons, among others:

- **Political will and the involvement of regional or national bodies is a necessary condition for successful HWC mitigation.** Even though many HWC management initiatives began in southern Africa, more progress appears to have been made in central Africa, possibly due to greater political will and the formal involvement and commitment of regional and national institutions.
- **The cross-fertilization of ideas and concepts among regions and subregions helps improve tools and policies.** Central Africa has advanced in its approach to the mitigation of HWCs due largely to the tools developed in southern Africa. Today, the information is flowing the other way, with efforts in southern Africa making use of the experiences obtained and tools developed in central Africa.
- **Adaptive approaches are best equipped to deal with emerging issues.** The guide to developing community action plans for HWC management was developed in

response to a need for a strategic approach to the use of the Human–Wildlife Conflict Management Toolbox, and the toolbox was developed in response to a need among affected communities. By responding directly to needs, this adaptive approach has been able to quickly address a significant issue.

- **Local traditions and perceptions can be a barrier to effective HWC management.** For example, local people affected directly by HWCs find it aggravating that wildlife is protected at their expense. In Angola’s Cabinda Province, people continue to think that the historical practice bequeathed by the colonial administration of “driven hunting”⁴ organized by government is the best means for managing HWCs. In other cases, problem animals are sometimes believed to be bewitched humans transformed into animals, constraining possible solutions.

CONCLUSION

HWC is a challenging issue in central and southern Africa that needs to be addressed at various levels. Some countries have demonstrated political will by developing clear HWC strategies, but the extent of practical action is often insufficient to mitigate HWCs and reduce their impacts on human well-being and wildlife conservation. HWC has thus become a political issue – which can be seen as an opportunity for elevating it in the agendas of politicians and encouraging decision-makers to pay more attention.

The lack of field impact can be explained partly by a lack of adapted tools for managing HWC. The production of the Human–Wildlife Conflict Management Toolbox, the smartphone app for monitoring HWCs, and the guide to assist local communities in developing HWC action plans is helping fill this gap.

⁴ Driven hunting is a form of hunting in which game is “driven” towards stationary hunters.

It is now time, therefore, to provide local communities with more assistance in developing HWC action plans and putting suitable tools into practice. Such support would go a long way towards mitigating HWCs in central and southern Africa and establishing a sound basis for the beneficial cohabitation of humans and wildlife. ♦



References

- Angoran, E.J.** 2015. *Human–wildlife conflict: Crystal Mountain National Park*. Internship report. Wildlife Conservation Society Gabon.
- FAO.** 2016. *Gestion des conflits homme-faune: guide pour la formulation des plans d'action communautaires*, by C. Julve Larrubia, L. Ilama, S. Le Bel & J-C. Nguinguiri. Libreville, Gabon.
- Ilama, L.** 2015. A toolbox for human-wildlife conflict management in Central Africa. *Nature & Faune*, 29(2): 70–73.
- Lamarque, F., Anderson, J., Fergusson, R., Lagrange, M., Osei-Owusu, Y. & Bakker, L.** 2009. *Human-wildlife conflict in Africa: causes, consequences and management strategies*. FAO Forestry Paper No. 157. Rome (available at www.fao.org/docrep/012/i1048e/i1048e00.pdf).
- Le Bel, S., Chavernac, D. & Stansfield, F.** 2016. Promoting a mobile data collection system to improve HWC incident recording: a simple and handy solution for controlling problem animals in southern Africa. In F.M. Angelici, ed. *Problematic wildlife: a cross-disciplinary approach*, pp. 395–411. Springer.
- Le Bel, S., La Grange, M. & Drouet-Hoguet, M.** 2015. Repelling elephants with a chilli pepper gas dispenser: field tests and practical use in Mozambique, Zambia and Zimbabwe from 2009 to 2013. *Pachyderm*, 56: 87–96.
- Le Bel, S., Mapuvire, G. & Czudek, R.** 2010. Human–Wildlife Conflict Toolkit: comprehensive solutions for farmers and communities. *Unasylva*, 236: 12–13.
- Le Bel, S., Murwira, A., Mukamuri, B., Czudek, R., Taylor, R. & LaGrange, M.** 2011. Human wildlife conflicts in southern Africa: riding the whirl wind in Mozambique and in Zimbabwe. In J. Lopez Pujol, ed. *The importance of biological interactions in the study of biodiversity*, pp. 283–322. Rijeka, Croatia, InTech.
- Madden, F.** 2006. Conflit entre l’homme et la faune sauvage: un cas de collaboration. *Nature & Faune*, 21(2): 8–10.
- Manfredo, M.J. & Dayer, A.A.** 2004. Concepts for exploring the social aspects of human–wildlife conflict in a global context. *Human Dimensions of Wildlife*, 9(4): 1–20.
- Ministère des Eaux et Forêts.** 2012. *Stratégie nationale et plan d'actions de gestion des conflits homme-faune au Gabon*. Libreville.
- Woodroffe, R., Thirgood, S. & Rabinowitz A.** 2005. *People and wildlife, conflict or co-existence?* Cambridge University Press. ♦

Wildlife conservation policy and practice in Central Asia

N. Yakusheva



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The Central Asian Mammals Initiative is demonstrating that regional cooperation and the strong involvement of local partners can achieve tangible wildlife conservation outcomes.

Central Asia is a strategic region and an important transport corridor located between the major growing markets of Asia, Europe and the Middle East (Wingard *et al.*, 2014). It is in the process of rapid transformation and faces many socio-economic, political, environmental and security challenges (Rakhimov, 2010). Central Asia holds significant mineral, energy and other natural resources, which are being widely exploited or are under development. It is also a region in which there is a high level of social inequality and – despite economic growth – widespread rural poverty. The livelihoods of rural communities are highly dependent on subsistence farming and livestock herding (Karlstetter and Mallon, 2014).

Central Asia is one of the few remaining regions worldwide in which ecologically significant migrations of large mammals still occur, with big herds of, for example, Mongolian gazelle and khulan (also known as the Asiatic wild ass) moving over long distances (UNEP/CMS, 2014a).¹

The global importance of the region's wildlife is recognized, and the mountains of Central Asia (the Tien Shan and the Pamirs) are among the world's biodiversity hotspots (Conservation International, 2014). The lower elevations of these mountains are inhabited by, among other species, the critically endangered saiga antelope, the goitered gazelle and the Bukhara deer. The populations of many species are transboundary – that is, they migrate across national borders – and cooperation among countries is required to coordinate responses to existing and emerging threats.

Wildlife is one of the region's most valuable renewable resources. Sustainable consumptive (e.g. trophy hunting) and non-consumptive (e.g. nature-based tourism) uses of wildlife can create commercial opportunities and provide local-to-national economic, social and environmental benefits (Mischler, 2006). The financial returns can help reduce rural poverty (e.g. by providing employment), improve local livelihoods (e.g. through investments in

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¹ The scientific names of these and other species are given in the footnote on page 46.

Above: The long-distance movement of khulan, Mongolia

local small-scale infrastructure) and support biodiversity conservation and other environmental objectives (e.g. by providing resources for the management of protected areas) (Rosen, 2012). The conservation of migratory species and their habitats would also provide essential ecosystem services, such as increasing the carbon storage capacity of grasslands by optimizing foraging (Mallon and Jiang, 2009).

The conservation of migratory species requires an ecosystem-based approach because conservation through protected areas has limited applicability for species relying on vast territories. Thus, this article examines the potential of the Central Asian Mammals Initiative (CAMI), an international conservation initiative

Confiscated saiga horns: poaching is one of the key threats to wildlife in Central Asia

under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), to advance regional cooperation and support actions for wildlife conservation from ecological and social perspectives. The article sets out CAMI's key propositions, provides practical examples of international cooperation, and addresses some key threats.

THE CENTRAL ASIAN MAMMALS INITIATIVE

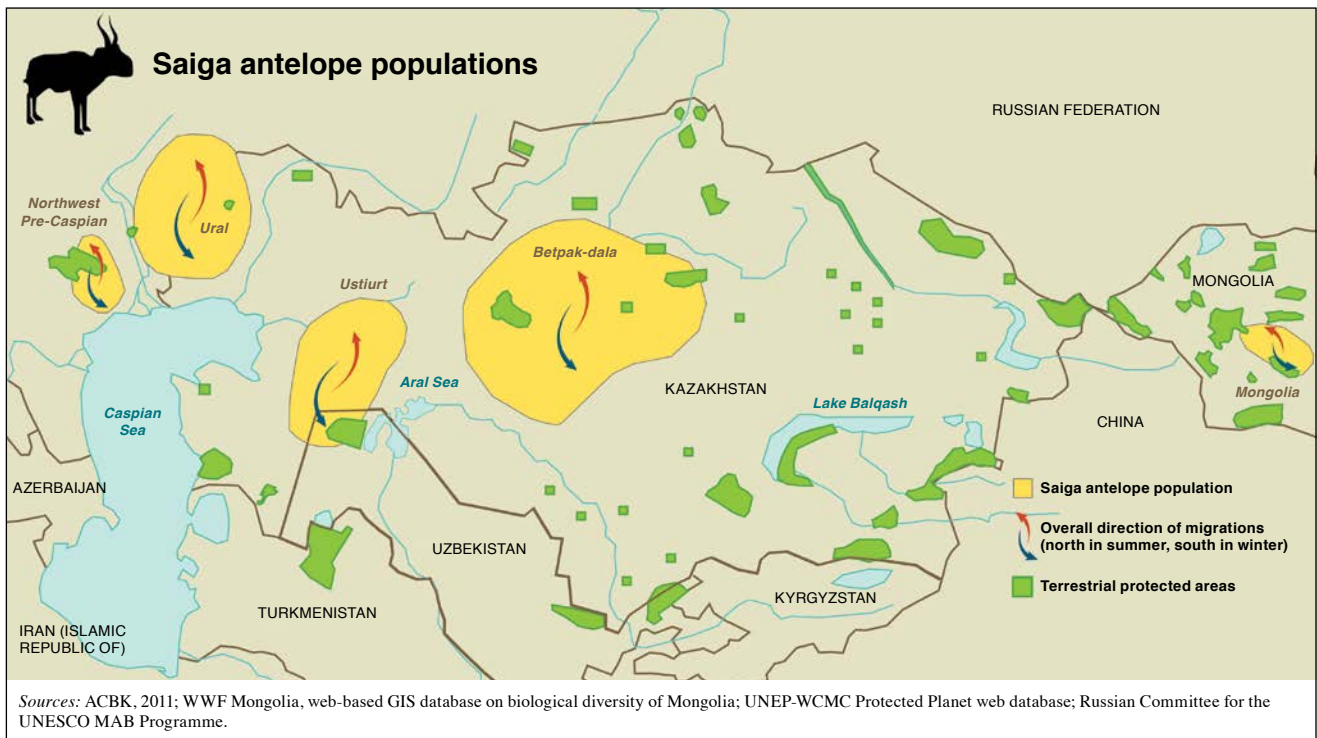
CAMI and its associated programme of work were adopted at the Eleventh Meeting of the Conference of the Parties to the CMS in Quito, Ecuador, in 2014. It encompasses the following 14 range states: Afghanistan, Bhutan, China, India, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, the Russian Federation, Tajikistan,

Turkmenistan and Uzbekistan. This extended definition of the region ensures that the initiative covers all the ecologically significant habitats of the focal species and promotes the ecosystem-based conservation approaches necessary for conserving fully functioning ecosystems (Mallon and Jiang, 2009). CAMI covers 15 species,² including mountain species such as the argali sheep and snow leopard and steppe

² The 15 species are: Asiatic cheetah (*Acinonyx jubatus*); wild yak (*Bos grunniens*); wild camel (*Camelus bactrianus*); Bukhara deer (*Cervus elaphus yarkandensis*); Przewalski's horse (*Equus caballus przewalskii*); Asiatic wild ass (*Equus hemionus*); kiang (*Equus kiang*); chinkara (*Gazella bennettii*); goitered gazelle (*Gazella subgutturosa*); argali sheep (*Ovis ammon*); chiru (*Pantholops hodgsonii*); Mongolian gazelle (*Procapra gutturosa*); Tibetan gazelle (*Procapra picticaudata*); saiga antelope (*Saiga tatarica tatarica* and *Saiga tatarica mongolica*); and snow leopard (*Uncia uncia*).



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species such as the saiga antelope and goitered gazelle (UNEP/CMS, 2014b).

The aim of CAMI is to provide a coordinated approach in addressing common threats – such as poaching, habitat degradation and barriers to migration – to the focal species. To do this, the initiative engages with state and non-state stakeholders involved in wildlife management and conservation at the local-to-international levels to ensure the effective use of limited resources. Such multistakeholder partnerships can benefit wildlife conservation in various ways by enabling effective research, policy development, awareness-raising and rural development and by supporting sustainable livelihood programmes, which are essential for long-term implementation.

CAMI has identified a set of policy actions to improve the governance of natural resources, address human needs and community engagement in conservation, and develop scientific knowledge and transboundary cooperation. These and other ecosystem-based measures need to be applied in the region's key landscapes,

including mountain, desert, steppe and semi-steppe ecosystems (UNEP/CMS, 2014b). To boost local livelihoods, the initiative advocates support for income-generation options compatible with conservation, as well as projects aimed at improving access to health, education and energy. CAMI's programme of work defines measures for local awareness-raising on conservation and wildlife, the use of local knowledge and skills in conservation co-management and participatory approaches in scientific research, and the promotion of non-consumptive uses, especially ecotourism (UNEP/CMS, 2014b).

CAMI's coordination functions include reducing overlap and encouraging the best use of synergies among the various CMS instruments in the region, such as the Memorandum of Understanding Concerning the Conservation, Restoration, and Sustainable Use of the Saiga Antelope ("saiga MOU") and the International Single Species Action Plan for the Conservation of the Argali. Where clear similarities exist in the threats faced by species, and resources for addressing them are scarce,

regional initiatives can support the application of ecosystem-based measures and consolidate the efforts and resources of involved partners. Administratively, the CMS Secretariat can engage more effectively with such umbrella initiatives rather than with individual species-based instruments. CAMI, therefore, draws on the experiences of existing CMS instruments in the region.

SAIGA ANTELOPE: LEARNING FROM EXISTING PRACTICES

The saiga antelope, a Central Asian migratory species, was spotlighted recently in the international media (e.g. Zimmer, 2015a, 2015b) for the unfortunate reason that almost the entire population of the species inhabiting the Betpak-dala plains in western Kazakhstan was wiped out, a loss amounting to more than 210 000 adult saigas (UNEP/CMS, 2015b). The proximate direct cause of the mass mortality event was established as haemorrhagic

1

The location and range of the saiga antelope's five populations



Saiga antelope in the Stephoi Nature Reserve, the Russian Federation

septicaemia caused by *Pasteurella multocida*. This bacterium is normally present in saigas and does not harm healthy animals, but it can attack animals weakened by other causes. More investigation into what triggered the mortality event is underway, and there are strong indications that it involved a climatic factor acting at the population or landscape scale (UNEP/CMS, 2015b).

The saiga can move up to 120 km per day in search of food and water across the semi-deserts and steppes of Central Asia (Singh *et al.*, 2010). The species was listed as Critically Endangered on the International Union for Conservation of Nature's Red List of Threatened Species in 2004 due to a significant rapid population

decline – from more than 1 million individuals to only 55 000 (Milner-Gulland *et al.*, 2001). Four of the five distinct populations of the saiga antelope – the Betpak-dala (Kazakhstan), Northwest Pre-Caspian (the Russian Federation), Ural (Kazakhstan and the Russian Federation) and Ustiurt (Kazakhstan, Turkmenistan and Uzbekistan) (Figure 1) – belong to the same subspecies, *Saiga tatarica tatarica*, and the Mongolian population is constituted by the *Saiga tatarica mongolica* subspecies (UNEP/CMS, 2015a). Two of the five populations – Ural and Ustiurt – are transboundary. The key threats to the saiga (in addition to the disease outbreak) are the fragmentation of habitats due to increasing barriers to migration such as railways and border fences, and poaching, both for saiga horns – which are used in

traditional Chinese medicine and traded with China, Hong Kong SAR, Japan, Malaysia and Singapore – and for saiga meat, which is consumed locally (Kühl *et al.*, 2009; Milner-Gulland *et al.*, 2001). The Mongolian saiga population faces additional threats from habitat degradation due to overgrazing (UNEP/CMS, 2015a).

The international effort to conserve the saiga started in 2006. Under the auspices of the CMS and in cooperation with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the five countries that comprise the saiga's range – Kazakhstan, Mongolia, the Russian Federation, Turkmenistan and Uzbekistan – agreed on the saiga MOU (with the Russian Federation signing in 2009 and Mongolia in 2010). Several cooperating organizations

(mostly international environmental non-governmental organizations – NGOs) also expressed commitment to saiga conservation and signed the MOU. The MOU's medium-term work programme defines measures to improve the conservation of the species and to restore it to the point that sustainable use might be reconstituted (UNEP/CMS, 2015c). Three meetings of MOU signatories brought together representatives of the range states and interested stakeholders to review the conservation status of the saiga and to update the priority actions. Despite initial difficulties, the saiga is considered a conservation success story; before the mass die-off in 2015, three of the five populations (Betpak-dala, Ural and Mongolia) had been growing, although both the Ustiurt and Northwest Pre-Caspian populations have continued to decline due to persistent threats from poaching and infrastructure development (UNEP/CMS, 2015a).

