High prices in international black markets tempt poachers to risk their lives harvesting ivory, threatening with extinction the half-million elephants roaming the African range states (M. Y. Said et al., 1995). In response, Michael Kremer and Charles Morcom (2000) offer insight into how to address this threat to the conservation of elephants and other species used for storable goods. They combine exhaustible and renewable resource models to account for wildlife commodity storage, and derive several useful results including the possibility of multiple equilibria and the role of endangered species policy. If governments or international organizations can credibly commit to tough enforcement should wildlife populations fall below a targeted threshold, then announcing these harsh measures beforehand can affect current poaching decisions, and effectively rules out the existence of the extinction equilibrium.

But if a government cannot make this credible commitment to punish poaching, Kremer and Morcom propose a novel solution—use public stockpiling of storable wildlife commodities to reduce the risk of extinction. A local government can store wildlife commodities and threaten to dump them on the market if the extant population falls too low (also see Gardner Brown and David F. Layton, 2001, on illegal sales of black rhino horns). This time-consistent stockpiling policy works by lowering the expected returns from illegal wildlife commodity sales, thereby driving otherwise fearless poachers out of the business and reducing enforcement costs.

Herein we focus exclusively on the Kremer-Morcom storage policy recommendation, and reveal its potential downside. We show that stockpiling could be detrimental to wildlife conservation if sufficiently large stocks trigger purposeful, strategic extinction by host governments who gain more from selling their stores than by holding them until a later date. Indeed, while “avoiding extinction at low cost” is a reasonable goal of the broader international community, the preferences in poverty-stricken countries like African range states which host endangered species might be less lofty. With problems like securing potable water and reducing AIDS, these nations might attach more weight to the discounted value of monetary revenues than to the survival of a species—particularly if many locals consider it a pest.

Why would governments that primarily care about monetary rewards find it in their own interest to extinct a species (either on their own or possibly in collusion with other nations)? Why not simply sell its existing stores to gain the revenues it desires, as opposed to going a step further and causing extinction? The answer is that a government cannot sell its stores legally on international markets if those stores represent commodities (such as ivory) for which international trade is currently banned by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES currently regulates or bans the public and private international sales of commodities derived from 33,000 endangered species. With a trade ban in effect, a nation’s stores are a liability. Nations could expect a trade ban to be lifted either (i) at a future date when the in situ population becomes sufficiently abundant, reaching a certain threshold

\[ \text{1} \]

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\[ \text{1} \] Note that this means that Kremer and Morcom’s dumping strategy would not be effective for CITES Appendix I species. Governments can dump commodities on domestic markets, depressing local prices, but this will not scare off poachers illegally catering to international black markets.
value set in the international arena;\(^2\) or (ii) almost immediately if extinction occurs.\(^3\) Since many endangered species inhabit only one or a few nations, governments could act strategically and take measures to affect the likelihood of either outcome so that trade may resume. The question is which strategy is more profitable.

We examine how the combination of (i) government preferences for revenues, (ii) the CITES trade ban, and (iii) a limited number of host countries affects a government’s conservation efforts when it has built up stores of wildlife commodities from endangered species. As a motivating example we consider the case of the African elephant. Governments compare the expected returns from two rules—a conservation strategy and an extinction strategy. The conservation strategy means that nations invest in antipoaching enforcement and store any confiscated ivory or ivory from culled problem animals. The extinction strategy implies the nations forgo enforcement and could even promote hunting the elephant to extinction. Our results suggest that conditions exist in which African nations prefer the extinction strategy.

With extinction, nations switch to a Hotelling depletion path for their stockpiled ivory. The extinction interval is shorter than the period it takes for the extant population to recover to the threshold level. Moreover the benefits derived from large elephant stocks that would allow trade are on-net negative because crop/human damages exceed tourism benefits. As a result, the discounted present value of the extinction strategy exceeds that accruing from the conservation strategy. This suggests an alternative strategy to enhance the viability of endangered species stocks—international conservation organizations rather than governments should hold the stockpiles.

