

African Elephants and the Impact of the 1989 Ivory Trade Ban: A Review of the Literature

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In 1989, simultaneously facing an exponential increase in the price of ivory and a decreasing population of African elephants, the international community took drastic action and banned the international trade in elephants and their derivative parts (Barbier, Burgess, Swanson, & Pearce, 1990). While many, particularly northern, affluent, developed nations who had already banned the import of ivory, attributed this decline in elephant populations to increasing demand for ivory and increasing rates of poaching, a minority of nations, specifically some southern African nations with stable elephant populations whose management was at least partially dependent on the funds generated by ivory sales, opposed the decision (Barbier et al, 1990). The authority to ban the trade emanated from CITES, the Convention on International Trade in Endangered Species of Fauna and Flora, a treaty drafted in 1973 and entered into force in 1975 (What is CITES, n.d.), which at the time of the ivory trade ban, regulated trade between about 100 nations (List of Contracting Parties, n.d.). In the twenty-five years since the trade ban, which is still in force, there have been two one-off sales of some southern African nations' governmental stockpiles of ivory, to Japan and China (Vandegrift, 2013). Thus, all international trade in ivory between CITES member nations (now totaling 180) outside of these two legitimate sales constitutes illegal trade in ivory. The illegal trade in ivory has increased in recent years, partially in response to increasing demand for ivory in China (Stiles, 2004; Underwood, Burn, & Milliken, 2013). Concerns over how the illegal trade in ivory will impact elephant populations has led to increased attention, regulation, and action by the international community, including several governmental ivory stockpile destruction events in 2013 and early 2014 (Mathiesen, 2014), and the recent United States decision to ban domestic trade in ivory (The White House, 2014).

This review of the literature will focus primarily on the impact of the ivory trade ban on elephant populations. Elephants are killed not only by poachers for their ivory but also by wildlife managers for population control and in instances of human-wildlife conflict (Fischer, 2010; Stiles, 2004). Elephant

habitat is also converted for other, next-best economic uses (Barnes, 1996; Fischer, 2010; Stiles, 2004), which can lead to decreases in elephant populations. The literature primarily focuses on the incentives to poaching as a result of the trade ban but also discusses the impact of the trade ban on opportunities for habitat preservation. There is little discussion about governmental wildlife management practices impacting elephant populations, perhaps because of the assumption that these measures do not endanger the species. The literature examines the role of elephants as an economic good, with an emphasis on use and non-use values. Several models of the ivory market are presented, and shifts in the market supply and demand curves are theoretically modeled, based not only the ivory ban but also on the one-off sales. The role of externalities in the market is also discussed, in both the pre- and post-ban scenarios. Policy recommendations are generated by several of the authors, representing a broad range of possible options.

It is first necessary to examine the nature of elephant populations as economic goods. In nations that contain elephant populations, particularly those that experience poaching due to insufficient law enforcement, elephants are an impure public good, specifically a common pool resource. While their consumption is rivalrous, there is generally no excludability of the resource. Heltberg (2001) notes that if wildlife laws were perfectly enforceable, and nations managed elephant populations sustainably, the ivory trade ban would be unnecessary since the use of elephant populations, at least those under the authority of the government, would be excludable. Barnes (1996) also identifies the excludability problem; the high net value associated with ivory attracts users who may in turn cause deterioration of the resource. Fischer (2010) labels this a classic tragedy of the commons scenario. Burton (1999) models what might happen in an open-access system of poaching under the trade ban regime with illegal consumption and estimates a global equilibrium population of just under 1000 elephants, a 93% decrease from 1985 elephant population levels. The establishment and enforcement of property rights is

presented as a solution to combat the non-excludability problem (Barnes, 1996; Bulte, Damania, & van Kooten, 2007; Fischer, 2010; van Kooten, 2008). With adequate property rights delineation and enforcement, elephants would be a private good, subject to rivalry and excludability.

Elephants are valued for both use, non-use, and indirect use (Barnes, 1996). The implication is that consumers derive utility from elephants, be it from ivory, hides, photographic images, species existence, option-to-use, etc. Barnes examines the economic use value of elephants in Botswana both pre- and post-ban. Prior to 1983, value was derived from safari hunting as well as non-consumptive tourist activities (p. 216). High ivory and hide prices made the consumptive use of elephants “profitable under almost any condition” (p. 217). Since the ivory ban, however, elephant range nations must derive value almost exclusively from non-use values. Barnes acknowledges the increase in wildlife tourism activities that began even before the ivory trade ban, but in conducting a fifteen-year cost-benefit analysis he calculates that the only use-option that would result in a net increase in value derived from elephant utilization was a scenario that included safari hunting (limited export of elephant hunting trophies is allowed under CITES). Additionally, Barnes calculates that “the international ban on the trade of elephant products had, in effect, reduced the potential economic contributions of elephant utilisation over 15 years by ... 47%” (p. 225). Non-use value, wildlife viewing alone, thus, does not “justify high expenditures on elephant protection” (p. 226). For Botswana elephants, this conclusion may be grim. A possible consequence of reduced economic contribution discussed earlier, is that elephant habitat may be converted for other next-best uses, such as agriculture and ranching. Barnes’ analysis uses a discount rate of six percent and Barbier et al (1990) confirm that the use of a high discount rate is warranted for analyses considering elephant valuation, because of the “high opportunity cost of capital” and the “high time rate of preference” found in rural African communities (pp. 16-17).