The implementation of the saiga MOU by governments, supported by the CMS and CITES, was backed by strong NGO partners on the ground, and the scientific community actively engaged in saiga research, both nationally and internationally. This mobilization led to the creation

of a strong conservation network that was able to attract funding for the implementation of the MOU as well as for international workshops and field projects.

A significant number of the field projects worked with local communities to create alternative income opportunities, raise awareness and provide environmental education (UNEP/CMS, 2015a). An example of non-consumptive use is safari-style tours for saiga observation organized by an NGO in Kazakhstan, which shares the benefits with local communities (ACBK, 2015). Other projects have supported local income-generation options, such as by providing training in handicraft-making and sustainable grazing schemes designed to reduce poaching and raise awareness on saiga conservation (Howe, Medzhidov and Milner-Gulland, 2011; Saiga Conservation Alliance, 2015).

The emergence of a strong multistakeholder partnership – in which partners contribute with their own resources and mobilize external support – has clearly increased the effectiveness of the saiga MOU and led to improvements in the status of three saiga populations. The MOU, in turn, has provided neutral ground for engagement and dialogue among state

and non-state stakeholders. The saiga MOU, one of the oldest CMS instruments in Central Asia, has acted as a learning platform for CAMI. The saiga MOU partners actively contributed to the conceptual development of CAMI and engaged in its implementation.

ADDRESSING THREATS: INFRASTRUCTURE DEVELOPMENT

Both the saiga MOU and CAMI have addressed threats posed by the development of infrastructure by providing detailed technical guidelines and conducting studies, as well as by exerting political pressure on national governments and private companies. The technical guidelines were developed under the saiga MOU to help mitigate the impacts on saiga populations of the development of the transport network in Kazakhstan and the threat it posed to the transboundary saiga population in Ustiurt (Olson, 2014). A newly constructed railway transects the habitat of the Betpak-dala population in several parts and crosses important migration corridors. For the Ustiurt population, the existing

Migration of khulan in the Great Gobi, Mongolia



railway and border fence pose significant barriers, blocking major migration routes. The efforts of the MOU partners led the Government of Kazakhstan to agree to mitigation measures on the railway to increase the potential for saiga movements.

The CMS Guidelines for Addressing the Impact of Linear Infrastructure on Large Migratory Mammals in Central Asia (Wingard *et al.*, 2014), developed under CAMI, provide a thorough review of the threats posed to Central Asian mammals by infrastructure development, technical solutions to such threats, and analyses of the existing political and legal frameworks in Central Asian countries for addressing the threats.

Infrastructure development is a key issue for wildlife populations in Mongolia; for example, the fenced Trans-Mongolian Railway created an almost complete barrier to the movement of Mongolian gazelle, khulan and other open-landscape mammals. The CMS guidelines provided a basis for the development of national standards that define obligatory wildlife-friendly measures for all development projects in Mongolia (Mongolian Agency for Standardization and Metrology, 2015). An international workshop was held to promote the CMS guidelines and the Mongolian standards and to develop a pilot project in collaboration with the Mongolian railway company to remove parts of the fence along the railway.

Such cases demonstrate that international engagement – in addition to providing expert technical solutions – can be an effective tool for initiating policy dialogue and supporting national stakeholders (e.g. scientific experts and NGOs) engaged in negotiations with government, and ultimately in achieving positive outcomes, even on complex issues.

POLICY IMPLICATIONS AND OBSTACLES TO IMPLEMENTATION

CAMI sets a general framework for policy and actions, as do other similar regional initiatives. The success or otherwise of implementation depends on the availability

of resources; the strength of established regional and local partnerships; the extent of political support and clear commitments from national governments; the support provided by the scientific community, donors and the private sector; and other factors. By providing a neutral platform for inclusive engagement, CAMI has the potential to support the development of participatory approaches in nature conservation decision-making, policies and practices in Central Asia.

Existing national policy and legislative frameworks are especially important for the overall success of such regional cooperation. To a large extent, these define the system of wildlife management and conservation in a country, as well as existing capacities and available resources, among other things. One way of ensuring the long-term implementation of CAMI would be to mainstream its provisions in relevant national laws. This is difficult to achieve universally, however, among the diverse countries covered by the initiative. Moreover, the wildlife conservation sector is prone to the governance problems common to other sectors in Central Asia, such as insufficient law enforcement and compliance capacity, a lack of resources and qualified staff, and limited collaboration and dialogue among stakeholders.

Existing laws on wildlife management and the use of natural resources (e.g. forests and pastures) vary greatly among countries in the region, as does the priority given to these in national policy agendas (see Morgera, Wingard and Fodella, 2009, for an overview). The consolidation and promotion of a unified approach to wildlife management and conservation across the region does not seem feasible. Some countries are not even members of the CMS, which therefore has limited competencies for engaging with them. The diversity of national policy and legal frameworks, and the differing levels of political buy-in among governments, are other key limitations to the implementation of CAMI and other regional instruments. Also, the lack of long-term financing

results in mostly ad hoc management. Full implementation, therefore, will depend largely on the ability to increase national political buy-in, consolidate resources, and mobilize additional donor funding. The CMS Secretariat (which administers CAMI), interested international NGOs and the scientific community can assist, but ultimately the active engagement of national and local partners is needed to improve the situation.

There is a further need, therefore, to identify and support national and local partners interested in long-term engagement. In most participating countries, governmental authorities show a high level of enthusiasm but lack the capacity for continuous engagement and project implementation due to limited financial, administrative and political stability and continuity. The coordination of CAMI, which spans 14 countries with their own political and economic priorities as well as a broad range of other stakeholders with their own interests and agendas, is itself a challenge, and inclusive negotiations and coordinated actions are difficult to achieve. Moreover, the question of ownership frequently arises in multi-stakeholder partnerships: Who is ultimately responsible for achieving results? Whose responsibility is it to ensure implementation and the dissemination of information? The experience of CAMI demonstrates that regional cooperation has a higher chance of achieving tangible results when strong local partners take the initiative, support implementation, and develop a sense of ownership for the conservation and sustainable use of wildlife species.

CONCLUSION

The vast open landscapes of Central Asia form the world's largest interconnected steppe habitat in which mass animal migration still occurs. The long-term survival of Central Asia's migratory mammals is linked inextricably to the continuing conservation of these highly valuable ecosystems and to the ability to address threats caused by anthropogenic influence. Wider political and economic factors, such

as rapid economic development, political instability, a lack of transparency, the inefficiency of governance structures, and security issues push the conservation agenda into the margins of national policies. In addition to identifying direct conservation measures, regional conservation initiatives such as CAMI aim to steer political engagement, build capacity and raise the profile of wildlife conservation and sustainable use in national governments and among policy-makers. The success of such a comprehensive initiative depends largely on establishing long-lasting partnerships among NGOs, scientists, governments and the international conservation community that can act at several levels of governance to mobilize resources and expertise.

There are few ongoing community-based conservation and management schemes in Central Asia, and even fewer such schemes operate without external donors or NGO support. In addition to providing direct monetary benefits, community-based conservation and management could trigger wider governance changes by empowering communities and strengthening their capacity to engage in political dialogues and defend their rights. There is a clear need, therefore, to further analyse these existing cases to better understand the key elements in the success or failure of such schemes. CAMI has the potential to consolidate this knowledge and to further streamline successful approaches among stakeholders. The example of community engagement in saiga conservation provides a good starting point for such an analysis, especially for non-consumptive uses. The infrastructure example in Mongolia shows the importance of targeted political negotiations and improving relevant laws.

The saiga MOU (one of the oldest CMS instruments in the region), backed by a strong conservation partnership and delivering successful conservation outcomes, constitutes a good learning platform for CAMI by demonstrating practices that could work in Central Asia. Close engagement with, and the support of, local rural

communities is crucial for stabilizing wildlife populations, which, in turn, will result in healthier ecosystems and increase the resilience of ecosystems and their capacity to cope with climate change. ♦



References

- ACBK.** 2015. Big Steppe Tour. Website (available at www.acbk.kz/en/pages/3778.html). Association for the Conservation of Biodiversity of Kazakhstan (ACBK). Accessed January 2017.
- Conservation International.** 2014. Biodiversity hotspots. Mountains of Central Asia. Website (available at www.cepf.net/resources/hotspots/Europe-and-Central-Asia/Pages/Mountains-of-Central-Asia.aspx). Accessed January 2017.
- Howe, C., Medzhidov, R. & Milner-Gulland, E.J.** 2011. Evaluating the relative effectiveness of alternative conservation interventions in influencing stated behavioural intentions: the saiga antelope in Kalmykia (Russia). *Environmental Conservation*, 38(1): 37–44.
- Karlstetter, M. & Mallon, D.** 2014. *Assessment of gaps and needs in migratory mammal conservation in Central Asia*. Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat.
- Kühl, A., Balinova, N., Bykova, E., Arylov, Y., Esipov, A., Lushchekina, A. & Milner-Gulland, E.J.** 2009. The role of saiga poaching in rural communities: linkages between attitudes, socio-economic circumstances and behavior. *Biological Conservation*, 142: 1442–1449.
- Mallon, D. & Jiang, Z.** 2009. Grazers on the plains: challenges and prospects for large herbivores in Central Asia. *Journal of Applied Ecology*, 46: 516–519.
- Milner-Gulland, E.J., Kholodova, M., Bekenov, A., Buhreeva, O., Grachev, I.A., Amgalan, L. & Lushchekina, A.** 2001. Dramatic decline in saiga antelope populations. *Oryx*, 35(4): 340–345.
- Mischler, A.** 2006. Wildlife Policy and Institutions for Sustainable Use and Conservation of Wildlife Resources: Joint FAO/Czech Republic Workshop. Facilitator's report (available at www.cic-wildlife.org/wp-content/uploads/2013/04/FAO_CIC_Prague_2006_WS_Report_Final_02.pdf).
- Mongolian Agency for Standardization and Metrology.** 2015. *Standard of Mongolia: passage for wild animals along auto and rail roads in steppe and Gobi region*. General requirements. Ulaanbaatar.
- Morgera, E., Wingard, J. & Fodella, A.** 2009. *Developing sustainable wildlife management laws in western and Central Asia*. Budapest, FAO & International Council for Game and Wildlife Conservation (CIC).
- Olson, K.** 2014. *Saiga crossing options: guidelines and recommendations to mitigate barrier effects of border fencing and railroad corridors on saiga antelope in Kazakhstan*. Frankfurt Zoological Society, Association for the Conservation of Biodiversity of Kazakhstan, Fauna & Flora International & Convention on the Conservation of Migratory Species of Wild Animals (CMS) (available at www.cms.int/sites/default/files/publication/Kirk_Olson_Saiga_Crossing_Options_English.pdf).
- Rakhimov, M.** 2010. Internal and external dynamics of regional cooperation in Central Asia. *Journal of Eurasian Studies*, 1: 95–101.
- Rosen, T.** 2012. *Analyzing gaps and options for enhancing argali conservation in Central Asia within the context of the CMS*. Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
- Saiga Conservation Alliance.** 2015. Saving saigas: projects around the world. Website (www.saiga-conservation.com/projects.html). Accessed January 2017.

- Singh, N., Grachev, I., Bekenov, A. & Milner-Gulland, E.J.** 2010. Saiga antelope calving site selection is increasingly driven by human disturbance. *Biological Conservation*, 143: 1770–1779.
- UNEP/CMS.** 2014a. *Central Asian Mammals Initiative: saving the last migrations*. Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat.
- UNEP/CMS.** 2014b. COP Resolution 11.24: The Central Asian Mammals Initiative. Bonn, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS).
- UNEP/CMS.** 2015a. *Overview report on conservation status of the saiga antelope (Saiga spp.) and MOU implementation*. Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat (available at www.cms.int/saiga/sites/default/files/document/Saiga%20MOS3_Overview_Report_of_Conservation_Status_Eng.pdf).
- UNEP/CMS.** 2015b. Report of the Third Meeting of the Signatories. United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat (available at www.cms.int/saiga/sites/default/files/document/unep_cms_saiga%20mos3_mr_with%20Annexes_e_0.pdf).
- UNEP/CMS.** 2015c. Medium-term International Work Programme for the Saiga Antelope (2016–2020). Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat (available at www.cms.int/saiga/sites/default/files/document/unep-cms_saiga%20mos3_mr_annex%205_mtiwp2016-2020_rev_eng.pdf).
- Wingard, J., Zahler, P., Victorine, R., Bayasgalan, O. & Buuveibaatar, B.** 2014. *Guidelines for addressing the impact of linear infrastructure on large migratory mammals in Central Asia*. Bonn, Germany, United Nations Environment Programme (UNEP)/Convention on the Conservation of Migratory Species of Wild Animals (CMS) Secretariat.
- Zimmer, C.** 2015a. Death on the steppes: mystery disease kills saigas. *The New York Times*, online edition, 29 May 2015 (available at www.nytimes.com/2015/06/02/science/saiga-antelope-mystery-disease-die-off.html).
- Zimmer, C.** 2015b. More than half of entire species of saigas gone in mysterious die-off. *The New York Times*, online edition, 2 November 2015 (available at www.nytimes.com/2015/11/03/science/more-than-half-entire-species-of-saigas-gone-in-mysterious-die-off.html?_r=0). ◆

High-tech participatory monitoring in aid of adaptive hunting management in the Amazon

N. van Vliet, F. Sandrin, L. Vanegas, L. L'haridon, J.E. Fa and R. Nasi



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A phone app is proving popular among Amazonian hunters in monitoring their offtakes, and it shows promise as a hunting management tool.

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Bushmeat (also called wild meat) consumption – defined as the use of any non-domesticated terrestrial mammals, birds, reptiles and amphibians harvested for food (Nasi *et al.*, 2008) – is a reality in many tropical forest landscapes. Millions of people worldwide rely on bushmeat as a major source of protein, calories and micronutrients, and the sale of such meat supports the livelihoods of many forest-living people, who often have few other sources of income (Fa, Peres and Meeuwig, 2002; Bakarr *et al.*, 2002; Mainka and Trivedi, 2002; Corlett, 2007; Nasi *et al.*, 2008; Brashares *et al.*, 2011; Golden *et al.*, 2011). The over-hunting of bushmeat species, however,

A hunter and his family are instructed in the use of a phone app for monitoring hunting activity

can be a significant driver of defaunation in tropical forests (Gandiwa *et al.*, 2014; Petrozzi *et al.*, 2016). Wildlife hunting can be locally intense, threatening entire populations and contributing to the local extirpation of vulnerable species (Abernethy *et al.*, 2013). Humans have been hunting wildlife for millennia, but the pressure exerted by hunting on wildlife today is being exacerbated by human population growth, improved hunting technologies, expanded market access, and extractive activities that bring people deep into tropical forests.

Unsustainable hunting not only creates empty forests and savannahs, it can affect ecosystem functioning because of the ecological roles played by wildlife in such environments (Abernethy *et al.*, 2013; Effiom *et al.*, 2013; Wilkie *et al.*, 2011). Moreover, the modification of ecosystems caused by unsustainable hunting jeopardizes the culture, health and well-being of indigenous groups and poor rural families living within them (Bennett *et al.*, 2007; Nasi *et al.*, 2011).

Given the importance of unsustainable hunting for conservation and livelihoods, the 11th Conference of the Parties to the Convention on Biological Diversity (CBD), held in 2012, called for the development of appropriate plans for ensuring the sustainable hunting and consumption of bushmeat. This is a laudable aim, but attaining it is possible only in situations where local communities fully participate in hunting management governed by adaptive processes (Stuart-Hill *et al.*, 2005). Recent experiences in adaptive management in temperate hunting systems provide inspiration for the sustainable use of bushmeat in tropical areas (Fiorini, Yearley and Dandy, 2011; Hunt, 2013; Carter *et al.*, 2014; Brown *et al.*, 2015).

THE IMPORTANCE OF MONITORING Weinbaum *et al.* (2013) suggested that adaptive management is fundamental to achieving sustainable bushmeat hunting, and this requires efficient monitoring processes. An effective monitoring system requires indicators that represent and explain the condition of a monitored variable over time (Jones *et al.*, 2011). Despite the CBD's call for more "appropriate monitoring systems of bushmeat harvest and trade" (CBD, 2012), however, only limited progress has been made in developing comprehensive indicators for the sustainability of wild animal offtakes, especially for terrestrial species. Monitoring should enable the detection of unexpected change, raise awareness among citizens and policy-makers, and allow the timely development and evaluation of management interventions (Wintle, Runge and Bekessy, 2010; Jones *et al.*, 2013).

