# CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA



Sixty-second meeting of the Standing Committee Geneva (Switzerland), 23-27 July 2012

# BACKGROUND STUDY: DECISION-MAKING MECHANISMS AND NECESSARY CONDITIONS FOR AFUTURE TRADE IN AFRICAN ELEPHANT IVORY

The attached document has been submitted by the Secretariat in relation to agenda item 46.4 on *Decision-making mechanism for authorizing ivory trade*<sup>1</sup>.

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# DECISION-MAKING MECHANISMS AND NECESSARY CONDITIONS FOR A

FUTURE TRADE IN AFRICAN ELEPHANT IVORY

# **BACKGROUND STUDY**

Consultancy for the CITES Secretariat (CITES Notification No. 2011/046) by

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Decision-Making Mechanisms and Necessary Conditions

for a

Future Trade in African Elephant ivory

# **BACKGROUND STUDY**

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# List of Acronyms

- ADC African Diamond Council
- AfESG African Elephant Specialist Group (of the SSC)
  - BNs Bayesian networks
  - CBD Convention on Biological Diversity
- CBNRM Community Based Natural Resource Management
  - CISO Central Ivory Selling Organisation
- CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora
  - CoP Conference of the Parties
  - CSG Crocodile Specialist Group (of the SSC)
  - DTC Diamond Trading Company (De Beers)
  - ETIS Elephant Trade Information System
  - FAO Food and Agricultural Organisation (of the United Nations)
  - FSC Forest Stewardship Council
  - HCR Harvest Control Rule
  - HCVF High Conservation Value Forests
- ISEAL International Social and Environmental Accreditation & Labelling
- ITRG Ivory Trade Review Group
- ITTA International Tropical Timber Agreement
- ITTO International Tropical Timber Organization
- IUCN The World Conservation Union
- MIKE Monitoring the Illegal Killing of Elephants
- MSE Management Strategy Evaluation
- MSY Maximum Sustained Yield
- MTW Mean Tusk Weight
- NGO Non-Governmental Organisation
- PIKE Proportion of Illegally Killed Elephant (MIKE)
- SSC Species Survival Commission (of IUCN)
- SULi Sustainable Use and Livelihoods Specialist Group (of SSC)
- TAG Technical Advisory Group (to ETIS and MIKE)
- TRAFFIC Trade Records Analysis of Fauna and Flora in Commerce
- UNCTAD United Nations Conference on Trade and Development

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**A.** In response to a request we sent out early in 2012 to range states, other countries and relevant nongovernmental organisations seeking information and thoughts on the project, we would like to acknowledge the inputs we received and thank the following individuals –

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We did not receive any responses from the Asian elephant range states.

# Other countries

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#### Other NGOs

*Earthmind*: Francis Vorhies; *Lukuru Foundation (DRC)*: John Hart; *TRAFFIC*: Tom Milliken; *WCS*: Hilde Vanleeuwe, Simon Hedges.

**B.** The first draft of the report was circulated by the CITES Secretariat early in April to the reviewers designated in the Terms of Reference for the consultancy. Comments were received from –

The CITES Secretariat, the African Elephant Specialist Group (AfESG), Amboseli Trust, Botswana, China, India, Japan, Kenya, Liberia, Nigeria, Elephant Voices (Joyce Poole & Petter Granli), SULi (Rosie Cooney, David Lusseau, Robin Sharp, Michael 't Sas Rolfes), South Africa, the United States and the United Kingdom.

We thank the reviewers. These comments were useful and have greatly influenced the final report.

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#### PREFACE

A first draft of this report was circulated by the CITES Secretariat to selected reviewers early in April 2012. It became apparent from the comments submitted that different people were expecting different results from the study. Perhaps the title of the study (*Decision-making mechanism for a process of trade in ivory*) was confusing. It certainly perplexed us and when we sought clarification from the Secretariat on what was meant by *an objective independent decision-making mechanism* we received no satisfactory answer. From the reviewers' comments it was apparent that –

(a) Some were simply seeking decision-making mechanisms which would allow the Parties to decide whether or not to allow a trade in ivory to proceed ... either at a global level or at the level of a range state applying for the transfer of its elephant population to Appendix II in order to be able to trade.

We saw this as a **primary decision** for the Conference of the Parties and focused our work on the **subsidiary decisions** and processes that would need to follow from such a primary decision. In order avoid continually having to qualify statements about trade in the report, we made the assumption that the primary decision had been taken. However, this assumption was misunderstood by many reviewers who took it as a *de facto* statement by us that trade in ivory would proceed.

To meet the expectations of those who sought 'rules' which could assist the Parties to decide whether or not there should be trade in ivory, we have included a brief set of guidelines on which such a decision should be based (Chapter 5, page 59).

(b) A number of reviewers felt that we had paid insufficient attention to the demand for ivory. Many felt that the demand was 'insatiable' and would inevitably lead to the extinction of elephants unless protection in the field was intensified; awareness campaigns targeted on ivory consumers were used to stigmatise the possession of ivory artefacts; monitoring of the movement of ivory along the full pathway from its source of origin to the end consumer was improved; and extreme measures were taken to achieve compliance with the Appendix I requirements of CITES.

Of these measures, the only one which has been proved to work is the *in situ* protection of elephants. If illegal hunting could be contained, the supply of ivory to the market would be effectively controlled by those with elephants on their land. This makes the other measures of secondary importance. However, the costs of protection against a determined illegal hunting challenge are high and many range states are unable or unwilling to commit the funds needed for fully effective *in situ* protection.

In conventional economics, demand is treated narrowly as a function of price and supply. Most of the present supply is illegal. However, recent advances in economics have introduced the concept of complex systems broadening the number of factors which influence demand to include ecological and socio-economic variables. We have proposed mechanisms aimed at gaining control of illegal markets through the establishment of marketing systems with strong incentives for legal ivory production and trade. The success of such a market will rely very largely on the degree of cooperation and trust which can be established amongst the stakeholders.

Given the existing strongly held and diverse views relating to the conservation of elephants, it is clear that reconciling these standpoints is difficult if not impossible at a global level. An *objective and independent decision-making mechanism* that would satisfy all interests and positions is unlikely to emerge from this, or any other study.

# **EXECUTIVE SUMMARY**

# INTRODUCTION

Chapter 1

Elephant populations are growing in some parts of Africa and declining drastically in others. Human populations are expanding throughout Africa with the result that habitat for elephants is declining and conflict between people and elephants is a growing problem in many parts of their range. Some protected areas are facing problems associated with overpopulation of elephants while others are facing rapid declines as elephants are being killed for their ivory.

This report was commissioned by the CITES Secretariat following the adoption, by the fifteenth meeting (Doha, 2010) of the Conference of the Parties (CoP), of Decision 14.77, as follows –

The Standing Committee, assisted by the Secretariat, shall propose for approval at the latest at the 16th meeting of the Conference of the Parties a decision-making mechanism for a process of trade in ivory under the auspices of the Conference of the Parties.

The Terms of Reference for this work (Annex 1, page 84) specifically excluded the question of whether or not there should be a trade in ivory.

We give a number of subsidiary assumptions and principles that we have applied in developing a workable decision-making process and a process for a trade in ivory which include the following –

- (1) That any legal trade will be sustainable and contribute positively to the conservation of elephants as envisaged in the African elephant range states' African Elephant Management Plan. If a legal trade does not meet this objective, it should be stopped.
- (2) That elephants will not be harvested to produce ivory, i.e. ivory, hides and meat will be a by-product of other management activities.
- (3) That an effective and controlled legal trade in ivory can provide incentives to conserve elephants and their habitats and that landowners/occupiers should be involved in decision-making regarding the management and conservation of elephants, and should derive benefits from maintaining elephants on their land.
- (4) That short and tight feedback loops between the state of elephant populations and the production and marketing of ivory are essential and would require appropriate hierarchical decision-making processes and a measure of subsidiarity.
- (5) That it is possible to establish a trade in ivory that minimises corrupt practices and the laundering of illegal ivory. By creating conditions that are advantageous for a legal trade, ultimately the illegal killing of elephants will be reduced.
- (6) That effective monitoring and management of elephant populations and ivory can be maintained in countries trading in ivory.

This report should not be interpreted as a blue-print but as a basis for negotiation towards a workable solution to a trade in ivory that will involve a full range of stakeholders.

**Executive Summary** 

#### **CITES DECISION-MAKING IN RELATION TO IVORY**

In response to increasing international legal and illegal trade in ivory the African elephant was listed on Appendix II in 1977. A rapid escalation of trade in the following eight years resulted in the introduction by CITES of a quota system. The amount of legal ivory leaving Africa declined in the following three years from about 800,000 to about 140,000 tonnes but illegal killing and trade in ivory continued and the species was placed on Appendix I in 1989. As a result many elephant populations began to recover. Sales of stockpiled ivory from southern Africa occurred in 1999 (to Japan) and 2008 (to China and Japan) under the supervision of the CITES secretariat.

The measures taken by CITES and member states almost certainly contributed to reducing levels of illegal trade for the period 1990 to about 2006. Other factors such as improved law enforcement in some countries following the ban may have also contributed. However, given the present rise in illegal killing of elephants in West, Central, and East Africa it is clear that current measures are not containing the present surge in the illegal trade in ivory. The present tendency to ascribe this increase to the sale of stockpiled ivory in 2008 tends to divert attention away from the far more serious problems relating to the inability of African countries to invest in protecting their elephants – an observation that begs the question of what incentives are there for them to do so? The focus on regulation without incentives is a central issue that needs to be addressed, a point made strongly by several authors.

#### **EVALUATION OF TRADE REGIMES IN HIGH-VALUED PRODUCTS**

Chapter 3

We could find no international trade regimes in other species and commodities that are directly comparable to those of elephants and ivory. In the report we discuss trade regimes associated with African rhinos, narwhals, vicuñas, crocodiles, tigers, the timber trade, and the diamond trade. We also examined trade regimes in several other species and commodities (e.g. broad-snouted caymans, yellow anacondas, bluefin tuna, sturgeon, drugs and alcohol prohibition), but the details are not included in our report because of their lack of any direct comparison to elephants and ivory. However, some aspects of the cases we reviewed do provide useful indicators on aspects of how a trade in ivory may be conducted and, in particular, the De Beers' selling system for diamonds could have application to ivory sales. From the reviews, we concluded that –

- 1. The costs of protecting species with high-valued products may be beyond the means of many developing countries;
- 2. Government and public support, together with an absence of civil disorder, are important ingredients for successful conservation of high-valued species and the maintenance of legal trade;
- 3. Expanding or maintaining the area of habitat available to high-valued species, such as elephants, beyond the boundaries of state protected areas requires incentives to landholders;
- 4. The development of regional and local institutions, such as joint commissions (e.g. narwhals) or specific treaties (e.g. vicuña, bluefin tuna and timber) for the management of species and trade in their commodities is likely to be beneficial, as is the involvement of a full range of stakeholders in the management of the resource and its trade;
- 5. Strong domestic law and its enforcement is pivotal to success;
- 6. An understanding of the market in which commodities are traded must be based on good empirical data dealing with consumer preferences, attitudes and behaviour, particularly if they (consumers) are to be influenced by pricing structures and certification, or green labelling initiatives;
- 7. The shorter the market chain between producer and consumer the less likelihood there is of illegal components being laundered in a legal trade and the fewer the opportunities for corrupt practices.

#### Chapter 2

#### IMPACT OF HARVESTING AND TRADE ON ELEPHANT POPULATIONS

Chapter 4

Population simulation models were used to explore the potential impacts of alternative harvesting regimes on elephant populations. The results of our population modelling indicate that –

- (1) Under the assumption that the offtake would target the animals with the largest tusks in the population, the maximum sustained yield occurs at an offtake of about 5% of the total numbers, at which level
  - a. The population growth rate is close to zero and the mean tusk weight of ivory coming from the population would be about 5kg;<sup>1</sup>
  - b. The proportions of tusks coming from males and females would be roughly equal. The oldest surviving males would be about 22 years and the oldest surviving females about 50 years old;
  - c. Ivory production would be about 0.5kg per annum for every living elephant in the population which would yield about 5 tonnes of ivory for every 10,000 elephants.

Under certain circumstances, these figures could be useful in making deductions about the status of living elephant populations or drawing conclusions about the impacts on elephant populations that may be deduced from raw ivory seizures.

(2) Some alternative scenarios are given -

- a. Illegal exploitation of elephant might take the form of successively making entire 'subpopulations' extinct in which case the ivory appearing in the market would exhibit the structure and characteristics of the ivory in the living population.
- b. In some African countries the management regimes may include trophy hunting, culling, problem animal control and collection of ivory from natural mortality. This type of management results in a relatively high production of some 8 tonnes of ivory per 10,000 elephants with two-thirds of the total ivory volume coming from trophy hunting (where the offtake is <1% of the population) and less than 15% from culling (where the offtake is about 3% of the population).</p>

None of this management **is aimed at ivory production**. Culling is carried out to protect habitats; problem animal control is an outcome of human-elephant conflict; trophy hunting is a recreational pursuit which results in high land-use values.

- (3) We discuss the observed effects of the one-off sales of ivory on levels of illegal exploitation and conclude that evidence has yet to be presented that demonstrates a clear link between the one-off sales of ivory and increasing levels of illegal trade.
- (4) Examination of the returns from the one-off sales of ivory in 1999 and 2008 lead to the conclusion that the range states lost between 66-75% of the value that might have been expected under normal trading conditions.

<sup>1.</sup> Maximum ivory value occurs at much lower offtakes.

# **PRINCIPLES AND A DECISION-MAKING MECHANISM FOR A FUTURE TRADE IN IVORY** Chapter 5

#### **Basic principles**

The fundamental principle that should guide any future trade in ivory is that it should contribute positively to the long-term conservation of elephants and their habitats in Africa. Underpinning this principle is that, to apply it successfully, trade in ivory must benefit the landholders on whose land the elephants occur.

The CBD Addis Ababa Principles for the sustainable use of biodiversity (Annex 4, page 111) have been endorsed and adopted by the Parties to CITES (Resolution Conf. 13.2 (Rev. CoP14)) and provide a sound framework for any future trade in ivory.

The Vision, Goal, Priority Objective 7 and Activity 7.1.4. of the African Elephant Action Plan (CoP15 Inf. 68) reinforce the above principles. Additional principles are –

- 1. Provided that the full value of elephants (both intrinsic and extrinsic) is fully realised by landholders, not only will elephants be conserved but so will the accompanying range of biodiversity on such land;
- 2. A legal trade in ivory, elephant hide and meat could change current disincentives to elephant conservation into **incentives** to landholders and countries to conserve them;
- 3. The **scale mismatch** between the global institutions attempting to control the trade in ivory and the *de facto* management of elephant and ivory in the field must be addressed;
- 4. The principle of subsidiarity<sup>2</sup> provides guidance for development of appropriate levels of decisionmaking and management of elephants and ivory at regional, national, sub-national and local levels.
- 5. **Trade should be self-financing** in order to achieve long-term sustainability: i.e. none of the costs of management or controls should depend on outside funding or charity (Addis Ababa principle 13).
- 6. When compliance with regulations becomes too burdensome, shortcuts and illegal activities emerge, which translates into a simple rule "make it easy to be legal".

#### Criteria for trade

It is proposed that six initial areas of compliance are needed for an Appendix II listed country to export ivory. Further criteria for an elephant range state to be admitted as a seller of ivory to an ivory marketing institution are developed in the final chapter -

- 1. The status and trends of the population(s) from which the ivory is derived should be healthy;
- 2. The status of law enforcement in the country is such that illegal killing of elephants and illegal trade in ivory will be detected and contained;
- 3. Ivory stocks are secure with a record-keeping system which maintains full details of the provenance of each tusk and which is open to inspection;
- 4. Appropriate mechanisms are in place for the return of benefits from the sale of ivory to landholders;
- 5. Ivory can only be exported to countries whose national legislation and controls meet CITES criteria;
- 6. The provisions of the CBD sustainable use principles and the African Elephant Action Plan are being implemented.

<sup>2.</sup> First enunciated by Pope Leo X, the principal of subsidiarity holds that '*it is an injustice, a grave evil and a disturbance of right order for a larger and higher organization to arrogate to itself functions which can be performed efficiently by smaller and lower bodies*'.

#### Decision-making

Decision-making for a trade in ivory could take many forms and range from a single top-down, command and control, mechanism centred on decisions taken by the CoP to one involving devolved, multi-level governance. Our analysis of CITES decisions suggests that the existing mechanism does not work very well largely because it relies on member states and their people to implement decisions in which they may not have been directly involved or may not have bought into, or both.

In outline, the following steps are necessary -

- 1. Clarify objectives, distinguishing between fundamental objectives and means objectives.
- 2. Explore alternative decision options while acknowledging both subjective and objective factors.
- 3. Evaluate the consequences and trade-offs of alternative decisions and clarify uncertainties and risks.

The tools available to undertake these necessary steps are -

- 1. Identification of the **hierarchy of scales and levels** extending from the landholder or village through to global conventions such as CITES and the CBD. Decision-making for trade in ivory will need to be taken holistically within such a framework and it will require both bottom-up and top-down decisions involving the full range of stakeholders at each level.
- 2. Scenario planning can be used to explore a limited set of qualitative, contrasting, but plausible alternative futures that provide the basis for further qualitative and quantitative exploration of their consequences. It is particularly useful as a tool for decision-making and policy planning in uncertain, complex and multi-cultural situations such as those that characterise conservation initiatives in Africa and the polarised approaches to elephant conservation and trade in ivory.
- 3. **Bayesian networks** (BNs), or probabilistic causal networks, provide a statistical modelling framework in which to examine the probable influence of a range of factors (e.g. ecological, social and economic) or drivers on response variables. BNs can be used to analyse the consequences of alternative futures arising from scenario planning.
- 4. **Management Strategy Evaluation (MSE)** is an adaptive management methodology where the results obtained from monitoring the simulated effects of harvesting on target populations are fed back into a number of linked models which modify the harvesting rules and the perceived response of the population to harvesting. The models take into account uncertainty and are a powerful tool to evaluate which management strategy will perform best in relation to a suite of objectives. The objectives and the performance metrics to evaluate them need to be clear before beginning the process. The methodology has application prior to deciding on a given management procedure and after implementing it.

A devolved decision-making process is proposed that would include a full range of stakeholders, and involve both top-down and bottom-up decision-making mechanisms in a multi-level governance framework from the CITES CoP to the local level. The process would provide for those directly responsible for the conservation of elephants, and the supply of ivory, to link directly with those responsible for carving ivory, through a single link in the form of a Central Ivory Selling Organisation. By closely linking supply and demand the crucial issue of incentives to maintain stakeholder buy-in and compliance in a sustainable and legal trade in ivory could be established. It provides for shorter, tighter feedback loops and minimises scale mismatches between institutions and resource management. Equally, it provides the basis for a legal market to establish market control for ivory, control that unfortunately presently rests in the hands of the criminal syndicates that are able control both the supply and the price of illegal ivory.

#### CONDITIONS UNDER WHICH A TRADE IN IVORY COULD TAKE PLACE

Chapter 6

In exploring conditions under which an international trade in ivory could take place, the establishment of a central ivory selling organisation (CISO) is proposed. Features of such a system would be –

- 1. A single outlet for all raw ivory exported from Africa
- 2. No intra-Africa trade in raw ivory
- 3. In addition to the criteria outlined in the previous chapter for Appendix II countries to be able to trade in ivory, exporting Range States would have to satisfy criteria to sell ivory through the CISO;
- 4. Buyers of raw ivory from the CISO would be individuals (or governments who own ivory-processing factories) from any country in the world which satisfied CITES and CISO requirements; and
- 5. Ivory sales would be held frequently and conducted on the CISO premises under a selling system similar to that used by De Beers for selling diamonds. and, immediately after each sale, the raw ivory would be consigned directly to the buyer's physical address passing through no intermediary hands.

The CISO might be controlled at the regional level by a Commission such as that described for narwhals (point 4, page x). There would be close liaison between the CITES Secretariat and the Conference of the Parties. A close relationship would be developed between the CISO and TAG, ETIS and MIKE with a bi-directional flow of monitoring information. The CISO should be funded by a levy on ivory sold through its marketing system.

Such a system addresses many of the current concerns relating to trade in ivory -

- 1. It deals with the problem of supply and demand. The CISO can manipulate prices in such a way that demand is reduced if it exceeds supply.
- 2. It reduces the length of the pathway from the producer to the processing 'factory' thus decreasing the opportunity for illegal ivory to enter the system.
- 3. The system minimises opportunities for corruption by government officals.
- 4. It deals with the perceived problem of the present system of one-off sales where range states feel they are not receiving the true value of their ivory.
- 5. It provides the 'independent' mechanism referred to in our terms of reference. Many of the functions outlined for the CSIO, whilst supporting the aims of CITES, also provide an independent screening mechanism for both buyers and sellers and an independent monitoring system of ivory trade.

The success of a legal trade in ivory will depend not so much on issues of supply, demand and pricing as it will on the ability of the stakeholders to cooperate with each other in creating a workable institution such as the CISO to bring them prosperity in the broadest sense – including the conservation of elephants. Trust and cooperation must be established amongst the stakeholders and the CISO to bring about the transformation.

We emphasise, however, that the proposed system is not a blueprint and should be regarded only as a starting point for discussion and negotiation amongst primary and secondary stakeholders in the trade in ivory and the conservation of elephants. An important component is the development of direct links between producers and consumers of ivory so as to establish the shortest possible market chain. This should result in short and direct feedback loops between regulatory institutions and those involved in the trade and in the management and conservation of elephants. Importantly, it would provide for returns and incentives to landholders, be they the state, private landholders or communities.

# **1. INTRODUCTION**

Elephant populations are growing in some parts of Africa and declining drastically in others. Human populations are expanding throughout Africa with the result that habitat for elephants is declining and conflict between people and elephants is a growing problem in many parts of their range. Some protected areas are facing problems associated with overpopulation of elephants while others are facing rapid declines as elephants are being killed for their ivory.

Since the initial listing on Appendix I in 1989, the elephant populations of Botswana, Namibia, South Africa, and Zimbabwe have been listed on Appendix II and two sales of stockpiled ivory have taken place, one in 1999, and the other in 2008. Stocks of ivory held by governments have continued to increase and there are pressures from range states with expanding elephant populations to trade in ivory. However, countries in West, Central and East Africa continue to experience declining elephant populations and most do not therefore support a legal trade in ivory.

This report was commissioned by the CITES Secretariat following the adoption, by the fifteenth meeting (Doha, 2010) of the Conference of the Parties (CoP), of Decision 14.77, as follows:

The Standing Committee, assisted by the Secretariat, shall propose for approval at the latest at the 16th meeting of the Conference of the Parties a decision-making mechanism for a process of trade in ivory under the auspices of the Conference of the Parties

At its 61st meeting in Geneva, August 2011, the CITES Standing Committee agreed to a procedure specified in document SC61 Doc. 44.4 to progress work on the implementation of Decision 14.77. This included conduct of an independent study on the development of a decision-making mechanism and process for future trade in elephant ivory to serve as a basis for further discussion by the Standing Committee. The Terms of Reference for this study are contained in Annex 1 (page 84) and specifically state **"The study is not to determine whether there should or should not be international trade in ivory."** This statement is re-enforced by the following text from the record of the 61st meeting of the Standing Committee held on the 15-19th August 2011 in Geneva –

The study is not to determine whether there should or should not be international trade in ivory, which is a separate and distinct matter for the Parties. This is a technically-focused study on a "decision-making mechanism for a process of trade in ivory under the auspices of the Conference of the Parties" that can be utilised by the Parties should they decide to enable future international trade in ivory under the Convention.

The Terms of Reference for this study require us to cover the following:

- (a) examination of the various processes and decision-making mechanisms related to ivory trade that are or have been operating under the provisions of the Convention, including compliance and enforcement provisions;
- (b) evaluation of the strengths and weaknesses of international trade regimes and associated controls, safeguards and monitoring methods for other high-value commodities in the context of future trade in ivory;
- (c) basic principles and factors that could guide future trade in ivory, and proposals on how an effective, objective and independent decision-making mechanism could operate, taking into account the provisions of the African elephant action plan and experiences from Asia; and

(d) exploration of the conditions under which international trade in elephant ivory could take place, taking into account: ecological and economic sustainability of ivory trade; the impact of trade on the illegal killing of elephants; the initial impact of the one-off sale that was agreed at the 14th meeting of the Conference of the Parties (The Hague, 2007); levels of illegal trade, enforcement challenges and capacities; information on linkages between legal and illegal trade, and methods to elucidate these linkages; methods to track the chain of custody; etc.

The value systems that influence the conservation and management of elephant, and the sale and marketing of elephant products differ greatly across the world. As a result, the trade in ivory is characterised by highly polarised positions grounded in differing worldviews, mental models, and asymmetrical power relations that will need to be reflected upon and considered in any decision-making process related to a future trade in ivory. Some of the more pertinent positions and their philosophical underpinnings that form the basis of these polarised views and intense debate are –

- 1. Recognition of the intrinsic value of elephants and their ranking as sentient beings underpins the belief that the killing of elephants for any reason, and trade in their products, is unethical.
- 2. Recognition of the extrinsic or utilitarian value of elephants and their products as a resource that can be used for the benefit of people and contribute to securing wild land for conservation. Utilitarian value is extended to both live elephants and to their products (ivory, hide and meat).
- 3. Recognition of the primacy of human interests. Direct conflicts between land use systems and between farmers and elephants result in elephants being killed and/or their available habitat being taken over for other uses with the result that the habitat available to elephants is reduced.
- 4. Recognition of the existence and ecological and existence values of other (often rare) plant and animal species that may be threatened in areas where high densities of elephants occur. Elephants act as ecosystem engineers in protected areas and opinions (and values) differ on the levels at which their impacts on habitats and other species are acceptable.

Given existing strongly held views relating to elephants and their conservation it is clear that reconciling these values is difficult if not impossible at a global level and an "*objective and independent decision-making mechanism*" that would satisfy all interests and positions is unlikely to emerge from this, or any other study. For this reason it is necessary, at the outset, to outline the main assumptions that underlie the decision making mechanism and a process for trade in ivory that are developed in this report. In summary these are as follows –

- That should the Conference of the Parties (CoP) decide to permit a legal international trade in ivory for a species that is listed on Appendix I this would require a two-thirds majority in favour of a transfer of the species, or a population of the species, to Appendix II. This would represent a primary decision and is a matter for the CoP to deal with and is explicitly not part of our Terms of Reference. It is necessary to make this assumption clear in order avoid continually having to qualify statements about trade in the writing that follows.
- 2. This report therefore deals with the **subsidiary decisions and processes** that may allow a trade in ivory from countries whose elephant populations are listed on Appendix II. It is in this context that we propose a decision-making mechanism and process for a trade in ivory to assist the CoP in reaching a decision on whether or not a trade in ivory could take place (Chapter 5, page 53).

