African and Asian Rhinoceroses – Status, Conservation and Trade

A report from the IUCN Species Survival Commission (IUCN SSC) African and Asian Rhino Specialist Groups and TRAFFIC to the CITES Secretariat pursuant to Resolution Conf. 9.14 (Rev. CoP17)

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1. Introduction

The present report was commissioned by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Secretariat, and prepared by the IUCN SSC's African Rhino Specialist Group (AfRSG), Asian Rhino Specialist Group (AsRSG) and TRAFFIC, in accordance with the provisions of paragraphs 7 and 8 of CITES Resolution Conf. 9.14 (Rev. CoP17) on *Conservation of and trade in African and Asian rhinoceroses*, for the 18th meeting of the Conference of the Parties to CITES (CoP18, Colombo, 2019).

In accordance with the Resolution, the report addresses the conservation status of African and Asian rhinoceros species, trade in specimens, stocks and stock management, illegal killing[1], enforcement issues, conservation actions and management strategies, and measures by implicated States to end illegal use and consumption of rhino parts and derivatives, and primarily deals with developments since the 17th meeting of the Conference of the Parties to CITES (CoP17, Johannesburg, 2016). At the recommendation of the CITES Standing Committee Working Group on Rhinoceroses (SC-RWG), the Standing Committee at its 70th meeting (SC70, Sochi, 2018) agreed to submit a draft decision to CoP18 for consideration, directing the Secretariat to, in consultation with interested Parties and the IUCN SSC AfRSG and AsRSG and TRAFFIC, explore options to reflect on challenges and best practices for addressing rhinoceros poaching and rhinoceros horn trafficking in the report prepared for CoP meetings in accordance with the provisions of paragraphs 7 and 8 in Resolution Conf. 9.14 (Rev. CoP17). This report therefore also highlights some identified challenges and best practices.

2. African rhinoceroses

2.1 National and continental conservation status and trends

White rhinoceros (*Ceratotherium simum*) are categorised as Near Threatened on the IUCN Red List (Emslie, 2012a), while black rhinoceros (*Diceros bicornis*) are categorised as Critically Endangered (Emslie, 2012b). Estimated numbers of African rhino by subspecies and country as of the end of 2017 are given in Table 1, together with revised 2012 and 2015 totals for comparison. 90% confidence levels around 2017 estimates (derived by bootstrapping using calculated or likely estimate precision) are estimated at 17,212 to 18,915 white rhino and 5,366 to 5,627 black rhino.

The vast majority of African rhino (97% of white and 94% of black rhino) occur in four range States: South Africa, Namibia, Kenya and Zimbabwe (in order of rhino numbers; Table 1). Botswana's rhino numbers now exceed 500 following the reintroduction of 215 white rhino since 2015 and population growth, and the country currently has the fourth largest white rhino population on the continent. Since CoP17, black rhino have been reintroduced to both Chad (2018) and Rwanda (2017). While the Rwandan population is starting to grow, some of the Chad founder animals have died and experts are

[1] Throughout the report the term "poaching" is also used to refer to illegal killing.

currently trying to determine the possible causes. In 2018 a population of southern white rhino (*C. s. simum*) was established in Democratic Republic of Congo with animals from Namibia and Zimbabwe[2]. A total of four white rhino have also been confirmed in reserves in Côte d'Ivoire and Senegal, outside the species' native range.

Table 1: Estimated numbers of white and black rhino by species and subspecies/genetic management cluster and by country as of the end of 2017, with continental totals for end of 2012 and 2015*. (Based on AfRSG data in collaboration with range States. Country trends are over the five-year period 2012-2017.)

Species	White rhino (WR) *Ceratotherium simum*				Black rhino (BR) *Diceros bicornis*					Total
Subspecies/ Management Cluster	*C.s.cottoni (Northern)*	*C.s.simum (Southern)*	TotalWR	Trend	*D.b.bicornis (South-western)*	*D.b.michaeli (Eastern)*	*D.b.minor (South-eastern)*	TotalBR	Trend	*Both species*
Botswana		452	452	*Up*			50	50	*Up*	502
*(Côte d'Ivoire) ***		1	1							1
Kenya	3	510	513	*Up*		745		745	*Up*	1,258
Malawi							28	28	*Up*	28
Mozambique		29	29				1	1		30
Namibia		975	975	*Up*	1,857			1,857	*Up*	2,832
Rwanda						19		19	*Up (New)*	19
*(Senegal)***		3	3							3
South Africa		15,625	15,625	*Down*	331	83	1,632	2,046	*Up*	17,671
eSwatini		66	66	*Down*			21	21	*Up*	87
Tanzania						155	5	160	*Up*	160
Uganda		22	22	*Up*						22
Zambia		14	14	*Up*			48	48	*Up*	62
Zimbabwe		367	367	*Up*			520	520	*Up*	887
End 2017 total	***3***	***18,064***	***18,067***	*Down*	***2,188***	***1,002***	***2,305***	***5,495***	*Up*	***23,562***
End 2015 total*	*3*	*20,053*	*20,056*	*Down*	*2,212*	*887*	*2,115*	*5,214*	*Up*	*25,270*
End 2012 total*	*4*	*21,316*	*21,320*	*20,165 in 2010*	*1,968*	*799*	*2,078*	*4,845*	*4,880 in 2010*	*26,165*

***** In light of information obtained since CoP17, 2015 totals have been revised slightly down (white rhino -1.6%, black rhino -0.7%), while 2012 totals have been revised slightly up (white rhino +3.5%, black rhino +0.5%). 2010 estimates remain as reported in CoP16 (Doc 16.54.2A2). ******Countries out of native range.

South Africa[3] has reported the export of 538 live rhino since 2014 (the majority of which were white rhino), with 67% (361) exported to current and former range States (South African Department of Environmental Affairs, 2018). The remaining 177 rhino were exported outside Africa to institutions that are either members of the World Association of Zoos and Aquaria (WAZA) or accredited members of regional zoo associations recognised as reputable institutions by the importing country's CITES Management Authority.

While white rhino numbers increased rapidly from 1992-2010, averaging +7.1%/year, population growth then slowed as poaching increased, with numbers declining from 2012 onwards (Figure 1, left). After black rhino numbers reached their lowest point in 1995, they have since steadily increased, with increased poaching slightly slowing population growth in recent years (Figure 1, right). The different trends shown by the two species are in part due to white rhino being subjected to higher poaching levels than black rhino. This is likely to be due to the fact that white rhino generally live in more open habitats where they are easier to target, live in larger groups and have greater average horn weights. The difference in trend in numbers between white and black rhino in recent years may also be due to the differential responses of the two species to the severe drought that affected parts of southern Africa in 2015-2016 (Ferreira *et al.,* 2018a; Mick Reilly – eSwatini Big Game Parks, personal communication), since the food supply of white rhinos (grass) is affected more by drought than that of black rhinos (browse). The impact of the drought on rhino numbers is discussed further below.

[2] While stakeholders in the Zimbabwe donor population were not consulted prior to this move, and the translocation didn't form part of the country's agreed annual management plan, the recipient site was visited and approved by Zimbabwe Parks and Wildlife Management Authority staff (Roseline Mandisodza-Chikerem - ZPWMA Chief Ecologist, personal communication).
[3] South Africa was the only range State to report significant exports of live rhino from 2014 onwards, according to data recorded in the CITES Trade Database.

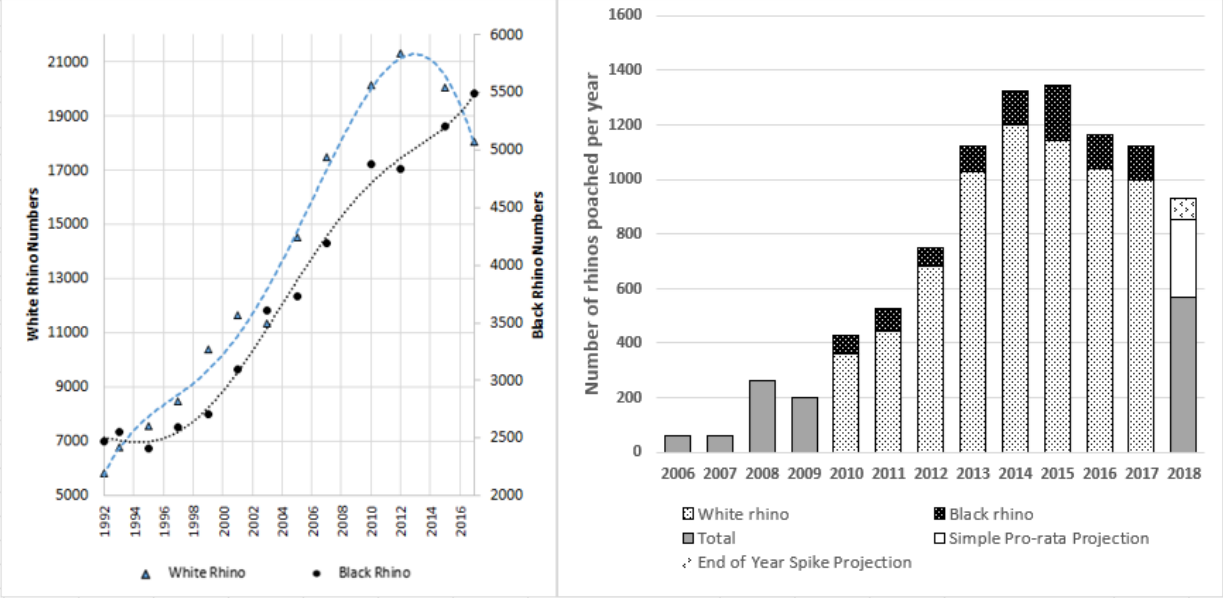


Figure 1: Estimated numbers of white and black rhino 1992-2017 based on AfRSG data in collaboration with range States (left) and reported numbers of rhino poached 2006-2018* (right). (Based primarily on AfRSG data, as well as TRAFFIC and CITES Standing Committee Rhinoceros Working Group [SC-RWG] data, in collaboration with range States. *The 2018 estimate includes reported poaching data available at the time of writing [see Table 2; darker shading] as well as a simple pro-rata projection for the rest of the year assuming poaching continues in each country at the same rates [no shading], and an additional estimate for an end-of-year spike in poaching which historically has often occurred [chevron shading], estimated using a correction factor derived from five years of available data for South Africa[4]. Actual 2018 poaching totals may differ from those projected here, and an update with actual 2018 totals will be provided to Parties at CoP18 by the AfRSG.

The decline in estimated continental white rhino numbers from 2012-2017 can largely be accounted for by a drop in estimated numbers in the largest population, in South Africa's Kruger National Park (KNP), which has been severely affected by poaching since 2007 (Figure 2). After allowing for the translocation of just over 300 white rhino out of KNP from 2015-2017, there was a net drop in estimated white rhino numbers of ~3,400 rhino in the park. This decline occurred despite a 40% recorded reduction in the number of white rhino poached in KNP over the same period (853 rhino were poached in KNP in 2015, 632 in 2016 and 513 in 2017; Ferreira *et al.,* 2018a; Figure 2). Given the declining population size, the decrease in the proportion of the KNP population poached annually has been much less marked (a ~14% decrease from 2015-2017). From 2014-2017, reported minimum poaching levels in KNP have remained high with a geometric mean of 8.1% per year. The 4,210 white rhino "removed" from the KNP population by reported poaching and management over this period account for only around four-fifths of the estimated decline in numbers over this period. While drought will have impacted numbers (as discussed below), some of the discrepancy can be explained if some poached carcasses were undetected, which is likely given KNP's large size and resultant low field ranger densities[5]. Analysis of field carcass detection data indicates that around 20% of carcasses may go undetected in KNP (Ferreira *et al.,* 2018b) [6]. If this is the case, actual white rhino poaching levels in KNP from 2014-2017 may have averaged in the region of 10%-12% of the population per annum[7]. This poaching level is above the longer-term estimated maximum population growth rate for white rhino of around 9%, and thus poaching is likely to have accounted for some of the recorded decline in KNP white rhino numbers.

[4] The 2018 total may well exceed the simple pro-rata projection estimate of 863 rhino, as in previous years there has often been a spike in poaching in the last quarter of the year. A comparison of simple projected year-end totals based on mid- to end-August data with actual year-end totals over five years of available data for South Africa indicated that actual year-end numbers poached were 8.56% higher than projected using a simple pro-rata model. Applying this correction factor would estimate an additional 74 rhino poached in 2018, giving a revised projection of 937 rhino. The AfRSG will be compiling updated population estimates and poaching records for 2018 at its February 2019 meeting, and will prepare a short update to be made available to CoP18 as an Information Document.

[5] Some of the difference could also be a result of sampling variability in block count estimation.

[6] Average persistence of carcasses in KNP was found to be 89.8% (0.769-1.000) and the probability of a carcass being observed given persistence was 89.7% (0.883- 911), with an estimated under-detection of total rhino poaching of 19.8% (white rhino 19.4%, black rhino 27.6%). This translates to an estimated 5,271 (4,750-6,165) white and 246 (224-287) black rhino poaching mortalities in KNP since 2016 (Ferreira *et al.,* 2018b). Given that carcasses of young calves are less likely to persist and be detectable, these estimates may under-estimate actual losses due to poaching.

[7] Including an estimate for additional carcasses of young calves less likely to have been detected.

Figure 2 shows trends in estimated numbers of white rhino in KNP (with confidence levels) and modelled trends in numbers under two scenarios – if there had been no poaching, and no poaching and no management removals[8]. In contrast to the decline in actual estimated numbers, white rhino numbers would have stabilised from 2008-2015 under the two modelled scenarios, only declining over the last two years (2015-2017) when actual estimated numbers showed the most significant decline.

This marked recent decline coincides with the severe drought that affected southern Africa in 2015-2016, when KNP rainfall was 49% below the long-term average following a 26% below long-term average rainfall the year before, which negatively impacted both mortality and calving rates (Ferreira *et al.,* 2018a)[9]. The drought affected other parts of South Africa and eSwatini (previously Swaziland), and was the most severe drought to hit this region since the early 1980s. As early as January 2016, experienced South African conservationists were predicting that this drought might kill more rhinos than poaching (Groenewald, 2016). Other large grazers also suffered during the drought. Despite losing only one white rhino to poaching in the period 2012-2017, eSwatini's white rhino numbers declined by 21% over the same period. White rhino losses would have been higher had it not been for many private owners in South Africa and eSwatini supplementary feeding their rhino during the drought.

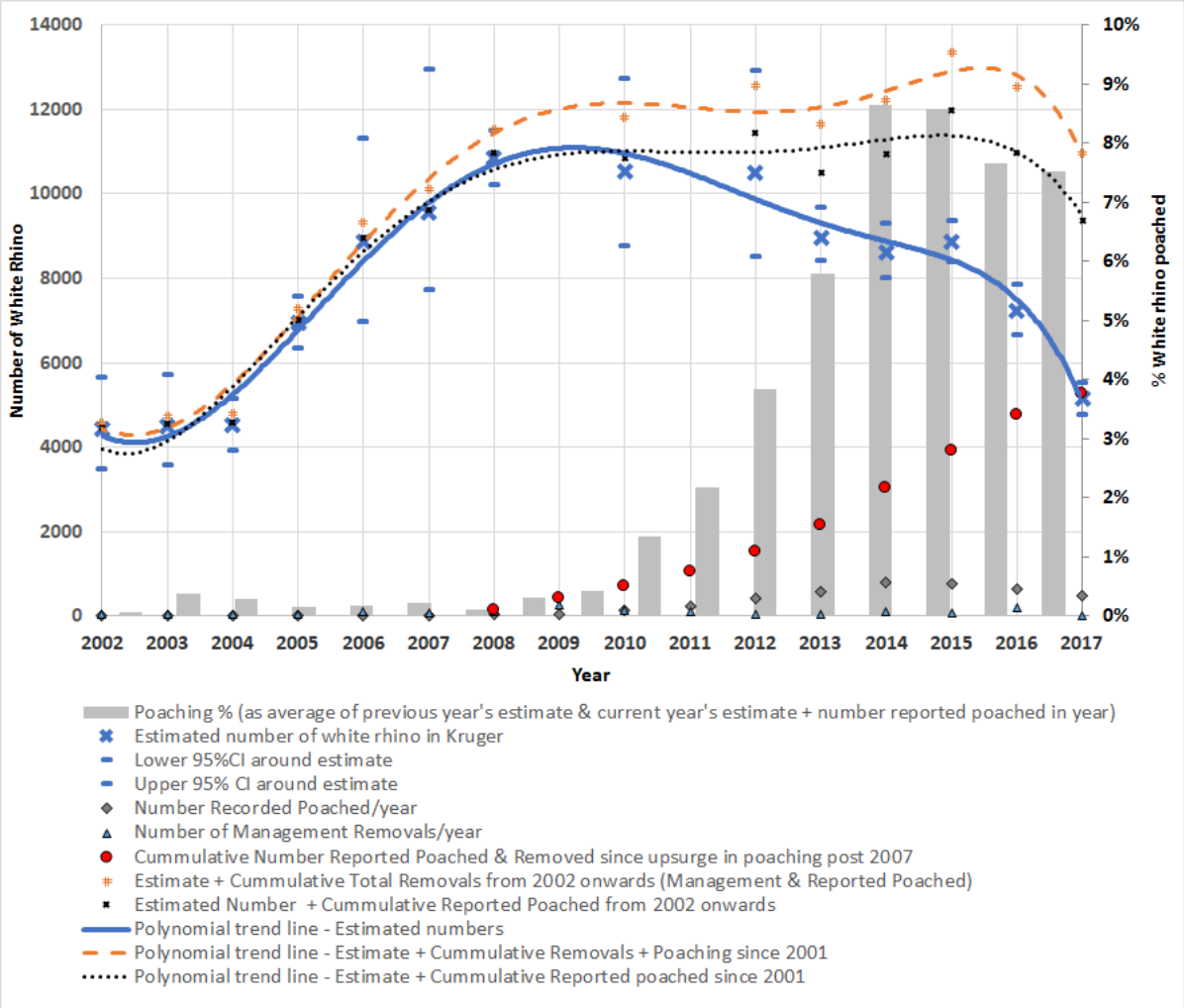


Figure 2: White rhino population history in Kruger National Park, 2002-2017. (Based on SANParks data provided to AfRSG, Southern African Development Community Rhino Management Group [SADC RMG] data and Ferreira *et al.,* 2018a). Removals from 2001-2003 were estimated as the average of removals in 2004 and 2005. For years where no species breakdowns were available (primarily early years), the numbers of white rhino poached were estimated based on the average proportion of white rhino poached over 10 years with available data [95.9%].)