Weinbaum *et al.* (2013) proposed the monitoring of harvested populations over time as one of the gold standards of sustainability monitoring. Understanding the impact of human hunting alongside the influence of exogenous factors, however, is also crucial for determining the fate of wildlife populations. Learning from the

better-developed monitoring systems for fisheries, as suggested by Ingram *et al.* (2015), may help in building more robust approaches for monitoring the exploitation of terrestrial species (e.g. the use of mean body mass indicator to assess whether hunters are relying on increasingly smaller species over time, and the use of the "offtake pressure indicator" as a measure of harvesting pressure on groups of wild animals). Hunting sustainability can also be investigated directly by monitoring hunters' catch per unit effort (CPUE), which allows spatial and temporal comparisons (Puertas and Bodmer, 2004; Sirén, Hambäck and Machoa, 2004).

The growing field of public participation in scientific research includes citizen science, volunteer monitoring and other forms of organized research in which members of the public engage in the process of scientific investigation by asking questions, collecting data and interpreting results. In the long term, population monitoring will be most effective in ensuring sustainable hunting if it is an ongoing participatory process (possibly accompanied by adaptive harvesting strategies), which in turn empowers local people (Johnson, Kendall and Dubovsky, 2002; Singh and



A hunter checks a trap in the Ticoya Indigenous Reserve, Colombia

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**Members of the
hunters' association,
Airumaküchi**



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Gajadhar, 2014). Such monitoring programmes require long-term, intensive and repetitive monitoring of hunting effort and offtake by the individuals undertaking the hunting. Crucially, they require methods that can be replicated over time and that are efficient and transferable to different communities (Meijaard *et al.*, 2011). To date, most offtake monitoring has involved the simple use of notebooks, in which hunters record information on their hunting trips, such as the type and numbers of animals killed, in a standardized format. But many hunters may be illiterate, filling out notebooks is time-consuming, and errors may arise due to research fatigue.

In this article, we present the results of a study on a new method for data collection, digitization and analysis based on a mobile phone application. Applications, commonly referred to as apps, are software programmes designed to run on mobile devices such as smartphones and tablets. We tested the method through a hunters' association, Airumaküchi, in Puerto Nariño, Amazonas, Colombia; we found that it is not only more efficient than traditional methods of note-taking, it also provides hunters with an opportunity to be data providers and to distinguish trends in their hunting activities. More importantly, the data generated using this

more efficient method can increase the involvement of hunters in decision-making. Here we present data generated by 30 hunters during a 5-month trial and discuss the perceived advantages and disadvantages of the use of phone apps compared with traditional notebooks.

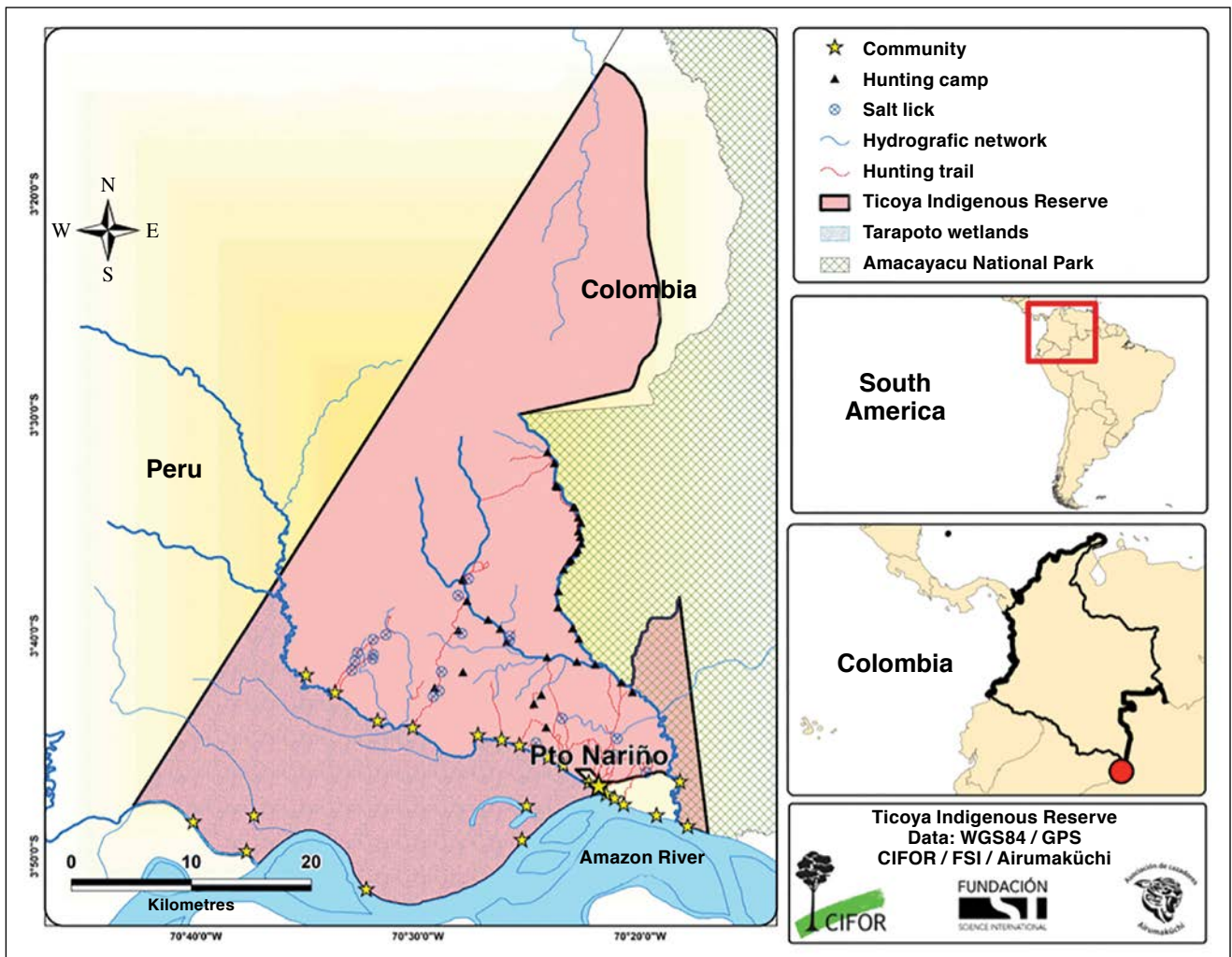
STUDY LOCATION

The study was carried out in and around the Ticoya Indigenous Reserve (TIR) in the municipality of Puerto Nariño, 87 km upstream of the Colombian Amazon's largest city, Leticia, on the Amazon River (Figure 1). Three types of forest are found in the municipality: *terra firme* forest (not subject to flooding regimes); varzea forest (subject to periodic flooding by white waters); and swamp forest (seasonally flooded by black waters) (Moreno Arocha, 2014). The climate of the area is warm and humid, with rainfall causing four distinct periods: 1) high waters (February to April); 2) decreasing waters (May to July); 3) low waters (August to October); and 4) rising waters (November to January). The average annual temperature is 26 °C (although it can reach 38 °C), and the relative humidity is around 87 percent (Rangel and Luengas, 1997).

The TIR, which was legally created in March 1990, covers 1 471 km² and represents 92.4 percent of the Puerto Nariño

municipality. Twenty-three indigenous communities from the Ticuna, Cocama and Yagua ethnic groups live within the TIR, mostly along the Amazon, Loretoyacu, Boyahuazu and Atacuari rivers. In our study, we sought the participation of eight communities living within or bordering the TIR. The main livelihood activities are shifting cultivation (31 percent); fishing (24 percent); timber extraction (7 percent); hunting (4 percent); the collection of non-wood forest products (4 percent); livestock (4 percent); and salaried jobs (18 percent) (Trujillo, 2008, data from three communities). Tourism has recently become an important livelihood activity, providing jobs for guides, cooks, cleaning services in hostels, and handicrafts. Recent studies indicate the cultural importance of bushmeat and its contribution to food security, especially in situations where there is a tendency for nutritional transitions (van Vliet *et al.*, 2015).

Hunters in the TIR have formed the Airumaküchi hunters' association, the main objective of which is to ensure sustainable hunting and the trade of surplus meat as a way of guaranteeing local food security and maintaining cultural values. We provided technical support for the development of a hunting monitoring system aimed at informing adaptive management processes for sustainability.



THE MONITORING APPROACH

Six hunters from Airumaküchi have been monitoring their wildlife offtakes using traditional notebooks since 2013. Given that Puerto Nariño has access to the Internet via a 3G network and that most households already have access to technologies such as tablets, iPhones and computers, we investigated the possibility of using the KoBoCollect software downloaded onto mobile devices in a participatory monitoring process as an alternative to notebooks. KoboCollect is an Android/iOS app to facilitate data collection involving the use of smartphones or digital tablets and questionnaires created online (or offline and then uploaded onto the devices) according to user requirements. Data collected via

mobile devices can be transmitted via the Internet (e.g. by 3G or Wi-Fi), stored on the KoBoCollect server (encrypted, if needed), and exported for analysis using software formats such as XLS, CSV, ZIP and KML. KoBoCollect can be used to produce, for example, summary tables, simple frequencies, and summary statistics (i.e. mean and median).

We developed a first version of the questionnaire based on the results of a meeting held with hunters, at which suggestions were made on the type of data to be collected to inform their decision-making. Each hunter was trained to use the questionnaire. Each also received a smartphone – the Samsung Galaxy Mini #4 model GT-I9195 (equipped with SIM cards,

monthly 2-gigabyte Internet plans and physical protection) – and a printed and plasticized map of the territory of the TIR divided into an indexed grid; the purpose of the map was to provide the locations of hunting points in case the hunter could not fill in the form in the forest or obtain the location using the smartphone's global positioning system. The first version of the form was reviewed several times over the two-month testing period (March and April 2015) to take into account the suggestions and contributions of hunters. This period was key to identifying the difficulties that hunters might encounter

1

*The Ticoya Indigenous Reserve,
Colombia*

in handling the smartphones and understanding the questionnaire. Among others, these difficulties were as follows:

- Most senior hunters had trouble handling the phone's tactile screen.
- Of the ten phones delivered, one was lost in a river and two others were damaged by water.
- When the hunters returned home with no animals hunted, no form was filled out, resulting in the underestimation of effort.
- Some hunters used the whole package of 3G data in downloading games and other apps, meaning that no 3G data were available for sending the forms.

To correct these difficulties, we adapted the method in the second month of monitoring by:

- selecting young hunters familiar with the manipulation of smartphones and tactile screens and putting them in charge of monitoring offtakes for illiterate or older hunters in their communities;
- providing impermeable blisters to protect phones from humidity and water;
- insisting on the importance of collecting data with rigour because the collected data would be important in helping hunters decide on future actions; and
- providing access to the Internet for one day (or 200MB) four times per month, at the end of each week, rather than continuously, to ensure that all hunters had sufficient 3G data to send their forms to the server.

The final version of the questionnaire used multiple-choice questions and addressed the following:

- hunter's name and community;
- general information on each hunting trip, even if no animal was hunted (i.e. date of departure; duration of trip; places visited using the map of the territory; and other activities carried out);
- offtake data (i.e. species, using a pre-defined species list that includes

pictures of the animals to assist identification; hunting tool used; place and type of habitat where the hunter killed the animal; sex and age of the animal; and, if female, whether the animal was pregnant); and

- the use of the animal (i.e. whether consumed, gifted or sold).

Hunters could also include photos of the animals caught and add comments. The following comments, among others, were entered into the database and used as sources of information for management:

"Migration and lack of prey due to the noise generated by the cutting of trees for new shifting cultivation plots."

"During my hunting trip, apart from the two animals I shot, I also saw a red deer and an agouti, but because I did not have any cartridges left, I let them go."

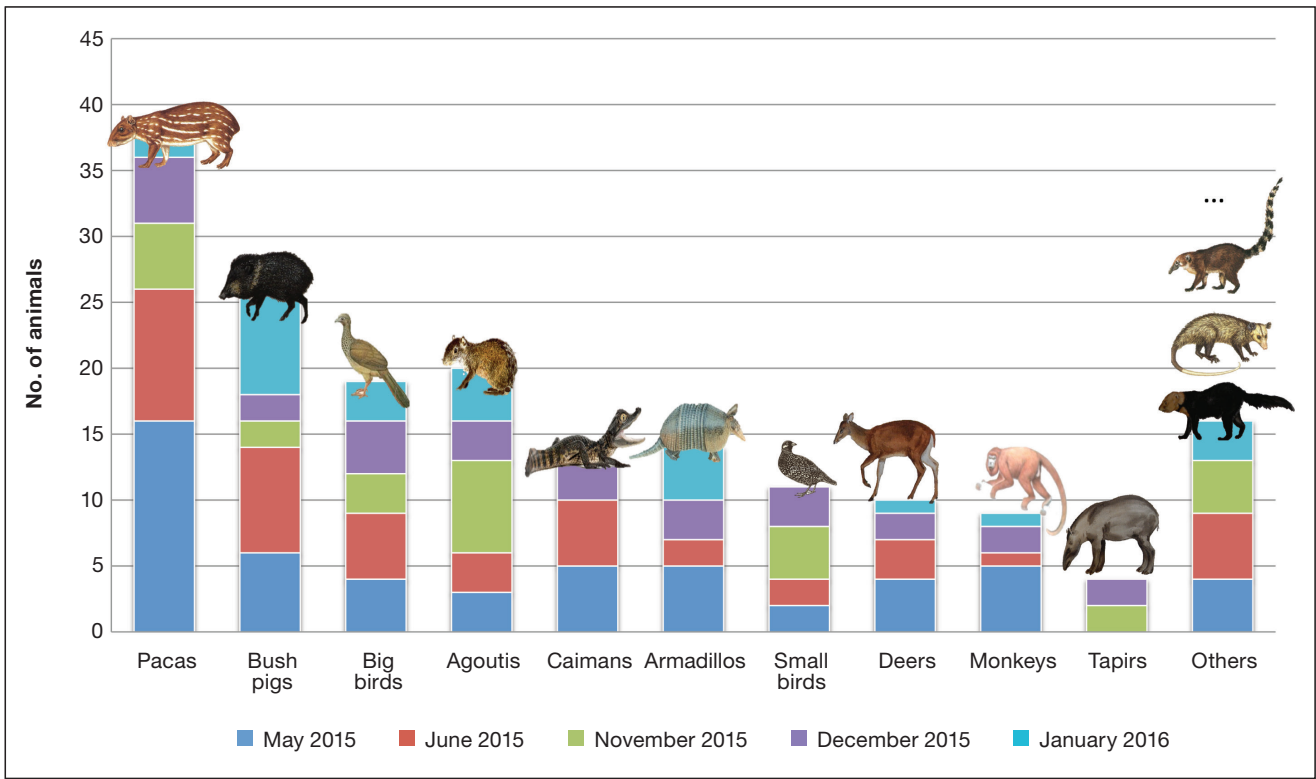
We monitored the hunting offtakes of the 30 hunters (but only 11 per month) over five months (May, June, November and December 2015 and January 2016) using the developed questionnaire. May and June correspond with decreasing waters

(less rainfall) and November, December and January with increasing waters (more rainfall). The data were uploaded weekly to the KoBoCollect server and exported from CSV to a central Excel file. This file contained formulas that automatically analysed information in graphs, and these were presented to the hunters every two months. We built a wooden structure (shown in the photo below) in which to provide a tangible display of monitoring results to visitors to the Airumaküchi office, and we generated a map of hunting effort and hunting offtakes. A WhatsApp group was created among the hunters and project staff to enable rapid communication between them.

The data were analysed using descriptive graphs for ease of understanding by hunters. The analysis included the following simple indicators: number of hunting trips per month; biomass hunted per month; number of animals hunted per species and per month; number of unsuccessful hunting trips; CPUE in kg per hour; the proportion of small species (less than 20 kg) in the overall monthly offtake; the use of the meat (percentage sold versus other uses); and biomass per hunter per month.

