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**MULTILATERAL WILDLIFE CONSERVATION POLICY: A POLITICAL-ECONOMIC ANALYSIS OF
THE TRADE BAN ON AFRICAN RHINOCEROS PRODUCTS**

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Definitions of Terms¹

African Rhinoceros – Refers to the Black and White Rhinoceros. Also abbreviated as African Rhino(s).

Asian Rhinoceros – Refers to the Indian, Javan and Sumatran Rhinoceros. Also abbreviated as Asian Rhino(s).

(CITES) Appendix I – The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) lists all species currently threatened with extinction which are or may be affected by trade on its Appendix I. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances.^A

(CITES) Appendix II – While Appendix I includes species currently threatened with extinction, Appendix II listed species are not now threatened but may become so unless trade in specimens of these species is subject to strict regulation.^A

Big Five – The term Big Five refers to five of the most well-known African wildlife species, namely the elephant, rhino, lion, buffalo and leopard.

Biodiversity – Diversity within species, between species and of ecosystems.^B

Biologically Viable Population – A Biologically Viable Population requires a species to have sufficient numbers in the wild to counteract the effects of disease, natural predation, and anticipated adverse human action.^C

Bushmeat – The meat for human consumption derived from wild animals.^B Bushmeat has traditionally been a term that relates to African wildlife species used for food, ranging from cane rats to elephants.^J

Commercially Extinct – Fish stock are considered Commercially Extinct if they are too small for continued commercial exploitation.^D

Conference of the Parties (CoP) – On average, every three years, the Conference of the Parties meets to review the implementation of CITES. These meetings last for about two weeks and are usually hosted by one of the Parties. The meetings are often referred to as 'CoP' followed by a number indicating the number of the meeting.^D

Consumer Nations – A country that imports a certain good for consumption. Unless otherwise noted, a Consumer Nation in this thesis refers to a country in which rhino products have historically or are currently being consumed.

¹ Definitions are taken from the following sources:

- A: CITES, "The CITES Glossary".
- B: Convention on Biological Diversity (CBD). "Article 2: Use of Terms".
- C: Funk, "Guide to the Endangered Species Act", EcoAccess.
- D: The Humane Society of the United States, "Commercial Fisheries and Marine Mammals".
- E: Emslie, Brooks and IUCN/SSC African Rhino Specialist Group, African Rhino: Status Survey and Conservation Action Plan, p.viii-ix.
- F: The Economist, "Economics A-Z".
- G: See for more details: Food and Agriculture Organization of the United Nations (FAO), "FAO Fisheries Technical Paper No. 382: Guidelines for the Routine Collection of Capture Fishery Data", FAO.
- H: Sustainable Technology Education Project (STEP), "Glossary", STEP.
- I: "WordNet: A Lexical Database for the English Language". Princeton University.
- J: UK Department for International Development (DFID), Biodiversity: A Crucial Issue for the World Poorest, p.7.
- K: Bennett, Blencowe, Brandon, et al., "Hunting for Consensus: Reconciling Bushmeat Harvest, Conservation, and Development Policy in West and Central Africa", p.884.
- L: Pugel, "International Economics". McGraw-Hill.
- M: Stiglitz and Walsh, "Economics", W. W. Norton.

Ecological Carrying Capacity (ECC) – The maximum number of rhinos that can be supported by the resources of a specific area.^E

Exclusive Economic Zones – A zone under national jurisdiction (up to 200 nautical miles wide) declared in line with the provisions of 1982 United Nations Convention of the Law of the Sea, within which the coastal State has the right to explore and exploit, and the responsibility to conserve and manage, the living and non-living resources.^G

Game Park – A protected area where wild animals are allowed to roam freely.^H

Intensive Protection Zone (IPZ) – An IPZ is a clearly delimited, but unfenced area on private or communal land, or within a larger State-run protected area, where law enforcement staff are deployed at a moderate to high density (ideally one field ranger between 10 and 30km²) specifically to protect rhino or other game animals.^E

Listing – The inclusion of a species in Appendix I, II or III of CITES.^A

Major Range States – Throughout this

Northern Approach – The Northern Approach is defined as the approach by the *Preservationists*, who predominantly reside in the North. It tends to perceive international trade as a threat to the conservation of endangered species and thus aims to regulate and if necessary restrict trade in such species.

Northern States (North) – North refers to developed countries.

Opportunity Costs – The true cost of something is what you give up to get it. This includes not only the money spent in buying the thing, but also the economic benefits that you did without because you bought that particular thing and can no longer buy something else.^F

Parastatal – A State organisation that is more autonomous than a government department, often run by a board. Parastatal organisations are free to retain any revenue they earn rather than have to channel it to a central treasury.^E

Precautionary Principle – When there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to

Protectionist – Protectionist is defined as a synonym for Preservationist.¹

Purchasing Power Parity Conversion Factor – Conversion factor used for calculating the correct value of a currency, which may differ from its current market value. It is helpful when comparing living standards in different countries.^F

Range State – A State whose territory is within the natural range of distribution of a species. Unless otherwise noted, a Range State in this thesis refers to a state in which rhinos occur.^A

Rhino Conservation Area (RCA) – RCAs are defined as medium to large areas of natural habitat in which the natural patterns of rhino distribution cover the entire area. This area may be fenced or unfenced, and staff are deployed at a moderate to high density specifically to protect the animals.^E

Resolution – An agreement between the Parties regarding the interpretation of the Convention or the application of its provisions.^A

Scientific Authority – Under CITES, a Scientific Authority is responsible for providing technical and scientific advice to its *Management Authority*, in particular as to whether the export or introduction from the sea of a specimen will be detrimental to the survival in the wild of the species involved.^A

Secretariat – The body of the Convention, responsible for providing advice to the Parties on the practical implementation of the Convention, organizing the meetings, providing reference material and technical assistance, acting as a central registry of information, assisting with communication and monitoring the implementation of the Convention to ensure that its provisions are respected.^A

Southern Approach – The Southern Approach is defined as the approach by the *Pragmatists*, who predominantly reside in the South. It denies the generic approach to ban international trade if a species is endangered, as trade can create incentives for better conservation and a trade ban may accelerate the path to extinction due to habitat conversion or uncontrolled poaching.

Southern States (South) – South refers to developing countries.

Sustainable Use – The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.^B

Tragedy of the Commons – The over-use of a natural resource as a result of unclear property rights. If ownership of a resource is not established, everyone has an incentive to take as much of it as possible, quickly depleting the resource. A typical example is the decline in the fish population resulting from over-fishing of the ocean.^L

Translocation – Movement of individual rhinos from one area to another either to improve chances of survival, to establish new populations, to keep established populations productive (i.e. at or below estimated MPCC), or to introduce new blood into a population. Rhinos may be translocated to other areas of suitable habitat and to where they may be better protected from poachers.^E

Throughout this document the word rhinoceros refers to both singular and plural, and the terms rhinoceros and rhino are used interchangeably.

List of Abbreviations

AfRSG	African Rhino Specialist Group
CAMPFIRE	Community Areas Management Programme for Indigenous Resources
Cartagena	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
CBD	Convention on Biological Diversity
CEEWEB	Central and East European Working Group for the Enhancement of Biodiversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CoP	Conference of the Parties
DEFRA	UK Department for Environment, Food and Rural Affairs
DFID	UK Department for International Development
DRC	Democratic Republic of the Congo (formerly Zaïre)
ECC	Ecological Carrying Capacity
ESA	Endangered Species Act
ESPU	Endangered Species Protection Unit (based in South Africa)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
HI	Historical Institutionalism
IFAW	International Fund for Animal Welfare
IPZ	Intensive Protection Zone
IR	International Relations
IUCN	International Union for the Conservation of Nature and Natural Resource, now known as The World Conservation Union
IWC	The International Whaling Commission
MAB	UNESCO's Programme on Man and the Biosphere
MEA	Multilateral Environmental Agreement
MPCC	Maximum Productivity Carrying Capacity
OECD	Organization for Economic Cooperation and Development
PETA	People for the Ethical Treatment of Animals
RCA	Rhino Conservation Area
RCI	Rational Choice Institutionalism
RENCTAS	Portuguese acronym for National Network to Fight the Trafficking of Wild Animals
RHPD	Rhino Horn and Product Database
RHPM	Rhino Horn Pricing Model
SADC	South African Development Community
SCI	Safari Club International
SSC	Species Survival Commission
SSN	Species Survival Network
STEP	Sustainable Technology Education Project

UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WHC	World Heritage Convention
WSPA	World Society for the Protection of Animals
WTO	World Trade Organization
WWF	World Wide Fund for Nature

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Table 1: Rhinoceros Species – An Overview (ordered by current population estimate)

Common Name	Scientific Name	Other Names	Subspecies (Common/Scientific Name)	Range States and Current Population ²	Current Population Estimate ³
White Rhinoceros (White Rhino)	<i>Ceratotherium simum</i>	- Square-lipped rhinoceros	- Southern (<i>Ceratotherium simum simum</i>) - Northern (<i>Ceratotherium simum coltoni</i>)	- South Africa (13,521) - Zimbabwe (308) - Namibia (293) - Kenya (234) - Botswana (99)	2005: 14,547
Black Rhinoceros (Black Rhino)	<i>Diceros bicornis</i>	- Prehensile-Lipped Rhinoceros - Hook-Lipped Rhinoceros	- Western (<i>Diceros bicornis longipes</i>) - Eastern (<i>Diceros bicornis michaeli</i>) - South-western (<i>Diceros bicornis bicornis</i>) - South-central (<i>Diceros bicornis minor</i>)	- South Africa (1,379) - Namibia (1,141) - Kenya (540) - Zimbabwe (527) - Tanzania (101)	2005: 3,726
Indian Rhinoceros (Indian Rhino)	<i>Rhinoceros unicornis</i>	- Asian Greater One-Horned Rhinoceros - Indian and/or Nepalese Rhinoceros	- None	- India (2,150) - Nepal (413)	2005: 2,565
Sumatran Rhinoceros (Sumatran Rhino)	<i>Dicerorhinus sumatrensis</i>	- Asian Two-Horned Rhinoceros - Hairy Rhinoceros	- Western (<i>Dicerorhinus sumatrensis sumatrensis</i>) - Eastern (<i>Dicerorhinus sumatrensis harrissoni</i>)	- Indonesia (180-200) - Malaysia (100-120)	2005: 280-320
Javan Rhinoceros (Javan Rhino)	<i>Rhinoceros sondaicus</i>	- Asian Lesser One-Horned Rhinoceros	- Indonesian (<i>Rhinoceros sondaicus sondaicus</i>) - Vietnamese (<i>Rhinoceros sondaicus annamiticus</i>)	- Indonesia (40-50)	2005: ~50

² Only *Range States* with populations of greater than 10 animals of the particular species have been included. (Source: Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.4-9. Document can be found as Annex 1 of CITES. "Doc. 54: Species Trade and Conservation Issues - Rhinoceroses".)

³ As of Dec 2005 for African Rhinos and as of Jan 2007 for Asian Rhinos. (Source: Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.4-9.)

1. Introduction

1.1. Overview of Thesis

International market standards have emerged as a major and controversial dimension of the globalisation process. Labour and environmental standards in particular have increasingly featured in public debate and in international disputes within organisations such as the World Trade Organization (WTO).

Human well-being and biodiversity are interrelated and people living in rural areas of developing countries are often the most dependent on biodiversity.⁴ At the same time, it is widely proclaimed that humans are responsible for the currently on-going sixth largest 'extinction event' in world history.⁵

Broadly speaking, there are two different approaches often associated with the global North and South. On the one hand, news coverage and politicians in the North frequently describe a trade-off between conservation of the ecosystem and the increasing demand for its products.⁶ As a consequence, the otherwise market-driven Western states commonly promote an approach that attempts to achieve conservation through trade restrictions in products of endangered species.

⁴ Millennium Ecosystem Assessment, Ecosystems and Human Well-being: Synthesis, p.54. See also: Broad, Mulliken and Roe, "The Nature and Extent of Legal and Illegal Trade in Wildlife", p.5; UK Department for International Development (DFID), Biodiversity: A Crucial Issue for the World Poorest, p.4.

⁵ Secretariat of the Convention on Biological Diversity and UNEP World Conservation Monitoring Centre, Global Biodiversity Outlook 2, p.10.

⁶ See among others: Vidal, "Collapse of Ecosystems Likely if Plunder Continues", The Guardian: "Humans Undermining the Very Biodiversity Needed for Survival", Environment News Service (ENS). A. Kirby points out that often the choice is to decide if we should 'conserve a species or feed a community; tourists' dollars or turtles' nests'. (Source: Kirby, "Biodiversity: The Sixth Great Wave", BBC News.) This view was also confirmed to the author by several representatives of the German *Management Authority* at a reception organised by the German Federal Environmental Ministry for the German delegates at CoP14 (7 June 2007, The Hague).

Southern countries on the other hand have long contested the above-described trade-off. For example, in many African countries it is argued that wildlife is a renewable resource and its usage can be sustainable if regulated and aligned with the interests of the people. A market value and legal trade in product of endangered species can enhance conservation efforts, as sufficient resources may be allocated to ensure the long-term viability of the income stream from wildlife usage.

Individual positions in the debate have ranged between the two extremes just described. However, the approach of developing countries to sustainable wildlife utilization has received increasing support from Western countries over the last decade. This shift is well demonstrated in the debate on the current approach and future role of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (hereafter referred to as "CITES" or the "Convention").⁷ one of the most important and influential multilateral wildlife conservation agreements.⁸

The debates in CITES on how to conserve endangered species have been primarily anchored in the discussions of so-called key species which have, either because of their outstanding aesthetic, scientific, cultural, recreational or economic value,⁹ received more media and policy attention than others.

⁷ CITES entered into force in 1975 to protect endangered species from over-exploitation through international trade. The precise wording of the Preamble of the Convention is: 'Recognizing [...] that international co-operation is essential for the protection of certain species of wild fauna and flora against over-exploitation through international trade'.

⁸ See among others: Jenkins, "The Significant Trade Process: Making Appendix II Work", p.23; Reeve, Policing International Trade in Endangered Species: The CITES Treaty and Compliance, p.5; Dickson, "What is the Goal of Regulating Wildlife Trade? Is Regulation a Good Way to Achieve this Goal", p.23.

⁹ These are the value characteristics named in the Preamble of the Convention. The precise wording is: 'Conscious of the ever-growing value of wild fauna and flora from aesthetic, scientific, cultural, recreational and economic points of view'.

The Black and White Rhinoceros (hereafter referred to jointly as the “African Rhinoceros” or “African Rhinos”) are such species and it has been suggested that a complete and detailed analysis of them would reveal many of the inadequacies of CITES.¹⁰

The rhino case study serves as a good political-economic study on multilateral environmental policy in the context of CITES. The Black and White Rhino have been listed by CITES from the outset of the Convention, and have been the subject of an intense since then. Rhino populations have been over-exploited through illegal poaching and international trade has been the primary reason for their demise. Other reasons for biodiversity decline such as habitat conversion that are not addressed directly by CITES, are lesser threats to the African Rhino, making it more suitable as an example in an analysis of CITES. Rhino products are a significant sub-market of the global illegal species trade, with sizable demand for rhino horn from the traditional Asian medicine and the Arab dagger markets. In terms of monetary value per unit of weight, rhino horn is one of the most valued natural resources.

As rhino horn regrows it can be harvested from live animals on a continuous basis, and thus ethical considerations typically related to the killing of wildlife for consumption are less relevant. There is a large and increasing stock of rhino horn held by *Range States*¹¹ that due to the trade ban on all rhino horn currently cannot be monetised. In addition, rhinos have high non-consumptive value for African *Range States* as the *Big Five* attract significant amount of tourists into Africa annually. Finally, it is interesting to note that while reopening of trade in rhino horn is regarded by many as non-sustainable, trophy hunting of a small number of rhinos annually is permitted and considered one form of *Sustainable Use*.

¹⁰ Favre, International Trade in Endangered Species: A Guide to CITES, p.99.

¹¹ Throughout this thesis, terms defined in the Definitions of Terms are printed in capitalised and italic letters.

After an overview of CITES' fundamental mechanisms for the conservation of endangered species, this study identifies and assesses critically the sources of conflict between *Northern* and *Southern States* in their respective approach to wildlife conservation: an important finding here is the greater complexity and interplay of interests and ideologies, than allowed for by the popular representation of a simple North-South conflict. Central to the Southern approach is the possibility to achieve economic benefit from well-regulated trade. Here, the contribution of the present study is the economic analysis of the supply and demand for African Rhino products: this includes the description of a model to explain how a reopening of the trade could be achieved that ensures long-term *Sustainable Use*.

On the basis of the above analysis, the study concludes that a consensus in the North-South debate on wildlife conservation is possible, and that – if carried through into policy - it could significantly improve the welfare of some of Africa's rural populations, which are among the poorest globally.

1.2. The African Rhino Case – An Introduction

During the 1920s, an estimated half a million to over a million African Rhinos¹² freely roamed over large parts of Sub-Saharan Africa. By the end of 2005, approximately 18,300 African Rhinos remained.¹³

Recent data suggest that both the Black and White Rhino populations have stabilised.¹⁴ This is however not an indication that CITES has been successful in its rhino conservation efforts as

¹² Martin, Martin and Amin, *Run, Rhino, Run*, p.35.

¹³ Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.4.

¹⁴ *Ibid.*

we continue to witness the increased threat of extinction to sub-species,¹⁵ and the remaining rhino populations are primarily confined to *Rhino Conservation Areas, Intensive Protection Zones* or similarly well-protected areas, primarily in South Africa, Namibia, Zimbabwe and Kenya.¹⁶

With the aim to protect the remaining rhino populations from poaching, an international trade ban has been in force since 1977, when all rhino species were listed as “threatened with extinction”¹⁷ by CITES.

The ban imposed by the Convention on rhino products (in particular rhino horn) has been highly controversial from the outset of CITES, and has been the subject of heated debates at the majority of the *Conferences of the Parties*. Various resolutions have been passed on the species, representing a good example to understand the political and economic factors that influence multilateral wildlife conservation policy.

The critics' main argument is that the trade ban on rhino horn has driven the trade underground and increased the incentives for poaching: the price of rhino horn has risen since the ban, as would be expected given the continuing demand in *Consumer Nations* and the total ban on any supply of rhino horn, even from animals that have died of natural cause or that have been dehorned by government officials.

Rhino horn grows continuously and can be harvested from live animals at regular intervals. It could therefore provide a significant sustainable revenue stream to *Range States*.

¹⁵ Current estimates account for only four Northern White Rhinos, a sub-species whose current only wild population is threatened by the political unrest in the Democratic Republic of Congo, its only remaining *Range State*. In addition, it is estimated that the Western Black Rhino is probably extinct, as it appears that no rhinos have survived in Cameroon, the last *Range State* for the Western Black Rhino. (Source: Ibid.)

¹⁶ See also Table 1. The trends over time in the population growth and decimation of the Black and White Rhino populations have varied greatly, as will be discussed in more detail in Section 4.

Currently governments of *Range States* in Africa hold almost 20 tonnes¹⁸ in rhino horn¹⁹ in secured reserves. These reserves are estimated to grow at approximately 5% a year.²⁰ At current prices exceeding US\$ 3,000 per kilogram²¹ the total realisable value of stock could be around US\$ 60 million. While these numbers appear low on an absolute bases, it is important to point out that the author's concern is not to provide proof for a high unrealised absolute dollar potential in *Sustainable Use* of rhino horn, but to highlight that *Sustainable Use* economics may be superior to the status quo using the example of rhino horn. It is also not the aim of *Sustainable Use* to maximise the liquidation value of current stock but to provide an economically and biologically sustainable basis for wildlife conservation and a continuous income stream for local populations.

The current restrictions by CITES however forbid any trade: the accumulated stock can not be monetised and reinvested in conservation efforts that are chronically underfunded and would benefit from additional cash flows.²² The illegal rhino horn market is currently not benefiting the local populations but only illegal speculators, middlemen and poachers.

