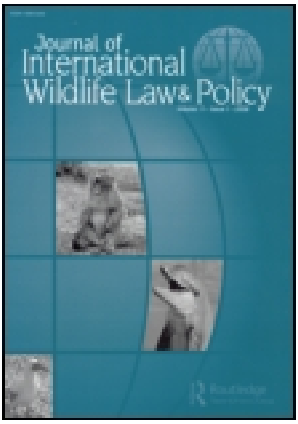

Journal of International Wildlife Law & Policy
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/uwlp20

Human-Elephant Conflict in Africa: The Legal and Political Viability of Translocations, Wildlife Corridors, and Transfrontier Parks for Large Mammal Conservation

Noa Pinter-Wollman [a]
[a] Program in Human Biology, Department of Biology, Stanford University, 450 Serra Mall, Stanford, CA, 94305-2160

Available online: 29 May 2012

To cite this article: Noa Pinter-Wollman (2012): Human-Elephant Conflict in Africa: The Legal and Political Viability of Translocations, Wildlife Corridors, and Transfrontier Parks for Large Mammal Conservation, Journal of International Wildlife Law & Policy, 15:2, 152-166

To link to this article: http://dx.doi.org/10.1080/13880292.2012.678793

Journal of International Wildlife Law & Policy, 15:152–166, 2012

ISSN: 1388-0292 print / 1548-1476 online
DOI: 10.1080/13880292.2012.678793

Routledge
Taylor & Francis Group

Human–Elephant Conflict in Africa: The Legal and Political Viability of Translocations, Wildlife Corridors, and Transfrontier Parks for Large Mammal Conservation

NOA PINTER-WOLLMAN*

1. INTRODUCTION

African elephants and humans occupy the same land. Due to elephants' vast ranges and demanding metabolic needs, encounters between them and humans are inevitable. While some encounters between the two species are beneficial, as when they are linked through tourism, many encounters result in conflict. This conflict situates elephants in the paradoxical situation of being simultaneously a pest and a vulnerable species. Human–elephant conflict (HEC) is a major concern in most elephant range countries, both in Africa and Asia, as the articles in this issue of the *Journal* demonstrate. This conflict takes the form of crop raiding and the destruction of valuable human property, such as houses, and it results in both human and elephant deaths.[1] Incidents of HEC are becoming more frequent due to increases in human population and encroachment on elephant habitat.[2]

Many solutions to HEC are available, varying in cost and efficacy. Deterrents such as electric fences,[3] bees,[4] and the plant *Capsicum oleoresin* (hot

---

*Lecturer, Program in Human Biology, Department of Biology, Stanford University, 450 Serra Mall, Stanford, CA 94305-2160. E-mail: nmpinter@stanford.edu

[1] N. W. Sitati et al., *Predicting Spatial Aspects of Human–Elephant Conflict*, 40 J. APPLIED ECOL. 667–677 (2003).

[2] R. E. Hoare, *Determinants of Human–Elephant Conflict in a Land-Use Mosaic*, 36 J. APPLIED ECOL. 689–700 (1999); R. E. Hoare, *African Elephants and Humans in Conflict: The Outlook for Co-Existence*, 34 ORYX 34–38 (2000); P. C. Lee & M. D. Graham, *African Elephants, Loxodonta Africana, and Human–Elephant Interactions: Implications for Conservation.*, 40 INT'L ZOOL. Y.B. 9–19 (2006).

[3] C. E. O'Connell-Rodwell et al., *Living with the Modern Conservation Paradigm: Can Agricultural Communities Co-Exist with Elephants? A Five-Year Case Study in East Caprivi, Namibia*, 93 BIOL. CONS. 381–391 (2000).

[4] L. E. King et al., *Beehive Fence Deters Crop-Raiding Elephants*, 47 AFR. J. ECOL. 131–137 (2009).

chili pepper)[5] are useful where elephants have alternative habitat. However, such deterrents are not always effective[6] and often require intensive maintenance to ensure their efficacy. Such maintenance can be costly and dependent on long-term funding, which is seldom available in developing countries.

In addition, most cases of HEC occur in highly populated areas where no alternative habitat is available for elephants when they are deterred.[7] In such situations, solutions to HEC include culling,[8] birth control,[9] and translocating elephants to new locations.[10] In unique situations, it is possible to increase the size of the elephants' habitat by creating wildlife corridors that connect protected areas or by removing fencing between protected areas that are situated on two sides of international borders, creating 'transfrontier conservation areas.'[11] Providing elephants with more space and natural resources reduces their need to venture into human settlements and fields, thus reducing HEC.[12]

Because African elephants range across 37 different countries, they face many, often conflicting wildlife management policies.[13] African elephants are listed as a vulnerable species on the Red List of the International Union for Conservation of Nature (IUCN).[14] Many range countries in eastern and central

[5] F. V. Osborn, *Capsicum Oleoresin as an Elephant Repellent: Field Trials in the Communal Lands of Zimbabwe*, 66 J. WILDLIFE MGMT. 674–677 (2002).