This display board is a local innovation by the Airumaküchi hunters' association to visualize hunting offtakes per month for a list of predefined species





2
Numbers of animals caught, by species, May 2015–January 2016

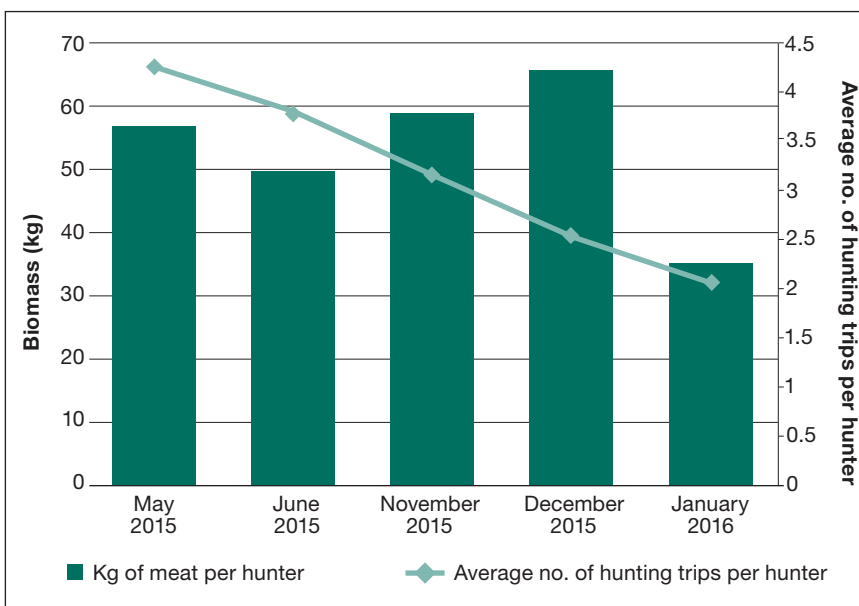
RESULTS

The hunters provided information on 175 hunting trips and 172 animals caught over the five-month monitoring period. The four most hunted species were paca (*Cuniculus paca*), bush pig (*Pecari tajacu*),

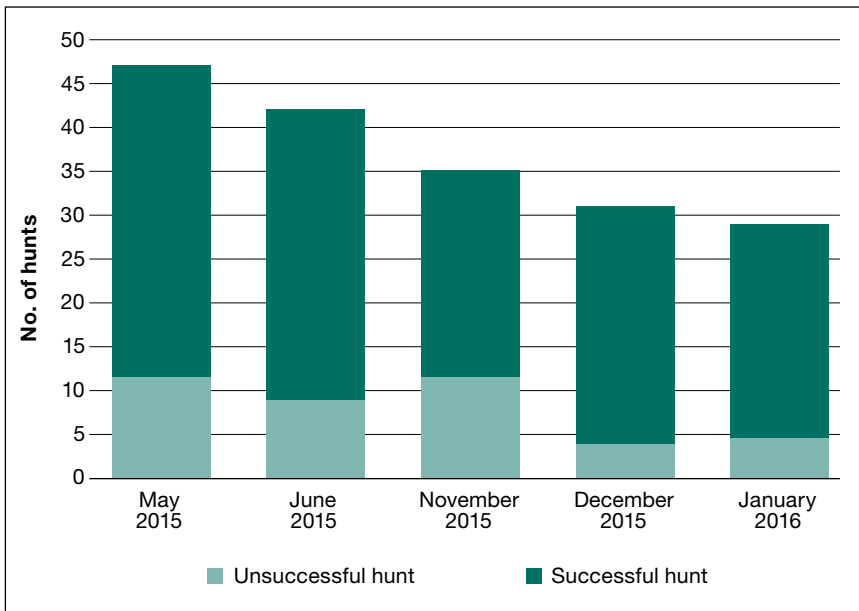
big birds and agoutis (*Dasyprocta* spp.) (Figure 2). The average biomass caught per month by hunters was in the range of 32–63 kg (Figure 3). The percentage of biomass sold locally varied from 31 percent to 48 percent, depending on

the month; the remainder was consumed by the families of the hunters or given as gifts to friends or family members.

The analysis shows seasonal variations in hunting patterns. Although the number of hunting trips was higher in the drier season (i.e. decreasing waters), the total biomass hunted per month did not vary significantly between seasons. Rain reduced the number of hunting trips in the rainy season but did not reduce the percentage of successful trips, which varied from 65 percent to 85 percent, depending on the month (Figure 4). About 75 percent of animals caught were from small-sized species (i.e. less than 20 kg), and this percentage did not vary significantly between months (Figure 5). The CPUE was higher in the rainy season (particularly in November and



3
Average biomass taken and number of hunting trips, May 2015–January 2016



4
Total number of successful and unsuccessful hunting trips, 30 hunters, May 2015–January 2016

date, use WhatsApp, take photos and play games. Among the disadvantages cited were that the smartphones could be damaged or stolen and that it was less easy to capture details about hunting trips because all questions were multiple-choice. For the two project staff members, the main perceived advantages were that the motivation of access to new technologies helped attract hunters to participate in the monitoring system and in understanding its importance. The use of the app was also seen as positive because the data could be uploaded directly to the server, saving the time required to digitize data from notebooks and avoiding transcription errors. The use of WhatsApp as a means of communicating among hunters and project staff was seen as very positive, helping create a sense of team within the group and enabling the sharing of experiences, photos and important information about the monitoring protocol.

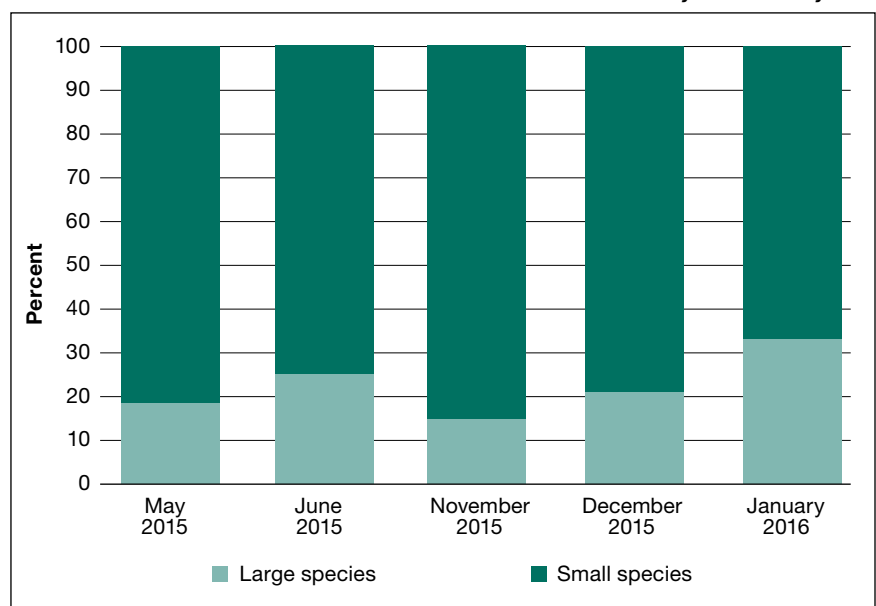
December) (Figure 6). Figure 7 shows the distribution of the catch and the number of pacas caught as an example of the output that the monitoring method generated to inform hunting management. The map, as well as the various indicators used in the monitoring process (i.e. CPUE, percentage of small-sized species, percentage of unsuccessful trips, and biomass per hunter), are useful for monitoring sustainability if used and compared over the long term.

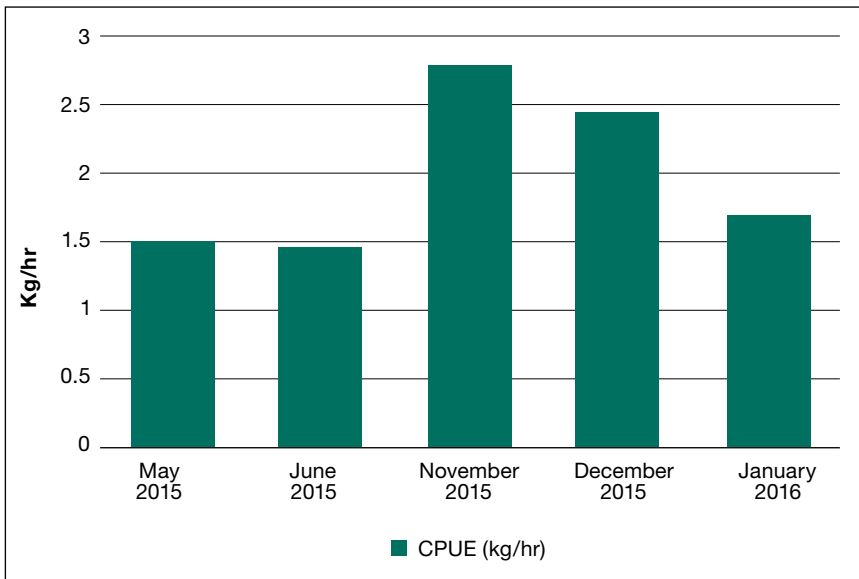
Of the six hunters, four had never previously used a smartphone but found it very easy to learn. Only one of the hunters (the eldest) preferred to use a notebook after trying the phone app. The other five hunters preferred the phone app because it was easy to use and information could be entered more quickly; they also appreciated learning about new technologies and using their smartphones for other purposes, such as to check the time and

5
Percentage of large (>20 kg) and small (<20 kg) species in total catch, May 2015–January 2016

ADVANTAGES AND DISADVANTAGES OF THE METHOD

To assess the advantages and disadvantages of the use of the app in monitoring offtakes compared with notebooks, we developed a semi-structured questionnaire and asked 6 of the 30 hunters participating in the monitoring process (because those six had previously worked with paper notebooks) and two staff members in charge of coordinating the project’s monitoring component to complete the questionnaire. The questions included a comparison between paper notebooks and phone apps in terms of the clarity of the questionnaire; the time spent filling out the form; the added benefits of being able to use a smartphone; and the disadvantages and advantages of using phone apps compared with notebooks.



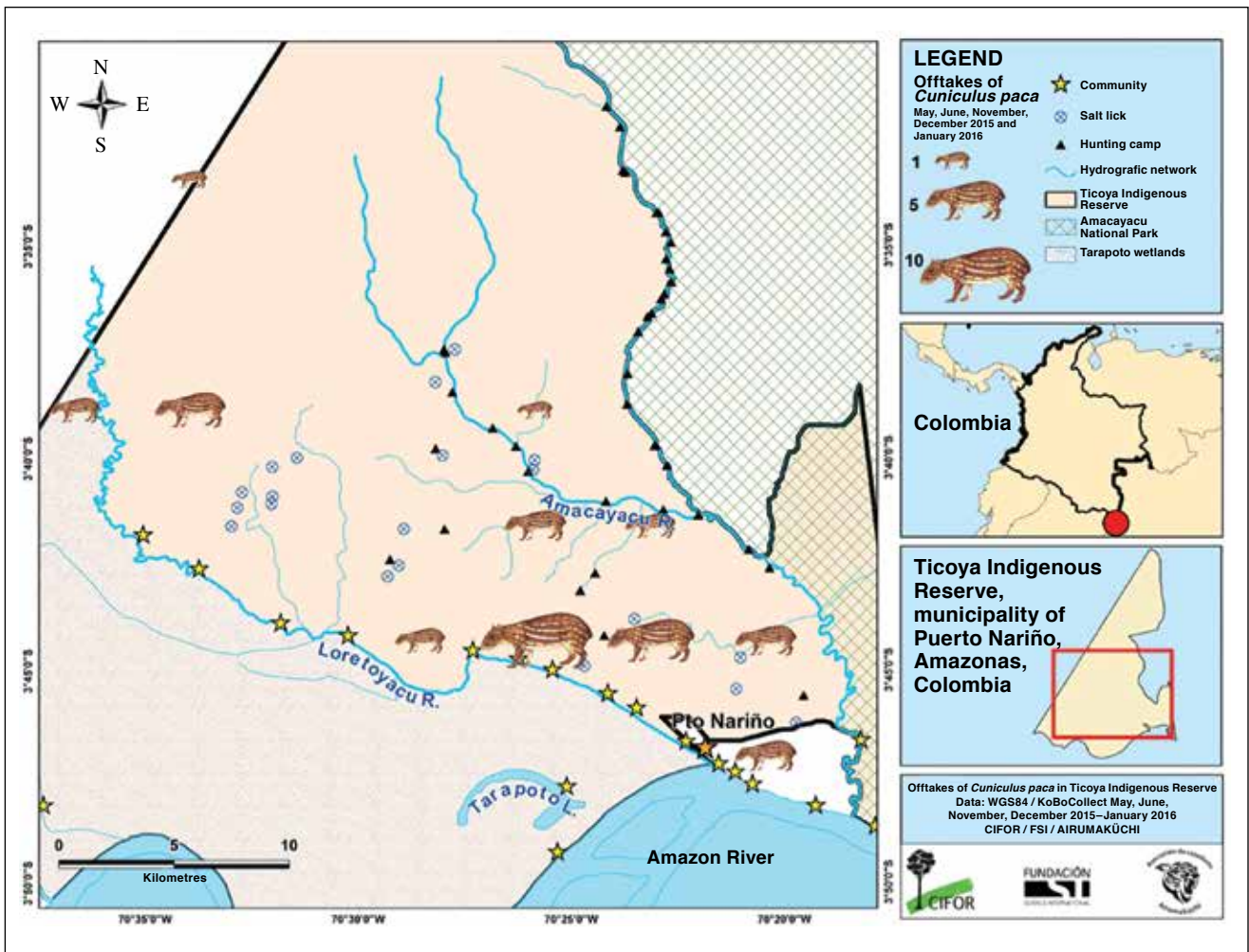


CONCLUSION

Our study tested the use of a smartphone app for the participatory monitoring of hunting in the context of sustainable hunting initiatives. The results show that the app can generate information on hunting on a monthly basis that, in the long run, can be used to inform decision-making. Hunters perceive smartphones to be easier to use and less time-consuming than paper notebooks, reducing the risk of research

6
Average catch per unit effort, May 2015–January 2016

7
Offtakes of *Cuniculus paca*, Ticoya Indigenous Reserve, May 2015–January 2016, obtained through the KoBoCollect app



Hunters share experiences and help each other in the use of the monitoring app



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fatigue; moreover, there may be more motivation to engage in monitoring over time because the results are readily available to users. This is not to say that smartphone apps are necessarily the solution in all contexts. Our pilot was successful partly because the area in which the project was conducted already had access to the Internet and phone technology was present in the community. The project, therefore, did not bring new technology with it; rather, it used an existing technology as a way of encouraging sustainable hunting; in other contexts, smartphone apps may not be so readily adopted. Despite a continuous decline in the prices of smartphones and Internet access, initial costs reduce the potential for many communities to use the methodology in the absence of external financial help.

Even though our study was preliminary and covered only seven months (a two-month trial and five months of implementation), it has shown the potential of using key indicators and modern technologies in participatory monitoring as a way of improving hunting management practices. ♦



References

- Abernethy, K.A., Coad, L., Taylor, G., Lee, M.E. & Maisels, F.** 2013. Extent and ecological consequences of hunting in central African rainforests in the twenty-first century. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 368(1625): 20120303 (DOI 10.1098/rstb.2012.0303).
- Bakarr, M.I., Ampadu-Agyei, O., Adomako, E. & Ham, R.** 2002. Bushmeat utilization, human livelihoods and conservation of large mammals in West Africa. In S. Mainka & M. Trivedi, eds. *Links between biodiversity conservation, livelihoods and food security: the sustainable use of wild meat*, pp. 45–54. Gland, Switzerland, and Cambridge, UK, International Union for Conservation of Nature (IUCN).
- Brashares, J.S., Golden, C.D., Weinbaum, K.Z., Barrett, C.B. & Okello, G.V.** 2011. Economic and geographic drivers of wildlife consumption in rural Africa. *Proceedings of the National Academy of Sciences*, 108(34): 13931–13936.
- Brown, C.L., Seaton, K.A., Brinkman, T.J., Euskirchen, E.S. & Kielland, K.** 2015. Applications of resilience theory in management of a moose-hunter system in Alaska. *Ecology and Society*, 20(1): 16 (DOI dx.doi.org/10.5751/ES-07202-200116).
- Carter N.H., Viña, A., Hull, V., McConnell, W.J., Axinn, W., Ghimire, D. & Liu, J.** 2014. Coupled human and natural systems approach to wildlife research and conservation. *Ecology and Society*, 19(3): 43.
- CBD.** 2012. COP 11 Decision XI/25. Website. Convention on Biological Diversity (CBD) (available at www.cbd.int/decision/cop/?id=13186). Accessed 4 January 2017.
- Corlett, R.T.** 2007. The impact of hunting on the mammalian fauna of tropical Asian forests. *Biotropica*, 39(3): 292–303.
- Effiom, E.O., Nuñez-Iturri, G., Smith, H.G., Ottosson, U. & Olsson, O.** 2013. Bushmeat hunting changes regeneration of African rainforests. *Proceedings of the Royal Society of London B: Biological Sciences*, 280(1759): 20130246 (DOI 10.1098/rspb.2013.0246).
- Fa, J.E., Peres, C.A. & Meeuwig, J.** 2002. Bushmeat exploitation in tropical forests: an intercontinental comparison. *Conservation Biology*, 16(1): 232–237 (DOI 10.1046/j.1523-1739.2002.00275.x).

