

POLICY PERSPECTIVE

From Poachers to Protectors: Engaging Local Communities in Solutions to Illegal Wildlife Trade

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Abstract

Combating the surge of illegal wildlife trade (IWT) devastating wildlife populations is an urgent global priority for conservation. There are increasing policy commitments to take action at the local community level as part of effective responses. However, there is scarce evidence that in practice such interventions are being pursued and there is scant understanding regarding *how* they can help. Here we set out a conceptual framework to guide efforts to effectively combat IWT through actions at community level. This framework is based on articulating the net costs and benefits involved in supporting conservation versus supporting IWT, and how these incentives are shaped by anti-IWT interventions. Using this framework highlights the limitations of an exclusive focus on “top-down,” enforcement-led responses to IWT. These responses can distract from a range of other approaches that shift incentives for local people toward supporting conservation rather than IWT, as well as in some cases actually decrease the net incentives in favor of wildlife conservation.

Introduction

The illegal wildlife trade crisis

Illegal wildlife trade (IWT) in wild species and products—ranging from rhino horn and elephant ivory to medicinal plants, timber, shark fins and pangolins—is an urgent global conservation challenge that has escalated dramatically in the last decade (Challender & MacMillan 2014; Wittemyer *et al.* 2014).

Since 2012, this crisis has attracted in excess of U.S.\$350 million in donor and government funding (Duffy & Humphreys 2014), and prompted high-level intergovernmental policy initiatives including the London (2014) and Kasane (2015) Conferences on IWT, the African Union's International Conference on Illegal Exploitation and Illicit Trade in Wild Flora and Fauna in Africa (Brazzaville; 2015), a UN General Assembly Resolution (2015), and relevant commitments in the

Sustainable Development Goals (2015). In terms of addressing poaching in source countries (as distinct from demand in consumer states) these policy commitments emphasize two broad areas: law enforcement and measures focused on communities and sustainable livelihoods. However, to date the emphasis in most policy debates and in donor resource allocation has been on strengthening state- and private sector-led law enforcement to reduce IWT. This enforcement is increasingly militarized in response to increasingly militarized poaching and to linkages with terrorism and state security (Duffy 2014; Lunstrum 2014; Buscher & Ramutsindela 2016). Militarization of the antipoaching response involves the use of military and paramilitary personnel (including private military forces), training, and technologies (e.g., drones and high-powered weapons) (Lunstrum 2014), and at field level is associated with increasingly punitive and lethal responses against suspected poachers (e.g., Makoye 2014; Konopo 2016).

By contrast, community-level interventions to reduce poaching for IWT have attracted far less attention and investment (IUCN SULi 2015). Details of how and where community-level interventions should be implemented and how they impact IWT remain vague, with designated resources and implementation largely lacking. Here we present a conceptual framework that highlights the incentives created by different types of policy interventions for local community actors to either poach or to protect wildlife. We use this framework to demonstrate the limitations to a “top-down” enforcement-only IWT strategy, including that such an approach can critically undermine approaches based on community empowerment, engagement, and benefit-sharing. We argue that diverse community-level approaches should and must be integrated into more effective anti-IWT responses.

Incentives shaping community attitudes and behavior in relation to IWT

Human decisions concerning conservation and exploitation of natural resources are shaped fundamentally by the incentives (financial and nonfinancial costs and benefits) accrued, as well as culture, norms, beliefs, values, lifestyles, and cognitive factors (Milner-Gulland & Rowcliffe 2007; St John *et al.* 2015). How these factors combine to affect individual decision-making varies according to both context and individual preferences. Studies in specific contexts have highlighted diverse motivations for poaching within communities, including (i) the requirement to meet subsistence needs, (ii) the desire to improve financial well-being or social standing, (iii) cultural practices and traditions, (iv) other noninstrumental motivations such as the desire to retaliate for

direct losses due to wildlife or for current or historical perceived injustices (Duffy 2010; Harrison *et al.* 2015). Community-based conservation (CBC) programmes seek to achieve conservation outcomes—including reduced poaching—predominantly by either increasing the financial benefits individuals receive through conservation, increasing the opportunity cost of behaviors that are incompatible with conservation or by instilling normative compliance through providing public goods (Gibson & Marks 1995). We build on and extend this thinking in the context of IWT to develop a conceptual framework for understanding individual decisions around poaching (Figure 1).

