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

Forty-second meeting of the Standing Committee
Lisbon (Portugal), 28 September-1 October 1999

Issues relating to species

RHINOCEROS: INDICATORS OF CONSERVATION SUCCESS

1. Resolution Conf. 9.14 directs the Standing Committee to continue to pursue actions aimed at reducing illegal trade, ensuring that:

   a) all such activities are accompanied by evaluations of their effectiveness;

   b) standardized indicators of success are developed to measure changes in levels of illegal hunting and of the status of rhinoceros populations in the range States; and

   c) the policies guiding interventions are responsive to the outcome of evaluations and are modified accordingly.

2. In the CITES Trust Fund budget for 1998, provisions were made for the development of standardized success indicators for rhinoceros conservation. These funds were used for the organization of a workshop, the report of which is included in this document as an Annex.

3. Point 4 of the Annex (Design of the indicator system) describes in detail the possible design of an indicator system.

4. An important aspect of such a system is the detection of illegal killing. This is explained in detail in point 4.2 of the Annex, and includes a number of options that are clearly related to cost and reliability (cf. graph).

5. The fourth, and most expensive option, is the one recommended by the workshop as providing reliable information on levels and trends of illegal killing and a basis for understanding causes, as required under paragraph b) above.

6. The Secretariat estimates that, for the development of a detailed proposal for establishing a system for the monitoring of illegal killing of rhinoceroses, an allocation of USD 85,000 to the CITES Trust Fund will be required.

INTERIM REPORT ON DEVELOPING INDICATORS OF SUCCESS FOR EVALUATING RHINOCEROS CONSERVATION INITIATIVES

(Report on the workshop to develop standardised indicators to measure the success of rhinoceros conservation measures in the context of CITES Resolution Conf. 9.14)
9-11 December 1998,
Cambridge, UK

Compiled by TRAFFIC International, January 1999

1. BACKGROUND

All the five species of rhinoceroses have been included in Appendix I of CITES since 1977 because of the threat posed by the demand for rhinoceros horn for traditional Asian medicines and for making handles for traditional daggers in some States in the Arabian peninsula. This demand has been associated with intensive illegal hunting of rhinoceroses. The loss of habitat has also been an important cause of the decline of certain rhinoceros populations, especially the three Asian species. However, in spite of the action taken under CITES (including a series of recommendations of the Conference of the Parties to implement domestic trade bans and, on one occasion, to destroy existing stocks of rhinoceros horn with compensation), as well as measures taken by individual range States, the serious declines in many populations and even the extinction of some populations of rhinoceroses have continued.

The conservation status of several rhinoceros species remains critical. In 1998, the continental population of *Diceros bicornis* (black rhinoceros), a species that once occurred from Cameroon in central Africa to southern Africa, stands at about 2,800 animals in widely scattered populations, a very serious decline from the estimated 14,785 animals in 1980. In Asia, *Dicerorhinus sumatrensis* (Sumatran rhinoceros) numbered only an estimated 270 animals in 1995, and *Rhinoceros sondaicus* (Javan rhinoceros), with only 75 animals in 1995, is extinct in most of its former Southeast Asian range.

There has been some positive progress in conserving rhinoceros species. In South Africa and Namibia, numbers of black rhinoceros have begun to increase. As a result of stringent measures taken by the Governments of India and Nepal, *Rhinoceros unicornis* (Great Indian rhinoceros) has recovered to a viable population of over 2,000 animals. Similarly, conservation efforts by South Africa have resulted in the recovery of its population of *Ceratotherium simum* (southern white rhinoceros) from near extinction early in the 1900s to over 8,000 animals in 1997. Following the submission of a proposal by South Africa, the Conference of the Parties, at its ninth meeting (Fort Lauderdale, 1994), agreed to the transfer of this population to Appendix II of CITES, for the exclusive purpose of allowing international trade in hunting trophies and live animals to appropriate and acceptable destinations.

