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THE SUMATRAN RHINOCEROS Dicerorhinus sumatrensis EX SITU CONSERVATION STATUS: PAST, PRESENT AND FUTURE

Francesco Nardelli, IUCN/SSC Asian Rhinos Specialist Group

TEST

Past conservation history

I traveled to Indonesia several times during the late 1970s, visiting the area where the Sumatran rhinoceros (*Dicerorhinus sumatrensis*) lives. I am fascinated by this mammal species. I met with Dr. Wartono Kadri in Jakarta at that time, who was the Director-General of Forest Protection and Nature Conservation (PHPA). We discussed the possibility of starting a captive breeding program for the Sumatran rhinoceros. However, our talk did not materialise due to a lack of sponsors.

Still, my desire to preserve the Sumatran rhinoceros prevailed in the following decade. During my first year at Howletts and Port Lympne Wildlife Parks (H&PL) in England in 1982, animal lover and zoo owner John Aspinall considered the urgency of activating a captive breeding project for the Sumatran rhinoceros. In 1983, a memorandum of understanding was signed between H&PL and PHPA. A field survey in the Gunung Patah area, southwest Sumatra, to discover isolated Sumatran rhinoceroses soon followed. Later, I worked as the Executive Director of Save the Sumatran Rhino project from 1984 to 1993, an initiative of the Indonesian Government supported by the UK-based H&PL and the Sumatran Rhino Trust (SRT), an association of four American zoos located in Cincinnati, Los Angeles, New York, and San Diego.

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Greatly impacting my field, the Asian Rhino Specialist Group (AsRSG) of the IUCN Species Survival Commission convened the first Sumatran rhinoceros summit in 1984. This summit endorsed the Sumatran rhinoceros captive breeding programme to capture isolated Sumatran rhinoceroses in unprotected areas. Representatives of the Indonesian and Sabah Governments supported a captive breeding project despite concerns raised by representatives of the AsRSG and the World Wildlife Fund. Sabah and peninsular Malaysia rejected the SRT program and proceeded on alone. The scenario at that time, with approximately 800 rhinos mostly located in four viable populations, was entirely different from today's situation.

Following this summit, the first Sumatran rhinoceros, the male Torgamba, was captured and kept in captivity on 25 November 1985. In 1986, a second agreement was signed between PHPA and SRT. Further, between 1985 and 1993, 17 Sumatran rhinoceroses were captured and safely moved to H&PL, Indonesian zoos, and the four American zoos. These animals were kept in separate facilities to avoid potential diseases striking and wiping them out, which occurred in the Malaysian breeding centre a few years later.

While the summit had good intentions, rhinoceros captures were suspended in 1994 as several Sumatran rhinoceroses in zoos did not survive. At that time, it was unknown that the Sumatran rhinoceros is a solitary folivore and experiences induced ovulation. In other words, the female ovulates in response to external stimuli during or before mating instead of ovulating cyclically or spontaneously. The Sumatran rhinoceros received a diet in zoos that mostly included hay, vegetables, fruit, and herbivorous pellets rather than leaves from tree species found in the Sumatran rhino's natural habitat. Therefore, the zoo diet proved inappropriate. In contrast to the hay, vegetable, fruit, and herbivorous pellet diet, when the rhinos were fed proper fig leaves daily at the Cincinnati Zoo, they improved considerably, giving birth to three calves (two males and one female) in natural succession in 2001, 2004 and 2007. These were the first-ever Sumatran rhinoceroses conceived, born, and raised in captivity, mostly thanks to the pivotal role of Dr. Terri Roth, Roth (2002). This was the turning point for the Sumatran rhinoceros captive breeding project. Two more calves (a male in 2012 and a female in 2016) were born at the Sumatran Rhino Sanctuary (SRS) in Indonesia.

According to Rhino expert Dr. Terri Roth (pers. comm., 27 May 2021), 'The theory that the Allee effect could be contributing to the extinction of the species is supported by the fact that individuals are becoming more and more isolated and not meeting often enough for successful reproduction. The current Allee effect is solely caused by humans encroaching into the habitat of the rhinos. As you know, this species has always been solitary and has existed in low numbers for a very long time, but the density and numbers were sufficient for maintenance and genetic diversity. Recently, humans have encroached into every forest containing rhinos which have led to the extreme isolation of individuals.' This species' growth and reproductive

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phases need time since the male becomes sexually mature at age 6–6.5 and the female at age 5–5.5. Gestation lasts 16 months, and the calf remains with its mother for approximately three years, requiring a long planning period for this species' conservation. Today, seven rhinos are thriving at the SRS, thanks to the captive breeding project and skill of the staff at the Cincinnati Zoo and SRS.

As previously demonstrated, the capture, acclimatisation, and transport of Sumatran rhinoceroses are skillful, complex, and delicate processes. The pioneer project provided plenty of information on how to set up and consolidate such complex operations. The project also advised how to devise new ways of capturing, handling, providing health, translocating and breeding the species in controlled environments. Talent and experience are fundamental to resurrect a new, winning project. Successful breeding at the Cincinnati Zoo and SRS are proof of the successful Sumatran rhinoceros captive breeding. Indeed, no losses occurred in the SRS facility; the male Torgamba died of old age, two rhinos were born and the group of seven individuals is thriving. Had the initial pair of Sumatran rhinoceroses not arrived at the Cincinnati Zoo, some of the species' vital and peculiar ecological characters would likely remain unknown, given that births in captivity had never occurred, and the SRS did not exist. The Indonesian Government made the commendable decision to establish breeding groups in different locations.

