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Saving rhinos: Our fatal blunders

BY TAN CHENG LI



Mud bath: Male rhino Tam enjoying his moment in a wallow at Tabin Wildlife Reserve, Sabah. In the past, captive rhinos were not given access to wallows, which they need to cool their bodies and obtain various minerals. — Bernama

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Mistakes of the past have cost us many rhinos. Now's the time to learn from the errors.

Between 1984 and 1995, a total of 22 Sumatran rhinos were captured in



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Peninsular Malaysia and Sabah for a captive breeding project. Except for one which was already pregnant when captured, none bred while in captivity, and all have since died.

Today, there are three captive rhinos in Sabah, taken from the wild in recent years – a male in 2008 and two females in 2011 and in 2014. They are our last hope to breed the critically endangered species in a final bid to boost their numbers.

In the wild, exact numbers are unknown, but rhino experts say the species is most likely extinct in Peninsular Malaysia and on the verge of extinction in Sabah, which has fewer than 10. In short, the Sumatran rhino is “functionally extinct” in Borneo and in Malaysia – meaning that the few individuals remaining are insufficient to save the species.

How did we reach this dire state? A paper “Preventing the extinction of the Sumatran rhinoceros” by three experts from the Borneo Rhino Alliance (Bora) gives a critical account of how Malaysia blundered in its attempt to wrest the species from the brink of extinction.

It points to a combination of lack of knowledge on rhino reproduction biology, poor husbandry and veterinary care in captive centres, a misguided approach in focusing on protecting rhinos in the wild, and lack of co-operation between rhino range states that led to today’s rhino crisis. The paper was authored by Bora chairman Dr Abdul Hamid Ahmad, executive director Dr Junaidi Payne and veterinarian Dr Zainal Zahari Zainuddin,

“There is finally a realisation in Malaysia that it muddled through with Sumatran rhinoceros in the past 50 years, recycling fabricated population estimates and refraining from making necessary conservation decisions,” states the authors in the paper published in the *Journal Of Indonesian Natural History* (December 2013). It also publicly reveals for the first time, information on the causes of deaths of captive rhinos.

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Sumatran rhinos are hunted as their horns are sought for folk remedies.


Hunted out

Rhino horns have long been favoured as a folk remedy. In the first decades of the 20th century, extensive hunting had already led to a precipitous decline in its distribution and numbers. By the mid-20th century, the species was depleted from its former range and in danger of extinction in Malaya and Borneo and elsewhere on mainland Asia.

By the early 1980s, wildlife experts estimated the Malaysian population at

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between 52 and 75, including 20 to 25 individuals in the Endau-Rompin area in Johor, and 15 to 30 in Sabah. In 1995, Dr Zainal found evidence of only five adult rhinos in Endau-Rompin, showing that published estimates of rhino numbers were notoriously unreliable, and that actual numbers had declined by half over the preceding decade.

The United Nations-led Sumatran Rhinoceros Conservation Strategy project (1995–1998) also pointed to a dwindling population, but “... inflated numbers kept appearing in public domain, largely due to some proponents’ disbelief that two decades of effort had failed.” As recent as 2007, official figures still put the rhino population at 70 to 100 in Peninsular Malaysia and 30 in Sabah. The far-from-accurate population figures could have jeopardised conservation efforts.

After the plight of the Sumatran rhino surfaced in the early 1980s, the International Union for Conservation of Nature in 1984 convened the first Sumatran Rhino Crisis Summit, in Singapore. Some 20 representatives from governments, zoos and wildlife institutions made plans to prevent the species’ extinction, which included enhanced protection of wild rhino populations, raising awareness, and developing a global captive breeding population.

From 1984 to 1995, 22 Sumatran rhinos were captured in Malaysia (*see table*) for a breeding programme. At that time, nothing was known of rhino reproductive biology. The paper says an analysis reveals several kinds of failures which should not have been allowed to occur with such a precious, critically endangered species.

Many rhinos were kept in conditions which caused them poor health and stress. It was known that rhinos live in closed-canopy forest and typically wallow in clean mud for five to six hours daily. However, most captive rhinos were kept in conditions of exposure to sunlight and in some cases without access to clean mud wallows. Frequent sunlit conditions have been linked to partial and complete blindness in some captive rhinos. Other mistakes included feeding unsuitable milk to an infant rhino and unsuitable enclosures which caused one rhino to be trapped between bars, and asphyxiate.

Deaths at rhino centres

Most shocking of all, basic hygiene was generally poor. Some rhinos were kept for long periods in facilities that lacked basic hygiene protocols and biosecurity measures, leading to bacterial infections and eventually, deaths. There was also a lack of experienced veterinary care, causing identification and treatment of disease to come late or not at all. Prior to the development of the Sungai Dusun Rhino Conservation Centre in Selangor, rhinos were maintained at Melaka Zoo, where treated piped water was installed only after the deaths of Sri Delima and Julia.