I. A Model of Strategic Conservation and Extinction: The Elephant Case

We focus on elephants because Kremer and Morcom do, but their and our contributions extend beyond the ivory-elephant case. Elephants provide a good case study given their natural charisma. Plus elephant conservation produces both positive and negative values that affect the likelihood of strategic extinction. Elephants are valued internationally for their ivory, and for their existence and positive impacts on tourism. But many locals view elephants as pests because they trample crops and damage the landscape. Another useful feature is that elephant management and ivory poaching are well-known and have been studied by others, so a reasonable amount of data exists to develop a model. The elephant case study, however, has its limits. Unlike many other endangered species, elephants are relatively abundant (estimated at 550,000) and they inhabit several countries. Collusion between nations could be difficult, although this does not distract us from the broader issues at stake. The question of collusion is less of an issue for other truly endangered species that inhabit only one or a few countries.

Assume a government has a store of ivory, \(s\), and can increase this store by directly influencing harvesting activities, \(h\), associated with elephant stocks, \(x\). We simplify the interaction between government and poachers by presuming the government can control poachers at a cost. This allows us to focus on government decision-making as constrained by the exogenously imposed trade ban. Harvests are

\[^2\] Conservationists argue that a strong link exists between legal sales of ivory and poaching. Legal trade abets the laundering of illegal ivory, lowering transaction costs and stimulating poaching. The alleged link between legal and illegal harvesting is a key reason why the trade ban is in place and makes it difficult to predict when the ban will be lifted (Andrew Dobson and Joyce Poole, 1992).

\[^3\] CITES deals explicitly with “endangered” species and not with “extinct” ones. After a species has disappeared, trade in its commodities currently falls outside the jurisdiction of CITES. Commercial trade in ivory from extinct mammoths is legal, for example, albeit subject to import certificates. The international community might try to implement a new trade ban (e.g., possibly in the context of GATT) after a species has gone extinct, but this policy could prove costly and difficult to implement and may not be truly global in nature (Nico Schrijver, personal communication). A postextinction trade ban does nothing to protect the extinct species and it reduces welfare for potential exporters and consumers. For ivory, many African nations continue to press for the trade ban to be lifted or at least relaxed so they can sell publicly held stockpiles (Tom Milliken, 1997; The Economist, 2002). One can imagine how hard they might argue for trade once elephants become extinct. The international community could disagree with this argument only if they believe it would discourage other countries from pursuing the strategic extinction of other endangered species. We assume the pressure by potential exporters and consumers is significant enough for the international community to succumb eventually and legalize trade after extinction is verified.
divided into immediate sales, \( q \), and stores, \( v \), i.e., \( h = q + v \). Due to international agreements, however, ivory cannot be sold until the stock of elephants is deemed safe at a level \( x^* \) (in CITES terminology, the species is downgraded from Appendix I to Appendix II). Thus, ivory sales, denoted \( z = y + q \), where \( y \) denotes sales from stores, can occur as long as \( x \geq x^* \). Assuming no depreciation, ivory stores evolve according to

\[
\dot{s} = \begin{cases} 
  v & \text{if } x < x^* \\
  v - y & \text{if } x \geq x^* 
\end{cases}
\]

Assume the initial stock of elephants, \( x_0 \), is such that ivory sales are not allowed initially, i.e., \( x_0 < x^* \). When sales occur, revenues are defined by \( p(z)z \), where \( p(z) \) is the downward-sloping demand for ivory, \( p' < 0 \), where primes denote the relevant derivative.

The elephant population grows over time according to the equation of motion

\[
\dot{x} = g(x) - h,
\]

where \( g(x) \) represents elephant reproduction. Harvesting costs are denoted by the well-behaved cost function \( c(h, x) \).

