TOWARDS EVALUATING THE EFFECTIVENESS OF RHINO CONSERVATION ACTIONS

A PRELIMINARY BRIEFING DOCUMENT ON THE USE OF "INDICATORS" FOR THE CITES STANDING COMMITTEE

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EXECUTIVE SUMMARY

This document serves to inform the CITES Standing Committee of the direction and basic approaches that the IUCN SSC's African Rhino Specialist Group (AfRSG) has been taking to provide direction regarding the use of *"indicators"* to provide *a basis for evaluating policy interventions pursuant to CITES* (as called for under Resolution Conf 9.14); as well as advancing our understanding of factors which impact upon rhino numbers.

The proposed *indicators* process initially involves setting up a contextual model which identifies both the key components affecting rhino numbers and trends; and the hypothesised relationships between these components (possible links, nature, strengths, direction of flows and interactions). The term *indicators* refers to components in the system that can be monitored and quantified (such as numbers or rhino and levels of field protection effort). The effects of other unmeasurable components have to be inferred from the observed inter-relationships between *indicators*. Teasing out the strength and nature of the relationships between the *indicators* is the crux to improving understanding of system functioning, ie determining the key factors influencing rhino numbers and trends.

After an introduction providing a "straw-dog" contextual model (framework within which *indicators* operate), this preliminary briefing document outlines how rhino number *indicators*, consumer demand *indicators*, field conservation effort *indicators* and other key *indicators* could be used to help evaluate the merits of current and potential future conservation strategies; and in so doing help guide future policy decision-making.

The *indicators* process is being developed with the aim of being as transparent and objective as possible, recognising that there is also a need to keep *indicators* and the process as simple as possible.

The underlying philosophy behind the *indicators* process is that if a particular conservation policy is working (or is likely to work in future if implemented), we can expect certain linkages between

indicators to show strong positive or negative effects, and others to be, or become unimportant. We can also expect the relationships between *indicators* (scenarios) to differ if alternative conservation strategies were more appropriate. In effect, before we collect *indicators* data, we can ask the question - what different *indicator* scenarios would we expect to find if alternative conservation strategies P, Q or R were either highly appropriate or inappropriate ? The process of later contrasting the range of different expected *indicators* scenarios, with the actual relationships observed (following measurement of *indicators)* should assist CITES Standing Committee evaluate both current and potential future rhino conservation policies.

In effect, we are proposing to develop a form of logical decision-analysis "expert system" using *indicators,* and interpretations of *indicator* scenarios. For example if *indicators* reveal X,Y, and Z, (one scenario) we might interpret this as a clear indication that current policy P is working. However, if our *indicators* instead reveal A,B and C (an alternative scenario) we may come to the very different conclusion that strategy P is almost certainly not working, and should probably be replaced by strategy Q.

In practice, working through the process of describing possible *indicator* scenarios, and trying to interpret them has highlighted additional *indicators* that need to be included in the process to complete interpretation (an example of this is presented later in the text).

We are therefore proceeding by first seeking to identify the set of *indicators,* which if measured, would have the greatest ability to assist the Standing Committee to discriminate between alternative conservation strategies in terms of their desirability. Only once we have successfully done this, should we i) proceed to develop and refine the rules for classifying all *indicators;* ii) collect *indicators* data; and iii) analyse and interpret these data.

What is outlined in this paper is preliminary in nature, and given the support of the Standing Committee, is going to be further developed and refined following wider consultation in both Africa and Asia. The AfRSG is not presenting a final working product at this stage, but is seeking endorsement from the CITES Standing Committee ..

1.   Supporting AfRSG efforts to develop the *indicators* process further following wider consultation with the African range States, IUCN SSC's Asian Rhino Specialist Group (AsRSG), TRAFFIC, resource economists, and if considered desirable, nominated member(s) of the CITES Standing Committee and/or the CITES Secretariat.

2.   Supporting efforts to complete the process of determining what, where, how, and if credible *indicator* data could be collected in consumer countries; and then to support efforts to undertake this research on consumer market *indicators* as soon as possible (provided the scoping process indicates that credible data can be obtained). This is important 1) given the critical importance of being able to reliably assess the nature of the demand for, and attitudes towards, rhino horn; and 2) that obtaining credible consumer market *indicators* data will take longer than for other *indicators;* and is therefore the "limiting time factor" in the process. (TRAFFIC is likely to be the most appropriate organisation to undertake this consumer market research.)

INTRODUCTION

BACKGROUND

Prior to the 1996 AfRSG meeting, the CITES Secretariat asked the AfRSG to formulate in more detail what it intended with respect to the directive, in Resolution Conf. 9.14, that *"the Standing Committee should continue to pursue actions aimed at reducing illegal trade, ensuring that:*

a. all such actions 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 outcomes of evaluations and are modified accordingly."

As a result of this request, a working group was convened at the February 1996 AfRSG meeting in South Africa to discuss further the subject of CITES *Indicators*. The preliminary groundwork by the AfRSG working group has been built upon following subsequent discussions between AfRSG members, and interested parties in TRAFFIC, IUCN and WCMC.

Resolution Conf. 9.14 recognises that *"there is a diversity of opinion as to the most effective approaches to the conservation of rhinoceroses in Asia and Africa"*; and so one of the basic premises behind Resolution Conf. 9.14, is that all rhino conservation measures need to be evaluated, and that adaptive management be instituted based on such evaluations. The need to expand funding sources to respond to substantial needs in the field was also articulated in Res.Conf. 9.14, with particular emphasis on promoting sustainability and self-reliance within range States.