[8] The modelled numbers reflect a simple "adding back" of poached and management removals to estimated numbers; for simplicity no growth has been modelled for these added animals.

[9] Ferreira *et al.,* (2018a) determined that the drought impacted on the KNP white rhino population in two main ways – by increasing natural mortalities in the two survey intervals 2015-16 and 2016-17 (by around 0.5% per year) and by reducing calving rates in 2016-17 (by around 4%), with the lag in the latter effect due to the white rhino's 16-month gestation period. These two factors alone would account for a loss of almost 400 white rhino.

From 2012-2017 white rhino numbers declined by an estimated 51% in KNP and 26% in other State-run parks and game reserves in South Africa. In 2017 there were 10 fewer State-run white rhino populations in South Africa than there were in 2012 (a 21% decline); these populations were either lost due to poaching or their last remaining animals were translocated out to prevent them being poached. There were also three fewer State-run black rhino populations in South Africa in 2017 compared to five years previously.

Updated white rhino number estimates are available for the majority of the larger known private populations in South Africa as well as for many other smaller populations. However, precise estimates for many other populations under private ownership in South Africa are not available due to non-reporting by certain owners (with predominantly smaller[10] populations) during a recent survey[11]. Conservative estimates[12] have been made to account for likely additional populations for which data were not available, and as such the total may be an underestimate. Despite this, these data indicate that numbers of white rhino on private land in South Africa have continued to increase (Figure 3). While some generally smaller private owners have sold some or all of their rhino in recent years, others have bought more animals thus leading to a sector-wide consolidation of populations. In contrast to most State parks and game reserves, many private owners supplementary fed their white rhino during the recent drought, often at great cost, thereby reducing mortalities and improving birth rates.

The largest semi-wild population of over 1,600 white rhino has achieved an average net growth rate of 8.7%/year since 2008 (Adcock *et al.,* 2018) and poaching levels approximately a tenth of the national South African average. No rhino have been poached at this site since January 2017. This success has come at significant cost of around USD357,000/month, of which security accounts for around 60%. Given the limited economic returns rhino are currently able to generate (discussed further below), such high levels of expenditure on intensive management and protection are not sustainable without additional support.

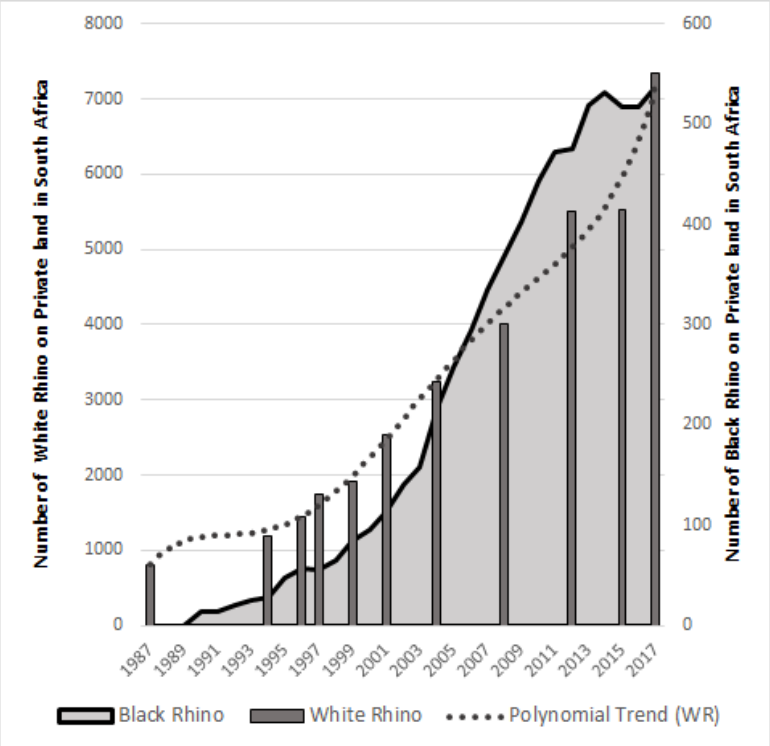


Figure 3: Estimated numbers of white and black rhino conserved on private land in South Africa, 1987-2017. (Black rhino estimates based on Southern African Development Community Rhino Management Group (SADC RMG) data, AfRSG data and 11 surveys of white rhino on private land by Buijs (1988), Emslie (1994a), Buijs & Papenfus (1996), Buijs (1998) Buijs (2000), Hall-Martin & Castley (2001), Castley & Hall-Martin (2004), Hall-Martin *et al.,* (2009), Balfour *et al.,* (2015), Balfour *et al.,* (2018) and Shaw *et al.,* (in prep).)

[10] Non-reporting properties are likely to hold an average ~8 rhino.
[11] Due to the continuing difficulty of obtaining reliable estimates of white rhino numbers on some private and State properties in some South African provinces, the SADC Rhino Management Group has initiated a process with the South African Department of Environmental Affairs with the intention of developing a formally gazetted annual reporting requirement in the country. It is planned for this process to be in place by October 2019 in order to test it at the end of 2019.
[12] With wider confidence intervals applied to this estimate.

White rhino numbers outside South Africa increased by ~64% over the five-year period 2012-2017. Some of this growth was due to continued translocations of white rhino (mainly from South Africa). At a continental level there has also been a significant shift in the proportions of white rhino conserved under different management models over the last five years, with private owners/landowners for the first time now conserving almost as many white rhino as the State (Figure 4). The estimated proportion of white rhino conserved on private land in 2017 was 49.3% (bootstrapped 90% confidence levels of 46.9% to 51.6%). In contrast, the proportions of black rhino under different management models in Africa have remained very similar over the five years 2012-17.

By 2016-2017, the southern African drought ended in most areas. If normal rains continue, and the reduction in poaching can be maintained, a slight increase in white rhino numbers as a result of increased birth and survival rates can be expected. At the time of writing, however, the start of the summer rains in KNP has been delayed and the park is very dry (Kobus De Wet – KNP, personal communication).

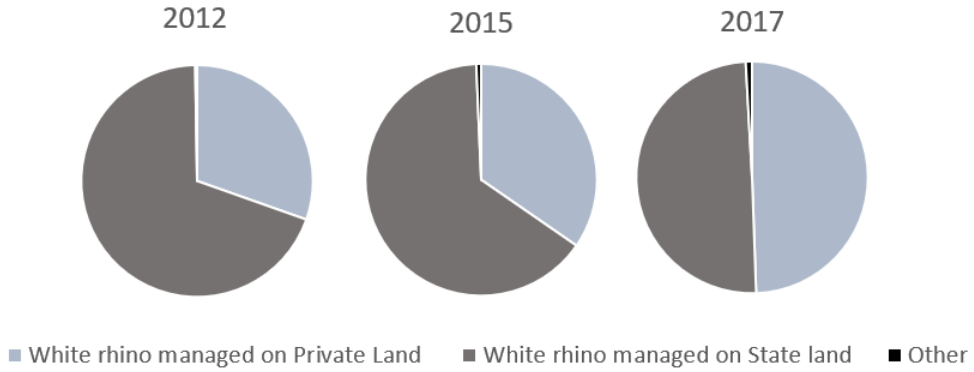


Figure 4: Proportions of continental white rhino numbers by management model for 2012, 2015 and 2017. (Based on AfRSG data. "Other" includes community land.)

2.2 Illegal killing

Table 2 gives numbers of rhino reported poached per year by country since 2006. It is important to note that these figures are likely to be under-estimates of actual poaching levels given potential under-detection of poaching, particularly in larger areas with lower field ranger densities.

Poaching of rhinos in Africa increased for six consecutive years from 2009-2015 to peak at almost 3.7 rhino/day in 2015, albeit at a slowing rate of increase from 2013-2015 (Table 2, Figure 2 and Emslie *et al.,* 2016). While recorded poaching levels have declined since 2015, poaching still remains at high levels with around 3.1 rhino/day poached in 2017 (Table 2). As noted above, reported poaching levels presented in Table 2 are likely to be slight underestimates of actual numbers, since ~20% of poached carcasses may be undetected in some very large areas with lower field ranger densities such as KNP (Ferreira *et al.,* 2018b).

The decline in poaching from 2015 appears to have continued into 2018, with reported poaching in the first eight to nine months of the year remaining low or falling in many range States (Figure 2, Table 2). Although recent slight increases in reported poaching in Botswana and Namibia in 2018 are cause for concern[13], numbers poached across Africa in 2018 are likely to drop below 1,000 rhinos for the first time in six years (Table 2), unless there is an end-of-year spike in poaching that is larger than predicted.

[13] The projected 2018 poaching levels for Botswana and Namibia presented in Table 2 (11 and 61 rhino, respectively) would represent 2.2% of the rhino population in each country.

Table 2: Reported African rhino poaching mortalities by country, 2006-2018*. (Based primarily on AfRSG data in collaboration with range States, and TRAFFIC and CITES Standing Committee Rhinoceros Working Group [SC-RWG] data). Some totals from previous years have been revised slightly compared to the previous [CoP17] report in light of additional information. Zimbabwe estimates for 2016 and 2017 include some animals missing and assumed poached; corresponding minimum recorded poaching figures for these two years were 28 and 27. Shaded cells in year columns indicate the country had no rhino in that year.)

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 to date	Date 2018 data up to	Total (not including 2018 projection)	*Simple Projection for 2018*	2017 Poaching as a % of population
Botswana	0	0	0	0	0	0	2	2	1	0	1	0	7	26-Aug	13	*11*	0.0%
Chad													0	25-Sep	0	*0*	
DR Congo	0	0	2	2									0	25-Sep	4	*0*	
Kenya	3	1	6	21	22	27	29	59	35	11	10	9	4	30-Sep	237	*5*	0.7%
Malawi	0	0	0	0	0	0	2	1	1	1	1	1	0	21-Nov	7	*0*	0.0%
Mozambique	0	9	5	15	16	10	16	15	19	13	5	4	1	31-Jul	128	*2*	11.8%
Namibia	0	0	0	2	2	1	1	4	30	97	61	44	53	21-Nov	295	*61*	1.5%
Rwanda												0	0	25-Sep	0	*0*	0.0%
South Africa	36	13	83	122	333	448	668	1004	1215	1175	1054	1028	508	31-Aug	7687	*763*	5.5%
eSwatini	0	0	0	0	0	2	0	0	1	0	0	0	0	25-Sep	3	*0*	0.0%
Tanzania	0	0	2	0	1	2	2	0	2	2	0	2	0	07-Nov	13	*0*	1.2%
Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	25-Sep	0	*0*	0.0%
Zambia	0	1	0	0	0	0	0	0	0	0	0	0	1	25-Sep	2	*1*	0.0%
Zimbabwe	21	38	164	39	52	42	31	38	20	50	35	36	15	30-Sep	581	*20*	3.9%
Additional projection for usual end of year spike in poaching >																*74*	
Total	60	62	262	201	426	532	751	1123	1324	1349	1167	1124	589		8944	*937*	4.6%
Poached/day	0.2	0.2	0.7	0.6	1.2	1.5	2.1	3.1	3.6	3.7	3.2	3.1				*2.6*	

* The column "Simple projection for 2018" provides a projected total poaching estimate for 2018 assuming that poaching continues in each country at the same rates to the end of the year. An "additional projection for usual end of year spike in poaching" is also included as an end of year spike has historically often occurred. This additional projection was estimated using a correction factor derived from five years of available data for South Africa[14]. Actual 2018 poaching totals may differ from those projected here, and an update with actual 2018 totals will be provided to Parties at CoP18 by the AfRSG.

2.3 Trade

2.3.1 Horn sourced for illegal markets

A total of 4,757 African rhino horns are estimated to have entered illegal trade in the period 2016-2017, of which 1,093 horns were reportedly recovered by enforcement agencies within and outside Africa (Table 3). This represents approximately 2,378 rhino horns each year being sourced for illegal markets, weighing some ~6.6 tonnes, with an estimated 1,832 horns or ~5.1 tonnes per year entering illegal trade. It appears that the rapid increase in illegal acquisition of horn documented in the CoP14 to CoP17 reports has now ceased, with a modest decline in the number of horns annually sourced for illegal markets in 2016 and 2017 (Table 4). Poaching remains the major source of these horns. Of the total number of horns intended for illegal markets, the percentage of horns seized in Africa has almost doubled since CoP17, from 4.5% to 8.9%, while the percentage of horns seized outside of Africa has remained at a similar level (5.8% and 5.5%, respectively).

[14] The 2018 total may well exceed the simple pro-rata projection estimate of 863 rhino, as in previous years there has often been a spike in poaching in the last quarter of the year. A comparison of simple projected year-end totals based on mid- to end-August data with actual year-end totals over five years of available data for South Africa indicated that actual year-end numbers poached were 8.56% higher than projected using a simple pro-rata model. Applying this correction factor to 863 would estimate an additional 74 rhino poached continentally in 2018, giving a revised continental projection of 937 rhino. The AfRSG will be compiling updated population estimates and poaching records for 2018 at its February 2019 meeting, and will prepare a short update to be made available to CoP18 as an Information Document.

Table 3: Estimated number of African rhino horns by source entering illegal trade, January 2016 – December 2017. (Based on TRAFFIC and AfRSG data.)

Description of source or recovery of horns	Number of horns	% of total*
Source of African rhino horns intended for illegal markets		
Horns on all recorded poached rhinos[15]	4,531	95.2%
Horns stolen from natural mortalities (estimate)[16]	85	1.8%
Thefts from government stockpiles[17]	12	0.2%
Other thefts in Africa (private stocks, museums etc.)[18]	40	0.9%
Horns illegally sold from private stocks (estimate)[19]	57	1.2%
White rhino horns obtained from legal trophy hunts (estimate)[20]	32	0.7%
Source Total	***4,757***	***100.0%***
Recovery of illegally obtained African rhino horns by enforcement agencies		
Recoveries of illegally obtained horns *in situ* (estimate)[21]	408	8.6%
Confiscations/seizures in Africa[22]	425	8.9%
Confiscations/seizures outside of Africa[23]	260	5.5%**
Recovery Total	***1,093***	***23.0%***
******Total African rhino horns entering illegal trade***	**3,664**	**77.0%**

*Percentage of total horns intended for illegal markets.
**Percentage of horns seized outside of Africa, out of total horns intended for illegal markets that leave Africa, is 6.6%.
***Estimated number of horns intended for illegal markets minus estimated number seized.

Table 4: Estimated average number of African rhino horns sourced for illegal markets per year, 2000-2017. (Based on Milledge, 2007; Milliken *et al.,* 2009; Emslie *et al.,* 2012, Emslie *et al.,* 2016.)

Jan'00-Dec'05 (Pre-CoP 14)	Jan'06-Sept'09 (Pre-CoP15)	Jan'09-Sept'12 (Pre-CoP16)	Oct'12-Dec'15 (Pre-CoP17)	Jan'16-Dec'17 (Pre-CoP18)
106	408	1,140	2,674	2,378

2.3.2 Major illegal trade flows and countries most affected

Figure 5 and Table 5 present data from the TRAFFIC Rhino Horn Seizures Database from 2009 to September 2018, covering 737 rhino horn seizure cases and involving an estimated 2,733 horns or horn pieces weighing a total of 6,349 kg[24]. Without a formal reporting mechanism for historic seizures, many of these data were obtained through opportunistic collection of open-source records. Many of the records originated from official government sources[25]. Although these data only reflect what has been detected and reported, this dataset remains the most comprehensive set of rhino horn seizure data presently available and analysis yields valuable insights into trade routes and other dynamics. There is now a formal process for CITES Parties to submit annual illegal trade reports in accordance with Resolution Conf. 11.17 (Rev. CoP17); rhino seizure data included in these reports could inform future reporting pursuant to Resolution Conf. 9.14 (Rev. CoP17) if made available.