The tragic death of all six rhinos at Sungai Dusun between April and November 2003 put an end to the captive breeding effort. The cause of deaths was reported to be due to trypanosomiasis originating from buffaloes on nearby land. The paper disputes this. It says long-term monthly monitoring of blood for parasites and blood parameters showed no trypanosomes (a parasitic protozoa) in the rhinos. Also, no trypanosome infection was detected in the blood of the buffaloes. In the post-mortem, trypanosomes were detected in only two of the seven rhinos that died, while abundant bacterial growth was found in the vital organs; mucoid *Escherichia coli* in five animals and *Klebsiella pneumoniae* in four.

The paper states that the death of male rhino Shah in January 2002 from mucoid *E. coli* should have prompted the facility to be on strict alert. Sensitivity tests were done in 2002 and gentamycin was found to be the only effective treatment but it was not used on the ill animals. (The tragedy recurred seven years later – from Sept 17-29, 2010, seven Malayan tapirs died from mucoid *E. coli* at Sungai Dusun, which by then had been turned into a tapir breeding centre. Only one tapir showed trypanosomes in the blood.)

The paper says trypanosomes might have infected the rhinos and tapirs at any time at Sungai Dusun, and that natural resistance effectively suppressed their growth until the advent of poor health and compromised immune response resulting from chronic mucoid *E. coli* and *Klebsiella* infection.

“The conclusion that trypanosomes were the cause of the Sungai Dusun deaths may have been reached erroneously, in order to allow parties involved to avoid responsibility for chronic poor hygiene in the facilities,” says the paper.

It sums up the reasons for the failure of the 1984-1995 effort on captive breeding:

- > Insufficient knowledge of Sumatran rhino breeding biology and inadequate high-quality veterinary care and husbandry in captive facilities.

- > Unsuitable diet in some facilities, with insufficient attention paid to the risk of iron ferritin disease.
- > Stress on rhinos due to weaknesses in facilities design and poor visitor control.
- > Over half of all female rhinos have reproductive tract pathology, making natural breeding difficult or impossible.
- > Absence of suitable males in Peninsular Malaysia; males in Sabah with low or no sperm production.
- > Rhinos were not shared between Peninsular Malaysia and Sabah due to beliefs that they were different subspecies, and between Peninsular Malaysia and Indonesia due to loss of trust after the initial exchange.
- > Rhinos were not sent to the United States for breeding programmes.
- > Some pairings involved inexperienced or incompatible rhinos.
- > Artificial insemination was never attempted due to lack of knowledge.



Filepic of Tam being coaxed into a trap with leaves. He was found wandering in an oil palm plantation in Kretam, Sabah in 2008.

Failure in preserving wild rhinos

With the deaths of the captive rhinos, the breeding project became unpopular and the focus shifted to saving rhinos in the wild rather than bringing them into

fenced, managed conditions. This proved to be a misguided approach as according to the paper, no one knows for sure whether wild populations are of sufficient size and fecundity to assure their survival, even in the absence of poaching.

Moreover, this approach does not address the impact of various factors on small, isolated wild populations or the Allee effect, which refers to a “positive correlation between population size or density and the mean individual fitness”. The Allee effect states that when a population declines to very low numbers, breeding success declines in tandem. This is because factors associated with low numbers (difficulty in finding a mate, narrow genetic base, skewed sex ratio, reproductive tract pathology linked to long periods without breeding) contribute to drive rhino numbers lower and lower, even in places with suitable habitat and no hunting.

“In small, scattered and non-contiguous populations, it is just a matter of time before the average annual death rate exceeds the annual birth rate, and before the population goes extinct.” The authors of the paper believe that the Allee effect was significantly impacting survival of wild rhinos because:

- > All records of wild juveniles were anecdotal, with no information on actual annual increase (or decrease) in wild population size.
- > Rhino numbers have been very low for many decades in most if not all areas where they are still present, so inbreeding was likely.
- > A skewed sex ratio was observed during the capture of rhinos from 1984 to 1995. The male to female ratio was 1:9 in Peninsular Malaysia and 8:1 in Sabah, and all the captured males were old.
- > Reproductive tract pathology is common in the captured females, a phenomenon associated with lack of either breeding or carrying of foetuses to successful birth.

“The Allee effect has likely been present in all Sumatran rhino populations over an extended period, effectively entering the Sumatran rhino into the extinction vortex irrespective of whatever protective measures might be put in place in the wild,” declares the paper.