Reliable *indicators* are required to objectively assess and evaluate the different conservation options for reducing the illegal trade in rhino horn; and in so doing facilitate the adaptive management called for by Resolution Conf. 9.14 .

OVERALL OBJECTIVE

The deliberations of the AfRSG working group were directed at developing the "standardised indicators" as outlined above. Following from resolution Conf. 9.14, the AfRSG working group defined its *overall objective* as:

To provide a future basis for evaluating policy interventions pursuant to CITES

THE IMPACT OF TRADE BANS UNDER CITES ON RHINO NUMBERS

The key *indicator* we are most interested in is numbers of rhino; and to evaluate current CITES policy we need to determine the likely impact of trade bans on rhino numbers.

CITES international trade bans following Appendix I listing have, on their own, clearly failed to increase numbers of rhino, although the degree to which Appendix I listings have possibly slowed the declines in rhino numbers in the past is unknown. The problem with CITES international bans on their own was that once rhino horn had been illegally smuggled into a consuming country without any internal controls, it had *de facto* become a legal product.

In an attempt to deal with this problem, internal trade bans have in recent years been imposed in all major consumer countries to complement international trade bans under CITES. This now makes it hard to separate out the impact of CITES Appendix listing *per se* compared to the effects of complementary internal legislation.

As a result, the *indicators* process should, at least initially, seek to evaluate the *combined* effects of CITES Appendix listing together with complementary local trade bans on rhino numbers.

A further complication that has to be considered when developing the *indicators* process is how to effectively separate out the impact of actions that may protect and improve the status of rhinos irrespective of CITES policies (eg levels of field law enforcement or measures to maximise breeding).

STEPS IN THE INDICATORS PROCESS

1. DEVELOP AND REFINE A "STRAW-DOG" CONTEXTUAL MODEL

The AfRSG has developed a "straw dog" contextual model, which will be updated and improved in the light of any new knowledge and comments received.

Figure 1 presents the AfRSG's straw-dog model. This model provides the context in which our key *indicators* operate and also has an educational function. It provides decision-makers with a background against which current and potential future policy options can be evaluated.

We are most concerned about [2] Population sizes and changes in numbers of rhino. The ultimate consideration is are rhino numbers going up or down; and what are the key factors are influencing this? Numbers in turn can be broken down into measures of overall population sizes and trends including population growth rates and determinant of changes (eg poaching levels, high rates of biological population growth, translocations etc.)

Unless internal trades bans and their level of enforcement varies significantly between consumer States, it will be difficult to separate out the independent effects of CITES Appendix listing (international trade bans) from those of complementary internal trade bans. The contextual model

therefore shows that we are seeking to evaluate the combined influence of [1] CITES Appendix listing & internal trade bans on [2] numbers. The model is therefore organised with CITES & internal trade bans at the top and numbers at the bottom.

Figure 1 identifies the different key components in the system, and the hypothesised relationships between the components (links, nature, strengths, direction of flows and interactions). Some components can be measured and these are termed *indicators* (cross-hatched and striped boxes in Figure 1) whilst the effects of other un-measurable components (open boxes) have to be inferred from the observed inter-relationships between *indicators*. Teasing out the strength and nature of the relationships between the components in Figure 1 is the crux to understanding system functioning; and monitoring of *indicator* variables is the approach being proposed to do this.

On Figure 1, arrows show the major direction of influence of one *indicator* or component on another; while the thickness of the lines has been used to differentiate between those links which are perceived to be more critical than others.

The *indicators* process is intended to better assess the actual importance of these links (ie. thickness of "pipes"), and whether they are acting in a negative or positive direction, or perhaps both ways depending upon values of other indicators.

The rationale underpinning the development of the contextual model and the *indicators* process is that..

-       the better we can understand the nature of the inter-relationships between the *indicators*,
-       the better we will be able to understand the dynamics of the system;
-       the better we can identify the key negative and positive factors affecting rhino numbers and population trends and hence
-       the better we can assess the likely impact of alternative conservation policies.

The AfRSG's "straw dog" contextual model (Figure 1) has three main sub sections. From left to right these deal with (i) Rhino conservation within range States; (ii) Criminal activity relating to illegal poaching, speculating and illegal dealing in horn; and then (iii) Law enforcement, consumer demand and attitudes in consumer States with special reference to the use of rhino horn as a Traditional Chinese Medicine (TCM).

The three critical generic *indicators* highlighted by the shaded cross-hatched boxes with thicker borders, are ...[2] Numbers of rhino, [3] Consumer demand for horn and [4] Field conservation effort

Note that these in turn can be broken down into component *Indicators* which can be combined to create overall generic summary *indicators*.