¹⁷ "Threatened with extinction" is defined as an *Appendix I* listing by CITES. The White Rhinoceros populations in South African and Swaziland have been downlisted to *Appendix II* in 1995 and 2005 respectively; however, the international trade ban on all rhino products remained in force.

¹⁸ Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.8.

¹⁹ This number includes the horns from Black and White Rhinos. The horns of both species are almost perfect substitutes. One may argue that, as the horn of the White Rhinoceros tends to be slightly bigger than the one of the Black Rhinoceros, it may be more suitable and valuable for carvings as bigger ornaments can be produced with potentially less scrap. This effect is assumed to be negligible for the price per kilogram of horn in the analysis of this thesis. Furthermore, interviews with TAM practitioners have confirmed that there is no difference with regard to the medical attributes between the two species. (Source: Eighteen interviews conducted by the author, Wei Li, Vicky Cui and Irawati Sohardjo in Yanji (Jilin Province, China), Surabaya (Indonesia) and London (UK) – June 2007.)

²⁰ World Wide Fund for Nature (WWF), "Black Rhinoceros Factsheet for the 13th Meeting of the Conference of the Parties to CITES".

²¹ For example, the prices varied in Taipei in 1991 from US\$ 3,257 to US\$ 8,610 per kilogram for African rhino horn. (Source: Nowell, Chyi and Pei, *The Horns of a Dilemma: The Market for Rhino Horn in Taiwan*, p.15.) Other estimates by Western media include prices of up to £10,000 per kilogram. (The Independent, "Illegal trading: Follow that badger!") Please refer to Section 4 for a detailed analysis. Prices reflect the risk associated with illegal trade and are high because of restricted supply.

²² Oldfield, *The Trade in Wildlife: Regulation for Conservation*, p.xxi.

At the same time, the international conservation community is foregoing the chance to restore rhino populations to their ecologically and economically optimum level. If conservation policy can be informed by basic economic principles, we could witness again free roaming rhino populations over relatively large parts of Sub-Saharan Africa, both to the benefit of the local people and the region as a whole.

1.3. A Political-Economic Perspective on the Conservation Debate

There has been a relative lack of academic discourse on the impact of international trade on species conservation. Vocal protagonists include politicians in Western countries, *Range States*, *Consumer Nations*, international animal rights and welfare pressure groups, individual environmentalists (both *Preservationists* and *Pragmatists*), as well as the traditional Asian medicine (TAM) community.

Much of the debate is focused on the ethical, legal, ecological and scientific consequences of human activities driving a species to extinction. However, a political-economic study can add important analytical dimensions to the debate, enriching our understanding of the current extinction crisis.

While economic tools and methodologies have been widely applied to maritime animals such as halibuts, they are seldom applied to the conservation of land mammals. The approaches are different because individual property rights can often be established and enforced with land mammals. Maritime animals on the other hand often migrate over large distances, beyond the *Exclusive Economic Zones* of individual countries and fishermen often have unrestricted access to fish stock in *International Waters*. Moreover, the fixed cost of commercial fishing are such that ecologically viable populations can survive human threat, as population sizes and concentration often remain at a level that render any commercial harvesting unprofitable.²³

²³ Exceptions are large maritime animals such as several of the whale species.

However, large land mammals, in particular mammals that live outside dense rainforests are often easier to locate at a lower cost and thus their populations can be reduced below the *Biologically Viable Population* size.

Conservation policies have a much greater chance of being effective, if they work with the grain of the market. Yet many protagonists in the Rhino conservation debate have little familiarity with – and appear to pay limited appreciation to – economic reasoning. This has led to a debate dominated by non-economists using economic terms, for example making assumptions about demand, without analysing its response to prices and incomes changes.

As a consequence, parallels have been drawn between the trade ban on rhino products and that on ivory which is widely published as success story. This comparison is invalid as the demand curve and consumer markets differ markedly between the goods derived from the two different species. Ivory has been demanded primarily in Europe and the US by the luxury goods industry and a trade ban in combination with effective media campaigns in these regions has diminished the demand significantly due to the price elasticity of luxury goods. Rhino horn on the other hand is used in price inelastic markets such as the traditional Asian medicine market and dagger market, primarily in Yemen.

The specific policy recommendations in this thesis are exclusively applicable to the conservation of the African Rhinoceros, and cannot be readily applied to other species. However, the principles of the analysis are of more general applicability, and would in the author's view improve the outcomes of the policy-making process across a range of conservation issues.

1.4. International Relations Theory and the Conservation Debate

In light of the obvious and numerous connections between conservation, international trade, economic development and governance, it is surprising that many contributions to the field fail to integrate different strands of economic and political analysis. To remedy this, the discipline International Relations ("IR") appears to provide a promising framework for an analytical approach for the case of the African Rhino precisely because of its interdisciplinary nature.

In particular New Institutionalism has proven to be a fruitful perspective in the analysis of the interaction of *Parties* to CITES. Institutions can be described as 'the humanly devised constraints that structure political, economic and social interaction'.²⁴ New Institutionalism, in particular the two subfields, Rational Choice Institutionalism ("RCI") and Historical Institutionalism ("HI") help describe in theoretical terms the dynamics around CITES, which are discussed in depth in Section 3.

One of the fundamental principles of RCI is that institutions are established with a focus on reducing transaction costs. This school of thought postulates that individual actors have a fixed set of preferences, are self-interested, rational and aim to maximize the attainment of their preferences by behaving in a highly strategic manner through extensive calculation.²⁵

Institutions in this case are political tools leading to rational outcomes for all actors and thus minimize collective inefficiencies such as the *Tragedy of the Commons* and the *Prisoner's Dilemma*. This is achieved by reducing uncertainty through providing information on the behaviour of other actors in conjunction with enforcement and control mechanisms.

²⁴ North, "Institutions", p.97.

²⁵ Hall and Rosemary, Political Science and the Three New Institutionalisms, p.12.

The optimal institution, according to RCI, maximizes gains from co-operation by limiting the choices of rational individuals and structuring the sequence of their interactions.²⁶ Institutions are seen as the means to align various interests of the actors, to reduce the cost of their interactions and maximize the collective outcome.

With regard to CITES this very much relates to the initial idea of the Convention where *Parties*, irrespective of their role as *Consumer Nations*, *Range States* or other *Parties* act together to achieve the common goal of wildlife conservation.

CITES remains focused on the coordination of law enforcement efforts by the *Parties* and has defined a clear set of rules and procedures to determine which species are endangered and how such species should be protected from international trade to reduce transaction cost with regard to individual species.

However, RCI does not explain the redistributive nature of CITES on wildlife resources decision-making, as economically and politically more powerful developed countries have arguably imposed their views on conservation on developing countries.

HI complements RCI in this respect as it emphasizes the asymmetry of power between actors within institutions. HI also emphasizes path dependency to a certain degree along with unintended consequences.²⁷

With regard to CITES, the idea of path dependency explains why the predominant view of the 1970's (that international trade is primarily a threat to endangered species) continues to persist today. More recently introduced Conventions such as the Convention on Biological Diversity

²⁶ Ibid., p.13; Gibson, Politicians and Poachers: The Political Economy of Wildlife Policy in Africa, p.10.

²⁷ Hall and Rosemary, Political Science and the Three New Institutionalisms, p.7.

(CBD) fully endorse the use *Sustainable Use* of wildlife to incentivise and reward *Range States* for their biodiversity.²⁸

In the perspective of HI, institutions provide a moral and cognitive template for the behaviour of its actors and consequently not only provide strategically useful information but also affect the identities, self-images and preferences of its actors.²⁹

HI assumes that despite the rational nature of individual actors, inefficient policies and institutions are possible as a dominant group of actors can lead to a sub-optimal allocation of resources should they have the ability to economically or politically force other parties to remain part of the institution.³⁰ Within CITES, the division of the *Southern* and *Northern* view has led to significant conflict as many *Southern Parties* see CITES' restrictive approach to international trade as an inefficient conservation policy. To enforce CITES' restrictive approach to trade in endangered species, *Northern Parties* have used their economic strength to impose unilateral trade sanctions on non-compliant *Parties* and non-*Parties*.

1.5. Literature Review

Clearly, over recent years the debate on conservation has assumed much greater relevance in the media and political arena. Thus it is surprising that academic literature on CITES and its approach to wildlife conservation remains sparse. Overall, conservationists have often been critical of some of the fundamental aspects of CITES, such as its listing structure. Legal

²⁸ Convention on Biological Diversity (CBD). "Preamble".

²⁹ Hall and Rosemary, Political Science and the Three New Institutionalisms, p.8.

³⁰ Ibid.

scholars on the other hand tend to be more positive about the principles of CITES and have identified the Convention's focus on compliance as a key strength.³¹

A number of studies examine the national policies followed in individual Range States. In particular C. Gibson and R. Duffy detailed and critically assessed the wildlife policies of Kenya, Zimbabwe and Namibia.

Together with the elephant, the rhino is a charismatic species that has been focused on in the public debate. Thus a lot of the readily available public data originate from newspaper articles and pressure groups, and are popular rather than scientific. Thus the public eye is continuously confronted with myths and false information such as that rhino horn is primarily used as an aphrodisiac in the Asian countries.³²

A comprehensive and scholarly political-economic analysis of the rhino case is discussed in the two relatively inaccessible papers from G. Brown and D. Layton. One is an unpublished working paper titled "Saving Rhinos" and the other paper was published in a book with several essays from various authors under the rather misleading title: "Protecting Endangered Species in the United States". These papers form the framework for the model detailed in Annex I of this thesis.

Principles of economic analysis have increasingly been applied to the study of scarce and renewable resources. The models are typically fairly abstract and general in nature and do not

³¹ The two volumes of collected essays edited by J. M. Hutton (Hutton and Dickson, Endangered Species, Threatened Convention: The Past, Present and Future of CITES.) and S. Oldfield (Oldfield, The Trade in Wildlife: Regulation for Conservation.) are good examples for the conservationist view on CITES. R. Reeve (Reeve, Policing International Trade in Endangered Species: The CITES Treaty and Compliance.) provides an example of the legal approach and the focus on compliance. For the history of CITES, see also W. Wijnstekers (Wijnstekers, The Evolution of CITES: A Reference to the Convention on the International Trade in Endangered Species of Wild Fauna and Flora.) and D. Favre (Favre, International Trade in Endangered Species: A Guide to CITES.).

³² This wrong perception came up again at the 14th Conference of the Parties (7 June 2007, The Hague), in the author's conversation with a Program Manager of one of the leading NGOs, that has worked among others on

tend to focus on the problem of any particular species. The common theme in the contributions in this subject area is the consideration of natural resources as an asset, the optimal use of which typically requires the maintenance of an optimal stock over time rather than its depletion. Among the main contributors are T. Swanson, D. Pearce, P. Dasgupta and A. Skonhott. The analytical core of this thesis is an application of these general principles on the African Rhino.

Detailed and well-researched writings on African Rhinos have been published by D. Balfour, E.B. Martin, A. Merz, N. Leader-Williams, M. Penny and M. 't Sas-Rolfes. These writers, with the exception of N. Leader-Williams, have often only anecdotally referred to a more rigorous economic analysis of the subject on hand. M. 't Sas-Rolfes, for example, published some of his work through the Institute of Economic Affairs (IEA);³³ however, the reader is assumed to have only basic knowledge of economics and market drivers are merely mentioned rather than analysed in detail.

In addition to the secondary literature discussed above, much of the information in this thesis relies on primary resources, for example, field studies commissioned by governmental and non-governmental organisations such as the IUCN and TRAFFIC status reports frequently produced in corporation with the African Rhino Specialist Group (AfRSG) headed by M. Brooks. Additional information has been obtained from interviews and conversations with traditional Asian medicine practitioners,³⁴ NGOs and *Management Authorities* from various *Parties*.³⁵

Operation Charm to combat the illegal traditional medicine market in the United Kingdom. In fact, the only places where rhino horns are used as an aphrodisiac are a handful of small provinces in India.

³³ Sas-Rolfes, Rhinos: Conservation, Economics and Trade-offs.

³⁴ A total of eighteen interviews have been conducted by the author, Wei Li, Vicky Cui and Irawati Soehardjo in Yanji (Jilin Province, China), Surabaya (Indonesia) and London (UK).

³⁵ The author has participated as an Observer during the 14th CITES *Conference of the Parties* (June 2007, The Hague). A significant amount of material was made available to the participants and the author had the chance to speak with key decision makers involved within CITES. Throughout this document, discussions and conclusions drawn from the conference will be mentioned as fit.

Over the last few years there has been a decline in primary data, with the last one of the elemental IUCN Status Reports published in 1999. Only a brief update was published in early 2007 as preparation material for the 14th *Conference of the Parties*, as Annex I in CoP14 Doc. 54.³⁶

As a consequence, it is particularly true for the last few years that the public and policy makers have to rely primarily on pressure groups to publish and discuss updates on the situation, which given their potential bias is sub-optimal.

³⁶ CITES. "Doc. 54: Species Trade and Conservation Issues - Rhinoceroses".

2. Fundamentals of CITES

2.1. Overview

CITES is a multilateral³⁷ environmental agreement that entered into force in 1975 to monitor and manage international trade in endangered species.

The international wildlife market is estimated at \$17.2 billion per year, a small but significant part of the \$240 billion world trade in organic natural resources, including timber and fish.³⁸ It has grown at an annual rate of around 7% from approximately \$3 billion in the 1980s.³⁹ Estimating the size of illegal trade in wildlife can only be guesswork, but it is likely to be a several billion dollars market and forms the 2nd or 3rd largest illegal market in the world.⁴⁰ In addition, it is growing with all likelihood at least equally fast compared to the legal trade, due to CITES' regulation of an increasing number⁴¹ of fauna and flora and strong economic growth in some of the major *Consumer Nations* such as China.

CITES focuses on international trade in endangered species. This section will describe this focus and other aspects of the Convention which have been the subject of a wide array of criticism over the last few decades. Section 3 will then lay out the heterogeneous policy goals of CITES *Parties* towards implementation and enforcement. Knowledge of CITES fundamentals

³⁷ As of January 2007, the Convention accounted for 169 governments as signatories. A complete list can be found at <http://www.cites.org/eng/disc/parties/alphabet.shtml>. 14 January 2007.

³⁸ Engler and Parry-Jones, Opportunity or Threat: The Role of the European Union in Wildlife Trade, p.10. For similar estimates see also: Giovanini, "Taking Animal Trafficking Out of the Shadows: RENCTAS Uses the Internet to Combat a Multi-billion Dollar Trade"; Roe and International Institute for Environment and Development, Making a Killing or Making a Living? Wildlife Trade, Trade Controls and Rural Livelihood, p.12.

³⁹ This number excludes timber and fishery food products. Roe and International Institute for Environment and Development, Making a Killing or Making a Living? Wildlife Trade, Trade Controls and Rural Livelihood, p.12. Citing: Roth and Merz, Wildlife Resources: A Global Account of Economic Use.

⁴⁰ See among others Roberts, "The Trade in Drugs and Wildlife", p.45: The Independent, "Illegal trading: Follow that badger!"; World Wide Fund for Nature (WWF), "About Wildlife Trade".

⁴¹ As of January 2007, around 5,000 species of animals and 28,000 species of plants are listed by CITES. A complete list can be found at <http://www.cites.org/eng/app/appendices.shtml>. 14 January 2007.

and the divergent approaches to wildlife conservation is a prerequisite for a political-economic analysis of the trade ban on the African Rhinoceros.

2.2. Focus on International Trade

The Preamble of the Conference states clearly that the measures taken by the agreement address international co-operation 'for the protection of certain species of wild fauna and flora against over-exploitation through international trade'.⁴² Thus CITES defines itself as a 'specific tool rather than a global solution',⁴³ aiming to address one particular threat to global biodiversity, the threat of over-exploitation.

CITES' focus has been criticised because (i) international trade is only one of the many reasons for declining wildlife and (ii) charismatic species have been treated differently by the Convention. These two arguments will now be discussed in detail.

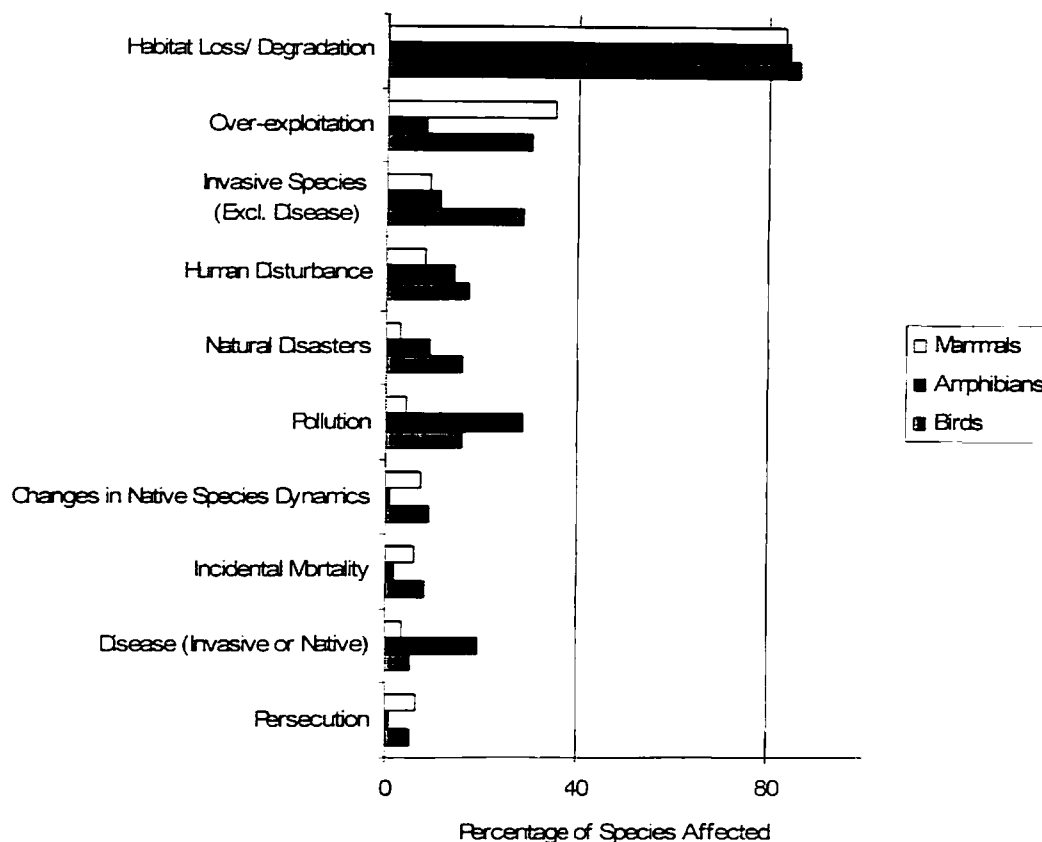
Various Reasons for Wildlife Decline

The major human induced influences on biodiversity identified by the IUCN Red List are: 'habitat destruction and fragmentation; invasive alien species; over-utilization; disease; pollution and contaminants; incidental mortality; and climate change'.⁴⁴

As indicated in Figure 1, mammals, amphibians and birds are affected by similar threats; however, the relative importance of different factors varies.⁴⁵ Over-exploitation⁴⁶ appears to be particularly relevant for mammals, such as the rhinoceros.

⁴² CITES. "Preamble: Convention on International Trade in Endangered Species of Wild Fauna and Flora".

⁴³ Reeve, Policing International Trade in Endangered Species: The CITES Treaty and Compliance, p.5. See also: Favre, International Trade in Endangered Species: A Guide to CITES, p.30.

Figure 1: Major Threats to Globally Threatened Species⁴⁷

While C. Huxley agrees that local over-exploitation has been detrimental to biodiversity, he argues that 'at most, very few species have been entirely exterminated as a result of international trade'.⁴⁸

This statement assumes that the factors that lead to extinction can be separated. This is not necessarily the case, as individual factors may have cumulative or synergistic effects; for

⁴⁴ Baillie, Hilton-Taylor and Stuart. 2004 IUCN Red List of Threatened Species: A Global Species Assessment, p.86.