Based on these data, the total estimated weight and number of horns seized has increased steadily from 2009-2017 (Figure 5, Table 5). More seizures were made in Africa (relative to countries outside Africa) in every year except 2013 and 2014, with numbers in 2017 being almost evenly split. From 2010-2014 the weight of horns seized per rhino poached declined as poaching was steadily increasing, reaching close to peak levels in 2014. However, since 2014 there has been an annual increase in the weight of horn seized per rhino poached, which may be indicative of increased enforcement effectiveness/effort. This trend has coincided with first a slowing rate of increase in poaching and then a

[15] Based on recorded number of poached rhinos in Table 2 multiplied by 1.98 horns per rhino.
[16] Assuming a 3% theft rate and a 3% annual natural mortality rate.
[17] Based on data obtained by TRAFFIC in collaboration with governments.
[18] Based on data obtained by D. Balfour, increased by 10% to account for estimated unreported data.
[19] Assuming a 3% annual natural mortality rate of privately-owned rhinos and an estimate of 14.5% entering illegal trade based on expert knowledge from law enforcement professionals and individuals monitoring the status of rhinos in South Africa.
[20] Based on assessment of trophy hunting data for South Africa and known and estimated patterns of pseudo-hunting.
[21] Assuming 9% of poached rhino based on discussions with wildlife authorities.
[22] Based on seizures data in the TRAFFIC Rhino Horn Seizures Database.
[23] Based on seizures data in the TRAFFIC Rhino Horn Seizures Database.
[24] 2,765 kg in the period 2009-2013; 3,584 kg in the period 2004-2018.
[25] Often pursuant to reporting to the CITES SC-RWG, through the National Ivory and Rhino Action Plan (NIRAP) process, or reporting to the Elephant Trade Information System (ETIS) where rhino horns are seized together with ivory; other official data comes through AfRSG country representatives in African range States, as well as South African government statistics on rhino crime). TRAFFIC has put significant effort into vetting these data and is willing to share data with Parties on request.

limited decline in poaching post-2015, with 2018 poaching estimates projected to return to levels last observed in 2013.

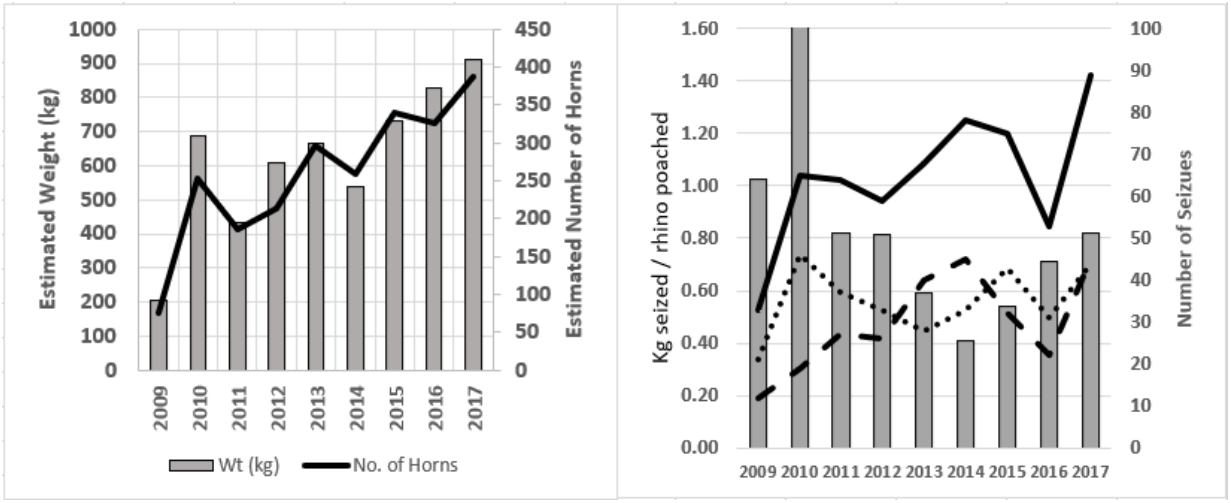


Figure 5: Estimated weight and number of African rhino horns seized globally (left), and number and location of seizures of African horns (in Africa [dotted line], in Asia and other countries [dashed line] and total [solid line]) and the ratio of seized horn weight to rhino poached (grey bars) (right), 2009–2017. (Based on TRAFFIC Rhino Horn Seizures Database. Where data on weights or numbers of horns were not available for a particular seizure, these have been calculated using species-specific average horn weights found in Pienaar *et al.,* 1991 and Leader-Williams, 1992.)

In Table 5, data for seizures made by a particular country ("*Made by*") have been combined with data on seizures that took place elsewhere but implicated that country as the origin, exporter, transit link or final destination ("*Implicated in*")[26]. Therefore, total consolidated numbers of seizures, weights and numbers of horns in Table 5 include some double-counting as data from a single seizure can be captured at more than one point in the trade chain. In the absence of DNA analysis of all seizure samples, the origin of much of the horn leaving Africa remains unknown. Knowledge of trade chains would be enhanced by increased forensic testing and more timely submission of seizure information and samples for DNA analysis (discussed later). Given the caveats associated with interpretation of the data in Table 5, these data cannot be used to indicate law enforcement effectiveness/effort, unless perhaps comparing similar types of countries (e.g. destination countries) or within a country over time. Nevertheless, the trade flows shown by these data provide an indication of the countries most affected by the illegal rhino horn trade.

[26] If a seizure was made in Country A and horns were destined to have been transported by air via Country B to Country C, the seizure would be recorded as "*Made by*" A and also listed under "*Implicated in*" for Countries B and C. In this case, law enforcement authorities in Countries B and C would have had no chance to make a seizure and thus "*Implicated in*" does not necessarily reflect law enforcement effectiveness. If a seizure is made in Country C and DNA shows the horn came from Country A, then it would be recorded as "*Made by*" Country C and listed under "*Implicated in*" for Country A.

Table 5: Global rhino horn seizure data, 2009–September 2018. (Based on TRAFFIC Rhino Horn Seizures Database. Where data on either weight or number of horns were not available for a particular seizure, these have been calculated using species-specific average horn weights found in Pienaar *et al.,* 1991 and Leader-Williams, 1992. Shading in the columns for the most recent period is proportional to the values in each column.)

Country/Territory	2009-2013				2014-Sept2018				Entire Period 2009-Sept2018			
	Seizure Number Made by	Seizure Number Implicated in	Estimated Weight (kg) of Seizures	Estimated Number of Horns & Pieces	Seizure Number Made by	Seizure Number Implicated in	Estimated Weight (kg) of Seizures	Estimated Number of Horns & Pieces	Seizure Number Made by	Seizure Number Implicated in	Estimated Weight (kg) of Seizures	Estimated Number of Horns & Pieces
South Africa	138	13	1,560	503	102	33	1,434	552	240	46	2,994	1,055
China (+Hong Kong SAR)	75	35	733	314	85	38	982	425	160	73	1,715	739
Viet Nam	26	35	847	339	35	25	910	422	61	60	1,757	761
Mozambique	7	12	241	89	25	18	790	341	32	30	1,031	430
Malaysia	0	4	63	25	3	3	367	140	3	7	430	165
Kenya	9	3	122	44	9	7	347	150	18	10	469	194
Qatar	0	11	102	62	1	13	201	86	1	24	303	148
Thailand	6	7	135	57	8	5	193	92	14	12	328	149
Malawi	0	0	-	0	3	2	138	61	3	2	138	61
Singapore	3	1	-	0	4	3	116	61	7	4	116	61
Namibia	0	0	-	0	10	5	114	55	10	5	114	55
Cambodia	0	0	40	19	2	4	96	42	2	4	136	61
Uganda	1	2	62	27	4	1	87	53	5	3	149	80
Zambia	1	0	14	5	4	3	73	33	5	3	87	38
Ethiopia	0	5	43	20	0	7	68	32	0	12	111	52
Nigeria	0	4	81	32	0	3	64	24	0	7	145	56
Lao PDR	0	1	6	2	2	6	63	48	2	7	69	50
Turkey	0	0	-	0	2	1	61	23	2	1	61	23
United Arab Emirates	1	6	35	18	0	6	50	41	1	12	84	59
United Kingdom	5	1	37	29	4	0	41	16	9	1	78	45
India	18	0	19	20	51	0	39	52	69	0	58	72
France	2	6	52	35	1	1	14	13	3	7	67	48
Czech Republic	4	0	118	40	2	0	7	3	6	0	125	43
U.S.A.	1	2	108	40	3	0	4	4	4	2	112	44
Zimbabwe	7	2	69	36	1	1	3	4	8	3	71	40
∑ Other Countries *	29	25	277	147	43	21	257	182	72	46	534	329
TOTAL	333	174	4,763	1,903	404	206	6,517	2,955	737	380	11,281	4,858

*Includes 35 other countries: Angola, Belgium, Bhutan, Botswana, Canada, Central African Republic, Côte d'Ivoire, Democratic Republic of the Congo, Denmark, Egypt, Germany, Greece, Guinea, Hungary, Indonesia, Ireland, Italy, Japan, Korea, Myanmar, Nepal, Netherlands, Philippines, Portugal, Rwanda, Slovakia, South Sudan, Spain, Sudan, eSwatini, Sweden, Switzerland, Taiwan (province of China), Tanzania, Togo.

As in reports to previous CoPs, Table 5 indicates that South Africa, China (including Hong Kong SAR), Viet Nam and Mozambique remain the countries most affected by illegal trade, and nationals of all of these countries continue to be arrested for rhino crimes.

Among source countries, ***South Africa*** accounts for the highest number of seizures in Table 5, with the country either making or being implicated in 33% of all seizures that have occurred since 2014 and accounting for 40% of the total weight of seized rhino horn in this period. This is not unexpected since South Africa has the greatest number of rhino and experienced the heaviest poaching, and therefore remains the biggest source of horn for illegal markets. Whilst the number of seizures made in South Africa, the estimated weight of seized horns and the estimated number of seized horns have all declined in the period 2014-2018 compared to the earlier period, these variables have all increased considerably in seizures made by other countries that implicate South Africa in the trade chain. This may be due in part to increased availability of information regarding the source of illegally traded horn, through DNA analysis and information obtained from traffickers that have been detained. The shift towards smuggling processed horn (discussed below) is, however, making detection more difficult. While South Africa remains one of the countries most affected by illegal trade, poaching levels in South Africa have been declining since 2014 (Table 2).

Mozambique is the second most prominent source country in Table 5; the country made, or was otherwise implicated in, approximately one in 10 of the total number of seizures made in the period 2014-2018. The weight of horn seized is significantly greater than could be produced by the small number of rhino that currently occur in Mozambique, indicating that the country is acting as a major transit country for horn. Many Mozambique nationals continue to be implicated in rhino poaching in

South Africa (Kobus De Wet, KNP - personal communication) and there is evidence that Vietnamese-led transnational criminal syndicates are heavily engaged in trafficking ivory and South African-sourced rhino horn out of Mozambique (EIA, 2017, 2018). While the number of rhino horn seizures made by Mozambique has risen 3.6 times compared to an approximate two-fold increase in poaching over the period 2014-2018 (Tables 2 and 5), which could be indicative of an improvement in law enforcement in the country, a greater quantity of rhino horn illegally left the country compared to the period 2009-2013 (involving at least an estimated 149 horns, weighing 374 kg, in 18 separate seizures that Mozambique was reportedly "implicated in" since 2014). Rhino horn trade dynamics in Mozambique are intrinsically linked with neighbouring South Africa which is the major source of rhino horn and is believed to share highly adaptive transnational criminal networks involved in the trade on both sides of the border.

China[27] again ranks as another important end-use destination in Asia based on available seizures data. China either made, or was implicated in, 30% of all recorded seizures in the period 2014-2018, representing more than one-quarter of the estimated weight and number of seized rhino horns (Table 5). The estimated weight and number of rhino horns seized by China grew by one-third and one-quarter, respectively, in the most recent period relative to the earlier period. The estimated weight and number of rhino horns in seizures made elsewhere that implicated China in the trade chain increased by 36% and 55%, respectively, during this same period. While these data may be indicative of improved enforcement effort, they could equally suggest that demand for rhino horn could be intensifying in the country, and that despite significant law enforcement effort and many prosecutions the country remains a key destination for illegal trade.

Among destination countries, available seizures data suggest that ***Viet Nam*** continues to be a leading destination for rhino horn overall, accounting for around 15% of the rhino horn seizure cases and more than one-quarter of the seized rhino horns by estimated weight or number in the more recent (2014-2018) period (Table 5). The number of seizures made in the country increased by 35% in the 2014-2018 period relative to the earlier period, with the estimated total weight and number of horns in those seizures more than doubling. In the same period, seizures made by other countries implicating Viet Nam decreased considerably. This could be indicative of an improvement in law enforcement in Viet Nam over the two periods. Overall, however, Viet Nam's rhino horn trade flow increased by about 24% between the two periods in terms of the estimated numbers of horns involved. As has been the case since CoP15, demand in Viet Nam remains a key driver of the illegal rhino horn trade.

The predominance of China and Viet Nam in the illegal rhino horn trade is not only reflected in the available seizure records, but also in law enforcement data available for source countries. These data indicate that within Africa, Chinese and Vietnamese nationals are heavily engaged in rhino horn trafficking and play major roles in the acquisition and transport of rhino horn out of Africa to Asian destinations. The results of 141 cases in which 219 nationals of Asian countries were arrested in conjunction with a rhino horn seizure in Africa, or were arrested in Asia coming directly from Africa with rhino horn, are presented in Figure 6. Comparing the periods 2009-2013 and 2014-2018, four times more Chinese nationals were arrested in the more recent period (25 versus 101 arrests), while there was a much smaller increase in the number of Vietnamese nationals arrested between the two periods (34 versus 53 arrests). From 2009 to date, Chinese nationals made up 57% of Asian individuals arrested while Vietnamese nationals comprised 40%.

A recent analysis of 21 court cases pertaining to rhino horn seizures made at OR Tambo international airport from August 2016 to October 2018 by South Africa's Department of Environmental Affairs in collaboration with South African Police Service, the Hawks and the South African Revenue Service (Melanzi, 2018) reveals a similar pattern of involvement of these two countries. Hong Kong SAR was the reported end destination for 13 of these shipments, with another two scheduled to pass through Hong Kong SAR to Nanjing in China, and the remaining six cases involving horns destined for Viet Nam via either Dubai or Doha.

[27] Data for China includes data for Hong Kong SAR, as there is no evidence that this region constitutes a separate market.

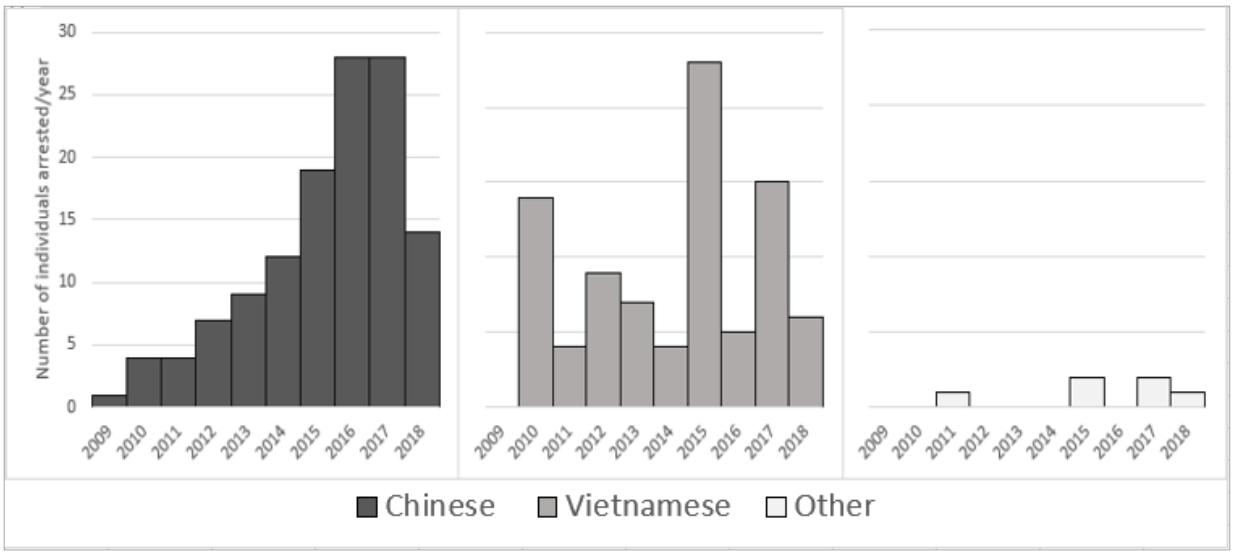


Figure 6: Numbers of individuals from Asian countries arrested in conjunction with African rhino horn seizure cases. (Based on TRAFFIC Rhino Horn Seizures Database. "Other" nationalities include 1 Malaysian, 2 North Korean, 2 Taiwanese and 1 unspecified "South East Asian".)

Evidence of Chinese-run rhino horn processing operations in South Africa for export to Asian markets has emerged since CoP17 and marks an entirely new development in the trade. Police investigations in 2017 uncovered small home workshops where rhino horn beads and bracelets are manufactured for export along with horn offcuts and powder, and two Chinese nationals and a Thai national were arrested as a result (Moneron *et al.,* 2017). Bags of rhino horn offcuts, beads and cylinders have also been seized in Mozambique but it remains unknown whether processing operations have been established in the country or whether the seized goods originated in South Africa or elsewhere (T. Milliken, personal observation, July 2018). The advent of manufacturing of rhino products in Africa coincides with a similar development in the illegal ivory trade (CITES, 2017).

As previously reported, in 1993 the Chinese government banned all trade and exploitation of rhino horns and tiger bones with the issuance of a *Circular on Banning the Trade of Rhino Horns and Tiger Bones*. This legal instrument strictly prohibited the import and export, sale, purchase and transport (including carrying or sending by post) of these wildlife products, and was further buttressed by the official removal of these substances as approved ingredients in the official *Chinese Pharmacopoeia* governing traditional Chinese medicine (TCM). However, on 29 October 2018, a *Notice by the General Office of the State Council on Strict Rules of Activities of Operation and Utilization of Rhinoceros and Tiger and their Products* repealed the 1993 *Circular* and effectively opens up two new channels of rhino horn and tiger bone usage and trade: the sale of antique or collectable specimens which hold cultural value, and licensed trade as a medicinal product through approved TCM doctors in accredited hospitals. The first trade option essentially mimics an exemption made for ivory antiques at the time of the market closure of legal ivory trade on 31 December 2017, but the allowance of rhino horn as a TCM ingredient overturns a longstanding prohibition on domestic use of rhino horn spanning two and half decades. The *Notice* restricts rhino horn usage to captive bred animals (as distinct from zoo specimens), but key implementation details concerning the eligibility of individual live rhino presently in China as a future source of horn, the conditions of rhino horn stock procurement and management, the design of chain of custody controls from producers to consumers, and other related issues are yet to be developed. However, on 12 November 2018, the official Xinhua news agency reported that the "detailed regulations for implementation" of the October *Notice* had been "postponed after study", and the "three strict bans" will continue to be enforced meaning that the import and export; the sale, purchase, transport, carrying and mailing; and the use of rhino horns and tiger bones in medicine all remain strictly banned. State Council Executive Deputy Secretary-General Ding Xuedong also announced that the government would soon be organising special crackdown campaigns focused on addressing the illegal trade in tigers and rhinos and their by-products, and that illegal activity would be dealt with severely.