It is a reasonable assumption that for wildlife conservation to prevail, a necessary but not sufficient condition is that the expected net benefits (benefits minus costs) of wildlife conservation to community members with the means and opportunity of engaging in IWT must be greater than the net costs (Figure 1). We include in “conserving wildlife” any action with the effect of promoting or furthering conservation, from passive (e.g., tolerating presence of wildlife) to active (e.g., protecting wildlife from poaching). Similarly “engaging in IWT” includes any action supporting IWT, from passively concealing the identity of poachers to actively participating in illegal extraction, trafficking and/or trade. We recognize that the instrumental motivations included in this framework are only part of the motivation for individual decision-making. For example, colonial legacies including the loss of legitimate forms of access to natural resources may contribute to poaching as a form of protest (Duffy 2010). However, costs and benefits to community members also interact with and shape broader social values and norms around conservation and poaching, albeit in complex ways mediated by perceptions of legitimacy, local institutions and culture (Scanlon & Kull 2009).

A broad range of financial and nonfinancial social and economic benefits and costs are associated with both conserving wildlife and with engaging in IWT (Figure 1). Critically, however, these costs and benefits are not evenly distributed among individuals within a community. For instance, some benefits of conserving wildlife accrue to the individual, and vary widely according to factors such as gender, ethnicity and status (e.g., gaining conservation-related jobs); while others accrue at the community level and are more equitably shared among community members (e.g., hunting lease payments to community land rights holders) (Naidoo *et al.* 2016). Similarly poachers can often be distinguished into varying types, with different social and economic linkages to local communities (Phelps & Webb 2015). This conceptual framework will yield different net incentives for different individuals, so needs to be applied with attention

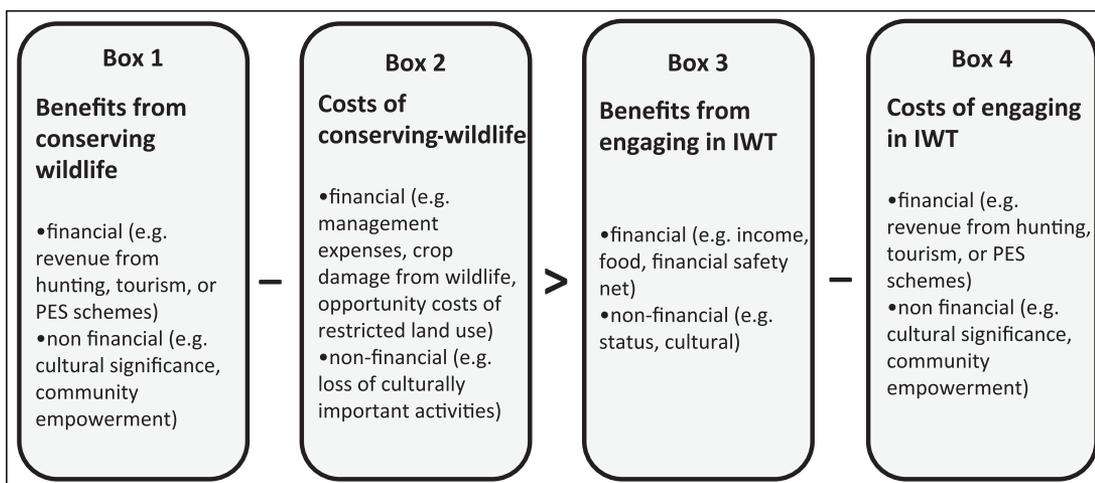


Figure 1 Conceptual framework for exploring the conditions likely to be required for local wildlife conservation in the context of IWT. Wildlife is more likely to be conserved where net benefits (financial and non-financial) to individuals in local communities of retaining it are greater than net benefits of engaging in IWT.

to the heterogeneity of costs and benefits amongst people in a local community, varying types of poachers, and the dynamic nature of payoffs to all actors over time.