⁴⁵ Ibid.

⁴⁶ The over-exploitation category in Figure 1 includes international trade, *Bushmeat* and other forms of domestic consumption.

⁴⁷ Baillie, Hilton-Taylor and Stuart. 2004 IUCN Red List of Threatened Species: A Global Species Assessment, p.86. The data is approximated from Figure 6.1. Please note that while climate change has been identified as a major threat, it has not been included in the IUCN Red List assessment.

⁴⁸ Huxley, "CITES: The Vision". p.5. See also: du Plessis, "CITES and the Causes of Extinction", p.22.

example, the hunting of a species may become a serious problem following fragmentation of a population due to habitat loss.⁴⁹ Also some collectors and speculators will start trading a species because of its rarity, thus trade may increase as the population size decreases.⁵⁰

In addition, species depend on each other in an ecosystem, and any reduction of one species through international trade could result in a destruction of the habitat or food chain of other species.⁵¹ Thus even if a small number of individuals survive, trade can result in such low population estimates that a species may be biologically alive but of no ecological relevance.⁵²

International trade in wildlife can also lead to collateral damage as specific age classes or sexes are removed, altering the gene pool and thus weakening the species' chances of long term survival.⁵³

Lastly, the threat to wildlife depletion through international trade also depends on characteristics such as size, habitat and breeding behaviour of certain species. Common fisheries models for example describe the observation of C. Huxley. Marine fish are seldom driven to extinction because they become *Commercially Extinct* first, as fisherman seek profitability and will therefore target other species.⁵⁴ Large land mammals, such as the rhinoceros living in the Sub-Saharan savannah however, are easier targets and can be fully depleted in a short time period by poachers. This has been forcefully demonstrated by the complete elimination of all Black

⁴⁹ See also: Mace and Lande, "Assessing Extinction Threats: Toward a Reevaluation of IUCN Threatened Species Categories", p.151; Broad, Mulliken and Roe, "The Nature and Extent of Legal and Illegal Trade in Wildlife", p.4.

⁵⁰ For further details see: Hutton and Dickson, Endangered Species, Threatened Convention: The Past, Present and Future of CITES, p.4-5; Favre, International Trade in Endangered Species: A Guide to CITES, p.35.

⁵¹ A good example would be the Javan Rhinoceros, the reduction of which renders other forest animal more vulnerable to predators and threats, as they depend on the walk ways entrenched into the jungle by the Javan Rhino to find water holes. (Source: Penny, Rhinos: Endangered Species, p.19.)

⁵² Favre, International Trade in Endangered Species: A Guide to CITES, p.33.

⁵³ Reeve, Policing International Trade in Endangered Species: The CITES Treaty and Compliance, p.8.

⁵⁴ For more detail see among others: The Humane Society of the United States, "Commercial Fisheries and Marine Mammals".

Rhinos in the two major former *Range States*, Tanzania and Central African Republic, with 3,000+ rhinos each in 1980 and none by 1990.⁵⁵

In the rhino case, international trade in horn is by far the most significant threat to the species' survival,⁵⁶ making this a very suitable case study of CITES, which puts such an emphasis on the concept of trade.

Overrepresentation of 'Charismatic' Species

The public eye has been focused on certain 'charismatic' species (e.g. elephants, rhinos and turtles) which have been subjected to comparatively more status surveys, action plans, resolutions and debate during CITES' conferences.

The biological characteristics of sea turtles and crocodiles, for instance, are very similar.⁵⁷ In essence both live in similar environments, produce a large number of eggs and experience a high (often more than 99%) mortality rate between egg laying and maturity. However, CITES treats the two species very differently. While captive breeding programmes have resulted in significant commercial trade in crocodile skins, ranching sea turtles requires overly complex proof of its sustainability.⁵⁸ G.J.W. Webb reaches the conclusion that the reason for this difference lies in the different popular perception of crocodiles and sea turtles.⁵⁹

⁵⁵ Balfour and Balfour, Rhino, p.53.

⁵⁶ Mohd. Khan bin Momin, Foose, Strien, et al., Asian Rhinos: Status Survey and Conservation Action Plan, p.6. Habitat conversion is a more significant threat for the Sumatran and Javan Rhinoceros as these species live in rainforests that continue to be dwarfed.

⁵⁷ Webb, "Are All Species Equal? A Comparative Assessment", p. 98-106.

⁵⁸ *Ibid.*, p.99. See also D. Favre, who focuses on the initial years of the discussion, when the two species were treated similarly. (Source: Favre, International Trade in Endangered Species: A Guide to CITES, p.210-12.)

⁵⁹ Webb, "Are All Species Equal? A Comparative Assessment", p.99.

Charismatic nature of a species can depend on 'size (elephant and whales)', 'assumed intelligence (dolphins)', 'harmless non-predatory nature (sea turtles)', 'big brown eyes (seals)', or 'simply their warm cuddly appearance (pandas)'.⁶¹

During CoP14,⁶² the listing of Slow Lorises (*Nycticebus* spp.) on Appendix I⁶³ was discussed and approved. While the *Management Authority* of Cambodia presented a well-documented and compelling case for an Appendix I listing, a widely shared comment by NGOs was that 'it pays to be cute'.⁶⁴

Figure 2: Slow Loris⁶⁰

2.3. System of Appendices

In Article II, 'Fundamental principles', the Convention defines *Appendix I* and *II* as follows:⁶⁵

1. Appendix I shall include all species threatened with extinction which are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances.

⁶⁰ Picture taken by Dr. K. Anna I. Nekaris, Oxford Brookes University, Department of Anthropology.

⁶¹ Webb, "Are All Species Equal? A Comparative Assessment", p.98. For a complementary set of criteria see also: Metrick and Weitzman, "Patterns of Behavior in Endangered Species Preservation", p.4.

⁶² CoP stands for "*Conference of the Parties*", the number suffix in this instance refers to the 14th such session.

⁶³ See next chapter for a detailed explanation of *Appendix I* and *II* listings.

⁶⁴ This was confirmed in the conversation of the author with Ericka Ceballos, the Education Program Co-ordinator of the Canadian Marine Environment Protection Society (8 June 2007, The Hague). However, it has to be understood that the cute looks of the animal has also resulted in a substantial demand from the pet industry in Asia, which is one of the reasons for the decline of the wild populations.

⁶⁵ Article II.1 and Article II.2 (a).

2. *Appendix II shall include: (a) all species which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival [...].*

Appendix II listed species may not be threatened at the time, but may become so unless trade is subjected to strict regulation. An export permit from the country of origin is required to confirm that trade is limited in order to maintain the species throughout its range 'at a level consistent with its role in the ecosystems [...] and well above the level at which that species might become eligible for inclusion in *Appendix I*'.⁶⁶

However, the frequent uplistings from *Appendix II* to *Appendix I* indicate that export permits may have been issued at unsustainable levels. R.W.G. Jenkins argues that the provisions have not been applied effectively as Article IV 'relies entirely on the will and capacity of the exporting country [...] [to] determine in what quantities species may be exported'.⁶⁷

Principally the same argument has led T. Swanson to conclude that *Appendix II* listings are, at best, a monitoring mechanism, and do 'little or nothing to support incentives to control the trade'.⁶⁸

When the *Appendix II* mechanism fails and/or a species is currently threatened with extinction and is or may be affected by international trade, it is listed on *Appendix I*.

An *Appendix I* listing requires not only an export permit, but also an import permit certifying that the import will not be used for primarily commercial purposes,⁶⁹ a term which according to

⁶⁶ Article IV.3.

⁶⁷ Jenkins, "The Significant Trade Process: Making *Appendix II* Work", p.48-9. See also: Favre, International Trade in Endangered Species: A Guide to CITES, p.63-4.

⁶⁸ Swanson, Global Action for Biodiversity: An International Framework for Implementing the Convention on Biological Diversity, p.147.

Resolution Conf 5.10 should be defined 'by the country of import as broadly as possible so that any transaction which is not wholly 'non-commercial' will be regarded as 'commercial'.'⁷⁰

This binary system does not allow *Appendix I* listed species access to potential benefits from commercial trade, as it bans all international trade, making no distinction between the sustainable and the unsustainable.⁷¹ Clearly, to the extent that regulated trade may enhance a species' chances of survival, an *Appendix I* listing may have perverse consequences.

In addition, it is very difficult and often costly to de-list a species from *Appendix I*, thus rendering the binary system inflexible and the differences between the two appendices further intensified. In the case of the Australian saltwater crocodile (*Crocodylus porosus*), a period of more than five years with a total spending of one million dollar was required to provide sufficient scientific data to convince the *Conference of the Parties* of a delisting.⁷²

As a consequence, it has been suggested that *Appendix I* and *II* should be combined into one single Appendix, with individual trade quotas for each species.⁷³

In a conversation with the author,⁷⁴ J.M. Hutton mentioned that another solution could be to keep *Appendix I* and have a tiered structure for *Appendix II* that acknowledges the different levels of threat for *Appendix II* listed species. While this sounds very sensible, one has to consider the significant administrative and organisational burden involved in devising individual

⁶⁹ Article III.3(c).

⁷⁰ CITES. "Resolution Conf. 5.10: Definition of Primarily Commercial Purposes".

⁷¹ Martin, "When CITES Works and When it Does Not", p.34. See also: Swanson. Global Action for Biodiversity: An International Framework for Implementing the Convention on Biological Diversity, p.147.

⁷² Jenkins, "The Significant Trade Process: Making Appendix II Work", p.49. See also: Favre, International Trade in Endangered Species: A Guide to CITES, p. 46.

⁷³ Martin, "When CITES Works and When it Does Not", p.36. See also: Jenkins, "The Significant Trade Process: Making Appendix II Work" , p.56.

⁷⁴ Conversation held on the way from The Hague to Cambridge (9 June 2007).

management programmes for all of the 4,493 animal species⁷⁵ currently listed on *Appendix II*. J.M. Hutton responded that this problem could be solved since the list could be significantly shortened as many of the currently listed species on *Appendix I* and *II* do not fulfil the listing requirements.

With regard to its listing requirements, CITES refers to – as it does throughout the Convention⁷⁶ – its scientific approach to conservation. While this portrays an objective methodology, it is difficult to implement in reality as there are significant uncertainties about the level of threat, causes and measures appropriate for any listed species. Although CITES has led to significant improvement in monitoring the status of endangered species, primary data required for scientific analysis remain unknown or very costly to obtain.

Consequently, the Convention needs to act in a precautionary way. Earlier Resolution Conf. 9.24 conflated contradictory approaches to the *Precautionary Principle*.⁷⁷ It was revised at CoP13 and now clearly states that a species 'should be included' in *Appendix II*, if 'it is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences'.⁷⁸

Further research is needed to develop a quick and reliable methodology to determine individualised conservation programmes for endangered species. This should among others include an analysis to determine if regulated international trade in a particular species or its products may be beneficial for its conservation, irrespective of the Appendix on which it is listed.

⁷⁵ As of January 2007, around 5,000 species of animals, including 529 in *Appendix I* and 4,493 in *Appendix II*, are listed by CITES. This argument does not take into consideration the 28,000 plants listed by CITES. A detailed list can be found at <http://www.cites.org/eng/app/appendices.shtml>, 14 January 2007.

⁷⁶ See among others: Article XV.2 (b); CITES. "Resolution Conf. 9.21 (Rev. CoP13): The Interpretation and Application of Quotas for Species included in *Appendix I*"; CITES. "Resolution Conf. 11.16: Ranching and Trade in Ranchered Specimens of Species Transferred from *Appendix I* to *Appendix II*".

⁷⁷ Dickson, "Precaution at the Heart of CITES", p.43.

⁷⁸ CITES. "Resolution Conf. 9.24 (Rev. CoP13): Criteria for Amendment of *Appendices I* and *II*".

2.4. Coordination of International Law Enforcement

CITES' primary intention as an international convention is to establish international cooperation in law enforcement.⁷⁹ For example, a CITES *Appendix I* listing results in higher penalties for illegal trade in both *Range States* and *Consumer Nations*.⁸⁰ In this respect, the Convention has been to a large extent successful because a global system to control wildlife trade is now in place.⁸¹

Amongst the established law enforcement initiatives that act in conjunction with CITES to combat the illegal trade in for example rhino horn are the Endangered Species Protection Unit (ESPU) by South Africa, Operation Lock supported by the WWF, the TRAFFIC Rhino Horn and Product Database (RHPD) and the 1994 Lusaka agreement on co-operative enforcement operations directed at international illegal trade in wildlife signed by several African *Range States*.

While currently 169 countries are *Parties* to CITES,⁸² the Convention has been and is impacted negatively by the countries that have not joined. For example, Yemen, a major *Consumer Nation* for rhino horn was not a *Party* to the Convention until 1997. Taiwan, another major *Consumer Nation* for rhino horn, remains a non-*Party* to the Convention. While Taiwan expressed interest in joining, China has opposed this by claiming that Taiwan is not an independent nation but part of China.

⁷⁹ Huxley, "CITES: The Vision", p.11.

⁸⁰ Pro Wildlife and Care for the Wild International, [Slow Lorises Need Your Help](#); Japan Wildlife Conservation Society, [Slow Lorises Fly so Fast into Japan](#).

⁸¹ Huxley, "CITES: The Vision", p.11.

⁸² As of January 2007. A complete list can be found at <http://www.cites.org/eng/disc/parties/alphabet.shtml>. 14 January 2007.

Article X of the Convention regulates the trade with non-*Parties* and details that in the case of a *Party* trading with a non-*Party*, it is permitted to do so with comparable documentation from a capable authority of the non-*Party* in lieu of the permits required by the Convention.⁸³ Thus, the jurisdiction of CITES does not cover just transactions between *Parties*, but all transactions in which at least one of the partners is a *Party*.

At the same time, the global law enforcement policy has been weakened by the right of all *Parties* to enter reservations with regard to the listing of particular species. For example, the Convention has encountered initial difficulty in imposing the international trade ban in 1979 on the salt-water crocodylians, as key *Consumer Nations* France, Germany, Italy, Japan, and Switzerland, who accounted for more than 80% of the trade in that species, entered reservations following the *Appendix I* listing of the species.⁸⁴ As in most multilateral agreements, *Parties* can impose a certain amount of pressure on other states to withdraw reservations. In the case of the salt-water crocodylians most reservations were withdrawn following significant political pressure from other *Parties*.⁸⁵

However in other cases, *Parties* have continued their reservations despite international pressure, in particular when the use of certain animals has been culturally embraced, such as the reservation on several Accipitridae and Falconidae (hawks and falcons) species used for sport hunting, entered by Saudi Arabia.⁸⁶

In the case of a reservation on the listing of a particular species, a *Party* is to be regarded as a non-*Party* with regard to this species, as detailed in Article XXIII of the Convention.

⁸³ Article X - Trade with States not Party to the Convention.

⁸⁴ Sand, "Commodity or Taboo? International Regulation of Trade in Endangered Species", p.22.

⁸⁵ Ibid.

⁸⁶ A list of reservations entered by *Parties* can be found at http://www.cites.org/eng/app/reserve_index.shtml, 12 December 2006.

2.5. Compliance of *Parties*

CITES is a regulatory Multilateral Environmental Agreement (MEA) that places specific obligations on the *Parties* and ensures compliance via a self-policing system.⁸⁷

The Convention has probably the most detailed control structure of any international wildlife treaty⁸⁸ and therefore forms an important step towards incorporating sustainable utilization of wildlife into well-defined and enforceable international laws.⁸⁹

CITES relies on the self-reporting of the *Parties*, information from NGOs, and other intergovernmental organisations including Interpol and the World Customs Organisation.⁹⁰

CITES trade data are however often problematic. For a start, illegal trade can only be estimated, with wide margins of error, and even if detected the quantities and countries of origin of seized specimens are often not reported by the *Parties*.⁹¹

In order to improve the reporting and to free up scarce resources for other conservation-related activities, the United Nations Environmental Program (UNEP) is currently coordinating efforts to harmonise reporting data and structuring of various bio-diversity related conventions, including CITES. Several pilot projects involving eight different conventions⁹² have demonstrated that a

⁸⁷ Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, p.6.

⁸⁸ Swanson, *Global Action for Biodiversity: An International Framework for Implementing the Convention on Biological Diversity*, p.95.

⁸⁹ *Ibid.*, p.96.

⁹⁰ Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, p.62.

⁹¹ Mulliken, *The Role of CITES in International Trade in Forest Products: Links to Sustainable Forest Management*, p.15.

⁹² United Nations Convention to Combat Desertification (UNCCD), CITES, CBD, The International Whaling Commission (IWC), Ramsar Convention, World Heritage Convention (WHC), Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena), and UNESCO's Programme on Man and the Biosphere (MAB)

modular approach to reporting⁹³ by the conventions 'is practical and should be replicable in both developed and developing countries'.⁹⁴

The co-operation of the *Parties* is key to implementing CITES' resolutions. CITES has no mandate to regulate domestic trade, thus it particularly requires significant cooperation from the local government to close illegal domestic markets.

Thus, the Convention is most effective when state and local government agencies have been established and coordinate efficiently, and legal rights that determine wildlife use by citizens are accepted by the local populations.⁹⁵ In other words, effective protection to species can only be achieved by law enforcement and the cooperation people living in close proximity to wildlife in *Range States*.⁹⁶

Thus it is very important to align the different conservation philosophies propagated by various groups in CITES. The next section will give a detailed overview of conflicts that need to be avoided for the Convention to be most effective.

⁹³ A modular approach entails that the various conventions record data using the same definitions and formats.

⁹⁴ Bundesamt fuer Naturschutz (BfN), Promoting CITES-CBD Cooperation and Synergy.

⁹⁵ Martin, "When CITES Works and When it Does Not", p.31.

⁹⁶ Ibid.

3. Divergent Approaches within CITES

3.1. Overview

Most participants to the conservation debate can be located along a range between two extreme stereotypes.⁹⁷

At one extreme, *Preservationists* (or *Protectionists*) would like to preserve wildlife in its untouched environment and minimise human impact. This approach is largely associated with the North (“Northern Approach”): it perceives international trade as a threat to conservation, and thus aims to regulate and when necessary restrict trade in endangered species.

Pragmatists, in contrast, promote *Sustainable Use* through raising funds and creating an incentive for those people living in close proximity to wildlife to help with the conservation efforts. This approach is often associated with the South (“Southern Approach”) and opposes an outright international trade ban on endangered species. *Pragmatists* believe that trade can create incentives for better conservation and a trade ban may accelerate the path to extinction due to habitat conversion or uncontrolled poaching.

The approaches will be detailed in this chapter. There is ample room for conflict and CITES has been a major discussion board as it lies at the very centre of the debate on the benefits and costs of international trade in endangered species.

⁹⁷ See among others: Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, p.14; Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.54.

3.2. Northern Approach

The key actors that represent the Northern Approach are the US, EU and northern NGOs. This chapter will give an introduction to some of the concerns raised with regard to the agenda and motivations of these *Parties*.

United States of America ("US")

The US has been a dominant *Party* to CITES from the outset of the Convention, throughout the evolution of international dialogue and legislation. In its dealings with *Range States* the US has often acted like a classic *Preservationist*.

In 1960, the Seventh IUCN General Assembly urged wildlife *Consumer Nations* to adopt an international framework close to export regulations and the laws of *Range States* to aid the latter to protect its wildlife.⁹⁸ At the same time the discussions of the IUCN raised concerns in the US that wildlife needs to be protected even at significant costs to society.⁹⁹

Thus parallel to internationally co-ordinated developments, the US passed a law to impose a unilateral import ban on certain endangered species (Endangered Species Act, "ESA") in 1969. As this domestic legislation was seen as a disadvantage to the American leather, fur and pet industries the US government was directed to seek a binding international convention that would result in similar laws in other countries.¹⁰⁰

⁹⁸ Wijnstekers, *The Evolution of CITES: A Reference to the Convention on the International Trade in Endangered Species of Wild Fauna and Flora* (Introduction).

⁹⁹ Coffman, "The Greening of America: How did it Happen?". p.66.