- 3. The main subsidiary assumptions and principles that we have applied in developing a workable decision-making process and a process for a trade in ivory include the following
  - a. That any legal trade will be sustainable and contribute positively to the conservation of elephants as envisaged in the African elephant range states' African Elephant Management Plan. If a legal trade does not meet this objective, it should be stopped.
  - b. That an effective and controlled legal trade in ivory can provide incentives to conserve elephants and their habitats and that landowners /occupiers should be involved in decision-making regarding the management and conservation of elephants, and in deriving benefits from maintaining elephants, on their land.
  - c. That short and tight feedback loops between the state of elephant populations and the production and marketing of ivory are essential and would require appropriate hierarchical decision-making processes and a measure of subsidiarity.
  - d. That it is possible to establish a trade in ivory that minimises corrupt practices and the laundering of illegal ivory. By creating conditions that are advantageous for a legal trade, ultimately the illegal killing of elephants will be reduced.
  - e. That effective monitoring and management of elephant populations and ivory can be maintained in countries trading in ivory.
  - f. That best business practices, transparency and accountability will be adhered to in trading ivory.
  - g. That ivory will be derived from natural mortality, sport hunting (presently permitted under CITES quotas), animals killed to control human-wildlife conflict, and, in some cases, culling to control overpopulation of elephants. Elephants will not be harvested to produce ivory, i.e. ivory, hides and meat will be a by-product of other management activities.
  - h. That the failure to protect and conserve elephants in many countries in Africa is not primarily because other countries have traded in ivory but because they have not invested sufficiently in protecting their elephants and have not provided incentives for their conservation.
- 4. That this report will not be interpreted as a blue-print but as a basis for negotiation towards a workable solution to a trade in ivory that will involve a full range of stakeholders. More specifically, in order for the CoP to agree to a trade in ivory from Appendix II countries agreement in principle, if not in detail, between the countries and prospective importers would need to be established regarding four main aspects. These aspects are
  - a. The process for trading in ivory;
  - b. Measures to ensure the sustainable conservation and management of elephant populations;
  - c. The creation of incentives for elephant protection and conservation in those countries involved (i.e. disbursement of benefits derived from a trade in ivory and other sources, such as trophy hunting and payments for ecosystem services); and
  - d. Secure legal processing and marketing procedures in countries importing ivory in order to minimise, if not eradicate, the laundering of illegal ivory.

The report broadly follows the sequence of topics specified in the terms of reference. Chapter 2 reviews the CITES decision making processes relating to ivory that have been used to date. Chapter 3 examines key elements in international trade regimes in high-valued products that may be applicable to a trade in ivory. Chapter 4 reviews the impact of harvesting and trade in ivory on elephant and develops models to explore such impacts. Chapter 5 outlines the principles and factors that could guide a future trade in ivory and develops guidelines for decision-making mechanisms for a process of trade in African elephant ivory. Chapter 6, the final chapter, explores the necessary and sufficient conditions required for a future legal trade in Ivory. Additional background material relating to the content and arguments presented in some chapters are provided in accompanying annexes.

The Final Report on this project, which is a summary of this *Background Study*, was submitted to the CITES Secretariat for translation and general distribution on 28 May 2012.

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# 2. CITES DECISION-MAKING IN RELATION TO IVORY

Clause (a) of the TOR states: examination of the various processes and decision-making mechanisms related to ivory trade that are or have been operating under the provisions of the Convention, including compliance and enforcement provisions;

#### 2.1 Introduction

The decision-making mechanisms of CITES are governed by the Articles of the Convention and guided by Resolutions adopted by the Parties which interpret and assist in implementation of the Convention.

Proposals to amend the Appendices of the Convention and/or their accompanying annotations in respect of any particular species may be submitted by one or more Parties 150 days in advance of a CoP and should include consultations with the other range states in which the species occurs. In the event that the proposing Party decides not to consult with other range states (which is not required under Article XV), the proposal should be submitted 330 days in advance of the CoP (Res.Conf. 8.21) to enable the Secretariat to carry out the required consultation with range states. For adoption, amendments of the Appendices require a two-thirds majority of the Parties present and voting. Parties may lodge reservations in cases where they do not accept an adopted amendment provided they make written notification to the depositary government within the 90 days before the amendment comes into effect.

In this section of the report we first outline the development of steps that have been taken by CITES (based on Wijnstekers 2011 and related CITES documents) to stem the illegal international trade in ivory that has contributed to the decline of many elephant populations in Africa. We then briefly examine the key features of the decision-making processes relating to elephants and ivory, the impacts of the one-off sales of ivory, and the efficacy and costs of existing compliance procedures.

#### 2.2 CITES controls on international trade in ivory

The Asiatic elephant, *Elephas maximus*, was listed on Appendix I of CITES when the Treaty was first signed in 1974.

The African elephant, *Loxodonta africana*, was listed in Appendix III in February 1975 by Ghana. This occurred before the Treaty entered into force with the tenth ratification in November 1975 and before the first Conference of the Parties in November 1976. Appendix III invoked the provision under the Treaty for all Parties to cooperate in preventing the import of ivory that did not have a legal export permit issued by the appropriate Ghana authority. *Loxodonta africana* was subsequently listed on Appendix II in February 1977 following the first CoP held in Switzerland in November 1976. The decision-making mechanism was a straightforward process based on significant trade in ivory and a proposal, by Ghana, for listing on Appendix II that was voted on and adopted by a majority of Parties.

The listing of the African elephant on Appendix II was in response to increasing illegal killing of African elephants, increasing prices for ivory, and the increasing volumes of ivory being exported from Africa. This trend continued into the 1980s and reached a peak of over 1,000 tonnes in 1983 (**Fig.2.1** on the next page; data from Barbier *et al* 1990). Concerns over the volume of trade led to the inception of a quota system in 1985 (see below).





Data compiled by Luxmoore of WTMU in Table 1.2 of Barbier (et al 1990)

The decision-making processes involved in the lead-up to the introduction of the quota system began in 1981, with Resolution Conf. 3.12, which stated *inter alia* –

CONSCIOUS of the fact that, due to the increasing monetary value of ivory, illegal trade activities have reached a significant level, that ivory is frequently traded with inadequate documentation, and that States which are not Party to the Convention play a special role in this trade;

and

NOTING the positive results experienced by a number of Parties having applied stricter domestic measures for ivory trade, in accordance with the provisions of Article XIV;

The resolution went on to *recommend* to parties to introduce a number of steps and controls aimed at improving the level of documentation relating to the export and import of ivory in an effort to distinguish between legal and illegal movements of ivory. Given the escalating amounts of ivory that continued to leave Africa between 1981 and 1986 these recommendations appear to have had limited, if any, impact.

At the next CoP, in Gaborone (Botswana) in 1983, "Appendix II was found to be insufficient while Appendix I was considered to be counterproductive and might even have put the continued participation of a number of ivory producing countries in CITES at stake." (Wijnstekers 2011). The Parties directed the then Technical Committee to draw up guidelines for controlling the trade in worked ivory. A seminar, hosted by the European Commission in June 1984, then developed the basis for a potential solution to the ivory trade problem that involved setting export quotas based on scientifically established management programmes, with no trade permitted from countries without such programs and without approved quotas, and no trade in unmarked ivory (Wijnstekers 2011).

In 1985 the Secretariat conducted a study to establish a quota system for the export of ivory (Martin *et al* 1985). The adoption of the quota system by CoP5 in Buenos Aires (Argentina) in 1985 (Resolution Conf. 5.12) led to the establishment of an Ivory Control Unit in the Secretariat for its implementation in compliance with Resolution Conf. 5.12. This added a number of tools to the conventional Appendix II controls and allowed the Parties to accept continuing trade in African elephant ivory (Wijnstekers 2011). These tools included requirements for range states to submit to the CITES Secretariat an annual quota for the maximum number of tusks to be exported in the following year, for the Secretariat to maintain a data base, and for importing countries to accept only those consignments of ivory that had valid documentation from the exporting countries. There were also several conditions relating to the routes through which ivory could be transported (e.g. not through non-member states), and a prohibition on trade with any country that did not comply with CITES requirements. The quota system was later refined by six resolutions adopted at the 6<sup>th</sup> CoP in Ottowa in 1987.

The data presented by Barbier *et al* (1990) in **Fig.2.1** (previous page) show that from 912 tonnes of ivory leaving Africa in 1985 (immediately before the inception of the quota system) the legal trade dropped to 805t in 1986, 331t in 1987 and 142t in 1988. Despite this sharp decline Wijnstekers (2011) observed that 'the quota system did not stop the illegal trade at all'. Illegal trade was undoubtedly taking place over the same period but data on its extent do not appear to be available.

The intent of the quota system was that countries should set their own quotas using the method of calculation prescribed in Res. Conf. 5.12 but there was little that the quota system could do to address the problem of illegal trade in ivory from countries such as Burundi and the United Arab Emirates that were not parties to CITES at that time.<sup>3</sup> Burundi had been a major exporter of ivory before the quota system was adopted although it had a population of only one elephant (Barbier *et al* 1990). Another problem was that, despite the inception of a quota system, a number of major ivory traders (e.g. in Sudan) continued to accumulate stocks of illegally-acquired ivory which their governments could not accommodate within the quota system and, at the same time, maintain credibility. Inevitably such ivory had to be exported illegally. The problem was exacerbated once countries such as Japan and the enclave of Hong Kong adopted stricter importing regulations that excluded illegal ivory, causing the illegal traffic, which was substantial, to move to other entrépots such as Macau and Singapore.

<sup>3.</sup> Burundi acceded to CITES in 1988 and the UAE in 1990.

The quota system was superseded by the listing of all populations of the African elephant on Appendix I in 1989 with the adoption of Resolution Conf. 7.8 that urged all Parties to support the listing on Appendix I and to introduce stricter domestic controls on trade.

The decision-making process in this case involved major technical and public action before the 7<sup>th</sup> CoP in Lausanne in September 1989. The Ivory Trade Review Group, convened by the Wildlife Conservation Society, conducted a study of the global ivory trade and its impact on the African elephant in 1988 (ITRG 1989). The results of the study were released in June 1989 and resulted in the United States, the European Community and Hong Kong immediately placing an import ban on all worked and raw ivory. Japan introduced an import ban on all worked ivory and raw ivory from all non-African states.

The decision-making process was an example of the powerful effects which a combination of the scientific and popular media and the public can exert in influencing the positions taken by Parties to the Convention for charismatic species such as elephant. These are legitimate activities relating to any open and transparent international convention where decisions are based primarily on political considerations even where, as is the case in CITES, they are expected to be based on scientific and objective criteria.

Resolution Conf .7.8 came into force for all Parties to the Convention early in 1990 and effectively introduced a ban on all trade in raw and worked ivory. Reservations were however entered by Botswana, Malawi, Namibia and Zimbabwe. At the 8<sup>th</sup> CoP, held in Kyoto in 1992, these four countries submitted proposals to transfer their elephant populations to Appendix II in return for which they undertook to maintain a moratorium on trade in ivory. The proposal was not adopted.

The 9<sup>th</sup> CoP, held in 1994 at Fort Lauderdale in the USA, consolidated all previous resolutions concerning trade in African elephant ivory into Resolution Conf. 9.16. The previous resolutions (from Conf. 3.12 to 7.8) concerning the trade in ivory were repealed.

Botswana, Namibia and Zimbabwe appear not to have exported any raw ivory between 1990 and 1997 despite holding reservations against the Appendix I listings. They did, however, continue to sell ivory to their domestic carving industries. The absence of exports is partly explained by the fact that no importing Parties had entered reservations at the time of the listing in 1989.

The elephant populations of Botswana, Namibia and Zimbabwe were transferred to Appendix II at the 10<sup>th</sup> CoP in Harare in 1997 and the reservations that these countries had entered in 1989 were withdrawn. However, the CoP placed constraints on trade in ivory by the affected range states by adopting CoP Decisions 10.1 & 10.2 and Resolution Conf.10.10, which replaced Conf. 9.16.

The first one-off sale of raw ivory from Botswana, Namibia and Zimbabwe took place in 1999 with Japan being the single buyer approved by CITES Secretariat. The decision-making process behind this sale was governed by the annotations that were included in Resolution Conf. 10.10.<sup>4</sup>

The South African elephant population was transferred to Appendix II in 2000 with a zero quota for trade in raw ivory (CoP11 in Gigiri, Kenya).

A further one-off sale was approved by the Parties at CoP12, in Santiago (Chile) in 2002, but the sale was postponed at a succession of Standing Committee meetings until 2008.

<sup>4.</sup> Additional constraints were added at subsequent meetings of the CoP and last consolidated under Resolution Conf. 10.10 (Rev. CoP15) at the CoP15 held in Doha in 2010; these are the current provisions governing international trade in ivory (see **Annex 2**, page 86).

An "Action plan for the control of trade in African Ivory" was established at CoP13 in Bangkok in 2004 (Decision 13.26 (Rev. CoP15)) calling on all range states to urgently –

- (a) prohibit the unregulated domestic sale of ivory and where regulated domestic trade is permitted it should comply with the provisions of Conf. 10.10 (Rev.CoP15);
- (b) instruct all law enforcement and border control agencies to enforce legislation rigorously; and
- (c) engage in public awareness campaigns to publicize existing and new ivory sales legislation.

The action plan also recommended range states to cooperate with research on ivory identification, called on the Secretariat to seek support from governments and a wide range of other agencies to help eradicate illegal exports of ivory from Africa, and to assess progress in implementation of the action plan, particularly in states where unregulated internal markets are active. Provision was made in Decision 13.26 for countries selling significant amounts of illegal ivory to be sanctioned through a Standing Committee Notification to Parties "advising that the Conference of the Parties recommends that Parties not authorize commercial trade in specimens of CITES-listed species with the State in question" (Wijnstekers 2011).

At a meeting of the Standing Committee on 5 October 2006 a decision on the sale of ivory agreed at CoP12 in 2002 was further postponed. At CoP14, held in the Hague (Netherlands) in 2007 the existing annotation for the populations of elephants listed in Appendix II was replaced with one that constrained trade in ivory to buyers approved by the CITES Secretariat, namely, China and Japan at the time. These countries were to satisfy the Standing Committee that they had sufficient controls in place to prevent the laundering of illegal ivory through their ivory carving industries. The annotation also precluded any further proposals to sell ivory for a period of nine years and gave the Standing Committee powers to suspend trade partially or completely in the event of non-compliance by exporting or importing countries, or in the case of proven detrimental impacts of the trade on other elephant populations (**Annex 2** page 93). Although the Secretariat noted at the time that this annotation did not comply with the Articles of the Treaty, it was nevertheless adopted.

A one-off legal sale of 108 tonnes of ivory from Botswana, South Africa, Namibia and Zimbabwe took place in 2008. The ivory was auctioned and imported into China and Japan in 2009. The total income for the four exporting countries was US\$ 15.4 million (approximately \$142 per kg).

Recent studies of the ivory carving industry in China (EIA 2011, Martin & Vigne 2011a) have revealed that the legal provisions and controls, on which their status as a buyer of ivory is based, are not being fully implemented. Large quantities of illegal ivory are clearly entering their ivory carving industry. Once again, the implementation of CITES resolutions at a national level by a member state has fallen short of expectations.

At CoP15 in Doha (Qatar) in 2010, further revisions of Resolution Conf. 10.10 took place resulting in Resolution Conf. 10.10 (Rev.CoP15) (Annex 2, page 86).

#### 2.3 Key features of the CITES decision-making processes relating to elephants

The period between 1976, when the African elephant was first listed on Appendix II, and 2010 when the Conference of the Parties last met, has witnessed two surges in the amount of ivory leaving Africa – both associated with increasing prices for ivory. The first occurred during the 1980s and reached a peak in 1986 and the second is presently underway (i.e. in 2011/2012). Attempts to contain both the legal (through a quota system) and illegal trade during the 1980s were widely considered to have failed with the result that African elephants were listed on Appendix I in 1990. The following sixteen or so years witnessed a recovery of many elephant populations, associated with apparently reduced illegal killing of elephant and reduced prices for ivory. The recovery was widely attributed to CITES intervention and the ban on an international trade in ivory. However, domestic ivory carving industries continued within Africa and illegal ivory continued to leave the continent to support ivory carving in several Asian countries (Lemieux & Clarke 2009, Martin & Vigne 2010, 2011a, 2011b, Stiles 2004, 2009).

The transfer to Appendix II of three populations in 1997 was accompanied by an increased effort to monitor the illegal trade in ivory and the illegal killing of elephants with the establishment of the ETIS and MIKE programs, which report through a Technical Advisory Group to the Secretariat. The primary purpose of these two programmes is "to establish monitoring systems through which the impact of CITES decisions with respect to elephants and trade in elephant specimens can be assessed" (Annexes 1 & 2 (pages 90-91) to Resolution Conf. 10.10 (Rev.CoP15).

Since the transfer to Appendix II of the elephant populations of Botswana, Namibia and Zimbabwe in 1997, and that of South Africa in 2000, the two sales of stockpiled ivory (1999 and 2008) were accompanied by continuing revisions, mostly in the form of annotations, to the initial primary resolution (Conf. 10.10) governing the trade in ivory from the Appendix II countries. The hope that the monitoring programs would provide definitive results on the impacts of CITES decisions in respect of trends in illegal trade in ivory and killing of elephants, particularly those related to the two sales of stockpiled ivory, have not yet been realised. In a thorough recent analysis of available data, Burn (*et al* 2011) point out that a wide range of factors may influence the illegal killing of elephant and clear correlations between CITES decisions and the trends in illegal trade in ivory have not yet emerged.

It is important to appreciate that CITES itself does not have any direct enforcement or implementation capacity. <sup>5</sup> This lies with member states and their capacity to implement the legally binding resolutions and decisions adopted by the CoP. And herein lies the crux of the conservation problems for African elephants. A high proportion of African elephant range states do not have the resources in funds and trained personnel to protect their elephant populations (e.g. Lemieux & Clarke 2009). As a result there is a marked scale mismatch (Cumming *et al* 2006) between the centralised decision-making processes of the Convention and the decision-making process and capacity on the ground. Furthermore, the feedback loops between what is happening in the field and the Convention's decision-making and subsequent action on the part of member states are lengthy and delayed. High levels of elephant mortality and illegal trade in ivory have coincided with periods of civil disorder, corruption, and conflict associated with armed conflict and militias in eastern, central and southern Africa (e.g. Douglas-Hamilton 1983, Cumming 1986, Smith *et al* 2003, Hart 2012 in litt.) We attempt to address these problems in Chapter 5.

<sup>5.</sup> The use of sanctions against non-compliant states can and has been used to effectively to bring about compliance by affected states. However, this instrument does not appear to have been used in dealing with the problem of unregulated domestic ivory markets in Africa (see Reeve 2006).

#### 2.3 The present system of trade and the market

Resolution Conf. 10.10 (Rev. CoP15) and its annotations determine the manner in which trade in ivory can take place from those countries whose elephant populations are listed on Appendix II. The practice of selling ivory stockpiles at lengthy, irregular intervals departs from normal commercial practices. It results in substantial losses to those selling ivory and, because the supply of legal ivory is irregular and uncertain, it provides no incentives to ivory traders to confine their trade to legally available ivory. While current practice (i.e. occasional sales) is likely to result in disincentives to both producers and consumers there is clearly a need for an in-depth study and analysis of current pricing structures, market demand and capacity to meet that demand.

There have been several economic studies of the likely effects of banning trade in ivory, of the oneoff sales of ivory, and of the trade-offs between levels of law enforcement and incentives for illegal harvesting of ivory and rhino horn. In the ITRG (1989) report and in their book Barbier *et al* (1990) drew attention to the need to provide incentives for elephant conservation if a ban was not to have negative impacts on elephants. The regulations that are available to CITES and its decision-making mechanisms and processes do not readily lend themselves to developing, or providing, incentives to conserve elephants. In part this is because bans, and intermittent sales of stockpiled ivory, cannot, by their very nature, include potential benefits from sustainable use. At present this constraint applies even to ivory derived from natural mortality. Barnes (1996) explored the effects of an ivory trade ban on the economic value of elephants to Botswana and concluded that it reduced the existence and use value of elephants by about half. Several theoretical papers by Bulte, Damania, van Kooten, and by others (e.g. Burton 1999, Bulte & van Kooten 1999, Bulte & Barbier 2005, Bulte *et al* 2007) explore the effects of the ivory trade ban and one-off sales of ivory on the illegal trade, ivory prices and incentives to illegal trade but without clear policy solutions emerging.

A key, and still unresolved, issue (despite the above studies by Bulte and colleagues) is the likely effect of a legal trade in ivory by some countries on the illegal killing of elephants elsewhere in Africa. Sound data with which to test the various hypotheses that have been advanced in relation to this issue are not available, and are unlikely to be so, until such time as the alternative hypotheses are tested empirically.

Elephants provide ecosystem services, both in the sense of their keystone role in ecosystem dynamics and in the sense of their existence and aesthetic value to many cultures. Payments for ecosystem services are emerging as an important source of support for environmental conservation (e.g. Kok *et al* 2010) and possibly as a means of assisting in meeting the costs of conserving elephants and large carnivores (e.g. Bulte *et al* 2008, Dickman *et al* 2011). These still nascent initiatives might provide an avenue that CITES and member states could explore as opportunities to develop incentives for the conservation of species such as elephants, rhinos and the large carnivores.

#### 2.4 Efficacy and costs of existing compliance and enforcement measures

There are at least three sets of costs that need to be factored into the elephant conservation equation that are related to present compliance and enforcement measures under CITES. These are the costs associated with protecting elephant populations in the field, the costs of CITES monitoring of compliance and enforcement, and the external subsidies that support African elephant conservation.

The costs of managing protected areas in savannas can be estimated using the following formula developed by Martin (2007) –

# Total Cost = US\$ A x Illegal Hunting Challenge x Annual Scout Salary $x \sqrt{(Area)}$

- where:

A is a constant of 4 for savanna parks and 2 for desert parks;
Illegal Hunting Challenge is a constant taking the values: 1=Low, 2=Moderate, 3=High, 4 = Severe;
Annual Scout Salary is expressed in US\$; and
Park Area is expressed in square kilometers.

This relationship provided a good fit with the state protected areas in South Africa, Namibia and Mozambique. An earlier rule of thumb derived from park running costs in the early 1980s was a figure of at least US\$ 200 per km<sup>2</sup> for operating costs. Cumming (2008) provided examples of operating budgets and their deficits for five major parks in the Kavango-Zambezi Transfrontier Conservation Area and all were operating on budget deficits of between 62% (Chobe National Park) and 92% (Hwange National Park) based on the above figure. For protected areas in tropical forests the constant A could well be eight or greater.

Taking an average park area of  $10,000 \text{ km}^2$  for central, east and southern Africa, a severe illegal hunting challenge of 4, a ranger or scout annual salary of \$4,000 per annum and a constant of 6 (mean of 4 and 8) for A, with a total of (say) 40 parks that include elephants, the likely minimum budget required to protect these elephant populations adequately would be in the region of US\$384 million per annum.

Subsidies to support elephant conservation and the implementation of CITES compliance and enforcement measures include: (a) international donor contributions in the field and in campaigns to support their fundraising and educational and awareness campaigns in consumer countries; (b) the land use opportunity costs associated with protected areas and human-elephant conflict borne by farmers, and, (c) the opportunity costs resulting from not being able to legally trade in ivory.

#### 2.5 Concluding comment

The measures taken by CITES and member states almost certainly contributed to reducing levels of illegal trade for the period 1990 to about 2006. Other factors such as improved law enforcement in some countries following the ban may have also contributed. However, given the present rise in illegal killing of elephants in West, Central, and East Africa it is clear that current measures are not containing the present surge in the illegal trade in ivory. The present tendency to ascribe this increase to the sale of stockpiled ivory in 2008 tends to divert attention away from the far more serious problems relating to the inability of African countries to invest in protecting their elephants - an observation that begs the question of what incentives are there for them to do so? The focus on regulation without incentives is a central issue that needs to be addressed, a point made strongly by Barbier (*et al* 1990) in their contribution to the ITRG report and in their book, and later by Swanson (2000), Schally (2011) and Carpenter (2011). On the following page we give some relevant quotations from Professor Marshall Murphree –

"Regulation of use is an essential component for sustainability in use. Prevailing regulatory structures consist largely of a proscriptive and legislative nature imposed by the centre on the periphery, and they have failed to stop negative trends. The profile of the incentive package for regulatory compliance is too often wrong. **Incentive is the fulcrum of regulation**. Regulation usually requires an element of negative incentive proscriptions backed by powers to enforce them. But any regulatory system which relies primarily on negative incentives is, in the long term, in trouble. Enforcement costs are high and the legitimacy of the system in the eyes of the enforced is called into question. History shows that such systems are unstable and that sustainable systems of regulation are those that rely primarily on positive incentives – economic, cultural and institutional – and which are affordable. Hardin's (1985) comment is relevant here: 'We must recognize that all control operations incur costs; excessive controls generate their own kind of poverty.'"

"In the interplay between local and global benefits in biodiversity there is a critical nexus which largely determines the success or failure of sustainable use initiatives at both levels. "Use" can be defined as "the derivation of benefit," but the incentives which determine preferences for the mode of use vary significantly from global to local levels. Unless these incentives are made compatible the necessary collaboration for their attainment will be lacking. Bromley (1994) comments that '*Incentive compatibility is established when local inhabitants acquire an economic interest in the long-run viability of an ecosystem that is important to people situated elsewhere. ... Such ecosystems represent benefit streams for both parties: those in the industrialized North who seek to preserve biodiversity and those who must make a living amid this genetic resource.'* 

Without incentive compatibility stasis occurs, since each party has an operational veto over the other. Through policy, legislation and fiscal controls governments and international agencies can deny local people the organizational conditions necessary for the attainment of their conservation incentives. Through their in-place location and *de facto* managerial status local people can render external initiatives futile. The central challenge is, therefore, to transform such initiatives into sets of congruent, although not necessarily identical, incentives.

There is nothing inherently incompatible in these two incentive profiles. The differences between them can be seen as differences in means-end sequencing, the one stance being livelihood enhancement as a means to conservation and the other being conservation as a means to continued well-being. Dissonance arises when the two are brought together in one arena of action and where one stance is accorded "privileged problem" status. At present the tendency is for international intrinsic and existence valuations to be accorded higher order status and for local and instrumental conservation incentives to be regarded as lower level factors to be co-opted in the pursuit of these values. **This does not work**. Aside from their inherent merits, local incentives have a powerful veto dimension. Unless they are accommodated, international values and goals will be subverted by local responses ranging from defiance to covert non-compliance."

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#### **3.** EVALUATION OF TRADE REGIMES IN HIGH-VALUED PRODUCTS

Clause (b) of the TOR requires: ... evaluation of the strengths and weaknesses of international trade regimes and associated controls, safeguards and monitoring methods for other high-value commodities in the context of future trade in ivory

#### 3.1 Introduction

Domestic and international trade in wildlife is one of the major factors that affects the status and distribution of wild species (Oldfield 2003). The regulation of trade can have different effects depending on the species and the range of social, economic, and environmental conditions that occur within the range of any particular species. As a result, the effects of trade regulations are likely to vary in space and time to produce a gradient of responses, from positive to negative, on populations of a wild species. By their very nature wild species, unless farmed or ranched, are common pool resources and are often *de facto* open access resources, which means that issues of ownership and resource protection become important variables (e.g. Ostrom 2009). These considerations suggest that a finer-scaled approach to examining the effectiveness or otherwise of trade regulations and markets for wildlife (Fischer 2004, 2010) is needed if we are to draw lessons from case studies on other species for the conservation of elephants in Africa.

A recent comprehensive comparative review, or evaluation, of the effects of trade regulations on wild species does not appear to be available. Reviews such as those by Hutton & Dickson (2000) and Oldfield (2003) do, however, provide a range of case studies. There are several economic studies on the likely impacts of trade regulations and a ban on the trade in ivory on elephants (see citations in the previous Chapter). The overall value of the trade in wild species amounts to hundreds of billions of dollars a year (Oldfield 2003). There is great variation in the values and volumes of the species traded, as well as in whether the products involved can be harvested with, or without, killing plants or animals. In some cases the trade involves live animals where mortality during capture and transit is often very high.