Barnes (1996) recognizes that this analysis fails to consider the indirect value of elephants.

Religious or ethical views towards elephants are not typically held by communities in African nations, therefore use values dominate the economic evaluation. Some important benefits not quantified are the impact of elephants on biodiversity and ecosystem services; Gilson and Lindsay (2003) and Khanna and Harford (1996) note that elephants are an important species for ecosystem health. Measuring and incorporating indirect values like seed dispersal and biodiversity maintenance into cost-benefit analyses for elephants is not attempted in any of the reviewed literature. Fischer (2010) notes that although society values these sort of resources, they are typically not traded in markets. In the international community, there are those who value elephants for their indirect value, even if they do not participate in non-use activities such as wildlife tourism. Barnes suggests that the international community's willingness-to-pay for elephant populations could be incorporated into transfer payments for elephant management programs. Currently, elephant range nations bear the burden of protecting elephant populations, from which much of the rest of world derives utility (Khanna & Harford, 1996). This is an example of when, in the case of a theoretical market for elephant conservation, facing a supply curve equal to the private marginal cost, the social marginal benefits are greater than the private marginal benefits by the value of the marginal external benefit for each unit transacted. This results in an inefficient quantity of elephant conservation provided. The equilibrium outcome is not the efficient outcome. The internalization of this externality, perhaps through conservation payments to elephant range states (van Kooten, 2008) (one possible application of property rights under the Coase theorem), could result in the efficient provision of elephant conservation. Continuing, van Kooten expresses optimism for elephant populations, if non-market values are connected to population numbers. A complete cost-benefit analysis would consider all values of elephant populations across their range, a herculean task that is not undertaken in the literature reviewed.

The market for ivory is one of the most thoroughly examined out of all the products derived

from elephants. Heltberg (2001) presents what is acknowledged to be a “simple, static model of world ivory supply and demand” (p. 189). In all likelihood, this model fails to accurately represent the real world. Beyond the international market, there are domestic markets for ivory (Lemieux & Clarke, 2009; Stiles, 2004). Fischer (2004) alternately presents a model in which the legal and illegal markets for ivory are generally separated. Heltberg acknowledges and Fischer (2010) points out that simple, static economic models of renewable resources such as wildlife populations fail to account for complex ecological processes, namely, population and habitat dynamics. In Heltberg’s model, the supply reaching the market is only that which is successfully smuggled, which, due to confiscations, is less than the total amount of ivory produced. In this single market, static model, Fischer (2010) argues that when illegal products are removed from the supply, the cost of production increases, raising the equilibrium price and resulting in additional elephants consumed for their ivory for any given supply of ivory. This argument appears to be consistent with a simple demand and supply model in the short run, though for the long run, we can assume that overexploitation would affect the marginal cost of production. Heltberg also notes that this model relies on the indefinite stockpiling or destruction of ivory acquired through legal means (governmental culling or collecting from dead elephants); any governmental stockpiles released into the market would impact supply. In the trade ban regime, which has allowed two one-off sales of ivory, a two market model seems more realistic than the single market model. In this model, a black market for illegal ivory exist (Fischer, 2004). In this illegal market, Fischer (2004) argues that the trade ban has no impact on poaching and that the supply of ivory is dependent solely on the elasticity of demand for ivory, if the marginal cost of production is held fixed.

An ivory trade ban reduces demand in the legal market primarily through two impactors on morality: stigma (Fischer, 2004, 2010; Heltberg, 2001; Stiles, 2004) and outrage (Fischer, 2004). Stigma reduces the utility of consumption and is related to the “relative sizes of legal and illegal markets,

while outrage depends on the absolute size of the illegal activity” (Fischer, 2004, p. 932) and is rooted in altruistic beliefs. In the single market model, Heltberg (2001) calculates that a twenty percent or more decrease in demand would result in a decrease in poaching. Considering the legal market for ivory in the two market system, we must recall that legal ivory sales should theoretically only occur in domestic markets of elephant range nations, in domestic markets of those nations that choose to sell off ivory confiscated from illegal importation, and in China and Japan, who were the recipients of the the two one-off sales in the post-ban regime. In reality, stigma and outrage are not able to reduce demand for ivory to zero, and markets are unable to meet the remaining demand only with legal ivory (Stiles, 2004). If, however, legal sales were allowed and prices were lower in the legal market, customers of illegal ivory would be able to realize lower prices for ivory in the legal market and the legal trade could reduce demand in the illegal market (Fischer, 2004). Fischer (2004) illustrates several regime scenarios in detail: trade ban, legal harvest and sale of ivory, two market system with legal price higher (laundering/no laundering), and two market system with legal price lower. The only regime that results in less poaching than the trade ban model is that in which the legal price of ivory is lower and there is perfect arbitrage between the two markets. In another method of analysis, Burton (1999) looks at the individual poaching firm’s response to an ivory trade ban. This analysis concluded that even if the ivory ban resulted in a reduced price for ivory on the world market, significant poaching would still continue, perhaps mainly because single-firm level profits exist “*for any set or prices, costs, fines and population level*” [italics original] (p. 100). Generally, the trade ban in isolation as a policy mechanism is insufficient to reduce elephant poaching and must be coupled with other policy mechanisms.