[6] M. D. Graham & T. Ochieng, *Uptake and Performance of Farm-Based Measures for Reducing Crop Raiding by Elephants Loxodonta africana Among Smallholder Farms in Laikipia District, Kenya*, 42 ORYX 76–82 (2008).

[7] D. Balfour et al., Review of Options for Managing the Impacts of Locally Overabundant African Elephants (Species Survival Commission, African Elephant Specialist Group, IUCN, Gland, Switzerland, 2007).

[8] R. J. van Aarde et al., *Culling and the Dynamics of the Kruger National Park African Elephant Population*, 2 ANIMAL CONS. 287–294 (1999).

[9] S. L. Pimm & R. J. van Aarde, *African elephants and Contraception [Brief communication–letter]*, 411 NATURE 766 (2001).

[10] C. Muir, Monitoring the Impact of the Mwaluganje Elephant Trans-Location, Kenya (Unpublished report to the Kenya Wildlife Service, Nairobi, Kenya, 2000); E. Wambwa et al., *Resolving Human–Elephant Conflict in Luwero District, Uganda, Through Elephant Translocation*, 31PACHYDERM 58–62 (2001); H. T. Dublin & L. S. Niskanen, Guidelines for the in situ Translocation of the African Elephant for Conservation Purposes (Species Survival Commission, African Elephant Specialist Group, IUCN, Gland, Switzerland, 2003), available online at http://www.african-elephant.org/tools/trnsgden.html (accessed 28 Jan. 2012); N. Pinter-Wollman et al., *Assessing Translocation Outcome: Comparing Behavioral and Physiological Aspects of Translocated and Resident African Elephants (Loxodonta africana)*, 142 BIOL. CONS. 1116–1124 (2009).

[11] S. Metcalfe & T. Kepe, *"Your Elephant on Our Land": The Struggle to Manage Wildlife Mobility on Zambian Communal Land in the Kavango-Zambezi Transfrontier Conservation Area*, 17 J. ENV'T & DEV. 99–117 (2008).

[12] G. M. Harris et al., *Rules of Habitat Use by Elephants Loxodonta africana in Southern Africa: Insights for Regional Management*, 42 ORYX 66–75 (2008).

[13] See the review of the contrasting approaches to elephant management among eastern and southern African countries in J. R. Berger, *The African Elephant, Human Economics and International Law: Bridging a Great Rift for East and Southern Africa*, GEO. INT'L ENVTL. L. REV. 418–470 (2001).

[14] J. Blanc, *Loxodonta africana,* in IUCN Red List of Threatened Species (2008), Version 2011.2, online at http://www.iucnredlist.org/apps/redlist/details/12392/0 (accessed on 16 January 2012).

Africa are at constant war with illegal poachers in an effort to protect their elephant populations. However, elephant populations in southern Africa are on the rise and several countries occasionally receive permission under the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) to trade in ivory stockpiles.[15] In addition, the laws of certain range states, some of which have only small elephant populations, permit sport hunting of elephants for trophies.[16]

In the age of globalization, it is clear that wildlife management laws and policies in one country affect the wildlife populations of other range countries. For example, when permission to trade ivory is granted to some countries, illegal hunting of elephants surges in all range states, and illegal ivory enters the market.[17] Discrepancies in law and policy and in attitude toward conservation among range states can be a hurdle when managing transfrontier parks that are subject to the wildlife management policies of more than one agency in more than one country.[18] The heterogeneity in elephant numbers throughout their ranges and the various attitudes of range states towards elephant conservation has resulted in implementation and development of a large array of solutions to HEC.

Here, I review some solutions to HEC. I highlight solutions that are sensitive to the elephants' vulnerable conservation status: translocations and increasing the size of protected areas by creating wildlife corridors and transfrontier parks. These solutions often require cooperation among range states. Such cooperation raises interesting political as well as logistical challenges.

There are two main approaches for resolving HEC: controlling elephant numbers and enhancing elephant habitat.[19] Methods for controlling elephant population sizes include culling, contraceptives, and problem animal control. Management strategies that increase the habitat available to the elephants include wildlife corridors, and transfrontier parks. Translocations combine both approaches.

[15] The Web site of the Convention in International Trade in Endangered Species (CITES) is at http://www.cites.org. The site gives ready access to fully up-to-date copies of the text of the Convention and its appendices. The article under which trade in stockpiles can be authorized, Article V, is at http://www.cites.org/eng/disc/text.php#V (accessed 28 Jan. 2012).

[16] Cameroon is a case in point. *See* Blanc, *supra* note 14.

[17] Recent developments in the ability to extract DNA from ivory now allow law enforcement agents to determine the origin of ivory and establish its legality: S. K. Wasser et al., *Using DNA to Track the Origin of the Largest Ivory Seizure Since the 1989 Trade Ban*, 104 PROC. NAT'L ACAD. SCI. 4228–4233 (2007); Samuel K. Wasser et al., *Elephants, Ivory, and Trade*, 327 SCIENCE 1331–1332 (2010).