A further three Indicators which should be monitored if possible are shown by boxes with the denser stripes and shading. These are..[5] Views of TCM practitioners and consumers towards the desirability of using rhino horn medicines, [6] State budgets for field rhino conservation and [7] Field conservation effort
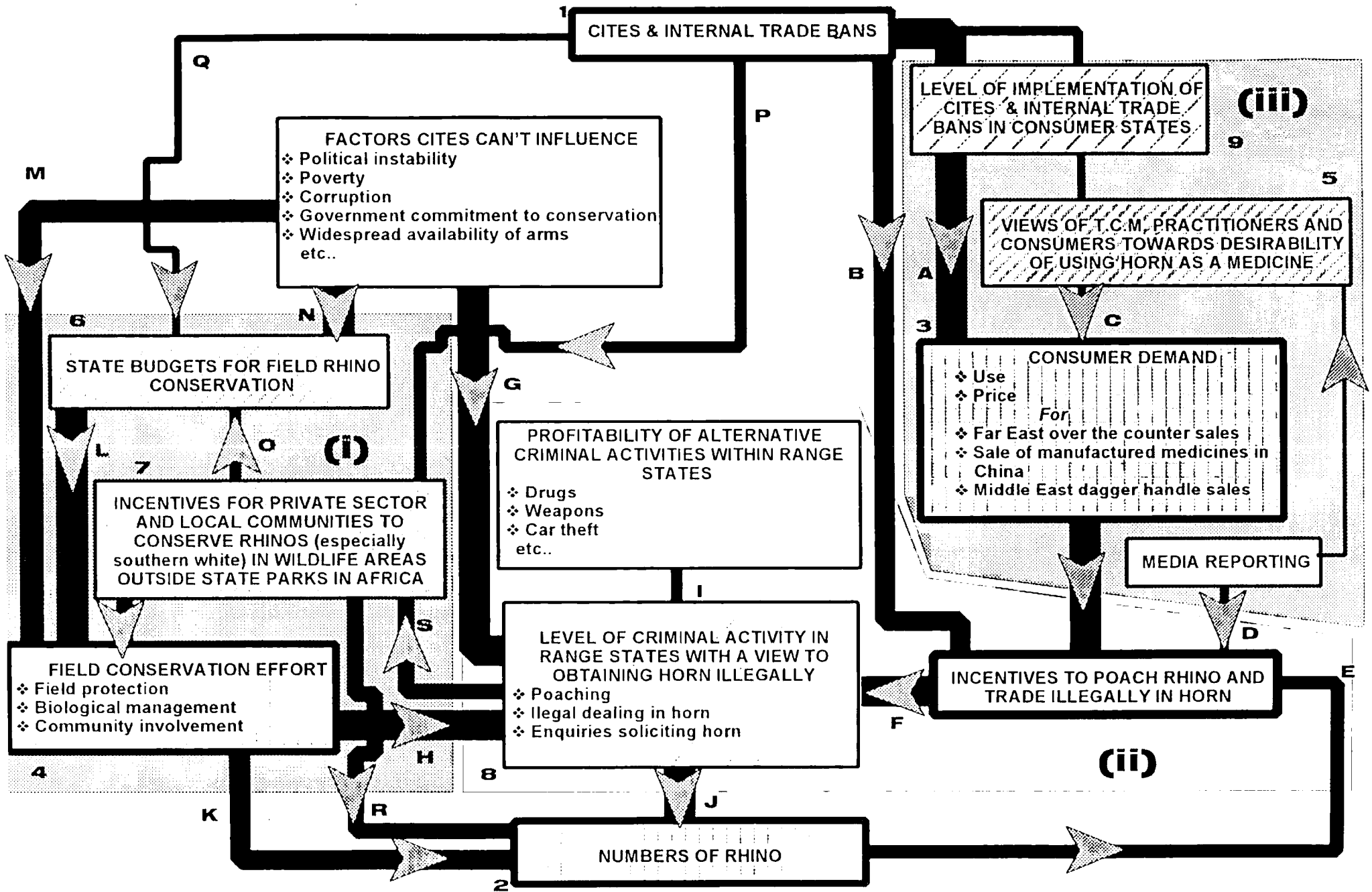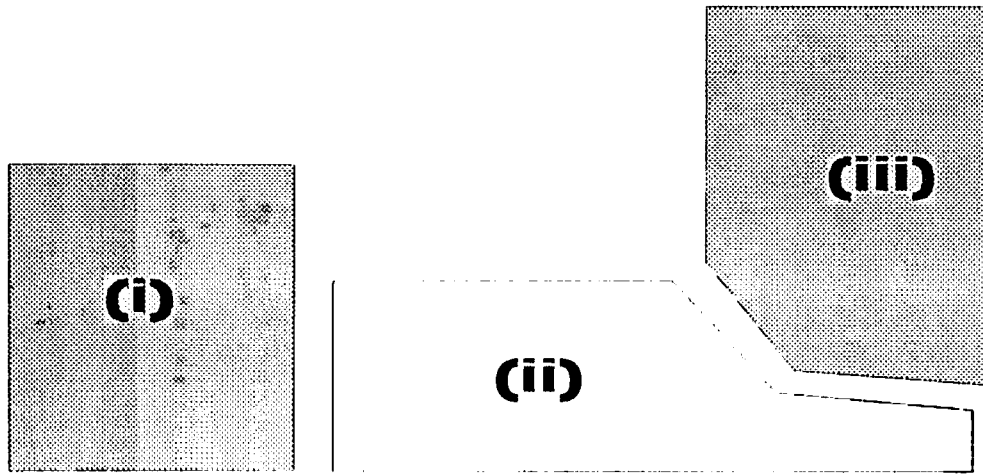
Figure 1: Contextual model highlighting main Indicators. See Key and the text for a brief explanation of links {A,B...S}.


CITES & INTERNAL TRADE BANS (1)

FACTORS CITES CAN'T INFLUENCE
- Political instability
- Poverty
- Corruption
- Government commitment to conservation
- Widespread availability of arms
  etc..

LEVEL OF IMPLEMENTATION OF CITES & INTERNAL TRADE BANS IN CONSUMER STATES (iii)

VIEWS OF T.C.M. PRACTITIONERS AND CONSUMERS TOWARDS DESIRABILITY OF USING HORN AS A MEDICINE

STATE BUDGETS FOR FIELD RHINO CONSERVATION

CONSUMER DEMAND
- Use
- Price
  For
- Far East over the counter sales
- Sale of manufactured medicines in China
- Middle East dagger handle sales

INCENTIVES FOR PRIVATE SECTOR AND LOCAL COMMUNITIES TO CONSERVE RHINOS (especially southern white) IN WILDLIFE AREAS OUTSIDE STATE PARKS IN AFRICA

PROFITABILITY OF ALTERNATIVE CRIMINAL ACTIVITIES WITHIN RANGE STATES
- Drugs
- Weapons
- Car theft
  etc..