Without trade, net benefits during a trade ban are the sum of stock related benefits and damages, possibly minus harvesting costs,

\[
NB(t) = F(x) - c(h, x),
\]

where \( F(x) \) measures the sum of wildlife-related tourism benefits, \( R(x) \), agricultural damages and other nuisance effects, \( D(x) \), and antipoaching enforcement, \( E(x) \). Assume \( F(x) \) can have positive and negative values. This structure implies the government is not simply self-serving, it also accounts for the benefits and costs affecting its constituents, as manifested by \( F \). With trade, net benefits include the demand for ivory as defined by

\[
NB(t) = p(z)z + F(x) - c(h, x).
\]

The government considers two broad strategies to maximize the present value of net benefits over time. First, the conservation strategy is defined as when the elephant population never goes extinct, possibly allowing legal sales in the future. Second, the extinction strategy is defined as a purposeful extinction of the stock, with a corresponding increase in stores, triggering an immediate lifting of the trade ban. We consider when the government chooses the extinction strategy over the conservation strategy by comparing the relative present value of net benefits. If extinction is rapid, relative to restoration of the population to safe levels, an impatient government may prefer the returns of a finite depletion path—strategic extinction, to the returns of an infinite sustainable culling scenario that starts at a later date with the conservation strategy.

First, consider the conservation strategy. The elephant stock always remains larger than \( x^* \) after some time \( T \), which is chosen endogenously. Ivory sales are always legal after \( T \). Abtracting away from illegal ivory sales, the government’s problem is

\[
\begin{align*}
\text{Max } & NPV_{v, q, y, T} \\
\int_0^T & [F(x) - c(v, x)]e^{-rt} \, dt \\
+ & e^{-rT} \int_T^\infty [p(y + q)(y + q) \\
+ & F(x) - c(v + q, x)]e^{-rt} \, dt \\
\text{s.t. } & (1), (2), x_0, s_0.
\end{align*}
\]

Two possibilities emerge for this conservation strategy: (i) the conservation-trade scenario, in which the elephant population grows larger than the threshold \( x^* \) and legal trade resumes; and (ii) the conservation-tourism scenario, in which the population is set at a positive level of abundance below the threshold, such that trade never resumes \( (T = \infty) \) and the benefits accrue from tourism to see the small elephant population. Kremer and Morcom’s approach to conservation does not work in the tourism scenario since

\[4\] We consider revenues and not consumer surplus since ivory consumers are mainly outside of the range states. Likewise, we do not consider nonuse (existence) values as these are mostly external as well.
no legal international ivory market develops on which governments could dump their stores.

Now define the extinction strategy, in which the stock never grows past $x^*$ but instead is depleted to zero. The optimal extinction scenario is defined by the solution to the problem

$$\text{(6) } \text{Max } \text{NPV}_{v,y,T_1,T_2} \Rightarrow \int_{0}^{T_1} [F(x) - c(v, x)] e^{-rt} \, dt \right.$$ 

$$+ e^{-rT_1} \int_{T_1}^{T_2} [p(y)y] e^{-rt} \, dt$$

s.t. (1), (2), $x_0$, $s_0$

where $T_1$ is the time at which extinction occurs, and $T_2$ is the time at which stores are depleted. We compare the returns from these two strategies with a numerical example.

II. Numerical Results

We contrast extinction and conservation strategies for the African elephant ($\text{Loxodonta Africana}$). Our parameters are derived from existing estimates of biological growth, and the economic characteristics of ivory harvesting costs and international demand (see E. J. Milner-Gulland and Nigel Leader-Williams, 1992; Bulte and G. Cornelis van Kooten, 1999). First, consider the biological growth and stock parameters. Recent estimates suggest that about 550,000 elephants exist in Africa (Said et al., 1995). Elephant population growth is given by the logistic function $g(x) = 0.067x(1 - x/3,000,000)$. African governments have been storing ivory for a number of years. A recent report indicates 460 tons of ivory have been declared, and it is believed that another 350 tons remain undeclared (Milliken, 1997). We presume 700 tons of ivory are stored in Africa. Assuming 10 kgs of ivory per elephant, this translates into 70,000 elephants. The initial store of ivory, measured in elephants, is $s_0 = 70,000$.

