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CHAPTER 15

Large mammals – Malayan seladang and Bornean banteng

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Abstract: Malaysia has two native wild cattle species that have a mixed grazing and browsing diet. Their post-Pleistocene distribution and survival are linked to grassland, a habitat now concentrated along roadsides and rare elsewhere as permanent agriculture has replaced swidden farming. Coupled with a long history of hunting, near-absence of grassland in remaining forests has led to a decline in both species to a few small, separate herds on a trajectory towards extinction. Interventions led by BORA (www.bringingbackourrareanimals.org) over the period 2019 – 2025 are described in this paper, with emphasis on creation of managed grasslands in Royal Belum State Park and Tabin Wildlife Reserve.

INTRODUCTION

Malaysia has three native species in the family Bovidae: Serow (*Capricornis sumatraensis*, not mentioned further in this paper), seladang or Malayan gaur (*Bos gaurus hubbackii*) and tembadau or Bornean banteng (*Bos javanicus lowii*). Seladang represents the southernmost race of the largest wild bovid on mainland Asia, while Bornean banteng represents one of three races of a formerly widespread species now with a disjunct distribution on mainland Asia, Java and Borneo. Both latter species have a mixed grazing and browsing diet. Neither species is well-known to the public, partly because they are extremely rare, but also because they are regarded as "just cattle".

After the Last Glacial Maximum (around 18,000 years ago), sea levels rose to cover the former savannah and woodlands that are now under the South China Sea. Charles Wharton (1968) demonstrated that, after around 11,000 years BP, human use of fire to burn forest and in more recent millennia to grow food crops — thereby evolving a swidden farming system with long fallows containing grasses — was key to sustaining habitats that allowed survival of wild bovids in Southeast Asia during the Holocene epoch.

Both species in Malaysia were widespread and locally common in the late 19th century. Sixty-four years ago, concern was expressed in the Malayan Nature Journal 21st Anniversary Special Issue over the status of both seladang (Kitchener 1961) and Bornean banteng (Burgess 1961). In 2025, the problem to be addressed is not that the estimated overall numbers of both species are in the very low hundreds of individuals. It is that no herd consists of more than about thirty individuals. The herds are isolated from each other and that absence of grassland is preventing recovery.

In the Malayan Nature Journal 81st Anniversary Special Issue 2021, Payne *et al.* (2021) described the status of both species in Malaysia, concluding that their extinction can be prevented only by creating managed grasslands within forests and through *ex-situ* (captive) breeding. The thinking behind feeding sites is simple: bovids require a large percentage of grasses in their diet; there is very little grass in places where the few remnant herds exist; without interventions, the already-low productivity of grasslands available to these bovids

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will decline as woody vegetation tends to overtake grasslands in equatorial, high-rainfall areas. The thinking behind captive breeding is also simple: an enormous amount of information and experience exists on managing captive cattle, and captive breeding provides insurance against possible failure to maintain wild herds.

CONSERVATION STATUS

Malayan seladang in Royal Belum State Park, 2021-2025

Belum is now one of the few relatively accessible sites containing a remnant cluster of seladang. Initially, a programme conducted there over 2021 – 2023, co-led by Perak State Parks Corporation and BORA, and co-financed by the National Conservation Trust Fund, aimed to investigate relatedness of individuals using faecal DNA. However, more urgent concerns quickly became apparent.

Reports on seladang presence in camera trap images commonly fail to distinguish between bull seladang (which may wander many tens of kilometers from breeding herds) and herds, and between herds that consist only of adults and herds with calves. The latter are vital to prevent extinction. Camera trap images of seladang in Belum dating from 2007 to 2021 provided by PSPC and WWF-Malaysia were analysed by one of the authors (ZZZ) with the intention to assess changes in observed numbers, body condition, reproduction and demography.

Evidence was found of only two reproducing herds in Belum. One was along the upper reaches of the Perak river at about 20 individuals, while the other, even smaller, was around Tiang-Kuak. The number of female seladang in adjacent forest reserves (Amanjaya and Temenggor) is even fewer. Interviews with old residents of upper Perak indicated that most former seladang habitat is either now inhabited by humans or has been under water for the past 50 years when the Temenggor Dam was completed. The Belum camera trap images and records of footprints indicated that cow seladang reproduce only in areas, where there is grassland and natural concentrated mineral sources, which represent less than 0.5% of Belum's total area. Despite being within a totally protected area, seladang numbers had not increased in Belum over 15 years (2007 – 2022). Furthermore, population numbers are likely experiencing a gradual decline. The actual birth rate is significantly lower than the species' reproductive potential, while body condition in seladang varies through the year. There are probably more males than females, and weaning of calves appears to be slower than is normal for cattle. Lack of grass was identified as probably the main reason for these observations.