¹⁰⁰ Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, p.27.

As a consequence, the US took the initiative to put forward a proposal that envisaged a global list of threatened species that would be used to regulate wildlife trade. At the time, Kenya led the developing countries' opposition with a counter-proposal, insisting that each *Range State* determines its own list of tradable species.¹⁰¹

The US proposal succeeded, and ultimately CITES was not in line with the initial 1960 IUCN call that required *Consumer Nations* to aid *Range States* in their wildlife conservation policies. Instead, CITES encroached on *Range States*' right to determine which species can be traded. While both approaches aimed to stop illegal trade, the decision on which trade to stop has shifted from the developing countries to a consensus driven Convention involving both developed and developing countries.

This formed the beginning of the move to empower the Northern *Preservationists*, and as a consequence ever since CITES entered into force in July 1975, many developing countries and critics of the Convention referred to it merely as the Washington Convention (named after a plenary conference held in Washington, DC in 1973 to discuss a draft convention).¹⁰²

The US has played a dominant role in the Convention through today, evident also in the case of the African Rhino. For example, in order to ensure increased domestic law enforcement and regulations in some of the *Consumer Nations*, the Convention supported the US in the mid-1990s in its suggestion to use trade sanctions under the legal framework of the Pelly Agreement.¹⁰³ However, the central role of the US in enforcement was fraught with conflicts. While sanctions were applied to Taiwan, other *Consumer Nations* such as China and South

¹⁰¹ Ibid., p.28.

¹⁰² See also: Wijnstekers, The Evolution of CITES: A Reference to the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (Introduction).

¹⁰³ The Pelly Amendment is a domestic US law that is designed to authorize trade sanctions against countries whose trading purposes undermine the effectiveness of CITES. See also: Beattie, "Opening Speech at CoP9", CITES.

Korea were treated with apparent lenience, allegedly because of wider trade interests at stake.¹⁰⁴

European Union ("EU")

The EU shares the view of the US that *Consumer Nations* have a significant responsibility to enforce wildlife trade restrictions and both appear to assume that 'they know best how developing countries should manage their resources'.¹⁰⁵

However, the *Preservationist* position of the US appears less dominant in the EU. Instead the main motivation of the EU to impose additional restrictions is related to the belief that *Range States* often have a strong interest in short-term profits rather than *Sustainable Use* of wildlife resources.¹⁰⁶ In particular, the perceived widespread corruption within several of the *Range States* has been identified as a reason for this short-term focus.¹⁰⁷

As a consequence, in addition to the regulations imposed by CITES, the EU maintains its own separate lists of threatened species which are listed on four different Annexes as defined in the the old (1984) and new EU Regulations (since 1997),¹⁰⁸ that are equally applicable for all 27 member states of the European Union.

While the Annexes of the European Union mirror to a large extent the Appendices of CITES, they go beyond the restrictions imposed by CITES and effectively require import permits for

¹⁰⁴ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.20.

¹⁰⁵ Hutton, "Who Knows Best? Controversy over Unilateral Stricter Domestic Measures", p.64.

¹⁰⁶ Ibid.

¹⁰⁷ Discussion of the author with several representatives of the German *Management Authority* at a reception organised by the German Federal Environmental Ministry for the German delegates at CoP14 (7 June 2007, The Hague).

¹⁰⁸ European Union, "Council Regulation (EC) No 338/97". See also: Hutton, "Who Knows Best? Controversy over Unilateral Stricter Domestic Measures", p.64; TRAFFIC, [Wildlife Trade Regulations in the European Union](#).

most species listed on *Appendix II*. In addition some *Appendix II* listed species are also prohibited for commercial trade in the EU.

While the EU is making use of Article XIV of CITES which regulates that the 'Convention shall in no way affect the right of *Parties* to adopt (a) stricter domestic measures [...]'¹⁰⁹, the unilateral restrictions that it applies on its trade with *Range States* are not in the spirit of a multilateral agreement.

In addition, the regional economic integration of the EU has been a law enforcement challenge, as illegal wildlife products are shipped to lenient ports such as in the Netherlands or Eastern Europe before it they enter, for example, the UK where custom controls are more strictly enforced.¹¹⁰

Northern Non-Governmental Organisations ("NGOs")

From the beginning of the Convention, NGOs have been important contributors and opinion leaders, and it is worth noting that there is interdependence between funding and information gathering.

CITES provides a unique advantage and platform for NGOs. They are given the opportunity to announce a crisis before a *Conference of the Parties*, raise substantial funds to collect supporting information, and then celebrate the mere listing of a species on an Appendix of the Convention as a 'conservation success'.¹¹¹

¹⁰⁹ Article XIV.1

¹¹⁰ Cook, Roberts and Lowther, *The International Wildlife Trade and Organised Crime: A Review of the Evidence and the Role of the UK*, p.24; Kala, Kelemen and Kepel, *Trade in Endangered Species in Central and East European Countries*. See also: Favre, *International Trade in Endangered Species: A Guide to CITES*, p.26; Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, p.320.

¹¹¹ Huxley, "CITES: The Vision", p.199; Adams, *Against Extinction: The Story of Conservation*. See also WWF's news report following the listing of certain mahogany and marine wildlife species. (Source: World Wide Fund for Nature (WWF), "CITES Conference is a Conservation Success".)

In return, CITES benefits greatly from the funding and information supplied by NGOs. In particular Species Survival Network (SSN – a network of approximately 7,000 volunteer experts from around the world), World Wildlife Fund for Nature (WWF) and International Fund for Animal Welfare (IFAW) are key contributors of information that is required among others to determine if a species should be listed.

However, many NGOs have their own agendas with regard to CITES. The Convention is perceived by some to promote a more ethical and ideological oriented agenda of animal rights and animal welfare, which is not necessary in line with *Sustainable Use* of wildlife.¹¹²

Partly because of this, certain animal welfare criteria have been added to the text of the Convention to forbid the cruel treatment of animals.¹¹³ While these concessions to animal rights appear reasonable, a fine balance has to be established to avoid a deeper entrenchment of the North-South conflict on conservation principles.

WWF, in appreciation of this conflict, has aligned its strategy with the concept of *Sustainable Use* as a major driver for species conservation. The potential impact of a CITES listing on the livelihoods of the poor is recognised and WWF identifies the need to integrate human needs as a fundamental part of species conservation efforts.¹¹⁴

Another group of NGOs in support of *Sustainable Use* of wildlife are sport hunting associations such as the Conservation Force, Safari Club International (SCI) or Landesjagdverband Baden-Württemberg (federal hunting association of Baden-Württemberg). They however tend to be

¹¹² See Jenkins, "The Significant Trade Process: Making Appendix II Work", p.54; Huxley, "CITES: The Vision", p.10.

¹¹³ See among others Article III.2, Article III.4, Article IV.2, Article IV.5, Article V.2. The point is also referred to by: Huxley, "CITES: The Vision", p.10; Reeve, Policing International Trade in Endangered Species: The CITES Treaty and Compliance, p.31; Jenkins, "The Significant Trade Process: Making Appendix II Work", p.54; Favre, International Trade in Endangered Species: A Guide to CITES, p.73-9.

ignored or even affronted by animal welfare NGOs and *Preservationists* and thus find it difficult to contribute to the conservation efforts of CITES.¹¹⁵

SSN, IFAW and many other animal welfare organisations¹¹⁶ oppose the views of WWF and sport hunting associations and argue that socio-economic considerations undermine the enforcement efforts of CITES¹¹⁷ and 'once a price tag is put on animal species, it becomes quickly threatened'.¹¹⁸ CITES is seen as a tool with a focus on enforcement efforts to counter the increasing demand for products of endangered species, fuelled by increasing global economic prosperity.

3.3. Southern Approach

Several of the key proponents of the *Southern Approach* come from Sub-Saharan Africa, and wish to distance themselves from the Northern *Preservationist* Approach that they perceive as a 'legacy of the colonial period'.¹¹⁹ The *Major Range States* of African Rhinos including Kenya, Namibia, South Africa, and Zimbabwe have been particularly vocal about their views.

The advocates of this approach argue that bold measures are needed to protect endangered species, often conflicting with that of many *Preservationists*. The Southern approach rejects as false the dichotomy between an idealistic, perfectly 'natural' outcome and the risk of extinction

¹¹⁴ World Wide Fund for Nature (WWF), WWF Positions.

¹¹⁵ This view was mentioned by Klaus Lachenmaier from the Landesjagdverband Baden-Württemberg (federal hunting association of Baden-Württemberg) in a discussion with to the author (6 June 2007, The Hague).

¹¹⁶ Such as People for the Ethical Treatment of Animals (PETA), Born Free Foundation and the World Society for the Protection of Animals (WSPA).

¹¹⁷ Species Survival Network (SSN), CoP14 CITES Digest.

¹¹⁸ International Fund for Animal Welfare (IFAW), Overview – IFAW Recommendations.

¹¹⁹ Hutton and Dickson, Endangered Species, Threatened Convention: The Past, Present and Future of CITES, p.xvi.

through commercial over-exploitation, propagating instead a pragmatic approach based on the concept of *Sustainable Use*.¹²⁰

It is argued that the *Preservationist* approach often merely pushes wildlife markets underground,¹²¹ with a number of perverse effects – notably, a reduction in the income opportunities for local populations, accompanied by surging criminal activities that benefit only a few poachers and middlemen.

Sustainable Use

The key concept of *Sustainable Use* is the coexistence of wildlife with local populations by enabling species to compete with the value of agriculture and other forms of land use.

Local populations can be incentivised to protect their wildlife, if they can directly benefit from consumptive (e.g. selling wildlife goods) and non-consumptive (e.g. eco-tourism) wildlife usage. The ability to harvest a continuous income stream for the community can result in a strong sense of responsibility and thus local populations can at least partially fulfil the role of law enforcement which otherwise will have to be funded by the government.

In 1992, CITES formally recognised the potential benefits of trade in wildlife as detailed in Resolution Conf. 8.3. The document was revised in 2004, and states the need to incentivise local people to counter the ongoing habitat conversion to alternative forms of land use, such as agriculture. The resolution goes on to describe that funds received from legal trade can be used for additional enforcement efforts against illegal trade, and that 'the implementation of CITES listing decisions should take into account potential impacts on the livelihoods of the poor'.¹²²

¹²⁰ See also: Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.9-10.

¹²¹ Hutton and Dickson, *Endangered Species, Threatened Convention: The Past, Present and Future of CITES*, p.xvi.

¹²² CITES. "Resolution Conf. 8.3 (Rev. CoP13): Recognition of the Benefits of Trade in Wildlife".

According to the principles of *Sustainable Use*, a restriction in international trade in endangered species can be detrimental for conservation efforts of the species since the above-mentioned benefits would be compromised as a result.

The benefits of *Sustainable Use* can be demonstrated for example by the permitted trophy hunting of a limited number of Black Rhinos each year in particular *Range States*.

CITES has set a yearly quota for trophy hunting of five Black Rhinos in South Africa and Namibia since 2005. Resolution Conf. 13.5 states that financial benefits derived from trophy hunting will benefit the conservation of the species by providing incentives for conservation and habitat protection. The resolution also recognises the efforts by South Africa and Namibia that have made significant advances in their conservation efforts.¹²³

The recognition of trophy hunting as potentially beneficial tool for rhino conservation, as advocated by the *Pragmatists*, has been gradually accepted and a proposal by Kenya to remove the quotas for the hunting of Black Rhinos at CoP14¹²⁴ was rejected by 65 votes against, 15 in favour and 11 abstentions.¹²⁵ This is despite the fact that trophy hunting was one of the reasons to form CITES in the 1970s and is strongly opposed by *Preservationists*.¹²⁶

¹²³ CITES. "Resolution Conf. 13.5: Establishment of Export Quotas for Black Rhinoceros Hunting Trophies".

¹²⁴ CITES. "Doc. 37.2: Appendix I Species Subject to Export Quotas - Black Rhinoceros Export Quotas for Namibia and South Africa". Please refer for more detail to Section 3.5.

¹²⁵ CITES. "CoP14 Com. I Rep. 2: Summary Record of the Second Session of Committee I".

¹²⁶ See also: Huxley, "CITES: The Vision", p.10; Sas-Rolfes, Rhinos: Conservation, Economics and Trade-offs, p.5.

3.4. North-South Conflict

Wildlife Conservation and Human Development

Wildlife usage is closely intertwined with human livelihood in developing countries. To impose restrictions on wildlife usage raises questions about justice, human rights and state sovereignty. Hence, sustainable wildlife use is all the more important as it aims to strike a balance between an improved living quality and earnings in the *Range States* and wildlife conservation. A policy for the *Sustainable Use* of wildlife therefore effectively becomes a policy for human development.¹²⁷

Currently, the Convention is used by the wealthy North to deny the global South the right to determine if usage of wildlife is sustainable. One would anticipate that such imposed limitations result in equitable compensation for the lost economic benefits; however, the Convention does not contain many of the provisions that are considered by some as 'positive' such as direct financial compensation for conservation efforts of *Range States* and differentiated obligations for developing countries.¹²⁸ There has been some reluctance by *Preservationists* 'to engage with these evaluative, 'non-scientific' issues'.¹²⁹

This may appear hypocritical as many of the countries rich in wildlife resources have macro-economic problems and impoverished populations partly because of their struggle to repay international debt. Thus some people have drawn the conclusion that the 'insatiable economies

¹²⁷ Hutton and Dickson, Endangered Species. Threatened Convention: The Past, Present and Future of CITES, p.xvii.

¹²⁸ IUCN, Trade Measures in Multilateral Environmental Agreements, p.21.

¹²⁹ Hutton and Dickson, Endangered Species. Threatened Convention: The Past, Present and Future of CITES, p.xvii.

of the developed consumer countries' are the real reason why developing countries have no choice but to plunder their habitats and clear them to reach mineral resources.¹³⁰

While this link appears questionable, it is true that developed countries have often plundered their wildlife resources as they progressed from developing to developed nations and are now using their power to prevent developing countries from following their path. On the other hand, *Sustainable Use* of wildlife forms a strong part of the culture of most African nations and represents one of the few ways of making a living.

However, as pointed out by J.M. Hutton, while it is true that countries such as Germany, France and the US may not have a better wildlife conservation record compared to many of the Sub-Saharan African countries, the developed industrial economies have a history of wildlife depletion that is followed by a period of restoration which often involves strict protection. Thus, it's no surprise 'that their conservation policies are often well out of step with those of resource-rich developing countries'.¹³¹

3.5. South-South Conflict

Another conflict that needs to be addressed by CITES is the potential conflict among Southern *Range States* when a species is listed on Appendix I.

All *Range States* are officially treated equally in the regulations of CITES, irrespective of their commitment and resources allocated to conservation, economic status, and size of remaining populations of a particular species. Thus conflicts frequently arise as these variables differ among *Range States*.

¹³⁰ du Plessis, "CITES and the Causes of Extinction", p.16-17.

¹³¹ Hutton, "Who Knows Best? Controversy over Unilateral Stricter Domestic Measures", p.58.

For example, Kenya proposed at CoP14 to repeal CITES Resolution 13.5¹³² that allows South Africa and Namibia to issue permits for trophy hunting of five Black Rhinos each per year. Kenya expressed concerns with regard to the management and monitoring capabilities of South Africa and Namibia and increased poaching and demand for rhino horn in certain *Range States* following the adoption of Resolution Conf. 13.5. In addition, Kenya felt that *Translocation* of surplus rhinos to other *Range States* and the resultant tourism would be viable alternatives towards global conservation efforts of the Black Rhino.¹³³ While Kenya's proposal was supported by the Democratic Republic of the Congo and Rwanda that have a small and declining number of Black Rhino populations, and certain *Preservationist*, namely SSN and IFAW,¹³⁴ it was opposed by the majority of Northern protagonists, including the US, EU and WWF.¹³⁵

One source for disagreement is the question of how much of CITES' focus should be on the global status of a species, and to what extent should the Convention address the threat of over-exploitation to local populations of particular *Parties*. The latter may result in the allocation of significant funds to protect local populations, despite the lack of a global extinction threat to a species.¹³⁶

The South-South conflict often gives rise to an enforcement problem as enforcement policies are significantly weakened if different countries impose different regulations. The case of Burundi and the trade in ivory is a good example that illegal trade in wildlife will always

¹³² CITES. "Resolution Conf. 13.5: Establishment of Export Quotas for Black Rhinoceros Hunting Trophies".

¹³³ CITES. "Doc. 37.2: Appendix I Species Subject to Export Quotas - Black Rhinoceros Export Quotas for Namibia and South Africa"; CITES. "CoP14 Com. I Rep. 2: Summary Record of the Second Session of Committee I".

¹³⁴ Species Survival Network (SSN), CoP14 CITES Digest, p.67-8. The author confirmed IFAW's position in a discussion with Peter Pueschel, Program Manager of IFAW's Wildlife and Habitat Protection Department. (6 June 2007, The Hague)

¹³⁵ CITES. "CoP14 Com. I Rep. 2: Summary Record of the Second Session of Committee I"; World Wide Fund for Nature (WWF), WWF Positions, p.44-6.

¹³⁶ Oldfield, The Trade in Wildlife: Regulation for Conservation, p.xviii.

determine the easiest and least protected routes to trade. When *Range States* of the African Elephant were permitted to export ivory, Burundi with a population of one elephant (in a zoo) managed as a "*Range State*" to export twelve tonnes of ivory per month in mid-1983.¹³⁷

3.6. CITES Resolutions on Rhino Conservation

Since CITES entered into force in 1975, the debate on the rhinoceros has been an important part of the Convention, and has been a topic at the vast majority of the fourteen *Conferences of the Parties* to date. All rhino species were listed by CITES since the outset of the Convention and since 1977 all species have been listed on *Appendix I*.¹³⁸

However, already at the third conference in New Delhi in 1981, Resolution Conf. 3.11¹³⁹ was concerned that despite the listing on *Appendix I* there was still a particularly rapid decline in rhino populations primarily because of continued demand resulting in illegal trade activities.

The resolution recommended that all *Parties* to the Conference as well as non-*Party* governments take measures to prevent trade in rhinoceros products, and place a moratorium on the sale of all government and *Parastatal* stocks of rhino horn. The resolution referred to a significant amount of trade with non-*Parties* to the Convention, in particular North Yemen and Taiwan.

At the 6th *Conference of the Parties*, Ottawa, 1987, Resolution Conf. 6.10¹⁴⁰ noted that the Black Rhinoceros population had continued to decline catastrophically due to illegal trade despite

¹³⁷ African Elephant & Rhino Group Newsletter, "Burundi Hurries to Export Ivory", IUCN Species Survival Commission.

¹³⁸ The White Rhinoceros populations in South African and Swaziland have been downlisted to Appendix II in 1995 and 2005 respectively; however, the international trade ban on all rhino products remained in force.

¹³⁹ CITES, "Resolution Conf. 3.11: Trade in Rhinoceros Horn".

¹⁴⁰ CITES, "Resolution Conf. 6.10: Trade in Rhinoceros Products".

efforts of all *Parties* concerned. The resolution drew attention to cross-border poaching and the possibility of using non-*Range State* countries as entry points for illegal shipment. It also pointed out criminal actions and theft aimed at government stocks of rhino horns.

The resolution further urged all *Parties* to ban all trade in rhino products, domestic as well as international; however, it excluded solely non-commercial movement of legitimate hunting trophies. This took CITES beyond its original mandate that was limited to international trade.

In addition, the resolution called for the destruction of all government and *Parastatal* stocks as substantial volumes have been stolen and sold on the illegal market.¹⁴¹ Furthermore, it urged *Parties* to increase penalties for middlemen and poachers and use economic, political and diplomatic means to exert pressure on countries that allow trade in rhino horn. Most unusually¹⁴² the resolution named specific countries (Burundi and the United Arab Emirates) as focus points. It also encouraged seeking substitutes for rhino horns and strengthening rhino conservation strategies.