Next consider the economic parameters. Assume the government can convert living elephants into ex situ ivory at a maximum pace of 200,000 elephants per year. This maximum harvest level is only slightly greater than actual harvesting in the 1980's, even though illegal poachers were the main harvesters, e.g., some 120,000 elephants were harvested in 1986, of which about 80 percent were illegal. We use the functional specifications derived in Bulte and van Kooten (1999): tourism value: $R(x) = 2.6 \times 10^5 \ln(x)$; crop and people damages: $D(x) = 165x$; ivory demand: $P(z) = 6,397 - 0.044z$; harvesting costs: $c(h, x) = 692,300hx$.

Assume the trade ban will be lifted under one of two conditions: (i) after the elephant population exceeds the “safe threshold” $x^*$, which reflects the conservation-trade scenario; or (ii) if extinction occurs, which reflects the extinction scenario. According to CITES, when the in situ population becomes sufficiently large, the species is relegated to Appendix II and controlled trade may resume. Since it is unknown what the “safe threshold” will be, we adopt a value of 1.2 million elephants—the elephant population in 1980 when trade was legal (see Edward Barbier et al., 1990). We consider less stringent conservation policies below. With extinction, assume the international community delays lifting the ban until it verifies that the last elephant has been killed. There is uncertainty about the length of the delay, and in the absence of other

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5 Note when trading is prevented, the Hamiltonian is linear in the control variables, which implies that a most rapid approach path to either extinction or the threshold level must be optimal.

6 Two caveats are worth noting. When calibrating demand, data on how much was for private consumption and how much was for speculation was unavailable. Kremer and Morcom’s analysis correctly indicates that this distinction could matter as prices are affected by current sales and future expectations (private stocks). Also good data on private stockpiles did not exist.

7 A threshold of 1.2 million elephants may seem high, but it will still probably meet opposition of conservationists, who might prefer less lenience toward elephant harvesting. The case of whaling provides a case in point where the threshold appears to be extremely high. A harvest moratorium on minks has been in effect since 1986. Every year there are heated discussions in the International Whaling Commission. A few countries (Norway, Iceland, Japan) want to resume small-scale commercial harvesting (e.g., Norway wants a few hundred out of the nearly 100,000 minks in the Northeast Atlantic). The rest of the world opposes any harvesting, even though stocks have recovered to near carrying capacity levels (more than 1 million worldwide).
information we assume a five-year delay, implying the total delay faced by range states in resuming trade under the extinction strategy is $T_1 + 5$. A longer delay increases the relative desirability of the conservation strategy. Finally, due to the lack of quality data, we do not address either the costs to store and guard ivory or the costs of antipoaching efforts. Setting these costs to zero increases the relative desirability of conservation.

Consider now our main result. Table 1 shows that the net present value of the extinction strategy exceeds that for both conservation strategies, the trade and tourism scenarios, given a range of discount rates. Relative to the trade scenario, stockpiling ivory creates an incentive for governments to follow the strategic extinction path for two reasons. First, it is faster to kill than to nurture elephants—it takes 11 more years to grow the stock to $x^*$ under the conservation-trade strategy relative to the time required to eliminate elephants under the extinction strategy. Second, the economic benefits of large elephant stocks are on-net negative in our model: while more elephants lead to more tourism benefits, they also cause more damage to crops and people in the range states. Tourism benefits dominate only at small stock levels that arise en route to extinction, whereas the damages dominate at the large stock levels that arise under the conservation plan. This helps explain why the conservation-tourism population (e.g., 16,179 elephants when $r = 0.1$) is much smaller than the current stock. Indeed, the conservation-tourism scenario is also dominated by the extinction strategy: discounted legal ivory sales after extinction exceed tourism-related benefits. African range states therefore have no incentive to choose an outcome in which a legal ivory market emerges along with a viable in situ population, and therefore, Kremer and Morcom’s conservation scheme cannot be implemented.