[18] For a non-technical introduction to attempts to save both species and landscapes across borders, *see* C. FRASER, REWILDING THE WORLD: DISPATCHES FROM THE CONSERVATION REVOLUTION (2009). The main legal and policy norms that have constrained more effective trans-border management of species and habitats are reviewed in D. HUNTER, J. SALZMAN, & D. ZAELKE, INTERNATIONAL ENVIRONMENTAL LAW & POLICY 1002–1231 (3rd ed., 2007).

[19] R. J. van Aarde & T. P. Jackson, *Megaparks for Metapopulations: Addressing the Causes of Locally High Elephant Numbers in Southern Africa*, 134 BIOL. CONS. 289–297 (2007); Harris et al., *supra* note 12.

2. CONTROLLING ELEPHANT NUMBERS

2.1 Culling

To reduce the size of elephant populations, certain countries resorted in the past to the managed killing of elephant herds. The goals of culling were to reduce both HEC and elephant herbivory in national parks, such as Kruger National Park in South Africa.[20] In the early 1990s, southern African countries stopped managing their elephant populations using culling, for several reasons.

First, public opinion of this management practice was negative and questioned the ethics of elephant culling.[21] Second, behavioral disruptions caused by culling were recorded, affecting the well-being of both remaining elephants and other wildlife.[22] Third, studies showed that culling did not effectively reduce elephant numbers. Local elephant populations increased after culling due to increased birth rates and due to emigration of neighboring elephants into the newly unoccupied habitat.[23]

2.2 Contraceptives

Contraceptives can technically be used for controlling the size of elephant populations, but the administration of contraceptives is not always feasible. Immunocontraceptive vaccines[24] that prevent egg fertilization have been hailed as humane substitutes to culling for controlling the size of elephant populations.[25] These drugs, indeed, stopped the growth of very small elephant populations.[26,27] However, effective control of population growth using contraceptives requires the contraception of a large proportion of the females in the population, which is difficult to accomplish in very large populations.[28,29] In addition, to effectively control population size, repeated administrations of the drug are required. It is necessary, therefore, to individually identify the treated females and locate them periodically for booster shots,[30] and this imposes a substantial burden on management agencies.

---

[20] Van Aarde et al., *supra* note 8.

[21] V. Butler, *Elephants: Trimming the Herd*, 48 BIOSCI. 76–81 (1998).

[22] G. A. Bradshaw et al., *Elephant Breakdown*, 433 NATURE 807 (2005).

[23] Van Aarde et al., *supra* note 8.

[24] These are Porcine Zona Pellucida (PZP) glycoproteins.

[25] R. A. Fayrer-Hosken et al., *Immunocontraception of African Elephants—A Humane Method to Control Elephant Populations Without Behavioural Side Effects*, 407 NATURE 149 (2000).

[26] A. K. Delsink et al., *Regulation of a Small, Discrete African Elephant Population through Immunocontraception in the Makalali Conservancy, Limpopo, South Africa*, 102 S. AFR. J. SCI. 403–405 (2006).

[27] Only 73 elephants were studied by Delsink et al., *supra* note 26, of which only 28 were reproductively mature females. This population was confined to a closed reserve and habituated to vehicles.

[28] A. P. Dobson, *Effect of Fertility Control on Elephant Population Dynamics*, 9 J. REPROD. FERTILITY 293–298 (1993).

[29] Up to 75 percent of the females in Kruger National Park need to be treated over the course of 11 years to reach zero growth. Van Aarde et al., *supra* note 8.

[30] Fayrer-Hosken et al., *supra* note 25.

These technical and organizational requirements often make the costs of administering contraceptives too expensive for large populations.[31] In addition, behavioral studies find excess aggression among females on which contraception has been used[32] and the long-term effects of contraceptives on population structure and ecology are still unknown.[33]

2.3 Problem Animal Control (PAC)

Some wildlife agencies control specific problem animals, notably those elephants that repeatedly raid crops. When conflict arises, problem animal control units are sent to chase away the problematic elephants and, when there is danger to human lives, the problem elephants may be shot.[34] Specifically targeting individuals that recurrently cause problems requires resources to carefully track and individually identify problem-causing elephants. Further research is required to better understand why certain individuals turn into problem animals and others do not. Such research may provide useful information on how to minimize cases of problem animals and potentially on how to resolve existing problems at reasonable cost.[35]

3. TRANSLOCATIONS

During translocations, elephants are transferred from areas with high levels of HEC to areas that can sustain a large elephant population with minimal conflict. This procedure both reduces the number of elephants at the origin, providing the remaining elephants with more resources, and places the removed elephants in new, sparsely populated habitat, in which they are less likely to interact with humans. Thus, elephant numbers are reduced[36] in the region of conflict and the size of suitable habitat increases for both the remaining and the removed elephants. Elephant translocations in South Africa were also conducted to stock new parks with elephants and increase their economic value in the tourism industry.