- Fiorini, S., Yearley, S. & Dandy, N.** 2011. Wild deer, multivalence, and institutional adaptation: the “deer management group” in Britain. *Human Organization*, 70(2): 179–188.
- Gandiwa, E., Zisadza-Gandiwa, P., Mango, L. & Jakarasi, J.** 2014. Law enforcement staff perceptions of illegal hunting and wildlife conservation in Gonarezhou National Park, southeastern Zimbabwe. *NuSpace Institutional Repository*, 55(1): 119–127.
- Golden, C.D., Fernald, L.C., Brashares, J.S., Rasolofoniaina, B.R. & Kremen, C.** 2011. Benefits of wildlife consumption to child nutrition in a biodiversity hotspot. *Proceedings of the National Academy of Sciences*, 108(49): 19653–19656.
- Hunt, L.N.** 2013. Using human-dimensions research to reduce implementation uncertainty for wildlife management: a case of moose (*Alces alces*) hunting in northern Ontario, Canada. *Wildlife Research*, 40(1): 61–69.
- Ingram, D.J., Coad, L., Collen, B., Kümpel, N.F., Breuer, T., Fa, J.E., Gill, D.J.C., Maisels, F., Schleicher, J., Stokes, E.J., Taylor, G. & Scharlemann, J.P.W.** 2015. Indicators for wild animal offtake: methods and case study for African mammals and birds. *Ecology and Society*, 20(3): 40 (DOI dx.doi.org/10.5751/ES-07823-200340).
- Johnson, F.A., Kendall, W.L. & Dubovsky, J.A.** 2002. Conditions and limitations on learning in the adaptive management of mallard harvest. *Wildlife Society Bulletin*, 30(1): 176–185.
- Jones, B.A., Grace, D., Kock, R., Alonso, S., Rushton, J., Said, M.Y., McKeever, D., Mutua, F., Young, J., McDermott, J. & Pfeiffer, D.U.** 2013. Zoonosis emergence linked to agricultural intensification and environmental change. *Proceedings of the National Academy of Sciences*, 110: 8399–8404.
- Jones, J.P.G., Collen, B., Atkinson, G., Baxter, P.W.J., Bubb, P., Illian, J.B., Katzner, A., Keane, A., Loh, J., McDonald-Madden, E., Nicholson, E., Pereira, H.M., Possingham, H.P., Pullin, A.S., Rodrigues, A.S.L., Ruiz-Gutierrez, V., Sommerville, M. & Milner-Gulland, E.J.** 2011. The why, what, and how of global biodiversity indicators beyond the 2010 target. *Conservation Biology*, 25(3): 450–457.
- Mainka, S. & Trivedi, M., eds.** 2002. *Links between biodiversity conservation, livelihoods and food security: the sustainable use of wild species for meat*. Occasional Paper of the IUCN Species Survival Commission No. 24. Gland, Switzerland, and Cambridge, UK, International Union for Conservation of Nature (IUCN).
- Meijaard, E., Buchori, D., Hadiprakarsa, Y., Utami-Atomoko, S.S., Nurcahyo, A., Tjiu, A. & Antoni, I.N.G.** 2011. Quantifying killing of orangutans and human-orangutan conflict in Kalimantan, Indonesia. *PLoS One*, 6(11): e27491 (DOI dx.doi.org/10.1371/journal.pone.0027491).
- Moreno Arocha, M.** 2014. Contexto geográfico y social de los humedales de Tarapoto. In F. Trujillo & S. Duque, eds. *Los humedales de Tarapoto: aportes al conocimiento sobre su diversidad y uso*. Serie humedales de la Amazonia y Orinoquia. Fundación Omacha, Corpoamazonia, Universidad Nacional Sede Leticia.
- Nasi, R., Brown, D., Wilkie, D., Bennett, E., Tutin, C., van Tol, G. & Christophersen, T.** 2008. *Conservation and use of wildlife-based resources: the bushmeat crisis*. Technical Series No. 33. Montreal, Canada, Secretariat of the Convention on Biological Diversity, and Bogor, Indonesia, Center for International Forestry Research (CIFOR).
- Petrozzi, F., Amori, G., Franco, D., Gaubert, P. & Pacini, N.** 2016. Ecology of the bushmeat trade in west and central Africa. *Tropical Ecology*, 57(3): 545–557.
- Puertas, P.E. & Bodmer, R.E.** 2004. Hunting effort as a tool for community-based wildlife management in Amazonia. In K. Silvius, R. Bodmer & J. Fragoso, eds. *People in nature: wildlife conservation in South and Central America*. New York, USA, Columbia University Press.
- Rangel, O. & Luengas, B.** 1997. Clima-Agua. In *Zonificación ambiental para el Plan Modelo Colombo-Brasilero (Eje Apaporis-Tabatinga: PAT)*, Chapter 1. Bogota, Instituto Geográfico Agustín Codazzi, Instituto Sinchi & Universidad Nacional.
- Singh, B.B. & Gajadhar, A.A.** 2014. Role of India’s wildlife in the emergence and re-emergence of zoonotic pathogens, risk factors and public health implications. *Acta Tropica*, 138: 67–77.
- Sirén, A., Hamback, P. & Machoa, J.** 2004. Including spatial heterogeneity and animal dispersal when evaluating hunting: a model analysis and an empirical assessment in an Amazonian community. *Conservation Biology*, 18: 1315–1329.
- Stuart-Hill, G., Diggle, R., Munali, B., Tagg, J. & Ward, D.** 2005. The Event Book System: a community-based natural resource monitoring system from Namibia. *Biodiversity and Conservation*, 14: 2611–2631 (DOI 10.1007/s10531-005-8391-0).
- Trujillo, C.** 2008. *Selva y mercados: exploración cuantitativa de los ingresos en hogares indígenas*. Masters thesis. Amazonas, Colombia, Universidad Nacional de Colombia.
- van Vliet, N., Quiceno-Mesa, M., Cruz-Antia, D., Tellez, L., Martins, C., Haiden, E., Oliveira, M., Adams, C., Morsello, C., Valencia, L., Bonilla, T., Yagüe, B. & Nasi, R.** 2015. From fish and bushmeat to chicken nuggets: the nutrition transition in a continuum from rural to urban settings in the tri frontier Amazon region. *Ethnobiology and Conservation*, 4: 1–12.
- Weinbaum, K.Z., Brashares, J.S., Golden, C.D. & Getz, W.M.** 2013. Searching for sustainability: are assessments of wildlife harvests behind the times? *Ecological Letters*, 16(1): 99–111 (DOI 10.1111/ele.12008).
- Wilkie, D.S., Bennett, E.L., Peres, C.A. & Cunningham, A.A.** 2011. The empty forest revisited. *Annals of the New York Academy of Sciences*, 1223(1): 120–128.
- Wintle, B.A., Runge, M.C. & Bekessy, S.A.** 2010. Allocating monitoring effort in the face of unknown unknowns. *Ecology Letters*, 13(11): 1325–1337. ♦



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Indonesia's ecosystem restoration concessions

M. Silalahi, A.B. Utomo, T.A. Walsh, A. Ayat, Andriansyah and S. Bashir

A new form of licence for Indonesia's logged-over state forests is bringing economic, social and ecological benefits through restoration – but it needs sustainable sources of funding.

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Production forests cover more than 50 percent (69.2 million hectares) of Indonesia's 127 million hectares of state forest (Drasopolino, 2015). This is more than double the total land area of Indonesia's terrestrial protected areas (PAs), which cover 27.9 million hectares (15 percent of the country's land area; IUCN and UNEP-WCMC, 2016). Given their large area and the natural forest types they contain, production forests are crucial for meeting the country's biodiversity and climate-change objectives. Sumatra's lowland tropical forests, for example, are among the world's most biodiverse but threatened ecosystems (Conservation International, 2016), with

numerous species categorized as Critically Endangered, Endangered or Vulnerable (IUCN, 2015). The area of lowland forests in production forest areas has been declining for many decades, however: the islands of Kalimantan, Sulawesi and Sumatra lost 60 percent of their remaining lowland forests between 1985 and 1997 due to illegal logging and conversion to other uses, such as industrial plantations for the production of paper, pulp or palm oil (Harvard Kennedy School, 2011).

Above: The landscape of Hutan Harapan, an ecosystem restoration concession in Sumatra, Indonesia

Logged-out natural forests are unattractive for commercial logging, with the result that nearly 37 million hectares of Indonesia's production forests now lack permits (Drasopolino, 2015); without recognized concession-holders or active on-the-ground management, they are at high risk of illegal exploitation and conversion to monocultural plantations and non-forest uses. Even in their degraded state, however, many production forests retain significant biodiversity, providing habitat for endangered species as well as crucial ecosystem services such as carbon sequestration and the supply of water for use by rural and urban populations (Meijaard *et al.*, 2005).

Wreathed hornbills
(*Rhyticeros undulatus*) in the
Hutan Harapan Ecosystem
Restoration Concession, Sumatra

The usual conservation strategy for reversing the trend of converting degraded forests to other land uses would be to lobby for a traditional PA, such as a national park. In 2002, however, Burung Indonesia (an Indonesian non-governmental organization – NGO), together with other national civil-society organizations and with the support of the BirdLife International Partnership, began to advocate for a new approach to forest governance and management – one that would allow degraded production forests to be restored and managed sustainably to meet a range of objectives, from biodiversity conservation and climate-change mitigation to sustainable forest-based enterprises. Their efforts led, in 2004, to a landmark policy by the Government of Indonesia, creating a new type of forest concession: the Ecosystem Restoration Timber Forest Utilization

Licence for Natural Forest in Production Forest (IUPHHK-RE), also known as ecosystem restoration concessions (ERCs). As Davie and Ridwansyah (2016) noted:

the purpose of the ERC was to demonstrate how a management presence through a production forest concession could offer an alternative to continuing forest degradation and conversion to forest plantations. It would assert the importance of a permanent natural forest production use in the landscape and benefit other forest functions, especially biodiversity and ecosystem services (p. 10).

This article describes efforts to put ERCs into effect as a way of retaining and restoring biodiverse forests while generating local economic and social benefits.



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ECOSYSTEM RESTORATION CONCESSIONS AND BIODIVERSITY CONSERVATION

The ERC policy of 2004 was a watershed in Indonesian forestry policy because, for the first time, production forests could be managed primarily for restoration and sustainable non-wood uses rather than for timber alone. The regulation establishes a de facto moratorium on the conversion of logged forests to monocultural plantations and other non-forest uses. Although ERCs are not classed as PAs under national law, the principles of ecosystem conservation and restoration – biodiversity, endemism, landscape connectivity, productivity and sustainability – apply. Licences are issued for a 60-year period, renewable for a further 35 years, offering a real opportunity to achieve significant results in terms of ecosystem restoration, biodiversity conservation, climate-change mitigation and economic development.

ERCs also allow for new systems of forest governance. Under the law, only Indonesian business entities may apply for and hold ERC licences, but NGOs have been actively engaged from the start, with several establishing companies in order to apply for ERC licences. Indeed, the first two ERC licences were awarded to a commercial company, PT Restorasi Ekosistem Indonesia (PT REKI), established by three NGOs: Burung Indonesia, the Royal Society for the Protection of Birds, and BirdLife International. PT REKI was awarded its first ERC in 2008 and a second one adjoining the first in 2010. Together, these two ERCs (known as Hutan Harapan, or “Rainforest of Hope”) cover 98 555 hectares in Jambi and South Sumatra provinces on the island of Sumatra (Figure 1). Although previously logged intensively on a commercial basis, Hutan Harapan contains more than 20 percent of Sumatra’s remaining lowland forests and a high proportion of the island’s biodiversity. The area falls within Conservation International’s Sundaland Biodiversity Hotspot (one of 34 global biodiversity hotspots) and is part of



A Sumatran tiger in the Hutan Harapan Ecosystem Restoration Concession, Sumatra

BirdLife International’s global network of Endemic Bird Areas and Important Bird and Biodiversity Areas. It is rich in globally significant biodiversity, providing habitat for over 1 350 species, 133 of which are globally threatened, including critically endangered species such as the Sumatran tiger and the Sumatran elephant subspecies (Box 1). The area is effectively a forest “island”, however, surrounded by industrial plantations; without the efforts of the BirdLife International Partnership to establish the two ERCs, it would undoubtedly have been converted to oil-palm and acacia plantations.

Other conservation organizations have obtained ERCs, and well-established companies from the palm-oil and paper and pulp industries, and others, have also successfully obtained ERC licences; many are collaborating with conservation organizations to advance restoration and conservation efforts.

As of mid-2016, 14 ERC licences had been issued covering nearly 553 000 hectares, complementing Indonesia’s terrestrial

PA system. Based on the PA criteria of the International Union for Conservation of Nature (IUCN), ERCs would qualify as Category VI: “protected area with sustainable use of natural resources”. In addition to conserving biodiversity and natural ecosystems *in situ*, ERCs act as buffers and corridors to existing PAs in an increasingly fragmented landscape. Thus, ERCs can contribute to the achievement of the Convention on Biological Diversity’s Aichi Targets.¹

¹ Including the following Aichi Targets: 5) Reducing rate of natural habitat loss (forests, etc.); 9) Control and eradication of invasive alien species; 11) Increasing % terrestrial habitats protected through area-based conservation measures integrated into the wider landscape; 12) Reducing rate of loss/improving status of threatened species; 14) Restoring and safeguarding essential ecosystem services benefiting the poor and vulnerable; and 15) Enhancing ecosystem resilience and contributing to climate change mitigation and adaptation by conserving and restoring forests.

A challenge to meeting biodiversity and conservation objectives in ERCs is the large number of competing claims on forestlands in Indonesia, which can pose serious risks to the long-term survival of individual ERCs. Many parts of Indonesia are witnessing a “land race” as various groups and stakeholders claim the same pieces of land. Logged-out timber concessions that have been set aside for allocation as ERCs are no longer encumbered with licences, making them vulnerable to illegal logging, poaching for the illegal wildlife trade, and forest clearing by local communities and migrants for oil-palm plantations and other agricultural development.

Landscape approach

The pressures of encroachment and especially the expansion of oil-palm plantations, and the need to resolve conflicts over land tenure and land use (including the recurrent problem of land-clearing fires and regional haze), highlight the need for ERCs to develop integrated landscape approaches to management. Landscape approaches recognize the multifunctionality of landscapes and aim to optimize relationships among the various land-cover types, institutions and human activities at the landscape scale (Kusters, 2015). Hutan Harapan is developing a strategy to integrate the two ERCs into the wider productive socio-ecological landscape.

THE FINANCIAL CHALLENGE

Ecosystem restoration is a long-term process requiring sustained investment, and ERC-holders are expected to generate the required finance through business development in line with the ecological objectives of their ERCs. With approximately 20 million people living in or near forests in Indonesia (Palmer and Engel, 2007), including indigenous communities, ERCs are also expected to generate benefits for local communities and will need to do so if they are to receive local support.

Business development presents opportunities for resolving conflicts and

establishing new kinds of partnerships between the private sector, local communities, local and national governments, and conservation organizations and other non-profits, including research institutions and international aid agencies. The success of ERCs is likely to depend at least partly on such effective partnerships because a vast range of skills and knowledge is needed to achieve ERC objectives, many of which also constitute legal obligations for the ERC-holder.

ERC-holders have identified potentially marketable forest products and services with which to finance the operational and management costs of ERCs, including markets for carbon and non-wood forest products and payment schemes for ecosystem services such as ecotourism, nature awareness, renewable energy and water supply. Another possible marketable forest product is sustainable timber, but timber harvesting is only possible once an ERC reaches “ecosystem equilibrium”, a state not clearly defined in the law and which would likely also take considerable time and investment to achieve.² Thus, developing financially viable businesses that will cover the costs of ERC operations remains a major challenge for ERC-holders, particularly companies established by conservation organizations, which generally do not have pre-existing commercial operations or market-based sources of revenue.

² Biological and ecosystem equilibrium is not defined in government regulations, but in the future it may be defined at the level of ministerial regulations. Article 14, Chapter 1, of Government Regulation 6/2007 refers to it but does not provide a concise definition, as follows: “An ecosystem restoration permit (*IUPHHK Restorasi Ekosistem*) in natural forests is a permit to develop the area in a natural forest ecosystem production forest so as to maintain the functions and representativeness through maintenance activities, protection and restoration of forest ecosystems, including planting, enrichment, thinning, wildlife breeding, release of flora and fauna to return the element biodiversity (flora and fauna) as well as non-biological elements (soil, climate and topography) in an area to the original type, in order to reach biological and ecosystem equilibrium.”

Given the current degraded state of many logged-over production forests, it is clear that most ecosystem restoration efforts will take place in forests with medium-to-heavy degradation. The prompt action needed to stop further degradation and restore forests is costly, but revenue-generating options in such forests are likely to be limited. To date, most ERCs have relied on project-based donor funding to cover their costs. Hutan Harapan, for example, had an annual expenditure of US\$2.5 million in its first five years of operation; this was covered by project-based funding, but the company cannot rely on donor funding for the next 95 years. With few ready-to-extract resources, and no fiscal incentives or assistance to cover the start-up costs of developing sustainable financing mechanisms, it is difficult for ERCs to compete with other more remunerative land uses, such as palm-oil production, in the short and medium terms. Creating sustainable and diversified income streams and other benefits, therefore, is key to the long-term sustainability of ERCs.

ACHIEVEMENTS AND LESSONS FROM HUTAN HARAPAN

With more than 550 000 hectares now covered by ERCs, and a further 1.6 million hectares allocated for ERCs by the Ministry of Environment and Forestry (MoEF), the lessons learned in Hutan Harapan are contributing to national forestry policy development (Burung Indonesia, 2016). Hutan Harapan’s experience has been instrumental in promoting an improved regulatory framework for ERCs while simultaneously enabling Hutan Harapan to develop and implement strategies for forest management, business development and community engagement.