Next we consider how four changes in the underlying conditions affect the robustness of the strategic extinction result (Table 2). First, since it is faster to kill than to rear an elephant, we make the conservation strategy more attractive by reducing the required time to replenish the stock. This assumption does not affect the conservation-tourism scenario. We reduce the threshold stock level by 40 percent, $x^* = 750,000$. Table 2 shows, however, the extinction strategy still dominates, even though the length of time needed to reach $x^*$ is reduced by nearly 60 percent, to 7 years from 17 years.

Second, we make large elephant stocks more attractive by presuming the government is
completely self-serving. It cares only about its ivory revenue, and nothing about tourist benefits or local damages, i.e., $F(x) = 0$. Note that the conservation-tourism scenario is not defined in this case. Again Table 2 shows that the extinction strategy dominates the conservation-trade strategy at the 10 percent discount rate. But note the differences in net benefits are smaller than before, and can actually favor conservation at lower discount rates. A 5 percent discount rate, for instance, reverses the result—now the net present value of conservation exceeds extinction by about $700 million. A more patient government that ignores stock effects might prefer the conservation strategy. The open question is how likely this low-discount-rate scenario reflects government actions within the range states given poverty levels and capital scarcity. Many experts in development and resource economics find this presumption unrealistic (see for example David Pearce and Jeremy Warford, 1993; Stein Holden et al., 1998).

Third, would conservation be more attractive if ivory stores started at zero, i.e., $s_0 = 0$? Table 2 suggests the answer is no. The benefits under both strategies with trade are moderately lower; the tourism scenario is unaffected. The contribution of past ivory stockpiling to future profits is modest, swamped by benefits of stockpiling in the extinction phase.

Finally, we explore the effects of ivory stockpiling further by presuming that there are no initial stores and that stocks cannot be increased during the extinction phase. This captures the scenario in which the government, trying to avoid the international political heat of an explicit extinction policy, lets poachers do the work for them. Here the government announces a “no enforcement” policy, which then triggers an inflow of rational poachers who kill off the elephants for private profit. Poachers now kill and trade the elephants, rather than the government, i.e., $s_T = s_0 = 0$, but the net revenues from the conservation strategies are the same as in the third scenario with $s_0 = 0$. Table 2 shows that the net value of the extinction strategy still exceeds the conservation-trade strategy by $636$ million. The conservation-tourism scenario, however, now dominates the extinction strategy by almost $150$ million. Comparing this result with Table 1, the government’s ability to stockpile ivory can tip the balance toward the extinction strategy.

Our main result holds up to changes in the underlying conditions—ivory storage by African range states enhances the relative profitability and probability of an extinction strategy. We now explore what conditions would have to exist to reverse this result. We consider alternative parameters to determine what conditions would have to exist, and consider whether they seem reasonable. First, we find that the conservation-trade scenario does not outperform the extinction strategy for any plausible delay ($T_1$) between extinction and resuming legal trade (e.g., say, under 100 years). The tourism strategy outperforms the extinction strategy for delays in excess of 17 years (for $r = 0.1$). It is an open question whether the ban can be retained for such a long period in light of current aggressive lobbying efforts by producer and consumer states to lift the ban (see footnote 3). Second, we find there is no market price for ivory, either large or small, that causes the conservation-trade scenario—the only case where Kremer and Morcom’s strategy would apply—to dominate the extinction strategy. Third, we do find that conservation dominates if the coefficient for tourism benefits is greatly increased. For instance, for the case where the differences in net present values are the smallest ($r = 0.15$), tourism benefits must increase more than fivefold, to at about $14$ million from $2.6$ million, such that $R(x) = 14 \times 10^6 \ln(x)$. Finally, we find that no coefficient for damages, either large or small, causes conservation to dominate extinction when $r = 0.15$. If $r = 0.1$, then the conservation-trade scenario dominates if the coefficient for damages is decreased nearly elevenfold, to $15$ from $165$, such that $D(x) = 15x$. Given the data currently available, it is our best judgment that these alternative specifications for $R(x)$ and $D(x)$ are unrealistic.