Elephant ivory probably fits within a high value / medium volume category and can only be retrieved from dead animals. Rhino horn presently commands a very high price but can be harvested without killing the animals, as can the wool from vicuna.<sup>6</sup> The highest levels of trade in wild species, in both volume and overall value, are to be found in the timber and marine fisheries trade, but value per unit mass is generally low. An exception is the black caviar from the beluga sturgeon where the retail value is about US\$ 465 per ounce or \$16,402/kg (Weber 2010). International trade regimes in high valued products from wild species that are strictly comparable, or analogous, to elephants do not exist. This obstacle may be overcome to some extent by considering particular features of trade regimes in other species, and some minerals, that may provide useful guidelines for a trade in ivory.

<sup>6.</sup> The price for raw ivory in the field is dependent on the size of the tusk but even the largest tusks seldom exceed a value of US\$1,000/kg – whereas the current price for rhino horn is around US\$25,000/kg to the illegal hunter. Vicuna wool has been valued at between US\$ 250 and \$940/kg (Lichtenstein 2011).

#### 3.2 Trade in fauna and flora

#### 3.2.1 African rhinoceroses

Rhino horn presently has a very high value but the trade regime is illegal, and there are no "associated controls, monitoring methods, and safeguards" comparable to elephants for a legal trade in rhino horn. All African species of rhinoceros were listed on Appendix I in 1977, in response to a dramatic decline in the numbers of black rhino from > 60,000 in 1970 to < 15,000 in 1980 (Emslie & Brooks 1999). During the period 1960-1976 the number of northern white rhino declined from 2,230 to about 500, while the southern white rhino population continued to increase. It numbered 150 in 1929, increased to 3,800 by 1984, and reached approximately 20,000 in 2010. The major expansion in range and numbers (outside of Kruger National Park) occurred on private land. However, levels of poaching in South Africa and Zimbabwe have escalated in the last five years, as has the price of rhino horn. The key point is that, despite very high investments in southern Africa on both state and private land, it has not so far been possible to contain, let alone eradicate, the levels of illegal killing of rhinos. Key features that emerge from the rhino conservation experience that have implications for elephant conservation and a trade in ivory are –

- a) The recent upsurge in rhino poaching, despite very high levels of protection, emphasises the increased level of investment required to protect endangered species carrying very valuable appendages. In some areas intensive daily monitoring of tagged individuals has been a cornerstone of protection and law enforcement strategies, as has dehorning.
- b) The northern white rhino is now probably extinct in its former range. High NGO investment in its protection in Garamba National Park eventually failed against a backdrop of negligible government support, and high levels of civil disorder and military action in the area.
- c) The growth in numbers of the southern white rhino over the last 30 years was associated with an expansion in their range through the purchase of animals by private landholders to stock conservancies and game ranches. For landowners the incentives were the added value to their tourism enterprise of having white rhinos on their land.<sup>7</sup> Similar incentives supported the relocation of black rhino from national parks to private land in Zimbabwe during the period when the country's population crashed from > 1,775 in 1986 to < 350 in 1993 (Du Toit 2002, Emslie & Brooks 1999).</p>
- d) The value of rhino horn has risen rapidly in the last few years despite the absence of a legal trade in rhino horn since 1977. In the 1980s the price of raw rhino horn was about \$850 per kg. The price to the illegal trader in South Africa has escalated sharply in the past three years. In 2009 it was about US\$5,000/kg, in 2010 it rose to US\$10,000/kg and, at the end of 2011, it was approaching US\$25,000/kg ((Martin 2012, Richard Emslie, *pers.comm.*)

<sup>7.</sup> South Africa is moving further and further away from its stated goal of disseminating rhino widely throughout the country and increasing their numbers. This process was essential to cope with a situation where rhino are reaching ecological carrying capacity in some State Protected Areas and need to be translocated if population growth is to continue. Rhino are now being seen as a liability by private investors, there are few incentives for landholders to invest in rhino and a process of range shrinkage and disinvestment in rhino has already started.

#### **3.2.2** Narwhals (Monodon monoceros)

Narwhals are confined to the Arctic waters of northern Russia, northern Canada, Greenland and Svalbard, and are usually in or near sea ice. Adults are 4-5m long, weigh up to 1,600kg, and males carry a single spiralled tusk of 1.5 to 3m long. They are highly social mammals, reach sexual maturity at 7-9 years with a gestation period of 14-15 months, and may live for 75 to 100+ years (NAMMCO 2005). Inuit hunters have subjected them to a subsistence harvest for centuries and the animals have been hunted since medieval times for their tusks, which were believed to have magical properties. The global population is estimated to be about 80,000.

Narwhals were listed on Appendix II of CITES in 1977. The main market for the ivory was Europe. The EU, however, banned the import of tusks in 2004 amid concerns about the sustainability of the harvest. Because of its specialised habitat requirements the species is likely to be more sensitive to climate change than most cetaceans. Quotas for each of the distinct components of the larger meta-population are based on aerial surveys and the North Atlantic Marine Mammal Commission (NAMMCO) and the Canada Greenland Joint Commission provide scientific advice on quotas in Canada and Greenland (Heide-Jørgensen *et al* 2010). Because of its listing on Appendix II, a 'non-detrimental finding' (NDF) is required to be issued by the national governments concerned for any exports. This requirement, in turn, requires up-to-date estimates of the size of the populations involved as well as other information.

Two aspects relating to the management of narwhals provide useful pointers for the management of elephants and a trade in ivory, namely, the role of localised commissions to manage the species <sup>8</sup> and the use of an NDF decision-making process as illustrated in **Fig. 3.1** on the next page. These institutional arrangements go some way to reducing the scale mismatches identified in the previous Chapter (section 2.3, page 10) and increase the likelihood of local participation in decision-making, buy-in and compliance.

<sup>8.</sup> See Weber (2008) for an analysis of the potential benefits of links between regional management organisations and CITES.



**Figure 3.1:** Non-Detrimental Finding decision process for narwhal 'fishery' in terms of CITES requirements for export of Appendix II specimens. (Source: Redrawn from Witting *et al* 2005)

#### 3.2.3 Vicuña

# Summarised from Lichtenstein (2011)

Vicuñas were listed on CITES Appendix I in 1975 when the total populations had dropped to about 10, 000 animals through overexploitation. The Convention for the Conservation and Management of the Vicuña was signed in 1979 by Argentina, Bolivia, Chile, Peru and Ecuador. Andean people were named as the main beneficiaries of future vicuña use, in Article I of the Vicuña Convention, and in the signatory states' subsequent submissions to CITES meetings.

Vicuñas are one of the few native large herbivores that inhabit South America's deserts and high plateau scrublands and grasslands. The distribution of vicuñas is limited to elevations above 3,700m in the *puna* and *altiplano*, high Andean ecoregions in Argentina, Peru, Bolivia, Chile, and Ecuador. Peru holds approximately 50% of the global vicuña population. Vicuña wool is one of the most valuable and highly priced sources of animal fibre on the international market. An adult animal produces only eight ounces (227gm) every two years. Vicuña fibre is more expensive than other fine fibre because of its rarity and unique qualities. Luxury garments made from vicuña fibre are sold in the most exclusive fashion houses in Europe, USA, Asia and Australia.

Vicuñas are managed through captive breeding and non-lethal harvests from wild populations. Captive breeding involves maintaining vicuñas in fenced enclosures where food, water and veterinary care are provided and selective breeding may take place. While wild management has the potential to create economic incentives for the conservation of species and habitat, the link between this management of captive animals is less obvious and the financial returns are much smaller. Wild management uses a capture and release system which has evolved from the Inca *chaku* tradition. In the case of vicuñas, large numbers of community members holding colourful flags chase the animals into a funnel from where they are taken, shorn and released.

The vicuña recovered from a global population of 10,000 to more than 400,000 animals during the period 1965-2010. CITES and the Vicuña Convention played a key role in halting the population decline.

The total vicuña fibre production of Andean countries is approximately 7,400 kg per year. In the past ten years, prices paid for raw fibre have ranged from US\$250 to US\$940 per kg and have varied greatly among and within countries. The profits obtained from the transformation of raw material in Italy are high but producers probably reap less than 5% of the price paid for the final product. Despite these problems of equity and the apparently low rewards to local farmers the recovery of vicuna has been remarkable and has been characterized by the following key features –

- a) An initial listing on Appendix 1, which provided an effective ban on lethal harvesting of vicuna that was complied with by the range states involved;
- b) A formal Convention for the Conservation and Management of Vicuna was then established by the five range states in which the species occurred;
- c) Once recovery of the species began, and appropriate institutions were established under the legal frameworks of the countries concerned, vicuna were then listed on Appendix II; and
- d) An explicit commitment was made to involve and benefit local farmers and communities in the conservation and management of vicuna.

### 3.2.4 Crocodiles

The legal trade in crocodiles is one of the success stories in CITES history which shows species recovery as a result of trade. Using international trade in crocodilian hides as a case study, Hutton & Webb (2002) addressed two competing hypotheses (hypotheses which polarise the positions adopted by the Parties to CITES in respect of matters relating to use and trade) –

- a. That legal trade in wildlife can be used to displace illegal trade.
- b. That legal trade in wildlife will inevitably encourage illegal trade.

The modern crocodilian trade has seen the replacement of skins from unregulated exploitation with skins from sustainable resource management. Today, at least 30 countries use wild harvests, ranching or captive breeding to produce crocodilian products from 12 species to supply international trade – with the clear management strategy that these programmes should not threaten any species in the wild. As a result, the eleven most commercially valuable species are those <u>least</u> threatened with extinction.

Hutton & Webb (2002) conclude that conservation incentives can and have been generated by markets; the economic importance of the resource has led directly to stronger institutional arrangements specifically for conservation and sustainable management. The illegal international trade, which flourished before CITES encouraged legal trade, has been all but eradicated.

The strengths in the reptile trading process are that large numbers of skins can be generated from captive breeding operations to satisfy market demand but also wild populations are sufficiently abundant that, provided systems of adaptive management are used to ensure sustainability, they too can produce a harvest of significant value. This has enabled the transition from illegal trade to legal trade.

#### 3.2.5 Tigers

As in the case of black rhinos, the range of tigers and their numbers have plummeted in recent decades (Dinerstein *et al* 2007) primarily through demand for body parts and a loss of habitat and prey. There are a few examples where concerted conservation efforts have resulted in some local recovery. The costs of these successful conservation efforts have varied from as little as  $14/km^2$  in the Russian Far East to about  $250/km^2$  in the Terai Arc Landscape of Nepal. In India, intermediate levels of investment (around  $95/km^2$ ) in tiger conservation failed partly because of misuse of funds (Dinerstein *et al* 2007).

China banned all trade in tiger parts within its territory in 1993 and this was considered to have been successful in reducing demand and trade (Gratwicke *et al* 2008). However, within China, tigers are being farmed with the intention of supplying tiger parts in the future. Conservationists argue that this will provide an opening for the laundering of parts from wild tigers, particularly those from wild animals that are considered to provide a more potent medicine (Dinerstein *et al* 2007, Gratwicke *et al* 2008). Furthermore the costs of raising tigers for their products make these (i.e. tiger parts) an order of magnitude more expensive than those taken from wild animals.

Bulte & Damania (2005), using theoretical models, examined aspects of likely market responses to parts from wild and farmed animals (tigers and rhinos) and concluded "simple rules of thumb might not exist in the complex world of the international trade in wildlife commodities." They suggest that criminal networks, centred between illegal suppliers and consumers, can gain **market control** and so influence the relative balance in pricing between wild (illegal) and farmed components of trade.

The crocodile farming industry, whether intentionally or not, was able to gain market control *(sensu* Bulte & Damania 2005) probably by the sheer volume of trade they were able to generate from farmed crocodiles. Market control was central to the De Beers diamond trading monopoly (see below). We are not suggesting that farming of elephants should be considered. We examined these examples of tigers and crocodiles because they raise two pertinent points that relate to trade regimes in high valued products –

- a) When member states attempt seriously to implement CITES decisions, as China did in banning *domestic trade* in tiger parts, they can contribute positively to the conservation of endangered species within and beyond their borders.
- b) The insights relating to market control and thresholds between legal and illegal supplies of high valued commodities raised by Bulte & Damania's (2005) analysis may have important implications for the manner in which any legal trade in ivory is managed.
- c) In-depth economic analysis of wildlife trade (at least for the species covered above) has been restricted to theoretical modelling and surveys of what is available in end markets. We are not aware of any in-depth empirical studies of demand and preferences for wildlife products by consumers based on statistically sound market and opinion surveys.

#### 3.2.6 The International Timber Trade and Certification

Timber is by some margin the most valuable renewable natural resource commodity traded. In the early 1990s, TRAFFIC estimated the global timber trade was worth around US\$104 billion, approximately 65% of the total worldwide wildlife trade. By 2009, the FAO estimated the annual turnover at more than US\$200 billion (TRAFFIC 2012).

Civilisations have risen and collapsed because their exploitation of forests has been unsustainable (Diamond 2005). The dilemma that has faced societies for thousands of years is that, on the one hand, the ecological role of forests is vital to human survival whilst, on the other, the opportunities for wealth for those countries possessing an apparent abundance of the resource are difficult to ignore. The global demand for timber has persisted for millennia and is increasing today. What is different today is that the issue has become a global concern and many international agreements and organizations have been established to deal with the problem of the sustainable use of forests. However, tropical forests continue to be logged and transformed at unsustainable rates and, besides the loss of biodiversity, the loss of forests has major implications for global carbon sequestration and climate change.

The first International Tropical Timber Agreement (ITTA) had its origins at the United Nations Conference on Trade and Development (UNCTAD) in 1976 as part of their Programme for Commodities. The eventual outcome of these negotiations was the ITTA 1983, which in turn led to the establishment of the International Tropical Timber Organization (ITTO). The ITTA was not a conventional commodity agreement. It was, in reality, as much an agreement for forest conservation as it was for the development of trade (ITTO 2012).
In response to ongoing depletion of forests and the general failure of trade agreements civil society organisations sought to build stronger links between the producers and consumers of timber and timber products by the certification of products throughout the full chain of custody. Perhaps the most prominent of these certification schemes has been that driven by the Forest Stewardship Council (FSC) founded in 1993. The move to certification beyond forests was strengthened towards the end of the 1990s when the FSC, the International Federation of Organic Agricultural Movements, Fairtrade and Marine Stewardship Council explored ways of collaborating. They were later joined by Social Accountability International, Rainforest Alliance Federation, and the International Organic Accreditation Service. In 2002 these organisations formed ISEAL to establish standards of good practice in social and environmental developments and associated trade.

The ten FSC principles and criteria for certification (http://www.fsc.org/) are as follows -

- "Principle 1. Compliance with all applicable laws and international treaties
- Principle 2. Demonstrated and uncontested, clearly defined, long-term land tenure and use rights
- Principle 3. Recognition and respect of indigenous peoples' rights
- **Principle 4.** Maintenance or enhancement of long-term social and economic well-being of forest workers and local communities and respect of worker's rights in compliance with international Labour Organisation (ILO) conventions
- Principle 5. Equitable use and sharing of benefits derived from the forest
- **Principle 6.** Reduction of environmental impact of logging activities and maintenance of the ecological functions and integrity of the forest
- Principle 7. Appropriate and continuously updated management plan
- **Principle 8.** Appropriate monitoring and assessment activities to assess the condition of the forest, management activities and their social and environmental impacts
- *Principle 9.* Maintenance of High Conservation Value Forests (HCVFs) defined as environmental and social values that are considered to be of outstanding significance or critical importance
- *Principle* **10.** In addition to compliance with all of the above, plantations must contribute to reduce the pressures on and promote the restoration and conservation of natural forests."

The relevance to ivory trade of these developments in certification and green labelling is that they may provide guidance in achieving public involvement in market choices in relation to ivory artefacts. It should be recognized, however, that such developments are only likely to be effective in societies where consumers feel a moral obligation to avoid illegally sourced goods and to support socially and environmentally sound and sustainable practices. These societal values are not presently evident in the major markets for ivory but there is no reason why attempts should not be made to develop them.

The applicability of this type of approach (often referred to as "eco-labelling") to CITES and the trade in wildlife is well argued by Swanson (2000) and requires a meeting of minds between producers and consumers.

#### 3.3 Non-wildlife commodities

Under this heading we reviewed alcohol prohibition in the United States (1920-1933) and the international drugs trade. Both of these are examples of trade bans that have not worked. Where there is a strong market demand for a commodity, it will find its way to the end-user regardless of controls and will automatically spawn organised crime and black markets. We decided not to include the reviews in the interests of brevity: however, we draw some lessons from them in the concluding comments of this Chapter (page 28).

## **3.3.1 The diamond trade** *History of De Beers summarised from Epstein (1982)*

Up until the late nineteenth century, diamonds were a rare and valued gemstone. They were found in a few riverbeds in India and Brazilian forests. The entire world production of gem diamonds amounted to a few kilograms a year, which served to maintain their rarity value. In 1867 the discovery of the Eureka diamond along the Orange River in South Africa precipitated a rush for alluvial diamonds along the river. This was soon eclipsed by the discovery of a diamond pipe at Kimberley in 1870 that resulted in the first diamond mine. The mine yielded huge numbers of diamonds that had the potential to flood the market. The major investors in diamond mines realized that it would be in their interests to combine into a single entity powerful enough to control diamond production and maintain the scarcity of diamonds. The instrument that they created for this purpose was De Beers Consolidated Mines, Ltd.; a company incorporated in South Africa. Sir Ernest Oppenheimer (1902-1957) established the Anglo-American Corporation, which had a controlling share in DeBeers and the Anglo-De Beers corporate pyramid provided the means for maintaining market control and protecting the diamond industry in adverse times.

De Beers dominated the diamond mining, diamond trading and industrial diamond manufacturing sectors up until 2000 (Stein, 2001). After relinquishing its global monopoly, De Beers took the lead in initiating the **Kimberley Process Certification Scheme** (KPCS) at a meeting of Southern African diamond-producing states in Kimberley in May 2000. The Kimberley process was designed to certify the origin of rough diamonds from sources which are free of conflict funded by diamond production.<sup>9</sup>

A state participating in the process must ensure that any diamond originating from its country does not finance a rebel group or other entity seeking to overthrow a UN-recognized government; that every diamond export be accompanied by a Kimberley Process certificate; and that no diamond is imported from, or exported to, a non-member of the scheme. This three-step plan is a simple description of the steps taken to ensure a chain of countries that deal exclusively with non-conflict diamonds.

The diamond industry is in some disarray at the moment. The Kimberley Process is not providing the hoped-for controls over the trade and many international NGOs which supported the KCPS initially are now withdrawing their support. One of the KCPS's major flaws lies in its organisational structure which relies on system of rotating chairs from national governments and allows the political process to influence the decisions of the organisation (Wikipedia 2011).

<sup>9.</sup> In December 2000, the United Nations General Assembly adopted Resolution A/RES/55/56, supporting the creation of an international certification scheme for rough diamonds, and this was followed by support from the United Nations Security Council in its Resolution 1459 passed in January 2003. Every year since then, the General Assembly has renewed its support for the KPCS - most recently in December 2009.

We do not see the Kimberley Process as providing a model for the ivory trade. The former De Beers controlled diamond industry is relevant to a potential future trade in ivory because of the direct links it established between producers and diamond cutting factories and the manner in which it sold diamonds.

## The De Beers selling system

In 1931 Ernest Oppenheimer created the Diamond Trading Company (DTC), which took over the responsibility of the syndicate for allocating diamonds to manufacturers and wholesalers.

- The entire world supply of raw diamonds was distributed through a single outlet at Number Two Charterhouse Street in London.
- (2) Sales (called 'sights') took place every five weeks during the year, i.e. about ten sales per year.
- (3) Some 250 chosen buyers (named 'sightholders') who owned diamond-cutting factories in New York, Tel Aviv, Bombay, Antwerp and Hong Kong attended the sales.
- (4) DTC carried out its own market research on the demand for diamonds and allowed sightholders to submit requests for their particular requirements before each sale.
- (5) Rough diamonds were sorted into 'parcels' before each sale and the head of DTC set the price for each parcel. Each parcel was allocated to a specific individual sightholder.
- (6) Buyers had to accept the prices set for their parcels and haggling was not permitted. A sightholder had Hobson's Choice he either accepted his parcel or rejected it. If he refused to pay the price he might not be invited to future sights.
- (7) Sightholders undertook to move their rough diamonds directly into the diamond cutting and polishing industry. They agreed not to trade in the rough stones they had purchased.
- (8) Sightholders also undertook not to sell their cut and polished stones to wholesalers or retail jewellers who undercut prices at the retail level. De Beers sought to remove destructive competition in the jewellery market.
- (9) Sightholders agreed to provide De Beers with whatever information it needed to assess the diamond market including full inventories of their own stocks in rough and polished diamonds.

Apart from these constraints on sightholders, De Beers also provided positive incentives. Favoured clients with unblemished records frequently received lucrative large stones in their parcels that allowed them to realise windfall profits. Compliance was monitored by sightholders agreeing to 'spot' audits being carried out on their own businesses from time to time in order to verify that their reports to DTC tallied with the stocks found on these surprise visits.<sup>10</sup>

<sup>10.</sup> In 1978 forty sightholders were barred from attending future sights because they had violated the rule not to trade in uncut diamonds by selling raw diamonds to dealers in Israel.

This system of selling enabled De Beers to extend its control from the mines to the cutting factories of Belgium, India, Israel and the United States. Through its clients De Beers was able to monitor and regulate the flow of diamonds that passed through the pipeline into the world retail market. De Beers maintained an effective monopoly over the diamond trade for more than a century – which included both colonial and post-colonial periods. This was done through controlling both the demand and supply of gemstone diamonds.

The key elements of this system that have potential for a trade in ivory and the conservation of elephants are –

- a) A very short and effectively controlled market chain between production and processing;
- b) Cooperation between producers and processors leading to adaptive management in, and careful attention to, the pricing of the raw material and the selling of processed artefacts; and
- c) Effective control of the legal market for an extended period.

Barmecha (2007) pays tribute to De Beers stabilizing effect on the diamond industry. De Beers provided structure, organization and regulation to one of the most profitable precious-stone industries in the world, without which the industry would have failed to exist. It maintained, sustained and created ideal market dynamics. Having made some harsh criticisms of De Beers, Barmecha (2007) goes on to describe the ironic situation that, despite the decline of De Beers cartel, the current diamond industry needs De Beers' presence as much as it does not want it ... and De Beers knows this.

#### 3.4 Ivory market chains and controls

Ivory is produced when elephants die from natural causes (including predation) or when humans kill them. A person then collects the ivory that may travel via several routes to a variety of end users as indicated diagrammatically in **Fig. 3.2** on the next page. The key question is where and how in this "market chain" control of the trade might be implemented to most effectively minimise illegal trade and the risk of illegal ivory entering the legal market chain?

The most recent attempt to re-open a legal trade in ivory involved the direct transfer of ivory from national stores in four southern African states to buyers in China and Japan. Illegal ivory, such as confiscated ivory originating from another state, could have entered national stores. Illegally derived ivory has clearly been included in the ivory carving businesses in Asia (Martin & Vigne 2011a) and some African countries (Martin & Vigne 2011b). In the case of China the legally purchased 60 tonnes ivory in 2008 had been held by government agencies and rationed to carving business but with a price hike of some 500% over the purchase price (D. Stiles *in litt.* 2012). In this way an intermediary trader in ivory could radically influence the price of raw ivory, whether legal or illegal.



Figure 3.2: Movement of ivory from production in the field to end consumers through legal (blue lines) and illegal (red lines and boxes) pathways. The two-way arrow between the legal external ivory trader and the illegal ivory trade in the centre of the diagram highlights a key point of "contagion" between legal and illegal ivory and one that could be closed by the process outlined in Chapter 6.

The short market chain used in the 2008, and the earlier 1999 sale to Japan, had several shortcomings, not least of which was low prices to producers and the intermittent and uncertain supply of legal ivory to the carving industry (see also section 2.3 p11). The system dealt with the movement of ivory from the field to the national ivory store, and from the buyer to the carver in the following ways. The ivory stocks held by each country were declared to the CITES Secretariat who then organised the sale. The provenance of the ivory to be sold was not audited and there have been suggestions that some forest elephant ivory was included in the stocks sold. The selection of which countries could buy ivory was based on an evaluation, by the Secretariat (e.g. CITES 2005), of the domestic controls the country had in place to regulate their ivory carving industry and to prevent the laundering of the illegal ivory. Clearly these controls have been ineffective (Martin & Vigne 2011a). The question then is what means are likely to be the most effective in regulating the entry of ivory into the market chain and its transit to ivory carvers and consumers?

*Entry of ivory into the market chain.* Raw ivory originates in various ways (Fig. 3.2) and the domestic regulations and incentives that govern where the ivory should go will influence the behaviour and choices of whoever collects the ivory in the field. At this point the ivory could follow a legal or illegal route depending largely on how effective national policy and legislation are, and the degree of public support for it. For example, regulations that make it illegal for anyone to hold raw ivory (as defined by CITES) without an appropriate permit and that have stiff penalties for offenders would act as a deterrent. Similarly, the transfer of collected ivory to a central store with the knowledge that there will be a return to a landholder or agency for the ivory sold, can act as a incentive to surrender collected ivory. A recent example from a Kenyan court case partly illustrates the point: on the same day, in the same court, one man received a seven year jail term for stealing a sheep, but others, apprehended while hacking the tusks out of an elephant, received a fine equivalent to about \$183.00 (Vigne 2012). The tradeoffs between passing ivory through a legal route or through an illegal dealer clearly need to be carefully examined in each country that may be involved in a legal trade in ivory.

*Transit of ivory between countries.* To avoid the risks of illegal ivory entering legal shipments transit should be by way of sealed and signed packages verified on departure and receipt by competent persons.

*Distribution of imported ivory to processors.* Ivory traders from Japan purchased southern African ivory at CITES supervised sales in 1999 and in 2008. The ivory was purchased by traders who then sold raw ivory on to carvers mostly for the production of seals of *hankos*, which formed about 80% of the use of ivory in Japan. Hankos are sold once they receive a CITES label after government inspection; a practice that provides an official check on the trade (Vigne & Martin 2009). China was accredited by CITES (2005) as a buyer of raw ivory at the southern African sale in 2008. The ivory was purchased by the Chinese government, which then sells raw ivory to government carving factories. A certification and labelling system exists for artefacts produced by ivory carving factories and which are then sold in numerous retail outlets. A recent survey of the ivory trade in China has revealed that the system is not working effectively and a high proportion of carved items did not have certificates, or the retailers could not produce the required certificates, with the result that illegal ivory is clearly being laundered alongside legally derived ivory (Martin & Vigne 2011a). The trade in elephant ivory occurs alongside a flourishing mammoth ivory carving industry that is not subject to CITES control.

## 3.5 Concluding comments

The above brief review of aspects relating to the international trade in several species with high valued products and of the earlier trade in diamonds, suggests that the following features may be important in designing a process for the trade in ivory –

- (1) The costs of protecting species with high valued products may be very high and beyond the means of many developing countries to meet.
- (2) Government and public support, together with an absence of civil disorder, are important ingredients to successful conservation of high valued species and the maintenance of legal trade in commodities.
- (3) Expanding the range of high-valued species beyond the boundaries of state protected areas requires incentives to landholders.