MEDIA REPORTING

FIELD CONSERVATION EFFORT
- Field protection
- Biological management
- Community involvement

LEVEL OF CRIMINAL ACTIVITY IN RANGE STATES WITH A VIEW TO OBTAINING HORN ILLEGALLY
- Poaching
- Ilegal dealing in horn
- Enquiries soliciting horn

INCENTIVES TO POACH RHINO AND TRADE ILLEGALLY IN HORN

NUMBERS OF RHINO

(i) (ii)

Labels: Q, M, P, N, B, A, G, L, O, S, I, H, R, K, F, E, J, D, C and numbers 1-9

KEY TO FIGURE 1

(i)   Rhino conservation within range States
(ii)   Criminal activity relating to illegal poaching, speculating and dealing
         in illegal horn
(iii)   Law enforcement, consumer demand and attitudes in consumer States
         with special reference to the use of horn as a TCM medicine

"Pipes" depict hypothesised
links between indicators
and components. The
fatter the pipe the greater
the hypothesised strength of
the link.
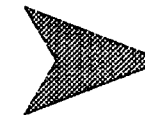
Direction of arrow depicts
hypothesised main direction
of relationship between any
two indicators/components

Key indicator

Indicators which should be monitored

Indicators that might be difficult to measure but which
should be monitored if possible

Component which will not/ cannot be measured.
Its influence can only be infered from the
relationships between indicators

1,2...9   Indicators

A,B...S   Links between indicators
                (see text for explanation)

A further two Indicators will be difficult to quantify, but if it is practically possible should also be monitored. These are depicted in un-shaded boxes with the a lower stripe density. These are.. [8] Levels of rhino related criminal activity in range States and [9] Levels of implementation of CITES & complementary internal trade bans in consumer states, and

A number of other components (eg incentive to poach or illegally trade in rhino horn) are important but are likely to be difficult to monitor. The probable influence of some of these components will have to be inferred by the status of other *indicators*.

The links between components in the straw-dog model are annotated on Figure 1 using letters. Space precludes including a full explanation of each link here, but the following brief comments should nevertheless give the reader an idea of how the contextual model components can link together.

Figure 1 shows that CITES and Internal trade bans may have a positive effect by reducing consumer demand if law enforcement in consumer States successfully reduces illegal use of horn (Link A). Proponents of trade bans hope this will happen following the imposition of internal trade bans to complement international bans under CITES. In reality this may or may not happen.

Trade bans may have negative effects (Link B) by criminalising trade in horn and creating opportunities for criminals to black-marketeer and monopolise the horn market in a similar way that prohibition led to an increase in organised crime in the USA. Trade bans also mean that demand for African horn cannot be supplied using legal horn obtained without killing rhinos (either from natural mortalities or "farming" horn by periodically de-horning rhino). This means that the illegal horn trade currently depends primarily upon horn from poached rhino to supply any demand.

The relative importance and size of the actual effect of path A versus path B is central to assessing the impact of trade bans. Path C shows that the recent imposition of internal trade bans and/or media reporting may either positively or negatively influence the opinions and attitudes of TCM doctors and the public which in turn might influence consumer demand. This link is more speculative and is not likely to be as important as links A or B in influencing system dynamics, and is therefore shown using a thinner pipe.

Consumer demand is one of the three key generic indicators. Measures of use (eg probability of prescription of over the counter medicines containing rhino horn) and price together can be used to describe demand. If trade bans are working then one would expect consumer demand to fall; but if demand remains steady or increases, this indicates that either trade bans are not working and there is a strong latent demand for horn; or that internal bans may not have been adequately enforced.

Therefore to assess the likely impact of trade bans, one needs to monitor the nature of consumer demand and whether local bans have been implemented.

The nature of demand (eg whether it is inelastic or elastic) in turn will strongly influence incentives for middlemen in both consumer States and range States to poach rhino and trade

illegally in horn (including speculating in horn).

If rhino numbers decline further this may act to stimulate speculation as given the apparent inelastic demand in some niche markets, traders might expect horn prices to rise as rhinos become rarer (Link E).

Sensational media reporting which continually gives inflated end market retail prices for horn may further stimulate demand, although this is a speculative link that cannot be easily measured (Link D).

Demand from middlemen in turn will directly influence the levels of criminal activity relating to horn in range States (link F), and the resulting poaching levels will have a direct influence on trends in rhino numbers (link J), especially in poorly protected and managed populations. Other factors such as political instability, corruption, widespread availability of arms and poverty in turn are likely to create a climate conducive to the development of wholescale commercial poaching (Link G).

Limited field conservation effort, which may be caused by inadequate budgets (link L), in turn will influence the probability of detecting and catching would be poachers, and this in turn should influence poaching levels (via link H). For example poachers will be encouraged if they feel they have little chance of being caught. However, if law enforcement is good, poachers may perceive they have a high chance of being apprehended, and this will act as a deterrent. In such cases one would expect criminals to be more inclined to trade in less risky commodities. The amount of poaching and illegal horn dealing will, in some measure, also be related to how easy it is to make big profits from other forms of illegal trading such as gun-running, drugs or car theft (Link I).