The theoretical models of the market for ivory provide some insight into the impact of the ivory trade ban on elephant poaching, but an investigation of actual elephant population data can affirm or refute these models. There is consensus that prior to 1989, the year of the trade ban, global elephant

populations were dramatically declining (Barbier et al, 1990). This coarse scale look at the global elephant population fails to consider the changing populations at a national level. A recent analysis indicates that only about half of the elephant range nations experienced a population decline in the decade before the trade ban (Lemieux & Clarke, 2009). Stiles (2004) argues that this indicates that factors other than the legal trade in ivory were causing the decrease in elephant populations. Range nations with adequate laws and enforcement, defined property rights, and management for use and non-use values are likely to have seen stable or increasing populations during the decade prior to the ban. In the analysis of elephant populations after the trade ban (1989-2007), which includes the first one-off sale of ivory, Lemieux and Clarke (2009) determine that the overall population of elephants increased by about 140,000, and that eighteen of thirty-seven range nations experienced population increases. Notably, in those nations that continue to experience population declines, the rate has slowed. Stiles (2004) and Barnes (1996) agree with the assessment that the trade ban generally has resulted in lower levels of poaching than were occurring prior to 1989.

Given the empirical data, it appears that changes in elephant populations are not singularly dependent on the trade ban. Several authors investigate the apparent causes of the differential results among range nations. Lemieux and Clarke (2009) correlate increases in elephant populations with the presence of a domestic regulated market for ivory or bordering a nation with a regulated ivory market, and decreases with the presence of an unregulated market, high levels of government corruption, civil conflict, and bordering three or more nations with unregulated ivory markets. In discussing the impact of the first one-off sale of ivory in 1999, Bulte, Damania, and van Kooten (2007) conclude that while the sale did not appear to have an impact on poaching, “the nature of the data was such that it was also hard to prove the reverse” (p. 617) and note that nations that did have reliable data “were also the ones most likely to invest in monitoring and enforcement.” Fischer (2010) acknowledges that there may be

asymmetries in regulation that affect different nations' populations. Barnes (1996) discusses community based natural resource management programs which distribute benefits derived from wildlife to the broader community. This may incentivize the local community to protect and conserve its natural resources. Khanna and Harford (1996) provide a theoretical discussion about the incentives to comply or not with the ivory ban. They argue that there must be incentives to comply with a trade ban, since non-compliant nations can gain from ivory poached from within compliant nations. This imposes an externality on compliant nations. Without the internalization of this externality, the global amount of trade ban enforcement is less than optimal. In consideration of this externality, Stiles (2004) maintains that the level of poaching within a nation is more dependent of the level of wildlife management, law enforcement, and corruption. While the causation story of the elephant population dynamic since the ivory trade ban remains unresolved, we are presented with a complex web of economic interactions that will undoubtedly influence future policy decisions.

While the focus of the literature thus far has been on the economic impact of an ivory trade ban, the authors present some policy recommendations to further benefit elephant populations. There appears to be no request for the complete revocation of the ivory trade ban, though Stiles (2004) does call for the discriminant treatment of nations' elephant populations. Allowing those nations with stable and well-managed elephants populations to trade ivory would require analysis of the impact of that change on the supply and demand functions, one that might be empirically possible through an examination of the impact of the two previous one-off sales. If the stigma effect was reduced and demand increased as a result of the legal trade, several of the authors would predict an increase in poaching (Burton, 1999; Heltberg, 2001; Khanna & Harford, 1996). Nearly all of the papers reviewed call for increased community investment, tourism, and enforcement in the hopes of increasing the value derived from elephant populations and to ensure excludability of the resource (Barbier et al, 1990;

Fischer, 2010; Gillson & Lindsay, 2003; Heltberg, 2001; van Kooten, 2008;). The call for increased definition and protection of property rights also runs a common thread throughout the literature (Bulte et al, 2007; Fischer, 2010; van Kooten, 2008). Overall, the policy recommendations demonstrate that the ivory trade ban alone may not be enough to combat the threats to African elephant populations.

This review of the literature focused on the nature of elephants and their derivative parts as economic goods, the markets in which their primary good (ivory) is traded, and the impact of the ivory trade ban on their populations. It is important to note here that much of this literature examines the state of the elephant before 2008, and that since then, elephant populations have been experiencing a second crisis event (Underwood et al, 2013). There is a need for updated population statistics and a reevaluation of the legal and illegal markets for ivory. The causal story of the most recent crisis has not yet been fully examined. Policies to combat the recent crisis are being put into place, as evidenced by the recent stockpile destruction events and domestic trade bans. Perhaps there is a need for other policy mechanisms to be enacted, as several of the authors recommended in this literature.

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