In the meantime, trade in rhino horn products continues to be observed in China. A study of art and antiquities auctions in China from 2000-2014 documented 7,189 rhino products in domestic trade with a rapid escalation in sales from 202 items in 2005 to 2,698 items in 2011, followed by a virtual collapse in the period 2012-2014 following the issuance of a special notice by China's State Forestry Administration on 15 December 2011 reaffirming prohibitions on rhino horn trading in the country (Gao

et al., 2016). Investment and appreciation of artistic value were the two common reasons given for purchase and the government's subsequent intervention was cited by the China Association of Auctioneers as a major factor in "a sharp decrease in turnover in China's booming art auction market" (Gao *et al.,* 2016). Another more recent review of auctions in China found rhino TCM products being sold[28]. Although the auction houses engaged in this trade were in apparent violation of the 1993 ban on rhino horn, the items found on display had all ostensibly been approved by officials from the State Administration of Cultural Heritage, indicating a major gap in awareness of wildlife trade regulation in the country amongst key government officials.

Countries with a higher proportion of "*Implicated in*" seizures in Table 5 include some countries with airports that are major transport hubs. With the recent expansion of Ethiopian Airlines to become the biggest airline in Africa, Ethiopia has emerged as an important regional transport hub, along with South Africa and Kenya where carriers offer direct flights to Asian destinations. The national carriers of Qatar, United Arab Emirates and Turkey also offer similar connections via Doha, Dubai/Abu Dhabi and Istanbul, and available evidence suggests that these routes have all been used by couriers to illegally move horn between Africa and Asia.

In addition to available data on seizures, market surveys can also provide valuable information regarding trade routes. An undercover investigation in the Golden Triangle (the border region between Thailand, Myanmar and Lao PDR) in April 2018 revealed a market where large quantities of illegal wildlife products were openly displayed for sale, including whole African rhino horns as well as pieces, shavings and worked beads of rhino horn[29].

2.3.3 DNA analysis and use of the CITES rhinoceros horn seizures form

The RhODIS® Rhino DNA Indexing System (Harper *et al.,* 2013, 2018), established in 2010, is proving to be increasingly useful in investigations where DNA profiles from blood samples, seized horns and even horn dust in a bag used to transport horns can be compared and matched to DNA forensic sample profiles taken from poached animals at specific crime scenes, or by searching for matches against the DNA profiles of thousands of live animals and horn stocks on the RhODIS database. The storage of all these profiles from multiple African countries in a single continental database facilitates such matching (Harper *et al.,* 2018). With collection of samples from hunts, dehorning and any rhino immobilizations being legally mandatory in South Africa, and other range States such as Kenya and Namibia continuing to supply samples, the number of DNA profiles on the continental database continues to grow, and the chances of getting matches to international seizures increases. The system provides a tool to police and control domestic horn sales and the export of hunting trophies by allowing for the identification of illegal laundering of horn from either source onto illegal markets.

South Africa's report to SC70 (SC70 Doc. 56 Annex 14) summarizes international seizure samples sent to South Africa from international sources over the three-year period 2015-2017. Links were made to specific Kenyan, Namibian and South African rhino in seizure samples received from 11 countries during this period. Additional matches not listed in SC70 Doc. 56 Annex 14 have also been made from international seizure samples submitted in 2012-2014 and 2018, with a positive match to at least one animal for every international seizure sample submitted since 2016. If individual countries instead opted to implement their own incompatible DNA profiling systems, it would not be possible to efficiently look for matches across Africa as has been possible using the continental RhODIS database.

Nevertheless, some countries have indicated a preference to use their own in country DNA labs, while others have questioned the need to allocate resources to sending samples to the South African Police Service Forensic Science Lab (SAPS FSL) and subsequent RhODIS analysis[30], when for them, a simple species DNA test may be all that is needed to successfully secure a prosecution in a seizure case in their own country. One option used very successfully by Malaysia was to use its national DNA

[28] *"For these items, the date of manufacturing was mostly claimed to be in the 1980s or before 1993 when the trade ban on rhino horn and tiger bone was imposed. A total of 112 lots of TCM were recorded. There were 66 auction lots of Peaceful Palace Bovine Bezoar Pill (containing rhino horn), with an estimated auction market value of … USD1,160-4,639 per lot"* (Chou, 2018).

[29] Based on photographs taken by an undercover investigator in April 2018, that were shown at the 30th meeting of the Rhino and Elephant Security Group (Mwanza, Tanzania, November 2018).

[30] While DNA species identification tests can be undertaken in a range of countries, RhODIS profiles are currently only being produced in a single lab in South Africa, but in time the hope remains that RhODIS-compatible profiles can be generated in multiple labs around the world. This would allow countries to analyse samples in-house and then share RhODIS-compatible DNA profiles without the need to send horn or extracted DNA samples to South Africa. Kenya's lab is apparently close to being able to derive RhODIS-compatible profiles. If a country is not able or seeking to adopt International Society of Animal Genetics standardization methods, another way to facilitate roll out of RhODIS compatible testing to other countries may be through the development of a commercial RhODIS kit.

forensic lab to extract DNA and conduct a species test needed for a local prosecution, and then to send samples of the extracted DNA to South Africa (obviating the need to send horn samples) that allowed many matches to be made.

Many range State investigators, conservationists and the major rhino coordination groups in Africa see it as vital for law enforcement efforts against transnational organized crime to share as much seizure information as possible (perhaps excluding confidential nominal data that can't be shared due to ongoing investigations or pending cases) along with DNA samples for analysis, and support the use of RhODIS as the only standardized DNA system and database to identify the source of samples in Africa. The system allows investigators to identify which different reserves and countries specific organized crime syndicates have been and are operating in, and provides greater understanding of their supply routes. Using DNA evidence to show the whole chain of supply in court allows couriers to be convicted for trafficking, rather than just illegal possession, and therefore receive higher penalties (for example in a recent case in eSwatini discussed later). INTERPOL in southern Africa has also shown support for the system and a film presentation to the 87th INTERPOL General Assembly by South Africa's Directorate for Priority Crime Investigations Unit stressed the value of using the RhODIS system to link seizures back to specific rhino in Africa.

From reports to the SC-RWG, it is also clear there have been many instances where transit or end user countries have not used the recommended CITES *Form for collection and sharing of data on rhinoceros horn seizures and on samples for forensic analysis* referenced in Resolution Conf. 9.14 (Rev. CoP17) and/or timeously submitted details of seizures. South Africa reported it had only received the collection form from three countries. Countries in general seem reluctant to complete the CITES collection form because investigations or court cases are still ongoing or pending.

2.3.4 Trophy hunting

In South Africa and Namibia, the two countries with the largest rhino populations in Africa, numbers of both species of rhino have increased considerably since sport hunting of white and black rhino resumed in 1968 and 2005 respectively (Emslie *et al.,* 2016; Cooney *et al.,* 2017). In 2004, CITES Parties approved annual hunting quotas of five black rhino males for both South Africa and Namibia. Between 2005-2017, 45 black rhinos were hunted in South Africa (an average 3.5/year and 69% of the quota), and a total of 10 black rhinos were hunted over the same period in Namibia (15% of the quota; Figure 7). Over the last six years, an average of 4.8 black rhinos/year have been hunted in the two countries. For white rhino, where hunting is not subject to CITES quotas, an average 83 white rhino/year have been hunted across both countries in the six years 2012-2017. These average hunting rates are equivalent to hunting a very low and sustainable 0.50% and 0.13% per year of the current total number of white and black rhino, respectively, in the two countries.

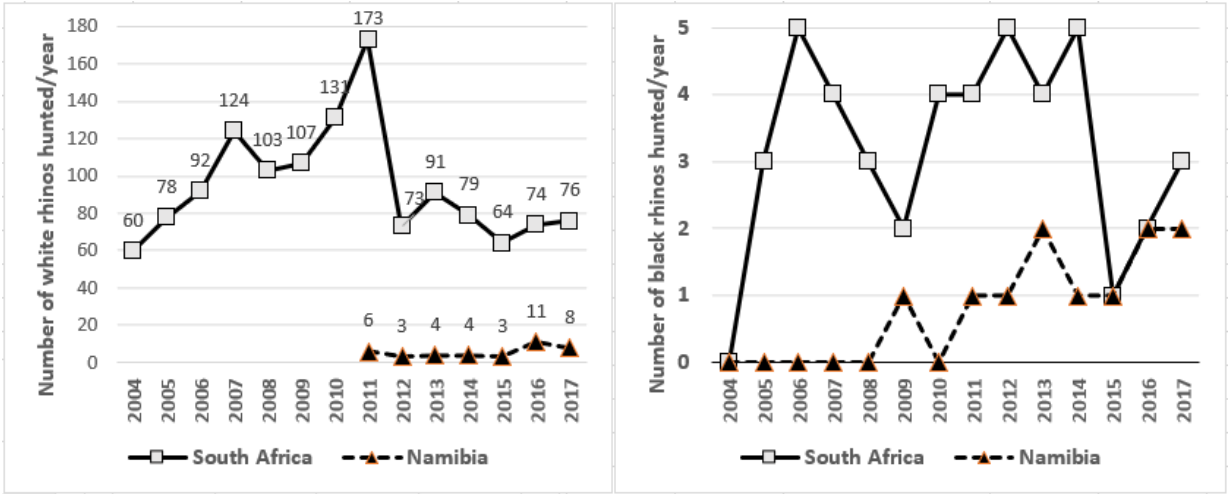


Figure 7. Number of white rhino hunted in South Africa 2004-2017 and Namibia 2011-2017 (left); and number of black rhino hunted in South Africa and Namibia since approval of annual quotas of five black rhino for each country in 2004 (right). (Data from Hall-Martin *et al.,* 2009, Milliken & Shaw 2012, South African Department of Environmental Affairs and Namibian Ministry of Environment and Tourism).

Pseudo-hunting (hunting to acquire horns for illegal markets) emerged as a serious issue in South Africa in 2006, rising steadily to peak in 2011 (Milliken and Shaw 2012, described in the CoP17 report).

This resulted in a doubling of the number of white rhino hunted in South Africa from 2005 to 2011 (Figure 7) coinciding with a marked increase in the number of hunters from "non-traditional" countries (Figure 8). South Africa's regulatory clampdown on pseudo-hunting in 2012 was followed by a decrease in the number of white rhino hunted annually between 2012-2015 to levels previously seen in 2004-2006 (Emslie *et al.,* 2016), a trend which has continued through 2016 and 2017. It is suspected that some pseudo-hunting has continued since 2012, although at a much lower level as a result of improved regulation, fewer white rhino hunts taking place annually, and some hunting applications being rejected in South Africa (a total of eight in 2016-2017, usually where the applicant had no prior hunting experience). Since the clampdown, the number of white rhino hunting applications from "non-traditional" countries including Czech Republic, Poland, Thailand and Viet Nam has declined considerably, while the number and proportion of white rhino hunting applications from "traditional" countries (those that hunted white rhino in 1977-1986 and/or 1991-1993) has increased (Figure 8). The proportion of white rhino hunting applications from the principal "traditional" countries, Spain and the United States, has increased from 1.2% and 5.4% respectively at the time of peak pseudo-hunting (2009-2011) to 5.8% and 47.4% respectively in 2016-2017. Historically over the period 1977-1986 and 1991-1993, hunters from Spain the United States accounted for 6.9% and 71.6% of white rhino hunted in South Africa respectively (Emslie 1994b).

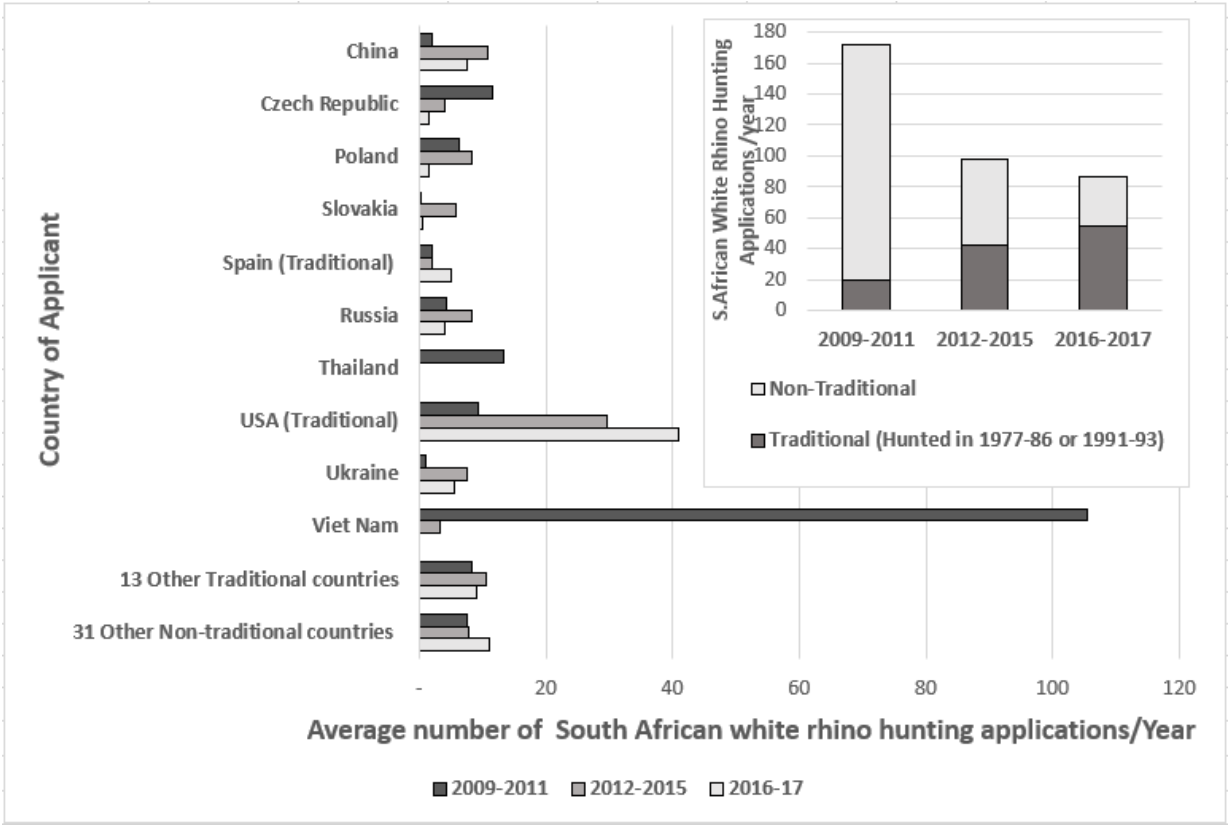


Figure 8: Average number of hunting applications for South African white rhino per year by hunter country of residence, for 2009-2011 (prior to psuedo-hunting clamp down by South Africa in early 2012), 2012-2015 and 2016-17. (Based on South African Department of Environmental Affairs rhino hunt data. "Traditional" countries are defined as those from which hunters came from to hunt white rhino in 1977-86 and/or 1991-93 (based on Emslie's (1994b) analysis of data from the CITES Trade Database for 1977-86 and South African CITES permits from 1991-93). Summary totals are provided for countries from which less than 5 permit applications/year were submitted in any of the three periods. The smaller insert bar graph compares the average number of applications per year over the three periods from "traditional" and "non-traditional" countries. Note that not all applications were approved or resulted in hunts.)

In reports to CITES and the SC-RWG, the EU reported that it has recommended that, where possible under national laws, Member States carry out risk-based checks on persons who imported trophies since 2009 to ensure they still remained in their possession. Austria, Germany and Hungary indicated they had checked hunting trophy imports to ensure they remained in possession of hunters, while the UK was also considering measures to ensure trophies remained in the possession of hunters. Hungary also reported steps to join a joint investigative team targeting illegal rhino horn trade in Czech Republic, Hungary and Slovakia, while Slovakia has suspended the import of hunting trophies since 2016. In the EU, the import of rhino trophies is conditional upon the issuing of an import permit by Member States.

The EU and South Africa have been closely considering the hunting experience of those applying to hunt or to import hunting trophies (SC70 Doc. 56 Annexes 1,3,5,6,13 and 17 and Mpho Tjiane – South African Department of Environmental Affairs, personal communication).