The level of influence of field conservation effort on rhino numbers is another critical part of the system. Effective field protection is very expensive, and so is strongly influenced by budgets for conservation (Link L). Community involvement in conservation may also lead to better intelligence, further increasing the probability of detecting potential poachers (link H).

Biological management is another form of field management, which can affect numbers of rhino directly by increasing population growth rates (Link K). Due to the effects of compounded growth rates, moderate increases in growth rates, can translate into large numbers of additional animals in just a few years. Alternatively poor biological management may result in populations performing poorly if they are allowed to increase to near or above carrying capacity (Link K).

Trade bans also preclude private sector conservationists in Africa from selling their legal horn stock, and prohibits "farming" of rhino for their horn. In turn this reduces the economic incentives for the private sector and local communities in southern Africa to conserve rhino (link P). This could have important implications. In the case of the southern white rhino, if current growth rates are maintained, numbers could double in only a decade. Most State run reserves, with the exception of Kruger NP, do not have much room for population expansion assuming the aim of keeping populations productive is maintained. The challenge will be to find enough area of suitable and protected habitat for another 7,000+ animals over the next decade; and the private sector will have to conserve a greater proportion of the population in future. Whether this will happen in southern Africa will to a large extent depend upon the economic and political incentives

to conserve white rhino and game, which in turn will depend upon the level of wealth and job creation, FOREX generation and empowerment of local communities that occurs through game ranching compared to other forms of land use. While such considerations would be inappropriate in India; they are critically important in southern Africa.

Any reduction in private sector initiatives (returns on investments) might reduce incentives and lead to a lowering of eventual southern white rhino carrying capacity. Thus by precluding any legal trade, CITES trade bans are reducing economic incentives for the private sector and local communities to stock rhino (Link P). In turn we could expect this to reduce the overall land area available to rhino (and other wildlife). Any such reduction in southern white rhino carrying capacity will reduce potential numbers and growth rates, as well as lead to the earlier initiation of culling surplus animals (Link R).

High poaching levels are likely to discourage private sector conservation of rhinos, as it will be perceived as too risky and dangerous (Link S).

If the live sale market of rhinos crashes in southern Africa, field rhino conservation budgets may decline in the State conservation sector where parastatal government conservation departments are able to reinvest revenue they have generated from sales of rhino (Link O).

In southern Africa the private sector currently can only realise the value of their "rhino assets" through ecotourism, limited sport hunting of a few surplus white rhino each year, and through live sales of black and white rhino. Despite the decline in the value of the Rand, live sales of white and black rhinos and white rhino trophy fees and daily rates have during 1996 generated a turnover in South Africa that is in excess of $2.75million.   While the generation of such revenue promotes sustainability and self sufficiency (as called for by Resolution Conf. 9.14) there is concern that the southern African rhino industry may become a victim of its own success. As white rhino numbers continue to increase, profits from hunting and live sales may drop (because of what economists call declining marginal utility) reducing incentives for private sector and local community rhino conservation in southern Africa.

The conservation budgets of most African States are inadequate, and disallowing the selling of horn prevents at least some of the shortfall being realised in conservation departments that can retain all or some of any additional revenue they earn (Link Q).

2. CONTINUE THE PROCESS OF INDICATOR SCENARIO DEFINITION AND INTERPRETATION

Indicators will be defined as categorical variables. In other words each *indicator* can take one of a range of possible states.

> - For example, an overall indicator for field conservation effort could be defined as either *High, Medium* or *Low)*. Other indicators could for example be scored { · 2. · 1,0,-1,-2}

Understanding can be advanced by contrasting system behaviour under different states of such *Indicators*.

> - For example, to determine the relative importance of field conservation effort one should contrast the performance of rhino in areas with *Low* field effort, to those where field effort

is *Medium*, and to where it is *High*. If field effort is critical to success we would expect to find a strong positive relationship between trends in rhino numbers and levels of field conservation effort. On the other hand if trade bans on their own are the solution one would not expect field effort to be directly related to poaching levels and rhino numbers.

Different combinations of *Indicators* and their states can be used to describe different *indicator* scenarios.

- Let us continue with the example of the relationship between rhino numbers and field conservation effort. To simplify matters, let us just consider the extremes of high and low field effort and increasing or decreasing rhino populations (ignoring medium levels of field conservation effort, and small or no changes in rhino numbers). Table 1 below shows we could define three main Rhino Numbers : Field Conservation Effort scenarios. The fourth potential combination of *indicators* is unlikely.

	LOW EFFORT NUMBERS UP	LOW EFFORT NUMBERS DOWN
HIGH EFFORT NUMBERS UP	Scenario A	Scenario C
HIGH EFFORT NUMBERS DOWN	Unlikely	Scenario B

Table 1: Three basic Field conservation effort/ rhino numbers scenarios.

After being defined each *indicators* scenario can in turn be interpreted.

- In our simple example, field conservation effort is clearly critical in scenario C (ie when conservation effort is high, numbers increase; but where effort is low, numbers decrease); whereas with scenarios A and B success appears to be independent of field effort. Scenario B is obviously particularly bleak.

The process of defining hypothetical scenarios and trying to interpret them also assists in the identification of additional key indicators that are needed to complete interpretation.

For example, let us suppose our consumer market indicators reveal that use of rhino horn is not declining despite the imposition of internal trade bans to complement CITES.

On its own, this does not necessarily mean we can conclude that trade bans are an inappropriate strategy. They may not be working simply because the level of implementation of internal trade bans in consumer States may have been poor; and that if law enforcement efforts were stepped up, the trade ban policy may still work.