---

[31] Van Aarde & Jackson, *supra* note 19.

[32] G. H. Kerley & A. M. Shrader, *Elephant Contraception: Silver Bullet or a Potentially Bitter Pill?*, 103 S. AFR. J. SCI. 181–182 (2007).

[33] A. A. Perdock et al., *Prospects for Managing African Elephant Population Growth With Immunocontraception: A Review*, 42 PACHYDERM 97–107 (2007).

[34] For evidence from Kenya *see* P. Omondi et al., *Managing Human–Elephant Conflicts: The Kenyan Experience*, 36 PACHYDERM 39–48 (2004). For evidence from Botswana, *see* Berger, *supra* note 13.

[35] For example, orphaned elephants that are raised by humans and then released to the wild may become problem animals due to their high affinity to humans.

[36] This reduction in elephant numbers at the translocation source is likely temporary, just as after culling, because population growth may accelerate and elephants from nearby regions may immigrate and replace the removed elephants.

The International Union for Conservation of Nature, Species Survival Commission, African Elephant Specialist Group (IUCN/SSC AfESG) published its translocation guidelines in 2003.[37] These guidelines include advice on logistical considerations during the planning and implementation of an elephant translocation. The recommendations in this guide book are based on the authors' "personal, professional experience, or transmitted by word of mouth among colleagues."[38]

Thus, even though by 2003 many translocations had taken place both in southern and eastern Africa, only few of the guidelines address how elephants respond to translocations, and there are only few references to published reports. Furthermore, to my knowledge, there are no published accounts of whether translocations as management actions indeed fulfill their goals both economically and in terms of alleviating HEC.

Most early translocations in South Africa released few elephants into small, fenced preserves. These translocations have been considered relatively successful because population numbers increased after release.[39] However, because many of these translocations involved moving juvenile elephants that were orphaned during culling operations, several behavioral anomalies resulted from the elephants' disrupted social structure. One example is the rampant behavior of young bulls trampling to death several rhinos in Pilanesberg National Park.[40] When older bulls were introduced this behavior subsided.[41]

In 1992, the first large-scale translocation, of both families and adult males, was performed in Zimbabwe. Four hundred and seventy elephants were moved from Gonarezhou National Park in Zimbabwe to other parks within the country, and 200 more elephants were moved to Madikwe Reserve in South Africa.[42] Unfortunately, no published reports on the fate of these elephants could be found. Very little post-translocation monitoring of other large-scale translocations of both family groups and adult males has been published.[43]

Most published reports about elephant translocations include information on numbers of elephants moved, death rates during the translocation, and occasionally anecdotes regarding logistical difficulties during the

[37] Dublin & Niskanen, *supra* note 10.

[38] *Id*., at 8.

[39] M. E. Garai et al., *Elephant Reintroductions to Small Fenced Reserves in South Africa*, 37 PACHYDERM 28–36 (2004).

[40] R. Slotow & G. van Dyk, *Role of Delinquent Young "Orphan" Male Elephants in High Mortality of White Rhinoceros in Pilanesberg National Park, South Africa*, 44 KOEDOE 85–94 (2001).

[41] R. Slotow et al., *Older Bull Elephants Control Young Males*, 408 NATURE 425–426 (2000).

[42] C. Coetsee, *Elephant Translocations*, 22 PACHYDERM 81–82 (1996).

[43] For outcomes of male translocations, see M. E. Garai & R. D. Carr, *Unsuccessful Introductions of Adult Elephant Bulls to Confined Areas in South Africa*, 31 PACHYDERM 52–57 (2001); Slotow & van Dyk, *supra* note 40.

translocation procedure itself.[44] Reports on the behavior of the animals post-translocation and on the economic benefits of these operations may provide useful advice to improve future management actions and help decide whether translocations are indeed appropriate and economically sound solutions to HEC.

3.1 Lessons Learned From the 2005 Elephant Translocation in Kenya

The results of a post-translocation monitoring of 150 individuals, females, calves, and males, that were moved from Shimba Hills National Reserve to Tsavo East National Park in Kenya in 2005 are now published and can assist managers when deciding which elephants to move, when to move them, and where to move them. This work from Kenya is summarized below.

3.1.1 Targeting Individuals for Translocation

The mortality rate of translocated elephants was greater than that of the local population at the release site. In addition, most deaths occurred within the first 2 months post-translocation, either due to the translocation procedure itself or due to hardships, such as not finding appropriate forage in an unfamiliar habitat or aggression from local conspecifics, during the initial acclimation period.[45] The use of bomas[46] and food provisioning may reduce the rates of these initial mortalities. The mortality of bulls and calves was higher than expected in the Kenyan translocation,[47] as was the mortality of young orphans translocated in South Africa.[48] Thus, moving families with very young calves may incur greater losses than moving families that do not have very young calves. Bull mortality was related to further HEC at the release site, resulting in some animals being either poached by the local community or shot by PAC. These findings question the efficacy of translocating adult bulls to resolve HEC.[49]

Both males and females with calves left the release site and either returned home or roamed into nearby human settlements and were then shot by PAC.[50] The females that returned with their calves split from the groups they

---

[44] Wambwa et al., *supra* note 10; Coetsee, *supra* note 42; M. W. Litoroh et al., *Two Successful Elephant Translocations in Kenya*, 31 PACHYDERM 674–75 (2001); P. O. M. Omondi et al., *Recent Translocation of Elephant Family Units From Sweetwaters Rhino Sanctuary to Meru National Park, Kenya*, 32 PACHYDERM 39–48 (2002).