Whilst prior to CITES CoP16 it was estimated that as much as 18% of the rhino horn sourced in Africa for illegal markets may have originated from pseudo-hunting (Emslie *et al.,* 2012), following the implementation of control measures from 2012 this source had declined to an estimated 2% prior to CoP17 (Emslie *et al.,* 2016). It is now estimated that only around 0.7% of horns destined for illegal markets may be sourced from pseudo-hunting (Table 3). Although hunters from Poland and Slovakia continued to be engaged in sport hunting of white rhino in South Africa in the period 2015-2016, this was at a reduced level compared to 2013 and Slovakia suspended the import of trophies in 2016 (SC70 Doc. 56 Annex 13). However, it is worth noting that there remain very large accumulated discrepancies between exports of rhino horn trophies reported by South Africa to certain countries, in particular Russia and the United States, and imports reported by these countries, which merit further investigation (see Annexure 1). Other such discrepancies continue to be noted for Canada, China, Denmark, Hungary and Spain. Further, hunters from Malaysia and Kuwait have apparently engaged in seven and ten sport hunts, respectively, while South Africa has not reported the export of the majority of these trophies (Annexure 1). In order to assist CITES Management Authorities in importing countries and facilitate their efforts to ensure trophies remain in the lawful possession of hunters, South Africa is encouraged to consider taking stricter domestic measures, as the EU has done, and require the prior issuance of an import permit before issuing an export permit for rhino horn trophies.

Hunting continues to play an important role in white rhino conservation through the revenue it generates, as recognised by the 2012 IUCN World Conservation Congress[31] and national rhino management plans in South Africa and Namibia, the two range States with the highest numbers of black and white rhino which together conserve 87% of Africa's rhino. Measures that have been introduced to restrict trophy hunting, such as hunting trophy import bans by some countries and refusal of certain airlines to transport trophies, has the potential to negatively impact on African rhino conservation by reducing revenue generated through this source.

2.3.5 Domestic horn sales

International rhino horn sales remain banned under CITES while the commercial sale of hunting trophies is also not permitted. Following successful legal challenges to the procedures followed by South Africa in instituting a moratorium on domestic rhino horn trade in 2008, the country's Constitutional Court ruled in 2017 that a tightly controlled legal domestic trade in rhino horn could re-open in South Africa[32]. As of September 2018, South Africa has reported issuing 12 permits for the potential sale of up to 1,219 rhino horns and 16 permits have been granted to potential buyers. To ensure traceability and assist law enforcement, all horns being sold were required to have RhODIS DNA profiles. While the numbers of horns actually sold or prices achieved have not been publicly released, a brief statement issued after the first rhino horn auction stated "the auction yielded fewer bidders and fewer sales than expected". This is likely to be at least partly due to the fact that the main market for horn is international rather than domestic.

2.3.6 Live sales

Regular removals of live animals from State and private populations to maintain productive densities continues to form a key part of the biological management of populations in most national rhino management plans. Historically, the sale of such surplus animals in some countries has also generated significant additional revenue to help fund and incentivise conservation efforts. Following the upsurge in poaching it has become more difficult to assess overall revenue from live sales, since for security reasons more private owners are buying rhinos by individual arrangement, rather than on public auctions from which sales data can be more easily obtained. However, trends in average prices can still be obtained from data provided by major auctioneers, major selling conservation agencies, and the owner of the largest privately-owned white rhino population (Figure 9).

[31] IUCN World Conservation Congress 2012 Recommendation 138: https://portals.iucn.org/library/node/44105.
[32] https://cites.org/eng/news/Background_issuance_CITES_permits_export_of_rhinoceros_horn_15032017.

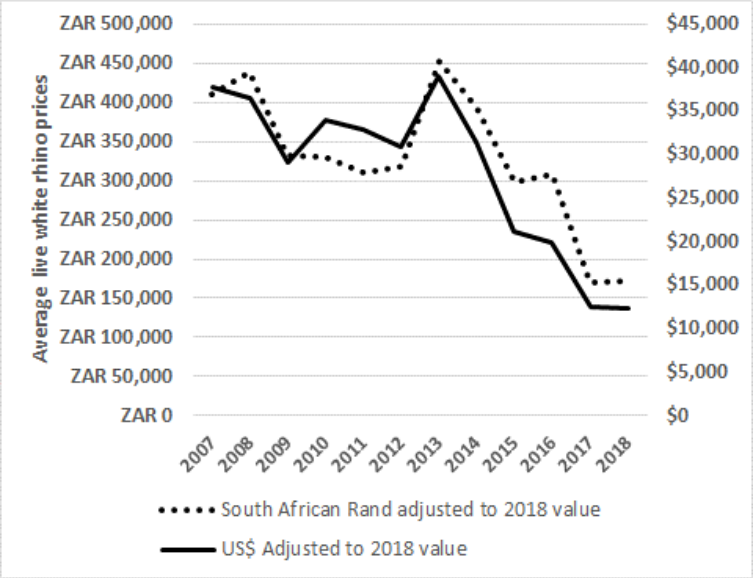


Figure 9: Inflation-adjusted average prices per live white rhino in South African Rand (ZAR) and United States Dollar (US$) from 2007-2018. (Based on data supplied by Ezemvelo KZN Wildlife, South African National Parks, Vleisscentraal Bosveld Auctioneers, Mpatamacha Wild Auctioneers, John Hume and Michael t' Sas-Rolfes).

From 2007-2018, prices per live white rhino (adjusted to account for inflation) showed a 58% drop in South African Rand (ZAR) and 67% drop in United States Dollar (US$) value (Figure 9). Since the poaching upsurge began post-2007, this has reduced the total asset value of white rhino in South Africa alone in 2017 by an estimated US$396.8m. The loss of an estimated 6,753 white rhino to poaching in South Africa from 2008-2017 represents a further loss of US$254.3m (based on 2007 pre-poaching upsurge prices adjusted for inflation). There is also the significant opportunity cost of poached rhinos not breeding, representing an estimated further loss of ~US$60.2m over ten years assuming an average net growth rate of +7.1% per year (which was the net growth rate achieved continentally prior to the poaching increase). The combined loss of revenue from these three sources totals ~US$711.3m, equivalent to~US$105,330 or well over ZAR1m per white rhino poached in South Africa since the upsurge in poaching started. If estimates for the potential declining value of animals on State land and in other range States, the value of the lost horn, and the substantially increased cost of security and law enforcement for all parties since poaching escalated were also taken into account, the real economic cost of the upsurge in poaching would be substantially higher. Seen in this context, a fine of around ZAR1m for a trafficking seizure involving poaching of multiple animals is well below the economic cost of the crime. The combination of much lower prices and fewer surplus animals to sell due to poaching, and in some cases what appear to be overzealous veterinary restrictions preventing some translocations, significantly threaten both State and private sector revenues from this source.

A number of possible reasons have been suggested for the decline in average live sale value. A 2018 survey of white rhino on South African private land (Balfour *et al.,* 2018) indicated that security costs per white rhino on private land had increased an estimated 348% since 2014, with total 2017 costs estimated at ZAR181.8m (~US$13m). Supplementary feeding during the recent drought has further added to costs. The number of white rhino hunts remains limited (Figure 7), and owners are unable to generate a significant return from their legal horn stocks. The recent launch of the "Rhino Coin" cryptocurrency[33] also occurred at a particularly difficult time when values of major cryptocurrencies have crashed and most new initial crypto-coin offerings have failed. It is therefore becoming increasingly difficult for owners to sustainably fund their rhino management, while incentives to conserve rhino continue to decline. To date, most of the rhino owners that have sold all their rhino have been relatively small-scale and therefore of less conservation significance. However, the owner of the largest semi-wild population of over 1,600 rhino has indicated that additional funding is urgently needed to maintain current efforts, while in 2018 the owner of another semi-intensive operation that once had 250 white rhino and had been spending ~US$ 20,840/month on management and protection has now sold most of his rhino and some of his land (Balfour *et al.,* 2018; Coetzee, 2018). While 62% of respondents to a recent survey of private owners in South Africa indicated that they didn't intend to sell any of their white

[33] Built on the Etherium blockchain, with each coin issued against 1g of legal rhino horn and a percentage of each coin sold going to fund rhino conservation: https://www.rhinocoin.com/.

rhino, 18% indicated they were considering selling up to a third of their white rhino, 7% between a third and two thirds of their rhino, and 13% more than two thirds of their rhino (Balfour *et al.,* 2018). Certain Namibian rhino custodians are also starting to question their part in the custodianship programme given the increased security costs and limited financial benefit.

2.4 Horn stocks and stock management

The CITES Secretariat provided the AfRSG with data on rhino horn stocks received from a number of Parties for 2016, 2017 and 2018 pursuant to Resolution Conf. 9.14 (Rev. CoP17), together with data on horns obtained prior to 2016 provided by some Parties. While these data are incomplete, data were received from the four African range States that currently conserve the most rhino (Kenya, Namibia, South Africa and Zimbabwe), together with Malawi and Uganda. However, Kenya and Uganda did not separate their totals into legal and illegal stocks, while South Africa only reported on additions in 2017. South Africa reported accumulating 7.40 tonnes of horn in 2017, with the majority of this (5.65 tonnes) privately held. The AfRSG has been provided with end-2015 data that improves upon Taylor *et al.,*'s (2017) South African stockpile estimate for 2016[34], as well as end-2015 eSwatini stockpile data. Adding a conservative projection for 2016 accumulation in South Africa (calculated as 75% of the reported 2017 accumulation) gives a conservative total African stockpile estimate of 52.16 tonnes, with the majority of this being legal stocks. With increasing numbers of white rhino on private land, some private owners undertaking regular dehorning[35] and some State-run parks also dehorning for security reasons, it is expected that horn stocks will increase more rapidly in future. These stockpile levels can be contrasted with the estimated average ~5.1 tonnes of African rhino horn entering illegal trade per year over the period 2016-2017. Taylor *et al.,* (2017) estimated that South Africa alone could sustainably produce from ~5.3 to ~13.4 tonnes of horn legally a year.

2.5 Conservation actions and management strategies

2.5.1 Management plans and strategies

Globally, resolutions, decisions and recommendations adopted under CITES and the IUCN World Conservation Congress[36] continue to provide direction with regard to rhino conservation and management. At the **continental** level, the African Rhino Conservation Plan that was developed with input from all African rhino range States was launched at a CoP17 side event. Almost all range States have **national** rhino conservation plans that have been formally accepted, with most being 5-10 year plans that undergo regular review and revision upon expiry. Since CoP17, national plans have been revised by Kenya, Namibia (separate black and white rhino plans), Tanzania (undergoing final revision and approval process) and Zimbabwe (awaiting Ministerial sign off). Uganda has now formally approved its first plan, and Rwanda and Chad also developed plans as precursors for the reintroduction of black rhino. Approved national plans have also been developed in Botswana, Malawi, South Africa (separate black and white rhino plans) and eSwatini. Zambia has also revised its plan but at the time of writing it is not known if this has been formally approved. Almost all of these national plans have measurable targets, and Key Performance Indicators for key components are being increasingly included.

2.5.2 Coordination and implementation mechanisms

Rhino range States continue to promote continental and regional coordination through membership in various groups and through the African Rhino Range States' plan[37]. Since CoP17, the Southern African Development Community (SADC) Rhino Management Group and East African Community Rhino Management Group have both held meetings in South Africa and Rwanda, respectively, and the IUCN/SSC AfRSG is scheduled to meet in Namibia in February 2019. A number of countries have formally identified rhino coordinators, and range States have nominated Official Country Representatives within the AfRSG. While the various continental and regional groupings have all created and maintain valuable networks, and continue to successfully share information, experiences and best practices, the degree and effectiveness of national rhino coordination remains limited in some range States.

[34] These data do not include any figure for private land in the province where the largest private white rhino population is found, therefore an additional estimate has been included based on figure provided by the owner of this population.
[35] Dehorning every 18 months generates approximately 0.75kg and 1.5kg per adult female and male white rhino, respectively, per year (John Hume, personal communication).
[36] In particular, CITES Resolution Conf. 9.14 (Rev. CoP17) and Decisions 17.133 to 17.144, and IUCN World Conservation Congress 2012 Recommendation 138.
[37] https://www.environment.gov.za/sites/default/files/strategic_plans/africanrhino_conservationplan.pdf.

2.5.3 Major conservation actions and field activities

As a report to CITES which primarily focuses on trade issues, conservation activities being undertaken by range States are only briefly outlined in this report; more detail can be found in range State reports to SC70 (Annexes to SC70 Doc. 56). Monitoring and continued biological management remain key areas for most countries but an increased focus and deployment of staff on rhino security has reduced the quality of monitoring in some areas.

South Africa undertook a thorough process to develop plans for the five key areas identified in its 2016 Committee of Enquiry report as requiring interventions, namely: security; community empowerment; biological management; responsive legislative provisions that are effectively implemented and enforced; and demand management. The WWF Black Rhino Range Expansion Project continues to contribute to expansion of black rhino range and numbers in the country. There is increasing recognition of the need for greater involvement of communities in rhino conservation in South Africa, and a number of pilot projects have been set up or are being planned[38]. A small number of more intensive semi-wild populations in South Africa have also very successfully bred and protected white rhino, but the financial sustainability of such operations in the current environment is increasingly challenging. Namibia has responded to increased poaching with some dehorning, and increased collaboration among government agencies and more coordinated involvement of NGOs. Botswana has significantly boosted its rhino numbers through some significant translocations into the country. In Kenya an "eyes in the court" programme that monitors case progress is proving useful. In Malawi, over 31,000 snares were removed from one rhino park, and the potential for boosting Malawi's black rhino numbers as part of the WWF Black Rhino Range Expansion Project is currently being considered. eSwatini continues to keep poaching at very low levels through intensive field patrolling and intelligence. Drought losses in the country were reduced through measures such as supplementary feeding, translocating animals, temporarily holding animals in bomas, hand raising calves, and removing other competing grazers. Tanzania is investigating options to bring in additional founder rhino and survey work is once again planned in areas of the Selous Game Reserve. Zimbabwe also held a one-day rhino metapopulation management workshop and developed detailed translocation recommendations to genetically revitalize some of its smaller white rhino populations.

Technology is playing an increasingly important role in law enforcement efforts, particularly in larger parks where field ranger densities are low. Technologies that have proved useful include innovative "Meercat" mobile radar systems that can distinguish humans from other animals, use of software such as CMORE in 24-hour manned command centres, thermal imaging, intrusion detection systems, and enhanced detection scanners. Detection, tracking or attack dogs continue to be very valuable in the field, at park entry points and at ports of exit. Increased aerial support and surveillance is assisting and as ever intelligence remains critical in the fight against poaching. However, finding ways to secure sufficient and sustainable funding for field protection, monitoring and management remains a major challenge and threat to rhino conservation. In an attempt to address this issue, a Rhino Impact Investment Project[39] has been initiated with the intention of developing a sustainable funding mechanism for rhino conservation in some key populations.

2.6 Enforcement issues

2.6.2 Security and law enforcement strategies

In recent years there has been greater recognition that poaching presents an organised crime problem impacting the socio-economics of range States, rather than being simply a conservation issue. To successfully combat organised crime requires a holistic government approach that is ideally police-led. Since CoP17, several range States have been working to enhance cooperation between different government agencies.

A number of countries have developed specific security-related strategies. Mozambique has developed a *National Ivory and Rhino Action Plan,* which outlines and periodically assesses measures to deal with rhino crimes. The country continues to co-operate closely with law enforcement authorities in neighbouring Kruger National Park in South Africa, and has started resettling villages in Limpopo National Park which have been known sources of poachers to areas outside the park. South Africa has an *Integrated Strategic Management Approach* to combat rhino poaching and a *National Strategy of the*

[38] In South Africa this is being included as part of the country's programme to develop a Wildlife Economy as part of its Biodiversity Economy. The aim is to fast track community programmes in which biodiversity and wildlife are seen as valid land uses and economic activities for communities to engage in.

[39] https://www.zsl.org/conservation-initiatives/animals-on-the-edge/rhino-impact-investment-project.

Safety and Security of Rhinoceros Populations and Horn Stocks. South African Government departments responsible for law enforcement also identified the need for an integrated approach across government, assisted by civil society, and under the leadership of the South African Police Service finalised a *National Integrated Strategy to Combat Wildlife Trafficking.* Namibia has developed a *National Strategy on Wildlife Protection and Law Enforcement*. Like many range States, Namibia has well-established informant networks and has set up a toll-free number the public can use to provide information. It has also undertaken training of wildlife investigators, prosecutors and magistrates so they can be more conversant with wildlife crime and applicable legislation, and is moving towards the use of a broad suite of Acts to prosecute offenders. With the recent signing of an MoU between the country's Big Game Parks, police and Directorate of Public Prosecutions, eSwatini has also recently formalised its National Wildlife Law Enforcement and Anti-Poaching Task Team. In Tanzania the introduction of a 24-hour operations control room is assisting its law enforcement efforts. Malawi has established a Wildlife Crime Investigations Unit and an Anti-Trafficking Unit.

In recent years a number of range, transit and end-user States have collaborated and developed bilateral MoUs. Mutual Legal Assistance agreements are also being sought. In addition, the SADC Law Enforcement and Anti-Poaching Strategy (LEAP) programme has been accepted by the SADC countries[40]. SADC is also pursuing the AFRICA-TWIX (Trade in Wildlife Information eXchange) tool developed to facilitate cooperation and the exchange of information between enforcement and custom officers to assist in combatting wildlife trafficking[41]. Since CoP17 the Rhino and Elephant Security Group in Southern Africa has also held meetings in South Africa and Tanzania. The Asset Recovery Inter-Agency Network of Southern Africa (ARINSA) promotes and facilitates use of asset forfeiture in member States to "follow the money" and to try to "take the proceeds from crime".

At a global level, the International Consortium on Wildlife Crime (ICWCC) is working to bring coordinated support to national wildlife law enforcement agencies. With respect to rhino, the World Customs Organisation (WCO) at CITES SC70 noted that it is seeking to encourage law enforcement efforts not to see international seizures as an end point, but rather the beginning of further action to investigate and prosecute wildlife traffickers (Roux Raath - WCO, personal communication).