At its ninth meeting, the Conference of the Parties reviewed the conservation status of rhinoceroses and the impact of conservation measures that it had recommended up until then. The result was the adoption of Resolution Conf. 9.14 (Conservation of Rhinoceros in Asia and Africa), which directed the Standing Committee to continue to pursue actions aimed at reducing illegal trade, ensuring that:

a) all such activities are accompanied by evaluations of their effectiveness;

b) standardised indicators of success are developed to measure changes in levels of illegal hunting and of the status of rhinoceros populations in the range States; and

c) the policies guiding interventions are responsive to the outcome of evaluations and are modified accordingly.

Since adoption of this resolution in 1995, the CITES Secretariat has sought advice on the development of "standardised indicators" from TRAFFIC and IUCN – the World Conservation Union's Species Survival Commission (IUCN-SSC) African and Asian Rhinoceros Specialist Groups. This interim report presents the results of these consultations as of December 1998.

2. METHOD

At the request of the CITES Secretariat, IUCN-SSC's African Rhino Specialist Group (AfRSG) discussed the development of indicators in a working group at its meeting at Itala Game Reserve, South Africa, in February 1996. The minutes of the working group were then used as a starting point to develop the process further. This work highlighted the complexity of the task and the need to consult more widely, especially to also include major input from both the IUCN-SSC's Asian Rhino Specialist Group (AsRSG) and TRAFFIC. Following further consultation, the AfRSG prepared a preliminary briefing document on the use of indicators entitled “Towards evaluating the effectiveness of rhinoceros conservation actions”. This document was submitted by the Secretariat to the 37th meeting of the Standing Committee in November 1996, as an annex to document Doc. SC.37.17. It presented a framework within which indicators operate, and outlined how indicators of rhinoceros numbers, consumer demand, field conservation effort and other key indicators could be used to evaluate the merits of current and potential future conservation strategies. The Standing Committee endorsed the early work done by the AfRSG on the development of the indicators.

In spite of strong support by CITES Parties for the development of standardised indicators, the CITES Standing Committee, the Secretariat, the AfRSG and its identified partners (AsRSG and TRAFFIC) were unable to continue this work because of a lack of funds to meet the cost of a workshop. This situation was remedied in 1998 when the 40th meeting of the CITES Standing Committee, on the request of the CITES Secretariat, approved the use of CHF 42,000 from the CITES Trust Fund for the development of standardised success indicators for rhinoceros conservation interventions. A pre-workshop discussion was then held with the members during the AfRSG meeting held in Namibia in April 1998, and subsequently TRAFFIC International was asked by the CITES Secretariat to organise an indicators workshop in late 1998.

Preparations for the workshop included further development of the background documentation previously compiled by the AfRSG, compilation of up-to-date information on rhinoceros populations and conservation measures and initial development of proposals for consumer market indicators. Concerning the latter, in September 1998, TRAFFIC convened an exploratory workshop in Hong Kong to further define consumer market indicators and to assess methodologies for the future monitoring of consumer demand for rhinoceros horns. Participants included research scientists and TRAFFIC and WWF staff, who examined the methods used in the past to monitor trade in rhinoceros horn and its derivatives in key consumer markets. Participants listed key factors that may have changed since earlier methods were used, and considered complications and consequences of past monitoring efforts. Methods with the most promise for yielding meaningful and accurate results were identified, and the workshop agreed that, under the current restricted-trade regime, it would often only be possible to use “proxy” (i.e. secondary or substitute) indicators for monitoring consumer demand for rhinoceros horn. It was also noted that independent variables needed to be taken into account from year to year, and that cultural differences needed to be assessed on an individual market basis. A summary report on the rhinoceros consumer market indicators workshop held in Hong Kong was prepared.