- (4) The development of regional and local institutions, such as joint commissions, for the management of species and trade in their commodities is likely to be beneficial, as is the involvement of a full range of stakeholders in the management of the resource and its trade.
- (5) Strong domestic law and enforcement is pivotal to success.
- (6) An understanding of the market in which commodities are to be traded needs to be based on sound empirical data dealing with consumer preferences, attitudes and behaviour, particularly if they are to be influenced by pricing structures and certification, or green labelling initiatives.
- (7) The shorter the market chain between producer and consumer the less likelihood there is of illegal components being laundered in a legal trade and the fewer the opportunities for corrupt practices to develop.
- (8) There is a clear need to address the leakages between the import of raw ivory and in its distribution in trading partner countries.

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## 4. IMPACT OF HARVESTING AND TRADE ON ELEPHANT POPULATIONS

Clause (d) of the TOR states: Exploration of the conditions under which international trade in elephant ivory could take place, taking into account: ecological and economic sustainability of the ivory trade; the impact of trade on the illegal killing of elephants; the initial impact of the one-off sale that was agreed at the 14<sup>th</sup> meeting of the Conference of the Parties (The Hague 2007); levels of illegal trade, enforcement challenges and capacities; information on linkages between legal and illegal trade; and methods to elucidate these linkages; methods to track the chain of custody, etc..

In this chapter -

- 4.1 We give a brief overview of the historical trade in ivory.
- 4.2 The population estimates from the African Elephant Database are summarised. These form the basis for some aspects of the population modelling which follows.
- 4.3 We examine the sustainability of ivory production using a population simulation model which is described in **Annex 3** (page 122). The life history parameters and assumptions underpinning the model are given in this annex. The model has been used to examine the effects of various levels of exploitation on parameters which could be measured in ivory seizures or in field data collection.
  - 4.3.1 Where the harvest entails removal of the largest tusks in the population each year, we give the expected changes in the mean tusk weight, population rate of increase, sex ratio of the offtake, age of the oldest surviving males and females, and ivory production under increasing levels of exploitation.
  - 4.3.2 We examine population recovery after unsustainable exploitation.
  - 4.3.3 Where the harvest entails a process of successive extinctions of discrete populations, we show the age structure, ivory production and ivory value which results from this process.
  - 4.3.4 The simulation model is used to assess expected ivory production from a population management regime which entails culling, trophy hunting, problem animal control and collection of ivory from natural mortality.
- 4.4 One-off sales of ivory -
  - 4.4.1 The effects of one-off sales of ivory on illegal hunting of elephants are assessed.
  - 4.4.2 Possible prejudice to ivory exporting countries under the method of ivory sales is estimated.
- 4.5 Conclusions

#### 4.1 History of ivory trade

Ivory has been carved (and presumably traded) for at least 40,000years, if not longer Parker (1983, p142) suggests it may date back to the time of the mammoths and Walker (2009) refers to worked ivory found both at Grotte du Renne (France) and Kostenki (Russia) dating back some 40,000 years. The tradition of ivory carving in China goes back for at least five thousand years. Ivory has been traded from Africa for the last three millennia. There is evidence to suggest that ivory was being traded from Mapungubwe on the Limpopo in 1100 AD and from the east African coast well before that (Martin & Martin 1978). Thorbahn (1979) described the pre-colonial south-eastern area of Kenya encompassing the Tsavo National Park as a human-elephant ecosystem in which the ivory trade was an integral component; the primary destinations for ivory being Asia Minor and India at the time (15-18<sup>th</sup> Century). Well before this time ivory was being imported to Greece and Rome from North Africa. Up to 200 tonnes of ivory were exported annually from Mozambique Island and Zanzibar from the 1500s to 1800s (Alpers 1975, Parker 1983).

Elephants have been hunted for their meat in Africa as far back as a million years ago and the rise of hominids as effective predators during this period may have contributed the demise of several genera of proboscideans on the continent (e.g. Lyons *et al* 2004, Surovell *et al* 2005). Elephant hunts feature in Khoi San rock paintings that date back to ten or twelve thousand years ago.

The latter part of the 19<sup>th</sup> Century saw a major rise in the export of ivory from Africa (**Fig.4.1** p33) which reached a peak in 1887 with approximately 1,000 tonnes leaving Africa (Spinage 1973) and a corresponding decline in elephant numbers across the continent. Colonial governments introduced protective measures and tusks weighing less than 15lbs could not be exported legally. By the 1950s most elephant populations had shown clear signs of recovery and by the mid-1960s elephant impacts on savanna woodland habitats raised concerns about over-population of elephants in protected areas. Elephant culling was introduced in several parks in east and southern Africa at this time. Incidents of human-elephant conflict and the number of elephants being killed as a result of crop raiding were also increasing rapidly.

A sharp rise in the amount of ivory being exported from Africa began in the 1970s (**Fig.2.1** p6), reached a peak of more than 1,000 tonnes in 1983 and declined until 1989 when the international ban on the trade in ivory was introduced. Since then, apart from two legal sales of southern African ivory stockpiles, the amount of ivory leaving Africa has had to be judged from seizures of illegal shipments intercepted by customs officials. Levels of mortality have also been tracked in some areas by monitoring the proportion of carcasses seen during aerial censuses and encountered on ground patrols.<sup>11</sup> These data indicate ongoing illegal killing of elephants in many parts of sub-Saharan Africa with marked declines in numbers in West, Central and parts of East Africa.

<sup>11.</sup> Ground patrols are able to identify illegal kills, which can't be done from the air and provide data for PIKE.







During the last two centuries the movement of ivory has tended to shift with changing patterns of supply and demand. The data shown above for imports into India, the United Kingdom, Japan and Hong Kong, show large quantities of ivory imported into India during the early part of the 19<sup>th</sup> Century, then into the United Kingdom, followed by Japan and Hong Kong during the latter part of the 20<sup>th</sup> Century.

It is noteworthy that the imports of ivory into these four countries alone over the two hundred year period have in several years approached 1,000 tonnes per annum. If the data for the remaining importing countries were included (e.g the USA), almost certainly the ivory leaving Africa would have exceeded 1,000 tonnes on many occasions over the two centuries.

The ivory exports from Africa during the ten years prior to the listing of the African elephant on Appendix I exceeded 800 tonnes consistently up until the inception of the quota system in 1985 (**Fig 2.1** page 6). The amounts of ivory exported by the separate regions in Africa are shown in the table – Eastern and Central Africa together provided more than 80% of the exports.

While many consider that the ongoing illegal trade in ivory and the declines in some elephant populations are driven by demand for ivory in China, there are many drivers involved <sup>12</sup> and identifying and quantifying the root causes of declines in elephant populations with any certainty is problematic because of a lack of appropriate data (e.g. Burn *et al* 2011).

Our reason for outlining the long history of trade in ivory is to suggest that it is deeply rooted in some cultures and is unlikely to be changed rapidly. A total ban on elephant ivory is unlikely to stop the carving of ivory or the demand for finely carved artefacts – mammoth ivory provides a long-term substitute.

#### 4.2 Elephant population estimates

Elephant population estimates from the African Elephant Database are available for 1995 (Said *et al* 1995), 1998 (Barnes *et al* 1999), 2002 (Blanc *et al* 2003) and 2007 (Blanc *et al* 2007). The most recent data are for 2007 (**Table 4.1** below) which are already 5 years out of date.

TOTALS **ESTIMATES** Definite Probable Possible Speculative Def+Prob Def+Prob+Poss All 709.422 554,973 453,073 101,900 104,085 50,364 659,058

 Table 4.1: Continental elephant estimates 2007

The detailed estimates for each region are given in **Table 4.2** on the next page and the trend lines and projections for the year 2012 are shown in **Fig.4.2** (page 36). We are well aware that the authors of the reports caution against the use of the data for illustrating trends: however, except in the case of Central Africa where there are few areas covered by detailed surveys, the correspondence between the points and the trend lines is fairly good.

If the average rates of increase of populations in each region in 2007 had persisted the continental elephant population would be some 738,000 in the year 2012 (excluding 'Speculative' estimates). However, recent reports suggest that elephant populations in West, East and Central Africa have declined markedly in the past two years so that it is unlikely to be as high as this. It is also unlikely to be less than 500,000 since the extrapolated value for the Southern Africa population is some 435,000 elephants and the illegal hunting in this region has not been severe. In making estimates of the potential ivory production at a continental level, we have conservatively used a figure of 555,000 elephants (the 2007 'definite' plus 'probable' estimates) and in some cases we have simply rounded this number off to 500,000. The quality of the data do not allow much greater precision.

<sup>12.</sup> Stiles (2012b, in litt.) observes that the demand from traders may exceed that of consumers.

## Table 4.2: African elephant population estimates from the African Elephant Database 1995-2007 (excluding Speculative estimates)

The figures next to the columns headed "Predicted" are the squared differences between the estimates in the upper part of the table and the values predicted from the growth parameters

	SOUTHERN AFRICA				EAST AFRICA			CENTRAL AFRICA			WEST AFRICA			GRAND			
Year	Definite	Probable	Possible	Total	Definite	Probable	Possible	Total	Definite	Probable	Possible	Total	Definite	Probable	Possible	Total	TOTAL
1995	170,837	16,402	18,983	206,222	90,482	16,707	19,999	127,188	7,320	81,657	128,648	217,625	2,760	1,376	5,035	9,171	560,206
1998	196,845	17,057	22,623	236,525	83,770	22,698	17,216	123,684	7,322	27,104	27,613	62,039	2,489	644	6,228	9,361	431,609
2002	246,592	23,722	26,098	296,412	117,716	17,702	22,511	157,929	16,450	32,263	64,477	113,190	5,458	1,188	3,039	9,685	577,216
2007	297,718	23,186	24,734	345,638	137,485	29,043	35,124	201,652	10,383	48,936	43,098	102,417	7,487	735	1,129	9,351	659,058
CURV	E FITTING	3															
	Populatio	n rate of in	crease %	4.36				4.21				-6.98				0.21	
		Populatio	n in 1995	210,500				120,700				173,200				9,280	
				Predicted	10 <sup>-3</sup> Diff <sup>2</sup>			Predicted	10 <sup>-3</sup> Diff <sup>2</sup>		I	Predicted	10 <sup>-4</sup> Diff <sup>2</sup>		l	Predicted	10 <sup>-1</sup> Diff <sup>2</sup>
			1995	210,500	18,301		1995	120,700	42,094		1995	173,200	197,358		1995	9,280	1,188
			1998	239,251	7,433		1998	136,595	166,699		1998	139,405	598,543		1998	9,339	50
			2002	283,786	159,422		2002	161,092	10,002		2002	104,372	7,776		2002	9,417	7,167
			2007	351,286	31,901		2007	197,979	13,488		2007	72,688	88,380		2007	9,517	2,742
		Sum of s	squared di	fferences	217,057				232,284				892,057				11,147
F	Predicted	populatio	n in 2012	434,842				243,314				50,623				9,617	738,395
		Percentag	ge of total	58.9				33.0				6.9				1.3	

500

Chapter 5



Figure 4.2: Elephant population estimates

## 4.3 Sustainability of ivory production

We have explored a number of indicators of sustainability through the use of a population simulation model (described in **Annex 3** page 99).

## 4.3.1 Effects of hunting for the largest tusks

We examine the scenario where the largest tusks in the population are removed first followed by progressively smaller tusks – which is what one might expect poachers to do (this assumption was used in the ITRG 1989 report). The behaviour of a number of key population parameters have been examined across a range of exploitation levels.

## Rate of population increase and mean tusk weight of the harvested ivory

With no exploitation, under the selected population parameters <sup>13</sup> the population increases at 4.73% (**Fig.4.3**). It maintains this rate of increase until the annual offtake exceeds about 0.5% of the total population. As the offtake increases beyond this level, the rate of growth declines sharply reaching zero at a 5% harvest level. This is the maximum sustained yield (MSY). Beyond 5% the population growth rate is negative reaching about -6% per annum at a 10% offtake level.



Figure 4.3: Mean tusk weight and population rate of increase under increasing offtakes

Age at first parturition 12 years; Intercalving interval 48 months; Mortality in the first year of life 8%; Mortality 5-40 years 0.5%.

At first sight it might seem impossible for a population which is only capable of increasing at 4.73% when it is not exploited to sustain a harvest which is 5% of the population. This arises from changes in the age structure when it is exploited. The animals carrying the largest tusks are generally the oldest males and their removal results in a 'younger' population with a higher proportion of breeding individuals.

The maximum sustained yield (MSY) from the population is the offtake which produces the highest numbers but this does not imply the highest returns for ivory from the population. The non-linear relationship between tusk size and price produces an income which increases inversely as the offtake is reduced below 1% of the population. The income mirrors the mean tusk weight (see Fig.4.5, page 40).

The mean tusk weight (MTW) of the harvest is high (>25kg) for offtake levels up to 0.4% of the population. This would correspond to a normal trophy hunting regime. Over the critical offtake range from 0.5-5% of the population, the mean tusk weight declines from 22kg to 5kg. In examining raw ivory seizures this parameter could be used to make deductions about the level of offtake from the target population, e.g. if the MTW is less than 5kg then the population from which the offtake was derived will be in rapid decline.

Some care would need to be exercised in applying the technique. It is valid when applied to the offtake from a discrete population within a bounded area. However, if the illegal harvesting is taking the form of successively making small populations extinct then the MTW would display a very different characteristic (subsection 4.3.3, page 42). Provided the technique is used at the correct scale it might be useful, e.g. in evaluating seizures at a regional level. It could not be applied to the continental population without a prior knowledge of the management regimes in place in different range states.

#### Sex ratio of the offtake and age of oldest surviving adults

Up to an offtake level <sup>14</sup> of 0.6% of the total population the harvest would be made up entirely of males (**Fig.4.4** next page). Female tusk sizes are too small to qualify. Females begin to appear in the harvest above an offtake level of 0.6% and, if the population is approaching the maximum sustained yield, the proportions of males and female tusks in the harvest will be close to 1:1. Once the MSY has been exceeded, the population has no stable age structure and there may even be a slight upturn in proportion of males.

Up to an offtake level of 0.4%, there should be a few males reaching the age of 60 years. As the offtake is increased beyond this there are progressively fewer and fewer old males in the population: at an offtake of 1% the oldest male would be about 43 years and at 5% (the MSY) the oldest male would be about 22 years. Because of the very different relationship between age and tusk weight for females, the selection pressure for the oldest females is less than it would be for males. Only when the harvest level exceeds 3% do the oldest females start to disappear from the population and, when the MSY is reached at 5%, there are still females older than 50 years in the population. There would still be females older than 30 years when the population is in decline at offtakes in the range 5-10%.

<sup>14.</sup> For each offtake level, the model was run until the population had achieved a stable age structure.



Figure 4.4: Proportion of male tusks in the harvest and age of oldest surviving adults

## Ivory production and offtake level

The potential ivory production from a population of 555,000 elephants<sup>15</sup> is shown in **Fig.4.5** (next page). Under no exploitation the ivory produced from natural mortality is slightly less than 100 tonnes per annum. Under increasing offtake levels it reaches about 300 tonnes at the maximum sustained yield offtake of 5% of the total population. At this level, the mean tusk weight of the harvest is around 5kg. At a 2% offtake level, the production is about 200 tonnes p.a. with a mean tusk weight of 10kg.

A useful formula which gives the approximate ivory production per living elephant in the population for any given exploitation level is –

# Ivory production = 0.2 + 0.114 (Offtake)<sup>2/3</sup> kg/elephant

- where Offtake is expressed as a percentage of the total population

<sup>15.</sup> The figure of 555,000 elephants is the estimate for the total population in Africa obtained from the sum of the Definite and Probable estimates from the 2007 African Elephant Database (Blanc *et al* 2007).



Figure 4.5: Predicted ivory production and value at various offtake levels

In **Table 4.3** below, we use the above formula to show the ivory production per living elephant (kg) for a range of offtakes up to the maximum sustained yield and the expected ivory tonnage (kg x 1,000) which a population of 500,000 elephants would yield annually.

Table 4.3: Theoretical ivory production up to the limit of sustainability

Offtake %	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Production/elephant	0.200	0.272	0.314	0.349	0.381	0.410	0.437	0.463	0.487	0.511	0.534
Production for Africa	100	136	157	175	191	205	219	232	244	256	267

It should be noted that the marginal increase in ivory production for each increment of 0.5% in the offtake becomes less and less.

## 4.3.2 Achieving sustainability after over-exploitation

Lusseau (2012, in litt.) distinguishes between offtake levels needed for populations which have been overexploited and those which can be applied to populations which have reached 'stability'. Our experience with depleted elephant populations is that recovery begins immediately following a change in the management regime to one which uses the parameters for a sustainable offtake in the long term, i.e. recovery would not be improved or shortened by any sort of moratorium. The return to a stable age structure during recovery may, however, take a long time which may be more than the lifetime of an elephant. Generally, elephant populations do not reach 'stability' in numbers at a level which is consistent with maintaining habitats in a desirable condition (Martin *et al* 1992).

Our modelling establishes that the maximum sustainable offtake from an elephant population which is capable of increasing at a rate of 4.73% annum in the absence of any exploitation is about 5% of the total population number. Simple sustainable use principles (Martin 1994) show that, regardless of what unsustainable regimes have been in place, a return to a sustainable offtake will reverse any decline, i.e. it is not necessary to reduce the offtake to (say) 1-2% ... 5% will suffice. We have tested what the ivory production would be from a population which has undergone the scenario above, i.e. a period of severe unsustainable exploitation followed by the change to a sustainable regime (**Fig.4.6** below).



Population Offtake (% of total population)

Figure 4.6: Overexploitation followed by return to a sustainable offtake

In **Fig.4.6** we begin with a population of 1.3 million elephants in 1979 and subject it to an offtake of 10% per annum. This level of offtake reduces the population to about 600,000 elephants in 1989. In 1989 the offtake is reduced to 5%. The recovery takes the form of a return to a positive growth rate by 1993 and thereafter a series of damped oscillations culminating in an asymptotic rate of growth of about 0.33% per annum. We stress that there is nothing desirable about this management scenario – a much lower offtake would be preferable. The effect of reducing the offtake to 2% of the total population is shown by the dashed line in Fig.4.6. This obviously allows the population to increase more rapidly: however, the time taken for the population to establish a stable age structure is the same as that for the 5% offtake.

## 4.3.3 A hunting regime which removes entire subpopulations of elephants

To understand the characteristics of a hunting regime which is eliminating entire sub populations of elephant, we need to examine the ivory present in the living population ... and make the assumption that all of this ivory would appear in the ivory trade within a few years of it being estimated.

The age structure of a population of 100,000 elephants which has not been subject to any recent exploitation is shown in the top diagram of **Fig.4.7** on the next page. The sex ratio is assumed to be unity – a result of using the same age-specific natural mortalities for males and females. <sup>16</sup> Under the initial assumption these will shortly all become dead elephants. The age-specific ivory production is shown in the middle diagram. For the males the maximum production occurs in the age classes 30-40 years and is around 18 tonnes in each of these age classes. In this region of the age structure the combination of numbers in the age classes and age-specific tusk weight is such that it results in the highest production. The female ivory production peaks at about 23 years of age and is much lower (6 tonnes in the 23 year-old age class). The mean tusk weight for the male ivory in all age classes is 8.36kg and that for the females is 2.55kg. The mean tusk weight for males and females combined is 5.45kg. The total ivory in the living population is about 1,050 tonnes with the males contributing 800 tonnes (worth US\$1.2 billion) and the females 250 tonnes (worth US\$127 million). These figures can be multiplied by 5 to obtain approximate values at the continental level.

To apply this information to a seizure of ivory, the male tusks would need to be separated from the female tusks (which an experienced ivory handler can do fairly easily) and the mean tusk weights calculated for each sex. If the results match with figures given in the previous paragraph, it would tend to indicate that the ivory came from a new population of previously unexploited elephants.

The value of the ivory in a living population of 100,000 elephants is shown in the bottom diagram. Taking into account the relationship between tusk weight and ivory price (Footnote #18 and **Fig.4.9**, p49) the total value is about US\$1.34 billion with the males contributing US\$1.21 billion and the females US\$130 million. For a population of 500,000 elephants, the total value would be US\$6.7 billion. The unusual profiles of the last figure are the interaction amongst three non-linear relationships.

<sup>16.</sup> In the Amboseli elephant population, Moss (2001) recorded significantly higher mortalities for males than for females over their entire lifetime. However, much of the male mortality was due to anthropogenic factors and the population cannot be considered typical of elephant populations in general. In southern Africa, the sex ratio varies from one population to another but is seldom far from 1:1. In the Etosha National Park in Namibia Lindeque (1988) found a sex ratio close to unity and a study by Ferreira (*et al* 2003) gives survival curves for males and females which are almost identical.



Figure 4.7: Age structure, ivory on living animals and ivory value in an unexploited population

#### 4.3.4 A typical management regime

Ivory is realised from natural mortality, culling to protect habitats (in some range states), problem animal control and trophy hunting. In **Fig.4.8** (next page) we show the combined effects of these various sources of ivory on the overall ivory production.

#### Culling

Culling entails the removal of entire breeding herds from the population. In this simulation, culling is applied to a population of 50,000 elephants to produce a population growth rate of zero. The model achieves this by simply removing the annual surplus of animals above 50,000. The long-term annual percentage of the population removed by this method is 2.96% (this is an outcome from the model and not a percentage which is set).

## Trophy hunting

In a population which is not subjected to culling, the trophy hunting quota should not exceed about 0.35% of the total population if it is desired to maintain a high trophy quality (Craig et al 2011). Very few males older than 15 years are included in culling and, after a number of years, the population age structure becomes skewed in favour of adult males. This allows higher trophy hunting quotas to be set whilst still maintaining a high mean tusk weight for trophies. We used a 1% quota (applied before natural mortality in the model)<sup>17</sup> which appears as 0.92% in Fig.4.8.

### Problem animal control

Problem animal control used applies largely to males in the age range 10-40 years but includes a small proportion of females. The selection is set by means of template in the model. We set a quota of 2.5% of the animals included in this template and this translated to about 0.55% of the total population (Fig.4.8).

#### Natural mortality

The age-specific mortality schedule used in the model is described in Annex 3. Under this management regime natural mortality is lower than it would be in an unexploited population because many of the animals in the population which would have died naturally in the given year are killed through culling, problem animal control and trophy hunting.

The simulation run on which these results are based was allowed to run for 300 years to achieve a stable age structure, constant rate of growth (slightly above zero) and constant mean tusk weight for trophy hunting. The total population of 50,000 animals is skewed in favour of males (1.2:1). Of the total number of animals dying annually (2,884) by far the largest proportion are in the culling category (1,480). Two-thirds of the total ivory production comes from trophy hunting. For the purposes of this exercise we have valued the ivory from trophy hunting as a commodity: the ivory from a single male with a mean tusk weight of 32.5kg is worth some US\$68,000<sup>18</sup> in the ivory trade and unless the relevant trophy hunt produced a net income more than this amount it would be more profitable to harvest the commodity.

<sup>17.</sup> In the population model (Annex 3), the hunting quota in any given year is applied to the population after breeding, illegal hunting and problem animal control but before natural mortality and this results in a slight departure from the 1% specified above at the end of each annual cycle of the model. At this level of offtake no females carry tusks large enough to be included as trophies.

<sup>18.</sup> The formula used for ivory value is: Price/kg = US $[30 + 79 (MTW)^{0.75}]$ 





The total quantity of ivory produced from 50,000 elephants under this management regime is slightly more than 40 tonnes per year with a value of US\$35 million. The average annual income earned per live elephant in the population is more than US\$700. The results differ from those obtained in the earlier analyses because of the very different age structure of the population arising from the culling.

It needs to be emphasised that none of the management shown in Fig.4.8 <u>is aimed at ivory</u> <u>production</u>. Culling is carried out to protect habitats; <sup>19</sup> problem animal control is an outcome of humanelephant conflict; trophy hunting is a recreational pursuit which results in high land-use values.

<sup>19.</sup> The proportion of the total ivory income which is earned from culling is 2.65% – despite the fact that more than 50% of the annual numbers dying (2,884) are due to culling.

## 4.4 One-off ivory sales

Two one-off sales of raw ivory have taken place since the elephant was listed on Appendix I in 1989. The first was in 1999 when Botswana, Namibia and Zimbabwe sold ivory to a single buyer (Japan) and the second took place in 2008 when Botswana, South Africa, Namibia and Zimbabwe sold to China and Japan. We address two questions: firstly, whether there is any evidence to support the assertion that these one-offsales have stimulated illegal hunting and, secondly, whether the financial returns to the four southern African countries whose elephants are listed on Appendix II have been equitable.

Examining the data presented by Milliken (*et al 2009*) in the TRAFFIC report to CITES, it is difficult to detect any linkage between these one-off sales and the trends in the illegal trade as measured by seizures of illegal ivory. Indeed, the year in which seizures were highest was 1998 and the first one-off sale took place the year after this. A biased observer might conclude that the illegal trade declined after the sale. The TRAFFIC report (Figs.6 & 7) observes that the illegal trade appeared to be increasing in recent years but, as this upward trend begins in 2004 and precedes the second one-off sale in 2008, there is no sound basis to link the trend to the one-off sale or, indeed, to attribute any causality.

Bulte (*et al* 2007) adressed the question of whether the 1999 one-off sale of ivory promoted elephant poaching in Africa –

"Our findings present a mixed picture. At the local level there was some evidence that the oneoff sale resulted in extra elephant killing, but this effect was relatively small (and probably shortlived). Although the data were too scanty to draw strong conclusions, decision-making about elephant management and the ivory trade has to continue and will necessarily be based on imperfect information for a long time to come. Our findings suggest that further experimenting with one-off sales may be beneficial from a conservation and development perspective."

Burn (*et al* 2011) also ask the question "Have changes in CITES policy, and in particular the one-off ivory sales, had an impact on elephant poaching?" and go on to observe that – [emphasis added]

"Debates in successive CoPs have tended towards a polarization of views. One side contends that any relaxation of restrictions on trade in ivory amounts to a green light to poachers and that any perceived increase in poaching must be attributable to it (Wasser *et al* 2010). The opposing view argues that there are many factors that could potentially explain an increase, and that CITES listings cannot be assumed to be of any great interest to the poaching fraternity. To judge from the debates that have taken place, it appears that **a sound evidence base, in support of either viewpoint, is lacking**."

"We contend that a prerequisite for measuring the impact of CITES policy must be to assemble data on all potential associated factors and to assess not only their effect on poaching, but also the inter-relationships between them. These factors may include both proximate causes ... and ultimate causes, such as economic factors and governance. Until we have a reasonably complete picture of the overall causal backdrop, it will be impossible to address the question of the relationship between CITES policy and illegal killing in a meaningful way."

Stiles (2004) considered that the 1989 CITES listing of elephants on Appendix I had resulted generally in lower levels of ivory market scale and reduced illegal hunting of elephant from the levels that prevailed prior to 1990. However, he goes on to state that –

"There is little evidence to support claims that the 1999 southern African ivory auctions stimulated ivory demand or elephant poaching. Levels of elephant poaching and illegal ivory trading in a country are more likely to be related to wildlife management practices, law enforcement and corruption than to choice of CITES appendix listings and consequent extent of trade restrictions. Elephant conservation and public welfare can be better served by legal ivory trade than by a trade ban, but until demand for ivory can be restrained and various monitoring and regulation measures are put into place it is premature for CITES to permit ivory sales."