The lesson from Malaysia, it says, is that the priority should have been to increase the number of rhino pregnancies rather than to hope that the mortality rate of wild rhinos through poaching could be reduced. “Protecting wild rhinos may be an over-ambitious option and captive breeding may have a greater chance of success than prevailing wisdom admits.”



Female rhino Puntung gets a cooling shower from workers at the Borneo Rhino Sanctuary in Tabin Wildlife Reserve in Sabah.

What now?

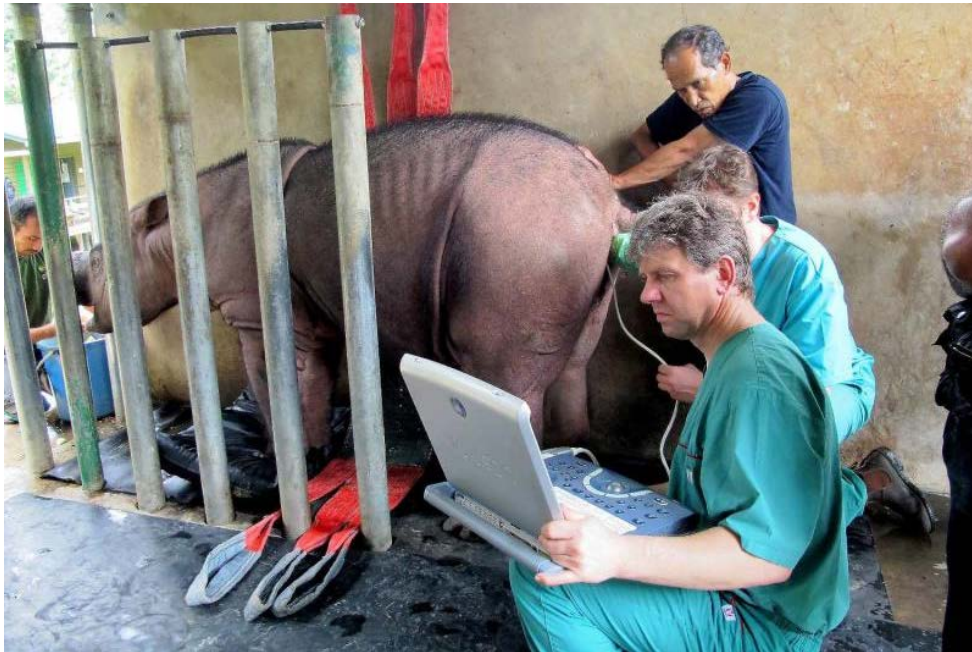
Last April, 100 wildlife experts convened the second Sumatran Rhino Crisis Summit in Singapore. They concluded that without immediate and committed conservation intervention, the Sumatran rhino will go extinct soon. Indonesia and Malaysia were urged to collaborate.

Simulations done during the summit showed that the species stands a good chance of surviving if there are at least 30 individuals with a birth interval of three years or less. The future of populations smaller than that is bleak even if they are healthy and protected. Using a more realistic birth interval of seven years, a starting population of 50 rhinos will have a negative growth rate of about -3% per year.

“This means that, without intervention, all possible known wild and captive populations are in an extinction vortex and are not sufficiently abundant to increase populations in isolation of each other.”

The paper says to reduce the current captive population’s extinction probability to below 10%, some 16 rhinos need to be transferred into captivity and managed with an interval of three years.

To date, there have been only four captive births, all descendants from the same pair in Cincinnati Zoo, the United States. The Sumatra-caught rhinos, Emi and Ipuh, both fertile and compatible, had received excellent care there, resulting in rhino births in 2001, 2004 and 2007. Their offspring, Andalas, was sent to the Sumatran Rhino Sanctuary in Way Kambas National Park, Sumatra, in 2007 and five years later, fathered a male calf.



Veterinarians doing an ultrasound check on Puntung: Dr Thomas Hildebrand from Leibniz Institute for Zoo and Wildlife Research, and Dr Zainal Zahari Zainuddin from Borneo Rhino Alliance.

Lesson learned

“Much of the fear over captive breeding stems from past failures,” says the paper. “But knowledge on rhino biology, animal husbandry and reproductive technology has improved.” Advances include the cryo-preservation of egg cells by vitrification, successful artificial insemination and subsequent live births of the white and Indian rhinos, and in vitro fertilisation.

The paper points to a general consensus that the sole imperative now is to produce Sumatran rhino embryos. This can only be done by bringing every rhino into closely managed facilities, and making maximum use of their gametes.

“Having these rhinos and gametes as part of a globally managed meta-population (separated populations, but with some interaction) is essential, and attempts at natural breeding and artificial insemination must continue as long as either is possible.”