At the 10th session¹⁴³ of CoP8, the Chairman of Committee One of the *Conference of the Parties* expressed great concern that despite great efforts, substantial expenditure and tragic loss of human life, there had been a continued decline in virtually all rhinoceros populations. He explained that CITES had been largely unsuccessful with its rhino conservation efforts primarily due to high demand in non-*Parties* states, and proposed enlisting support of the public and media to increase pressure on such states to close markets for rhino products.

¹⁴¹ See *Ibid.* This problem persists until today as mentioned in World Wide Fund for Nature (WWF), WWF Positions, p.45.

¹⁴² Favre, International Trade in Endangered Species: A Guide to CITES, p.103. This rather unusual note in an official resolution by a multilateral environmental convention against some non-*Parties* (Burundi joined in 1988, the United Arab Emirates joined in 1990), demonstrated the determination of the *Parties* to stop the trade in rhino products.

¹⁴³ CITES. "Plen.8.10: Summary Report of the Plenary Meeting (Session 10)".

While the US, UK, Kenya and Zambia agreed on the proposal to address the illegal market with an emphasis on stronger law enforcement. Namibia, fully supported by South Africa and Zimbabwe, expressed their dismay at hearing of the solution as the attempts to close the rhino horn trade had failed and their own proposal of a controlled trade was rejected by the *Parties*.

Some of the issues got resolved in between the conferences and South Africa and Kenya became signatories to the Lusaka Agreement that was signed two months before CoP9, by several of the larger rhino *Range States* directed to 'establishing close co-operation among themselves in order to reduce and ultimately eliminate illegal trade in wild fauna and flora'.¹⁴⁴

During CoP9 in Fort Lauderdale, 1994, Resolution Conf. 9.14¹⁴⁵ on the Rhinoceros was passed. This resolution acknowledged the difficulties faced by *Range States* and *Consumer Nations* to reduce the trade in rhino horn. It stated that the call of Resolution Conf. 6.10 to destroy all government and *Parastatal* stocks has not been implemented and mentioned that this was no longer considered necessary.

The resolution also recognised that the trade ban on rhino products had a number of unintended consequences, and has driven the trade underground which has resulted in an increase in the price of the good in some *Consumer Nations*. The resolution placed particular importance on additional law enforcement measures to be implemented but also suggested that all *Range States* should lay out recovery plans that use revenue, derived from sources consistent with the Convention, to achieve the aim of long-term sustaining rhino populations on the basis of self-sufficiency.

¹⁴⁴Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora. "Preamble". The Parties to the agreement are Kenya, Lesotho, the Republic of Congo, Tanzania, Uganda and Zambia. Ethiopia, South Africa and Swaziland are also signatories. (Source: United Nations Environment Programme (UNEP), "Another Milestone Attained in Operationalizing Lusaka Agreement".)

¹⁴⁵ CITES. "Resolution Conf. 9.14: Conservation of Rhinoceros in Asia and Africa".

The request for *Range States* to produce such recovery plans, given that the Convention's position was clearly non-trade with regards to rhino horn, must have been perceived with dismay by some of the *Range States* and at the 11th *Conference of the Parties* in Gigiri, 2000, the text of Resolution Conf. 9.14 was revised¹⁴⁶ and the request was deleted. Instead the amended resolution asked for more reporting from the *Range States* that should include a detailed report on the status of their rhino populations to be submitted to the Conference at least six weeks prior to each future meeting of the *Conferences of the Parties*.

During the 13th Conference of the Parties in Bangkok 2004, the text of Resolution Conf. 9.14 was again revised,¹⁴⁷ and as many *Range States* failed to submit a report on the status of their rhino populations ahead of CoP12 and CoP13, the request for these reports was deleted from text of the resolution. While, the amended text continued to refer to the illegal trade in rhino horn as a global law enforcement problem, it also pointed to the problem of rising stocks in many of the *Range States*.

Thus all resolutions on the rhino have pointed to the same set of solutions, i.e. continue to implement the trade ban, focus on global and regional law enforcement efforts and expand the reporting requirements by *Range States* on their rhino populations. This approach continues to receive opposition by *Range States*. who among others decided to not implement the initial call by the Convention for a destruction of all rhino horn stocks and have not submitted some of the status reports requested.

¹⁴⁶ CITES. "Resolution Conf. 9.14 (Rev. CoP11): Conservation of and Trade in African and Asian Rhinoceros".

¹⁴⁷ CITES. "Resolution Conf. 9.14 (Rev. CoP13): Conservation of and Trade in African and Asian Rhinoceros".

4. Background on the African Rhinoceros

There are five species of rhinoceros alive today.¹⁴⁸ These are the survivors of at least 60 different species including the largest mammal of all times. Fossils have been discovered in North America, Europe, Africa and Asia.¹⁴⁹

Up to 1920, estimates of the African Rhino population range from half a million to above a million¹⁵⁰ and European explorers commented frequently on the large number of rhinos they encountered. For example, during his travels in the 1930's, Andrew Smith recorded that he came across between 100 to 150 Black and White Rhinos during a single day's march.¹⁵¹

However, this situation did not last for long. Merely 40 years later, Frederick Felous noted already that 'this animal "must be almost extinct," and that "thousands upon thousands of these huge creatures were killed by white hunters and natives armed with the white men's weapons and the species has become partially extinct."¹⁵²

While the numbers for the Southern White Rhinoceros have increased substantially in South Africa (from a population possibly as small as 20 in 1895¹⁵³ to around 14,543¹⁵⁴ in 2005), the Northern White Rhino has encountered the reverse trend with a population of over 2,000 in 1960¹⁵⁵ decreasing to only four animals sighted in the Democratic Republic of Congo in 2005.¹⁵⁶ Previous estimates accounted for a population size of 30 individuals in 2003.¹⁵⁷

¹⁴⁸ See Table 1 for more details.

¹⁴⁹ Penny, Rhinos: Endangered Species, p.5-7; Martin, Martin and Amin, Run, Rhino, Run, p.11-12; Balfour and Balfour, Rhino, p.24. D. Balfour refers to fossil records that relate to as many as 170 different rhino species.

¹⁵⁰ Martin, Martin and Amin, Run, Rhino, Run, p.35.

¹⁵¹ Balfour and Balfour, Rhino, p.27.

¹⁵² Martin, Martin and Amin, Run, Rhino, Run, p.35.

¹⁵³ World Wide Fund for Nature (WWF), "White Rhinoceros Factsheet for the 13th Meeting of the Conference of the Parties to CITES".

¹⁵⁴ Emslie, Milledge, Brooks, et al., African and Asian Rhinoceroses: Status, Conservation and Trade, p.4. For details on the Southern White success story see also: Balfour and Balfour, Rhino, p.37-8.

¹⁵⁵ World Wide Fund for Nature (WWF), "White Rhinoceros Factsheet for the 13th Meeting of the Conference of the Parties to CITES".

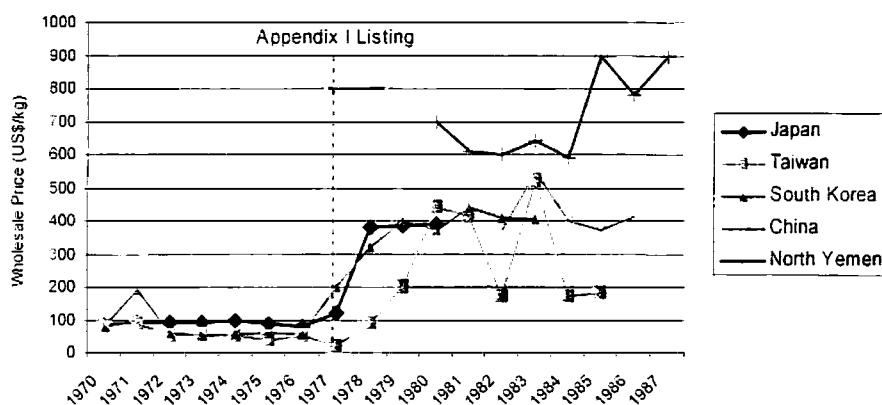
¹⁵⁶ Emslie, Milledge, Brooks, et al., African and Asian Rhinoceroses: Status, Conservation and Trade, p.4.

¹⁵⁷ Vigne and Martin, "Conservation News: The Garamba-Yemen Link and the Near Extinction of the Northern White Rhino", p.13.

The population of the Black Rhinoceros was estimated at around 70,000 in the late 1960s, in 1981 the estimates accounted for 10,000 and in 1993 only 2,475 rhinos were recorded.¹⁵⁸ More recently, the numbers have increased to around 3,726 in 2005.¹⁵⁹ The trend is currently upwards or stable in all *Major Range States*, with the exception of Zimbabwe.¹⁶⁰

Since the listing of rhino products on the Appendices of CITES, the price for rhino horn has increased significantly, playing into the hands of poachers. The numbers in Figure 3 indicate prices only until the mid to late 1980s. The chart indicates the steep price rise following the listing of all rhino species on Appendix II. Prices in particular in China and Taiwan continued to rise to significantly higher levels by 1991 (US\$3,000+ per kilogram).¹⁶¹ There are no reliable updated estimates for the price of rhino horn as the market operates underground, but press speculations reach all the way up to GBP10,000 per kilogram.¹⁶²

Figure 3: Rise in Price of Horn Following the Listing of All Rhino Species on *Appendix I*¹⁶³



¹⁵⁸ World Wide Fund for Nature (WWF), "Black Rhinoceros Factsheet for the 13th Meeting of the Conference of the Parties to CITES".

¹⁵⁹ Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.4.

¹⁶⁰ Ibid.

¹⁶¹ For example, the prices varied in Taipei in 1991 from US\$ 3,257 to US\$ 8,610 per kilogram for African rhino horn. (Source: Nowell, Chyi and Pei, *The Horns of a Dilemma: The Market for Rhino Horn in Taiwan*, p.15.)

¹⁶² The Independent, "Illegal trading: Follow that badger!" Please note that this price quote does not specify if it refers to African or Asian Rhinos.

While total African Rhino population have slightly increased over the last decade, the pressure remains on many of the *Range States* where rhinos can not be secured in highly protected areas such as *Rhino Conservation Areas* or *Intensive Protection Zones*. Thus the overall success of the trade ban remains highly questionable as the geographical distribution of rhino populations, and thus the ecological role of the animal throughout Africa, continues to shrink dramatically.¹⁶⁴

Some highly protected conservation areas, primarily in South Africa and Namibia, currently see more than a one-for-one rise compared to the rhinos killed in less secure areas. Once the full *Ecological Carrying Capacity* is reached in the highly protected parts of South Africa and Namibia, the total rhino population will again decline as there will be no offset to the continuing reduction of the rhinos in for example the unprotected areas in Zimbabwe.

¹⁶³ Leader-Williams, "Regulation and Protection: Successes and Failures in Rhinoceros Conservation", p.93.

¹⁶⁴ Current estimates account for only four Northern White Rhinos, a sub-species whose current only wild population is threatened by the political unrest in the Democratic Republic of Congo, its only remaining *Range State*. In addition, it is estimated that the Western Black Rhino is probably extinct, as it appears that no rhinos have survived in Cameroon, the last *Range State* for the Western Black Rhino. (Source: Emslie, Milledge, Brooks, et al., African and Asian Rhinoceroses: Status, Conservation and Trade, p.4.)

5. Demand for Rhino Products

5.1. Overview

The major *Consumer Nations* today are China, Taiwan, North Yemen and South Korea¹⁶⁵ but the market extends to countries with sufficiently sized expatriate Chinese communities such as the United States, Canada, Singapore, etc.

Northern perceptions of the demand for rhino horn are often dismissive: A. Merz, for instance, has argued that rhinos should not be killed for 'something as idiotic as a lust for carved horn dagger handles and medicine of dubious efficiency'.¹⁶⁶

Quite apart from the problematic nature of the implied moralism and even cultural superiority in such statements, from the point of view of the present analysis studying dispassionately for what purposes the rhino products are used, and what influences define this usage, is fundamental to understand the relationship between price and demand.

There are many traditional uses for rhino horn, including but by no means limited to historical drinking cups to detect poison (the keratin of the horn reacts with alkaloid liquids), and artfully decorated cups and mortars. Today, in the quest to receive the valued horn for medical purposes, historically valuable and masterfully carved art pieces are destroyed.¹⁶⁷ There are references to hunting for meat by the indigenous populations, and many European hunters also

¹⁶⁵ Milliken, Nowell, Thomsen, et al., The Decline of the Black Rhino in Zimbabwe: Implications for Future Rhino Conservation, p.55-7; Martin, Vigne and Allan, On a Knife's Edge: The Rhinoceros Horn Trade in Yemen; Vigne and Martin, "Conservation News: The Garamba-Yemen Link and the Near Extinction of the Northern White Rhino"; Mills and International Traffic Network., Rhinoceros Horn and Tiger Bone in China: An Investigation of Trade since the 1933 Ban, p.11-13.

¹⁶⁶ Merz, Rhino: At the Brink of Extinction, p.14.

¹⁶⁷ Martin, "Medicine from Chinese Treasures". p.14-15.

acquired a taste for it.¹⁶⁸ However, over the last few decades, meat has been found left to rot following the hunt for the horn.¹⁶⁹

Today, the demand for rhino products is predominantly from traditional Asian medicine and Arab dagger markets described in the next two sections.

5.2. Traditional Asian Medicine

The use of rhino horn in Chinese medicine dates back more than 2,000 years. Its medical applications have been recorded in many of the traditional Asian medicine books, ranging from curing high fever to detoxifying poison.¹⁷⁰

Ancient species of rhinoceros were present in China until growing human population probably led to their extinction by the 13th century.¹⁷¹ As rhino horn became scarce in China rhino products were imported as early as the second century AD from Africa via Arabian and Indian ports.¹⁷²

¹⁶⁸ Martin, Martin and Amin, *Run, Rhino, Run*, p.35.

¹⁶⁹ Merz, *Rhino: At the Brink of Extinction*, p.12.

¹⁷⁰ “Ben Jin” (本经) refers to rhino horn as a cure for uneasy stomach and snake bites. “Ben Cao Jin” (本草经集注) refers to its ability to cure poisoning. “Bie Lu” (别录) says it cures fever, headache, colds and different forms of poisoning. “Yao Xing Lun” (药性论) says it is detoxicating, calming, cures fever and cold and helps to heal wounds. “Shi Liao Ben Cao” (食疗本草) says it cures odd skin condition, heartache, poisoning, fever, stroke and uneasy feelings. “Ri Hua Zi Ben Cao” (日华子本草) says it cures unease, fever, poisoning, helps with eyesight and speech, cures stroke and is calming. “Gang Mu” (纲目) says it cures vomiting blood, high fever accompanied by hallucination, acne and helps to heal wounds. (Source: Survey conducted among students and professors of the Beijing Traditional Chinese Medicine University in June 2007. Meng Shi, current Master student at the University, helped the author to conduct the interviews.)

¹⁷¹ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.14.

¹⁷² Ibid. See also Balfour and Balfour, *Rhino*, p.25. D. Balfour refers to carvings during the Tang Dynasty in (618-907 AD) that must be because of its large dimensions made from African Rhino horn. The horn of Asian Rhinos is significantly smaller compared to the African Rhino, and they carry only one horn.

Literally all rhino parts are used in traditional medicines, including blood, hide, stomach, urine and dung.¹⁷³ The quantities of horn consumed per treatment are comparatively small with only approximately 0.5 *chien* (1.88 grams) per prescription.¹⁷⁴

Unsurprisingly, price has very little impact on the demand for a medicine believed to be effective against grave and life-threatening illnesses. People are willing to consume a drug recommended by a trusted doctor in the quantity prescribed, as long as the ingredients can be obtained and are affordable for the individual. And in turn it is understandable that patients would put their 'lives and health before that of a strange animal in some distant land'¹⁷⁵ and do not further reflect on or know about their indirect impact on African rural communities.

Many TAM practitioners believe that there are no suitable substitutes for rhino horn and therefore, in the best interest of their patients, recommend usage whenever needed. K Nowell et al reported that some Taiwanese doctors continue to believe that rhino horn is irreplaceable,¹⁷⁶ and another survey revealed that 34% of doctors in South Korea believe that there is no substitute for rhino horn.¹⁷⁷

This suggests that TAM practitioners and their patients would have a strong incentive to secure supplies for rhino horn notwithstanding the official ban. Yet finding evidence for the black market is understandably difficult. The author, by himself and using local contacts as proxy, has conducted interviews with Chinese TAM practitioners in Yanji (Jilin Province, China), Surabaya (Indonesia) and London (UK). Those interviewed stated that as rhino horn is not readily available at the moment, they could not quote a price for it. It is important to point out that as a

¹⁷³ Carty and Lee, The Rhino Man and Other Uncommon Environmentalists, p.25.

¹⁷⁴ Nowell, Chyi and Pei, The Horns of a Dilemma: The Market for Rhino Horn in Taiwan, p.16. Approximately two to three prescriptions are common over the course of an illness.

¹⁷⁵ *Ibid.*, p.3. A good historic example of the widespread belief in its superior healing powers is that Pope Gregory XIV was offered a horn on his death-bed. (Source: Martin, Martin and Amin, Run, Rhino, Run, p.14.)

¹⁷⁶ Nowell, Chyi and Pei, The Horns of a Dilemma: The Market for Rhino Horn in Taiwan, p.22.

¹⁷⁷ Sas-Rolfes, Rhinos: Conservation, Economics and Trade-offs, p.37.

consequence of CITES, trading rhino horn is illegal in China¹⁷⁸ and the other major Asian medicine markets.

TRAFFIC reported in 2002 that some legitimately registered pharmacies continue to sell prohibited items in the UK and other countries. The enforcement agencies have considerable difficulties to differentiate the horn from other products sold as the pharmacies will only covertly trade with trusted customers and personal contacts.¹⁷⁹

The horns of the five rhino species are perfect substitutes as TAM consumers and practitioners only distinguish in strength of the rhino horn (thus the required doses). E.B. Martin speculates that 'because Indian rhino horn is so much smaller than that from the African species, many Asians believe that its curative powers are far more concentrated and they will pay up to 15 times as much for it'.¹⁸⁰

5.3. Arabian Daggers

Daggers refer to a traditional knife that most adult men in Yemen and some other Arab countries (such as Oman) possess and traditionally wear on all occasions. It is used as a tool but also reflects the status of an individual. Rhino horn is a premium material for the knife shaft as in contrast to other materials, it improves in appearance with handling and skin contact and gains a translucent quality.¹⁸¹

¹⁷⁸ A domestic trade ban on Rhino products has been in force in China since 1983.

¹⁷⁹ Cook, Roberts and Lowther. The International Wildlife Trade and Organised Crime: A Review of the Evidence and the Role of the UK, p.13.

¹⁸⁰ Martin, Martin and Amin. Run, Rhino, Run, p.37. In a recent survey arranged for by the author, it was reasoned that Asian Rhino horns have a better effect in calming and curing fever due to the geographical location and habitat of the Asian Range States. (Source: Survey conducted among students and professors of the Beijing Traditional Chinese Medicine University in June 2007.)

¹⁸¹ Varisco, "Wildlife Conservation for North Yemen", Yemen Update. See also: IUCN, Trade Measures in Multilateral Environmental Agreements, p.46. Citing: Martin, Vigne and Allan, On a Knife's Edge: The Rhinoceros Horn Trade in Yemen.

Demand for rhino horn from the region has historically been linked to the oil price.¹⁸² During the 1970s, the economy of Yemen dramatically improved due to the proximity to new oil rich neighbours and the benefit of up to \$1bn in annual remittances from overseas Yemeni at the oil price peak.¹⁸³ As the oil price rose, approximately one million North Yemeni emigrated during the early 1970s to Saudi Arabia and other Gulf countries. The influx of funds enabled a country with around 6 million inhabitants to become the world's largest importer of rhino horn during the 1970s.¹⁸⁴ Based on North Yemeni official import statistics before the trade ban, 2,878 kg of rhino horn were imported each year on average from 1969/70 to 1976/77.¹⁸⁵

In a study on Yemeni culture in 1987, D.M. Varisco found that the use of rhino horn is deeply embedded in the culture and has even been used before the Islamic period. He recommends to raise Yemeni's awareness for the threat of extinction faced by some of Yemen's own species to gradually achieve an understanding of the plight of the African Rhino and thereby reduce demand for its horn.¹⁸⁶

Yemen formally outlawed the trade in horn in 1997 (with lax enforcement, however) and there has been a search for substitutes, but despite the high prices there is evidence that new daggers continue to be manufactured with rhino horn.