The main indicators workshop, held in Cambridge on 9-11 December 1998, aimed to bring together representatives from African and Asian rhinoceros range states and key individuals with special expertise in the different aspects of the determination of indicators of conservation success, and a representative of the CITES Secretariat. The expertise in the group included knowledge of trade in

consumer markets, implementation of trade bans, levels of field protection and conservation effort, intelligence on levels of poaching and illegal demand in range States, attitudes of traditional East Asian medicine practitioners, changes in rhino numbers, economics, statistics etc). Through consultations between TRAFFIC and the IUCN/SSC specialist groups and the CITES Secretariat, a total of 19 participants were invited and 13 were able to attend (see Annex). The workshop aimed to develop standardised indicators of success for evaluating rhinoceros conservation measures pursuant to the provisions of Resolution Conf. 9.14, and to report on its progress to the CITES Secretariat.

3. PURPOSE OF THE INDICATOR SYSTEM

Understanding the underlying purpose of the standardised indicators of success called for in Resolution Conf. 9.14 is fundamental to their design. The starting point for this clarification is the preambular text of the resolution, which stresses certain key issues:

– the considerable efforts already made to curtail threats to rhinoceros species caused by trade;
– the fact that these measures had not arrested population declines and that emphasis solely on law enforcement had failed to remove the threat to rhinoceroses;
– the belief that some measures taken had caused unintended negative consequences; and
– the recognition that there was a diversity of opinion as to the most effective approaches to rhinoceros conservation.

In its operative sections, the resolution urges a range of actions aimed to continue and strengthen the restrictions on rhinoceros horn trade, but complements this strategy with the direction to the Standing Committee quoted in Background above, whereby there must be an evaluation of the effectiveness of actions aimed at reducing illegal trade, development of standardised indicators of success, and modification of policies in light of the results.

At the time of the adoption of Resolution Conf. 9.14, this direct call for the formal evaluation of the effectiveness of such a CITES policy approach was unique. A somewhat similar approach has since been employed with respect to elephant trade policies in CITES Decisions 10.1 (Conditions for the resumption of trade in African elephant ivory from populations transferred to Appendix II at the 10th meeting of the Conference of the Parties) and 10.2 (Conditions for the disposal of ivory stocks and generating resources for conservation in African elephant range States) and Resolution Conf. 10.10 (Trade in Elephant Specimens). Following on from the clarification offered by these later, but nonetheless similar, CITES decisions, it becomes clear that the task called for under Resolution Conf. 9.14 is not simply to measure changes in levels of illegal hunting and population status over time, but also to understand the cause of these changes, particularly to distinguish the impact of CITES policies from the impacts of a range of other factors that could contribute to rhinoceros populations trends.

4. DESIGN OF THE INDICATOR SYSTEM

Design of the indicator system presents particular challenges in that it has to apply to five species distributed in parts of both Africa and Asia. The species differ significantly in terms of habitat preference and ecology, population status and the security of individual populations varies greatly both within and between range countries (in part due to big differences in expenditure on field rhinoceros conservation in different range States). Similarly, the illegal trade that has driven recent threats to these populations is known to be fluid and adaptable and very difficult to monitor.

The workshop examined possible frameworks and approaches to using indicators, and to identifying appropriate indicators. In the discussions the participants considered the potential of continental, national, site- and species-specific approaches; resolution/precision of systems and approaches; scope and feasibility of range-state indicators; sampling requirements for determining trends; indicators of illegal killing; site selection criteria; independent variables to the indicators; prioritising of

variables; and ranking of site selection. In addition to looking at range-state indicators, the participants explored previous approaches to and current ideas on trade indicators and consumer market indicators.

4.1 Overall framework for the indicators

Initially the workshop participants considered an overall framework for the indicator system as being a three-part system incorporating range State indicators, trade indicators, and consumer market indicators. Further discussions led to the view that range State indicators (illegal hunting/killing and status of populations) were the main part of the indicator framework, and that trade indicators and consumer market indicators were, in effect, explanatory variables to the range State indicators. The following illustrates the relationship of consumer demand and illegal trade indicators to the range State indicators.