Here is why. For tourism benefits, the threshold value for the coefficient in which conservation becomes profitable is $b_T = 14$ million. But consider how this compares to an upper bound estimate of the net gain from elephant tourism within the range nations. We start by noting that the net gain to Kenya of wildlife

\[ R(x) = 14 \times 10^6 \ln(x) \]
tourism is estimated to be about $45 million in 1995 (Allan Earnshaw and Lucy Emerton, 2000). Now assume Kenya attracts about 15 percent of the wildlife receipts earned in Africa, and that the relation between receipts and net benefits is equal in different countries. Then, total wildlife benefits in all of Africa equal 6.67 times $45 million = $300 million. Let us optimistically assign half of the wildlife benefits to elephants and elephants alone—and divide the other half among popular species like lions, rhinos, leopards, buffalos, gazelle, African dog, ostrich, and so on. In this case, tourism benefits from elephants equals, \( R(x) = $150 million \). But given \( b_T = $14 million \), one would predict that the benefits of elephant tourism alone amount to no less than $185 million \( [R(x) = $14 million \times \ln(550,000 \text{ elephants})] \). This suggests that the pro-conservation threshold value overestimates our upper bound benefit estimate by $35 million annually ($185 million vs. $150 million). While recognizing this is a rough benchmark based on the best available data, overestimating the upper bound of tourism benefits by 23 percent causes us to suspect that the pro-conservation threshold value, \( b_T \), is too high.

We have examined the case in which African governments collude during the extinction phase and then act as a cartel to earn monopoly profits after the trade ban has been lifted. Collusion increases the profits from selling ivory, which biases the results towards extinction. Although most elephants are distributed among a few nations, viable populations are currently found in 25 nations (Said et al., 1995). We recognize this reality makes the case for collusion less likely relative to cases involving truly rare species. Yet, it clearly illustrates the perverse incentives that host countries might have and provides a demonstration of what could happen in some of these cases.

### III. Discussion

Kremer and Morcom (2000) used ivory stockpiling to merge the theories of renewable and nonrenewable resources, a valuable contribution to our understanding of the efficiency of natural resource policy. They revealed how a policy of stockpiling and dumping could be used to reduce the risks to species threatened by poachers. Their strategy requires that host nations stockpile large quantities of the storable commodity (e.g., ivory). The problem is that existing prices for such commodities might be large enough to make it profitable for governments to deplete in situ stocks—facilitating legal sales out of ex situ stocks. We have shown herein that for a wide range of plausible scenarios the strategic depletion of elephants could be profitable relative to a conservation strategy. Our main insight goes beyond the ivory-elephant case. Stockpiling ex situ resources may enhance depletion of in situ stocks if trade in the ex situ stock is restricted due to the in situ stock, which holds for most species protected by CITES.