The paper states that in the absence of agreement to share rhinos and gametes between nations and facilities, the current scope in Malaysia is limited. Thus, a key element of current effort is the cryo-preservation of gametes and cells that might be used in the future to restore the species after its extinction in Malaysia.

Captive Sumatran rhinoceros			
Rhino, sex	Year of capture	Characteristics; history	Death (cause; location; date)
Peninsular Malaysia			
Jeram, F	1984	Mature at capture; from oil palm near Sg Dusun Rhino Conservation Centre, Selangor; never bred	Old age; Melaka Zoo; 09/07/02
Erong, M	1984	Caught at 2 months old; fed carton cow's milk; later analysis showed that rhino milk is low in fat and high in protein	Fed unsuitable milk; Melaka Zoo; 01/06/84
Melintang, F	1995	Mature at capture; Perak; sent as royal gift to Thailand	Dislocated neck as caught between bars of inappropriate fence; Dusit Zoo, Bangkok; 28/11/86
Rima, F	1985	Pregnant at capture; Johor; retained in Melaka Zoo and Sg Dusun	Likely mucoid <i>E.coli</i> infection (previously reported in public domain as tetanus); Sg Dusun; 12/04/03
Sri Delima, F	1987	Mature; Selangor; retained in Melaka Zoo and Sg Dusun	Salmonellosis (<i>Salmonella blockley</i>); Melaka Zoo; 15/12/89
Dusun, F	1986	Mature; sent to Jakarta in 1987 in exchange for a male	Old age; Way Kambas National Park, Sumatra; 07/02/01
Panjang, F	1987	Mature; Selangor; retained in Melaka Zoo and Sg Dusun	Bacterial infection; Sg Dusun; 09/11/03
Minah, F		Captive born to Rima in Melaka Zoo in 1987; a progesterone implant was mistakenly placed into her bladder	Bacterial infection; Sg Dusun; 16/11/03
Julia, F	1986	Mature; Selangor; retained in Melaka Zoo	Uncertain; Melaka Zoo; 23/09/88
Mas Merah, F	1987	Mature; Selangor; retained in Melaka Zoo and Sg Dusun	Bacterial infection; Sg Dusun; 17/11/03
Shah, M	1988	2.5 years old at capture; Selangor; retained in Melaka Zoo and Sg Dusun	Mucoid <i>E. coli</i> infection (previously reported as colitis or emphysema); Sg Dusun; 19/01/02
Seputih, F	1988	Mature; Pahang; retained in Melaka Zoo and Sg Dusun	Bacterial infection; (previously reported as intestinal torsion); Sg Dusun; 28/10/03
Ara, M	1994	Mature; retained in Melaka Zoo and Sg Dusun	Bacterial infection; Sg Dusun; 08/11/03
Sabah			
Linbar, M	1987	Mature at capture	Internal injury and respiratory failure at trap site; lower Segama; 28/03/87
Tenegang, M	1987	Mature at capture	Hindgut obstruction was cited, without details; Sepilok Rhino Breeding Centre (now closed); 22/04/92
Lokan, M	1988	Mature at capture	In pit trap; 25/05/88
Lun Parai, F	1989	Juvenile; mated in 1995 but no pregnancy; retained at Sepilok and Tabin Wildlife Reserve	Uncertain; Sepilok; 23/08/00
Tekala, M	1991	Mature; retained at Sepilok	Reported as tetanus; Sepilok; 08/05/95
Sidom, M	1992	Mature; mated unsuccessfully; Sepilok	Uncertain; Sepilok; 20/01/97
Bulud, M	1993	Mature; escaped through electric fence into Tabin	Unknown (but seen in June 1995, 30km from escape site)
Tanjung, M	1993	Mature; retained at Sepilok	Fallen tree branch; Sepilok; August 2006
Malbumi, M	1995	Mature; retained at Sepilok	Unknown; Sepilok; 04/12/97
Gelogob, F	1994	Mature; mated in 1995 but no pregnancy; retained in Sepilok, Tabin and Lok Kawi Wildlife Park	Died 11/01/2014
Kertam (Tam), M	2008	Mature; oil palm estate at Kretam; retained in Tabin	Alive
Puntung, F	2011	Captured in pit trap in Tabin; retained in Tabin	Alive
Iman, F	2014	Mature; Danum Valley; retained in Tabin	Alive

Source: Abdul Hamid Ahmad, Juneali Payne and Zainal Zahari Zainuddin

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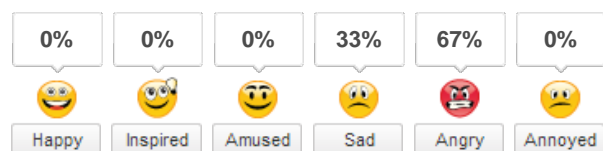


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