To elaborate how this framework can apply to specific community members or poacher types is beyond the scope of this paper. Rather, we present here a simple conceptual model to help structure thinking about the basic conditions that will need to be in place for successful anti-IWT interventions. There are likely to be some circumstances where community-level interventions to help achieve the condition set out in Figure 1 are not applicable; for instance, where poaching takes place in remote areas far from settled communities and involving mobile gangs of poachers. However, this framework is likely to be relevant wherever the behaviors and decisions of local communities living with wildlife affect patterns of IWT, including effective provision of intelligence and cooperation in enforcement.

Applying this conceptual framework to interventions to combat IWT

We now consider each component of this framework, setting out how interventions to combat IWT can shape key incentives. We then discuss the importance of interaction between the payoffs, with specific reference to the impact of state-led enforcement approaches on overall incentives for IWT.

(i) Increasing benefits from wildlife conservation

Some anti-IWT interventions seek to shift incentives by increasing the benefits realized by community members

from conserving wildlife (Box 1 in Figure 1). This follows the well-established logic of common property resource governance theory (Ostrom 1990) and its application to wildlife in the form of Community-Based Natural Resource Management (CBNRM) (Hulme & Murphree 2001).

Increasing the benefits from conservation can be pursued through approaches such as strengthening community ownership rights and/or capacity to use, manage and benefit from wildlife (either for subsistence or commercial purposes), including pursuing traditional cultural practices linked to wildlife, participating in Payments for Ecosystem Services (PES) schemes, securing jobs as community guards or in nature-based tourism enterprises, or strengthening cooperation and communication with conservation/wildlife management agencies (IUCN SULI 2015; Roe 2015). Such benefits can be powerful in motivating communities to be active and committed conservation actors against poaching and IWT, as evidenced in conservancies in Namibia (Naidoo *et al.* 2016) and Kenya (Blackburn 2016). Effectiveness of different interventions will vary according to local context: for example, benefits from tourism are only feasible where certain conditions are met, such as political stability, tourism infrastructure and scenic landscapes (Naidoo *et al.* 2016).

CBC and CBNRM initiatives have failed when the generated benefits have been insufficient to offset individual costs, too diffuse to result in the creation of norms in favor of conservation, or captured by government/community elites (Child 1995; Gibson & Marks 1995). As such, increasing benefits from conservation is likely to be most effective in reducing IWT in those

cases where the benefit flows to local communities are conditional on conservation outcomes, that is, where better conservation outcomes are associated with increased or more secure benefits and vice versa; where benefits are experienced by a significant proportion of the community; *and* where accountability for these positive changes can be demonstrated clearly, that is, where changes in conservation status can be clearly attributed to actions of specific people or groups. This is the case with many sustainable use approaches, and some PES schemes (e.g., Lewis *et al.* 2011; Naidoo *et al.* 2016).

(ii) Decreasing the costs of living with wildlife

Promoting conservation over IWT can also involve efforts to reduce costs associated with conserving wildlife (Box 2 in Figure 1), including threats to personal security, livestock or crops; resource competition; and disease transmission between livestock and wildlife. Communities are often substantially disadvantaged by these impacts, particularly where they pose risks to life or livelihoods, leading to anger, resentment, and retaliatory poaching (Dickman 2010; Twinamatsiko *et al.* 2014). Interventions to reduce costs can include the construction of physical barriers such as fences to keep wildlife away from crops and livestock, problem animal control, and insurance or compensation schemes for crops damaged by wildlife (Hoare 2012). Reducing these costs may assist (or indeed be necessary) in shifting overall incentives for local people away from IWT and in favor of conservation. However, alone these interventions are unlikely to be sufficient, particularly in the context of escalating prices for illicitly sourced wildlife products (Challender & MacMillan 2014).