2.6.2 Legislation and prosecutions

South Africa uses asset forfeiture, and Section 252A of the Criminal Procedure Act 51 of 1977 also allows for the use of traps and undercover operations where evidence obtained is admissible in court. In addition to prosecuting under its National Environmental Management and Biodiversity Act, South Africa lists 12 additional charges that can be instituted against rhino crime-related offenders and 11 associated legal Acts (Doc. SC70 56 Annex 16). By pursuing multiple charges, significant sentences have been handed down such as an effective sentence of 35 years 3 months in a November 2018 rhino case conviction on 11 counts under eight different charges. However, while there have been several convictions with significant deterrent sentences, there have been other cases where those convicted have received very light sentences.

Mozambique has reported several successful convictions following the coming into force of new amendments to its conservation law in 2017.

In Kenya the Wildlife Conservation Act of 2013 has penalties of up to a life sentence or a fine of up to KES20m.

Malawi's amended National Parks and Wildlife Act contains stiffened penalties. Following collaboration between African Parks, Malawi's Department of National Parks and Wildlife and its Police Service, a black rhino poacher in Malawi was convicted (horns recovered) and sentenced to 18 years' imprisonment, with two accomplices also sentenced to 8 and 10 years each. This has set a new precedent for punishment of wildlife crimes in the country.

Namibia's Controlled Wildlife Products and Trade Amendment Act of 2017 provides for the implementation of CITES with fines of up to N$15-25m and/or imprisonment of up to 25 years. Repeat offenders are liable for fines up to N$50m and/or imprisonment up to 40 years. The Nature Conservation Amendment Act of 2017 also provides for similar increases in penalties relating to poaching of rhino. In 2016, four Chinese nationals were sentenced to 14 years for attempting to smuggle 14 rhino horns. However, case backlogs due to trial postponements while awaiting forensic reports appears to be an issue.

[40] https://tfcaportal.org/system/files/resources/SADC_LEAP_FINAL%20DRAFT_Revised%2031%20MARCH%2015%20Eng.pdf.
[41] https://www.traffic.org/news/africa-twix-enhancing-collaboration-in-the-fight-against-illegal-wildlife-trade-in-central-africa/.

Tanzania amended its Economic and Organised Crime Control Act in 2016 to increase penalties to between 20-30 years' imprisonment, and defined certain trafficking offenses to be economic offenses of the first schedule under the Wildlife Conservation Act Number 5 of 2009.

Zimbabwe has reported two convictions for poaching with sentences of 36 and 10 years. The Parks and Wildlife General Laws Amendment of 2011 provides for significant jail terms of nine years and from 11-20 years for repeat offenders.

The granting of bail to serious or repeat offenders remains a problem identified by some range States. Botswana issued an INTERPOL Red Notice for known rhino trafficker Dumisane Moyo so he could be brought back to the country to face charges; but after having been arrested and extradited by Zimbabwe on the strength of this Red Notice, he was again released on bail in Botswana. At the time of writing his current status is unclear. The granting of bail in Zimbabwean cases has for some time also been identified as a problem. This problem was also apparent in a South African analysis of 21 court cases pertaining to trials of 22 couriers caught smuggling rhino horn at OR Tambo International Airport from August 2016 to October 2018 (Melanzi, 2018). While nine of the cases had been finalized and five cases had been postponed for various reasons, warrants of arrest have had to be issued for the remaining eight accused (36% of those charged). All eight were Chinese nationals and all had been granted bail of from R70,000 to R150,000 (Melanzi, 2018).

To date there have been more than 250 rhino poaching and seizure case reports where RhODIS DNA matches were found and have assisted in successful prosecutions, not only in South Africa, but also in Kenya, Namibia and eSwatini. DNA evidence can help ensure convictions and longer sentencing. Table 6 gives examples of 10 successful court cases from four African countries where RhODIS DNA evidence was used. A recent case in eSwatini is a good example, where RhODIS DNA analysis was able to link a seizure in eSwatini to specific poached rhinos in three different reserves in neighbouring South Africa. In addition to being sentenced to 29 years each, the convicted traffickers were (for the first time) also ordered by the court to pay compensation for the poached animals to the three identified owners in South Africa, with a failure to do so adding another four years to their sentences. DNA evidence was key in this case as it allowed the prosecution to identify the full criminal supply chain from source, so that the accused could be convicted of wildlife trafficking and not just illegal possession of rhino horns and receive longer sentences as a result.

Table 6: Summary of ten prosecuted case of rhino crimes. (Based on Harper *et al.,* (2018); Mick Reilly – eSwatini Big Game Parks, personal communication).

Year	Species	Subspecies/ Genetic Management Cluster	Match result	Country Case in	Country horns linked to	Poaching Site linked by DNA	Sentences	Nationality
2012	White rhino	*C.s.simum* Southern	2 horns matched carcass1 and 1 horn matched carcass 2	South Africa	South Africa	Kruger National Park	29 years 3 months	Mozambican
2012	White rhino	*C.s.simum* Southern	2 horns matched carcass1 and 1 horn matched carcass 2	South Africa	South Africa	Waterberg (SA)	10 years	Zimbabwean
2013	White rhino	*C.s.simum* Southern	Horn matched carcass	South Africa	South Africa	Hoedspruit	15 years each	Mozambican & S.African
2013	Black rhino	*D.b.michaeli* Southeastern	2 horns matched carcass1 and 1 horn matched carcass 2	South Africa	South Africa	Kruger National Park	14 years	Mozambican
2014	White rhino	*C.s.simum* Southern	6 horns with 2 horns matched to a carcass	South Africa	South Africa	Kruger National Park	15 months	Vietnamese
2015	White rhino	*C.s.simum* Southern	The profile from clothing matched carcass	South Africa	South Africa	Limpopo	8 years each	Zimbabwean and Mozambican
2016	Black rhino	*D.b.bicornis* Southwestern	14 horns with 2 horns matched to a carcass	Namibia	Namibia	Etosha National Park	14 years	Chinese
2016	White rhino	*C.s.simum* Southern	3 horns matched to 3 carcasses	South Africa	South Africa	OR Tambo International Airport and Hluhluwe-iMfolozi Park	R800,000 fine or 6 years	Chinese
2017	Black rhino	*D.b.michaeli* Eastern	Horn matched blood on carpet	Kenya	Kenya	Ol Pejeta Conservancy	11 years	Kenyan
2017	White rhino	*C.s.simum* Southern	Out of horns there were matches to carcasses in three different reserves in three different SA provinces. In one case horn in eSwatini a week since animal poached	eSwatini	South Africa	King Msawati III International Airport (eSwatini)and Balule (SA), Hluhluwe-iMfolozi (SA) and Madikwe GR (SA)	29 years each plus order to pay compensation for value of rhinos to identified owners in S.Africa or an additional 4 years	2 Taiwanese

3. Asian rhinoceroses

3.1 National and continental conservation status and trends

Population estimates of Asian rhino species are summarized in Table 7 based on AsRSG and WWF data.

Table 7: Estimates of Asian rhino numbers by country, species and subspecies with trends since CoP17 report*. (Based on AsRSG and WWF data.)

Species Subspecies	Greater One-horned (GOH)	Lesser One-horned or Javan	Sumatran			Trend
Country	*R.unicornis*	*R.s.sondaicus*	*D.s.sumatrensis*	*D.s.harrisoni*	Total	
India	2,939					Up slightly in Assam and Uttar Pradesh but trend since 2015 in West Bengal unknown
Nepal	649					Up in two smaller populations since 2015 (due to growth and translocations) but trend in main population since 2015 unknown
Indonesia		65-68				Up since 2015
			37-75	3	40-78	Unknown for *D.s.sumatrensis* but assumed stable for *D.s.harrisoni*
Total	**3,588**	**65-68**	**37-75**	**3**	**40-78**	

*Given their uncertainty, *D. s. sumatrensis* rhino estimates have been provided as a range, from minimum estimates based on footprints, camera traps and range occupancy information to maximum estimates of possible numbers (Source: AsRSG). Nepal's figure is based on the 2015 estimate for its largest population less translocations, assuming zero natural population growth given high recent natural mortalities, plus updated estimates for the other three populations. India's figure reflects recent slight increases in Assam and Uttar Pradesh but numbers in West Bengal have not been updated since CoP17.

The greater one-horned rhino (*Rhinoceros unicornis*) is categorized as Vulnerable on the IUCN Red List (Talukdar *et al.,* 2008). Surveys in 2018 confirm numbers in Assam are relatively stable at an estimated ~2,650 rhino in four populations in April 2018 (an increase of only 25 rhino from February 2015). Kaziranga National Park in Assam conserves the majority (~82%) of India's population, with numbers continuing to increase, albeit at a very slow rate of <1% per year which suggests that density dependence is an increasingly important factor. Since re-establishment of the population in Manas National Park, births there have cancelled out earlier poaching losses. Following four more introductions from Kaziranga's Centre for Wildlife Rehabilitation and Conservation (CWRC) from 2016-2018 and the birth of a calf in September 2018, the population has increased from 32 to 37 and here are plans to move at least another two founder rhinos to the park during 2018-19. Since 2015, numbers in Uttar Pradesh have increased by two to 34. There have been no new counts in West Bengal since the 2015 estimate of ~255 rhinos. Despite low growth rates in existing populations, no wild rhino have been translocated in Assam since 2016 as the identified new recipient reserve site needs more time to prepare logistics and put protection and monitoring regimes in place prior to reintroduction.

In Nepal, heavy poaching in a period of socio-political unrest caused numbers to fall to a low of 410 in 2005 before recovering to 645 by 2015. This follows a political settlement and the re-engagement of the army to assist with rhino protection in 2010. Only two rhino have been reported poached in the entire country from 2011 to September 2018. Like India the majority (~94%) of Nepal's rhinos occur in one population, in Chitwan National Park. There have been no rhino counts in Chitwan since 2015 and while deaths are recorded there is no standardised recording of births, so it is not possible to model a revised updated estimate. While numbers in Chitwan increased by ~4.7% per year from 2011-2015, natural mortalities have increased recently in this population with a minimum of 34 mortalities recorded in 2017 alone (a likely underestimate of true numbers). Thus, as in India, it appears that density dependence may be starting to impact on growth. Thirteen rhino have also been translocated out of this population. A conservative revised Chitwan estimate of 592 rhino (605 minus 13 translocations) assuming zero net population growth was used in compiling the revised national total in Table 7. Updated estimates are, however, available for other populations in Nepal: Bardia National Park has 37 rhino (up from 29 in 2015 following translocation of eight rhino); Suklaphanta National Park has 17 rhino (up from 8 in 2015 following translocation of five rhino); and Parsa National Park has three rhino. This gives a revised total estimate of 649 rhino in the country (five more than reported to CoP17).

The Javan rhino (*Rhinoceros sondaicus*), categorised as Critically Endangered (van Strien *et al.,* 2008a), only exists in a single population in Ujung Kulon National Park in west Java, Indonesia. As reported to CoP17, monitoring is improving with camera traps now covering the entire park. Park

authorities report that between 2016 and 2018, three Javan rhino were found dead with horn intact (presumed natural mortalities) but at least four calves were born in 2017 and three additional calves have been reported so far in 2018, giving a current total estimate of 65-68 individuals. This represents a small increase on the 2015 estimate of 63 individuals included in the CoP17 report. With all individuals in a single population, the species is particularly vulnerable to outbreaks of poaching, disease carried by domestic cattle, and potential natural disaster through volcanic activity ("Anak Krakatau" volcano is active immediately north of the park) or a major tsunami. Decades-old plans to establish a second population in Indonesia continue to show little progress. Strategically, a second population would not only reduce risk, but should promote breeding in the current population by freeing up food resources for remaining females, assuming a sufficient area of suitable and well-protected habitat.

The Sumatran rhino (*Dicerorhinus sumatrensis*), also categorized as Critically Endangered (van Strien *et al.,* 2008b), is now restricted to only four isolated sites in Indonesia in up to ten sub-populations. Some sub-populations are estimated to number between only two and five animals that are not likely to be viable in the long term. In addition to known populations in three National Parks in Sumatra, three rhinos survive in Kalimantan (Indonesian Borneo). No existing sub-population is thought to be greater than 30 individuals. In 2015, the minimum total number of Sumatran rhino was estimated at 73 individuals (Miller *et al.,* 2015), far fewer than previously thought. Monitoring effort has not been sufficient to obtain precise estimates of any of the populations on Sumatra. Recent ground information suggests the population in Bukit Barisan Selatan National Park could number between 4-15 individuals and in Way Kambas National Park between 15-30 individuals. Much uncertainty also exists around numbers in Gunung Leuser National Park due to its large area, undulating forested terrain, and patchy photo-trapping effort. Limited photo-trapping over the last seven years has recorded at least 18 different individuals, but it is thought there may be as many as 30 in this population. Despite a successful trial of intensive camera trapping in a study area in Gunung Leuser National Park a few years ago, which yielded high average sighting frequencies of individual rhino, this methodology has not been rolled out across all Sumatran rhino range areas at the scale needed to reliably assess numbers, distribution and population structure. Such monitoring data would not only help guide security needs assessments and patrol deployment, but would also enable more informed biological management decision-making and, over time, perhaps also help identify missing individuals. Improved monitoring data could help guide decision-making regarding the possible need to consolidate some very small outlier populations that may be non-viable if left alone (as Kenya successfully did in the 1980s). Field ranger densities also remain lower than minimum recommended levels in Africa and there are also significant infrastructure and equipment needs if protection is to be brought up to the necessary level. In addition to poaching, habitat conversion, invasive species and possible vegetation succession remain important threats to the survival of the Sumatran rhino. The seizure of three Sumatran rhino horns has been reported since 2014 (Table 8) and this only represents what has been detected. The need to significantly increase efforts to better monitor, secure and manage remaining wild populations is becoming ever more urgent if this species is to be saved from extinction.

3.2 Illegal killing

Available data indicate that poaching of the greater one-horned rhino has declined each year since 2013 (Figure 10). Only two out of 120 recorded deaths in Nepal from January 2011 to September 2018 were due to poaching[42]. Recorded poaching is not currently significant for this species and well below levels in Africa. Numbers of Javan and Sumatran rhino are, however, so low that sub-populations could be negatively impacted by even very low levels of poaching, so there remains a need to enhance law enforcement effort for these critically endangered and highly conservation-dependent species.

[42] Correction from CoP17 report – the one rhino reported poached in Nepal in 2014 was in fact poached in 2012.

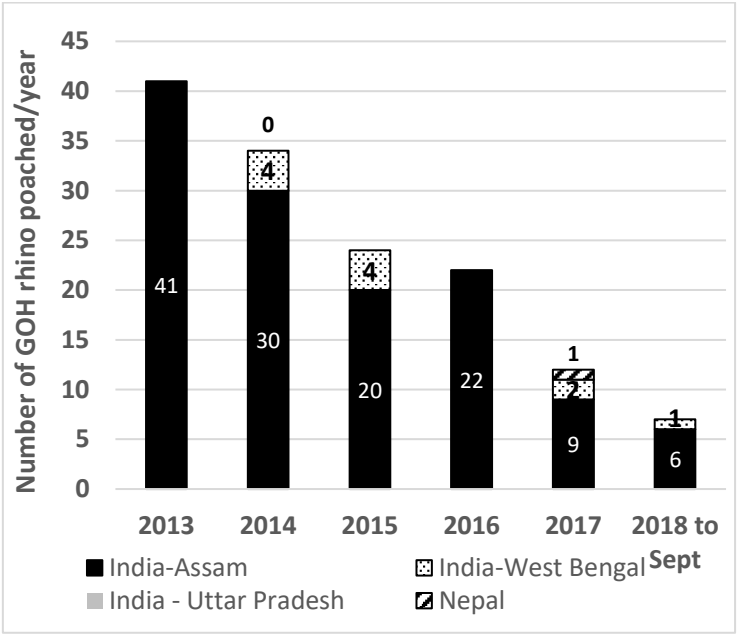


Figure 10: Poaching of greater one-horned rhino, 2013 – September 2018. (Based on AsRSG data.)

3.3 Trade

The continued decline in poaching of the greater one-horned rhino documented in Figure 10 reflects the success of enforcement agencies working on the ground. Although the two African rhino species account for the vast majority of the horns in current trade, horns from Asian rhino species are specifically identified in seizures on occasion. Table 8 presents available seizures data between 2009-2018, comprising a total of 117 greater one-horned rhino horns (although some of the horns in data reported by the Indian government are described as "suspected horns"[43]), four Sumatran rhino horns and two Javan rhino horns seized in seven Asian countries.

While 86% of greater one-horned rhino horns were seized in the two main range States of this species, India and Nepal, 16 horns from this species were seized in transit or end-use market countries. While 75 horns were recovered from 2014-2018, only 99 greater one-horned rhino were reported poached during this period. Seizures of Sumatran rhino horns from 2009-2018 occurred in Indonesia (three horns) and China (one horn). Two Javan rhino horns were reportedly seized in China in 2009[44].

Table 8: Seizures of Asian rhino horns, 2009-2013 and 2014-2018. (Based on the TRAFFIC Rhino Horn Seizures Database.)