¹⁸² Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.13.

¹⁸³ Martin and Vigne, "An Historical Perspective of the Yemeni Rhino Horn Trade", p.36.

¹⁸⁴ Huxley, "Introduction", p.7.

¹⁸⁵ Martin and Vigne, "An Historical Perspective of the Yemeni Rhino Horn Trade", p.36. As a reference, the two horns of a Black and White Rhino weigh together on average approximately 8kg. Thus the 2,878kg of recorded imports are the products of 360 dead African Rhinos. It can also be assumed that significant additional horn has entered the country unrecorded.

¹⁸⁶ Varisco, "Wildlife Conservation for North Yemen".

This is reflected in the fact that the country remains one of the main recipients of African Rhino horn.¹⁸⁷ According to L. Vigne and E.B. Martin, the majority of the imported horns in 2005 came from the Northern White Rhino living in the Democratic Republic of Congo, decimating that population to four animals.¹⁸⁸

5.4. Summary

Current conservation efforts have generally focused on reducing demand through an international trade ban. This strategy has proven rather ineffective with rhino products. Consumer demand has not significantly decreased despite international and domestic regulations put in place by CITES and the *Consumer Nations*.

TRAFFIC reported in 2002¹⁸⁹ that although the price increased significantly (reflecting the additional cost of fines and confiscations), significant demand persisted at these higher prices. This is true both in the TAM market places as well as in North Yemen. It also remains true that individual *Consumer Nations* could probably spend more money on enforcement. However, they have little incentive as most have no local rhino populations to protect.¹⁹⁰

In the course of the debate, many suggestions have been made to substitute the horn with other products. Despite the arguments above, many people remain confident that the Chinese may ultimately be persuaded to replace Traditional Chinese Medicines with Western medicines, although recent analysis shows that this will be a lengthy process over several generations.¹⁹¹

¹⁸⁷ Vigne and Martin, "Conservation News: The Garamba-Yemen Link and the Near Extinction of the Northern White Rhino", p.13.

¹⁸⁸ Emslie, Milledge, Brooks, et al., African and Asian Rhinoceroses: Status, Conservation and Trade, p.4.

¹⁸⁹ Cook, Roberts and Lowther, The International Wildlife Trade and Organised Crime: A Review of the Evidence and the Role of the UK, p.12.

¹⁹⁰ Sas-Rolfes, Rhinos: Conservation, Economics and Trade-offs, p.37.

¹⁹¹ Lam, "Strengths and Weaknesses of Traditional Chinese Medicine and Western Medicine in the Eyes of some Hong Kong Chinese", p.765. This view was also confirmed to the author in a recent survey. The consensus was that

The promotion of alternative animal products such as the Saiga antelope horn, as suggested by E.B. Martin who argued in 1982 that 'this would not threaten their survival',¹⁹² has led to the listing of Saiga antelope on CITES *Appendix II* in 1995 due to increased illegal hunting. While it remains a sensible approach to promote the use of cow and buffalo horn, the unique medical and aesthetic properties assigned to rhino horn render the success of these measures questionable.

Western medicine can not be a substitute to rhino horn, as there are ingredients in rhino horn that are not completely understood and thus can not be replaced by artificially synthesized Western medicine. (Source: Survey conducted among students and professors of the Beijing Traditional Chinese Medicine University in June 2007.)

¹⁹² Martin, Martin and Amin. Run, Rhino, Run. p.128.

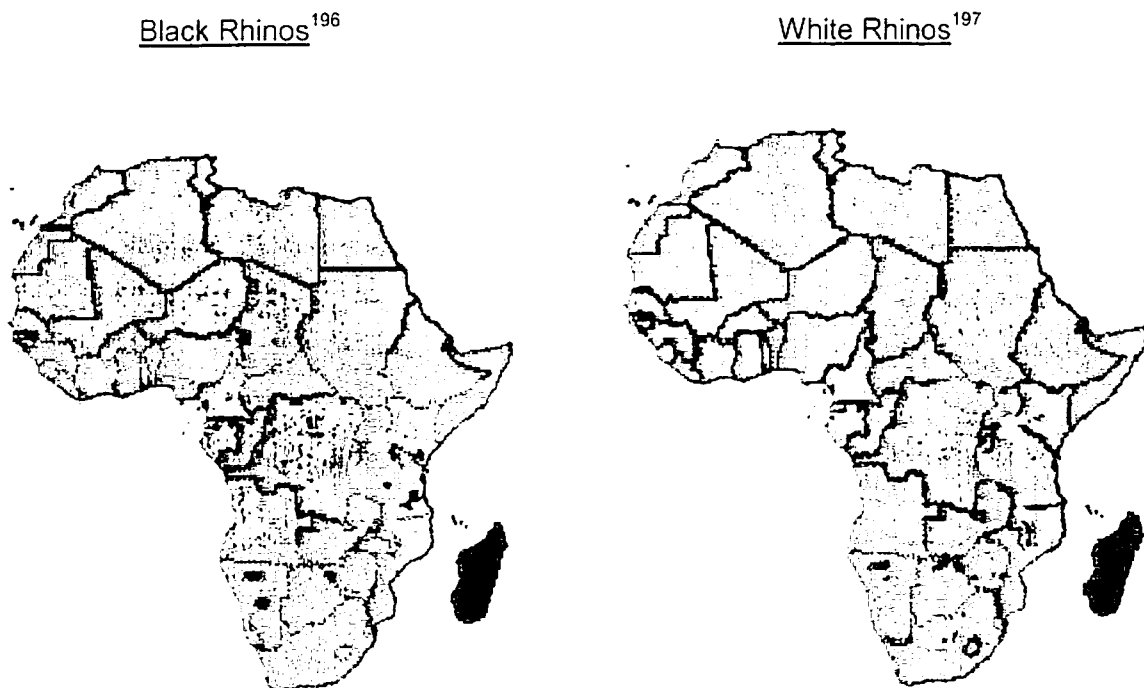
6. Supply of Rhino Products

6.1. Overview

The four *Major Range States* (South Africa, Namibia, Zimbabwe and Kenya)¹⁹³ together account for approximately 98.7% of the White Rhino and 96.3% of the Black Rhino population.¹⁹⁴

Both Black and White Rhinos are very adaptable and 'could live almost anywhere, from the deserts of Namibia to the montane forests of the Aberdares'.¹⁹⁵ Today, discrete populations of the White Rhino can be found in only a fraction of its historic habitat and the Black Rhino populations have been hit even harder.

Figure 4: Past and Present Distribution of the African Rhino



¹⁹³ Sorted by current population estimates for the Black and White Rhinoceros combined (see Table 1).

¹⁹⁴ Emslie, Milledge, Brooks, et al., African and Asian Rhinoceroses: Status, Conservation and Trade, p.4.

¹⁹⁵ Merz, Rhino: At the Brink of Extinction, p.97-8.

¹⁹⁶ International Rhino Foundation, "Black Rhino Information".

Sub-section 6.2. defines and outlines the three currently active principal agents of supply – middlemen, poachers and speculators.

The propensity to become a poacher and the inability of governments to enforce the law are highest in countries with an unstable economic environment.¹⁹⁸ Hence an economic analysis of *Range States*, as provided in Sub-section 6.3, is critical to understanding supply.

In addition, a spatial analysis of rhino distributions reveals that rhino populations have suffered the most in “highly vulnerable” countries as defined by the vulnerability index, a concept taking into account factors of social and environmental stability,¹⁹⁹ also discussed in further detail in Sub-section 6.3.

6.2. Speculators, Middlemen and Poachers

Poachers are individuals or groups of individuals who kill rhinos to obtain rhino horn to supply black market middlemen.²⁰⁰ They are getting paid, in local terms, significant amounts of money and come from all walks of life.²⁰¹

However, the sums that the local poachers receive are not high compared to the wholesale price of rhino horn. The typical value chain consists of a local poacher who may be a local tribesman or local farmer supplying middlemen in smaller towns, shippers and smugglers in big

¹⁹⁷ International Rhino Foundation, “White Rhino Information”.

¹⁹⁸ Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.6.

¹⁹⁹ Hassan, Scholes, Ash, et al., *Ecosystems and Human Well-Being: Current State and Trends, Volume 1*, p.150-1. Citing: Lonergan, *The Role of Environmental Degradation in Population Displacement*.

²⁰⁰ Rhinos are today not killed for their meat to feed the population, but purely for their horn. (Source: Merz, *Rhino: At the Brink of Extinction*, p.12.)

²⁰¹ Martin, Martin and Amin, *Run, Rhino, Run*, p.32; Oldfield, *The Trade in Wildlife: Regulation for Conservation*, p. xx.

cities who transfer the goods to other countries, and pharmacies or craft shops that sell the goods to the end consumer. Poachers only receive a relatively small share considering the risk they take: many *Range States* have a shoot-to-kill policy for illegal hunting. This eliminates a significant portion of the benefits for local populations, where poachers often reside. Even less profit reaches the local population when poaching is carried out by cross-border gangs as is the case in the northern and eastern parts of Kenya where poaching is mainly carried out by bandits coming over from Somalia.²⁰²

Most of the profits go to internationally operating crime syndicates and there is an established link between the illegal trade in animal products and illegal trade in other products including drugs and firearms.²⁰³ *Range States* therefore experience a negative externality as a result of the trade ban.

Findings of N. Leader-Williams suggest that an increased probability of detection is more important than increasing penalties.²⁰⁴ Penalties can only be enforced if the poacher is detected. Thus a high level of penalties is by itself not a very effective anti-poaching measure as was shown by the high level of poaching between 1984 and 1993 in Zimbabwe's Zambezi Valley, 'where the effective penalty was frequently death'.²⁰⁵

It is very costly to increase the probability of detection and *Range States* often have insufficient funds allocated to wildlife. E.B. Martin, for example, determined the cost required in Zimbabwe to reduce poaching to a level where the rhino population of the country can grow by 2% annually is US\$20 million annually, which was almost twice the amount allocated by the

²⁰² Merz, *Rhino: At the Brink of Extinction*, p.13; Martin, Martin and Amin, *Run, Rhino, Run*, p.47.

²⁰³ Cook, Roberts and Lowther, *The International Wildlife Trade and Organised Crime: A Review of the Evidence and the Role of the UK*, p.4; Roberts, "The Trade in Drugs and Wildlife", p.45-9.

²⁰⁴ Milner-Gulland and Leader-Williams, "Illegal Exploitation of Wildlife", 202-6.

²⁰⁵ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.30.

government at the time.²⁰⁶ Scholarly research has shown that poaching is inversely related to government spending on management and protection.²⁰⁷

While the cost for anti-poaching measures has remained high, rhino hunting has become a significantly safer and faster activity following the wide-spread availability of modern automatic weapons in Africa.

Speculators' behaviour can be responsible for demand and price peaks and has consequences on poaching activity. Speculators for instance aim for an economic profit by accumulating stock that is anticipated to increase in value if the species becomes extinct.²⁰⁸ This is also the case with the rhinoceros, and in line with the significant value increase over the last decades, speculators, mainly based in China, may have accumulated more stock of rhino horn than is currently carried by the wild population in Africa.²⁰⁹

Speculators, Poachers and *Range State* governments are the actors of the economic model that is discussed in Section 7. Middlemen are strictly-speaking not an actor in shaping demand as they act as facilitators and neither accumulate stock nor take market positions.

²⁰⁶ Ibid., p.30-1. Citing: Martin. "Rhino Population Dynamics, Illegal Hunting and Law Enforcement in the Lower Zambezi Valley in Zimbabwe". This estimate is in line with Rowan Martin's (Zimbabwe Department of National Parks) calculation that \$7 million would be needed to protect the lower Zambezi Valley alone. (Source: Balfour and Balfour, *Rhino*, p.64.)

²⁰⁷ Milner-Gulland and Leader-Williams. "Illegal Exploitation of Wildlife", p.201.

²⁰⁸ In this case the listing of a species by CITES can actually propagate the rare status of species.

²⁰⁹ Bulte, Mason and Horan, "Betting on Extinction: Endangered Species and Speculation", p.466. For a similar argument see also: Milliken, Nowell, Thomsen, et al., The Decline of the Black Rhino in Zimbabwe: Implications for Future Rhino Conservation, p.57.

6.3. Political-Economic Factors and Indicators²¹⁰

Economic Environment

An analysis of the economic environment of the *Major Range States* is important for an understanding of the market dynamics for the trade in rhino products.

Overall government expenditure for wildlife protection, including the necessary training and equipment, are generally limited²¹¹ and restrained partly due to many other pressing requirements for investments, for example in infrastructure and education in *Range States*. This funding gap is only insufficiently met with Western donor money.²¹² As a consequence, A. Merz for example refers to frequent problems with enforcement officer morale during her work with the staff from the Wildlife Department in Kenya who were not adequately compensated.²¹³

To reduce poaching, it is necessary to keep the price received by the poachers at or below the total costs for poachers, thereby making the poaching business unprofitable. Poachers in Africa receive on average 'less than 7.5% of the wholesale value (and between 0.4 and 5% of the retail value) of African horn in Asian markets'.²¹⁴ However it is important to note that, the 0.4 – 5% of the current retail price, can be equivalent to up to US\$ 400 per rhino,²¹⁵ which is very

²¹⁰ All the charts in this chapter have been produced using data from: The World Bank Group. "World Development Indicators Online (WDI)".

²¹¹ Oldfield, *The Trade in Wildlife: Regulation for Conservation*, p.xxi.

²¹² For example, in three meetings by UNEP in 1992 and 1993 when poaching was getting worse, the request for \$55 million in emergency funds by the *Range States* was answered with a mere \$10 million, much of which had already been earmarked for projects in process. (Source: Beattie. "Opening Speech at CoP9".)

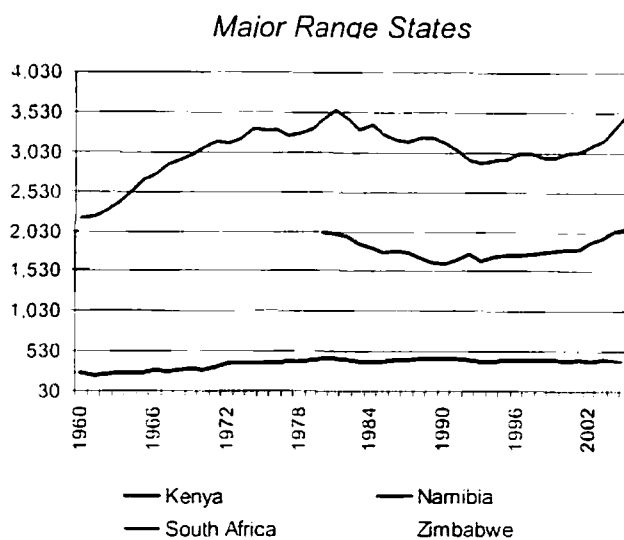
²¹³ A. Merz reports cases where she and the staff would chase a rhino for days and lose track since the staff refused to work on Sundays. (Source: Merz, *Rhino: At the Brink of Extinction*, p.51.)

²¹⁴ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.31. R. Balfour also points out that even if only 1% of the ultimate selling price is realised by the poacher, the proceeds from one animal is still in many cases the equivalent of a year's wages. (Source: Balfour and Balfour, *Rhino*, p.68.)

²¹⁵ This calculation assumes a retail price of US\$3.000 per kilo, and approximately 8kg for the two horns of an Africa Rhinoceros. It is assumed that the poacher receives 1.6% of the final sale price. These are crude assumptions as the prices vary by end market and White Rhinos have on average larger horns than Black Rhinos.

close to the annual *GDP per capita* (see Figure 5) in Kenya and Zimbabwe, and worth more than 200 days of net income for substantial parts of the population in the *Major Range States* (see Table 2).

Figure 5: *Gross Domestic Product (GDP) per Capita (Constant 2000 US\$)*



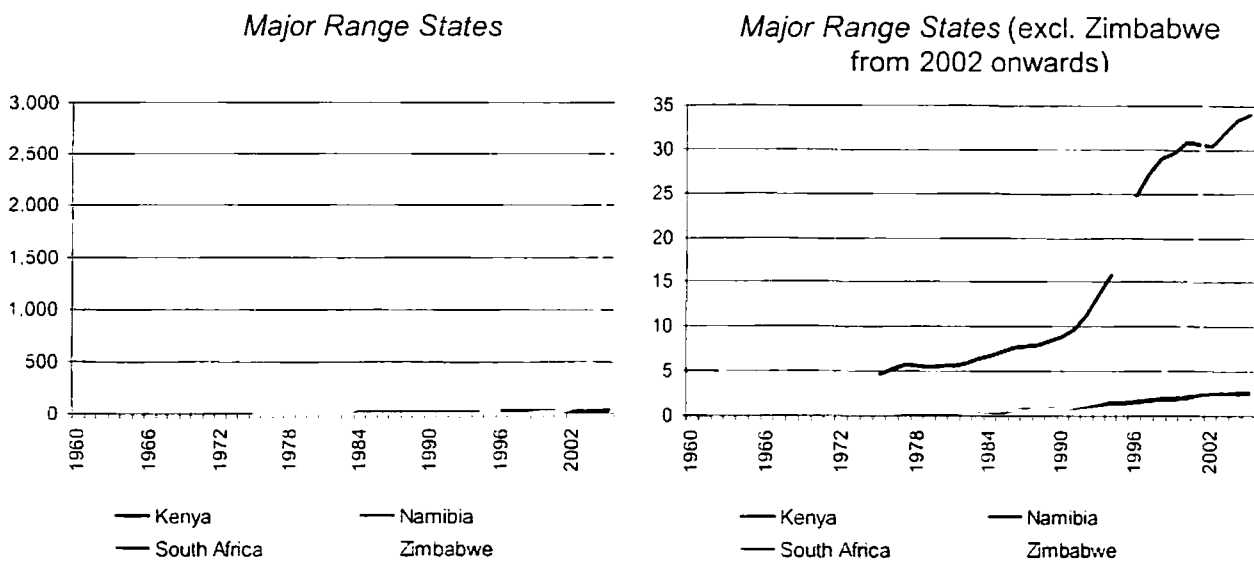
South Africa	15-35%
Namibia	35-75%
Zimbabwe	75%
Kenya	35-75%

These findings indicate that in order to reduce the poaching business by making it unprofitable, the retail prices of rhino horn must be significantly reduced from its current level. As will be discussed in Section 7, this can be achieved by legalising and managing the amount of rhino horn supplied.

²¹⁶ UNDP, UNEP, World Bank, et al., *World Resources 2005: The Wealth of the Poor*, p.7.

Further to low absolute income levels, exchange rate dynamics play a role in the supply of rhino horn. Rhino horn is a commodity with a relatively stable value and therefore, in countries with overvalued local currencies and strict foreign exchange controls, represents a form of hard currency that can be smuggled across borders similar to the trade in diamonds.²¹⁷ South Africa and Namibia have arguably been more effective in rhino conservation over the last decade. An inflation-linked index (such as the *Purchasing Power Parity Conversion Factor*) demonstrates that these countries have also experienced significantly more stable currencies.