When ERCs were introduced they were categorized by the then Ministry of Forestry as production forest (timber) concessions. The management and administrative requirements, therefore, were inappropriate for ERCs, meaning considerable unnecessary effort and high costs. Based on the experience of Hutan Harapan,



Reinwardt's flying frog (Rhacophorus reinwardtii) in the Hutan Harapan Ecosystem Restoration Concession, Sumatra

the MoEF has revised the Guidelines on Performance Assessment of Sustainable Forest Production Management (PHPL), which originally were designed to measure performance in timber concessions and focused on technical matters dealing with standing timber stock inventory. The revised PHPL incorporates information on vegetation, key wildlife species, the abiotic environment, and socio-economic conditions, thereby moving away from forest inventory, which was heavily focused on assessing the timber stock as if it were a production forest concession. The PHPL previously stated that ERCs needed to plant commercial timber species in the forest. Now, the ERC-holder no longer has to plant such species if to do so would not

be in keeping with concession objectives. ERCs can use other restoration approaches, such as assisted natural regeneration, that are more cost-effective than planting. ERCs can also plant tree species that are not commercially valuable but which may be important for maintaining the habitat of particular wild species. And, in January 2016, the Ministry of Finance issued revised guidelines for land and property taxes in the forest sector,³ in which ERCs are categorized as unproductive areas and differentiated from productive logging or timber concessions; thus, the tax rate applied to ERCs will be lower than

³ Directorate General of Taxation Regulation No. PER-42/PJ/2015.

those applied to timber concessions that are producing an income.

LOOKING TO THE FUTURE

Indonesia's commitment to preventing further deforestation and degradation under the United Nations Framework Convention on Climate Change has put the country at the centre of national and international debates on forests, biodiversity conservation, land rights and sustainable development. These became particularly acute in late 2015, when land-clearing fires in Kalimantan and Sumatra resulted in a major episode of transboundary regional haze, affecting several other Southeast Asian nations for many weeks (Islam, Pei and Mangharam, 2016).

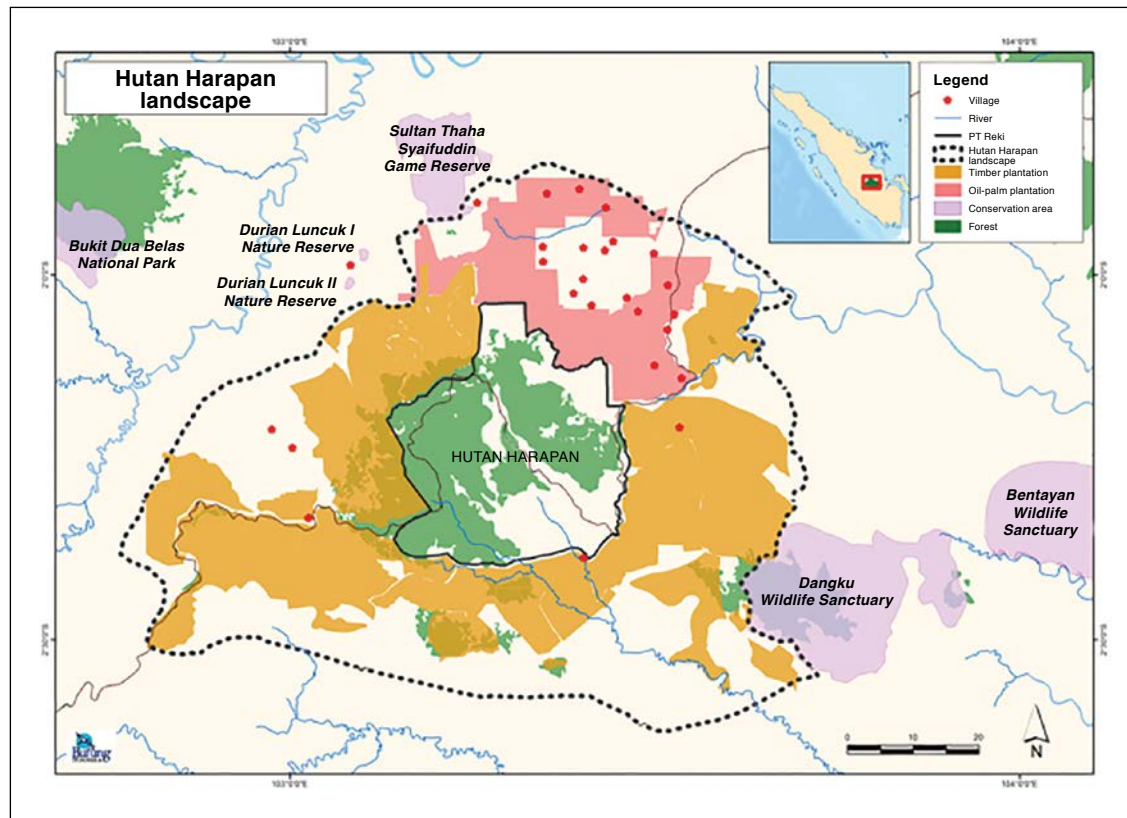
ERCs offer a strategic way of halting and reversing deforestation and degradation in production forests. Despite implementation challenges, interest in ERCs remains high, with over 50 applications to date. Recognizing the importance and potential for replication and scaling up, the Government of Indonesia is seeking to accelerate the pace of policy change to strengthen the enabling environment for ERCs. The MoEF established an ERC policy working group in April 2015, bringing together ERC-holders, NGOs and academics to define policies in several key areas, such as the fiscal framework and the rules governing concession management. The ongoing reform of ERC-related policies and regulations has positive implications for both ERC management and financial viability and reflects a major shift in the MoEF's approach to ERCs.

The Directorate of Conflict Resolution, Tenure and Customary Forests (Hutan Adat) has also been created, and it is working

with ERC-holders to resolve land-related conflicts. The Directorate is using Hutan Harapan as one of a few national pilots for building experiences and shaping national regulations related to conflict resolution. Since September 2015, the Directorate has taken the lead in negotiating with indigenous communities and migrants living in and around Hutan Harapan, together with relevant national, provincial and local stakeholders and human-rights NGOs; to date, four livelihood agreements have been signed with the Batin Sembilan indigenous people and two land-use agreements have been made with migrant communities. Disentangling the various land claims in the concession area is complex because many interests and groups are involved – indigenous peoples, migrant peoples from other parts of Sumatra and from Java, land speculators, local elites, and agrarian-reform activists – each with its own agenda, creating conflicts with each other as well as with Hutan Harapan. Resolving such conflicts

will require considerable investments of time and effort in dialogue and negotiations to find mutually acceptable solutions to complex and deeply entrenched problems (Silalahi and Erwin, 2014).

In keeping with the MoEF's policy of decentralizing management through the establishment of provincial-level forest management units (FMUs), Hutan Harapan is working with the Meranti FMU in South Sumatra Province to address conflict resolution, concession boundary issues, fire prevention and illegal logging and to design a wildlife corridor between Hutan Harapan and the Dangku Wildlife Sanctuary. The FMU has taken a lead role in resolving boundary disputes with communities living on the Hutan Harapan concession boundary in South Sumatra. As this FMU and the newly established FMU in Sarolangun and Batanghari in Jambi Province develop greater capacity, they will be key partners in addressing the various pressures on Hutan Harapan.



Box 1 Species richness in Hutan Harapan

Although Hutan Harapan represents less than 1 percent of Sumatra's total geographic area of 47.3 million hectares, it contains a disproportionately high number of Sumatran species (Table 1) and lowland forest species, including 72 percent of the 425 bird species recorded in lowland Sumatra. To date, 64 mammal species have been recorded in Hutan Harapan, including five primate and seven cat species. The latter includes a sizeable population of the Sumatran tiger (*Panthera tigris sumatrae*), a subspecies with a total population of just a few hundred on the island and which is categorized as Endangered on the IUCN Red List.

Other Endangered mammal species recorded in Hutan Harapan are the Asian elephant (*Elephas maximus*), Asiatic wild dog (*Cuon alpinus*), Sunda pangolin (*Manis javanica*), mitred leaf monkey (*Presbytis melalophos*), agile gibbon (*Hylobates agilis*), siamang (*Symphalangus syndactylus*) and Malayan tapir (*Tapirus indicus*), and there are ten Vulnerable and five Near Threatened mammal species (Ayat, 2013). The concession also features at least 56 species of reptiles and 38 amphibians.

Plant diversity is high: 446 tree species have been identified to date, with meranti (*Shorea* spp.), medang (*Litsea* spp.) and balam (*Palaquiums* spp.) dominating. Twelve globally threatened plant species have been identified, including four that are Critically Endangered: three dipterocarps (*Hopea mengerawan*, *Hopea sangal* and *Shorea acuminatai*) and the smaller *Syzygium ampliflorum*. It is expected that more species will be identified as surveys continue, particularly among plants and the smaller animal taxa.

TABLE 1. Comparison of species richness in Hutan Harapan and Sumatra

Taxa	Total no. of species (Sumatra)	Total no. of species (Hutan Harapan)	Percentage of Sumatra's species found in Hutan Harapan
Birds	626	305	48.7
Mammals	194	64	33.0
Reptiles	217	56	25.8
Fish	589	123	20.9
Plant species	820	446	54.4

Sources: Ministry of Forestry and Ministry of Marine and Fisheries, 2010; Ayat, 2013.

CONCLUSION

Indonesia's ERC policy is a bold step forward in reversing forest loss and degradation in production forest areas while also supporting the restoration of forest functions and services. From modest beginnings in 2004, ecosystem restoration is being mainstreamed into major government policies and institutions. The ERC policy, and the large area of degraded production forests in Indonesia, opens up many possibilities for generating economic and ecological benefits at different

scales, such as: strengthening biodiversity conservation efforts, including the sustainability of the existing national PA system; developing new approaches to forest management and business development; resolving land-use conflicts and supporting sustainable livelihoods; reducing carbon emissions on a large scale; and increasing capacity to adapt to climate change. Challenges remain in realizing the full potential of ERCs, and the MoEF continues to work closely with civil-society actors, the private sector and local governments

to overcome these. Addressing land-use pressures, strengthening good forest governance, and government measures to support the development of viable business models for ERCs are key to the long-term success of the ERC policy. ♦



References

- Ayat, A.** 2013. *Harapan forest: saving biodiversity richness in Sumatra's remaining lowland forest*. Fact sheet. Bogor, Indonesia, Burung Indonesia.
- Burung Indonesia.** 2016. *Restoring environmental services and protecting biodiversity in the Hutan Harapan Ecosystem Restoration Concession, Sumatra. Phase 3: achieving sustainability through diversifying income, building partnerships, and restoring ecological functions*. Bogor, Indonesia, Burung Indonesia.
- Conservation International.** 2016. Critical Ecosystem Partnership Fund: Sundaland. Website (available at www.cepf.net/where_we_work/regions/asia_pacific/sundaland/Pages/default.aspx). Accessed 8 March 2016.
- Davie, J. & Ridwansyah, Md.** 2016. *The Hutan Harapan Lesson Learnt Review: final report*. DANIDA, Jakarta, Ministry of Foreign Affairs Denmark.
- Drasopolino.** 2015. *Peran Restorasi Ekosistem dalam Mendukung Strategi Nasional Perubahan Iklim*. Jakarta, Ministry of Environment and Forestry.
- Harvard Kennedy School.** 2011. *From Reformasi to institutional transformation: a strategic assessment of Indonesia's prospects for growth, equity and democratic governance*. President and Fellows of Harvard College Harvard Kennedy School Indonesia Program (available at <http://unpan1.un.org/intradoc/groups/public/documents/UN-DPADM/UNPAN042322.pdf>).

- Islam, Md. S., Pei, Y.H. & Mangharam, S.** 2016. Trans-boundary haze pollution in Southeast Asia: sustainability through plural environmental governance. *Sustainability*, 8(5): 499 (DOI 10.3390/su8050499).
- IUCN.** 2015. *The IUCN Red List of Threatened Species*. Website (available at <http://www.iucnredlist.org>). Accessed 9 March 2016. International Union for Conservation of Nature (IUCN).
- IUCN & UNEP-WCMC.** 2016. World Database on Protected Areas (dataset). Accessed 9 March 2016. URL: <http://www.protectedplanet.net/country/ID>. International Union for Conservation of Nature (IUCN) & United Nations Environment Programme–World Conservation Monitoring Centre (UNEP-WCMC).
- Kusters, K.** 2015. *Climate-smart landscapes and the landscape approach: an exploration of the concepts and their practical implications*. Wageningen, the Netherlands. Tropenbos International.
- Meijaard, E., Sheil, D., Nasi, R., Augeri, D., Rosenbaum, B., Iskandar, D., Setyawati, T., Lammertink, A., Rachmatika, I., Wong, A., Soehartono, T., Stanley, S. & O'Brien, T.** 2005. *Life after logging: reconciling wildlife conservation and production forestry in Indonesian Borneo*. Bogor, Indonesia, Center for International Forestry Research (CIFOR).
- Ministry of Forestry & Ministry of Marine and Fisheries.** 2010. *Gap analysis of ecological representative on conservation area in Indonesia*. Jakarta, Ministry of Forestry and Ministry of Marine and Fisheries.
- Palmer, C. & Engel, S.** 2007. For better or for worse? Local impact from decentralization of Indonesia's forest sector. *World Development*, 35(12): 2131–2149.
- Silalahi, M. & Erwin, D.** 2015. Collaborative conflict management on Ecosystem Restoration Concession: lessons learnt from Harapan rainforest Jambi-South Sumatra-Indonesia. *Forest Research*, 4: 134 (DOI 10.4172/21689776.1000134). ◆



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Grouse-friendly forest management in Finland

M. Rautiainen, J. Miettinen, A. Putaala, M. Rantala and M. Alhainen

Relatively simple adjustments to management regimes are enabling commercial forestry and grouse conservation to co-exist.

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Forest grouse species (Tetraoniae), a subfamily of Galliformes, inhabit forests and tundra ecosystems. Many populations are declining, and species are threatened with extinction at the local, national and regional scales. This is particularly true along the southern edges of their distributions and of grouse-inhabiting regions densely populated by humans – western and central Europe, eastern and central North America, and parts of eastern Asia (Storch, 2007a). Human land use, particularly forestry, greatly influences the structure and dynamics of forest grouse habitats, and it is seen as the main cause of the declining trend observed in many grouse species (Rolstad and Wegge, 1989; Storch, 2007b).

The Finnish populations of capercaillie (*Tetrao urogallus*), black grouse (*Lyrurus tetrix*) and willow grouse (*Lagopus lagopus*) declined markedly nationwide or locally from the 1970s to the 2000s, although the stock of hazel grouse (*Bonasa bonasia*) was relatively stable (Ministry of Agriculture and Forestry, 2014). The declines in the three grouse species were attributed mainly to unfavourable changes in forest structure caused by intensive forestry. In 2000, capercaillie, black grouse and willow grouse were categorized according to the criteria of the International Union for Conservation of Nature (IUCN) as Near Threatened at

Above: A male willow grouse displays just beyond a restored pine mire

the national level (Rassi *et al.*, 2001), and the need for a national multispecies action plan was perceived. Finland's Ministry of Agriculture and Forestry launched a project to prepare a national grouse management plan, in cooperation with representatives from research institutes, the national game administration, the state forestry service, forest industries, and organizations of private landowners, hunters and conservationists. The Grouse Management Plan (GMP) was published in 2014 by the Ministry of Agriculture and Forestry and is now under implementation through education, legislation and projects.

Capercaillie, black grouse and hazel grouse are included in Annex I of the European Union's Birds Directive (Directive 2009/147/EC), which means that member states must take special conservation measures to protect the habitats of those species. Finland has 26 million

hectares of forest, which is 86 percent of the land area, and the GMP therefore emphasizes grouse habitat conservation and improvement in forests. The plan aims to improve the quality of commercially managed forests as habitats for grouse, maintain shrub and field-layer vegetation (e.g. bilberry – *Vaccinium myrtillus*), and conserve or actively restore key habitats such as spruce mires¹ and the ecotones between forests and mires (Ministry of Agriculture and Forestry, 2014).

There are various ways to integrate habitat management and human land-use practices. The grouse-friendly methods described in the GMP were introduced in the 1980s, but the well-meaning initiatives

¹ A mire is a stretch of boggy or marshy ground. A spruce mire is a type of forested mire, usually close to flowing water, in which common species are Norway spruce (*Picea abies*), birch (*Betula pubescens*) and bilberry.

of that time were largely overrun by production-related forestry intensification. Grouse-friendly forest management was reintroduced in the 2000s in experimental areas, and larger-scale implementation was carried out in state-owned forests. Now, private landowners are also increasingly interested in grouse-friendly ways of managing their forests.

ONGOING POSITIVE PROGRESS

Grouse are still highly valued among hunters as quarry species. The annual breeding populations in 2006–2012 in Finland were estimated at around 290 000–330 000 pairs for capercaillie; 600 000–710 000 pairs for black grouse; 470 000–520 000 pairs for hazel grouse; and 67 000–150 000 for willow grouse (European Environmental

A grouse hunter prepares a bird for cooking in Finland



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Agency, 2017). All populations are subject to high levels of natural fluctuation between years. In the ten years to 2014, the average annual harvest was 40 000 capercaillies, 160 000 black grouse and 80 000 hazel grouse (Ministry of Agriculture and Forestry, 2014).