With these varying breeding groups and 17 years of successful events, it is perplexing that more rhinos have not been captured in numbers. If rhinos are still present in the forests, their numbers are no longer adequate to propagate the species, given how scattered they are. Today's good intention 'of catching isolated rhinos' is insufficient. The plan should include robustly protecting in situ viable populations in intensive protection zones (e.g., Gunung Leuser) and capturing all the other Sumatran rhinoceroses to release them into new Sumatran rhinoceros sanctuaries to be managed as a single breeding program. These last 'forest ghosts' need our help to meet each other now. Managed conservation should be started while the numbers can support ex situ conservation as the genetic reservoir and with offspring reintroduction.

Present and future

Shifting our focus to present day, the Sumatran rhinoceros (*Dicerorhinus sumatrensis*)is on the verge of extinction. Decades of well-intentioned, 'politically correct' conservation activities have not changed its 'demise' trend. Neither will a reversal of the situation in a few years unless the policy is changed (Nardelli 2020). The decline in the Sumatran rhinoceros's numbers was initially attributed to poaching and habitat loss. However, it is now known that reproductive

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failure has played a large part, equally affecting the wild and captive populations (Schaffer et al. 2020). Populations of Sumatran rhinoceroses in Indonesia are small, scattered and lack unrelated mates for breeding, possibly leading to inbreeding and isolation-induced infertility. Problems with conception among the females of captive and wild populations compound the breeding program. According to Shaffer et al. (2020), capturing rhinos with compromised breeding will not improve the situation, adding that 'the success of efforts to build a viable captive population will depend upon assembling fertile animals and probably the application of assisted reproductive techniques to boost production'.

Considering how to prevent the Sumatran rhinoceros's extinction, the ex-situ breeding of endangered species has been a major support and insurance for their survival. Recent camera trap photos in Sumatra in Way Kambas National Park and parts of the Leuser Ecosystem show mothers with offspring. I read that a female was also recently sighted in Kalimantan (Yovanda 2020). Schaffer (2020) further noted in an unpublished report that very few fertile rhinos are left anywhere. The researcher goes on to say that 'the most cost effective source of fertile rhinos should be the immediate pursuit of animals in areas that have recent (less than 3 years) camera trap photos of females with babies. Saving these animals is urgent, since they will continue to progress toward infertility. Waiting will also compromise their usefulness for the assisted reproductive technology (ART) program'.

Considerations for future conservation planning

In evaluating how to take action, I recently wrote (2019) that the quality of ex-situ environments is fundamental for successful conservation breeding. As custodians of the last Sumatran rhinoceroses, we must ensure their limited habitats are safe and healthy for them to prosper. The new concept's facilities are a priority. There is no time. Concerned parties must provide innovative management urgently to stem this fall. Indeed, only one rhinoceros has been safely captured since 2018, and no reproduction has been recorded in captivity since 2016. Among the remnant rhinoceros populations remaining, most isolated individuals cannot meet and breed (Shaffer et al. 2020).

State of Emergency

A government declares a state of emergency when a natural disaster occurs or is imminent. If a state of emergency is declared to save the Sumatran rhinoceros, resources will be availed immediately to rescue and quell disturbances in localities where the last rhinos survive. Successes with the Californian condor (*Gymnogyps californianus*), the European bison (*Bos bona-*

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sus), the White oryx (*Oryx leucoryx*)and other endangered species should have taught us some valuable lessons. Conversely, let us not forget the fate of the Thylacine (*Thylacinus cynocephalus*), the Quagga (*Equus quagga quagga*), the Malaysian population of the Sumatran rhinoceros (*Dicerorhinus sumatrensis harrissoni*), and other species that have gone extinct. Should we wait until only a handful of individuals remain before we try to stop the spiral to extinction?

The answer is that we must take action immediately. A state of emergency will deter activities that might further threaten the Sumatran rhinoceros's survival, such as constructing new roads (Hanafiah 2020) in their habitats. In a state of emergency, governments and wildlife stakeholders will prioritise efforts focusing on rescuing and translocating as many rhinos as possible to controlled breeding centres.

I recommend the following protocols to ensure animals are integrated into emergency planning:

- Focus on preparedness training with more resources allocated to planning and improving coordination at every level, from the community level to the government level.
- Specific training must include logistics, planning, overhead management, animal care and control, and veterinary care.
- Adopt proper trapping codes and animal handling protocols to prevent disasters.
- Sumatran rhinoceroses should be finally held in new concept structures, dissimilar to the SRS facility (Nardelli 2019).

I foresee the lack of proper food and the species solitary life as serious problems to be prioritised in captive management.

Conclusion

Conserving a species is a multi-faceted activity; one approach is often insufficient. Captive breeding and other strategies should be observed not in substitution but in addition to efforts to conserve wild animals in situ. If we retain the status quo, the Sumatran rhinoceros will become extinct despite a global commitment to protect the species. At one time, a few visionary people came together and put aside their biases to conserve a species in the midst of being misunderstood, criticised and even condemned, only for their opinions to be recognised much later. Therefore, people and knowledge are available. Let us create the momentum to make critical decisions and action to conserve the Sumatran rhinoceros.

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*Member IUCN/SSC Asian Rhino Specialist Group

Patron Save the Rhino International

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