Figure 6: Purchasing Power Parity Conversion Factor (Local Currency per US\$)



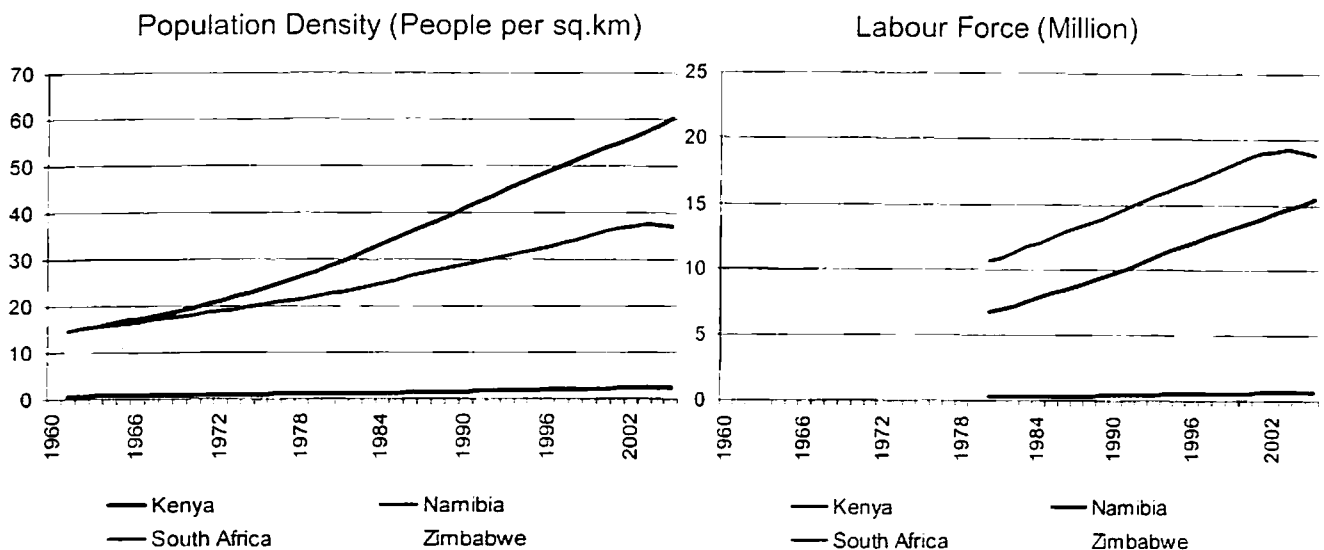
The relative value of rhino horn compared to income levels and its relative value as a foreign currency commodity, logically rise as the world market price for rhino horn goes up. The recorded increase in rhino horn prices following the listing of the species on *Appendix I* has therefore made poaching relatively more attractive.²¹⁸

In addition, across the *Range States* there has been a significant increase in human populations over the last few decades.

²¹⁷ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.31.

²¹⁸ Leader-Williams, "Regulation and Protection: Successes and Failures in Rhinoceros Conservation", p.93.

Figure 7: Population Density (People per sq. km) and Labour Force (Million)



Population density in South Africa has been levelling off over the last couple of years. While the population in Namibia has been increasing, density has remained very low in comparison with its peers. These trends and findings ease the pressure on wildlife resources to some extent in these countries, compared to Kenya and Zimbabwe.

The so far identified economic factors can be summarised in the following table. The colour of the individual cells indicate if the current status is likely to be favourable (green), neutral (yellow) or detrimental (red) for rhino conservation in that country.

Economic Indicator	Kenya	Namibia	South Africa	Zimbabwe
GDP per capita	Low	Medium	High	Low
Population density	High	Low	Medium	Medium
Labour Force	Strong Growth	Low Growth	Low Growth	Medium Growth

It appears that South Africa and Namibia have an economic environment that is more benign to rhino conservation and provides fewer incentives to poachers. Divergence in economic status (among other factors) can produce diverging interests in Multilateral Environmental Agreement (MEAs). This is referred to earlier as the South-Scuth Conflict.

Socio-Political Indicators

Economic conditions, summarized by the indicators discussed in the previous section, are only one of the social determinants of conservation: environmentalists also acknowledge that political stability in *Range States*, the amount of crime, corruption, widespread use of fire arms, and the economic and political situation of neighbouring nations exert a major influence.

Table 4 contains four indicators that attempt to measure these factors. The four *Major Range States* all score relatively poorly on these measures, yet the correlation with the economic environment is evident in that it is again South Africa and Namibia standing out positively.

	Transparency International 2006 (percentile rank)	Human Development Index 2004 (percentile rank) ²¹⁹	Vulnerability Index 1998 (ascending) ²²⁰	Combined Gross Enrolment Ratio 2004 (%) ²²¹
South Africa	71%	32%	1.00-4.99	77%
Namibia	69%	29%	1.00-4.99	67%
Zimbabwe	27%	15%	5.00-5.99	52%
Kenya	20%	14%	6.00-6.99	60%

²¹⁹ United Nations Development Programme (UNDP). Human Development Report 2006 - Beyond Scarcity: Power, Poverty and the Global Water Crisis, p.285. The Human Development Index is a composite measure for life expectancy, adult literacy and enrolment at the primary, secondary and tertiary level and standard of living (measured among others by purchasing power parity and income).

²²⁰ Hassan, Scholes, Ash, et al., Ecosystems and Human Well-Being: Current State and Trends, Volume 1, p.150-1. Citing: Lonergan, The Role of Environmental Degradation in Population Displacement.

²²¹ United Nations Development Programme (UNDP). Human Development Report 2006 - Beyond Scarcity: Power, Poverty and the Global Water Crisis, p.285. The number of students enrolled in primary, secondary and tertiary levels of education, regardless of age, as a percentage of the population of official school age for the three levels.

Corruption has been identified by developed nations as a major hurdle in progress towards *Sustainable Use* driven policies.²²² The NGO Transparency International prepares an index that aims to capture the perceived level of corruption in different nations. The lower a country ranks, the higher perceived corruption. The ability to enforce regulation against poachers is most difficult in such countries.

Another indicator to consider is the Human Development Index (HDI) – a composite index including life expectancy at birth, education level (adult literacy rate and education enrolment ratio) and GDP per capita. Inhabitants in countries that score weak on the HDI are more likely to see poaching as a viable way of feeding their families and low HDI-ranking countries are on balance also countries where enforcement is difficult.

The third index in Table 4 uses data and a framework conceived by S. Lonergan.²²³ The “index of vulnerability” was originally developed to measure the dependency of a population on its environment.²²⁴ In theory countries with a high degree of vulnerability have the strongest incentive to make short-term and unsustainable use of their wildlife. South Africa and Namibia have a low vulnerability index i.e. these countries should find themselves less compelled to exploit their wildlife due to their lower dependency on such sources for survival.

The combined gross enrolment ratio²²⁵ (the number of students in primary/secondary/tertiary education divided by total population) is a factor that is also included in the HDI. It is however worth mentioning on a standalone basis as children education is a significant forward looking

²²² Please refer to Section 3.2 for more detail.

²²³ Hassan, Scholes, Ash and Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Current State and Trends*, Volume 1, p.150-1. Citing: Lonergan, *The Role of Environmental Degradation in Population Displacement*.

²²⁴ The index is comprised of factors such as food import dependency ratio, water scarcity, energy imports as percentage of consumption, access to safe water, expenditures on defense versus health and education, human freedoms, urban population growth, child mortality, maternal mortality, income per capita, degree of democratization, and fertility rates.

²²⁵ United Nations Development Programme (UNDP), *Human Development Report 2006 - Beyond Scarcity: Power, Poverty and the Global Water Crisis*, p.285.

indicator to predict future development. The figures from Table 4 suggest that the divergence in social conditions between South Africa and Namibia on the one hand, and Kenya and Zimbabwe on the other, is *ceteris paribus* likely to worsen in the future, aggravating the South-South conflict in conservation policy.

6.4. Summary

An analysis of the economic and socio-political determinants of conservation policy confirms that the *Major Range States* provide an unfortunately benign environment for poachers, featuring corruption, environmental stress and economic distress that incentivises poaching rather than *Sustainable Use*. There is also significant, and potentially increasing, divergence between the *Range States*, giving rise to the South-South conflict.

7. An Economic Model of Rhino Conservation

7.1. Introduction

Since the listing of rhino products on the Appendices of CITES, the price for rhino horn has increased significantly, playing into the hands of poachers and speculators.

While the total African Rhino population has slightly increased over the last decade, the pressure remains on many of the Range States where rhinos can not be secured in highly protected areas such as *Rhino Conservation Areas* or *Intensive Protection Zones*. Thus the overall success of the trade ban remains highly questionable as the range of the species continues to shrink dramatically.²²⁶

Alternative conservation measures such as the concept of *Sustainable Use* need to be considered. In economic terms, this can be stated as the manipulation of demand and supply to deliver an equilibrium price high enough for *Sustainable Use* and for rhino yield to be competitive against e.g. agriculture, but low enough to make high-risk and high-cost poaching less attractive. In this section, I attempt to formalize the argument by means of a formal economic model.

The roadmap for CITES should seek 'optimal control mechanisms' to regulate international trade by including both optimal demand side and optimal supply side policies.²²⁷ The aggregate present value of future cash-flows from harvesting should be maximized by supporting the price, which therefore enhances the attractiveness for local people to commercially invest in

²²⁶ Current estimates account for only four Northern White Rhinos, a sub-species whose current only wild population is threatened by the political unrest in the Democratic Republic of Congo, its only remaining *Range State*. In addition, it is estimated that the Western Black Rhino is probably extinct, as it appears that no rhinos have survived in Cameroon, the last *Range State* for the Western Black Rhino. (Source: Emslie, Milledge, Brooks, et al., *African and Asian Rhinoceroses: Status, Conservation and Trade*, p.4.)

²²⁷ Swanson, *Global Action for Biodiversity: An International Framework for Implementing the Convention on Biological Diversity*, p.148.

conservation (and thus future harvesting) of the species as it stands in competition with other potential revenue sources. At the same time, a supply side policy should structure the trade to make it conditional for the producer state to demonstrate sustainable utilization of its natural habitat and wildlife resource.²²⁸

These two policy needs – price manipulation, and long-term supply security through sustainable utilisation - form the corner stone of the rhino horn pricing model (“RHPM”) detailed in Annex I. RHPM maximises the unit price under the constraint of *sustainable utilization*, as it keeps the price below a level that is profitable for illegal poaching to conserve the rhino population.

7.2. Model Overview, Assumptions and Parameters

The model assumes a lift of the trade ban in rhino products, regulated legal trade of sustainably de-horned rhino horn and continued law enforcement against illegal trade. It is also based on the premise that horn is not of major importance for the survival and reproduction of rhinos.²²⁹

It is also assumed that the currently high *Range State* inventory levels of rhino horn will be monetised immediately after the suspension of the trade ban. This will most likely result in a significant fall in prices and drive poachers out of the market. Heralding the advent of *Sustainable Use* in such way will also send a strong signal to the market that there is nothing to be gained from speculating on future CITES re-listings. Such speculation normally takes the form of inventory building and increased poaching.

²²⁸ Ibid.

²²⁹ See among others: Brown and Layton, “A Market Solution for Preserving Biodiversity: The Black Rhino”. Namibia and Zimbabwe implemented de-horning programmes in the past and are often used as case studies to demonstrate the feasibility of dehorning rhinos. (e.g. Sas-Rolfes, Rhinos: Conservation, Economics and Trade-offs, p.18.) Counter-arguments have been raised, including the observations that rhino mothers require the horn to protect their offspring against spotted hyena (this can be addressed by a policy that does not permit dehorning for reproductive females) and dehorned male rhinos may get injured in fights with other rhinos, see for example: Penny, Rhinos: Endangered Species, p.16; Martin, Martin and Amin, Run, Rhino, Run, p.123. This biological topic will require additional work to reach consensus.

Credibility is key: those involved in the horn market must believe that the regime of legalised trade will continue indefinitely. Any uncertainty about a possible future change to the trading regime (e.g., re-listing by CITES) would create the risk of shifts in expectations, increase speculative activity, and as a result lead to more volatile horn prices, making price management much more difficult to achieve.

The cost to ensure high levels of law enforcement and anti-poaching measures in *Range States* will be incurred both under the trade ban and under sustainable legal trade, and can therefore be considered as sunk costs²³⁰ under the RHPM. The model does not take into account any benefits from ancillary revenues from legal trade such as eco-tourism, regulated trophy hunting, rhino by-products (e.g. *Bushmeat* and hides), and the sale of live animals to restock other *Range States* and zoos. These benefits will not affect the price of rhino horn directly, but represent additional incomes for local populations.

The key input variables and output functions of the model are as follows.²³¹

Key Input Variables	Output Functions
- Rate at which the governments/ poachers/ speculators sell rhino horn	- What prices to set to keep out poaching
- Horn yield per rhino at death	- When government should enter the market and at what price they should sell
- Mortality rate of rhino populations	- Captures the movement of speculators to understand their impact on the pricing curve
- Amount of horn per rhino cropped	- Define three different stages that help to analyse the price curve overtime
- Total rhino population intrinsic rate of growth	- Determine how long each stage lasts and the beginning/end price for each stage
- Carrying capacity of range states	
- Discount rates (expected return on investment) for speculators	

²³⁰ These include the opportunity costs of land, work force, cost of infrastructure such as fences and workers' wages.

²³¹ Please refer to Annex I for a detailed discussion.

Lastly, it is important to note, while dehorning is an important feature of the economic model it is not assumed that dehorning rhinos directly deters poaching of the animals. This is primarily because (i) around 1/3 of the horn of a rhino can not be removed without harming the animal; (ii) horn regrows and thus even dehorned animals are likely to have regrown a significant part of the horn again until the procedure is repeated;²³² and (iii) a poacher may shoot the animal anyway just to not trace it again the following day, or because he realises too late that the horn has been removed.

7.3. Limitations

Illegal Trade and Legal Trade

D. Favre argued that rhino populations are so depleted that it is too dangerous to dare the switch to legal regulated trade.²³³ He sees a risk of illegal trade exploiting the legitimate channels of legal trade, leading to accelerated poaching.

There are two effects that primarily influence any change in the amount of illegal poaching. Firstly, the initial sale of government stock and the ability of *Range States* to determine in this supply-driven market the future prices of rhino horn, will result in significantly lower prices compared to today's estimated price and thus reduce the incentives for poachers. Secondly, the costs of poachers will be slightly reduced because of the possibility that they can trade easier through legal market sales channels. However, as local and global law enforcement spending to protect the rhino is assumed to remain constant, poachers will still face similar total costs as today.

²³² See also: Milner-Gulland, Beddington and Leader-Williams, "Dehorning African Rhinos: A Model of Optimal Frequency and Profitability".

²³³ Favre, International Trade in Endangered Species: A Guide to CITES, p.100-1.

While this argument needs to be supported with scientific data, J.M. Hutton and Grahame Webb²³⁴ have conducted a quantitative assessment of the hypothesis that legal trade will encourage illegal trade using the example of the trade in crocodilian hides. They have come to the conclusion that this hypothesis can be rejected and the reverse (namely that legal trade replaces illegal trade) can be assumed.

Private Enterprises and Property Rights

There has been an intense debate on who has and should have property rights for rhinos. The proposals range from rhinos belonging to everybody all the way to rhinos belonging to nobody.²³⁵

While Western NGOs and politicians may have their opinions on this issue, answering this question in general is not as important as linking its answer to the concept of *Sustainable Use*.

The local people have the 'practical' property right and thus for all practical purposes 'own' the rhino.²³⁶ It is however important to clearly define and enforce property rights as otherwise people are incentivised to exhaust resources immediately as future use is highly uncertain. Hence, establishing well-defined property rights in *Range States* countries is of utmost importance for an efficient market and ultimately *Sustainable Use*.

Corruption

Corruption has been a major argument in the North's rejection of *Sustainable Use* so far. This was confirmed to the author during conversations with current and former members of the

²³⁴ Hutton and Webb, "Crocodiles: Legal Trade Snaps Back".

²³⁵ Sas-Rolfes, *Rhinos: Conservation, Economics and Trade-offs*, p.43.

German *Management Authority* at CoP14.²³⁷ It was pointed out that only a very small part of the proceeds from wildlife usage directly benefit local populations and wildlife conservation. Thus from their point of view, a resumption of trade in rhino horn would create only limited local wealth but increase poaching.

It is indeed very difficult to make assumptions on the share of proceeds and benefits from regulated trade in rhino products that would actually be received by the local populations. However, instead of using this uncertainty as an argument to maintain the status quo, measures and reporting requirements should be established to minimise corruption.

Zimbabwe for example claims success with its CAMPFIRE programme. It presented a detailed account at CoP14, revealing that 52% of the \$2.2 million funds raised through sports hunting of wildlife in 2006 were dispersed again to communities either as cash payment to households or for use in community projects.²³⁸

The author presumes that *Range States* may be amenable to a request for an independent audit of the future fund flows from a reopened rhino horn trade, to ensure the international community that proceeds will benefit the local populations. The reality of corruption and other market inefficiencies can be best approached by building a consensus on the reporting requirements by *Range States*, as a reopening of the trade could represent a win-win situation for all parties involved.

²³⁶ For a more detailed discussion on the different types of property rights see: Barzel, *Economic Analysis of Property Rights*.

²³⁷ Conversation of the author with representatives of the German *Management Authority* at a reception organised by the German Federal Environmental Ministry for the German delegates to CoP14 (7 June 2007, The Hague).

²³⁸ Zimbabwe Management Authority, *CAMPFIRE Programme, Rural Development Conservation in Zimbabwe*, p.6.

8. Conclusion

8.1. Proposed Recommendation

This thesis interprets a major conservation issue – that of the African Rhino – in terms of a potential conflict on different approaches to wildlife conservation between the global North and South, but argues that the conflict can be solved by developing a political-economic approach to rhino conservation.

In this framework, rhino horn becomes a harvestable crop, whose price can be manipulated through appropriate market standards to provide a welcome and sustainable income stream for the local people in African *Range States*.

The main conclusion of this present work is that a trade ban in rhino products may not be the best conservation measure for the species. It denies substantial funds to local populations, has created a gruesome battle between rangers and poachers, and has restricted the potential for rhino's to prosper beyond the highly protected areas primarily in South Africa and Namibia. Once the *Ecological Carrying Capacity* is reached in these highly protected areas the population growth in these regions will slow down.

At the same time, rhinos in Kenya and Zimbabwe may experience future declines due to the economical and political environment in these countries. Also, several of the rhino populations in smaller *Range States* have recently become extinct or highly threatened.

The model in Annex I demonstrates how *Sustainable Use* in rhino products via regulated trade is possible in principle, and details some of the main policy tools that can be used to manage that trade. Before the model can provide operational conclusions, reliable input data must be

made available and the model itself must be expanded to incorporate additional factors such as corruption and domestic wildlife policies in *Range States*.

Such economic model should appeal to a wide-range of CITES *Parties*, given CITES' known preference for scientific methods. Compared to initial discussions on the Rhino trade ban during CoP3²³⁹ and CoP6,²⁴⁰ there is today an increasing acceptance in the North that *Sustainable Use* may be beneficial for species conservation as detailed in CITES Resolution Conf. 8.3 (Rev. CoP13).²⁴¹ However, there is strong Northern resistance to lifting exiting trade bans on so-called key species regulated by CITES.²⁴² Thus while a quota that enables trophy hunting of African Rhinos has been widely accepted, Western NGOs and the representatives of *Management Authorities* of CITES *Parties* remain strongly opposed to a lifting of the trade ban on rhino products.²⁴³ The conservation through internationally enforced trade bans were hard fought achievements of the wildlife conservation community in the 1970s and '80s and there is reluctance to amend the status quo.

If the preliminary analysis conducted in this study is supported by further research, then the main policy implications with regard to the trade ban in African Rhino products may include:

- (i) Robust reporting requirements need to be implemented in *Range States*, to ensure that most of the income from rhino horn trade is channelled to local populations;

²³⁹ CITES. "Resolution Conf. 3.11: Trade in Rhinoceros Horn".

²⁴⁰ CITES. "Resolution Conf. 6.10: Trade in Rhinoceros Products".

²⁴¹ CITES. "Resolution Conf. 8.3 (Rev. CoP13): Recognition of the Benefits of Trade in Wildlife".

²⁴² This view was confirmed to the author by several representatives of the German *Management Authority* at a reception organised by the German Federal Environmental Ministry for the German delegates at CoP14 (7 June 2007, The Hague).