4.2 Indicators of illegal hunting and status of populations (range State indicators)

The participants agreed that two aspects need to be addressed – indicators of levels of illegal killing and indicators of population status, for all species/subspecies and all range States. These indicators are the dependent variables in the eventual analysis.

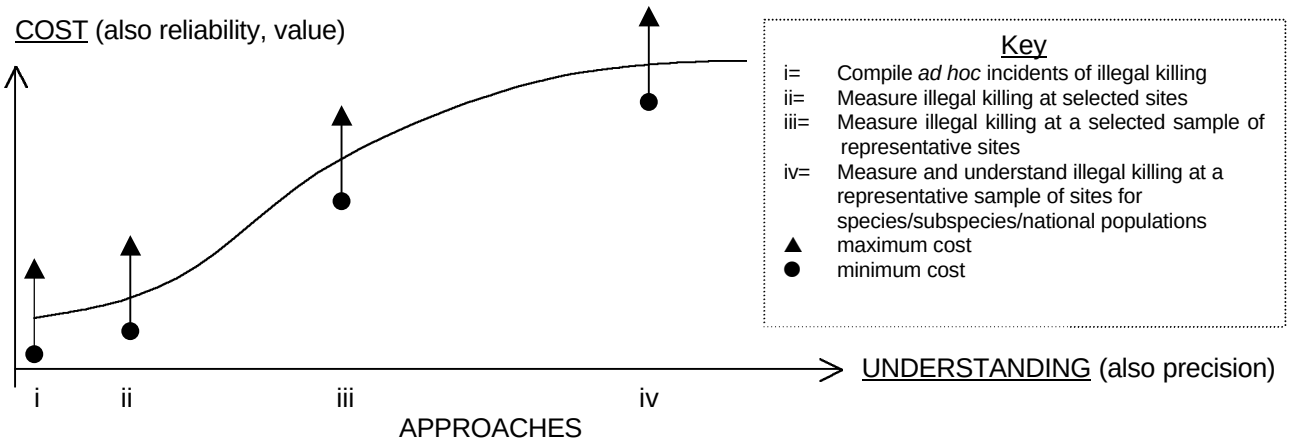
Illegal killing

Four possible approaches to measuring illegal killing were considered according to their aim, methodology and likely results:

Approach aim	System	Limitations
i) Compile *ad hoc* incidents of illegal killing	Incident reporting (active or passive).	No scientifically valid indication of overall levels or trends and not a basis for understanding impact of policy.
ii) Measure levels of illegal killing at selected individual sites	Carcass and proxy indicators at chosen sites.	Could show the level of killing at these sites only; no scientifically valid indication of overall levels or trends and not a basis for understanding impact of policy.
iii) Measure changes in the level of illegal killing for species and/or subspecies	Fixed-site-based monitoring with a sample selected to represent a range of populations (e.g. all rated key and important populations of all five rhinoceros species).	Could show levels and trends in illegal killing, but not a basis for understanding causes.
iv) Measure and understand changes in the level of illegal killing for species/subspecies and/or national populations	Fixed-site-based monitoring with a sample selected to represent a range of populations and measuring a range of independent factors that may influence levels of illegal killing.	Could show levels and trends and would provide a basis for understanding causes.

The participants understood there was a relationship between cost and level/degree of understanding (see graph below). Compiling incidents of illegal killing would be the least expensive option, but these data would not provide a scientifically valid indication of overall levels of illegal killing nor of any trends, and the data would not provide a basis for understanding the impact of policy. Measuring levels of illegal killing in individual sites would only indicate levels of illegal killing and trends for those sites. If the same were done for a sample of sites selected to represent a range of populations (e.g. all rated key and important populations of all five rhinoceros species), levels of illegal killing and trends could be shown across the sites, but this would still not provide the basis for understanding causality. However, a fixed-site-based monitoring system, using a sample selected to represent a range of populations and to measure a range of independent explanatory factors/variables that may influence levels of illegal killing, could show changes in the levels of illegal killing of rhinoceros species (and trends in populations) that can be measured and, most importantly, understood. The workshop participants considered this latter approach (iv) the preferred scenario and the one necessary to provide the indicators requested in Resolution Conf. 9.14. This is because the Parties have asked for a means to understand the causes of changes in levels of illegal hunting and population status over time, particularly to distinguish the impact of CITES policies from the impacts of a range of other factors that could contribute to rhinoceros populations trends.