(iii) Reducing the benefits of engaging in IWT

A third type of anti-IWT intervention at community level aims to reduce the benefits that people can gain through engaging in IWT (Box 3 in Figure 1), through means such as reducing offtake of wildlife through increasing detection of snares (Linkie *et al.* 2015) or “devaluing” wildlife items, for example, infusing rhino horns with chemicals (Ferreira *et al.* 2014). While such interventions may likewise be important in shifting overall payoffs away from IWT, in most cases they will need to be augmented with other approaches to effectively reduce it.

(iv) Increasing costs of engaging in IWT

The most widely emphasized response to IWT focuses on increasing the costs associated with engaging in it (Box 4 in Figure 1). This is typically through state-led (sometimes private) law enforcement (Roe *et al.* 2015a), which can involve tightening restrictions on harvest and

trade; increasing the probability of detection and capture; increasing the chances of successful prosecution; and/or increasing sanctions and penalties (Duffy 2014; St John *et al.* 2015).

The costs of engaging in IWT can also be increased through approaches that empower and engage communities as active and motivated partners in law enforcement (Lotter & Clark 2014; Roe 2015; Naidoo *et al.* 2016). In Mali, for example, the Mali Elephant Project has supported local communities to establish voluntary game patrols to monitor elephant populations and detect poaching incursions (Roe 2015). In many cases, local residents are best placed to know what is happening on the ground, including who is poaching and their movements—information typically scarce in the IWT context. They can apply social and informal sanctions to members of their communities, and can be the “eyes and ears” of formal enforcement authorities as scouts, informants and guides that work cooperatively through joint patrols or information sharing (Lotter & Clark 2014; Wilkie *et al.* 2016). These approaches will be strongest where people feel a strong sense of ownership or stewardship over wildlife—where they are protecting “their” wildlife (Wilkie *et al.* 2016). Mechanisms can be established to enable people to easily, anonymously and safely report information, increasingly through mobile technologies. This approach is relevant wherever IWT takes place in or around areas where communities live, regardless of whether local residents are involved in IWT or not. Given the prevalence of IWT driven by “outsiders” and the increasingly militarized nature of some IWT, it is vital that community members are not endangered by such interventions, and they will typically need strong and reliable backup from well-equipped authorities with the power of arrest. Ample evidence shows that law enforcement and crime prevention is most effective when citizens and armed authorities both contribute (Hawdon & Ryan 2011).

A further popular anti-IWT strategy is providing “alternative livelihoods” for local communities, understood here as those not based on (legal or illegal) use of wild resources (e.g., small-scale farming, retail enterprises). The most commonly cited rationale for these interventions is that by providing an alternative source of income they reduce dependence on income from IWT. They also provide a mechanism for occupying limited time and resources that might otherwise be allocated to IWT. In some cases, the ability to benefit from alternative livelihoods interventions is made conditional on wildlife conservation. In these cases, the interventions serve to increase the costs of engaging in IWT (thus falling within Box 4 in Figure 1). However, the evidence for the effectiveness of alternative livelihoods approaches (in terms of