²⁴³ Critical points with regard to lifting the trade ban on rhino products were raised in discussions by the author with representatives of the German *Management Authority*, IFAW, Born Free. Alfred Wong from the Chinese *Management Authority* was critical if a reopening of the trade is possible due the entrenched positions by the *Parties* on this topic. Cautious support for the idea was raised by Dr. Taye Teferi (Conservation Programme Director of the WWF), Rik Kutsch Lojenga (Programme Manager of the United Nations BioTrade Initiative) and Klaus Lachenmaier from the Landesjagdverband Baden-Württemberg (federal hunting association of Baden-Württemberg). All discussions were held at Cop14 (June 2007, The Hague).

- (ii) A market making institutional body needs to be established by the *Range States* to manage the price of rhino horn as suggested by the supply-driven pricing model detailed in Annex I of this thesis;
- (iii) Trade in African Rhino horn should be legalised and therefore all African Rhino populations should be listed on Appendix II;
- (iv) The large scale immediate disposal of government-held rhino horn stock.

Relatively to the illegal market, a regulated market envisaged here would be characterised by:

- (i) Lower price of rhino horn compared to today's assumed price, due to increased supply and rather inelastic demand;
- (ii) Lower stocks in the long run as speculators can not trade profitable anymore once the price has stabilised;²⁴⁴ and
- (iii) Larger rhino populations, occupying a larger portion of the historical range.

8.2. The Distributional Impact of the Proposed Recommendation

If legal trade were to be permitted, *Range States* would benefit directly from the financial gain by selling their existing stock of rhino horns. Their local populations would benefit from the *Sustainable Use* incentives such as profit sharing schemes and from what was described as ancillary revenue. As poaching is reduced, negative externalities such as international and domestic crime will reduce.

Consumer Nations also benefit, as they will be able to obtain rhino horn through legal channels for use in traditional Asian medicines and cultural symbols.

²⁴⁴ See the discussion on "Stage III" in Annex I.

The money otherwise spent on policing *Range States* and *Consumer Nations* by Western NGOs can be put to other dire needs.

While *Pragmatists* will have achieved the long-advocated concept of *Sustainable Use* for a key species, the ultimate beneficiary of legal trade in rhino horns would be the African Rhinos as their population will be secured and poaching reduced.

Poachers, speculators and middlemen share the negative impact of legalizing trade in rhino horn, as prices would then be kept at a stable level that is not profitable for illegal poaching or speculative trade. They would lose their role as agents of demand to the legal channels.

Some *Preservationists* may feel their principles are undermined since, ethically, they oppose any trade in products of endangered species.

8.3. Additional Work Needed

The political-economic aspects of Multilateral Environmental Agreements are under-researched, and thus also the example of this thesis and its results demand additional work before conclusions are robust enough to qualify for practical application.

The multi-disciplinary toolbox of International Relations has been very beneficial, but could only find a partial application given the time and space constraints of this thesis. Relevant subject areas that have not been covered include international law and the potential for CITES to work closer with other multilateral environmental agreements such as the Convention on Biological Diversity (CBD), but also fields not typically included within International Relations such as domestic wildlife policy, ecology, biology, land economy and criminology.

It is only natural to explore the possibility of taking the methods employed in this thesis to the next level and applying them to other endangered species. The author however would like to point out that the proposed version of *Sustainable Use* is only applicable to the species discussed in this thesis, namely the Black and White Rhinoceros, two subspecies of rhinoceros, and by no means a general remedy for conservation of all wildlife species.

Even within the rhinoceros species, the conservation impact on all species by legalizing trade in rhino horn requires further research. The major threat for the Asian Rhino is habitat conversion and not poaching, so a model for all rhino species would have to incorporate different factors such as alternative use of land to discuss the optimal conservation method. Also, given the interrelated nature of the subspecies, reopening trade in African Rhino horn, as propagated in this thesis as the best way to conserve the African Rhinos, may inadvertently have an impact on poaching of the Asian species of rhinos, whose horns have a market value roughly ten times the equivalent amount of African Rhino horns.²⁴⁵ The addition of a price difference between Asian and African horn would be required for a pricing model that may cover all rhino species.

To conclude, although a significant amount of additional work is needed to derive at a political-economic framework that can be used for the analysis of all endangered species, the author hopes that this thesis has demonstrated the benefits of a political-economic approach to conservation studies, and that the methods will be used more frequently to support policy-makers and *Pressure Groups* in their efforts to protect endangered species.

²⁴⁵ Nowell, Chyi and Pei. The Horns of a Dilemma: The Market for Rhino Horn in Taiwan, p.15. For a more detailed discussed please refer to Section 5.2.

8.4. Fundamental Critique to Market-led Conservation

The thesis has been conducted on the conventional approach by economists that animals are a natural resource, which can be optimally exploited for the only welfare that counts – human welfare.

It is important to note that this approach is open to a fundamental philosophical and ethical challenge, as there is considerable doubt around the ethical grounds that conventional economic theory builds on with regard to animals.²⁴⁶ In conservation studies, economic theory is often utilitarian in the sense that it weighs animal welfare against human benefits; however it is less utilitarian in the sense that the interests of animals and humans are commonly not compared directly and on par.²⁴⁷

P. Singer argues that the distinction made between animals and humans is the result of an ideology, that he termed speciesism. He compares the discrimination in favour of one species to racism and sexism.²⁴⁸ Utility is arguably derived from the ability to gain pleasure and avoid pain and thus all animals that can demonstrate a response to pleasure and pain should be included in the decision-making process.

However, animals cannot express their demand through purchasing power and thus the utility of animals is often included into the economic framework only in so far as some humans derive their utility from altruism by looking at the fate of animals.

²⁴⁶ For more detail, see among others: Regan, Animal Rights, Human Wrongs: An Introduction to Moral Philosophy; Singer, In Defense of Animals: The Second Wave; Webster, Limping Towards Eden; Armstrong and Botzler, The Animal Ethics Reader.

²⁴⁷ Turner and D'Silva, Animals, Ethics and Trade: The Challenge of Animal Sentience, p.46.

²⁴⁸ Singer, Animal Liberation, p.4.

Only few humans transfer their feelings through what Amartya Sen described as commitment in such a way that they're willing to amend their own utility to include the needs of animals.²⁴⁹ Thus, as animals are only considered stock in the market economy and due to the inaccurate reflection of their utility, this can only be regarded as a significant externality which, if included, would undoubtedly alter any recommendation derived by economic analysis.

²⁴⁹ Amartya Sen (winner of the Bank of Sweden Prize in Economic Sciences in 1998) cited in: Perman, Ma, McGilvray, et al., Natural Resource and Environmental Economics, p.67.

Annex I. Detailed Economic Model²⁵⁰

This section will draw on basic economic tools and methodologies, and will apply an economic model related to the field of environmental and natural resource economics. Much work has been done since pioneers C. Clark²⁵¹ and L. Anderson²⁵² defined and explained the use of bio-economic models for the management of fisheries from the late 1970s onwards.

In the model it is assumed that governments would sell their current stocks of rhino horn immediately when the trade in rhino horn is legalized. The release of government stock into the market would be accompanied by a significant drop in price. Note it is expected that most of the rhino horns released by governments into the market will be bought by speculators who stock up on the expectation that price would increase again.

It is also assumed that the rhino populations are big enough to meet demand throughout; namely in this supply driven market demand is the price taker, and thus there is no requirement to discuss optimal cropping strategy for the moment as it will only optimise the model, but not fundamentally change its assumptions and calculations. This assumption appears reasonable, due to the inelasticity of demand for rhino horn.

We consider three parties in this pricing model, namely the governments, the speculators and the poachers.

²⁵⁰ The formulas and methodology in this section are derived to a large extent from two papers by Gardner Brown and David Layton. (Source: Brown and Layton, Saving Rhinos; Brown and Layton, "A Market Solution for Preserving Biodiversity: The Black Rhino".)

²⁵¹ Clark, Mathematical Bioeconomics: The Optimal Management of Renewable Resources.

²⁵² Anderson, The Economics of Fisheries Management.

Define:

a - rate at which governments sell horn

b - rate at which the poachers sell horn

c - rate at which the speculators sell horn

Hence the total amount of horns available in the market during any period is:

$$Q = a + b + c. \quad (1)$$

The higher the quantity of rhino horns in the market, the lower the price of rhino horns so we have the following inverse price function, where P is the price:

$$P = g(Q) = g(a, b, c) \quad (2)$$

Poachers

In this model we assume that governments in order to open the legal market in rhino horn, promise to keep the market price below the price at which it becomes profitable for the poachers to enter. This is a valid assumption as CITES aims to achieve long term *Sustainable Use* of wildlife resources and therefore will demand minimizing profits for poachers.

Below we work out this price.

Total revenue for the poachers = Price \times Quantity = $g(a, b, c)b$

Let k be the total cost of poaching one unit of rhino horn. Note k depends among others on the risk, equipment and potential fine/penalties when caught.

Total cost of poaching b unit amount of rhino horns is bk .

To make the business profitable we require:

$$g(a, b, c)b > bk$$

In fact, the poachers want to maximize the profit Z :

$$Z = g(a, b, c)b - bk \tag{3}$$

Where the only variable from the poachers' view is b .

To maximize (5) we require:

$$\begin{aligned} \frac{\partial Z}{\partial b} &= g(a, b, c) + \frac{\partial g(a, b, c)}{\partial b} b - k = 0 \\ &= \Phi(a, b, c) - k = 0 \end{aligned}$$

Throughout our price model we aim to minimize poaching by rendering it unprofitable, i.e., we have to satisfy $P \leq \Phi(a, b, c) = k$.

(4)

Range States

Define:

v' - horn yield per rhino at death

M - mortality rate of rhino populations

β - fraction of rhinos whose horns are harvested every year

v - the horn per rhino cropped

W - the total rhino population

Let the total stock of governments be F ,

$$\frac{dF}{dt} = -u + (v'M + \beta v)W \quad (5)$$

Total stock decreases by the rate at which governments sell horn, but at the same time increases by the horn derived from rhinos that have naturally died as well as horn derived from government dehorning programs.

We must also demand that the number of rhino cropped be less than the total rhino population.

We use the logistic growth function to model natural growth rate. Let W be the total rhino population.

$$f(W) = rW \left[1 - \left(\frac{W}{\bar{W}} \right)^\alpha \right]$$

Where $r > 0$, $\alpha \geq 1$.

Define:

r - intrinsic rate of growth

\bar{W} - the carrying capacity of the *Range States*

α - exponential term introduced in the logistic growth function, due to asymmetric population growth.

Now let db be the rate at which rhinos are being poached, and we can then deduce d is the inverse of horn per rhinos poached.

We now have the rate at which the rhino population changes:

$$\frac{dW}{dt} = f(W) - MW - db \quad (6)$$

The rhino population increases with natural growth but decreases with natural mortality and poaching.

We now analyze from the governments' point of view and assume governments act as a cartel and don't compete against each other in the rhino horn market.

In order to maximize profit, we aim to maximize:

$$g(a, b, c)a - a\bar{k}$$

Where \bar{k} is the cost of cropping per unit rhino horn for the governments.

Profit is thus the revenue from horn sales minus expenditure on dehorning.

To incorporate the constraint $P \leq \Phi(a, b, c) = k$,

We put in the Lagrange multiplier μ and hereby maximize:

$$[g(a, b, c)a - a\bar{k}] + \mu[k - g(a, b, c)] \quad (7)$$

Actually in the above expression we take the constraint from keeping out the poachers as $P = k$, but when $P < k$ we have $\mu = 0$, thus our original constraint still holds.

To maximize profit X we require:

$$X = [g(a, b, c)a - a\bar{k}] + \mu[k - g(a, b, c)]$$

$$\frac{\partial X}{\partial a} = g(a, b, c) + \frac{\partial g(a, b, c)}{\partial a} a - \bar{k} - \mu \frac{\partial g(a, b, c)}{\partial a} = 0$$

$$\zeta(a, b, c) - \bar{k} - \mu \frac{\partial g(a, b, c)}{\partial a} \leq 0 \quad (8)$$

The above analysis is exactly the same as that of the poachers.

Combining the two arguments, we see profit-wise, until the price reaches k , the poachers don't enter the market, which renders our Lagrange's multiplier $\mu = 0$ and (8) becomes

$$\zeta(a, b, c) - \bar{k} \leq 0.$$

So we can deduce the profitable entering price for the governments is \bar{k} .

Speculators

Let the total stock of speculators be S ,

$$\frac{dS}{dt} = -c \quad (9)$$

S decreases by the amount of horn that they sell on the market.

Now we analyse the speculators and suggest the following formula (3) for the rate at which the inventory of the speculator changes:

$$\frac{dS}{dt} = -c$$

The total profit for speculators over the period that they stay in the market, i.e., from $t = 0$ to $t = T$ is:

$$\text{Net present value of the revenue from speculators} = \int_0^T P c e^{-\rho t} dt, \quad (10)$$

ρ is the discount rate which is dependent on political and economic anticipations, economic situation of the speculators, anticipation of future rhino population development, the risk free rate and alternative investment opportunities.

We have:

$$\frac{\dot{P}}{P} = \rho, \quad (11)$$

The formula results from the fact that prices need to grow at the discount rate for speculators to continue to sell their stock steadily to maximize net present value. If prices grow slower, speculators will sell their stock now, thus decreasing current prices which will result in a faster

growth for future prices. If prices are growing faster, speculators will hold their stock and thus current prices will increase until prices will grow again at the discount rate.

The formula is valid for as long as the speculators have stock and stay in the market.

We assumed in the above situation that at time T , when speculators leave the market, $P = k$, it becomes profitable for the poachers to come in. Due to regulation by governments the price will stop rising which explains speculator leaving the market.

When price is no longer rising, we also have $S = 0$ as speculators have lost incentive to hold their stock.

We impose the above boundary conditions when solving $\frac{\dot{P}}{P} = \rho$.

We have:

$$P_t = P_0 e^{\rho t} \quad (12)$$

$$P_0 = k e^{-\rho T} \quad (13)$$

Now we analyse the price curve.

According to our previous discussion there are three stages on the price curve.

Stage I

Price increases due to lack of supply but it does not meet the minimum profitable prices for neither governments nor poachers. A point to note is that $k > \bar{k}$. With the additional risk and penalty imposed, the cost for poachers will naturally be higher than that for the governments. So in this stage, the speculators are the only players in the market.

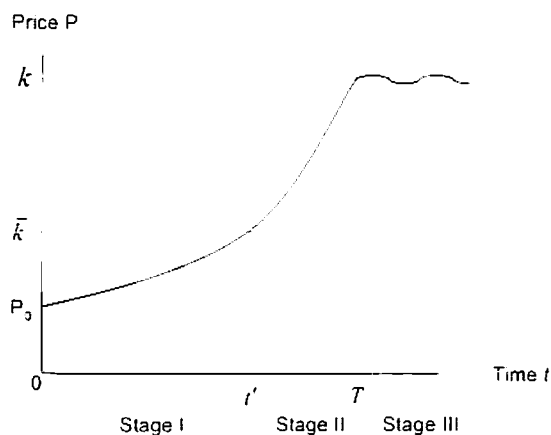
Stage II

Price increases to \bar{k} when governments enter. Governments enter the market and together with speculators form the suppliers of the market. As discussed earlier, at time T , $S = 0$, at which point price stops rising as states agree to keep price below entry point for poachers and as a result speculators exhaust their inventory and leave the market.

Stage III

With governments as the sole supplier in Stage III, the price is expected to oscillate slightly around k , as there is a time lag before any government interference can take effect in the market and it is never possible to match supply and demand exactly. The aim is to keep poachers out of the market. However, that also means that they don't get to increase price wilfully as with what happens in the case of monopoly.

A plot of P over t



From (2) $P = g(Q)$, we can write:

$$Q = CP^* \quad (14)$$

κ is the exponential term linked to the inverse relationship between price and available rhino horns in the market, and C is a constant.

Let τ be the share of speculators in Q and, as discussed earlier, poachers have only a negligible share in Q due to government interference, so the share of government is $1 - \tau$.

So:

$$\tau = \frac{c}{a+c}, 1-\tau = \frac{a}{a+c}$$

(8) can now be written as:

$$\zeta(a, c) = \bar{k} = P \left[1 - \frac{(1-\tau)}{\kappa} \right] \quad \zeta(a, b, c) - \bar{k} - \mu \frac{\partial g(a, b, c)}{\partial a} \leq 0$$

\Rightarrow

$$\bar{k} = P \left[1 - \frac{(1-\tau)}{\kappa} \right] \quad \text{and} \quad \tau = \left[1 - \kappa \left(1 - \frac{\bar{k}}{P} \right) \right] \quad (15)$$

Now set $t = 0$ when states enter the market, i.e., $P_0 = \bar{k}$, equivalent to shifting the time axis to the beginning of Stage II.

$$\text{Sub into (12): } P_t = P_0 e^{\rho t} = \bar{k} e^{\rho t} \quad (16)$$

$$\text{And (13): } P_0 = k e^{-\rho T}$$

$$k = P_0 e^{\rho T} = \bar{k} e^{\rho T}$$

Solving for T :

$$k = \bar{k} e^{\rho T}$$

$$\ln k = \ln \bar{k} + \rho T$$

$$T = \frac{\ln\left(\frac{k}{\bar{k}}\right)}{\rho} \quad (17)$$

$$c = \tau Q = \tau C P^{-\kappa} \quad (\text{by substituting (14)}) \quad (18)$$

Similarly we obtain the following under the assumption that at this point speculators and governments are the only players:

$$a = (1 - \tau) Q = (1 - \tau) C P^{-\kappa} \quad (19)$$

Horns sold by speculators in Stage II are:

$$\begin{aligned} S_{II} &= \int_0^T c dt \\ &= \int_0^T \tau C P_t^{-\kappa} dt \end{aligned}$$

Substituting in (16) and (18) to solve it:

$$S_{II} = C \bar{k}^{-\kappa} \left[\left(1 - e^{-\kappa \rho T}\right) \frac{1}{\kappa \rho} - \left(1 - e^{-\kappa \rho T}\right) \frac{1}{\rho} + \left(1 - e^{-(\kappa+1)\rho T}\right) \frac{\kappa}{(\kappa+1)\rho} \right] \quad (20)$$

Sub in (17), we can get the value of S_{II} , for $S_{(t=0)} > S_{II}$ (Stage II).

Now look at the horns exhausted in Stage I by the speculators:

$$\begin{aligned} S_I &= \int_0^0 c dt = \int_0^0 C P_t^{-\kappa} dt \\ &= \int_0^0 C \bar{k}^{-\kappa} e^{-\kappa \rho t} dt \end{aligned} \quad (21)$$

Since we set the beginning of Stage II as time 0, t' (the beginning of Stage I) is negative.

Solving it:

$$t' = \left(\frac{1}{-\kappa\rho} \right) \ln \left[\frac{\kappa\rho}{C\bar{k}^{-\kappa}} \left(S_I + \frac{C\bar{k}^{-\kappa}}{\kappa\rho} \right) \right] \quad (22)$$

Where $S_I = S - S_{II}$ as stocks of the speculators are exhausted at the end of the Stage II. We recognize t' is the length of Stage I.

Applying (12),

$$P_t = \bar{k} e^{\rho t'} \quad (23)$$

Note we can get a quantitative picture of the price curve as well as the movement of speculators from the results obtained above.

In summary, using figures²⁵³ that can be obtained directly or estimated such as the percentage of rhinos being cropped, cost for cropping a rhino, and rhino population size, etc, and assuming the profit-driven nature of all parties concerned this model aims to predict the price curve, describe speculator movements and also provide an accurate reference price for the state governments involved in rhino horn trading that would effectively put a stop to illegal poaching.

²⁵³ Comprehensive listing includes: rate at which the government/poachers/speculators sell horns, horn yield per rhino at death, mortality rate of rhino populations, fraction of rhinos whose horns are harvested every year, horn per rhino cropped, total rhino population, intrinsic rate of growth, carrying capacity of range state, asymmetric exponential term in logistic growth function, rate at which rhinos are being poached, discount rate, and exponential term related to the inverse relationship between price and available rhino horns in the market.

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