GRAPH: THE RELATIONSHIP BETWEEN LEVELS OF COMPLEXITY IN RANGE STATE INDICATORS AND THEIR COST



With this approach in mind, it was agreed that site-level indicators should include as many of the following components as possible (depending on feasibility for particular rhinoceros species and habitats). It was recognised that these indicators must be corrected for enforcement and data-collection effort involved, as reliability in the measure of illegal mortality can only be derived if there is some measure of the effort put into carcass detection (e.g. carcasses per unit of searching time, carcasses per unit area) and the effort devoted to law enforcement (e.g. staffing levels, enforcement budgets, number of man-days, patrol nights/days etc.).

Indicators of illegal mortality rates

The following are examples of direct or indirect measures of illegal mortality rates of rhinoceroses.

i) Carcass detection
- natural vs. unnatural mortality
- presence or absence of horn
- time since death
- etc.

ii) Illegal activity (corrected with measures of effort)

Quantitative variables
- no. of contacts with rhino poachers
- no. of arrests of rhino poachers versus convictions
- no. of snares/ traps/ wires set for rhinos
- ratio of inactive to new traps/snares
- no. of poaching camps hunting rhinoceros

Qualitative variables
- changes in profile of poachers (e.g. changes in type of weapons used and *modus operandi*)
- changes in behaviour of rhinos (e.g. becoming elusive in their habits due to poaching pressures)
- intelligence reports (e.g. inquiries regarding horn availability in local areas)
- increase in poaching of other species; arrests; seizures of snares, weapons
- theft from stockpiles and stores

Note: The applicability of these indicators would not be uniform in all areas. For instance, carcass detection may be feasible in certain African sites, while almost impossible in certain Asian sites.

iii) Estimated population numbers and trends at site
demographic breakdown (age & sex) and trends
estimates based on various categories of data reliability (taking into account precision, bias and accuracy of the methods used)

Status of populations

Indicators of population status should be (a) the number of rhinoceroses and (b) the number of populations (by species and range State). The best available data for this purpose are those produced by the AfRSG and AsRSG. The AfRSG and AsRSG have produced Action Plans that provide data on known population numbers of all rhinoceros species. The AfRSG and AsRSG also produce updates to the population figures at the periodic meetings of the groups. These figures, however, are limited in being able to demonstrate trends owing to their wide confidence limits. The regular evaluations of all populations undertaken by the AfRSG and AsRSG, including all subspecies, could be used as the basis for providing population status information for the indicator system. However, there is a need to standardise the way that the population information is categorised according to quality and precision or reliability to improve compatibility within and between populations and continents. The participants noted it would be worthwhile to use this standardised system to re-categorise previously collected data so that some historical trend analysis might be possible.

Explanatory or Independent Variables

There are also a number of other explanatory or independent variables operating on the African and Asian continents that may have a direct impact on the illegal killing of rhinoceroses and trends in rhinoceros numbers. There must be some attempt to measure these factors and to integrate them into any assessment of causality of trends in illegal killing or changes in these trends. These factors can become quantifiable variables by establishing relative scales of measurement or simple presence/absence records for a specific site. The following table, first prepared by the AfRSG CITES Indicator Working Group, includes independent variables that may influence rates of illegal killing or changes in population status, in addition to any policy action taken in a CITES context. These variables have been ranked A to C for their relative importance in influencing the dependent variables, and 1 to 3 for the relative difficulty of quantifying the variables (e.g. A1 being very important and easy to quantify). It should be noted that the estimated importance and estimated difficulty of measurement values reflected the modal view of AfRSG members although there were dissenting views as to a variable's importance.