[45] N. Pinter-Wollman et al., *supra* note 10.

[46] Bomas are enclosures at the release site in which translocated animals are kept for a short period before further release into the park. *See* Dublin & Niskanen, *supra* note 10.

[47] Pinter-Wollman et al., *supra* note 10.

[48] Garai et al., *supra* note 39.

[49] Muir, *supra* note 10; Pinter-Wollman et al., *supra* note 10.

[50] N. Pinter-Wollman, *Spatial Behaviour of Translocated African Elephants (Loxodonta africana) in a Novel Environment: Using Behaviour to Inform Conservation Actions*, 146 BEHAVIOUR 1171–1192 (2009).

were captured with, suggesting they might not have been genetically related. Ensuring that intact family units are targeted for translocation at the source site may reduce such homing events. In addition, individuals who roamed far from the release site were the bold animals.[51] Boldness was measured as approach distance to a stationary vehicle which can be easily assessed pre-translocation and used for choosing which individuals to move.

3.1.2 Translocation Timing

Translocating elephants during the wet season may provide more abundant food than is available in the dry season when environments are arid but it may also facilitate large-scale movements. Some elephants that returned to the source site in 2005, waited until the rains began and food was abundant before homing.[52] In addition, moving elephant during the wet season is often accompanied by logistical difficulties caused, for example, by mud.

Stress hormones of the 2005 translocated elephants were higher than those of the local population during the first dry season following the translocation.[53] It is unclear whether heightened stress levels were the result of the translocation procedure itself or due to lack of food in the dry conditions. Further work on the stress hormones of elephants moved during a wet season is needed for determining which seasonal conditions are most optimal for translocating elephants. The physical state of the translocated elephants was inferior to that of the local population throughout the entire first year post-translocation.[54]

Mammary glands of translocated females were empty, which was likely the cause of the increased death rate of young calves.[55] In addition, only after one year in the new habitat, the translocated elephants began to socially integrate into the local population.[56] Thus, translocation success can be assessed only after monitoring the acclimation process of translocated elephants for at least one year.

3.1.3 Release Site Characteristics

Upon arrival at the release site, translocated elephants preferred to associate with other translocated individuals instead of with the local elephant populations.[57] Translocated elephants also chose to frequent habitat that was similar to their source site and was not frequented by local elephants.[58] Thus,

---

[51] *Id*.
[52] *Id*. at 1181.
[53] N. Pinter-Wollman et al., *supra* note 10.
[54] *Id*. at 1120.
[55] *Id*. at 1121.
[56] N. Pinter-Wollman et al., *The Relationship Between Social Behaviour and Habitat Familiarity in African Elephants (Loxodonta africana)*, 276 PROC. ROYAL SOC. B 1009–1014 (2009).
[57] *Id*.
[58] Pinter-Wollman et al., *supra* note 10, at 1121–1122.

as expected, translocation success may greatly depend on the characteristics of the release site, as also discussed by Dublin and Niskanen.[59]

3.2 Economic Outcomes

Surprisingly, there are no published reports on the economic efficacy of translocations as solutions to HEC. Data for such studies exist but are out of reach to interested researchers. For example, daily reports of HEC incidents are carefully documented by each Kenya Wildlife Service park headquarters. Yet straightforward comparisons of the numbers of HEC reports in Shimba Hills before and after the 2005 translocation have never been conducted and published. It is possible that negative findings from such a study could have daunting political ramifications, for example, by halting job advancement of the personnel conducting such investigations. Because the Kenya government funded this large-scale translocation operation, it is possible that such analysis would be considered scrutiny of the government, which is not usual or welcome in a number of developing countries.

In most cases, translocations are funded by non-governmental agencies (NGOs). For example, in 2009, the International Fund for Animal Welfare (IFAW) funded the translocation of 83 elephants in Malawi. IFAW's interest in this translocation was to find an ethical solution to HEC and prevent the culling of these elephants.[60] Because the economic consequences of translocating elephants are seldom the focus of the funding body or the potential beneficiaries, such as local farmers, it is not surprising that such economic studies have never been carried out. Still, there is much need for comparing the costs of translocations with other HEC solutions for an objective evaluation of the various methods.

Economic calculations for evaluating translocations should weigh, among other factors, monetary costs of the translocation operation, including pre- and post-translocation monitoring, the costs to local farmers near the release site as well as the costs to local tourism industry at the source site, against the benefits gained by alleviating the pressure caused by HEC to the local farmers at the source site. Because there is little economic accountability within the bodies carrying out translocations, such economic studies are difficult to carry out and publish.