Stiles (2012b in litt.) makes the following points -

"The two 'one-off' sales have unfortunately led to a lot of unnecessary and irrelevant controversy. As long as a ban is in place, illegal trade is going to carry on regardless of whether there is legal ivory circulating in the system or not. There is no need to launder it – the illegal trade carries on as usual."

"One-off sales should not be allowed. Not enough ivory enters the system to affect the supplydemand ratio and the sales allow the production of misleading and inaccurate propaganda by antitrade proponents. The entire issue has been twisted so much by these ill-considered sales that it has become extremely difficult to discuss trade objectively. The sales really are simply a political manoeuvre to pacify temporarily an articulate and relatively effective lobby group of ivory suppliers and users."

Burn (*et al* 2011) state that more data is required to establish any causal relationships between legal ivory sales and illegal hunting. We remark that, even with the collection of very large amounts of data, it should not be assumed that the system will ever be fully understood. It is a complex bio-economic system (Ruitenbeek & Cartier 2001) involving ecological, economic and social systems and, as such, may not be amenable to predictability. In **Fig.4.1** (page 33) we showed how patterns of the trade have changed over the past two centuries in a manner which could not have been foreseen.

# 4.4.2 Possible prejudice to ivory exporting countries under the method of ivory sales

Table 4.4:	1999	one-off ivory	sale
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	Botswana	Namibia	Zimbabwe	Totals
Weight of ivory sold (kg)	17,195	12,416	19,963	49,574
Mean Tusk Weight (kg)	9.36	5.42	15.17	9.10
Average price/kg US\$	105	59	108	94
Total earnings US\$	1,805,453	732,548	2,155,972	4,693,973
Expected price/kg US\$	346	238	486	339
Expected earnings US\$	5,950,781	2,954,828	9,705,580	18,611,188
% of expected earnings	30.3	24.8	22.2	25.2

Table 4.5: 2008 one-off ivory sale

	Botswana Namibia		South Africa	Zimbabwe	Totals	
Weight of ivory sold (kg)	43,153	7,503	47,346	3,764	54,420	
Total earnings US\$	7,093,551	1,147,369	6,702,695	487,162	15,430,777	
Assumed MTW (kg)	9.36	5.42	9.10	15.17	9.10	
Expected price/kg US\$	453	310	444	637	444	
Expected earnings US\$	19,537,536	2,329,163	21,022,308	2,398,489	45,287,497	
% of expected earnings	36.3	49.3	31.9	20.3	34.1	

#### Notes

- 1. The formula used for expected ivory price/kg in 1999 is US\$ (25 + 60 MTW <sup>0.75</sup>)
- 2. The expected ivory price/kg in 2008 is US\$ (30 + 79 MTW <sup>0.75</sup>) adjusted for US\$ inflation 1999-2008
- 3. The data for the 2008 ivory sale (Wijnstekers 2011) do not give the number of tusks in the sales for each country so it is not possible to calculate mean tusk weights. We have used the MTW values for Botswana, Namibia and Zimbabwe from the 1999 sale and assigned the average of all three countries as the MTW for South Africa.

A consequence of having no ongoing market-based continuous legal sales of ivory is that there is no way of knowing the real price for ivory in 1999 and 2008. The prices used here are based on a relationship derived from ivory auctions in Zimbabwe before trade was banned in 1989 (**Fig.4.9**).<sup>20</sup>

<sup>20.</sup> For the period 1979-1987 Princen (2003) observes: "Of the ivory-producing countries, only Zimbabwe brought in a level of revenue (\$63-\$76/kg) close to the value of raw ivory earned in Japan (\$85-\$99kg). For other producer states, the revenues ranged from \$6-\$15/kg. Zimbabwe, unlike the other states, had actively managed elephants during the 1980s, marketing ivory in such a manner to gain the largest proportion of rents possible."



Figure 4.9: Ivory prices for tusk weights 0-50kg

Stiles (*et al* 2011, Table 1) give prices for ivory in Africa as paid to poachers and middlemen. These are generally low – less than US\$50kg for tusks up to 10kg. More applicable to this analysis are the wholesale raw ivory prices in Asia shown in **Fig.4.9** above (see footnote on the previous page). The ivory prices used in this study fall at the bottom end of their range and might reasonably be realised in a marketing system such as that described in Chapter 6 (page 74).

Accepting the assumed prices, then the loss to the southern African range states in the 1999 one-off sale was about 75% of the value of the ivory sold and, in 2008, it was about 66%.

## 4.5 Conclusions

"Essentially, all models are wrong, but some are useful"<sup>21</sup>

In this chapter we have examined the expected response of an elephant population to various levels of harvesting under the assumption that the offtake would target the animals with the largest tusks in the population. The results of our population modelling indicate that -

- The maximum sustained yield from an elephant population occurs at an offtake of about 5% of the total numbers, at which level –
  - a. The population growth rate is close to zero and the mean tusk weight of ivory coming from the population would be about 5kg;
  - b. The proportions of tusks coming from males and females would be roughly equal. The oldest surviving males would be about 22 years and the oldest surviving females about 50 years old;
  - c. Ivory production would be about 0.5kg per annum per living elephant in the population which would yield about 500kg of ivory for every 1,000 elephants.

Under certain circumstances, these figures could be useful in making deductions about the status of living elephant populations or drawing conclusions about the impacts on elephant populations that may be deduced from raw ivory seizures.

- (2) Some alternative scenarios are given
  - a. Illegal exploitation of elephant might take the form of successively making entire 'subpopulations' extinct in which case the ivory appearing in the market would exhibit the structure and characteristics of the ivory in the living population (Fig.4.7, p43).
  - b. The results of typical elephant management in some southern A frican countries where trophy hunting, culling, problem animal control and natural mortality all contribute to ivory production are shown in Fig.4.8 (page 45). This type of management results in a relatively high production of ivory with two-thirds of the total ivory volume coming from trophy hunting (offtake <1% of the population) and less than 15% from culling (offtake 3% of the population). The southern A frican range states have been accused in the past of culling in order to realise revenues from ivory: the analysis shows fairly clearly that the income from cull ivory compared to the income from the total ivory generated is very minor (<3%).</p>
- (3) We discuss the observed effects of the one-off sales of ivory on levels of illegal exploitation and conclude that evidence has yet to be presented that demonstrates a clear link between the one-off sales of ivory and increasing levels of illegal trade.
- (4) Examination of the returns from the one-off sales of ivory in 1999 and 2008 lead to the conclusion that the range states lost between 66-75% of the value that might have been expected under normal trading conditions.

<sup>21.</sup> G.E.P. Box, Professor Emeritus of Statistics, University of Wisconsin

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## 5. PRINCIPLES AND A DECISION-MAKING MECHANISM FOR A FUTURE TRADE IN IVORY

TOR Clause (c): Basic principles and factors that could guide future trade in ivory, and proposals on how an effective, objective and independent decision-making mechanism could operate, taking into account the provisions of the African elephant action plan and experiences from Asia

## 5.1 Introduction

The fundamental principle that should guide any future trade in ivory is that it should contribute positively to the long-term conservation of elephants and their habitats in Africa. A corollary of this principle is that any trade in ivory should be based firstly on ivory produced as a by-product of natural elephant mortality and secondly on management activities undertaken for reasons other than for the harvesting of ivory. These activities may include the necessary killing of problem animals and culling in cases of overpopulation, which may occur in some protected areas and in farming areas. In addition to these basic principles we outline, below, additional principles and factors that should be used to guide a future trade in ivory.

Decision making for a trade in ivory could take many forms and range from a single top-down, command and control, mechanism centred on decisions taken by the CoP to one involving devolved, multi-level governance (Ostrom & Janssen 2002, Ostrom 2009). Our analysis of CITES decisions (Chapters 2 and 3 above) suggests that the existing mechanism does not work very well largely because it relies on member states and their people to implement decisions in which they may not have been directly involved or may not have bought into, or both. For this reason we propose a multi-level but devolved decision making mechanism and process. There are two aspects of the decision-making mechanism that need to be developed. One deals with the steps required to establish an effective decision-making process for a trade in ivory. The other deals with how decision-making could work in the ongoing process of managing and monitoring the trade and its conservation impacts so as to ensure sustainability and conservation benefits.

## 5.1.1 Current requirements for quotas and trade (Resolution Conf. 10.10 (Rev. Conf. 15)

The provisions in Resolution Conf. 10.10 (Rev. CoP15) relating to trade in ivory from Appendix II populations are derived mainly from Resolution 5.12, i.e. in the days of the quota system. As Wijnstekers (2011, page 619) notes, they no longer apply and should be deleted. For ease of reference the relevant part of Conf. 10.10 (Rev. CoP15) is provided here (from Wijnstekers 2011).<sup>22</sup>

"The Conference of the Parties recommends that:

- a) each State that has a population of African elephants and wishes to authorize export of raw ivory establish, as part of its management of the population, an annual export quota for raw ivory expressed as a maximum number of tusks (from Resolution Conf. 5.12);
- b) each export quota be communicated to the CITES Secretariat in writing by 31 December for the next calendar year (1 January to 31 December) (from Resolution Conf. 5.12, where the deadline was 1 December);

<sup>22.</sup> References to earlier resolutions in parenthesis and grey font were added by Wijnstekers, 2011

- c) Parties ensure that significant amounts of confiscated ivory are notified separately to the Secretariat and are not incorporated in quota submissions (from Resolution Conf. 5.12);
- d) the CITES Secretariat assist in the implementation of the quota system by: reviewing information submitted on each quota, together with any information received about the status of the population in question; discussing any concern with the relevant State; and, if there is no cause for concern, communicating the current quota to the Parties not later than 31 January of each year;

This paragraph adds importantly to the role given to the Secretariat with Resolution Conf. 5.12, which limited it to the maintenance of a central database, the circulation of the list of quotas (before 1 January) and to provide advice on the conservation status of elephant populations.

Resolutions Conf. 5.12 and Conf. 9.16 only recommended a stock inventory of raw ivory that might be destined for international trade and the Secretariat only had to be informed before export was allowed.

- e) the Secretariat maintain its *Ivory Trade Control Procedures Manual* and that the Parties follow the procedures for quota submissions documented in this Manual (from Resolution Conf. 9.16).
- f) if the quota is not submitted by the deadline, the State in question have a zero quota until such time as it communicates its quota in writing to the Secretariat and the Secretariat in turn notifies the Parties (from Resolution Conf. 5.12);
- g) no export, re-export or import of raw ivory be authorized unless it is marked in accordance with this Resolution or in accordance with the Secretariat's Manual (from Resolution Conf. 5.12);
- h) Parties accept raw ivory from producer States only where the export permit was issued in a year for which a quota for the State in question has been communicated to the Parties in accordance with this Resolution (from Resolution Conf. 5.12);
- Parties may accept raw ivory from a producer non-party State only if a quota for that State has been reviewed by the Secretariat and communicated to the Parties and if the Secretariat has received from the State an annual report on its ivory trade, and if the State meets all the other conditions in this Resolution and Article X of the Convention (as interpreted by Resolutions of the Conference of the Parties) (from Resolution Conf. 5.12);
- j) in compiling their annual reports, producer party and non-party States that have authorized the export of raw ivory relate such exports to their quota for any given year, providing the Secretariat with as much relevant information as possible, including, as a minimum, the number of whole or substantially whole tusks and their individual weights and identification numbers (from Resolution Conf. 5.12);
- k) all Parties maintain an inventory of the stock of raw ivory held within their territory, and inform the Secretariat of the level of this stock each year before 31 January, indicating the source of the ivory; and
- Parties assist the Secretariat to ensure that the duties set out in this Resolution are carried out (from Resolution Conf. 5.12);"

Following our examination of basic principles and factors that could guide a future trade we suggest an alternative set of requirements regarding quotas and trade.

## 5.2 Basic principles and factors

#### 5.2.1 Sustainable use principles

CITES Resolution Conf. 13.2 (Rev. CoP14) (Annex 4, page 111) urges Parties to use the Addis Ababa Principles and Guidelines of the Convention on Biodiversity (CBD) for the sustainable use of biodiversity. The fourteen Addis Ababa practical principles are as follows –

- 1. Supportive policies, laws, and institutions are in place at all levels of governance and there are effective linkages between these levels.
- 2. Recognizing the need for a governing framework consistent with international / national laws, local users of biodiversity components should be sufficiently empowered and supported by rights to be responsible and accountable for use of the resources concerned.
- 3. International, national policies, laws and regulations that distort markets, which contribute to habitat degradation or otherwise generate perverse incentives that undermine conservation and sustainable use of biodiversity, should be identified and removed or mitigated.
- 4. Adaptive management should be practiced, based on:
  - a. Science and traditional and local knowledge;
  - b. Iterative, timely and transparent feedback derived from monitoring the use, environmental, socio-economic impacts, and the status of the resource being used; and
  - c. Adjusting management based on timely feedback from the monitoring procedures.
- 5. Sustainable use management goals and practices should avoid or minimize adverse impacts on ecosystem services, structure and functions as well as other components of ecosystems.
- 6. Interdisciplinary research into all aspects of the use and conservation of biological diversity should be promoted and supported.
- 7. The spatial and temporal scale of management should be compatible with the ecological and socio-economic scales of the use and its impact.
- 8. There should be arrangements for international cooperation where multinational decision-making and coordination are needed.
- 9. An interdisciplinary, participatory approach should be applied at the appropriate levels of management and governance related to the use.
- 10. International, national policies should take into account: a) Current and potential values derived from the use of biological diversity; b) Intrinsic and other non-economic values of biological diversity; and c) Market forces affecting the values and use.
- 11. Users of biodiversity components should seek to minimize waste and adverse environmental impact and optimize benefits from uses.
- 12. The needs of indigenous and local communities who live with and are affected by the use and conservation of biological diversity, along with their contributions to its conservation and sustainable use, should be reflected in the equitable distribution of the benefits from the use of those resources.
- 13. The costs of management and conservation of biological diversity should be internalized within the area of management and reflected in the distribution of the benefits from the use.
- 14. Education and public awareness programmes on conservation and sustainable use should be implemented and more effective methods of communications should be developed between and among stakeholders and managers.

The above principles provide a comprehensive set of guidelines that are applicable to the management of elephant populations.

#### 5.2.2 African Elephant Action Plan

The African Elephant Action Plan (CoP15 Inf. 68) states that the conservation of elephants can provide benefits and that these should be available to those living with elephants, as is indicated in the following statements of the Vision and Goal of the plan, and particularly in Objective 7.

- a) Vision: To ensure a secure future for African Elephants and their habitats to realize their full potential as a component of land use for the benefit of the human kind.
- b) Goal: To secure and restore where possible sustainable elephant populations throughout their present and potential range in Africa recognising their potential to provide ecological, socio, cultural and economic benefits.
- c) **Priority Objective 7**: Improved Local Communities Cooperation And Collaboration On African Elephant Conservation

"While elephants do have an intrinsic value, recognition must be given to those communities that share land and resources with African elephants, and who are most affected by elephants on a dayto-day basis. It is often the case that these communities suffer the costs of living with elephants (such as loss of food crops), while the benefits (such as revenue from tourism) are largely gained by those living further afield. It is important to recognise and address this imbalance, as the accrual of greater and more tangible benefits at a local level is more likely to translate directly into increased tolerance for elephants by those communities most affected."

*d) "Activity 7.1.4.* Develop innovative incentive schemes that increase benefits to local communities, while simultaneously reducing costs of living with elephants."

## 5.2.3 Additional principles

Additional principles that could be used to guide a future trade in ivory are -

- Elephant range. Because elephants are valued in many ways<sup>23</sup> and can act as a flagship species, they
  have the capacity to enhance the value of land on which they occur and so contribute to maintaining
  wild land in the face of pressures to convert it to other uses. In so doing, and provided that their full
  value (i.e. both intrinsic and extrinsic) is fully realised by the landholders involved, not only will
  elephants be conserved but so will the accompanying range of biodiversity existing on such land.<sup>24</sup>
- 2. *Proceeds of trade* should be returned to the landholders on whose land the elephants occur to realise their investment in elephants and habitats, and improve their livelihoods.

<sup>23.</sup> Values include both their 'intrinsic existence value' and their 'extrinsic or utilitarian values'. They are also ecosystem engineers and an important component of African ecosystems.

<sup>24.</sup> It is important to bear in mind that substantial numbers of elephants in Africa presently occur outside of protected areas and that growth in protected area elephant numbers will, in many areas, need to be accommodated in surrounding areas which are often small scale communal farming areas.

- 3. *Incentives.* A legal trade in ivory, elephant hide and meat <sup>25</sup> can contribute directly to the vision and goal as enunciated by the range states by helping to reverse current disincentives to elephant conservation into incentives to landholders and countries to conserve them. However, incentives and disincentives related to regulating the trade in ivory need to be carefully examined and monitored. While trade regulations may act to reduce the volume of illegal trade they can also act as a disincentive to conservation and even stimulate increased exploitation (Courchamp *et al* 2006, Rivalan *et al* 2007) and price hikes (e.g. for rhino horn, Leader-Williams 2003).
- 4. Scale mismatches between resource management and governance should be corrected and avoided as far as possible (Cumming et al 2006). There is a serious scale mismatch between the global institutions (rules and legal frameworks) governing the management of elephants and ivory and the *de facto* management of elephant and ivory in the field. More specifically there is a mismatch between the institutions attempting to control the trade and the institutions producing the commodity and those moving and marketing it. It is reflected in the "one size fits all" approach taken to managing the illegal trade in ivory. Sub-Saharan Africa is huge <sup>26</sup> and the variability in elephant numbers, trends, threats, and capacities to manage them, and opportunities for elephant conservation across their range merit a diversified and experimental/adaptive management approach as implied in the Addis Ababa principles.
- 5. *The principle of subsidiarity*<sup>27</sup> may provide important guidance for the development of appropriate levels of decision-making and management of elephants and ivory at regional, national, sub-national and local levels. The second Addis Ababa principle above deals in part with this aspect of natural resource governance.
- *Financing*. Trade should be self-financing in order to achieve long-term sustainability: i.e. none of the costs of management or controls should depend on outside funding or charity (Addis Ababa principle 13). Funding to support the initiation of the process and the negotiations involved may however be needed. Trade should maximise returns from ivory sales: i.e. the possibility of prejudicial trading practices should be minimised.
- 7. *Compliance*. When compliance with regulations becomes too burdensome, shortcuts and illegal activities emerge, which translates into a simple rule "make it easy to be legal".

<sup>25.</sup> See recent IUCN report (Stiles 2011) on the trade in elephant meat in central Africa

<sup>26.</sup> Sub-Saharan Africa is approximately five times the size of the contiguous states of the USA and ten times the size of the European Union and treating 37 range states as a single, uniform entity impedes rather than advances the conservation of elephant.

<sup>27.</sup> First enunciated by Pope Leo X, the principal of subsidiarity holds that '*it is an injustice, a grave evil and a disturbance of right order for a larger and higher organization to arrogate to itself functions which can be performed efficiently by smaller and lower bodies*'. Handy (1989) says, 'To steal people's decisions is wrong'

## 5.2.4 Additional Factors that could guide a future trade in ivory

The following factors will be important in guiding any trade in ivory.

- 1. *Regular production and frequent marketing*. One-off and intermittent sales of ivory (or any other commodity) send the wrong signals to the market and to consumers.
- 2. Coordinated and secure marketing mechanisms that minimise the steps between producers of ivory and those who carve ivory are necessary in order to reduce the opportunities for illegal ivory to be fed into to the market. This could be accomplished by establishing a central ivory exchange in Africa (e.g. Barbier *et al* 1990) with direct sales to registered ivory carving companies with no secondary marketing of raw ivory. This provision would have to backed up by appropriate legislation in both producer and consumer countries.
- 3. *Regulatory mechanisms*. CITES resolutions and annotations concerning the trade in ivory have tended to focus on controlling the production of ivory whether legal or illegal in Africa. There is a need to re-examine the demand side of the equation and the processes that could minimise the leakage of illegally obtained ivory into the processing and marketing of carved products (see Chapter 3, p28). This entails developing appropriate incentives as well as regulations for ivory carving businesses to avoid dealing in illegally derived ivory.
- 4. Ensuring that *returns to stakeholders* (i.e. state, private, and communal sector landholders) provide incentives to conserve and sustainably manage elephants on their land.
- 5. *Green-labelling and certification* (e.g. Forest Stewardship Council, Marine Stewardship Council). Labelling products as being derived from sustainable harvesting regimes that are contributing to conservation of elephants and their habitats, and wider biodiversity conservation goals, can provide a powerful force for public involvement in conservation (Diamond 2005, p473). The experiences gained and lessons learned from the Forest and the Marine Stewardship Councils can contribute to establishing a green-labelling system for ivory products.
- 6 *Traceability*. The ability to distinguish legally derived ivory from illegally sourced ivory is required to minimise the leakage of illegal ivory into the production and marketing chain. At the beginning of the production chain, raw ivory will need to be securely marked with the details of at least who collected it, where it was collected (GPS record) and the date. The details of mortality should also be included. The potential of new technological developments to provide secure markers to raw ivory will need to be explored and implemented. DNA and isotopic analysis can provide markers of the general area from which ivory was derived (e.g. Wasser *et al* 2004, Couto 2011) and spot checks on ivory delivered to a central ivory selling organisation could be conducted on a regular basis. Similar checks could be made on export/import consignments. The potential for unique chemical or other micro-markers for carved ivory will also need to be explored.
- 7. *Monitoring and feedback loops*. The organisational and institutional (rules of the game) structures established for a trade in ivory will need to operate at appropriate scales and levels to promote rapid feedback between ongoing monitoring and decision making. Or, in other words, scale mismatches should be avoided.
## 5.3 Quotas and Trade

The criteria on which a trade in ivory from an Appendix II listed elephant population could be based are outlined here but are further developed in the following sections of this chapter and in Chapter 6, which proposes a process for a trade in ivory.

There are six areas of compliance needed for an Appendix II listed country to export ivory. These are as follows together with proposed criteria in some cases –

- The status and trends of the population(s) from which the ivory is derived. Criteria: Population
  number has been stable or increasing over a period long enough to establish the trend as
  monitored by annual or bi-annual surveys and/or MIKE data.<sup>28</sup>
- 2. *The status of law enforcement and capacity* is at a level to detect illegal killing of elephants and to contain threats of illegal killing of elephant and illegal trade in ivory. Criteria: National legislation includes provision for severe penalties for illegal killing of elephants as revealed by log of prosecutions and sentencing of offenders. Domestic trade in raw ivory is prohibited. All raw ivory has to be surrendered to the state and uniquely marked, together with full details of its provenance. No illegal shipments of ivory originating in the country have been recorded by ETIS.
- 3. *Ivory stocks* are secure with an appropriate ivory register and database in which full details of the provenance of each tusk are maintained and which is open to inspection by the CITES Secretariat.
- 4. *Appropriate mechanisms for the return of benefits* to landholders (state, private and communal land) from the sale of ivory have been established.
- 5. *Ivory can only be exported* to countries whose national legislation and controls meet the criteria of CITES.
- 6. Provisions of the *CBD sustainable use principles* and the *African Elephant Action Plan* are being implemented.

The details of these provisions could be developed and agreed upon at the level of the CITES Secretariat, Standing Committee and the CoP and be "imposed" from above on countries seeking to trade in ivory. However, we suggest that the process of decision-making and negotiation together with appropriate measures of devolution, subsidiarity and institution building at regional local levels will yield a more effective, transparent and durable result in sustainable development and elephant conservation.

<sup>28.</sup> The establishment and maintenance of additional MIKE sites may be needed if existing sites are not adequate.

# 5.4 A Decision-making Mechanism and Process

There is an enormous literature on decision-making methods<sup>29</sup> and a range of approaches, algorithms and associated software exist to help establish conservation priorities and reach decisions. These range from transparent scoring and ranking systems that cover biological, social and economic factors (e.g. Cumming & Jackson 1984, Bell & Martin 1987) through structured decision-making methods (Ralls & Starfield 1995) to sophisticated, computer based, methods including multi-criteria decision analysis (e.g. Possingham *et al* 2001) and robust decision-making under extreme uncertainty (e.g. Regan *et al* 2005, Lempert *et al* 2006, Grove & Lempert 2007). More participatory approaches include scenario planning (Schwartz 1991, Peterson *et al* 2003, Carpenter *et al* 2006, Kass *et al* 2011, Polasky *et al* 2011), soft systems methodology (Checkland & Scholes 1999), ecosystem management (Waltner-Toews *et al* 2008), and Resilience Analysis (Walker *et al* 2002).

Here we apply decision theory to provide a structured approach to making decisions about the conservation of elephant and a trade in ivory. This approach requires that objectives be clearly stated, that decision alternatives are examined along with utilities of decision outcomes (Conroy *et al* 2008). The process assists in separating values (e.g. conservation objectives) from beliefs about the system under scrutiny such as may be expressed in diagrams or computer models of how the system works. Importantly, this approach can be applied in a fully participatory and transparent manner at many levels to support decision-making.

In outline, the following steps are necessary -

- 1. Clarify objectives, distinguishing between fundamental objectives and means objectives.
- 2. Explore alternative decision options while acknowledging both subjective and objective factors.
- 3. Evaluate consequences and trade-offs of alternative decisions and clarify uncertainties and risks.

Clearly, the first and most important step in decision-making is to establish the fundamental objectives that the decision-making process seeks to achieve. It is also necessary to distinguish between fundamental objectives that represent the values of the decision maker(s) and those that can contribute to achieving the fundamental objectives, namely, means objectives (Conroy *et al* 2008). Constructing an objectives network or means-ends network, which may include methods is a helpful first step (Fig. 5.1 next page).

The African Range States (2010) clearly included sustainable use, sustaining elephant habitats, and benefits to people in their vision and goal, as well as in the set of more specific (means) objectives for the conservation of elephants (see page 3 above). These objectives also include controlling the illegal killing of elephants and the illegal trade in ivory.

<sup>29.</sup> A Google search for "decision-making process" provides c. 14.5 million hits, while the same search through Google Scholar provides about 1 million hits.



Figure 5.1: An illustrative outline of an objectives network for the conservation of the African elephant based on the Range States' African Elephant Management Plan indicating the division into fundamental objectives, means objectives, and methods

Visions, goals and objectives reflect the values, world-views and culture of those who craft them. This raises the inevitable question of whose values should prevail in making decisions about the conservation of elephants. Since the range states and their people are the ultimate custodians of elephants their values should rank highly, if not take precedence.

Because the mandate of CITES is to regulate the international trade in endangered species, its focus in relation to elephants and ivory has, understandably, been on international trade in ivory and particularly on stemming illegal ivory trade. The Convention's primary tool is to permit, or block, international trade in those species listed on its appendices. Because the successful conservation of elephants will require more than stemming the illegal killing of elephants and the trade in ivory, it is necessary to view CITES decisions within a broader hierarchy of conservation objectives and decision-making that, in reality, extends from the village to the global level (**Fig. 5.2** next page).