In the most recent (2015) update of Finnish bird species in the IUCN National Red List, the statuses of capercaillie and black grouse were upgraded to Least Concern, and both species were removed from the Red List. The status of willow grouse weakened from Near Threatened to Vulnerable due to a negative trend in the southern ranges of its distribution in Finland (Tiainen *et al.*, 2016). The major reason for population declines of southern willow grouse is thought to lie in global warming, which has shortened the period of snow cover and which, in turn, has made willow grouse more vulnerable to predation because its plumage changes colour to white in winter. In addition, the drainage of peatlands has significantly reduced the area of open mires and thereby increased the isolation of local willow grouse populations (Box 1 describes steps to restore such areas).

GROUSE HABITAT MANAGEMENT IN STATE-OWNED FORESTS

The State of Finland owns approximately 3.6 million hectares of commercial forests, 2.1 million hectares of protected areas, and 2.1 million hectares of wilderness reserves and other areas of special importance. According to the law, state-owned areas should be treated in a way that gives the most benefit to Finnish society. Responsibility for reaching this goal is given to Metsähallitus, an organization that administers all state-owned areas in Finland; among its many tasks are the management of commercial forests and protected areas and the provision of hunting opportunities for citizens. Biodiversity conservation, recreational use, reindeer husbandry and the culture of the Sámi people are all taken into consideration, in addition to timber production.

Box 1 Restoring grouse habitats

Among the most visible impacts of production forestry in Finland is the large-scale drainage of peatlands – more than half the original 9 million hectares of peatland has been drained for forestry purposes. According to some estimates, however, 1 million hectares of these interventions have been unsuccessful, with only minor increases or no impact on timber growth. The restoration of drainage areas is an important activity for re-establishing good-quality habitats for forest grouse species.

As a result of a project in 2007–2008, Metsähallitus has developed a routine, cost-effective methodology for restoring willow grouse habitats in state-owned commercial forests. Forest planners recognize suitable sites for restoration, prepare site-specific work plans, and record all this in the forestry geographic information system (GIS) planning database. Restoration involves blocking an area's drainage network and removing the trees. The majority of restoration projects are funded using income from the sale of grouse hunting permits. As of the end of 2015, 3 950 hectares of potential grouse habitats had been restored, with each area 2–100 hectares in size.

Monitoring of the restored sites has shown an increase in the number of male willow grouse. There are also benefits for other biodiversity, as well as for water quality and hydrological conditions.

Grouse hunting in state-owned forests has a long history. Today, more than 70 000 recreational hunters visit state-owned areas to hunt grouse. These people form an important stakeholder group in grouse management, and they are a key reason for the development of grouse-friendly forest management in state-owned forests.

Because all state-owned forests are managed by a single organization, it is possible to manage grouse habitats using unified methodologies on a large scale, and this has had positive impacts on grouse populations at the regional and even national levels. State-owned multiple-use forests are managed according to the *Environmental guidelines for practical forest management* (Päivinen *et al.*, 2011), a handbook for all forestry professionals (730 persons) and contractors (1 200 persons) working for Metsähallitus (Metsähallitus, 2016). Biodiversity conservation through the ecosystem approach forms a core element of the guidelines, based on recent scientific studies. The provision of game – especially grouse species – is considered an important ecosystem service of state-owned

forests, and a chapter in the guidelines is devoted to it.

FRAMEWORK FOR ACTIVITIES IN PRIVATELY OWNED FORESTS

Approximately 60 percent of Finland's total forest area is privately owned. The Finnish Wildlife Agency's hunter survey found that hunters and their families own about half these forests. The vast majority of privately owned forest is used for commercial wood production, but more than half (58 percent) of all Finnish landowners can be characterized as managing their forests for multiple objectives or as recreationists (Kumela and Hänninen, 2011). These people own 65 percent of private forests, and many see the maintenance of abundant grouse populations as an important goal, along with obtaining economic benefits through timber sales.

Finnish forest legislation has changed recently towards more grouse-friendly forest management. The latest (2014) Forest Act allows uneven-aged management (selective cuts), set-aside wildlife thickets, and other structural diversity at different stages of stand rotations. After decades

of very strict legal standards, landowners are now allowed to decide on their forest management methods according to their personal objectives.

The heart of the grouse-friendly working model in privately owned forests comprises a voluntary participatory approach and the active restoration of habitats. The goal is to create a new culture in forestry in which biodiversity conservation and multiple forest ecosystem services are taken fully into account alongside economically profitable timber production.

Multiple studies have described the forest habitat characteristics favoured by grouse species and form the basis of all grouse-friendly forest management (e.g. Storch, 1994; Wegge *et al.*, 2005; Braunisch and Suchant, 2007; Miettinen, 2009; Sirkiä, 2010). The procedures are compiled and clarified in a book with recommendations prepared jointly by the Finnish Wildlife Agency and Tapio Ltd (formerly the Finnish Forestry Development Centre Tapio) (Lindén *et al.*, 2014). The Finnish Wildlife Agency also published specific working guidelines in 2015 (Suomen riistakeskus, 2015).

Box 2 Management of capercaillie lek sites

Capercaillie lek is a local group-play of males gathered for competitive displays that enable females to choose their mates. The lek area, which usually covers a couple of hundred hectares of forest, consists of the day territories of the males and the lek site itself; on average, the latter covers roughly 20 hectares. In state-owned areas, foresters regularly monitor lek sites, and more than 2 500 lek sites are registered in the forestry GIS planning database.

Capercaillie lek areas are treated with special care, with the aim of retaining their quality. The minimum forest cover suitable for capercaillie is determined for both the lek site and the lek area. Requirements for thinning and clearcutting are described in detail in management plans (specifying, for example, the minimum density of remaining trees and the tree species composition). The lek site should be managed on a small scale, with the size of clearcuts restricted to a maximum of 1 hectare; the centre of lek sites should be left untouched (Päivinen *et al.*, 2011).

GROUSE HABITAT MANAGEMENT METHODOLOGY

Forest management affects game at many levels, from the nesting sites of individual birds to the landscape scale and the distributions of species. At the site scale (from a few to some tens of hectares), the management focus is on key habitat structures for single birds, pairs and broods (Päivinen *et al.*, 2011). At the landscape scale (usually

thousands of hectares), a wider planning approach is required to ensure continuous quality forest cover.

The most sensitive part of the annual cycle of all forest grouse species is the reproduction period, and the management focus is therefore on habitats for broods. Even though requirements differ somewhat between grouse species, the common denominator is a mixed forest



Wildlife thickets such as this (foreground) provide cover for grouse and enable bilberry growth



In their first two weeks, grouse chicks depend on plant cover and insect food provided by the dwarf-shrub layer

type with sufficient understorey and a rich vegetation of bilberry and other dwarf shrubs to provide the necessary food and shelter.

Grouse-friendly forest management may comprise one of the following two approaches:

1. Actions that do not negatively affect the economic profitability of forestry and simultaneously increase social and ecological benefits. These include actions that promote mixed tree species stands, wildlife thickets and bilberry preservation.
2. Actions that may reduce the economic value of the forests but at the same time support the preservation of high-quality wildlife habitat features on relatively small areas (i.e. key habitats). Thus, the overall income from forestry at a property level remains largely unchanged and the social and ecological benefits increase.

Wildlife-oriented peatland restoration (Box 1) and the management of capercaillie

lek sites (Box 2) are two commonly used methods, especially in state-owned forests, but these are special cases. For example, wildlife-oriented peatland restoration, which provides favourable habitats for willow grouse, is relatively expensive but does not limit the overall economic benefits from forestry when applied in peatland areas of low timber production.

MIXED STANDS, WILDLIFE THICKETS AND BILBERRY

In grouse-friendly management, the aim is to restore or maintain forest in which at least three components – mixed stands, wildlife thickets and bilberry – are present and the dominant species has a maximum 80 percent share of the total standing tree volume. In forests dominated by pine (*Pinus sylvestris*) or birch (*Betula pendula*), Norway spruce (*Picea abies*) and many shrub-layer species provide essential cover for grouse and provide protection from predators. In Norway spruce-dominated forests,

pine constitutes an important winter food source for capercaillies, while pine, birch and several broadleaved species guarantee that sufficient light reaches the field layer for bilberry and other species to flourish.

The extent of wildlife thickets can vary from a couple of spruce trees to several hectares of forest; combined, they should account for about 2 percent of the stand area. They should consist of many tree species and a wide range of individual tree sizes, including understorey trees and shrubs. The best spots for wildlife thickets are slacks (wet, low-lying spots), forest stand edges, rocky areas, and other places where regular forestry practices are challenging. Thickets established in a young stand can be maintained throughout a rotation, and ideally they are left as set-aside tree groups in clearcuts (i.e. the final felling of commercially valuable trees) and in regeneration areas of stands aged 60–100 years.

Bilberry is a crucial plant species for several boreal forest wildlife species of



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*The centre of a capercaillie lek site,
Finland*

Box 3 Implementation on private land

The Finnish Wildlife Agency has promoted grouse-friendly forest management in practice based on numerous past and ongoing projects and, as a direct consequence, more than 50 private forest owners have implemented grouse-friendly forest management in their forests. In addition, about 500 forest owners have expressed a willingness to use such methods and are ready to make their forests available for demonstration purposes and future projects. The Finnish Forest Centre – the main public authority responsible for national forestry legislation – has been a key partner in recent grouse management projects, and it plays an active role and has expressed interest in the development of grouse-friendly management methodologies and guidelines.

mammals and birds. For grouse species, the importance of bilberries lies in a crucial two- to three-week period in mid-June, when newly hatched chicks feed on insects dwelling in the leaves and shoots of bilberry and other ground-layer dwarf shrubs. In forest management, maintaining

young undergrowth trees as regeneration material helps preserve the important dwarf-shrub layer. This provides shelter for wildlife after the clearcut and reduces the costs of soil preparation and tree planting or sowing. Soil preparation should be minimized to protect the shoots and roots

of the dwarf-shrub layer. A mixture of pine and spruce accompanied by young broadleaved trees should be favoured to promote the development of mixed forest.

KEY HABITATS

Spruce mires and transition zones between forests and open mires and agricultural fields are often naturally composed of mixed species and are multilayered. The abundance of bilberry and other dwarf shrubs is generally high, and soil moisture is high enough to support diverse and rich insect populations. Due to such features, these areas are among the most important brood habitats for all grouse species.

The grouse-friendly management of transition zones has a high cost-benefit ratio. Saving the undergrowth of tree and shrub

species maintains structural diversity, and unnecessary undergrowth preclearance should be avoided. Thinnings made in selective cuts (resulting in uneven-aged forests) are recommended for transition zones. The optimal soil moisture content in transition zones can be supported by restricting the maintenance of drainage networks to those ditches away from the edge of peat forests. Where possible, ditches close to mineral soil should be filled in or left untouched to restore the original hydrology of the area (Box 1). These actions reduce the economic profitability of the forest only slightly and provide many significant ecological benefits by increasing forest cover and structural diversity in biodiversity hotspots.

THE FUTURE

Grouse-friendly forest management methods continue to be developed. A recent innovation is “doughnut thinning”: when a forest is thinned, groups of set-aside trees are surrounded by clearcut circles – or “doughnuts” – 10–15 m in diameter. The set-aside and the stand of seedlings that will soon grow in the surrounding doughnut provide cover for wildlife and help preserve the dwarf-shrub layer. Doughnut thinning creates variations in forest structure, thereby mimicking the natural dynamics of boreal forest. The method is considered to have economic benefits because of its lower per-hectare logging costs and slightly higher timber yields.

The future of forest grouse species is strongly related to habitat conditions in production forests. Taking habitat requirements into consideration in forest management interventions can actively support grouse populations. The means are often simple and cost-effective; the main challenges are to change traditional forestry practices and to raise the awareness of landowners, forestry professionals and grouse hunters (Box 3). By showing concrete examples of successful outcomes, it is possible to create a positive atmosphere for grouse-friendly management in the forestry and wildlife conservation sectors. ◆



References

- Braunisch, V. & Suchant, R.** 2007. A model for evaluating the “habitat potential” of a landscape for capercaillie *Tetrao urogallus*: a tool for conservation planning. *Wildlife Biology*, 13(Suppl. 1): 21–33.
- European Environmental Agency.** 2017. Population Status and Trends at the EU and Member State Levels (dataset). Accessed 16 January 2017. EIONET – European Topic Centre of Biological Diversity. URL: <http://bd.eionet.europa.eu/article12/summary>.
- Kumela, H. & Hänninen, H.** 2011. Metsänomistajien näkemykset metsänkäsittelymenetelmien monipuolistamisesta. Working Papers of the Finnish Forest Research Institute No. 203. Vantaa, Finland, Finnish Forest Research Institute (available at www.metla.fi/julkaisut/workingpapers/2011/mwp203.htm).
- Lindén, M., Lilja-Rothsten, S., Saaristo, L. & Keto-Tokoi, P., eds.** 2014. Metsänhoidon suositukset riistametsänhoitoon, työopas. Metsätalouden kehittämiskeskus Tapion julkaisuja.
- Metsähallitus.** 2016. Forestry. Website (available at www.metsa.fi/web/en/forestry). Accessed 25 October 2016.
- Miettinen, J.** 2009. *Capercaillie (Tetrao urogallus L.) habitats in managed Finnish forests: the current status, threats and possibilities*. Dissertationes Forestales 90 (available at www.metla.fi/dissertationes/df90.htm).
- Ministry of Agriculture and Forestry.** 2014. *Suomen metsäkanalintujen hoitosuunnitelma* (Finnish Management Plan for Forest Grouse Species). Maa- ja metsätalousministeriön julkaisuja 10/2014.
- Päivinen, J., Björkqvist, N., Karvonen, L., Kaukonen, M., Korhonen, K.-M., Kuokkanen, P., Lehtonen, H. & Tolonen, A., eds.** 2011. Metsähallituksen metsätalouden ympäristöopas. Metsähallituksen metsätalouden julkaisuja 67.
- Rassi, P., Alanen, A., Kanerva, T. & Mannerkoski, I.** 2001. Suomen lajien uhanalaisuus 2000. Helsinki, Ympäristöministeriö & Suomen ympäristökeskus.
- Rolstad, J. & Wegge, P.** 1989. Capercaillie populations and modern forestry: a case for landscape ecological studies. *Finnish Game Research*, 46: 43–52.
- Sirkiä, S.** 2010. *Effects of large-scale human land use on capercaillie (Tetrao urogallus L.) populations in Finland*. Helsinki, Faculty of Biological and Environmental Sciences, University of Helsinki (available at <https://helda.helsinki.fi/handle/10138/22360>).
- Storch, I.** 1994. Habitat and survival of capercaillie *Tetrao urogallus*. Nests and broods in the Bavarian Alps. *Biological Conservation*, 70: 237–243.
- Storch, I.** 2007a. Conservation status of grouse worldwide: an update. *Wildlife Biology*, 13(Suppl. 1): 5–12.
- Storch, I.** 2007b. *Grouse: status survey and conservation action plan 2006–2010*. Gland, Switzerland, IUCN, and Fordingbridge, UK, World Pheasant Association.
- Suomen riistakeskus.** 2015. Riistametsänhoidon työohjeet (available at <http://riista.fi/wp-content/uploads/2015/09/Riistametsänhoidon-ty%C3%B6ohjeet-2015-Web.pdf>).
- Tiainen, J., Mikkola-Roos, M., Below, A., Jukarainen, A., Lehikoinen, A., Lehtiniemi, T., Pessa, J., Rajasärkkä, A., Rintala, J., Sirkiä, P. & Valkama, J.** 2016. Suomen lintujen uhanalaisuus 2015 – the 2015 Red List of Finnish Bird Species. Helsinki, Ympäristöministeriö & Suomen Ympäristökeskus.
- Wegge, P., Olstad, T., Gregersen, H., Hjeljord, O. & Sivkov, A.V.** 2005. Capercaillie broods in pristine boreal forest in northwestern Russia: the importance of insects and cover in habitat selection. *Canadian Journal of Zoology*, 83: 1547–1555. ◆



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FAO report finds that forest foods are vital for food and nutritional security in the Congo Basin

The contribution of forest foods to food and nutritional security in the Congo Basin is greatly underestimated, according to a new FAO report. *Living in and from the forests of central Africa* found that non-wood forest products (NWFPs) such as game, fruit, seeds, roots, insects and fungi provide an important complement to agricultural products in the region, broadening the food base, diversifying diets and helping prevent micronutrient deficiencies, especially in young children.

The report is based on a decade of work across central Africa and the Congo Basin, which is home to 130 million people, many of whom depend directly on NWFPs for nutritious food and overall well-being. The report's findings are drawn from projects that began in 2005, a long-running FAO forestry initiative aimed at understanding and increasing the contributions of forests and trees to food and nutritional security. The projects were implemented by FAO under the supervision of the Central African Forests Commission (COMIFAC) in Burundi, Cameroon, the Central African Republic, Chad, the Congo, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Rwanda, and Sao Tome and Principe.

A mother and her children carry wood from the Yoko Forest in the Democratic Republic of the Congo. Such forests are important sources of food and nutrition for millions of people in the Congo Basin

The value of forest products to nutrition, culture and well-being in local communities is still not widely understood and valued, according to Raymond Mbitikon, COMIFAC Executive Secretary.