2.3.3 Translocation Across Countries

On several occasions, elephants in southern Africa were translocated between range states. Juvenile orphans were translocated from South Africa

---

[59] Dublin & Niskanen, *supra* note 10.
[60] This is stated on the Web page of IFAW at http://www.ifaw.org/us/node/2211 (accessed 28 Jan. 2012).

to Namibia throughout the 1970s and early 1980s, and Angola received elephant families from South Africa and from Botswana in the early 2000s.[61] In 1992, there was a large translocation of 200 elephants from Gonarezhou National Park in Zimbabwe to Madikwe Reserve in South Africa.[62] In eastern Africa, joint teams consisting of personnel from both Kenya and Uganda have performed translocations within Uganda[63] but not across borders.

The viability of translocating elephants across borders is constrained by international agreements that seek to regulate international trade in species. CITES is an agreement among governments regulating the trade in endangered species of wildlife and flora. Currently, most elephant populations are placed in Appendix I of CITES, which imposes the toughest restrictions on trade. However, the elephant populations of Namibia, South Africa, Botswana, and Zimbabwe are placed in Appendix II.[64] This less restrictive Appendix allows these four countries to trade in live elephants and in parts of dead elephants, such as hide, hair, and ivory stockpiles.

International trade in species listed in Appendix I is prohibited, aside from a few exceptions. According to CITES Article III, permission to export specimens of species listed in Appendix I may be permitted under specific circumstances which include that (1) export is not detrimental to the survival of the species, (2) that the use of the specimens is not primarily commercial, and (3) that specimens are obtained in adherence with national laws of the exporting country.[65] Thus, translocations among countries whose elephant populations are listed in Appendix I are possible.[66]

When moving elephants across borders, neighboring countries may be affected by the influx of elephants, especially if the receiving park borders another country into which the elephants may travel.[67] Veterinary restrictions are often placed to prevent the spread of disease among countries, and genetic composition of the source population is carefully considered during

[61] Dublin & Niskanen, *supra* note 10.
[62] Coetsee, *supra* note 42.
[63] Wambwa et al., *supra* note 10.
[64] According to Blanc, *supra* note 14, "The African Elephant has been listed in CITES Appendix I since 1989, but the populations of the following Range States have since been transferred back to Appendix II with specific annotations: Botswana (1997), Namibia (1997), South Africa (2000) and Zimbabwe (1997). These annotations have been recently replaced by a single annotation for all four countries, with certain specific sub-annotations for the populations of Namibia and Zimbabwe. . . . The sport hunting of elephants is permitted under the legislation of a number of Range States, and the following countries currently (2007) have CITES export quotas for elephant trophies: Botswana, Cameroon, Gabon, Mozambique, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe."
[65] Article III of CITES is explained at http://www.cites.org/eng/disc/text.php#III (accessed 28 Jan. 2012).
[66] Dublin & Niskanen, *supra* note 10, at 34.
[67] *Id.*

international transfers.[68] According to the IUCN guidelines for reintroductions,[69] animals should be introduced to locations that are part of their historic range and should be of genetic composition similar to that of the original populations.

Recent studies suggest that genetic differences among elephant populations in Africa may be sufficient to differentiate the African elephants into two species: the forest elephants of western and central Africa and the savanna elephants of eastern and southern Africa.[70] Translocations between these two regions have never been performed, and due to the large distances and poor infrastructure will likely never be performed, thus maintaining the unique genetic pool of each region.

3.4 Translocations as a Viable Solution for HEC?

Although ethically appealing, translocations are costly operations that provide only temporary relief from HEC. Natural growth of the source population will inevitably replace the removed elephants. In addition, if the release site is adjacent to human settlements, HEC might arise there, too.

4. INCREASING HABITAT—WILDLIFE CORRIDORS AND TRANSFRONTIER PARKS

Translocations can often be avoided by establishing wildlife corridors connecting more than one park and, thus, increasing the available habitat of the elephants, especially if elephants are translocated over short distances. For example, the 2005 translocation of 150 elephants between Shimba Hills National Reserve and Tsavo East National Park in Kenya could have been avoided by establishing a wildlife corridor between the two parks. The distance between Shimba Hills and the release site within Tsavo East is 160 km, but the distance between Shimba Hills and the most southern part of Tsavo East is only 75 km,[71] a distance easily traveled by elephants within a day.[72] The feasibility and logic of establishing a wildlife corridor between the two parks were made apparent when one of the radio-collared translocated bulls returned from Tsavo East (the release site) to Shimba Hills (the source site) and then months later walked back to Tsavo East.[73]

[68] *Id.*

[69] IUCN, Guidelines for Reintroductions, Prepared by the Species Survival Commission, Re-introduction Specialist Group (IUCN, Gland, Switzerland, 1998).

[70] Y. Ishida et al., *Reconciling Apparent Conflicts Between Mitochondrial and Nuclear Phylogenies in African Elephants*, 6 PLOS ONE doi: ARTN e20642 (2011).