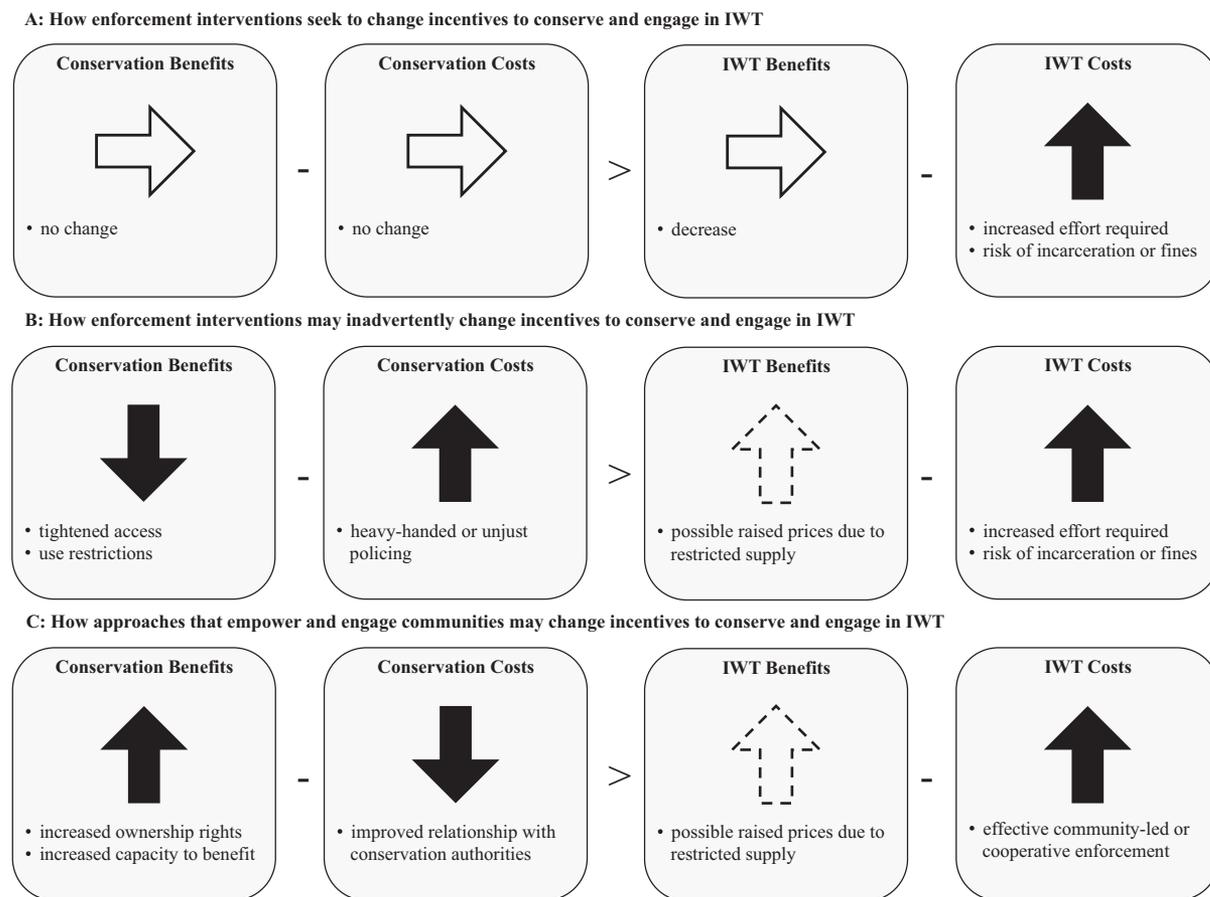


Figure 2 Potential impacts of interventions to combat IWT on incentives facing local community members. Dotted lines indicate more speculative impacts.

delivering conservation outcomes) is scant (Wicander & Coad 2014; Roe *et al.* 2015b). In particular, it is unclear if the provision of benefits from alternative livelihoods interventions replaces or simply supplements IWT benefits (Wright *et al.* 2016). There are some examples in which alternative livelihoods have been used as one component of a package of interventions to tackle IWT (Lotter & Clark 2014) or where “reformed poachers associations” have been established on the premise of provision of alternative sources of income-earning opportunities (see Harrison *et al.* 2015). But, as with other nonconditional conservation incentives, we are skeptical about their wide-scale adoption in combating IWT.

What's wrong with current approaches?

The dominant approach to countering IWT based on “top down” enforcement (Figure 2A) has a number of serious limitations. While regulation and enforcement clearly have an important role to play in reducing IWT, an exclu-

sive focus on this element of our framework has several potentially perverse collateral impacts: it ignores important ramifications for other costs and benefits that shape incentives for IWT; it overlooks the potential for reducing incentives for IWT through strategies that change other incentives; and it fails to leverage (and indeed may impair) more nuanced and locally engaged forms of monitoring and enforcement (e.g., community-led efforts).