Alternatively if a real attempt has been made by consumer States to enforce and

implement CITES provisions and local trade bans, we are more likely to conclude that trade bans are not working, and that part of the solution may be to recognise that there is a latent culturally-entrenched medicinal demand for rhino horn that is not going to disappear quickly, even with significant law enforcement effort (in a similar way to the apparent failure of significant law enforcement efforts to reduce either the demand for drugs in many western countries or for alcohol during the prohibition era in the USA).

This example therefore shows that the level of attempted enforcement of internal trade bans is a key *indicator* that needs to be monitored.

In practice the process of defining and interpreting scenarios is more complex than the simple example above, as indicators may take on more than two states, and we are concerned with the relationships between more than one explanatory *indicator* and rhino numbers.

It is possible to extend our crude scenarios model to look at 3 categories of changes in rhino numbers {*Up, Stable* and *Down*} instead of just the two categories. We could also look at three categories of field effort {*High, Medium* and *Low*}. This extension would allow us to infer 1) if a critical minimum threshold level of field effort was required or whether the relationship between field conservation effort and rhino numbers is a simple linear one.

In effect, instead of a 2 dimensional 2 by 2 matrix (Table 1) we end up with a 3 dimensional 3 by 3 by 3 hypercube - a bit like a Rubik's cube (ie X,Y and Z axes represent *High, Medium* and *Low* field conservation effort while along each axis there are three positions to show whether numbers are *Up* , *Stable* or *Down* . That gives us 27 possible combinations. Fortunately 17 of these combinations are unlikely. For example we do not expect numbers to increase under *Low* field effort and decline under *High* field effort etc.

For now, let us just consider the 10 likely possible combinations (although all 27 possible scenarios could be listed in the eventual scenarios process). The 10 likely scenario combinations are listed in table 2. This gives us 4 basic interpretations as to the importance of field conservation effort, while there are 3 different interpretations as to the nature of the relationship between field conservation effort and numbers.

Let us further extend the scenarios to consider the Consumer demand *Indicators* of Use and Price. There are 9 possible combinations of Use and Price if each variable has three categories (Listed in Table 3).

Table 3 shows there are 3 main interpretations as to whether CITES and internal trade bans may be working (showing once again how essential it is to collect these consumer demand data). The table also gives some interpretation as to possible effects of horn stock levels and incentives to black marketeer.

Combining Tables 2 and 3 generates 90 possible *Indicator* scenarios {Aa .. Ji}.

Table 2: **DIFFERENT SCENARIOS DEPICTING RELATIONSHIPS BETWEEN FIELD CONSERVATION EFFORT AND CHANGES IN RHINO NUMBERS**

SCENARIO CODE	LEVEL OF FIELD EFFORT			INTERPRETATION OF INFLUENCE OF FIELD EFFORT ON RHINO NUMBERS		
	HIGH	MEDIUM	LOW			
A	Up	Down	Down	Level of effort critical	- Essential to maintain effort at a high level (High critical EFFORT threshold level)	
B	Up	Stable	Down	"	" - The greater the effort the better (Linear relationship between effort and trends in numbers)	
C	Up	Up	Down	"	" - Essential to maintain at least a medium level of effort (Lower critical EFFORT threshold level)	
D	Up	Stable	Stable	Level of effort important provided	it is high	
E	Up	Up	Stable	" "	it is at least at a medium level	
F	Stable	Down	Down	Level of effort has some effect...	but only at a high level	
G	Stable	Stable	Down	" "	provided it is at least at a medium level	
H	Up	Up	Up	Changes in rhino numbers currently independent of effort ...		Very Positive scenario - Trade bans appear to be working well.
I	Stable	Stable	Stable	" " " "		" Room for improvement
J	Down	Down	Down	" " " "		" Disaster - neither trade bans or field effort working

TRENDS IN RHINO NUMBERS (in cells above)

Table 3: **DIFFERENT TRADE DEMAND SCENARIOS LISTING DIFFERENT HORN USE/PRICE SCENARIOS**

D E M A N D		INTERPRETATION OF INDICATORS
USE	PRICE	
a Up	Up	Trade bans appear not to be working* and may even be hampering successful conservation
b Up	Stable	Trade bans appear not be working as horn continuing to be used *- Use of existing stock by TCM practitioners may be limiting current demand for fresh horn.
c Up	Down	Trade bans appear not to be working * - Medical practitioners may be using existing horn stock they may have, temporarily limiting demand for fresh horn.
d Stable	Up	Current policies may be slowing use, but possibly increasing incentive for black marketeers
e Stable	Stable	Current policies may be slowing use, but profits can still be made by black marketeers
f Stable	Down	Current policies may be slowing use, and possibly reducing incentive to black marketeer.
g Down	Up	Difficult to explain - Hypothesise that although trade bans may be influencing end use levels, horn may be being speculatively traded
h Down	Stable	Trade bans may be working but price possibly remaining high because of perceptions of high value and rarity of horn.
i Down	Down	Trade bans appear to be working and likely to reduce poaching and incentive to black marketeer. Current strategy appears to be working.

* Interpretation depends upon level of attempted implementation of bans in consumer countries Bans may not have been properly applied; and might still work with increased law enforcement effort.

With 9 "demand scenarios" (a..i) and 10 "field effort/population trend scenarios (A..J) we get 90 different combination scenarios (Aa..Ji).

These scenarios could be developed further by adding further Indicators such as Budgets for Conservation and Incentives for Private Sector.

Let us again contrast some extreme scenarios for illustrative purposes..

We could do this in the form of an equation...