The participants agreed that further consultation, particularly with Asian rhinoceros experts, would be needed before being able to finalise this list and the rankings.

Independent variables	Importance (A-C) Difficulty to measure (1-3)
Budgets	A1
Staffing densities (enforcement)	A1
Human demographics/density (adjacent to protected areas)	A1
Civil strife (at site and country level)	A1
Development/loss of habitat for rhinoceroses	A1
Proximity to international border	A1
Rhino monitoring effort	A2
Functioning law enforcement/courts	A2
Legislation/penalties	A2
Effectiveness of implementing legislation	A2
Training of staff / leadership	A3
Degree of community involvement and relations	A3
Habitat and risk relating to hunting access and visibility	A3
Land tenure and category of area under protection	B1
Size of area under protection	B1
Availability of weapons to poachers	B2
Level/capacity of biological management	B3
Economic use from rhino (e.g. tourism)	C1

It was also noted that the following independent variables were deemed to be statistically significant in a recent WWF/WCS study on different approaches to rhinoceros conservation in Asia and Africa:

Size of area under protection
Land status
Category of area under protection
Proximity to international border
Civil unrest
Origin of rhino population (e.g. natural vs. translocated)
Budget
Staffing densities
Type of legal use
Degree of legal use
Degree of community involvement
Origin of poachers
Staff training level (including a measure of leadership)
Fenced/unfenced
Donor involvement

There were additional variables the participants thought to be important, and these should be considered during the consultation process. These independent variables/factors need further review, particularly with regard to Asian rhinoceros species and conditions:

Donor involvement
Origin of poachers
Presence of fencing
Population source (natural vs. translocated)
Development/loss of habitat
Level of search/deterrent effort

Level of penalties for rhino-related crimes
Effectiveness of the judiciary (e.g. number of prosecutions/arrest, convictions/prosecution)
Types of weapons available (in the adjacent areas)
Level of biological management
Horned vs. dehorned (yes/no and numbers of each)

Site Selection

The workshop participants agreed that site selection for measurement of illegal killing data must include attention to all species/subspecies and all range States. A large enough sample size is required, allowing for a wide range of explanatory variables/factors to be used, and allowing in particular for a wide range within each of the explanatory variables/factors (i.e. this would provide a contrast on the effect of an explanatory variable on the dependent variables of illegal killing or trends in rhinoceros numbers).

Independent variables must be ranked in terms of relative importance in influencing rates of illegal killing and difficulty of measurement. The participants recognised that the more variables used, the greater the number of sites required to provide meaningful results. However, some combining of factors may be possible.

Participants suggested a process by which sites could be selected:

a) Create a list of all possible sites (perhaps some sites will be combined);
b) score all independent variables (use prioritised variables);
c) decide on the prioritisation of independent variables;
d) decide if alternative sampling/sample size scenarios are required (these need to be defined); and
e) use the above to derive one or more lists of appropriate sample sites.

4.3 Indicators of trade volumes and flows

The main trade indicators that are required are (a) level of trade and (b) routes of trade. However, these are extremely difficult if not impossible to obtain, as there is no legal source of rhinoceros horn or products and subsequently there are no available data on trade levels and routes from sources such as Customs statistics (with the possible exception of pre-Convention stocks). Proxies must be used, where for instance information on seizures can be used as a proxy for import data and trade routes. The workshop participants recommended the development of a seizure/effort/supplementary information monitoring system for rhinoceros products in trade, designed along the lines of the system in use for ivory.