Top down (and particularly militarized) enforcement strategies frequently not only change the costs of engaging in IWT, but can produce a range of other (sometimes unanticipated) impacts that can collectively undermine conservation incentives (see Figure 2B). Where enforcement efforts are upholding local rights, providing security and/or defending a community's assets they will strengthen community benefits from conservation and may well increase support for it. But poorly directed or heavy-handed efforts can impose unjustified restrictions on people's use of wildlife resources, infringe rights, and undermine the benefits that local people can gain from

conservation and wildlife protection. Interventions justified by cracking down on IWT can, for example, curtail livelihood benefits from legitimate use of wildlife through subsistence use, trade, or trophy hunting programmes. Heavy-handed enforcement can further involve unjust persecution, harassment and human rights abuses by authorities (Corry 2015), increasing the perceived costs of living alongside wildlife. When people lose benefits and feel increasing costs of conservation, this can lead to anger and resentment—traits associated with poaching in some studies (Twinamatsiko *et al.* 2014).

It is also plausible that enforcement-focused strategies (top-down or otherwise) can actually increase the individual benefits gained from IWT, when they reduce the supply of illegal products but demand remains constant or indeed increases with product rarity (Chen 2015). In these circumstances prices for illegal products are expected to continue to rise and may further incentivize IWT.

By contrast, approaches that explicitly seek to empower and engage communities in combating IWT can harness multiple levers to shift conservation incentives in a positive direction (Figure 2C), while safeguarding and promoting critical human rights and livelihood concerns (see e.g., IUCN SULi *et al.* 2015, pp. 15–19). Community-led interventions can motivate community members to protect wildlife through simultaneously supporting their rights to benefit from wildlife resources and associated sense of ownership, seeking to increase the benefits they gain through doing so and minimizing the costs, as well as fostering more efficient and powerful forms of enforcement through drawing on the energies and capacities of motivated community members as active partners in combating IWT. While enforcement plays a critical role in this model, it is enforcement that upholds and protects the rights of individual community members, rather than potentially undermining them. Integrating these approaches offers a far more coherent and, where successful, more powerful package of incentives raising far fewer social concerns than purely enforcement-focused interventions.

Where to from here?

Community-based approaches alone are unlikely to be adequate to stem IWT, particularly in the face of escalating commodity values for wildlife traded illegally, the militarization of poaching, and the involvement of “outsiders,” including sophisticated organized crime networks, in IWT (Duffy 2014). A critical need is for better understanding of where and how community-level approaches can effectively help combat IWT (Biggs *et al.* 2016). State-led and/or private law enforcement will

rightly continue to play an essential role in successful natural resource management and in the battle against IWT (Phelps *et al.* 2014). However, a frequent, often narrow preoccupation with this approach may be compromising the possibilities for exploring fruitful and complementary pathways that engage and support communities—risking the undermining of anti-IWT efforts by alienating or disenfranchising local residents in source areas of illicit wildlife goods. Improving relations with communities and increasing incentives for conservation—in ways that effectively meet the requirements of Figure 1—creates the necessary backbone for successful enforcement by providing a critically needed enabling environment. In addressing the current devastating spate of IWT it is urgent and essential that interventions combine the best of both “top-down” enforcement and diverse community-engagement approaches, while always carefully considering the various feedbacks and unintended consequences they can cause.

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References

- Biggs, D., Cooney, R. & Roe, D. *et al.* (2016). Developing a theory of change for a community-based response to illegal wildlife trade. *Cons. Biol.*, doi: 10.1111/cobi.12796
- Blackburn, S., Hopcraft, G.C., Ogotu, J.O., Matthiopoulos, J. & Frank, L. (2016). Human-wildlife conflict, benefit sharing and the survival of lions in pastoralist community-based conservancies. *J. Appl. Ecol.*, **53**(4), 1195–1205. doi: 10.1111/1365-2664.12632
- Buscher, B. & Ramutsindela, M. (2016). Green violence: rhino poaching and the war to save southern Africa’s Peace Parks. *Afr. Aff.*, **115**(458), 1–22.
- Challender, D.W.S. & MacMillan, D.C. (2014). Poaching is more than an Enforcement Problem. *Conserv. Lett.*, **7**(5), 484–494.