# Figure 5.2: Hierarchy of levels and scales at which elephant management and conservation decisions are, or may be, taken with top-down and bottom-up links (information) between levels (Elephant numbers in Botswana are derived from Chase 2011)

Decision-making for the conservation of elephants and the trade in ivory, if it is to meet the African Range States' goals (see section 5.2.2 above), will therefore need to be taken holistically within an agreed hierarchy of scales and levels.<sup>30</sup> More specifically, these scales and levels extend from the landholder or village through to global conventions such as CITES and the CBD. Both bottom up and top-down decision-making processes, involving the full range of stakeholders at each level, will be required, and will need to be in harmony, if elephants and their habitats are to be successfully conserved in Africa. The alternative is to retain all decision-making for an international trade in ivory at the level of the CoP where it has resided since African elephants were listed on Appendix II in 1975.

Social, economic and political drivers and peoples' value systems play a major role determining not only where elephants may live, but also how many may do so. Social, economic and political factors at local, national, regional and global levels also influence the demand for ivory. These generally neglected aspects require decisions based on multiple criteria, poor data and uncertainty. Risk analysis is an important component of decision-making.

<sup>30.</sup> Ecological scales are characterised by grain and extent, while social systems are characterised by levels and in discussing social-ecological systems, such as those involved in elephant conservation, the distinction is useful. (See Cumming *et al* 2006, Veldkamp *et al* 2011).

# 5.4.1 Where are decisions on elephant management and trade in ivory made?

Decisions on the management of elephant are, in reality, made at several scales and levels. The scale at which particular decisions may be reached can cover a single landholding, a landscape, nation or continent. The level at which management decisions are taken may vary between those taken by a land holder, by a consortium of landholders, a national government, a region or continental group of countries (e.g. the African Elephant Range States), or an international convention such as CITES.

Criminals, crime syndicates and corrupt armed forces <sup>31</sup> clearly operate outside these decision frameworks but will also operate within a hierarchy of decision processes starting with the person who collects ivory, by whatever means, in the field. The numerous alternative paths through which ivory passes, from source to end product, are outlined in **Fig.3.3** (page 27).

At a fundamental level it is the landholder who decides on whether to conserve or get rid of elephants. The *de facto* managers of natural resources in Africa are those living in rural areas, be they small-scale farmers in communal lands, managers of large private farms and estates, or wardens in protected areas. Their actions, and the incentives they experience, have direct implications for the conservation of elephants. Farmers can manage their land in ways that exclude elephants. They can kill them (or have them killed) when they intrude. Game wardens can turn a blind eye to illegal hunting in the areas under their care or may even participate in the process.

In much of Africa, decisions on land use planning and development tend to be coordinated and taken at district levels. Such decisions can have critical implications for maintaining elephant range and numbers and, without appropriate incentives; the needs of elephants are likely to receive short shrift. Similar considerations apply at national levels, where there is the added responsibility of overseeing the management of state protected areas, which in many cases cover more than 10% of the country. At a national level decisions are made on the allocation of resources (budgets, staff and equipment) to protected areas and for the conservation of elephants – again, the need for national involvement in decisions on elephant conservation is clear.

Regional groupings, such as Southern, Eastern, Central, and West Africa provide the next level at which decisions relating to elephant management can be taken. Between this level and that of CITES lies that of the African elephant range states. In order for the conservation of elephants in Africa to be successful some measure of consensus on the specifics of conserving and managing elephants needs to be established at each of these levels. This also means that a diversity of approaches suited to particular situations may have to be accommodated.

<sup>31.</sup> High levels of elephant mortality and illegal trade in ivory have coincided with periods of civil disorder, corruption, and conflict associated with armed conflict and militias in eastern, central and southern Africa (e.g. Douglas-Hamilton 1983, Cumming 1986, Smith *et al* 2003, Hart 2012 in litt.).

The decision on how to trade in ivory in order to maintain high returns to those conserving elephants and producing ivory, while minimising the illegal killing of elephants and the illegal trade in ivory (and elephant meat), can be imposed by a higher level, such the CITES CoP, or it can be negotiated by the key stakeholders under the guidance of a higher body that may provide the broad principles and parameters under which decisions and procedures at lower levels may be established and taken. We suggest that the latter process is more likely to be successful than a top down, command-and-control approach (e.g. Holling & Meffe 2006). The experiences of the timber trade and certification schemes that serve to link producers and consumers in sustainable forestry could serve as a model. The De Beer's diamond trading model provided an example of the effectiveness of establishing direct links between producers and the primary consumers (see Chapter 3).

We propose a multilevel decision making mechanism that includes stakeholders and the necessary and sufficient principles, provisions and processes to sustain a legal trade in ivory that will contribute positively to the conservation of elephant populations.

# 5.4.2 Proposals for a devolved, multilevel decision-making mechanism

As indicated in the introduction to this chapter, decisions will be required on a set of initial steps to establish an effective decision-making process and trade in ivory. A second set of decisions will be required on (a) how decision-making could be conducted at various stages of the process of establishing a trade in ivory, and (b) for the ongoing processes of managing and monitoring the conservation status of elephants and the trade in ivory.

# Steps required to establish a trade in ivory from Appendix II elephant populations

The following steps are envisaged in establishing a trade in ivory.

- 1. The CITES CoP agree to allow a trade in ivory from countries in which elephants are listed on Appendix II. At present this would apply to Botswana, Namibia, South Africa and Zimbabwe that carry approximately 50% of the African elephant population. The initial decision would be one *in principle* that would only allow trade to begin once the following steps have been completed.
- 2. *Regional conservation and management plan.* The four Appendix II countries meet to establish long term plans for the conservation, management and trade in ivory, using scenario-planning approaches (see Kass *et al* 2011 for the development of a rigorous inclusive approach to scenario planning).
- 3. Agreement to form a central ivory selling organisation (CISO). The four producer countries and processor countries, e.g. China and Japan (but not necessarily limited to these two countries) agree to establish a Central Ivory Selling Organisation and to establish the protocols for what ivory can be accepted and how it is sold in keeping with the principles outlined earlier in this chapter and the process of trade outlined in the next chapter.

- 4. Agreement from processor countries. Potential ivory processing countries would need to participate in the development of the ivory trading process and agree to establish policy, legal frameworks and agreements that
  - a) Ensure that raw ivory is purchased only from the CISO;
  - b) Prevent raw ivory from being traded onwards by processors; and
  - c) Provide for effective tracing and accounting of stocks of raw ivory and manufactured items.
- Elephant population conservation and management. Within the four Appendix II countries there are six major elephant populations. These are the populations centred on (1) Etosha National Park, (2) Chobe/Hwange National Parks, (3) the Sebungwe with Chizarira and Matusadonna National Parks, (4) Mana Pools National Park, (5) Gonarezhou and Kruger National Parks, and (6) the Mapungubwe National Park. For each of these elephant populations the stakeholders (central and local government, private sector and communities) directly involved are required to develop
  - a) long-term plans for the conservation and management of the elephant population using scenario planning approaches and establish and agree on an objectives network (see Fig.5.1 page 61);
  - b) A Bayesian Network model (based on the objectives network) of the system in order to explore alternative management options, their associated utilities, uncertainties and risks; and
  - c) An operational management plan for each elephant population using the Management Strategy Evaluation framework that involves the full range of stakeholders in the management process together with Management Orientated Monitoring systems that operate from village and district to national levels with the back-up of MIKE and ETIS.
- 6. *Submit full details* of all plans and agreements to CITES Secretariat to begin the final approval process in order to proceed in trade in ivory.

If full compliance and buy-in for the effective implementation of an ivory trading process is to be achieved, each of the steps (from Step 2 to Step 6) will need to involve negotiation and agreement amongst key stakeholders. The primary decision making tools that we recommend to assist in this process are outlined in the following section.

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# 5.4.3 Decision-making mechanism and tools

## Multi-level decision-making mechanism

The devolution of responsibility and accountability to appropriate levels in the chain of supply and demand requires decision-making mechanisms appropriate to each level, together with tight and effective feedback loops and accountability within and between levels. A conceptual model of such a multi-level decision-making process is provided in **Fig.5.3** below.



Figure 5.3: Decision-making involved in the process of legal trade in ivory. Conceptual framework of the top-down and bottom-up links and feedback loops in decision-making between the major levels involved in the process of legal trade in ivory

An important aspect of the process would be to reach decisions on the unit of management. Elephant populations cross boundaries while CITES resolutions and reporting structures are tied to administrative (national) boundaries (van Aarde & Ferreira 2009). Six population clusters occur within the four Appendix II countries. Two of these lie entirely within their respective countries (Etosha in Namibia and the Sebungwe within Zimbabwe) while the remaining four clusters fall within transfrontier conservation areas and spill over into Angola, Zambia or Mozambique, where elephant populations are listed on Appendix I. From an ecological and resource management perspective it makes sense to base management on the elephant population clusters, rather than on segments of shared populations within countries (van Aarde & Ferreira 2009).

## Scenario planning

The term "scenarios" is used in two senses. One sense refers to alternative projections from simulation models such as the climate change models and the alternative scenarios they generate. The other, used here, refers to the exploration of a limited set of qualitative, contrasting, but plausible alternative futures that provide the basis for further qualitative and quantitative exploration of their consequences (**Fig. 5.4** below). It is essentially an exploration of alternative futures by stakeholders who are directly involved in the issue or problem being tackled.



Figure 5.4: Alternative futures

Systems vary in their degrees of certainty and controllability and scenario planning is appropriate where ability to control the system is low and uncertainty is high - a situation widely encountered in conservation in Africa. (Adapted from Peterson *et al* 2003)

Scenarios that map out the key drivers, issues and alternative trajectories of the system under examination can then form the basis of rigorous data gathering and analysis to further inform decisionmaking (Peterson *et al* 2003, Carpenter *et al* 2006, Kass *et al* 2011, Polasky *et al* 2011) and provide a basis for greater understanding of the system and effective adaptive management.

Scenario planning is particularly useful as a tool for decision-making and policy planning in uncertain, complex and multi-cultural situations such as those that characterise conservation initiatives in Africa and the polarised approaches to elephant conservation and trade in ivory. It can be used at high levels, as was the case in the transition from Apartheid to the new dispensation and majority rule in South Africa in the early 1990s, to local and even village level planning. Scenario planning, involving a full range of stakeholders bordering the Hwange National Park, was used successfully in a two-day workshop to explore the potential for developing an adaptive co-management approach to conserving elephants within and beyond the boundaries of the park (Cumming 2006). A continuation of the then current situation was reflected in the "lose-lose" scenario (**Fig. 5.5** next page).



Figure 5.5: Narrative summary of four management scenarios for Hwange National Park and surrounding area elephant population developed by working groups and a plenary session during a two-day stakeholder meeting held in June 2006. (Source Cumming 2006)

#### **Bayesian** Networks

Bayesian networks (BNs), or probabilistic causal networks, provide a statistical modelling framework in which to examine the probable influence of a range of factors (e.g. ecological, social and economic) or drivers on response variables. For example, Amstrup (*et al* 2008) used a Bayesian network modelling approach to predict the distribution of polar bears during the 21s Century in response to climate change. In addition to empirically established probabilities BNs can include expert knowledge, and can be updated as new knowledge becomes available. Major advantages of BNs are that they can be used in group settings to develop 'influence diagrams', include continuous and categorical variables, and result in transparent models and model outcomes in a form that can be used in risk and decision analysis.

BNs are being used in a wide variety of conservation and natural resource management situations (e.g. McCann *et al* 2006, Marcot 2006) and specific examples include the rehabilitation of Hector's dolphin in New Zealand (Conroy *et al* 2008), planning future land use options around Nairobi National Park (McCloskey *et al* 2011) and assessing Red Listing of species (Adrian 2010).

## Management Strategy Evaluation (MSE)

MSE had it roots in the development, by the International Whaling Commission in the 1980s, of management procedures for the harvesting of whales and in the management of marine fisheries in South African waters. Since then it has been widely applied in South African and Australian fisheries. E. J. Millner-Gulland and colleagues (Milner-Gulland *et al* 2010, Bunnefeld *et al* 2011) have recently explored the applicability of MSE to terrestrial systems. It is clear that the approach could readily be adapted to the management of elephant populations.

Major advantages of the MSE approach are that it provides a rigorous and transparent approach to decision making in resource management and involves a full range of stakeholders so as to ensure compliance and buy-in in the establishment of management procedures and harvest rules. It also makes provision for dealing with uncertainty at all stages in the process. The following description of the process is taken from Milner-Gulland (*et al* 2010).

"MSE makes use of an operating model (OM), representing the 'true' resource dynamics and parameterized using knowledge of the biology of the population being harvested. Simulated data are 'collected' in an observation model and used to determine a harvest control rule (HCR) that specifies the level and type of extraction. This extraction is then applied through an implementation model, under which the OM is projected forward to the next time step. This simulation loop is repeated, potentially over many years, allowing the user to evaluate the HCR against the management objectives, which may include stability of the yield, profitability and the probability that the stock will stay above a threshold size. Uncertainty is explicitly accounted for in several steps of the process, including parameter and structural uncertainty in the OM, observation and implementation uncertainty. This means that the eventual management procedure (MP) that is chosen by decision makers based on the results of an MSE is more likely to be robust and consistent with the precautionary principle."

"Since alternative hypotheses of underlying resource dynamics often exist and a range of management strategies need to be evaluated, sets of OMs and HCRs have been used to evaluate which management strategies consistently perform best, relative to suites of objectives. It is necessary that these objectives and the performance metrics to evaluate them are clear before beginning the MSE process, and so MSE has also been seen as a way of heightening stake-holder involvement in management, because stakeholders (e.g. resource users) can be involved both in the development of objectives and metrics and in the decision about which MP to adopt in the light of the results of the MSE".

An extension to the approach incorporating a harvester operating model, suggested by Bunnefeld (*et al* 2011), provides a basis for including rules for harvester decision-making and a basis for modelling the take from a variety of harvesters. In the case of elephants this might include trophy hunting, meat harvesting, culling for habitat management, problem animal control, and collection of found ivory such as may occur following die offs due to drought.<sup>32</sup> An extension of the MSE to include such a component is shown in **Fig. 5.6** on the next page.

Some key aspects of the needed population modelling have already been carried out (Martin 2004, 2006, 2007, 2008 and Craig *et al* 2011 [references in Annex 3]). Examples are provided Chapter 4 of this report.



**Figure 5.6: Management Strategy Evaluation (MSE) framework.** The harvest control rules can be fed into an additional harvester model that would allow for decision making by managers of component populations (Redrawn and adapted from Bunnefeld *et al* 2011)

## Monitoring and oversight

Clearly, rigorous and regular monitoring protocols would need to be implemented for each population involved in the legal trade. For elephants the items monitored would include numbers, structure and growth rates, mortality rates (legal and illegal), carcass ratios derived from aerial censuses, and full details of all tusks collected and held in national stores as well as those submitted to the CISO. Additional information on management capacity, returns on revenue from ivory and other elephant products, and the usual costs incurred in a business operation would be needed.

At the level of elephant population management and the production and marketing of ivory we recommend the development of operational plans within a rigorously applied Management Strategic Evaluation framework that includes the necessary range of stakeholders. The International Whaling Commission initially developed this approach. It has found wide applicability in marine fisheries and its application to terrestrial systems is now being developed.

Oversight of the Management Strategy Evaluation process would need to be provided by a body comprising representatives from the CISO (that would have rules for what ivory it can accept), the CITES Secretariat, the Technical Advisory Group (TAG), ivory processors, ivory producers (governments), private enterprise, and landholders/communities with elephants.

## 5.5 Concluding Comment

A devolved decision making-process is proposed that would include a full range of stakeholders, and involve both top-down and bottom-up decision-making mechanisms in a multi-level governance framework (Ostrom & Janssen 2002) from the CITES CoP to the local level. The process would provide for those directly responsible for the conservation of elephants, and the supply of ivory, to link directly with those responsible for carving ivory through a single link in the form of a Central Ivory Selling Organisation (see next chapter). By closely linking supply and demand, the crucial issue of incentives to maintain stakeholder buy-in and compliance in a sustainable and legal trade in ivory can be established. It provides for shorter, tighter feedback loops and minimises scale mismatches between institutions and resource management. Equally it provides the basis for a legal market to establish market control for ivory; control that presently rests in the hands of the criminal syndicates that are able control both the supply and the price of illegal ivory.

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# 6. CONDITIONS UNDER WHICH A TRADE IN IVORY COULD TAKE PLACE

TOR Clause (d): *Exploration of the conditions under which international trade in elephant ivory could take place, taking into account: ecological and economic sustainability of the ivory trade; the impact of trade on the illegal killing of elephants; the initial impact of the one-off sale that was agreed at the* 14<sup>th</sup> meeting of the Conference of the Parties (The Hague 2007); levels of illegal trade, enforcement *challenges and capacities; information on linkages between legal and illegal trade; and methods to elucidate these linkages; methods to track the chain of custody, etc.*<sup>33</sup>

## 6.1 A potential ivory-trading system

Following from the factors which could guide a future trade and the decision-making mechanisms outlined in Chapter 5, we put forward a notional design for a process of trade in ivory. We emphasise that the proposed system is no more than a starting point for negotiation amongst the primary and second stakeholders (range states and ivory importing states).

We propose the establishment of a **Central Ivory Selling Organisation** (CISO) the features of which are outlined on the pages which follow. We have drawn on some of the lessons learned from examining the practices of De Beers in their conduct of the diamond trade (Epstein 1982) which was highly successful for over 100 years (**Chapter 3**, page 24). Barbier (*et al* 1990) and Burhenne (1998) have proposed a similar system. We are not proposing a monopoly in the sense that De Beers was: the new institution would effectively be owned by the stakeholders and be accountable to the Conference of the Parties to CITES. Whereas De Beers' sole aim was to maximise the income from diamonds, the CISO would have multiple objectives – to obtain the best possible returns for the primary stakeholders, to gain control of the currently illegal market and, ultimately, to reduce illegal killing of elephants.

At the outset we emphasize that it would not be the aim of the CISO to promote the killing of elephants for trade in ivory. We are unaware of any national policy or elephant management plan that has ever advocated the use of elephants for this purpose. However, the *de facto* management situation in many range states is that elephants are being exploited (illegally) for their ivory.

Elephant populations will inevitably produce ivory through natural mortality <sup>34</sup> and a range of management practices such as problem animal control, culling and trophy hunting (see **Fig.4.8**, p45). It seems entirely beneficial for conservation (including higher-valued land use) that the value of this ivory should be re-invested in the areas where it originated. The aim of the CISO would be to secure this value for the producers of ivory.

The proposed system cannot be implemented overnight. It will require considerable consultation, negotiation and planning with range states, prospective importers of raw ivory and technical experts. The previous chapter on decision-taking mechanisms outlines the necessary steps to ensure the buy-in of all stakeholders involved.

<sup>33.</sup> The remaining issues in para (d) of the TOR are addressed in Chapter 2 (subsection 2.4, page 11), Chapter 4 (subsections 4.3, p37 and 4.4, p46) and Chapter 5 (subsection 5.2.4, p58).

<sup>34.</sup> In an unexploited elephant population the ivory production from natural mortality is about 0.2kg/elephant/yr or about 100 tonnes per annum from a population of 500,000 elephants (Table 4.1, p40).

The features of the proposed system are -

# 6.1.1 A single outlet for all raw ivory exported from Africa

- a) All sales of raw ivory would be conducted in Africa by a **Central Ivory Selling Organisation** (CISO) which would operate from a single site, agreed amongst the range states;
- b) The organisation would be staffed with its own experts and operate semi-autonomously (p77);
- c) The CISO would be accountable to the elephant range states exporting ivory and the Conference of the CITES Parties for its performance; <sup>35</sup>
- d) The CISO would receive quota applications from range states each year and would assess the sustainability of such quotas, their consistency with the management plan referred to in paragraph 6.1.3 (a) below. In the event of disagreement and the need for arbitration, the matter would referred to the CITES Secretariat and, if necessary, to the Conference of Parties;
- e) The CISO would be funded by a levy on ivory sales a levy to which both buyers and sellers agree; and
- f) The CISO would undergo and annual external audit of its stocks and financial transactions.

# 6.1.2 No intra-Africa trade in raw ivory

- a) There would be **no legal trade in ivory amongst range states** all ivory for export would move directly to the holding facility of the CISO;
- b) All ivory put forward for sale would originate from government ivory stores in the range states (but see 6.1.3.d below); and
- c) Owners of ivory carving industries in range states would be subject to the same conditions as those for international raw ivory buyers defined in section 6.1.4 and any domestic ivory carving industry would be regulated to the same standards as are expected of consuming countries.

## 6.1.3 Exporting Range States

Range states that satisfy certain criteria would be admitted as **sellers to the CISO**. In addition to the provisions outlined in Chapter 5 (Section 5.3, page 59) for Appendix II countries to be able to trade in ivory, the criteria might include the following –

- a) The submission of an acceptable management plan for elephants; <sup>36</sup>
- b) An undertaking to supply all their raw ivory only to the CISO (but see para. 6.1.2c above) and not to engage in trade in raw ivory with any individuals or countries within or outside Africa;

<sup>35.</sup> A "Regional Elephant conservation and management commission" (such as those for narwhal and vicuna (Section 3, pages 18 & 20) may be an appropriate body to ensure accountability at the regional level in Africa.

<sup>36.</sup> The Management Plan could be altered as and when needed as long as the CISO found the amendments acceptable.

- c) The submission of an annual quota estimate to the CISO that is consistent with the management operational plan referred to in paragraph 6.1.3a above and an agreement to accept the CISO's decision on the final quota;
- An undertaking to return the proceeds of ivory sales directly to the agencies, individuals or community organisations from whose land the ivory had originated;<sup>37</sup>
- e) Compliance with existing CITES requirements for marking ivory (or, preferably, with an improved microchip or similar system still to be developed); and
- f) An undertaking to provide a provenance certificate <sup>38</sup> with every shipment of ivory to the CISO.

# 6.1.4 Raw ivory buyers

Buyers of raw ivory from the CISO would be individuals (or governments who own ivory-processing factories)<sup>39</sup> from any country in the world which satisfied CITES requirements and the following CISO requirements –

- a) Proof of financial liquidity;
- b) Ownership of a carving (or ivory processing) industry;
- c) An undertaking to ensure that any raw ivory purchased from the CISO goes directly into the industry defined in para. b) above and no raw ivory is sold onward under any circumstances;
- d) An undertaking to use no ivory in the industry defined in para.b) above other than that purchased from the CISO;
- e) An undertaking to register with the CISO all existing stocks of raw ivory held at the time of receiving 'buyer status';
- f) Agreement to spot audits by the CISO;
- g) An undertaking to provide monthly returns of stocks of raw ivory and artefacts made and sold to the CITES Management Authority in the buyer's country of residence; and
- h) An agreement with the CISO concerning removal of buyer status in the event of infringement of any of the points c-g above.

A principle underpinning the admission of buyers is that it should be made easy to be legal. Buyers would effectively have a privileged status similar to that of 'sightholders' in the diamond industry ... subject to the conditions outlined above.

<sup>37. ...</sup> including State Protected Areas, private or corporate landholders and community organisations.

<sup>38.</sup> This certificate would give details of the origin of every tusk in the shipment, e.g. problem animal on community land, natural mortality or culling in a State Protected Area, seizure from illegal hunters within the range state concerned. The location from which the tusk originated would be specified (GPS reference).

<sup>39.</sup> The reason for this is to shorten the pathway for raw ivory from the producer to the end-user. The current system in China where the state purchases ivory and resells it to ivory carving industries opens up a loophole in the system.

# 6.1.5 Ivory Sales

The process by which ivory would be sold is outlined below -

- a) Ivory sales would be conducted on the CISO premises;
- b) Sales would be held frequently; <sup>40</sup>
- c) Tusks would be sorted into 'parcels' which catered for different buyer preferences;<sup>41</sup>
- d) At the inception of the system, the CISO would set the prices for each parcel of ivory but, as the number of buyers increases over time, the system might shift to auctions; <sup>42</sup> and
- e) Immediately after each sale, the raw ivory would be consigned directly to the physical address of the buyer passing through no intermediary hands ('middle men').

To achieve its dual objectives, the CISO would neither sell ivory at artificially low prices or overprice it. Attempts to isolate illegal traders by flooding the market could have the undesirable effect of encouraging consumption. Over-pricing ivory would be likely to stimulate illegal activity as criminal entrepreneurs seek to undercut the profits being earned by the CISO (SULi 2012, in litt.).

## 6.2 Structure of the CISO

A notional organisational structure for the CSIO is shown in **Fig.6.1** on the next page, together with its relationships to CITES, TAG, MIKE & ETIS, producers, ivory processors and consumers.

- (1) The organisation would be headed by a Chief Executive Officer (CEO) controlling three divisions, each headed by a Director;
- (2) The first division deals with the ivory producers, i.e. the Range States. Its functions would be to
  - a. Receive applications from producer states<sup>43</sup> to be admitted as suppliers of ivory to the CSIO. The conditions attached to this were outlined in section 6.1.3 above.
  - b. In the event that the applying range state satisfies all the conditions, the Director would recommend that the country be admitted and this would be conveyed to the CITES Secretariat through the CEO.
  - c. Whilst acting as the gatekeeper as to which range states are accepted as suppliers of ivory to the CISO, at the same time the 'Producers Division' would be providing assistance to range states to help them qualify. This assistance might take the form of legislative revision or developing management plans and management institutions amongst local communities.
- 40. De Beers used to hold about ten diamond sales ('sights') per year. Obviously the CISO would suit this to the supply and demand side of raw ivory.
- 41. De Beers prepared individual parcels for their various sightholders which suited their particular requirements. The CISO would conduct its own market research and maintain close liaison with the buyers.
- 42. De Beers operated entirely on their own price setting. Buyers had Hobson's Choice they could accept the price or reject the parcel. Those buyers who rejected too many parcels were not invited to subsequent 'sights'. The CISO would decide at what stage the threshold number of buyers required for effective auctions to take place without collusion amongst buyers had been reached.
- 43. In referring to 'producer states', the provisions of 6.1.3 d) would still apply.

- c. For those range states qualified as sellers of ivory, this division of the CISO would carry out the task of spot audits on their ivory stores.
- d. When any range state is ready to move ivory to the CISO and the CISO is ready to accept it, this division attend to the logistics of the transfer.



Figure 6.1: Organisational structure for the CISO

- (3) The second division deals with the actual sales of ivory. Amongst its functions would be
  - a. All ivory would be sold through a single outlet where the offices of the CISO would also be located. The location of the facility at which ivory is stored and sales are conducted would be a matter for agreement between range states and importing countries.
  - b. Sales would be held as frequently as necessary to suit both suppliers and buyers and the pricesetting strategy of the CISO (see 6.1.5b and footnote # 40).
  - c. This division would weigh and check the ivory received from suppliers and sort it into lots or 'parcels' to be sold at each sale. The composition of these lots would take into account known buyer requirements (see (4)b below) but also the objective of achieving the best returns for the producers. The CISO would set the prices for each parcel.
  - d. This division would carry out **certification** of the ivory which might take the form of attaching a special sticker or tag carrying a CITES hologram and unique number to every tusk.
  - e. Finally, the sales division (in liaison with the processors division) would oversee the freight arrangements directly to each buyer's premises.
- (4) The third division (Processors) would carry out the following tasks
  - a. In section 6.1.4 the conditions were outlined for being considered as a buyer. This division would consider the applications from potential buyers and invite suitable candidates to become buyers. All such applications would require an endorsement from the CITES Management Authority in the country where the buyer's processing factory is located. The CITES Secretariat, MIKE and ETIS would be kept informed of all individuals with buyer status.
  - b. This division would carry out all liaison with the buyers including notification of when sales will take place<sup>44</sup> and receiving their 'wish-lists' of the types, sizes and quantities of ivory they would like see in their parcels.
  - c. It would also arrange spot audits on buyers' premises (a condition agreed to in acquiring the status of a buyer).
  - d. Finally, it would monitor the passage of all ivory purchased on CISO sales to their end destinations.