Since the African Elephant *Loxodonta africana* was listed in Appendix I, the use of ivory seizure data and information has been developed by TRAFFIC as a proxy for measuring consumer demand and understanding trade routes in the wake of an international ban on commercial trade in ivory. In this regard the tenth meeting of the Conference of the Parties to CITES, through Resolution Conf. 10.10, formally recognised TRAFFIC's Bad Ivory Database (BIDS) as the appropriate instrument for monitoring the pattern and measuring the scale of trade in ivory and other elephant products. To meet the tasks set out in the resolution effectively, particularly with regard to causality, it has been necessary to expand the capabilities of BIDS into an integrated trade monitoring information system called the Elephant Trade Information System, or ETIS. Two key elements of this system are recognised as integral for effective monitoring and analysis of trade, to indicate trends, changes in trends, and to infer causality. These are seizure information, and information on enforcement effort/resources and effectiveness. Seizure data alone do not provide a true measure of illegal trade flows, but there is a close relationship between the rates and scale of seizures and the second key element, enforcement effort/resources and effectiveness. Data on enforcement effort/resources and effectiveness are fundamental to any analysis of seizures data. Other factors which may influence illegal trade are also to be measured in order to supplement the key elements, to enable assessment of the total volumes of illegal products in trade, and trends in trade flows and related dynamics of supply and demand. These include economic indicators, legal trade, domestic markets, intelligence

data, and data quality assessments. Building on the success of BIDS, TRAFFIC is starting a database on rhinoceros horn seizures.

The workshop participants noted the strong parallels between ETIS and the trade monitoring needs of the rhinoceros horn trade. With no legal international trade in rhinoceros horn, seizure information must act as a proxy indicator for trade volume. As with ETIS, information on enforcement effort/resources and effectiveness and other factors that may influence illegal trade are needed to interpret seizure data, just as they are necessary for interpreting range State indicators of illegal killing of rhinoceroses.

Workshop participants identified a further trade-related concern as being the range of different sources from which horn might be entering trade (where the collection of information on sources other than wild rhinoceroses may be crucial explanatory information in assessing links between range State indicators and trade trends). These sources include, in range States, (a) wild rhinoceroses, (b) government stocks, and (c) private stocks (the latter is especially important for white rhinoceros horn in South Africa). Sources in consumer States are (a) private stocks, (b) captive animals, (c) hunting trophies, art and personal possessions, and (d) museums. In the case of rhinoceros horn in consumer States, participants identified the necessity to consider sources of processed versus unprocessed horn. The participants also noted it will be a challenge to quantify stocks of rhinoceros horn in consumer States, and could be expensive to accomplish. TRAFFIC noted that it would be trying to quantify the legal existence of rhinoceros stocks world-wide.

As with the indicators of illegal hunting and status of populations (range State indicators), there is likely to be a relationship between levels of complexity in trade indicators and their cost.

4.4 Indicators of level of demand (consumer market indicators)

A precise measure of the level of demand, if available, is the most important consumer market indicator. Demand could theoretically be measured with data on the volume of rhinoceros horn sold and the price it is sold at in specific markets, but in the absence of legal trade, these data are largely unobtainable. In addition, while sampling and research methods used in the past offered valuable insights, most are not viable in today's markets. Several possible proxies for demand were proposed during the TRAFFIC workshop held in Hong Kong in September 1998. These are as follows:

1. monitoring of imports of non-CITES countries and via seizures in CITES countries
2. stock surveys (though this would only be possible where the government keeps track)
3. pharmacy/retail outlet surveys (this will be difficult in areas that have been sensitised)
4. manufacturer surveys (though this is only possible where a domestic trade is legal, i.e. Japan)
5. pharmacist/doctor attitude surveys
6. user/peer/caregiver surveys

Numbers 1-4 are indicators of availability and possible proxy indicators for measuring use and trade volume. Numbers 5 and 6, measuring attitudes towards the use of rhinoceros horn and the willingness to use or supply rhinoceros horn products, are possible proxies for measuring demand. However, none of these would provide a universal indicator for demand. TRAFFIC noted that long term monitoring of rhinoceros horn volume/price data using a uniform methodology may now only be possible in Yemen, where a legal domestic trade is allowed.

Participants of the TRAFFIC workshop on rhinoceros consumer market indicators in Hong Kong agreed that monitoring seizures and measuring enforcement effort, and measuring attitudes towards use, are amongst the few general trade and consumer market indicators available today (some other indicators, such as stock and retail outlet surveys, may be useful in certain countries outside of East Asia under certain conditions, and may no longer viable as general indicators under the current restricted-trade regime).