- Chen, F. (2015). Poachers and snobs: demand for rarity and the effects of antipoaching policies. *Conserv. Lett.*, **9**, 65-69.
- Child, B. (1995). The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme. *Biodiv. Conserv.*, **5**(3), 369-398.
- Corry, S. (2015). When Conservationists Militarise, Who's the Real Poacher? *Truthout*, <http://www.truth-out.org/opinion/item/32255-when-conservationists-militarize-who-s-the-real-poacher> (visited Jan. 22, 2016).
- Dickman, A.J. (2010). Complexities of conflict: the importance of considering social factors for effectively resolving human-wildlife conflict. *Anim. Conserv.*, **13**(5), 458-466.
- Duffy, R. (2010). *Nature crime: how we're getting conservation wrong*. Yale University Press, New Haven, CT and London.
- Duffy, R. (2014). Waging a war to save biodiversity: the rise of militarized conservation. *Int. Aff.*, **90**(4), 819-834.
- Duffy, R. & Humphreys, J. (2014). Mapping donors: key areas for tackling illegal wildlife trade (Asia and Africa). *Evidence on Demand*, UK. <http://www.evidenceondemand.info/mapping-donors-key-areas-for-tackling-illegal-wildlife-trade-asia-and-africa> (visited Jan. 22, 2016).
- Ferreira, S., Hofmeyr, M., Pienaar, D. & Cooper D. (2014). Chemical horn infusions: a poaching deterrent or unnecessary deception? *Pachyderm*, **55**, 54-61.
- Gibson, C.C. & Marks, S.A. (1995). Transforming rural hunters into conservationists: an assessment of community-based wildlife management programs in Africa. *World Dev.*, **23**(6), 941-957.
- Harrison M., Roe, D., Baker, J. *et al.* (2015). *Wildlife crime: a review of the evidence on drivers and impacts in Uganda*. IIED Research Report, London. <http://pubs.iied.org/17576IIED> (visited May 1, 2016).
- Hawdon, J. & Ryan, J. (2011). Neighborhood organizations and resident assistance to police. *Soc. Forum*, **26**(4), 897-920.
- Hoare, R. (2012). Lessons from 15 years of human-elephant conflict mitigation: management considerations involving biological, physical and governance issues in Africa. *Pachyderm*, **51**, 60-74.
- Hulme, D. & Murphree, M. (2001). *African wildlife and livelihoods: the promise and performance of community conservation*. James Curry, Oxford, UK.
- IUCN SULI (2015). Beyond Enforcement: communities, governance incentives and sustainable use in combating wildlife crime. Symposium Report. IIED, London, UK. <http://pubs.iied.org/G03903.html> (visited Jan. 22, 2016).
- Konopo, J. (2016). Botswana's 'shoot-to-kill policy' against suspected poachers. *Mail and Guardian*, 18 March 2016. <http://mg.co.za/article/2016-03-16-botswanas-shoot-to-kill-policy-against-suspected-poachers> (visited May 6, 2016).
- Lewis, D., Bell, S.D., Fay, J. *et al.* (2011). Community markets for conservation (COMACO) links biodiversity conservation with sustainable improvements in livelihoods and food production. *P. Nat. A. Sci.*, **108**(34), 13957-13962.
- Linkie, M., Martyr, D.J., Harihar, A. *et al.* (2015). Safeguarding Sumatran tigers: evaluating effectiveness of law enforcement patrols and local informant networks. *J. Appl. Ecol.*, **52**(4), 851-860.
- Lotter, W. & Clark, K. (2014). Community involvement and joint operations aid effective anti poaching in Tanzania. *PARKS*, **20**(1), 19-28.
- Lunstrum, E. (2014). Green militarization: anti-poaching efforts and the spatial contours of Kruger National Park. *Ann. Assoc. Am. Geogr.*, **104**(4), 816-832.
- Makoye, K. (2014). *Anti-poaching operation spreads terror in Tanzania*. Inter Press Service. Jan 6th, 2014. <http://www.ipsnews.net/2014/01/anti-poaching-operation-spread-terror-tanzania/> (visited May 1, 2016).
- Milner-Gulland, E.J. & Rowcliffe, J.M. (2007). *Conservation and sustainable use: a handbook of technique*. Oxford University Press, Oxford, UK.
- Naidoo, R., Weaver, C.L., Diggle, R.W., Matongo, G., Stuart-Hill, G. & Thouless, C. (2016). Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Cons. Biol.*, **30**(3), 628-638. doi: 10.1111/cobi.12643.
- Ostrom, E. (1990). *Governing the commons. The evolution of institutions for collective action*. Cambridge University Press, Cambridge, UK.
- Phelps, J., Shepherd, C.R., Reeve, R., Niissalo, M.A. & Webb, E.L. (2014). No easy alternatives to conservation enforcement: response to Challenger and Macmillan. *Conserv. Lett.*, **7**(5), 495-496.
- Phelps, J. & Webb, E.L. (2015) "Invisible" wildlife trades: Southeast Asia's undocumented illegal trade in wild ornamental plants. *Biol. Conserv.*, **186**, 296-305.
- Roe, D., (2015). *Conservation, crime and communities: case studies of efforts to engage local communities in tackling illegal wildlife trade*. IIED, London, UK. <http://pubs.iied.org/14648IIED.html> (visited Jan. 22, 2016).
- Roe, D., Cooney, R., Dublin, H. *et al.* (2015a). Beyond enforcement: engaging communities in tackling wildlife crime. *IIED Briefing Paper*. IIED, London, UK. <http://pubs.iied.org/17293IIED.html> (visited Jan. 22, 2016).
- Roe, D., Day, M., Booker, F. *et al.* (2015b). Are alternative livelihood projects effective at reducing local threats to specified elements of biodiversity and/or improving or maintaining the conservation status of those elements? A systematic review. *Environ. Evid.*, **4**, 1-22
- St John, F.A.V., Mai, C.H. & Pei, K.J.C. (2015). Evaluating deterrents of illegal behaviour in conservation: carnivore killing in rural Taiwan. *Biol. Conserv.*, **189**, 86-94.
- Scanlon, L.J. & Kull, C.A. (2009) Untangling the links between wildlife benefits and community-based