[71] See Pinter-Wollman, *supra* note 50, at 1179.

[72] I. Douglas-Hamilton et al., *Movements and Corridors of African Elephants in Relation to Protected Areas*, 92 NATURWISSENSCHAFTEN 158–163 (2005).

[73] Pinter-Wollman, *supra* note 50, at 1181.

Thus, in certain cases, the short- and long-term costs and benefits of establishing wildlife corridors can and should be weighed against those of translocating the animals.[74] Understanding elephants' travel routes and navigation capabilities is vital for establishing appropriate wildlife corridors. For example, in northern Kenya, where the movements of many elephants are continuously being monitored, a wildlife corridor underneath a major highway was recently opened, allowing elephants to move safely between protected areas, thus reducing HEC along their travel path.[75]

Increasing the area available to elephants addresses the cause of HEC instead of treating only its symptoms.[76] Habitat loss and fragmentation are the leading problems for wildlife conservation.[77] Because human encroachment on wildlife habitat leads to inevitable conflict, it seems sensible to make habitat restoration a primary focus of conservation agencies. However, restoration of an animal's entire historic range may not be necessary. Creating wildlife corridors through which animals can safely disperse and migrate between protected areas can lead to a healthy metapopulation.[78]

Restoring elephant habitat in Africa is possible due to low human densities and little land use transformation throughout much of the African elephant range.[79] Much elephant habitat is outside protected areas. But although human disturbance of habitat, as a result of roads and plantations, for example, reduces habitat connectivity, this problem is very effectively addressed in some cases by maintaining wildlife corridors. Such corridors can take many forms, from overpasses or tunnels that allow movement across barriers such as roads to large undisturbed pieces of land that link disjoint protected areas. In addition, the land use designation of areas used as wildlife corridors may vary greatly from pristine protected places to land that is available to pastoralists.[80]

Elephants are capable of moving great distances[81] and can utilize corridors between protected areas to avoid places where there is high human use.[82] Although there are many records of elephants moving into new protected

[74] Of all the implemented solutions to HEC listed by Omondi et al., *supra* note 34, none include wildlife corridors or efforts to increase elephants' habitat size.

[75] See the information online at http://www.mountkenyatrust.org/elephantcorridor.htm (accessed 28 Jan. 2012).

[76] Van Aarde & Jackson, *supra* note 19.

[77] L. Fahrig, *Relative Effects of Habitat Loss and fragmentation on Population Extinction*, 61 J. WILDLIFE MGMT. 603–610 (1997).

[78] Van Aarde & Jackson, *supra* note 19.

[79] *Id.*

[80] A. F. Bennett, Linkages in the Landscape: The Role of Corridors and Connectivity in Wildlife Conservation (IUCN, Gland, Switzerland, 1998, 2003), available online at http://app.iucn.org/dbtw-wpd/edocs/FR-021.pdf (accessed 28 Jan. 2012).

[81] Douglas-Hamilton et al., *supra* note 71.

[82] A. P. Kikoti et al., *Elephant Use and Conflict Leads to Tanzania's First Wildlife Conservation Corridor*, 48 PACHYDERM 57–66 (2010). *See* also http://www.mountkenyatrust.org/elephantcorridor.htm (accessed 28 Jan. 2012).

areas as soon as those became available,[83] elephants can be slow to expand their home ranges, taking up to a year to begin using a newly available area.[84,85] Restoring and conserving routes traditionally used by elephants can also conserve habitat that is important for other large mammals.[86]

4.1 Challenges for Increasing the Size of Habitat Available to Wildlife

The acquisition of lands primarily for wildlife uses can be politically challenging. Land ownership and the cultural importance attributed to ancestral land are both factors that may prevent the purchase or conversion of land to allow wildlife use. The larger the area to be converted, the more stakeholders need to be consulted, spanning many managerial levels from villages and districts to countries and governments.

The funding needed to purchase and lease land and to establish and maintain on that land the management of a transfrontier park typically requires the involvement of large international agencies such as the World Bank.[87] Funds are also usually drawn from several international agencies and businesses that may have conflicting interests. The incentives of business investors who hope to gain from potential increases in tourism, for example, might be very different from those of donating conservation agencies, whose goal is to preserve nature. In addition, the interests of international funding agencies will usually differ from those of the relevant and affected local communities and governments.[88]

The benefits to each of the participating parties in a transfrontier park may show substantial variability, and this raises concerns about the unevenness of the economic incentives and benefits of such parks.[89] For example, countries may differ in the economic gains from the collaborative effort because the tourism revenue will likely increase more in countries where this industry is already flourishing and the political climate is stable.[90]

Communities surrounding transfrontier parks may differ in their support of the protected area based on their livelihood sources and on how their country compensates damage caused by elephants. For example, communities surrounding the Kavango-Zambezi (KAZA) Transfrontier Conservation

[83] This is reviewed in van Aarde & Jackson, *supra* note 19.