Country	2009 - 2013					2014 - 2018				
	No. of Seizures	Weight (kg)	Number of GOH Horns	Number of Javan Horns	Number of Sumatran Horns	No. of Seizures	Weight (kg)	Number of GOH Horns	Number of Javan Horns	Number of Sumatran Horns
China	5	3.70	3	2	1					
India	18	18.76	20			51	39.32	52		
Indonesia						3	0.81			3
Myanmar						1	3.05	4		
Nepal	15	15.49	18			10	9.16	11		
Taiwan (Province of China)	1	1.00	1							
Viet Nam						1	3	8		
TOTAL	**39**	**38.95**	**42**	**2**	**1**	**66**	**55.34**	**75**	**0**	**3**

Investigations being conducted by members of the AsRSG and NGOs working in South and Southeast Asia have increasingly indicated that Myanmar is a key transit country for horns of poached greater one horned rhino. Field investigations and intelligence from arrested poachers have revealed that rhino horn

[43] Many of the horns reported seized by police in Indian newspapers have turned out to be fake. The TRAFFIC Rhino Horn Seizures Database did not include newspaper reports of seizures in India.
[44] The species was reportedly identified by the Kunming Institute of Zoology, Chinese Academy of Sciences.

traders are using the Moreh-Tamu border to transport rhino horns from West Bengal and Assam via Mandalay in Myanmar (a known transit point of illegal wildlife products) before being moved on to China and other end-user countries. There is a need to improve monitoring and build capacity among the relevant authorities in India and Myanmar to address the illegal movement of rhino horns and other wildlife products between the two countries.

3.4 Horn stocks and stock management

Pursuant to CITES Resolution Conf. 9.14 (Rev. CoP17), Asian countries (Japan, Lao PDR, Malaysia, Thailand and Viet Nam) reported horn stockpiles totaling 1.04 tonnes of horn to the CITES Secretariat (some of which will comprise African horns), with Indonesia reporting two horns. In Viet Nam, Customs officers were prosecuted for stealing 6.1 kg of rhino horn, together with elephant ivory, from a government stockpile in 2017 (Anon., 2017). Once again neither Nepal nor India reported horn stockpiles to CITES. In Assam, which is estimated to manage about 90% of India's rhino horn stockpiles, a verification audit of rhino horn stockpiles was however initiated in 2016. The committee responsible verified around 2,020 rhino horns within Assam government treasuries, cross-referencing horns against data recorded by various Forest Divisions in the field at the time of acquiring the horn. However, it is estimated that there may be another 150-200 rhino horns in Assam which are being kept in different forest divisions and have not yet been deposited in government treasuries due to lack of space. West Bengal and Uttar Pradesh have not reported on their rhino horn stocks to CITES through the Indian Government. As in Africa, a lack of regular auditing and reporting of all stockpiles opens up opportunities for theft and possible leakage of horn onto international markets. Nepal and India are therefore encouraged to report their stocks to CITES.

3.5 Conservation actions and management strategies

As in Africa, the greatest rhino conservation successes in Asia continue to occur where there has been significant political will backed by active resourcing of sites, combined with dedicated staff commitment to effective action in the field.

In 2017, Nepal revised and updated its national Conservation Action Plan for the period 2017-2021. India still lacks a national rhino strategy, with conservation currently coordinated at the state level in Assam, West Bengal and Uttar Pradesh. Indonesia developed action plans for both Javan and Sumatran rhinos covering a 10-year period from 2007, which have now expired. Population Viability Assessments (PVAs) were also conducted for Sumatran and Javan rhino in 2015 (Miller *et al.,* 2015; Haryono *et al.,* 2016).

In contrast to India, Nepal and some African range States, where staffing densities, expenditure and political will are comparatively high, in Indonesia there remains limited government support and funding for protection, monitoring and biological management of free-ranging wild rhino populations. Indonesia is preparing an Emergency Action Plan for the next three years, and the PVA represents an important step. However, Sumatran rhino conservation continues to face great challenges from the low densities of anti-poaching field rangers (well below recommended minimum densities in Africa) to insufficient budgets allocated for protection and monitoring. Improving knowledge of the current status of this species in the wild remains a priority to determine security needs and better inform biological management decision-making. On World Rhino Day on 22nd September 2018, IUCN/SSC announced the launch of a Sumatran rhino rescue project in partnership with the International Rhino Foundation, WWF, Global Wildlife Conservation, National Geographic and the Indonesian Government. The project will establish two new intensive semi-captive breeding facilities that will aim to breed animals from currently small and isolated sub-populations in Kalimantan and Bukit Barisan Selatan National Parks in the hope of expanding these populations. The existing breeding facility in Way Kambas National Park was also recently expanded.

For Javan rhino, the immediate priority is to increase numbers in the wild through improved biological management and the creation of a second population in suitable habitat; goals identified through the PVA workshop included securing three well-managed sites for *in situ* populations to ensure an increase to at least 150 animals by 2040.

3.6 Enforcement issues

3.6.1 Security and law enforcement strategies

India and Nepal's anti-poaching efforts in the field and intelligence-based investigations continue to be critical in combatting poaching of greater one-horned rhino. In July 2018, the Chief Minister of Assam province in India appointed 90 youths from local communities surrounding Kaziranga National Park as constables to form a Special Rhino Protection Force that will help to protect rhinos in Kaziranga, Orang and Manas National Parks.

3.6.2 Legislation and prosecutions

In India and Nepal, jail terms under national wildlife legislation are generally severe. Although fines in both countries remain extremely low compared to the value of horns in illegal trade, in most cases fines continue to be given in addition to a jail term and not as an alternative. In Assam, the 12 district courts established in November 2016 by the Gauhati High Court are now fast-tracking judicial proceedings for all wildlife-related cases, with several cases already in the courts. Penalties for killing a rhino in Assam include a minimum seven years' imprisonment with Rs75,000 fine (~US$1,062). If an offender is convicted of rhino poaching on more than two occasions, the offender can receive a sentence from 14 years to life imprisonment. For example, in January 2017, the Golaghat Court in Assam sentenced a poacher for killing a rhino in Kaziranga to seven years' imprisonment and a fine of Rs50,000 (~US$708). In Nepal, the minimum sentence is five years' imprisonment and the maximum up to 15 years with a minimum fine of around US$50.

4. Measures implemented by implicated States to end illegal use and consumption

Legislation in **China** is well developed and penalties for minor offenses include up to five years' imprisonment, criminal detention and a fine, whilst major offenses can result in a life sentence, property confiscation and suspension of political rights. The severity of the crime and corresponding sentences for those convicted are determined by the economic values of the products or animals being illegally traded. A distinction is also made between cross-border smuggling and internal illegal sale, purchase and transport of horn. In determining the value of each crime, a flat price of RMB250,000 (~US$39,396) is used for each horn, with a fixed value of RMB1m (~US$145,583) for each white rhino involved and RMB2m (~US$291,168) for each animal of any other rhino species[45].

There have been a number of successful prosecutions for rhino crimes in China. According to a Government website that lists court verdicts[46], 88 cases involving rhino horn or horn products were finalized between June 2013 and April 2017, with 131 offenders convicted and sentenced over a 46-month period (Wang 2018). Sentences on average were heavier for international cross-border smuggling than for internal trafficking and illegal trade, as generally these cases involved greater quantities of horn (Wang 2018). All 131 offenders convicted received either fixed-term imprisonment or criminal detention totaling 689 years (average 5 years 4 months). However, 43 of the offenders were put on probation, with sentences postponed subject to a judge's assessment after probation (where those convicted are institutionalized in a correctional programme and required to undertake community service for a stipulated time). Assets were also forfeited by 13 of those convicted of cross-border horn smuggling. One had all assets seized, while the remainder had property totaling RMB3.41m (~US$496,400) confiscated. Ninety per cent of those convicted also received fines, totaling RMB5.502m (~USD801,001, range RMB2,000 to 500,000 or ~US$291 to 72,792). Eight of those convicted were also deprived of political rights for one to three years. In one case, the seller of only a single 4g bead made of rhino horn was sentenced to four months' imprisonment with probation of six months and a fine of RMB3,000 (~US$437), while the purchaser was sentenced to four months in criminal detention and a fine of RMB5,000 (~US$728).

China also reported to SC70 (SC70 Doc. 56 Annex 2) on several measures it was taking to address rhino horn trafficking. The country has participated in a number of international operations targeting illegal wildlife trade, including most recently the INTERPOL operations Thunderbird (2017) and Spring Thunder (2018). The country has also undertaken internal operations to combat wildlife trafficking which have resulted in rhino horn seizures. China also reported that it cooperates closely on efforts to combat rhino trafficking via MOU's with several countries, and has improved international exchange of

[45] With the proviso that the accumulated values of parts from one rhino will not exceed the economic value of the whole animal.
[46] http://wenshu.court.gov.cn.

information and intelligence. China's industry and commerce departments have regularly policed tourist souvenir and antique sales and online auctions, with information being passed onto law enforcement authorities for further action as required. Customs authorities have also prioritized the detection of rhino products, using X-ray and CT scanners and sniffer dogs to check containers, vehicles and luggage. Chinese criminal law allows for this use of specialized investigation techniques such as controlled deliveries and covert investigations to detect wildlife trafficking.

China has also conducted public education efforts to raise awareness of illegal trade in rhino horn, with public service advertisements on mass media and social media, sign boards, posters and brochures, as well as displays at airports and important land and sea border points. However, while knowledge and awareness are prerequisites to change behaviour, they are not necessarily sufficient on their own. Experience suggests that behaviour change rarely occurs as a result of public service ads alone, and that campaigns often need to be implemented in conjunction with other influencing strategies to effect behaviour change (Bada and Sasse, 2014). News of seizures and subsequent prosecutions and sentences are being reported in the mass media in the hope that these will act as a deterrent. China also reported a range of educational efforts focused on Chinese nationals in Africa, including SMS messages sent by the three main Chinese communication service providers to every Chinese national arriving in a foreign country warning not to buy, carry or ship endangered wildlife and particularly rhino horn and ivory. The effectiveness of these measures appears to be limited given the increasing numbers of Chinese nationals being arrested abroad (Figure 6), and a recent study by GlobeScan for USAID which found that the typical rhino horn/ivory buyer in China is someone who has travelled abroad, purchased the product and brought it home[47] (Figure 11; USAID Wildlife Asia 2018).

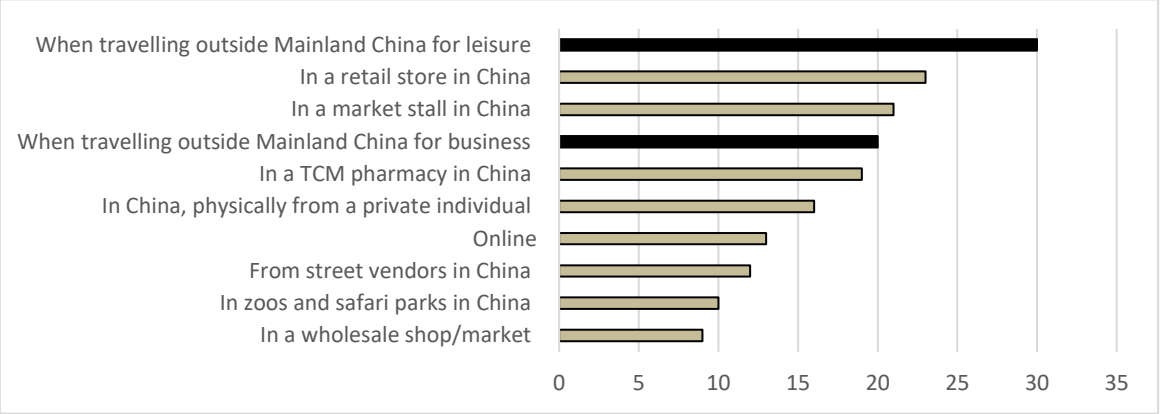
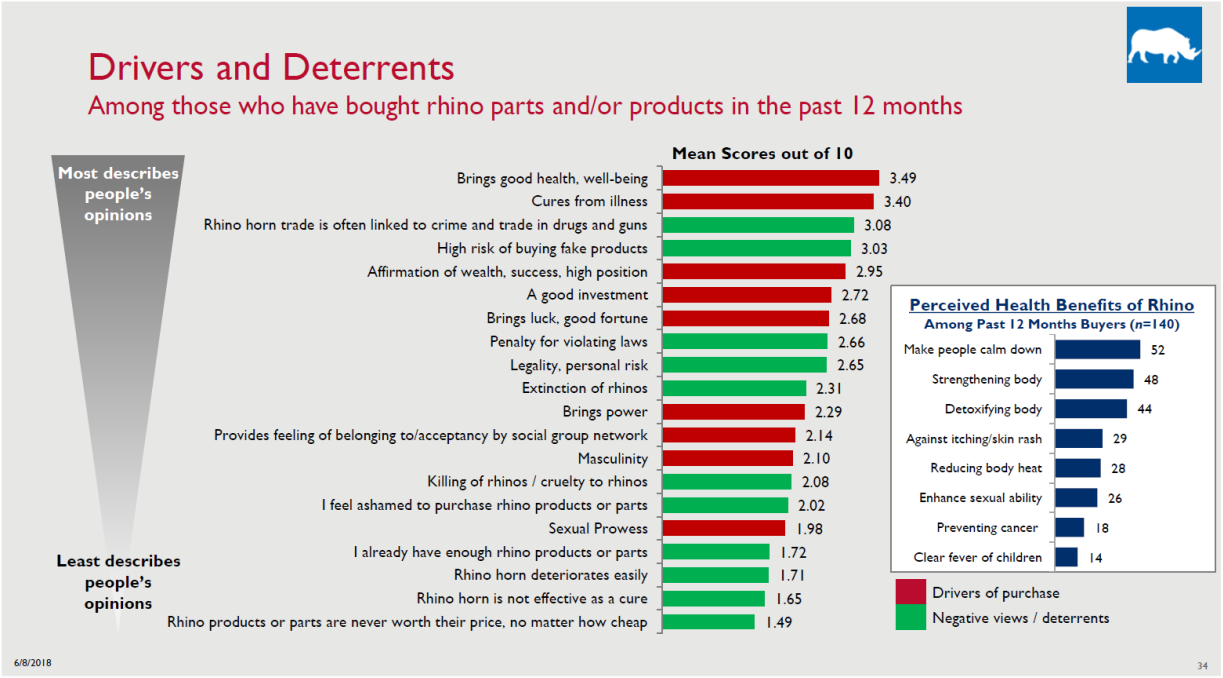


Figure 11: Main purchase channels of rhino horn for Chinese nationals based on a survey of 173 buyers. (Based on USAID Wildlife Asia 2018.)

A quantitative online survey assessing consumer demand for elephant, pangolin, rhino and tiger products in China was conducted in February-March 2018 among 1,800 self-reported buyers in six urban centres: Shanghai, Beijing, Guangzhou, Kunming, Nanning and Harbin (USAID Wildlife Asia, 2018). The timing of the surveys coincided with China's Lunar New Year gifting season when the purchase of high-value gifts such as rhino horn is likely to occur. The study revealed that 16% of the survey sample reported purchasing rhino horn, with 8% claiming to have done so within the previous 12 months. More than one-fifth of those reporting past purchase claimed to have done so as a gift. More than three-quarters (77%) of rhino horn buyers in the past 12 months indicated they were likely to purchase again in the future. Across the survey sample, around one-third believed cow/ox and buffalo horn were acceptable alternatives to rhino horn, while 31% indicated synthetic alternatives, which resembled rhino horn aesthetically, might replace it for the purpose of decoration. Comparing the drivers and deterrents reported in this study (Figure 12) with those presented in Kennaugh (2016), the survey found some shift towards viewing rhino horn as medicine as it 'brings good health, well-being' and 'cures from illness', surpassing more status-related motivations such as 'affirmation of wealth, success and high position' and 'a good investment' (USAID Wildlife Asia, 2018).

[47] A 2018 USAID study found that 50 out of 173 respondents from China who indicated they had bought rhino horn obtained it when travelling outside China for leisure (30 respondents) or business (20 respondents).

Figure 12: Drivers and deterrents behind Chinese consumer demand for rhino horn in Shanghai, Beijing, Guangzhou, Kunming, Nanning and Harbin in 2018. (Based on USAID Wildlife Asia, 2018.)



All online trade in rhino products is currently illegal in China, even items that would otherwise qualify for specific exemptions under Chinese law. TRAFFIC's long-term monitoring programme of 31 website platforms that frequently offer endangered species products for sale has allowed monthly tracking of the number of new advertisements for a range of endangered species, including rhino. Whilst the annual number of new rhino product advertisements per month more than halved from an average of 96 per month in 2016 to 42 per month in 2017, a major resurgent trade has since been noted over the first six months of 2018: through June 2018, the monthly average of new rhino product advertisements increased 6.7 times to 283 per month (TRAFFIC unpublished data). This dramatic increase has occurred in conjunction with China's full closure of its legal ivory market, which has resulted in the offering of ivory products through these website platforms to plummet to record lows. Since then, following interventions with the offending website managers, the number of rhino product solicitations has dropped to only 34 across the 31 websites monitored in October 2018 (TRAFFIC unpublished data).

An Internet Enterprise Coalition against Cyberspace Illegal Wildlife Trade, involving the three biggest internet service providers in China, was launched in November 2017. In March 2018, Chinese coalition members joined forces with Google, Facebook and six other international companies to form an international coalition aiming to reduce illegal wildlife trade on internet platforms by 80% by 2020. However, criminals may simply migrate to the Dark Web or other encrypted member-only sites.

Viet Nam also reported to SC70 on the implementation of its NIRAP (SC70 Doc. 56 Annex 19). The country's CITES Management Authority cooperated with United Nations Office on Drugs and Crime (UNODC) to organise three training courses for 190 law enforcement personnel including police and customs officials. The course included the application of the penal code in relation to wildlife trade, identification of rhino horn and undertaking investigations. Viet Nam's environmental police department conducted two operations that resulted in the seizure of 20.5kg of rhino horn and arrest of two traffickers in Lao Cai in transit to the Chinese border.