The participants in Cambridge recommended that TRAFFIC continue its monitoring work in Yemen, collect rhinoceros horn stock information where possible, consider surveys of pharmacy availability of

rhinoceros-based drugs in China and other markets (recognising problems of sensitisation, etc.), and survey practitioners and/or pharmacists for “willingness to supply" and users for “willingness to use” as proxies for demand. Participants observed that refining techniques for attitudinal surveys may improve results that can contribute towards measuring consumer demand.

Overall, the participants agreed that collecting and interpreting consumer market indicators may not be as clear-cut as range State indicators or trade indicators, but that they could contribute valuable information that will help interpret other variables.

4.5 Summary of the proposed indicator system

The workshop participants concluded that the best framework for a system of standardised indicators of success aimed at measuring changes in levels of illegal hunting and the status of populations in the range States is that of a two-component indicator system, based primarily upon range-State indicators at the site level, and strengthened by trade/trafficking indicators. The indicators would need to be linked to explanatory variables, to allow for an understanding of causality.

RANGE STATE INDICATORS	TRADE INDICATORS
i) level of illegal killing (carcass detection/illegal activity/site data, adjusted for effort), linked to explanatory variables	i) level and routes of trade (seizures proxy; willingness to supply, use of stocks, level of use in Yemen etc.), linked to explanatory variables (e.g. supply from non-wild sources; consumer demand trends; and measures of effort, resources, and effectiveness of enforcement)
ii) population status (rhinoceros numbers, trends, and number of populations--AfRSG/AsRSG data)	

The participants agreed that interpretation of range-state information (i.e. illegal hunting and population status) as indicators of success can be strengthened by providing a linkage / developing a linkage to trade information (i.e. trade levels and routes). Consumer market information, such as monitoring of imports, surveys of stocks and probability of use etc., is considered a subsidiary data set of the trade indicators).

5. RECOMMENDATIONS/NEXT STEPS

The workshop participants agreed on the next steps to be taken towards recommending a system of standardised indicators of success. These are as follows:

1. Consult with Asian and African rhinoceros experts to review the list of independent variables for the range State indicators, and review the ranking of these independent variables;

2. Identify detailed site-selection data needs and design a data collection form and guidance notes;

3. Score potential sites against independent variables to be measured and carry out a statistical site selection process, providing multiple scenarios if required;

4. Consult with the Asian and African Rhinoceros Specialist Groups regarding methods for collecting periodic rhinoceros population status reports; and

5. TRAFFIC shall continue to explore innovative approaches for measuring demand and monitoring techniques for researching consumer markets.

Annex

INVITED PARTICIPANTS

Africa (nominated by AfRSG)

1. Richard Emslie (South Africa)*
2. Tony Conway (South Africa)*
3. Musa Lyimo (Tanzania)*
4. Holly Dublin (Kenya)*

Asia (nominated by AsRSG)

5. Nico van Strien (Indonesia)
6. Mohammed Khan (Malaysia)*
7. P. Lahan (India)
8. Effendy Sumardja (Indonesia)

Trade monitoring, enforcement and consumer markets

9. Tom Milliken, TRAFFIC E/S Africa (Malawi)*
10. Marcus Phipps, TRAFFIC E. Asia (Hong Kong)*
11. Manoj Misra, TRAFFIC India (India)
12. Esmond Martin (Kenya)
13. Crawford Allan, TRAFFIC International (UK)*

Other

14. Ger Van Vliet, CITES Secretariat (Switzerland)*
15. Sue Mainka, IUCN/SSC (Switzerland)*
16. Nigel Leader-Williams (UK)*
17. Frank Vorhies IUCN economist (Switzerland)
18. Stephen Nash, TRAFFIC International (UK)*
19. Steven Broad, Chair (UK)*

* *participated in the meeting*