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9 While a comprehensive analysis of cartel stability, including the possibility of side payments or interconnected games, lies beyond the scope of this comment, one novel mechanism exists that could make cartel stability more likely for elephants—cross-border poaching. Suppose some countries decide to defect and conserve a viable stock of elephants to capture all tourist benefits once other states destroy their populations. Abstracting away from economic sanctions or other retributions, we find numerically that nations with large initial elephant or ivory stocks, such as Zimbabwe, find it profitable to promote poaching in the defecting countries and trigger extinction. (Additional numerical results for a number of additional simulations supporting our main results are available from the authors on request.) Poachers can cross borders easily, and evidence exists that poachers do cross borders given the relative profitability of targeting a specific site (e.g., Holly Dublin and Alison Wilson, 1998; Michael Burton, 1999). As a result, these other countries then have incentives to cull their own elephant herds and stockpile the ivory before the international poachers move in. Range states can use this threat to promote stability by keeping others hostage. Such circumstances support our main findings—even if cartel stability is doubtful, extinction could arise if the net present value of extinction exceeds the net present value of sustainable use for some countries. A small-herd nation could boost enforcement to keep poachers out, but estimated enforcement costs are up to $250 to $500 per hectare per year (Randy T. Simmons and Urs P. Kreuter, 1989; Dublin and Wilson, 1998; Burton, 1999), and elephants spill over substantial land areas—about 80 percent of the elephant’s range lies outside protected areas (R. Hoare, 1999). Such costs and mobility erode the profits from playing the defection strategy. Nevertheless, the possibility exists that some countries may choose to defect and rigorously enforce conservation, fighting cross-border poaching with all means, even if this runs against the logic of a conventional cost-benefit analysis (e.g., moral values). The issue of cartel instability introduces an element of uncertainty in the analysis that arguably is imperfectly captured by the current cost-benefit analysis. Kremer and Morcom have rightly pointed out to us that risk dominance provides another relevant criterion.
Strategic extinction could hold with more force for species that are truly endangered and inhabit just a few nations—see Kremer and Morcom’s Table 1 for a long list of endangered species yielding storable commodities. For instance, only a handful of countries support viable populations of tigers or black rhinos (e.g., black rhino populations in excess of 100 animals exist in only four countries: Namibia, Zimbabwe, South Africa, and Kenya; see International Rhino Foundation, 2002). Coordination on extinction is more plausible and killing off the remaining populations is cheaper. Our results suggest that moderately abundant species like elephants (550,000) might not be safe when one accounts for the perverse incentives of stockpilers, and these conditions might be even worse for some of the other 33,000 species protected by CITES.

In this light, we offer an alternative set of policy measures to enhance the viability of endangered species with storable commodities. First, set the threshold population that allows switching to legal trade at a relatively low level. Low threshold levels reduce the time during which range states bear the costs of conservation, thereby increasing the relative profitability of conservation. Tough conservation measures—high threshold values—can be counterproductive.

Second, encourage noncommercial donor buyouts. The international community could invest in purchasing storable commodities from the host nations. Buying stockpiled ivory, for instance, promotes global welfare since it undermines the profits of the extinction strategy. The international organizations buying the stored commodity could also adopt Kremer and Morcom’s strategy by threatening to dump when endangered species populations collapse. Negotiators at COP 10 (Conference of the Parties) of CITES decided to allow for buyouts by noncommercial donors, under the condition of a “no resale.”

The no-resale restriction, however, prevents international organizations from implementing the Kremer-Morcom dumping strategy. We contend that by both encouraging noncommercial buyouts and by redefining legal uses of purchased stockpiled commodity, the international community would set the stage for a Kremer-Morcom-style conservation strategy. Similarly, restricted and controlled commercial trade under certain conditions should be encouraged. Recent experiences with noncommercial buyouts have been disappointing, but COP 11’s resumption of restricted trade is encouraging. The international community would have to design an incentive-compatible and individually rational contract for the governments, such that they are just as well off or better off relative to their next best alternative—the strategic extinction option. Good intentions backed with cash and incentives could better serve to protect treasured species at risk.

Third, the threat of strategic extinction declines with a change in the rules of CITES by, say, adding an Appendix 0 for certain extinct species. This would not be an easy task, however. It would require an amendment of CITES rules by a two-thirds majority, and the change of regime created this way is only in force for those Parties that accept the amendment—in other words, the result will most probably be a divided treaty regime. Suppose the international community was able to change the rules to say that trade bans for extinct species will not be lifted for some period, and is able to commit to and enforce this policy. This would dilute the incentives to coordinate on an extinction strategy to cash in on preexisting stocks. This would amount to changing CITES into CITEES—the Convention on International Trade in Endangered and Extinct Species of Wild Fauna and Flora.

REFERENCES


10 These buyouts are conditional in that none of the traded commodity can be “re-sold in any form at any time in the future” (Milliken, 2000).