A revised Penal Code governing trade in rhino horn and elephant ivory in Viet Nam took effect on 1 January 2018 with the objective of treating trafficking crimes as serious offences. Now the maximum penalty is up to 15 years imprisonment or a fine of VND2 billion (~US$86,500) for individuals who are convicted of rhino horn trafficking, whilst corporate entities face fines of up to VND15 billion (~US$651,000) or the suspension of operations for up to three years. Whilst this is clearly a step forward, exemptions still remain if the amount of rhino horn is less than 50 grams. This loophole is an issue of contention as most consumers of rhino horn products such as beads, bracelets, pendants or medicinal powders would qualify for this exemption. Further, under current Vietnamese law, illegal

advertisements offering rhino horn for sale through online channels are only regarded as administrative violations subject to fines of up to VND100 million (~US$4,300). A criminal prosecution of an offer for sale can also only take place if a suspect is caught in possession of a rhino horn. This allowance constitutes another serious loophole as the rhino horn trade progressively retreats from physical markets into the safer confines of internet and social media advertising. Indeed, there have been very few convictions for serious wildlife crime in Viet Nam and the sentences handed out to date have primarily been limited to fines and not imprisonment. Closely monitoring the situation in Viet Nam, as one of the two most important markets for rhino horn, is of critical importance to ensure that the full extent of the revised Penal Code is effectively used to deter rhino horn trafficking and retail sales in the country. Viet Nam is due to submit a full progress report to the Secretariat by 31 January 2019 on the implementation of the Penal Code.

In a quantitative study of 1,400 Vietnamese nationals in 2018, 11% of respondents indicated they had 'ever' consumed rhino horn, with 6% indicating this was within the past 12 months (GlobeScan, 2018). 23% of recent buyers bought at least once a month, suggesting that rhino horn consumption is a more habitual behaviour and consequently more difficult to change. The main deterrents to consumption among recent buyers were the endangered status of rhinos (76%), heavy penalties for buyers (73%) and animal cruelty (71%). However, a disconnect was evident with focus group respondents reporting awareness of animal cruelty images and messaging around extinction threats, but that it did not affect their future purchase intentions. They reasoned that they were not the ones killing the animals and justified their purchase by perceiving it to be a by-product. Legal deterrents were not considered to be effective due to a perception of poor implementation combined with minor penalties. Only 41% of recent rhino horn buyers were aware of the revised Penal Code, which was lower than those consuming elephant or pangolin products. Drivers for purchase included to give a gift, in particular in formal and important (business) relationships. The use of powdered horn continued to be in order to cure a hangover and improve sexual performance. The most important attributes driving purchase by recent buyers were that rhino horn was '*worth the price however expensive*' and to demonstrate wealth, power and social status.

Using choice modelling, Hanley *et al.,* (2017) explored willingness to pay for rhino horn among existing and potential future consumers in Viet Nam and found that wild-sourced horn, harvested humanely from the least rare species, is the most highly valued product. Furthermore, they report that consumers were willing to pay less for rhino horn products under a scenario where international trade was legalized compared to the current situation of illegal trade, although they caution their sample may not have been representative of the potential wider population of buyers. However, a much broader study of 310 rhino horn buyers, users or 'intenders' to buy or use in five Vietnamese cities, found that 46% of the respondents expected to pay more for rhino horn emanating from legal trade and only 17% suggested it would be cheaper. Conversely, 50% expected to pay less for rhino horn from illegal trade, whilst only 12% thought it would be more expensive (GlobeScan, 2018).

5: Challenges and suggested best practices for reducing poaching and trafficking

With reference to the recommendation from SC70 to explore options to reflect on challenges and best practices for addressing rhinoceros poaching and rhinoceros horn trafficking, we have briefly listed here some key challenges and suggested best practices. We suggest a focus on best practices in the widest sense of reducing impact of poaching and trafficking on rhino numbers, and this includes facilitating the growing of rhino numbers as fast as possible to offset these impacts.

- A major challenge identified by a number of range States, as previously discussed, is the granting of bail to repeat offenders and flight risks. Another major challenge is continued low and slow conversion rate of arrests to successful convictions with deterrent sentencing. More formal monitoring of court cases may help quantify and draw attention to this issue, with civil society also playing an important role. Greater use of INTERPOL Red Notices may assist in international efforts to bring offenders to trial.
- In some countries, backlogs and delays in obtaining forensic reports remains an issue, as well as the slow speed of DNA analysis and reporting of results. Again, a more formal process for tracking the progress of arrests through to court and reasons for case postponements may assist.
- Most arrests are of lower level poachers and couriers, and the challenge is how to successfully investigate and prosecute those higher in the criminal pyramid, especially when they may live in different countries. Whenever possible cases should be recognised as serious organised

crimes and coordination between different government agencies improved, with police departments playing a key role. Intelligence-sharing both nationally and internationally is key but presents another significant challenge. Greater sharing of intelligence and samples through use of the CITES rhino seizure form referenced in Resolution Conf. 9.14 (Rev. CoP17), as well as increased use of platforms such as TWIX, could assist.

- Another identified problem is that rhino horn seizures are often treated as the end of an investigation, with disregard for possible beneficial intelligence flow. Again, greater use of the CITES seizure form and submission of horn samples or extracted DNA to SAPS-FSL for RhODIS analysis could help range States with their investigations and efforts to combat organised crime, noting that funding is likely to be required to assist efforts to facilitate roll-out of RhODIS-compatible DNA analyses to other labs around the world. Seized horn may also provide investigators with opportunities to gain further intelligence by following what happens to horns if released (controlled deliveries).
- There have been calls by ICCWC partners and the Asset Recovery Institute of Southern Africa to “follow the money” and use asset forfeiture approaches to recover criminal revenues. The challenge is to develop financial investigation skills and an enabling legislation to catalyse expansion of such approaches.
- Internal corruption and staff involvement in poaching, or provision of information to poachers, continues to be a challenge. Attempts to corrupt court processes can also occur. A more formalised court system where all cases and outcomes are closely monitored, as previously mentioned, would help to address this issue.
- There is a danger of paralysis of decision makers following rhino losses in a small number of recent high-profile translocation exercises. It is critically important to keep translocating surplus rhinos to maintain productivity of established populations (and hence maximise offset against any poaching). There is strong evidence that without translocations, certain populations (such as the largest populations of greater one-horned rhino) would eventually cease to grow due to density dependence. Translocation has been central to growing rhino numbers and range rapidly. Overzealous veterinary restrictions on translocations also pose an important threat to effective biological management of some key populations. Solutions include the development of improved Standard Operating Procedures for translocations and expert evaluation of and learning from any losses that occur.
- The main approach advocated by the international community in recent years has been to increase law enforcement effort and to support demand reduction efforts that seek to change behaviour of consumers in end-user countries. The recent surveys referenced in the previous section in both Viet Nam and China indicate a willingness of many existing buyers to continue to buy horn, suggesting new behaviour change interventions will need to focus carefully on these particular buyers.
- The difficulty of sustainably funding the very high costs of rhino conservation in some areas is a major and increasing problem. Increasing costs and risks and declining incentives pose a threat to the continued successful conservation effort being made by many private owners and custodians.
- Another challenge identified in Africa is the need to create alternative livelihood opportunities for communities, which are often the source of poachers. This is difficult in the current environment where financial returns and incentives are limited and costs and risks are high. In the absence of such progress, the potential negative impacts of paramilitary law enforcement on attitudes of neighbouring communities to conservation efforts poses another important challenge and longer-term threat to conservation.
- The issue of inadequate securing, monitoring and reporting of rhino horn stocks by certain countries has also been identified as a challenge, as this may create opportunities for corrupt officials to launder horn. Transparent, long-term rhino horn stock management systems spanning rhino horn trade chains from producers to end-use destinations would assist in preventing leakage of horn onto illegal markets.
- Field ranger densities, monitoring effort and expenditure in the remaining Sumatran rhino range remains relatively low compared with what would be considered appropriate minimums for informing management decision-making and successfully protecting and growing rhino populations. In Africa, co-management or contractual management has boosted rhino

conservation in some State reserves and may be an option to consider, although this may require legislative changes in certain range States. The proposed increase in more intensive semi-captive efforts to breed Sumatran rhinos also needs to be done in such a way as to not detract from wild conservation efforts or negatively affect population viability. It is important that habitat in Kalimantan and Bukit Barisan Selatan is protected and conserved so that animals can be released back into these areas if successfully bred in the new semi-captive facilities.

- While currently well protected and monitored, the persistence of Javan rhino in only one population remains a significant risk to the survival of this species, and steps to establish new populations are encouraged.

6. Conclusions

Average rhino poaching in Africa has remained at high levels, with an average of just over three rhino poached per day in 2017. Nevertheless, the latest information available indicates some limited progress in reducing poaching in both Africa and Asia. The use of innovative technology as a “force multiplier” appears to be assisting law enforcement efforts, and the estimated quantity of horn reaching end-user markets in Southeast Asia has declined slightly for the first time since CoP14.

White rhino have, however, been badly affected by a recent severe drought in parts of southern Africa, especially in the largest white rhino population in Kruger National Park. In response to both poaching and drought, white rhino numbers have been in decline since 2012. At the time of writing, another possible drought threatens any recovery in this population. Private owners are playing an increasingly important role in conserving this species, but limited and reducing incentives and increasing costs and risks pose a threat to the continued growth of rhino numbers on private land. By contrast, black rhino numbers have continued to increase, although poaching has slowed growth rates.

In India and Nepal, poaching rates of greater one-horned rhino have declined markedly and seizure rates appear high. The greatest constraint to growing numbers of greater one-horned rhino is density dependence, coupled with a lack of additional secure areas in which to establish new populations. The continued lack of regular reporting of horn stocks to CITES by range States remains a concern, although a thorough audit of stocks has recently been undertaken in Assam. Javan rhino numbers are likely to have increased slightly but remain at very low numbers. It is still a strategic concern that the establishment of a second wild population of this species within Indonesia has not been progressed as hoped. The Sumatran rhino continues to be the most threatened rhino species. There remains an urgent need to more accurately determine numbers and distribution of Sumatran rhino in the three main populations to inform management and protection, as well as boost law enforcement effort at least to levels considered the minimum desirable in Africa. Additional planned efforts to expand intensive breeding efforts should also be done in such a way as not to detrimentally affect or draw attention away from efforts needed to boost wild rhino monitoring, protection, and biological management.

As in reports presented to previous CoPs, and despite progress on a number of fronts since CoP17, China (including Hong Kong SAR), Mozambique, South Africa, and Viet Nam continue to be the most affected source, transit and destination countries for African rhino horn, recorded in over two-thirds of reported seizures. These four countries remain priorities for actions to successfully curb the illegal rhino horn trade. Enforcement action in Viet Nam appears more limited thus far and reporting by the country on implementation of its new Penal Code in January 2019 is awaited with interest. The role of Myanmar as a potentially key transit country for Asian rhino horn may also merit further investigation.

There have been a number of successful prosecutions with deterrent sentences in many countries. Use of asset forfeiture, charging accused under multiple acts, and where possible treating offences as organised crime have assisted in increasing penalties. However, the granting of bail to serious offenders and flight risks, as well as low and slow conversion rates of arrests to prosecutions, remain important challenges. DNA forensic evidence is playing an increasingly valuable role and it is important that enforcement authorities do not see seizures simply as an end, but use all opportunities to further knowledge of the entire criminal supply chain and assist law enforcement efforts in range States by providing samples and intelligence information on seizures, and where possible releasing and following seized horns in a controlled manner. Taking action to address corruption and internal involvement in rhino crimes also remains essential to the success of law enforcement efforts.

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Annexure 1. Trade in African rhino horn trophies recorded in the CITES Trade Database.

Table A1: Direct exports of white rhino horn trophies* from South Africa reported by South Africa and by importing countries, 2013-2016 (based on data included in the CITES Trade Database***).**

	2013		2014		2015		2016		Total		
Importer#	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Balance between reported exports and imports
Russia	56		46		22		20	X	144		144
United States	54	40	170	64	131	134	88	68	443	306	137
China			14	12	43	6	58	24	115	42	73
Canada	11		2		16		18		47		47
Poland▲	32	22	35	24	12	4	6	4	85	54	31
Denmark	4	2	12		10	4	2		28	6	22
Slovakia▲	26	20	18	6	4	6	8	4	56	36	20
Spain	10	6	16	10	7		4	2	37	18	19
Kuwait							2	20	2	20	(-18)
Hungary	4		10		4		2	4	20	4	16
Ukraine	10	2	28	21	14	8	12	18	64	49	15
Germany	18	8	4		6	4	2	4	30	16	14
Sweden	8	20							8	20	(-12)
Viet Nam▲		12								12	(-12)
Italy	6		4						10		10
Lebanon	4	N/A	6						10		10
Czech Republic▲	14	6	2	2					16	8	8
France	2		6	18	2				10	18	(-8)
Australia					2		2		4		4
Kazakhstan			6	X	2			4	8	4	4
Mexico			4		4	4	2	2	10	6	4
Switzerland					2		2		4		4
United Kingdom			2		2		2	2	6	2	4
Hong Kong SAR		4								4	(-4)
Estonia							4	2	4	2	2
Gambia	2	X						X	2		2
Luxembourg	2								2		2
Panama					4	2			4	2	2
Zimbabwe			2						2		2
Belgium	2	2	4		2	10	7	5	15	17	(-2)
Philippines					2	4			2	4	(-2)

Romania								2		2	(-2)
Austria	2	2	10	2	2	6	2	6	16	16	0
Singapore					4			4	4	4	0
Total	**267**	**146**	**401**	**159**	**297**	**192**	**243**	**175**	**1208**	**672**	**536**

*Includes trade reported as "horns" or "trophies" ("trophies" were converted to horns using a conversion factor of 2 horns per trophy), with purpose code "H" (hunting trophy), "P" (personal) or "T" (commercial). Trade reported with source code "I" (seized/confiscated) or "O" (pre-Convention) was excluded.
**In the columns "Reported by importer", X = annual report not received from the country, N/A = First year in which CITES came into force in the country so annual report not required.
***CITES Trade Database (trade.cites.org) managed by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC) on behalf of the CITES Secretariat. Data obtained on 22 November 2018 in consultation with UNEP-WCMC.
#For the importing country concerned, ▲= incidences of pseudo-hunting have been confirmed (investigations have concluded that imported sport hunted trophies have gone into illegal trade).

Table A2: Direct exports of white rhino horn trophies* from Namibia reported by Namibia and by importing countries, 2013-2016 (based on data included in the CITES Trade Database***).**

	2013		2014		2015		2016		Total		
Importer	**Reported by Namibia**	**Reported by importer**	**Reported by Namibia**	**Reported by importer**	**Reported by Namibia**	**Reported by importer**	**Reported by Namibia**	**Reported by importer**	**Reported by Namibia**	**Reported by importer**	**Balance between reported exports and imports**
United States	8	4			4	2	2	4	14	10	4
Russia					4	6	4	X	8	6	2
Austria			2	1	4	4			6	5	1
Germany					2			2	2	2	0
Denmark	2	2							2	2	0
Hungary			2	2					2	2	0
South Africa					2	2			2	2	0
Total	**10**	**6**	**4**	**3**	**16**	**14**	**6**	**6**	**36**	**29**	**7**

*Includes trade reported as "horns" or "trophies" ("trophies" were converted to horns using a conversion factor of 2 horns per trophy), with purpose code "H" (hunting trophy), "P" (personal) or "T" (commercial). Trade reported with source code "I" (seized/confiscated) or "O" (pre-Convention) was excluded.
**In the columns "Reported by importer", X = annual report not received from the country.
***CITES Trade Database (trade.cites.org) managed by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC) on behalf of the CITES Secretariat. Data obtained on 22 November 2018 in consultation with UNEP-WCMC.

Table A3: Direct exports of black rhino horn trophies* from South Africa reported by South Africa and by importing countries, 2013-2016 (based on data included in the CITES Trade Database***).**

	2013		2014		2015		2016		Total		
Importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Reported by South Africa	Reported by importer	Balance between reported exports and imports
Malaysia	1		2		3	20	4		10	20	-10
France			4		4	2			8	2	6
Mexico		6								6	-6
China							4		4		4
Germany	2	2			1	2	4		7	4	3
Poland		2								2	-2
Total	**3**	**10**	**6**		**8**	**24**	**12**		**29**	**34**	**-5**

*Includes trade reported as "horns" or "trophies" ("trophies" were converted to horns using a conversion factor of 2 horns per trophy), with purpose code "H" (hunting trophy), "P" (personal) or "T" (commercial). Trade reported with source code "I" (seized/confiscated) or "O" (pre-Convention) was excluded.
**Annual reports have been received from all importing countries for the period 2013-2016.
***CITES Trade Database (trade.cites.org) managed by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC) on behalf of the CITES Secretariat. Data obtained on 22 November 2018 in consultation with UNEP-WCMC.

Table A4: Direct exports of black rhino horn trophies* from Namibia reported by Namibia and by importing countries, 2013-2015 (based on data included in the CITES Trade Database***). No trade was reported in 2016.**

	2013		2014		2015		Total		
Importer	Reported by Namibia	Reported by importer	Reported by Namibia	Reported by importer	Reported by Namibia	Reported by importer	Reported by Namibia	Reported by importer	Balance between reported exports and imports
South Africa		2						2	-2
Spain			2			2	2	2	0
United States	2	2			6	6	8	8	0
Total	**2**	**4**	**2**		**6**	**8**	**10**	**12**	**-2**

*Includes trade reported as "horns" or "trophies" ("trophies" were converted to horns using a conversion factor of 2 horns per trophy), with purpose code "H" (hunting trophy), "P" (personal) or "T" (commercial). Trade reported with source code "I" (seized/confiscated) or "O" (pre-Convention) was excluded.
**Annual reports have been received from all importing countries for the period 2013-2016.
***CITES Trade Database (trade.cites.org) managed by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC) on behalf of the CITES Secretariat. Data obtained on 22 November 2018 in consultation with UNEP-WCMC.