[84] H. C. Druce et al., *The Response of an Elephant Population to Conservation Area Expansion: Phinda Private Game Reserve, South Africa*, 141 BIOL. CONS. 3127–3138 (2008).

[85] This is similar to the time it takes elephants to acclimate to new social settings after a translocation. *See* Pinter-Wollman et al., *supra* note 10.

[86] C. W. Epps et al., *An Empirical Evaluation of the African Elephant as a Focal Species for Connectivity Planning in East Africa*, 17 DIVERSITY & DISTRIBUTIONS 603–612 (2011).

[87] W. Wolmer, *Transboundary Conservation: The Politics of Ecological Integrity in the Great Limpopo Transfrontier Park*, 29 J. S. AFR. STUD. 261–278 (2003).

[88] *Id*.

[89] *Id*.

[90] *Id*.

Area (TFCA) in Namibia receive incentive payments for allowing elephants on their lands, whereas communities in Zambia do not.[91] In certain countries, people might need to be relocated and appropriately compensated to allow establishing wildlife corridors at biologically appropriate locations. For example, in Tanzania, a wildlife corridor linking Mount Kilimanjaro National Park with southern Kenya passes through places used by the local Maasai as grazing pastures. After many discussions among government, NGO, and village representatives, people living within the corridor were given land elsewhere, and government funding was provided to build a new school away from the corridor.[92]

The politics of these variable impacts on the people who live in countries that share transfrontier parks are hard to predict, and this creates challenges, both during establishment and while managing an existing park. Political turmoil and volatility in one of the collaborating countries can change its level of commitment to the protected area. For example, the recent political volatility in Zimbabwe has been an obstacle to the establishment of the Great Limpopo Park.[93] When large economic gaps exist between collaborating countries, transfrontier parks may be used for smuggling goods and for illegal migration of humans, and not just for wildlife or tourism purposes. For example, while planning the Great Limpopo Park, concerns were raised regarding potential illegal smuggling of goods from South Africa to Mozambique through the park.[94]

Finally, differences in how collaborating countries manage their natural resources may damage the wildlife populations, in striking contrast with the original purpose of these parks. Variations in disease prevalence and in policies for disease control can lead to unwanted epidemic outbreaks. For example, because bovine tuberculosis is prevalent in Kruger National Park a concern during the establishment of the Great Limpopo Park was that this disease would spread to neighboring countries once they began to share wildlife populations with South Africa.[95] Sport hunting may be allowed in certain countries that are part of a transfrontier park but not in others. In the case of the countries sharing the KWZA TFCA, for example, Botswana, Namibia, and Zimbabwe have permission under CITES to market elephants through sport hunting, but Zambia does not have such permission.[96] Different laws regarding sport hunting also lead to variation in the revenue each country receives from maintaining viable wildlife populations and this can potentially lead to heterogeneous habitat use by the hunted animals. One consequence of

[91] Metcalfe & Kepe, *supra* note 11.
[92] Kikoti et al., *supra* note 82.
[93] Wolmer, *supra* note 87.
[94] *Id*.
[95] *Id*.
[96] Metcalfe & Kepe, *supra* note 11.

heterogeneous habitat use is the setting of unjustified hunting quotas in places where wildlife populations are perceived to be larger than they actually are.

4.2 Wildlife Corridors and Transfrontier Parks as a Viable Solution for HEC

Wildlife corridors and transfrontier parks in Africa both have the potential to increase the habitat available to elephants and, thus, to alleviate the pressure elephants impose on certain communities. However, both of these management interventions may result in HEC at new locations. For example, HEC may increase along corridors[97] or move from one country to another.[98] It is important to weigh carefully the costs of converting land into protected areas against the reduction in HEC and the potential increase in revenue from tourism. Countries that seek to collaborate in the formation and management of transfrontier parks would be wise, as a matter of political practicality if not legal necessity, to establish compensation programs that transfer funds from communities that greatly benefit from the establishment of these transfrontier parks to those that are financially compromised.

5. CONCLUSION

Of the many solutions available in Africa to deal with HEC, translocations and expanding elephant habitat have long been recognized as the most humane, effective, and sensitive to elephants' vulnerable status. Translocation and the creation of new protected areas, such as transfrontier parks, can be used in conjunction to increase the habitat available to elephants and to better connect fragmented protected areas as solutions for HEC. The commendable interrelation of these management practices arises from an understanding that simply moving elephants from one place to another is not in and of itself a sustainable solution to HEC. Eastern African countries, slowly learning from and following in the footsteps of southern African countries, are giving increasing attention to the establishment of wildlife corridors, in addition to discussing the implementability of common or shared management for protected areas that span political boundaries to augment translocations. These various management plans must all be considered in the solution set that will allow us to move toward sustainable solutions whereby humans and elephants live side by side in Africa, without unnecessary conflict and in ways that ensure the long-term preservation of African elephants.

[97] Kikoti et al., *supra* note 82.
[98] Metcalfe & Kepe, *supra* note 11.