"Despite the importance of NWFPs for food and nutritional security in central Africa, NWFPs are not given the recognition they deserve in related policies and programmes," he said.

Young children in particular benefit from consuming forest fruits, which are excellent sources of vitamins and important minerals, including iron, potassium, zinc and calcium, according to the report. For example, the popular African plum, known locally as "safou", is rich in vitamins A, C and E, and wild mango, African cherry and caterpillars help meet protein and iron needs, the projects found.

"The report is a hymn to forest peoples who live in close relation to the forests and have in-depth knowledge of NWFPs," said Ousseynou Ndoye, lead technical advisor for the projects and the report. "It is also intended to describe the techniques and processes already developed and still in development that can enhance the value of NWFPs."



Training was a key component of the projects, with an emphasis on enhancing the marketing and organizational skills of small and medium-sized forest-based enterprises. In the Democratic Republic of the Congo, for example, training focused on helping local women boost their incomes by improving strategies for preparing and shipping njansang nuts.

Some projects also provided training for local participants to domesticate local tree species to alleviate pressure on natural forests. This training is now being scaled up by local organizations. Improvements to regional policy and institutional frameworks dealing with rights of access and use, taxation, supply chains and data collection were additional components of the projects, which were funded by the Government of Germany, the European Union, the African Development Bank and the Congo Basin Forest Fund.

The report is available online at: www.fao.org/3/a-i6399e.pdf

Equatorial Guinea launches REDD+ investment plan to combat climate change and foster sustainable development

The Government of Equatorial Guinea has launched an 18-month project to develop a national investment plan for the country's participation in REDD+, the international initiative for reducing emissions from deforestation and forest degradation.

With technical support from FAO and funding from the Central African Forest Initiative (CAFI), Equatorial Guinea is set to finalize its national REDD+ strategy and move quickly to the planning of its REDD+ investments. The government says these investments will fit with its broader strategies.

"One of the strategic key objectives of the National Economic and Social Development Plan 'Horizon 2020' is about the protection and conservation of the natural resources and thus in line with the objectives pursued with the country's national investment plan on REDD+," said Eucario Bakale, Equatorial Guinea's Minister of Economy, Planning and Public Investment. The CAFI project follows previous country efforts to prepare for REDD+, including the crucial approval by the national parliament of the Readiness Preparation Proposal (R-PP) for REDD+.

"Our government is committed to protect biodiversity and take actions to improve forest utilization practices for the benefit of mankind in general and our country's development in particular," said Mba Oló Bahamonde, Minister of Forests and Environment.

The launch of the project is a significant milestone in building national consensus around REDD+ implementation and future investments and in strengthening the country's efforts towards low-carbon development. Initial meetings are aimed at raising awareness of the CAFI initiative and the REDD+ process and reaching agreement on a work plan, leading to the development of the national REDD+ investment plan.

CAFI supports strategic, holistic and country-level REDD+ and low-emission development investments in central African high-forest-cover countries, with the aim of recognizing and preserving the value of the subregion's forests to mitigate climate change, reduce poverty and contribute to sustainable development. UN agencies (including FAO), the World Bank and bilateral cooperation agencies such as the French Development Agency serve as implementing organizations for the initiative. Six central African countries, and a coalition of donors, have signed the CAFI Declaration, thereby committing to coordination and harmonization and to mobilizing resources for the implementation of national investment frameworks developed by central African countries.

More information on CAFI is available online: www.cafi.org

United Nations Biodiversity Conference

This conference, which convened on 2–17 December 2016 in Cancun, Mexico, encompassed several meetings, including a high-level segment on 2–3 December addressing the theme “mainstreaming biodiversity for well-being”, and the 13th Conference of the Parties to the Convention on Biological Diversity (CBD COP13). More than 8 000 delegates attended the conference, representing CBD Parties and other governments, United Nations agencies, intergovernmental, non-governmental, indigenous and local community organizations, academia and the private sector.

Responding to the high-level segment, CBD COP13 (in its Decision UNEP/CBD/COP/13/L.31):

- urged Parties to strengthen efforts to mainstream conservation and sustainable use within and across sectors, including agriculture, forestry, fisheries and aquaculture, and tourism at all levels and scales, and to report to the CBD Secretariat on their experiences;
- invited governments to use, in accordance with the priorities and policies of each country, FAO guidance related to biodiversity and agriculture, fisheries and forestry, including the five elements developed by it as a basis for policy dialogue and governance arrangements to identify sustainable development pathways across the Sustainable Development Goals (SDGs) and sectors and along related value chains;
- encouraged Parties to make use of the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and

Forests in the Context of National Food Security, as appropriate, to promote secure tenure rights and equitable access to land, fisheries and forests; and

- urged Parties to mainstream biodiversity in their implementation of the SDGs.

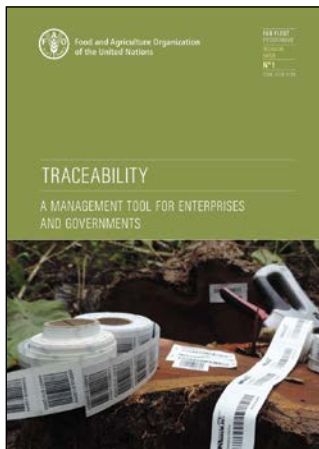
Among other outcomes of CBD COP13 was Decision UNEP/CBD/COP/13/L.2 on sustainable wildlife management, which requested the CBD Secretariat (subject to the availability of resources and in collaboration with other members of the Collaborative Partnership on Sustainable Wildlife Management) to:

- elaborate technical guidance for better governance towards a more sustainable bushmeat sector, with a view to supporting the implementation by Parties of the CBD Strategic Plan for Biodiversity 2011–2020;
- jointly scope and organize a wildlife forum event;
- enhance synergies with the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services with regard to the re-scoping of the assessment of the sustainable use of biodiversity;
- continue to support efforts by Parties to combat illicit trafficking in wildlife and to enhance institutional capacities on wildlife conservation and law enforcement, with relevant law enforcement bodies; and
- report on progress to relevant CBD bodies before the next CBD Conference of the Parties (CBD COP14), which will be convened in 2018.



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Youth volunteers prepare to plant trees as part of activities on the sidelines of the United Nations Biodiversity Conference, Cancun, Mexico, December 2016



Knowing where it came from

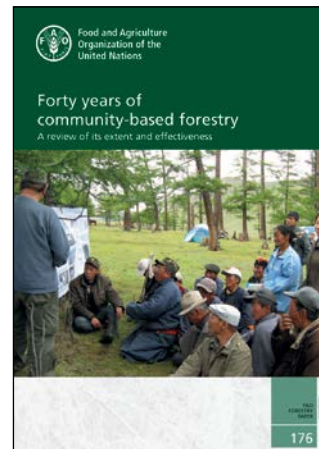
Traceability: a management tool for enterprises and governments.

M. Vandenhoute & J. Laporte. 2016. FAO FLEGT Technical Paper No. 1.

Rome, FAO. ISBN: 978-92-5-109423-5.

Traceability is the ability to trace the history, application and location of an item by means of recorded identification. It involves two main aspects: the identification of the item by marking; and the recording of data on the item all the way along the production, processing and distribution chain. This technical paper presents examples of forest-product traceability initiatives to show the advantages of efficient traceability that takes into account the aims of users and the environment in which such a system operates. The paper is intended for the managers of large-scale enterprises as well as of community forests and for forest officers with the task of developing traceability systems suited to their needs.

Available online: www.fao.org/3/a-i6134e.pdf



A look back at community forestry

Forty years of community-based forestry: a review of its extent and effectiveness. FAO Forestry Paper No. 176. D. Gilmour. 2016. Rome, FAO.

ISBN: 978-92-5-109095-4.

This publication covers 40 years of experience, building on FAO's two previous global reviews of community-based forestry (CBF) in 1991 and 2001. FAO conducted the review not only as an update on the status of CBF but also to assess the extent to which CBF is meeting expectations and the factors that can explain successes and failures. The review demonstrated that CBF is a powerful vehicle for moving towards sustainable forest management while bringing about significant improvements in local livelihoods. It looks at changes generated by CBF in social capital (livelihoods, food security and nutrition, influence over decisions, and access to and control over forest resources), economic capital (employment and household incomes) and environmental capital, as well as other impacts, and it identifies key issues for the future of CBF. The publication targets a range of actors, from policy-makers, practitioners and researchers to communities and civil society. It will provide them with inspiration and guidance in supporting local communities, indigenous peoples and family smallholders to sustainably manage their forests.

Available online: www.fao.org/3/a-i5415e.pdf



The gold standard for working with indigenous peoples

Free prior and informed consent: an indigenous peoples' right and a good practice for local communities. Manual for project practitioners. FAO. 2016. Rome.

This manual on free, prior and informed consent (FPIC), designed as a tool for practitioners in a broad range of projects and programmes in any development organization, provides information on the right to FPIC and how it can be implemented in six steps. In an FPIC process, the “how”, “when” and “with and by whom” are as important as the proposed “what”. For an FPIC process to be effective and to lead to either the consent or denial of a proposal, the way in which it is conducted is paramount. The time allocated for discussions among indigenous peoples, the cultural appropriateness of the way the information is conveyed, and the involvement of the entire community, including women, the elderly and youth, are all crucial. A thorough and well-conducted FPIC process helps guarantee everyone’s right to self-determination and enables everyone to participate in decisions that affect their lives. This manual will enable field practitioners to incorporate FPIC into the design and implementation of projects and programmes and ensure that the rights of indigenous peoples are respected. FPIC can be considered the “gold standard” because it allows for the highest form of participation of local stakeholders in development projects.

Available online: www.fao.org/3/a-i6190e.pdf



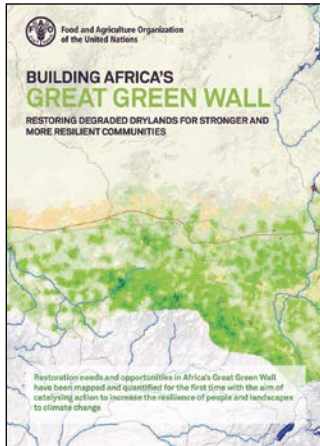
Improving the domestic sawnwood sector in Cameroon

Demandes nationales de sciages: obstacle ou opportunité pour promouvoir l'utilisation des ressources forestières d'origine légale au Cameroun?

G. Lescuyer, R. Tsanga, E.E. Mendoula, B.X. Embolo Ahanda, H.A. Ouedraogo, O. Fung, E. Dubiez & P.B. Logo. 2016. Rome, FAO, and Bogor, Indonesia, Center for International Forestry Research (CIFOR). ISBN 978-92-5-109533-1.

The economic and social importance of domestic wood consumption is now recognized in central Africa, but it is fuelled largely by informally produced sawnwood. No one has yet developed a global understanding of domestic sawnwood sectors in the subregion in order to develop the conditions for improving the legality of sawnwood trade and practices. This report reviews the supply and demand of wood products in the Cameroonian domestic market (at Yaoundé and Douala) and identifies options for promoting the domestic consumption of sawnwood and furniture of legal origin, which would enhance sustainable forest management and sustainable economic growth.

Available online: www.fao.org/3/a-i6515f.pdf

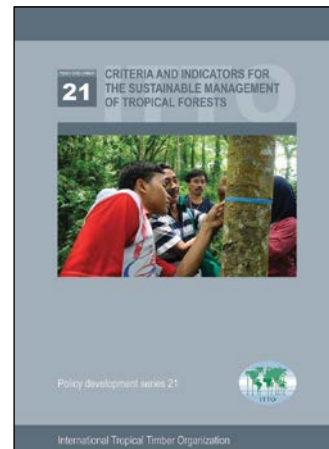


New map of priority restoration areas in Africa

Building Africa's Great Green Wall: restoring degraded drylands for stronger and more resilient communities. N. Berrahmouni, L. Laestadius, A. Martucci, D. Mollicone, C. Patriarca & M. Sacande. 2016. Rome, FAO.

The Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI) is Africa's flagship initiative to build prosperity and resilience in more than 20 countries around the Sahara. Endorsed by the African Union in 2007 as a game-changer in Africa's drylands, the GGWSSI aims to transform the lives of millions of people by creating a great mosaic of green and productive landscapes across North Africa, the Sahel and the Horn. Early results show that degraded lands can be restored, but these achievements pale in comparison with what is needed. This brochure, and the groundbreaking map it contains, contributes to the understanding of what is needed in terms of restoration in the area encompassed by the GGWSSI, considering primarily tree-based systems. It charts the size and provides a regional overview of the restoration challenges and opportunities, drawing on data collected on trees, forests and land use in the context of the Global Drylands Assessment conducted by FAO and partners in 2015–2016.

Available online: www.fao.org/3/a-i6476e.pdf



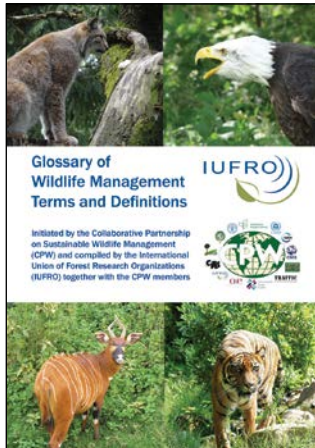
Evolving criteria and indicators

Criteria and indicators for the sustainable management of tropical forests.

ITTO Policy Development Series No. 21. International Tropical Timber Organization (ITTO). 2016. Yokohama, Japan, ITTO. ISBN: 978-4-86507-028-6.

ITTO pioneered the development of criteria and indicators (C&I) for sustainable forest management in the early 1990s to assist in monitoring and assessing the condition of natural tropical forests in the organization's producer member countries and in identifying improvements needed in forest practices. ITTO published *Criteria for the measurement of sustainable tropical forest management* in 1992 and new versions in 1998 and 2005. This further revised set of the ITTO C&I is timely in light of recent global developments in forest policies, such as those related to climate-change mitigation and adaptation, the Convention on Biological Diversity's Aichi Biodiversity Targets, and the Sustainable Development Goals, as well as in view of recent work among C&I processes and FAO to streamline and rationalize national reporting on forests.

Available online: www.itto.int/policypapers_guidelines



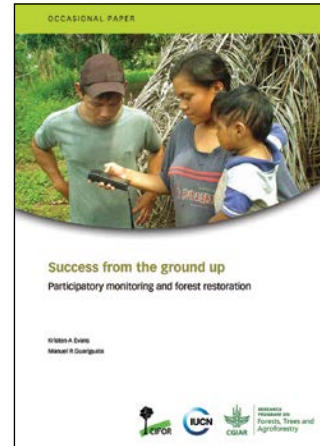
Defining wildlife and its management

Glossary of wildlife management terms and definitions. International Union of Forest Research Organizations (IUFRO).

The aim of this online glossary, launched on World Wildlife Day on 3 March 2016, is to raise awareness of the usage and meanings of technical terms related to wildlife management and conservation and thereby to increase common understanding of the issues and enable an informed dialogue. The glossary includes about 250 terms – such as wildlife, bushmeat, predator management, retrievable species, and flagship species – and their definitions in English, with the equivalent terms also given in French, German and Spanish.

The glossary was initiated by the Collaborative Partnership on Sustainable Wildlife Management (CPW) and compiled by IUFRO, with contributions from CPW members, including FAO. It is a work in progress and will be updated periodically as new knowledge is gained.

Available online: www.iufro.org/science/special/silvavoc/wildlife-glossary



People power in restoration monitoring

Success from the ground up: participatory monitoring and forest restoration. CIFOR Occasional Paper No. 159. K.A. Evans & M.R. Guariguata. 2016. Bogor, Indonesia, Center for International Forestry Research (CIFOR). ISBN: 978-602-387-039-4.

New global forest restoration initiatives present an unparalleled opportunity to reverse the trend of deforestation and forest degradation. Such a reversal will require the collaboration of stakeholders at all levels and, most importantly, the participation and support of local people. Ambitious restoration initiatives will also require monitoring systems that allow for scalability and adaptability to a range of local sites – this will be essential for understanding how restoration efforts are progressing, determining why they are succeeding (or not), and learning from successes and failures. This review explores the potential of participatory monitoring in forest restoration and related forest management activities through case studies, experiences, field tests and conceptual discussions. It seeks to deepen and broaden understanding of participatory monitoring by teasing out the lessons learned from existing knowledge and by mapping a possible path forward, with the aim of improving the outcomes of forest restoration initiatives.

Available online: www.cifor.org/publications/pdf_files/OccPapers/OP-159.pdf



Collaborative Partnership on Sustainable Wildlife Management

The **Collaborative Partnership on Sustainable Wildlife Management (CPW)** is a voluntary partnership of international organizations with substantive mandates and programmes for the sustainable use and conservation of wildlife resources. Its mission is to increase cooperation and coordination among its members and other interested parties on sustainable wildlife management to promote the sustainable use and conservation of terrestrial vertebrate wildlife in all biomes and geographic areas.

More information on the CPW at:
www.fao.org/forestry/wildlife-partnership



Photo: African elephants (*Loxodonta africana*), Gorom, Cameroon



**Food and Agriculture Organization
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