EXAMPLE 1 : Scenario Hi:

(*High, Medium* or *Low* Field Conservation Effort = Numbers *Up*)
+   (Use and Price *Down*)
=   The combination of CITES and trade bans appear to be working - retain them
      Performance of rhinos is currently independent of field conservation effort.

EXAMPLE 2: Scenario Aa:

(*High* Field Conservation Effort = Numbers *Up*)
but   (*Medium* or *Low* Field Conservation Effort = Numbers *Down*)
+   (Use and Price *Up*)
=   CITES and trade bans do not appear to be working and may either be detrimental
      or simply may not have been adequately implemented and enforced.
      High levels of FIELD EFFORT are critical
      There is a critical need to generate revenue to fund necessary FIELD EFFORTS
and in conclusion we should:
      either attempt to enforce TRADE BANS effectively if this appears to have been
      the problem, or
      recognise that a culturally entrenched view of rhino horn as a life-saving medicine
      is not going to change in a hurry; and that there is a latent demand for the product
      which if not supplied legally will lead to poaching. Under such circumstances it
      would be worth investigating whether a system to legalise trade in southern white
      rhino horn could be set up with sufficient anti-laundering provisions to avoid
      negatively affecting other species, and especially Asian species of rhino. Provided
      a legal trade could be set up with sufficient safeguards and controls this should
      generate additional revenue for conservation departments, supply demand without
      having to kill rhinos, make TCM practitioners part of the solution, try to reduce
      the incentives of black marketeers, and hopefully benefit Asian rhinos by
      encouraging some substitution of southern white horn for Asian horn..

The latter option would be favoured more if i) significant attempts had already been made
to enforce CITES and local trade bans; ii) budgets and private sector/local community
incentives were declining, and iii) TCM practitioners continue to strongly believe there is
no suitable substitute for horn for treating certain cases

The process of listing and interpreting scenarios is intended to identify the key *indicators* that
could be used in future to guide policy. In particular, we are seeking to identify the set of
indicators, which if measured, would have the greatest ability to assist the Standing Committee
to discriminate between alternative conservation strategies and suggest which one is most likely
to succeed in increasing rhino numbers in Africa and Asia.

Only once we have successfully done this, and are convinced that the indicators process will in the long run be able to meet the overall objective should we i) proceed to develop and refine the criteria for classifying all *indicators*; ii) collect *indicators* data; and iii) analyse and interpret these data.

3. SET UP CRITERIA TO BE USED TO CLASSIFY INDICATORS

Once the critical set of *indicators* has been identified, and the process appears to be able to meet the overall objective; the AfRSG and partners then need to set up and refine the criteria for classifying *indicators*. In all probability the better and more transparent the definitions, the better the process will work (like the IUCN Red-Listing or CITES Appendix listing process).

> - For example, we need to identify the criteria which will allow us to, say, whether the field protection (detection & prevention) effort in a particular Park is either *High*, *Medium* or *Low*.

4. UNDERTAKE SCOPING EXERCISE WITH TRAFFIC AND PRODUCE A PROJECT PLAN FOR CONSUMER MARKET *INDICATORS* RESEARCH

Following further discussion, the AfRSG suggests that TRAFFIC should produce a project plan detailing what consumer market *indicator* data are required (provided they can be credibly collected), where they should be collected, how this should be done, together with a proposed implementation plan (including budgets).

In analysing the nature of the rhino horn trade, the biggest challenge is to obtain sufficient reliable data, because the less credible data we have, the more we have to rely on speculative intuition rather than more objective empirical analysis. As highlighted by 't Sas-Rolfes (1996), there are a number of ways in which existing trade data are seriously deficient. Also, because of the recent efforts to intensify trade restrictions, there are few reliable data from the last ten years, yet this decade is arguably the most important period for analysing significant trends (given the recent imposition of internal trade bans in most consumer States to complement international trade bans).

Internal trade bans complicate consumer market research as any trade has been forced to go "under the counter". TCM doctors are therefore unlikely to openly admit to using horn in surveys as this would now be tantamount to a "criminal confession". Similarly the fact that rhino horns may no longer be openly displayed in TCM "pharmacies", does not mean that horn is still not being prescribed. Other more time-consuming and elaborate methods than straight surveys are therefore required to provide the necessary data (if indeed it can be collected). Methodology is clearly going to be critical. The eventual success of the indicators process will be closely tied to the quality of consumer market indicator data that can be obtained.

The AfRSG working group held a wide-ranging discussion on *Indicators* in consumer markets, including whether or not any practical indicators could be identified, given the covert nature of most consuming markets, and the difficulty in obtaining credible data at the present time.

It was suggested that the best approach would involve "key markets" where credible data sets from the past could be used and built upon for future analysis. In this regard, it was pointed out that "key markets" would include Taiwan, South Korea, Hong Kong and China in the Far East, and Yemen in the Middle East.

The AfRSG working group felt that:

o no single element (price, availability, volume, etc.) would be sufficient to understand trade dynamics in isolation from other types of information;

o to understand consumer markets would require supplementary qualitative information and data; and

o there will probably be a need to establish different indicators to measure different trade dynamics in different markets.

The AfRSG working group agreed that the most important element to measure is "demand", because continuing "demand" will lead to future impacts on the "population status" of rhinos in range States over time. The group considered "demand" to be something different from "availability". The AfRSG working group felt there were two fundamental *Indicators* of **DEMAND** and these could be categorised as 1) a use *Indicator* and 2) a price *Indicator*.