# 6.3 Relationship of the CISO to key organisations

a. It might be desirable to have a Board or a Commission (see footnote #35) with oversight of CISO operations. Logically, this board/commission should have representation of the range states (primary stakeholders) and the buyers (secondary stakeholders). There might be a permanent seat on the Board for the CITES Secretariat. The CEO of the CISO might have the option to invite certain experts to join the Board, e.g. elephant specialists, economists and social scientists with expertise in Africa. The size and composition of the Board and the manner of selecting its incumbents falls outside the scope of this study but should be in accordance with the process outlined in Chapter 5 (subsection 5.4.2, page 64).

<sup>44.</sup> De Beers used to send out annual calendars with all the sales dates during the year ringed.

- b. It is recommended that the point of liaison between the CISO and CITES is a designated person within the CITES Secretariat. The Secretariat would use its experience and judgement about which aspects of the CISO's operations need to be reported to the Standing Committee and presented at the Conferences of the Parties.
- c. Because of the importance of their monitoring work, CISO would obviously want to have a close relationship with TRAFFIC, TAG, ETIS and MIKE. The flow of information would be bidirectional.

## 6.4 Funding of the CISO

The desirable principle that whatever system was decided upon to undertake trade in ivory should be self-supporting was given in Chapter 5 (page 57). The operating budget and staff structure for the CISO would be developed following agreement amongst the primary and secondary stakeholders on the structure and function of the organisation. The budget could be realised by a levy on the ivory sold and would be shared between the producers and processors.

# 6.5 Discussion

Such a system addresses many of the concerns which have been raised in this report.

Firstly, it deals with the problem of supply and demand. The CISO can manipulate prices in such a way that demand is reduced if it exceeds supply. De Beers' aim was to keep the market always needing more diamonds and it adjusted prices to achieve this. The CISO's aim is to maintain the value of ivory and gain control of what is, at present, a market organised and run by criminal syndicates.

Secondly, it reduces the length of the pathway from the producer to the processing 'factory' thus decreasing the opportunity for illegal ivory to enter the system. This would simplify the detection, identification and seizure of illegal ivory. Anything outside the legal shipments from the CISO is illegal. For buyers ('sightholders') the risk of being caught using illegal ivory in their factories would be less attractive than losing access to a continued supply of legal ivory.

Thirdly, the system addresses corruption. It will be very difficult for individuals within government structures to circumvent the conditions outlined in section 6.1.3.

Fourthly, it deals with a perceived problem of the present system of one-off sales where range states feel they are not receiving the true value of their ivory.

Finally, it provides the 'independent' mechanism referred to in our terms of reference. Many of the functions outlined for the CSIO, whilst supporting the aims of CITES, also provide an independent screening mechanism for both buyers and sellers and an independent monitoring system of ivory trade.

Critics of the proposed system are dubious whether it will work. It must be observed that the present system is not working so that there are strong imperatives for seeking an alternative.

One of the concerns raised is that a legal trade through the CISO for countries listed on Appendix II will have no beneficial effect for the remaining countries listed on Appendix I and the present illegal trade will continue as before. We observe that the present Appendix II countries have more than 50% of the Africa's elephants so that, if the legal trade achieves its objectives, at a minimum it will benefit half of the elephants in Africa. If Tanzania (which proposed the transfer of its elephant population to Appendix II at CoP13, CoP14 and CoP15), Zambia (which proposed the transfer of its elephant population to Appendix II at CoP12), Malawi (which holds a reservation against the Appendix I listing of its population) and Mozambique (which is involved in transfrontier conservation areas with South Africa and Zimbabwe – point 5, subsection 5.4.3, page 65) were able to achieve the criteria for selling ivory through the CISO, more than 75% of Africa's elephants would be included in the new system. This could approach the tipping point where the legal trade might gain control of the illegal market and would place peer pressure on those countries holding the remaining 25% of Africa's elephants. There may also be greater resources available from their peers to assist them to do so.

# SULi (2012 in litt.) state that -

"To act as an effective conservation measure, a legal trading regime must work in both of two ways. First, it must offer a sustainable alternative source of supply at prices that can compete with illegal markets. Second, the proceeds from sales must be reinvested into protection and effective management of populations. This dual effect allows the legal regime to compete effectively with illegal suppliers. If the second condition is not met, the case for legal trade is weakened."

This sounds admirable but the issue is not so simple. Firstly, it assumes the State will invest the proceeds from sales into the conservation of elephants and is silent on the issue of incentives. Throughout this study we have assumed that if the correct incentives are in place and the primary stakeholders receive the benefits which are due to them from a legal trade, they will invest in the protection and management of elephants. It will not be achieved directly by State intervention (except in State Protected Areas) but rather through the State creating an enabling environment.

Secondly, the issue is not directly amenable to analysis by 'old-fashioned' economics. Beinhocker (2006) challenges the simple assumptions which have underpinned traditional economics and replaces them with a complex systems approach. The success of a legal trade in ivory will depend not so much on issues of supply, demand and pricing as it will on the ability of the stakeholders to cooperate with each other in creating a workable institution such as the CISO to bring them prosperity in the broadest sense – including the conservation of elephants. The CISO can play a vital rôle in this process by the relationships it builds with the stakeholders. Trust and cooperation must be established amongst the stakeholders and the CISO to bring about the transformation.

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SULi (2012, in litt.) Comments received on the first draft of this report.

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# Annex 1

# CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)



Notification No. 2011/031

# Decision-making mechanism for a process of trade in ivory

# Terms of reference

The Secretariat wishes to commission an independent study on the development of a decision-making mechanism and process for future trade in elephant ivory for review by the CITES Standing Committee. This study, which will be coordinated by the Secretariat in consultation with stakeholders including African and Asian elephant range States, will cover the following issues:

- a) examination of the various processes and decision-making mechanisms related to ivory trade that are or have been operating under the provisions of the Convention, including compliance and enforcement provisions;
- evaluation of the strengths and weaknesses of international trade regimes and associated controls, safeguards and monitoring methods for other high-value commodities in the context of future trade in ivory;
- c) basic principles and factors that could guide future trade in ivory, and proposals on how an effective, objective and independent decision-making mechanism could operate, taking into account the provisions of the African elephant action plan and experiences from Asia; and
- d) exploration of the conditions under which international trade in elephant ivory could take place, taking into account: ecological and economic sustainability of ivory trade; the impact of trade on the illegal killing of elephants; the initial impact of the one-off sale of ivory that was agreed at the 14th meeting of the Conference of the Parties (The Hague, 2007); levels of illegal trade; enforcement challenges and capacities; information on linkages between legal and illegal trade, and methods to elucidate these linkages; methods to track the chain of custody; etc.

The study is not to determine whether there should or should not be international trade in ivory.

# Qualifications

The Secretariat is seeking tenders from a professional, independent and technical consulting firm or expert(s) to prepare the report, in line with the above terms of reference.

The consultant should have knowledge of, or be able to gather comprehensive information about, trade in ivory as well as other high-value commodities and related regulatory and verification systems.

# Activities and time-frames

The consultant will use electronic means to contact various stakeholders, including African and Asian elephant range States, China, Japan, the United Kingdom of Great Britain and Northern Ireland, the United States of America, IUCN Specialist Groups and TRAFFIC for information that could assist in the preparation of the report.

The Secretariat will provide the consultant with documentation relating to previous and current ivory trade controls, and various processes and decision-making mechanisms related to ivory trade that are or have been operating under the provisions of the Convention, including compliance and enforcement provisions.

The draft report of the consultant, which shall identify options for feasible decision-making mechanisms, shall be submitted to the Secretariat by February 2012.

The Secretariat will then use electronic means to seek comments from identified stakeholders and provide its own comments on the document. These comments will be provided to the consultant to take into account, as appropriate, in finalizing its independent, technical report before 24 May 2012.

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# Annex 2

Resolution Conf.10.10 (Rev.CoP15)\*

# Trade in elephant specimens

NOTING that the Asian elephant, *Elephas maximus*, has been included in Appendix I since 1973;

NOTING also that the African elephant, *Loxodonta africana*, was transferred from Appendix II to Appendix I at the seventh meeting of the Conference of the Parties (Lausanne, 1989) but some populations were transferred back to Appendix II, under a set of conditions, at the 10th meeting (Harare, 1997) and at the 11th meeting (Gigiri, 2000);

RECOGNIZING that elephant range States are the best protectors of their elephants but that the majority of them lack adequate enforcement capacity to ensure the security of their elephant populations;

AWARE that monitoring systems should encompass capacity-building in range States, to provide information to facilitate elephant management, and to prioritize and guide enforcement initiatives and protection efforts;

CONVINCED that the enhancement of elephant security in Africa and Asia would be facilitated by cooperation, data-sharing and mutual assistance between and among the range States;

# THE CONFERENCE OF THE PARTIES TO THE CONVENTION

# Regarding definitions

AGREES that:

- a) the term 'raw ivory' shall include all whole elephant tusks, polished or unpolished and in any form whatsoever, and all elephant ivory in cut pieces, polished or unpolished and howsoever changed from its original form, except for 'worked ivory'; and
- b) 'worked ivory' shall be considered readily recognizable and that this term shall cover all items made of ivory for jewellery, adornment, art, utility or musical instruments (but not including whole tusks in any form, except where the whole surface has been carved), provided that such items are clearly recognizable as such and in forms requiring no further carving, crafting or manufacture to effect their purpose;

# Regarding marking

RECOMMENDS that whole tusks of any size, and cut pieces of ivory that are both 20 cm or more in length and one kilogram or more in weight, be marked by means of punch-dies, indelible ink, or other form of permanent marking, using the following formula: country-of-origin two-letter ISO code, the last two digits of the year / the serial number for the year in question / and the weight in kilograms (e.g. KE 00/127/14). This number is to be placed at the 'lip mark', in the case of whole tusks, and highlighted with a flash of colour;

\* Amended at the 11th, 12th, 14th and 15th meetings of the Conference of the Parties

# Regarding control of internal ivory trade

RECOMMENDS to those Parties in whose jurisdiction there is an ivory carving industry that is not yet structured, organized or controlled and to those Parties designated as ivory importing countries, that comprehensive internal legislative, regulatory and enforcement measures be adopted to:

- a) register or license all importers, manufacturers, wholesalers and retailers dealing in raw, semi-worked or worked ivory products;
- b) establish a nationwide procedure, particularly in retail outlets, informing tourists and other nonnationals that they should not purchase ivory in cases where it is illegal for them to import it into their own home countries; and
- c) introduce recording and inspection procedures to enable the Management Authority and other appropriate government agencies to monitor the flow of ivory within the State, particularly by means of:
  - i) compulsory trade controls over raw ivory; and
  - ii) a comprehensive and demonstrably effective reporting and enforcement system for worked ivory;

URGES the Secretariat, where possible, to assist Parties in improving these legislative, regulatory and enforcement measures; and

DIRECTS the Standing Committee to undertake a regular review of actions taken by consumer States to improve legislation and enforcement measures and to report the results at each meeting of the Conference of the Parties;

# Regarding compliance with control of internal trade

DIRECTS the Secretariat, with reference to the findings of ETIS and MIKE and within available resources:

- a) to identify those Parties with an ivory carving industry and internal ivory trade whose domestic measures do not provide them with the authority to:
  - register or license all importers, manufacturers, wholesalers and retailers dealing in raw, semiworked or worked ivory products;
  - ii) assert compulsory trade controls over raw ivory; and
  - iii) establish a comprehensive and demonstrably effective reporting and enforcement system for worked ivory;
- b) to seek from each Party so identified information indicating the procedures, action and time-frames that are needed in order to establish the measures necessary to properly effect the recommendations regarding internal ivory trade; and
- c) to report its findings, recommendations or progress to the Standing Committee, which shall consider appropriate measures, including restrictions on the commercial trade in specimens of CITES-listed species to or from such Parties; and

DIRECTS the Secretariat, dependent on available resources, to provide technical assistance to Parties to develop practical measures to regulate their internal ivory trade;

## Regarding monitoring of illegal hunting of and trade in elephant specimens

AGREES that:

- a) the systems known as Monitoring the Illegal Killing of Elephants (MIKE) and the Elephant Trade Information System (ETIS), established under the supervision of the Standing Committee, shall continue and be expanded with the following objectives:
  - measuring and recording levels and trends, and changes in levels and trends, of illegal hunting and trade in ivory in elephant range States, and in trade entrepôts;
  - assessing whether and to what extent observed trends are related to changes in the listing of elephant populations in the CITES Appendices and/or the resumption of legal international trade in ivory;
  - iii) establishing an information base to support the making of decisions on appropriate management, protection and enforcement needs; and
  - iv) building capacity in range States;
- b) these monitoring systems shall be in accordance with the framework outlined in Annex 1 for *Monitoring* of illegal trade in ivory and other elephant specimens and in Annex 2 for *Monitoring of illegal hunting* in elephant range States;
- c) information on illegal killing of elephants and trade in their products from other credible law enforcement and professional resource management bodies, should also be taken into consideration; and
- d) technical oversight will be provided to both MIKE and ETIS through an independent technical advisory group to be established by the Secretariat;

## Regarding assistance to elephant range States

RECOMMENDS that Parties assist range States to improve their capacity to manage and conserve their elephant populations through improved law enforcement, surveys and monitoring of wild populations;

## Regarding quotas for and trade in raw ivory

# **RECOMMENDS** that:

- a) each State that has a population of African elephants and wishes to authorize export of raw ivory establish, as part of its management of the population, an annual export quota for raw ivory expressed as a maximum number of tusks;
- b) each export quota be communicated to the CITES Secretariat in writing by 31 December for the next calendar year (1 January to 31 December);
- c) Parties ensure that significant amounts of confiscated ivory are notified separately to the Secretariat and are not incorporated in guota submissions;

- d) the CITES Secretariat assist in the implementation of the quota system by: reviewing information submitted on each quota, together with any information received about the status of the population in question; discussing any concern with the relevant State; and, if there is no cause for concern, communicating the current quota to the Parties not later than 31 January of each year;
- e) the Secretariat maintain its *Ivory Trade Control Procedures Manual* and that the Parties follow the procedures for quota submissions documented in this Manual;
- f) if the quota is not submitted by the deadline, the State in question have a zero quota until such time as it communicates its quota in writing to the Secretariat and the Secretariat in turn notifies the Parties;
- g) no export, re-export or import of raw ivory be authorized unless it is marked in accordance with this Resolution or in accordance with the Secretariat's Manual;
- Parties accept raw ivory from producer States only where the export permit was issued in a year for which a quota for the State in question has been communicated to the Parties in accordance with this Resolution;
- Parties may accept raw ivory from a producer non-party State only if a quota for that State has been reviewed by the Secretariat and communicated to the Parties and if the Secretariat has received from the State an annual report on its ivory trade, and if the State meets all the other conditions in this Resolution and Article X of the Convention (as interpreted by Resolutions of the Conference of the Parties);
- j) in compiling their annual reports, producer party and non-party States that have authorized the export of raw ivory relate such exports to their quota for any given year, providing the Secretariat with as much relevant information as possible, including, as a minimum, the number of whole or substantially whole tusks and their individual weights and identification numbers;
- all Parties maintain an inventory of the stock of raw ivory held within their territory, and inform the Secretariat of the level of this stock each year before 31 January, indicating the source of the ivory; and
- I) Parties assist the Secretariat to ensure that the duties set out in this Resolution are carried out; and

## Regarding resources required for implementation of this Resolution

APPEALS to all governments, non-governmental conservation organizations and other appropriate agencies to provide funds for the resources required in the Secretariat and producer States to ensure that the recommendations in this Resolution can be effectively implemented; and

REPEALS Resolution Conf. 9.16 (Fort Lauderdale, 1994) - Trade in African Elephant Ivory.

# Annex 1

# Monitoring of illegal trade in ivory and other elephant specimens

## 1. Introduction

In order to monitor and record levels of illegal trade in ivory and other elephant specimens on a global basis, there is a need for a system to collect and compile law enforcement data on seizures and confiscations. The Conference of the Parties recognizes the Bad Ivory Database System (BIDS) established by TRAFFIC for this purpose in 1992.

Through further development and refinement of BIDS, the Elephant Trade Information System (ETIS) was developed to monitor the pattern and scale of illegal trade in ivory and other specimens.

#### 2. Scope

ETIS will include the details of law enforcement records for seizures or confiscations of elephant ivory and other elephant specimens which have occurred anywhere in the world since 1989. ETIS will also include subsidiary information on law enforcement effort, legal and illegal elephant product markets and background economic data.

# 3. Methods

Data and information on illegal trade in elephant ivory and other elephant specimens will be collected by TRAFFIC in collaboration with the CITES Secretariat. In this regard, a standardized methodology will be developed for the collection of data, including, *inter alia*:

- source of information
- date of seizure
- type of transaction
- country of seizure
- country of origin
- country of export
- country of destination/import
- type of ivory and quantity
- mode of transport
- modus operandi
- profile of offenders/suspects
- status of cases in the courts
- law enforcement effort.

A data collection form has been designed and circulated to all Parties by the CITES Secretariat.

# 4. Data collection and compilation

The MIKE and ETIS Technical Advisory Group (TAG) support the development and implementation of ETIS. ETIS will be managed and coordinated by TRAFFIC in consultation with the TAG.

All Parties should provide information on seizures and confiscations of ivory or other elephant specimens on the prescribed form to the Secretariat within 90 days of their occurrence. In addition, law enforcement agencies in States not-party are also requested to provide such information.

TRAFFIC will assist the relevant Parties with the collection of data, ensure data quality and consistency, and provide training in data collection and information management techniques to designated officials around the world as appropriate.

## 5. Data analysis and interpretation

The analysis and interpretation of data will be coordinated by TRAFFIC in association with the CITES Secretariat and institutions involved with monitoring the illegal hunting of elephants (see Annex 2) and in consultation with TAG.

# 6. Reporting

TRAFFIC will produce a comprehensive report for each meeting of the Conference of the Parties.

## 7. Intersessional remedial action

In the event that there is a need for urgent intersessional action, TRAFFIC will report to the Standing Committee via the Secretariat as appropriate.

8. Funding

A funding mechanism will be established to ensure that ETIS is fully operational.

# Annex 2 Monitoring of illegal hunting in elephant range States

# 1. Introduction

In order to address the concerns of many elephant range States, it is necessary to establish a system through which the impact of CITES decisions with respect to elephants and trade in elephant specimens can be assessed. Of primary importance is the establishment of a simple system of international reporting of incidents of illegal hunting as a baseline against which levels and trends can be determined and changes in these levels and trends can be detected.

It is recognized that such measurement must consist of two elements. The first of these is the monitoring of parameters relevant to the issue, such as the pattern and scale of illegal killing, the pattern and scale of illegal trade in ivory, the effort and resources being applied to detection and/or prevention, and the monetary value of illegally traded ivory, as well as other factors that might affect these parameters, such as civil strife, the flow of illegal arms and ammunition, loss of habitat and drought.

The second element is the establishment of correlations between relevant parameters and the decisions of the Conference of the Parties with regard to elephants.

The overall aim of this system is to provide information needed for range States and other Parties to CITES to make appropriate management and enforcement decisions, and to build institutional capacity within the range States for the long-term management of their elephant populations by improving their ability to monitor elephant populations, detect changes in levels of illegal killing, and to use this information to provide more effective law enforcement and to strengthen any regulatory measures required to support such enforcement. The system should be established in such a way that it can continue after financial support for the programme has come to an end.

## 2. Scope and methodology

The monitoring system will include elephant range States in both Africa and Asia and trade entrepôts.

It will be based on a standardized methodology for the reporting of illegal hunting by CITES Management Authorities in range States and for monitoring in specific sites or areas. Relevant databases and standard reporting protocols will be established by the CITES Secretariat in consultation with the range States and the MIKE and ETIS Technical Advisory Group (TAG).

## 3. Data collection, compilation and reporting

Data collection will cover the following topics:

- elephant population data/trends;
- incidence and patterns of illegal hunting; and
- measures of the effort and resources employed in detection and prevention of illegal hunting and trade.

Data and information on illegal hunting and illegal trade in ivory will be collected through active communication with range States through the implementation of MIKE and ETIS (see Annex 1).

The CITES Secretariat will request/sub-contract technical support from appropriate experts, with the advice of the TAG, to:

- a) select sites for monitoring as representative samples;
- b) develop a standardized methodology for data collection analysis;
- c) provide training to designated officials in countries with selected sites and to CITES Management Authorities of elephant range States;
- d) collate and process all data and information from all sources identified; and
- e) provide a report to the CITES Secretariat for transmission to the Standing Committee and Parties to CITES.

# 4. Reporting

The CITES Secretariat will provide an updated report on information collected, as part of this monitoring programme, at each meeting of the Conference of the Parties.

## 5. Funding

Substantial funding will be required for the above activities.

# 2. CURRENT ANNOTATION ON APPENDIX II AFFECTING TRADE IN ELEPHANT IVORY

#### Loxodonta africana

Populations of Botswana, Namibia, South Africa and Zimbabwe (listed in Appendix II):

For the exclusive purpose of allowing:

- a) trade in hunting trophies for non-commercial purposes;
- b) trade in live animals to appropriate and acceptable destinations, as defined in Resolution Conf. 11.20, for Botswana and Zimbabwe and for *in situ* conservation programmes for Namibia and South Africa;
- c) trade in hides;
- d) trade in hair;
- e) trade in leather goods for commercial or non-commercial purposes for Botswana, Namibia and South Africa and for non-commercial purposes for Zimbabwe;
- f) trade in individually marked and certified ekipas incorporated in finished jewellery for non-commercial purposes for Namibia and ivory carvings for non-commercial purposes for Zimbabwe;
- g) trade in registered raw ivory (for Botswana, Namibia, South Africa and Zimbabwe, whole tusks and pieces) subject to the following:
  - only registered government-owned stocks, originating in the State (excluding seized ivory and ivory of unknown origin);
  - ii) only to trading partners that have been verified by the Secretariat, in consultation with the Standing Committee, to have sufficient national legislation and domestic trade controls to ensure that the imported ivory will not be re-exported and will be managed in accordance with all requirements of Resolution Conf. 10.10 (Rev. CoP14) concerning domestic manufacturing and trade;
  - iii) not before the Secretariat has verified the prospective importing countries and the registered government-owned stocks;
  - iv) raw ivory pursuant to the conditional sale of registered government-owned ivory stocks agreed at CoP12, which are 20,000 kg (Botswana), 10,000 kg (Namibia) and 30,000 kg (South Africa);
  - v) in addition to the quantities agreed at CoP12, government-owned ivory from Botswana, Namibia, South Africa and Zimbabwe registered by 31 January 2007 and verified by the Secretariat may be traded and despatched, with the ivory in paragraph g) iv) above, in a single sale per destination under strict supervision of the Secretariat;
  - vi) the proceeds of the trade are used exclusively for elephant conservation and community conservation and development programmes within or adjacent to the elephant range; and
  - vii) the additional quantities specified in paragraph g) v) above shall be traded only after the Standing
     Committee has agreed that the above conditions have been met; and

h) no further proposals to allow trade in elephant ivory from populations already in Appendix II shall be submitted to the Conference of the Parties for the period from CoP14 and ending nine years from the date of the single sale of ivory that is to take place in accordance with provisions in paragraphs g) i), g) ii), g) iii), g) vi) and g) vii). In addition such further proposals shall be dealt with in accordance with Decisions 14.77 and 14.78 (Rev. CoP15).

On a proposal from the Secretariat, the Standing Committee can decide to cause this trade to cease partially or completely in the event of non-compliance by exporting or importing countries, or in the case of proven detrimental impacts of the trade on other elephant populations.

All other specimens shall be deemed to be specimens of species included in Appendix I and the trade in them shall be regulated accordingly.

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## **3. REVIEW OF MIKE** (Monitoring of Illegal Killing of Elephants)

The CITES MIKE project illustrates the difficulties of instituting a reliable and sustainable global monitoring system.

The project has a two-pronged approach aiming to detect:

- 1. Changes in elephant populations
- 2. Magnitude and changes in levels of illegal killing

(Monitoring the illegal trade is, at present, the responsibility of ETIS in cooperation with MIKE)

The project was set up as a result of agreements that took place at the CITES Conference of the Parties 1997 (Resolution Conf 10.10) when populations of 3 countries were down-listed to Appendix II, opening the possibility of ivory sales. The background Document for MIKE (MIKE 200) explains the situation as follows:

"... when range states with healthy and well-protected elephant populations and good enforcement of CITES applied for permission for a limited legal trade in elephant products to the 1997 Harare CITES Conference, many other range states and other parties were concerned that if permission was given the effect on those range states with less secure systems, as well as any more local effects, should be monitored at an international level ..."

Resolution 10.10 resulted in CITES Decision 10.1 which, among other things, states:

"... the standing committee shall make available its evaluation of legal and illegal off-take ... as soon as possible after the experimental trade has taken place." And: "The standing committee shall identify, in cooperation with the range states, any negative impacts of this conditional resumption of trade and determine and propose corrective measures."

This objective necessitated the establishment of MIKE, through the proposal (Doc SC41.6.3, 1998). Doc 11.31.2, outlining the decision, was presented to CoP11 (2000) along with the background document.

Doc 11.31.2 states the objectives of the system as follows -

- 1. Measuring and recording current levels and trends of illegal hunting ... in African and Asian range states;
- 2. Assessing whether and to what extent observed trends are a result of changes in the listing of elephant populations in the CITES appendices and/or the resumption of legal international trade in ivory; and
- 3. Establishing an information base to support the making of decisions on appropriate remedial action in the event of any problems with compliance or potential detriment to the species.

And that the monitoring system should -

- a. Facilitate the monitoring of parameters relevant to the issue (i.e. the pattern and scale of illegal killing, the effort and resources being applied to detect or prevent the illegal killing etc);
- b. Determine whether or not "there is a causal relationship between changes in these parameters and the decisions of the Conference of the Parties"; and
- c. Build institutional capacity within the range states for long-term management of their elephant populations.

The original draft proposal (Doc SC41.6.3, 1998) envisaged biennial population surveys in 45 sites; aerial surveys in savanna sites and ground dung-counts in forested sites (at recurrent annual cost of US\$1.3m at today's values). Carcass data, summarised monthly, were to come continuously from patrols. The index of killing was to be produced by calibrating the number of carcasses found using patrol effort. Building capacity so that this monitoring could be carried out by the range states themselves became an important feature of the programme, which began in 2000 with the establishment of a Central Coordinating Unit (CCU). At the same time, a technical advisory group (TAG) was set up to provide independent oversight of the methods and results.

In reality, key details of the project's objectives were not met. Only a few sites were surveyed every two years as planned and although carcass data were regularly submitted, patrol-level information has not yet been available from sufficient sites to calibrate a comparable index of illegal hunting. Over the eleven years of the project (progress reports to CoPs 12-15), no analysis of population trends has been produced, although a baseline of estimates for most sites was mandated in 2003 (SC49 Doc 11.2) and assembled and approved in 2007 (Doc 53.3) as a basis for comparison with future results. That is, rather than five sets of population estimates collected every two years from 45 sites, there is one set against which a future full set from all sites can be compared.