- conservation at Torra Conservancy, Namibia. *Dev South Afr.* **26**(1), 75-93
- Twinamatsiko, M., Baker, J., Harrison, M. *et al.* (2014). Linking conservation, equity and poverty alleviation: understanding profiles and motivations of resource users and local perceptions of governance at Bwindi Impenetrable National Park, Uganda. *IIED Research Report*. IIED, London, UK. <http://pubs.iied.org/14630IIED> (visited Jan. 22, 2016).
- Wicander, S. & Coad, L. (2014). *Learning our lessons: a review of alternative livelihood projects in Central Africa*. Environmental Change Institute, University of Oxford, UK, & IUCN, Gland, Switzerland. <http://cmsdata.iucn.org/downloads/english'ersion.pdf> (visited May 13, 2016).
- Wilkie, D., Painter, M. & Jacob, I. (2016). *Rewards and Risks associated with community engagement in anti-poaching and anti-trafficking*. *Biodiversity Technical Brief*. United States Agency for International Development, Washington. <http://pdf.usaid.gov/pdf/docs/PA00M3R9.pdf> (visited July 20, 2016).
- Wittemyer, G., Northrup, J.M., Blanc, J., Douglas-Hamilton, I., Omondi, P. & Burnham, K.P. (2014). Illegal killing for ivory drives global decline in African elephants. *Proc. Nat. Acad. Sci.*, **111**(36), 13117-13121.
- Wright, J.H., Hill, N.A., Roe, D. *et al.* (2016). Reframing the concept of alternative livelihoods. *Conserv. Biol.*, **30**(1), 7-13.doi:10.1111/cobi.12607