To facilitate thinking, the kinds of data or considerations which would be necessary in the "best case" scenario to measure demand were outlined. These included:

o price data at import, wholesale and retail levels;

o quantity sold at all given prices; and

o consistency in the level of the marketplace (i.e. retail data is only compared with retail-level data, etc.).

All of these considerations must be linked to time and place.

The AfRSG working group considered whether it was possible to obtain data for these variables based on an appreciation of the extent of, and limits to, data stemming from previous survey efforts.

The AfRSG working group identified three different forms of trade dynamic which require different *Indicators* to assess **DEMAND (use & price)**. These were :

  1) Far East over the counter sales;
  2) sale of manufactured medicines containing horn in China; and
  3) Middle East dagger handle production

In terms of **over the counter sales**, the AfRSG working group felt that research should focus on "the probability of doctors prescribing rhino horn" rather than measuring "availability" *per se*. This approach was deemed necessary in recognition of the fact that rhino horn usage is more of a function of "doctors prescribing" rather than "patients demanding" medicines containing rhino horn. Thus, focusing on the "probability of doctors prescribing rhino horn" would be a more effective proxy for measuring "demand". It was recognized that this approach would necessitate a change in survey methodology in comparison with past work on this subject on account of the imposition of internal bans.

For measuring the market for the production and sale of **manufactured medicines** in China, the AfRSG working group agreed that the "price" *Indicator* would be the retail price of manufactured medicinal products and the "use *Indicator* would be the rate of stock turnover. The AfRSG working group recognised that this information has not been collected adequately in the past, and more importantly it may not be possible to collect it in future in a credible manner, given the Chinese prohibition on the manufacture and sale of such medicines. Nevertheless, the AfRSG working group felt that an attempt should be made to assess the overall market share this trade dynamic represented in the past so that the relative significance of the monitored *Indicators* could be evaluated.

For the **dagger handle** trade the key indicators would focus on "import price" and "volume" with Yemen being a key consumer State. It was felt that there was a past track record for obtaining this information and that it could be obtained in the future. The impact of the introduction of red agate high value, high quality substitute dagger handles should also be evaluated.

There was also discussion on whether or not data on rhino horn seizures could be employed as useful indicators. The AfRSG working group concluded that the key element in relating seizure information to current demand for rhino horn was whether or not the horns were "new/fresh" as opposed to old stock. Although it may not always be something that could be unequivocally determined, it was felt that in some instances "new/fresh" horn could be identified, and that instances of such trade would be an example of qualitative information useful for understanding current trade dynamics

5. COLLECT INDICATORS DATA

Provided 1) credible consumer State *indicator* data can be collected and funding can be obtained, and 2) the use of *indicator* scenarios appears likely to be able to meet the overall objective; then TRAFFIC should undertake this consumer market *indicators* research as soon as possible, and the AfRSG and AsRSG should concurrently collect other *indicators* data.

6. ANALYSE AND INTERPRET THE INDICATORS DATA AND PRODUCE A REPORT FOR CITES STANDING COMMITTEE

Once the data have been collected the observed indicators scenarios should be interpreted and a report produced by the AfRSG. AsRSG and TRAFFIC to assist the Standing Committee.

7. FURTHER REFINE THE CONTEXTUAL MODEL USING ADDITIONAL DATA ANALYSIS AND SYNTHESIS OF THE RESULTS OF OTHER STUDIES

Finally as a spin off, it may also be possible to analyse the raw categorical *indicators* data collected using multivariate "data mining" techniques such as Neural Network Analysis, Non Parametric Discriminant Function Analysis or Categorical Formal Inference Based Recursive Analysis (CATFIRM) to give more insight into which *indicators* or *indicator interactions* have the most impact on trends in rhino numbers.

The results of the *Indicators* process, and the overall contextual model which underpins it, can also be viewed in the light of the results of any other data analyses and other integrated studies, such as the WCS/WWF cost:benefit study, and/or results of any economic analyses of the rhino horn trade.

CONCLUSIONS

The AfRSG is proceeding by first seeking to identify the set of *indicators*, which if measured, would have the greatest ability to assist the Standing Committee to discriminate between alternative conservation strategies in terms of their desirability. Only once we have successfully done this and demonstrated that the process is likely to work , should we i) proceed to develop and refine the criteria and rules for classifying all *indicators*; ii) collect *indicators* data; and iii) analyse and interpret these data.

Following the preliminary work by the AfRSG to produce a preliminary straw dog contextual model and suggested indicators scenarios approach; the AfRSG recognises the need to consult more widely, and in particular to canvas the opinion of Asian rhino conservationists.

What is outlined in this paper is preliminary in nature, and given the support of Standing Committee. is going to be further developed and refined following wider consultation in both Africa and Asia. The AfRSG is not presenting a final working product at this stage, but is seeking endorsement from the CITES Standing Committee ..

1.   Supporting AfRSG efforts to develop the *indicators* process further following wider consultation with African range States, the IUCN SSC's Asian Rhino Specialist Group (AsRSG), TRAFFIC, resource economists, and if considered desirable, nominated member(s) of the CITES Standing Committee and/or the CITES Secretariat.

2.   Supporting efforts to complete the process of determining what, where, how, and if credible *indicator* data could be collected in consumer countries; and then to support efforts to undertake this consumer market *indicators* research as soon as possible (provided the scoping process indicates that credible data can be obtained). This is important 1) given the critical importance of being able to reliably assess the nature of the demand for, and attitudes towards, rhino horn; and 2) that obtaining credible consumer market *indicators* data will take longer than for other *indicators;* and is therefore the "limiting time factor" in the process. (TRAFFIC is likely to be the most appropriate organisation to undertake this consumer market research.)

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