Carcass data *were* able to be used, thanks to innovative thinking within the MIKE CCU, in consultation with the TAG. A result was produced from 8 years of carcass observations in 2010 (Doc 44.2.5, Burn *et al* 2011). This was done by circumventing the lack of data on effort with which the carcass counts should have been calibrated. Instead the ratio of illegally killed to other carcasses found was used as an index of the level of poaching. No evidence was found of an increase in the level of illegal killing related to the one-off sales of ivory, but relationships with other country-specific variables were revealed. This success demonstrated the usefulness of carcass data in estimating trends in illegal hunting, although the authors of the analysis would have preferred to work from patrol level data as originally intended (Burn *et al* 2011).

The reasons for the wider failures were varied. Some problems arose through faults in the original design, impractical protocols for data collection, a lack of funds in the MIKE budget to support a full set of surveys combined with a lack of incentives to range states to do them; and a few sites became inaccessible due to civil strife. Incentives to provide patrol level data are now in place in the form of improved data collection protocols and computer hardware and software that facilitates decision-making at the site level, so the situation is improving rapidly (pers. comm. MIKE CCU). However, the problems of funding and motivating population surveys remains.

This does not apply across the board: some states have provided the required information regularly at the planned intervals. However, even here the failure of MIKE to achieve overall compliance, or the perception that it has not influenced CITES decisions, could prove demotivating. Not all of this is the fault of the project; it is part of a trend noted in the MIKE background document, which states: "Generally the resources and capacity to monitor, manage and protect elephant ... and to enforce CITES decisions, were under severe strain following the ivory trade ban, though there were exceptions".

In the world at large, work does not get done without the resources to facilitate it, pressure or incentives to do it or sanctions for not doing it. In complying states, pressure to monitor wildlife may come from a government concerned with its conservation image, or a desire to deal in wildlife products, or indirectly from local public opinion or an economically powerful wildlife private sector. Tangible incentives may come in the form of economic benefits to the country, or recognition by the international community that might have other spin-off effects (provided either of these are motivators). None of these factors are uniform throughout participating states, however, and even conservation aims, as they relate to ivory trading, may vary widely. The problem of how to obtain a uniform compliance with monitoring requirements across the elephant range, therefore, remains a challenge for this or any monitoring system linked to the ivory trade.

MIKE can form the basis of a monitoring and reporting system in support of decision-making for a system of controls on ivory trade, as it embodies the elements of continent-wide data collection and analysis and independent verification of results. However, the history of the project illustrates the problems that any future continent-wide system of monitoring will face. The primary challenge is implementation at site and country level, which has the potential to limit the quantity, quality and timeliness of submission of data and which, in turn, could undermine the decision-making process.

As the main obstacles to implementation are the absence of resources and incentives to do the work and provide the necessary information, it could be expected that, at best, information will be flowing freely mainly from those states that have sufficient elephants and are permitted to trade or wish to trade. Such a bias in the information gained would mean that, as long as the aim is to determine *global* levels of illegal activity and its trend over short time intervals as a criterion for the continuation of trade, decisions are going to be problematic. Any future system linked to decision-making for ivory trading must address this issue, perhaps by making provision for independently conducted surveys, which do not depend on local expertise and funding, in areas where it is difficult to obtain data within a reasonable time.

A secondary lesson is that estimates of carcasses resulting from illegal killing are more useful than estimates of the actual populations. According to the initial proposal, the present design of MIKE would be capable of detecting a population change of 20% over two successive surveys with 90% probability. Meaningful declines in terms of illegal killing may be less than this, and of course natural increases, which cannot exceed a few percent, are realistically undetectable over a short period. In contrast, carcass counts, which have a naturally low background value, will increase several-fold when illegal hunting becomes significant. Carcasses are therefore much more sensitive indicators of change. A future system should place emphasis on carcass estimates, without neglecting population surveys, which, in any case provide many carcass sightings in savanna sites.

## **Documents** Consulted

- Background Document: Long term system for monitoring the illegal killing of elephant (MIKE),
   (2000). Project proposal to Directorate General VIII (ca 2000) Development DG VIII AG Budget
   Line B7 6200
- Doc SC41.6.3 Annex I. Proposal for establishing a long-term system for Monitoring the Illegal Killing of Elephants (MIKE) (1998).
- SC49 Doc 11.2 (2003). Baseline information for MIKE. 49th meeting of Standing Committee
- Resolution Conf 10.10 (CoP 10) (1997)
- CoP 11 Doc 11.31.2 (2000)
- CoP 12 Doc 34.2 (2002) progress report of MIKE
- CoP 13 Doc 29.3 (2004) progress report of MIKE
- CoP 14 Doc 53.3 (2007) progress report of MIKE
- CoP 15 Doc 44.2 (2010) progress report of MIKE
- Burn R.W., Underwood, F.M. & Blanc, J. (2011) Global trends and factors associated with the illegal killing of elephants: A hierarchical Bayesian Analysis of carcass encounter data. *PLoS ONE* **6**(9).
- SC 49 Doc 11.2 (2003) Baseline information for MIKE information to be presented:
  - a. At least one population survey <3 years old
  - b. Levels of illegal killing derived from a minimum of 12 month (Africa) / 6 month (Asia) data obtained from patrol forms and carcass forms and usmmarised in monthly reports
  - c. A descriptive report on the patterns of influencing factors
  - d. An assessment of effort made in providing the illegal killing information
  - e. A preliminary baseline analysis of paragraphs a to d.

TAG 06 Doc 12.1 CCU (2008) Validation of site samples

CITES Secretariat (2000). Monitoring of Illegal Trade and Illegal Killing. Doc 11.31.2 Objectives etc.

#### ANNEX 3

#### **POPULATION SIMULATION MODEL**

The population simulation model used in this study is similar to that used in developing the Namibian Elephant Management Plan (Martin 2004) which was refined in the Elephant Management Plan for Savé Valley Conservancy in Zimbabwe (Martin 2006), further modified in a study of trophy hunting in Botswana (Craig *et al* 2011) and improved in 2012 for a review of an FAO project in Zimbabwe.

The model consists of 12 linked spreadsheets which operate as a 'birth-pulse' system (**Fig.A3.1** next page). It behaves in a manner similar to the Leslie matrix (Leslie 1984) but the calculations of births and deaths are separated into successive operations because it is designed to cycle within the row operations of a computer spreadsheet. A single key-press causes the model to carry out all the calculations for one year and advance to the next year.

"Stochasticity, in the form of variation in illegal killing or due to ecological factors, would clearly disrupt age distributions and demographic rates, and thus the sustainability of any harvest regime" (Amboseli Trust 2012, in litt.). However, the inclusion of these factors in a model may result in less reliable outcomes because of the uncertainties associated with their very nature, i.e. any complex system will produce surprises and it is often better to work with slow-changing variables (Ostrom 2007). This model is primarily intended for work with large populations where stochastic effects have less influence than they would have with small populations. We have experimented with stochastic models over the years and find numerous disadvantages with them: firstly, no run of the model is ever repeatable and, secondly, runs have to be repeated many times in order to obtain meaningful averages. In the end, these averages yield the same results as those obtained by using average values for the input parameters.

The functioning of the spreadsheets shown in Fig.A3.1 are as follows -

- A The main reproductive, management and financial parameters are defined here and, for any particular simulation run, different management functions can be enabled or disabled.
- B The starting population is defined here by setting the overall size of the population and the numbers in all male and female age classes. The model runs on a counter for each iteration and in the first year it uses the population defined here. In all successive years, the 'running cohort' is the population from the year before (obtained after completion of the mortality calculations on spreadsheet H). Various options are provided for the starting population. It can have a stable age structure or be any 'custom' population defined by the user. The overall sex ratio of the population can be adjusted to give any desired ratio of males to females.

Whatever combination of options is selected for the starting population, the final stage on this spreadsheet is to adust its overall size so that it is exactly equal to the size specified at the start of the sheet and the numbers in all the age classes are integers. This is achieved by rounding the population so that there are no fractions and, when the total of the rounded numbers does not match the specified number (as is usually the case), animals are added to or deducted from the age classes. The selection of which age classes to increase or decrease is done by ranking the fractional numbers before rounding and selecting the values which were closest to being included or excluded.



**Figure A3.1: Population Simulation Model** 

C – The annual breeding of the population is done on this sheet. The intercalving interval is specified in months and converted to a fecundity value (12/ICI) which is the average number of calves (of both sexes) produced per year per female. The mean age at first conception is specified together with a standard deviation which allows a spread of fecundities either side of the mean.

Provision is made for defining a peak in fecundity values for any particular age class and, by defining a standard deviation and scaling factor, the effect of this peak can be very sharp (i.e. affecting only a few age classes) or broadly spread over a number of age classes. The decline in fecundity with old age is catered for by specifying the mean age for the onset of decline and a standard deviation which determines how sharply fecundity declines with increasing old age.

The mean value we have used for the age at first parturition is 12 years (with a standard deviation of 2) and we have used an intercalving interval of 4 years. A full review of values for these parameters is given in Craig (*et al* 2011) and sensitivity analyses were performed to examine their influence on the population rate of increase. The values chosen in this study are the most typical for savanna populations.<sup>45</sup>

The next three spreadsheets each deal with a particular management activity. All of these spreadsheets contain algorithms which ensure that an integer number of animals is deducted from each age class using the technique described for Spreadsheet  $\mathbf{B}$ ).

- D Culling entails the removal of animals in breeding herds (all males up to the age of 10 years and all female age classes). The inclusion of males older than 10 years in the numbers culled (i.e. they happen to present in a cow herd at the time of culling) is determined by a probability function which is less than unity and which decreases with increasing age of males. This sheet allows the specification of a percentage offtake, or a fixed number from the population, or the surplus above a specified carrying capacity to be removed in any selected year. The financial returns from ivory, meat and skin derived from culling are calculated.
- E Problem animal control (PAC) includes males and females older than 14 years of age in the simulation model. A probability template is used to bias the PAC offtake towards younger males and fewer females.
- $\mathbf{F}$  **Hunting**: This includes both trophy hunting <sup>46</sup> and harvesting for ivory. The hunting spreadsheet is the most sophisticated part of the model. Since this is the main application of the simulation model in this study, the techniques used for simulating trophy hunting are presented separately at the end of this Annex.

<sup>45.</sup> The Botswana population has shown a very high rate of increase since 1995 (greater than 6% per annum) which cannot be achieved using the parameters specified above. A depleted age structure for adult males largely accounts for the observed growth rate.

<sup>46.</sup> The impact of trophy hunting on the elephant population is negligible in biological terms. Trophy hunting has no effect whatsoever on limiting population growth and is not a management tool to replace culling when an elephant population is judged to be overabundant.

This completes the spreadsheets analysing the management regime. For each sheet the total and net income to be expected from sale of meat, skin and ivory is calculated and, for trophy hunting, the income generated from trophy fees and daily rates is estimated.

- G Emigration: This sheet provides for emigration from the population when its density exceeds a certain threshold. It has not been used in this study. The specified density is converted to a number of elephants and when the population exceeds this number emigration begins. The numbers leaving the population are a specified percentage of the surplus animals above the threshold number. Emigration is assumed to affect both sexes and all age classes in the same proportion.<sup>47</sup> Emigration applied in this manner is capable of full regulation of an elephant population.
- H Natural mortality is the last of the spreadsheets in which population numbers are modified in the course of an annual cycle. The model assumes that age-specific mortality is the same for both sexes in the absence of any data which might indicate otherwise. <sup>48</sup> We have used a mortality of 8% for juveniles in their first year of life, 0.5% for animals from 10-40 years and an escalating curve for senescent mortality which begins at the age of 40. The age-specific mortality schedule is set by means of a template and the analysis is performed simply by multiplying the numbers in each age class by the age-specific mortality in a row vector operation. As with the previous spreadsheets, an algorithm operates to ensure that an integer number of animals is deducted from each age class using the technique described for Spreadsheet B.

This sheet also calculates the total amount and value of ivory both on the living elephants and from the animals expected to die naturally.

After natural mortality has been applied, the final population vectors (males and females) become the starting population for the next year.

J – This sheet summarises each year of management giving the numbers at the start of the year, the numbers of animals dying in each category of management and through natural mortality, and the population at the end of the year. The population growth rate is calculated and the results are displayed graphically.

The spreadsheet software is set to 'manual operation', and the model is advanced one year at a time by a keypress. By keeping the key depressed, the model run continuously within the speed limitations of the computer. Any particular run of the model is terminated on this page by the Reset button.

K – This sheet keeps an overall record of the results for each year in any simulation run, including all of the population dynamics information, the management information (offtakes, mean tusk weights etc.) and a full financial record of all gross and net income earned from management.

<sup>47.</sup> To some extent this is a simplification. Observed dispersal from elephant populations usually consists of mature males at the start and this is later followed by cow herds.

<sup>48.</sup> Moss (2001) found male mortality was significantly higher than female mortality for all age classes in the Amboseli elephants in Kenya. However, much of the male mortality is anthropogenic rather than 'natural' in the sense used here. From the low Amboseli population growth rate it can be deduced that the elephants are probably at a density where self-regulating mechanisms are operating.

### Tusk Weight versus Age

Attempts have been made using limited data sets to construct the relationship between elephant tusk weight and age (Perry 1954, Elder 1970). The largest data set assembled (1,116 male tusks and 1,399 female tusks) is that collected by R.M. Laws from elephants culled in Kenya, Tanzania and Uganda between 1965-1969. These data were analysed by Pilgram & Western (1986) to give the relationship for a single male elephant tusk –

$$Age = e^{(1.76 + 0.58 \ln weight)}$$
 years

This converts to -

## *Tusk weight* = $0.04596 Age^{1.7241}$ kg

However, when this relationship is plotted on the scatter diagram with the original regression line (Pilgram & Western 1986, Fig.4) it does not coincide exactly with the line. To achieve a 'perfect' match the constants need to be modified very slightly to -

This is the relationship we have used for male tusks in the population simulation model (**Fig.13**). The method of simulating hunting requires a measure of the scatter of tusks for any given age. For Pilgram & Western's data the following expressions give good approximations of the standard deviations above and below the mean (the scatter is not symmetrical about the mean) –

Upper Standard Deviation = 
$$0.0181$$
. Age <sup>1.731</sup>  
Lower Standard Deviation =  $0.0118$ . Age <sup>1.731</sup>

The formula given by Pilgram & Western for female tusks does not sit comfortably with the scatter diagram shown in their Fig.13. We have modified it to pass centrally through the distribution of Law's data using the formula -

```
Female tusk weight = 0.8 \ Age^{1.53} (1 - e^{-0.00054 (96.5 - Age)}) \ kg \dots (2)
Upper Standard Deviation = 0.357. Female tusk weight
Lower Standard Deviation = 0.306. Female tusk weight
```

The 95% confidence intervals given by these formulae are shown in **Fig.A3.2** on the next page. The asymmetrical relationship between the upper and lower standard deviations is not of much importance in the modelling of trophy hunting because the overwhelming number of trophies come from animals carrying tusks greater than the mean for every age class. However, the simulation model takes into account both standard deviations and if the tusk weight is below the mean the lower standard deviation is used.



Figure A3.2: Male and female tusk weights versus age

# Technique for Simulation of Hunting

This section describes the calculations carried out in spreadsheet **F** of the model. Males and females are handled simultaneously and, for a given level of hunting offtake, the animals carrying the largest tusks are selected.

#### Model operation

The Quattro Pro software used in the model is set to Manual and Row-wise Calculation. Each keypress of F9 advances the model by one year. The minimum tusk weight to be used during the simulation run is specified. Generally, in most of the simulation runs it is only necessary to generate slightly more tusks than will be hunted in the year concerned and the minimum tusk weight can manipulated during the run to ensure maximum computer speed.

- A vector with 60 cells at the top of the sheet (Fig.A3.3, page 107) contains the population brought forward from the previous spreadsheet (Sheet E – Problem Animal Control)
- (2) There follows a group of 8 rows which contain the key numbers needed to calculate the tusk weights in each age class for individual elephants. The rows are shown in the second tier in Fig.A1.4 and the abbreviations are given below –
  - (a) MTW Mean tusk weight which is calculated from the age-tusk weight formula;
  - (b) **USD** the Upper Standard Deviation which applies to all tusks above the MTW;
  - (c) LSD the Lower Standard Deviation which applies to all tusks below the MTW;
  - (d) SAS% the percentage of the population which would be present in each age class of an unexploited population of the given size with a stable age structure. This figure is taken from the percentages for a stable age structure on Sheet B.
  - (e) **P0** these are the projected numbers of animals of both sexes expected in a stable age structure population of this size calculated from the SAS% above.
  - (f) P1 these are the actual numbers of animals (according to the model) present in each age class from 21-60 years taken from (1) above.
  - (g) Ratio **P1/P0** this the ratio of **P1** to **P0**. It is a measure of the degree of depletion in the age class and sets the entry point for calculating probabilities (explained further in **Probabilities**).
  - (h) ▼ Nabla this is the increment attached to each animal in the age class which is used for calculating probabilities. This is explained further in the section Probabilities.

 $\mathbf{\nabla} = \mathbf{1}/\mathbf{P}\mathbf{0}_i$ 

- (3) Three large arrays follow which provide sufficient space to generate all of the tusk sizes down to the minimum tusk weight specified at the start. It requires considerable computer capacity and speed to be able to carry out the calculations for one year in a reasonable time. The operations carried out in the arrays are
  - (a) the **probabilities** attached to there being a tusk in a particular age class which is above the minimum tusk weight are tabulated in order from highest to lowest in each cell in each row and column of the array;
  - (b) these probabilities are used to generate a set of tusk weights (in kg for a single tusk) in the columns for each age class;
  - (c) a RANK function is used to select the required number of animals with the largest tusks;
  - (f) the selected animals are then totalised for each age class and deducted from the population.

The process is shown schematically in Fig.A3.3 on the next page -



Figure A3.3: The hunting spreadsheet (Sheet F)

Some of the analytic techniques referred to in Fig.A3.3 (previous page) require explanation.

#### **Probabilities**

The generation of a set of probabilities for the occurrence of tusks in any particular age class relies on the assumption of a normal distribution for the tusk sizes within that age class. A cumulative normal distribution with a mean tusk weight of 28.64kg and upper and lower standard deviations of 9.72 & 5.84kg respectively is shown in **Fig.A3.4** below. These are the values which would apply to the 40 year old age class in the model. The slight 'knee' in the curve which occurs at the mean is due to the transition from the lower standard deviation (LSD) to the upper standard deviation (USD) which occurs at the mean.



Figure A3.4: Cumulative normal distribution for tusks in 40 year old age class

If all the animals which <u>should be</u> present in the age class <u>are</u> in the age class (i.e. the male population has not suffered unduly from exploitation or trophy hunting), a curve such as that shown in the figure might be expected. For the purposes of explanation, let us assume that 100 animals is the expected number in the age class. The value of nabla (paragraph (h) page 105) would be 0.01. If there are 100 animals in the age class, they should carry the complete range of tusk weights shown in the figure from a probability of 0.01 to 0.99. If the population was very slightly depleted – say 90 animals were present – there would be no tusks over (say) 44kg in that age class. If there were only 50 animals present, the probability becomes 0.5 and there would be no animals carrying tusks greater than 28kg.

In the model the probabilities which are generated for each class begin at the value of ratio of the actual numbers to the expected numbers (e.g. 0.5 if only half the expected numbers are present) and each animal is assigned a probability obtained by deducting the value of nabla from this successively until the probability reaches 0.01. The deductions stop before the 0.01 level is reached if the tusk weight which would result from any given probability is less than the specified minimum tusk weight.

#### Generation of tusk weights

The probabilities which have been generated by this method (see **Fig.A3.4**) are then used to generate the corresponding set of tusk weights by inserting the probability value into an inverse normal distribution function (Quattro Pro software) –

Tusk weight (kg) = @NORMINV (Probability, Mean tusk weight, Standard Deviation) <sup>49</sup>

The curve for the inverse normal function is shown in **Fig.A3.5** below. As in Fig.A3.4, the values are for the 40 year old age class.



49. The scatter of elephant tusk weights about the mean is asymmetrical. The formula uses the upper standard deviation for probability values greater than 0.5 and the lower standard deviation for values less than 0.5.

#### Selection of tusks

A RANK function is used to select the tusks. Selection occurs if the rank for any given tusk is higher than the required number of tusks for the relevant quota.

#### Deduction of the hunted animals

The selected animals are totalised in each age class and deducted from the initial population which appeared at the start of Spreadsheet F (**Fig.A3.3**).

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## Annex 4

## Resolution Conf. 13.2 (Rev. CoP14): Sustainable use of biodiversity Addis Ababa Principles and Guidelines

WELCOMING the adoption at the seventh meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD CoP7), in Decision VII.12, of the *Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity*, a summary of which is contained in Annex 1;

NOTING that these Principles and Guidelines can be utilized in the implementation by CITES Parties of Article IV and other relevant provisions of the Convention;

RECOGNIZING that CBD and its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) will be working on case studies to test these Sustainable Use Principles and Guidelines;

RECOGNIZING further that CBD defines, in its Article 2, the term 'sustainable use' as "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 the potential to meet the needs and aspirations of present and future generations";

NOTING further that the vast majority of CITES Parties are Parties to CBD at the time of the 14th meeting of the Conference of the Parties;

WELCOMING further Target 4.3 of the *Strategic Plan: future evaluation of progress* of CBD (Decision VII.30, Annex 2, Goal 4), which states that "No species of wild flora or fauna is endangered by international trade", and therefore is fully consistent with the CITES Strategic Plan;

RECALLING Resolution Conf. 10.4 (Rev. CoP14) and the Memorandum of Cooperation between CITES and CBD;

## THE CONFERENCE OF THE PARTIES TO THE CONVENTION

URGES the Parties to:

- a. make use of the *Principles and Guidelines for the Sustainable Use of Biodiversity*, also taking into account scientific, trade and enforcement considerations determined by national circumstances, as well as the recommendations of the Animals and Plants Committees (see Annex 2) when adopting non-detriment-making processes and making CITES non-detriment findings;
- b. share experiences on sustainable use at the national level, particularly between CITES Management and Scientific Authorities, and their CBD Focal Points; and
- c. endeavour to ensure that their CITES Management and Scientific Authorities participate, through their national CBD Focal Points, in the work of CBD and its Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) on these Principles and Guidelines; and

URGES the Parties that are also Parties to the CBD, to take effective measures at policy and institutional level to ensure synergy between their implementation of CITES and CBD at the national level.

## Part 1

## Sustainable Use of Biodiversity Addis Ababa Principles and Guidelines

## Summary

The Addis Ababa Principles and Guidelines for the Sustainable use of Biodiversity consist of 14 interdependent practical principles, operational guidelines and a few instruments for their implementation that govern the uses of components of biodiversity to ensure the sustainability of such uses. The principles provide a framework to assist Governments, resource managers, indigenous and local communities, the private sector and other stakeholders on how to ensure that their use of the components of biodiversity will not lead to the long-term decline of biological diversity. The principles are intended to be of general relevance, although not all principles will apply equally to all situations, nor will they apply with equal rigour. Their application will vary according to the biodiversity being used, the conditions under which they are being used, and the institutional and cultural context in which the use is taking place.

Sustainability of use of biodiversity components will be enhanced if the following practical principles and related operational guidelines are applied:

Practical principle 1	Supportive policies, laws, and institutions are in place at all levels of governance and there are effective linkages between these levels.
Practical principle 2	Recognizing the need for a governing framework consistent with international / national laws, local users of biodiversity components should be sufficiently empowered and supported by rights to be responsible and accountable for use of the resources concerned.
Practical principle 3	International, national policies, laws and regulations that distort markets which contribute to habitat degradation or otherwise generate perverse incentives that undermine conservation and sustainable use of biodiversity, should be identified and removed or mitigated.
Practical principle 4	Adaptive management should be practiced, based on:
	a) Science and traditional and local knowledge;
	<ul> <li>b) Iterative, timely and transparent feedback derived from monitoring the use, environmental, socio-economic impacts, and the status of the resource being used; and</li> </ul>
	<ul> <li>Adjusting management based on timely feedback from the monitoring procedures.</li> </ul>
Practical principle 5	Sustainable use management goals and practices should avoid or minimize adverse impacts on ecosystem services, structure and functions as well as other components of ecosystems.
Practical principle 6	Interdisciplinary research into all aspects of the use and conservation of biological diversity should be promoted and supported.

	re should be arrangements for international cooperation where multinational
Practical principle 8 The deci	sion-making and coordination are needed.
Practical principle 9 An in leve	nterdisciplinary, participatory approach should be applied at the appropriate Is of management and governance related to the use.
Practical principle 10 Inter	mational, national policies should take into account:
a)	Current and potential values derived from the use of biological diversity;
b)	Intrinsic and other non-economic values of biological diversity; and
c)	Market forces affecting the values and use.
Practical principle 11 Use envi	rs of biodiversity components should seek to minimize waste and adverse ronmental impact and optimize benefits from uses.
Practical principle 12 The by th to it: distr	needs of indigenous and local communities who live with and are affected ne use and conservation of biological diversity, along with their contributions s conservation and sustainable use, should be reflected in the equitable ribution of the benefits from the use of those resources.
Practical principle 13 The inter	costs of management and conservation of biological diversity should be malized within the area of management and reflected in the distribution of the efits from the use.
Practical principle 14 Edu use show	cation and public awareness programmes on conservation and sustainable should be implemented and more effective methods of communications uld be developed between and among stakeholders and managers.

# Recommendations of the Animals and Plants Committees concerning the *Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity*

1. Whereas the CBD provides general guidance to Parties on how to address a broad range of biodiversity issues through national implementation, CITES is regulatory in nature, species-specific, and focuses on international trade in wildlife.

Part 2

2. Although CITES does not have a definition of sustainable use, the case studies show that the elements of the *Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity* that are generally relevant to CITES are either already implicit in the language of CITES or are promoted by CITES. This for instance, refers to practical Principles 1, 2, 4, 7, 9 and 12, elements of which are incorporated in the *Checklist to assist in making non-detriment findings for Appendix-II exports*.

- 3. From the case studies presented at the joint session of the 16th meeting of the Plants Committee and 22nd meeting of the Animals Committee (Lima, July 2006), it is evident that the Addis Ababa Principles and Guidelines are not always immediately applicable to the decision-making process under CITES, particularly with respect to making non-detriment findings (NDF).
- 4. It is recognized that the Addis Ababa Principles and Guidelines are, on a case-by-case basis, relevant to the work of CITES (in addition to the Principles referred to in paragraph 3, e.g. Principles 5, 6, 8, 11), and may be considered for possible development of further taxa-specific NDF guidelines.
- 5. The Animals and Plants Committees propose the amendment of Resolution Conf. 10.4 (Rev. CoP14) to acknowledge the use of the Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity as a voluntary additional tool that can be used in making NDFs.
- 6. Additionally, questions were raised concerning the work still required by the scientific committees on this matter, and the possible complications of using socio-economic aspects of the Addis Ababa Principles and Guidelines in the making of non-detrimental findings.
- 7. It was further noted that the Addis Ababa Principles and Guidelines could support the existing IUCN guidance for the making of non-detrimental findings, and would be valuable for the development of taxa-specific guidelines in this regard, for instance for tree species.
- 8. Finally it was recognized that the Addis Ababa Principles and Guidelines, which had been developed over many years and received broad international support, were of global importance but that not all principles were of relevance to CITES.
- \* Amended at the 14th meeting of the Conference of the Parties