In parallel with the Belum field work, a detailed analysis of the captive seladang herd initiated since the mid-1980s at Jenderak Selatan, Pahang, revealed that the observed high mortality prior to adulthood and poor breeding performance in this herd is closely related to an unsound captive environment and poor management practices, with no evidence of genetic problems (Norsyamimi *et al.* 2023).

Despite initial concerns over planting grasses in a protected area, a decision was made by the authority to initiate expansion of grassland at one experimental riverside site within Belum commencing in September 2022. An old female seladang was shot dead next to the grassland on 3 August 2023. A post-mortem examination revealed that she had been wounded by shooting on at least two previous occasions. Clearly, both lack of grasslands and illegal hunting in Belum are both threats to the species there.

A two-day workshop was convened in September 2023 to present the results of the programme and obtain stakeholder feedback. Amongst the 44 participants, representatives from PERHILITAN, Forestry Department, Malaysian Army (which has a long-standing

camp near to the grassland) and several NGOs were present on both days. In early 2024, a report on the work was provided to the main project donor, along with 'A preliminary seladang conservation plan for Royal Belum State Park and adjacent areas' and a list of plants that had been identified during the work as seladang food plants in Belum, including 16 grasses and sedges, and 18 other plant species. In early 2024, three NGOs (BORA, The Habitat Foundation and WWF-Malaysia) wrote to the Minister of Natural Resources and Environmental Sustainability, proposing several seladang conservation initiatives. On 30 August 2024, the National Biodiversity Council agreed to recognise the seladang as an endangered species of national importance, to stabilise the seladang population, and that a seladang conservation management plan will be developed.

Bornean banteng in Tabin Wildlife Reserve, 2019–2025

The Bornean Banteng Action Plan for Sabah 2019 – 2028 (Sabah Wildlife Department 2018), currently under review, indicates fifteen separate locations supporting this species, with fewer than 400 individuals in total. Apart from one small cluster in the Sarawak and Brunei border area (Phillipps and Phillipps 2018), the Bornean banteng exists in a few scattered sites in some Kalimantan provinces (Dewi and Santoso 2020). There are no Bornean banteng in captivity.

Work was conducted by BORA from 2019 – 2025 within the western boundary of Tabin Wildlife Reserve, Sabah, to monitor by monthly examination of camera trap videos the response of a wild Bornean banteng herd to development and maintenance of a 5-hectare pasture with added mineral sources. The site was chosen because BORA has been based nearby since 2009. Prior to the 1960s, the entire region was covered in closed-canopy dipterocarp forest, with prime banteng habitat confined to the banks of the largest rivers in the region more than 5 km from the remnant herd. By 2018, the area where the residual banteng spent most of their time included a privately-owned grassland initiated around year 2000, an oil palm estate and an abandoned road (known as Tomanggong road) built and used from around 1972 to 1984 for log extraction from the surrounding forest. By 2018, most of the Tomanggong road had been reduced to a 1 – 2 meters wide pathway maintained by ungulates through thick secondary plant growth composed largely of native and invasive exotics forbs and shrubs. In 2019, BORA chose a 2.5 km stretch of the road for interventions aimed at improving banteng nutrition. Monitoring by BORA and WWF-Malaysia throughout Tabin Wildlife Reserve since 2021 indicates that the herd reported here is now the only remaining herd of banteng in the Reserve.

Starting in 2020, grasses on the road were manually cut to favour new growth while plant species rarely or never eaten by banteng were removed manually, monthly. Ten kilograms of multi-mineral blocks (containing Na, Ca, P, S, Fe, Mn, Mg, Zn, I, Co, K, Se and Cu) were put in place at five sites along the road, with replacement as necessary. Initial preparation of the 5 hectares (2.5 km × 20 m) took almost one year of effort. Monitoring was done using eight to twelve camera traps from October 2019 to present. Images and video clips have been analysed manually every month by ZZZ, and tabulated for body condition scores, health, behaviour, age, individual identification, reproduction, and distribution. Initially, the ages of banteng seen on camera traps were estimated based on daily records of weight and height of two Bali cattle (closely related to Bornean banteng), one male and one female that were hand-raised from a week after their birth by BORA staff from January 2020 to mid-2021 in the Faculty of Sustainable Agriculture, Universiti Malaysia Sabah. Subsequently, the known ages of Bornean banteng calves born during this study were used as a guide. Measuring stakes were installed in front of several camera traps to measure the shoulder height of individual banteng as an indicator of age and growth. It was assumed that, as with cattle and Malayan gaur (Norsyamimi *et al.* 2023), individual Bornean banteng cows can calve once a year in healthy condition.

All the observed favoured food plants were grasses, notably (in decreasing order of preference) carpet grass (*Axonopus compressus*), buffalo grass (*Paspalum conjugatum*), giant paspalum (*Paspalum urvillei*), itchgrass (*Rottboellia glandulosa*) and *Leptochloa panicea*. *Paspalum urvillei* and *R. glandulosa* had to be trimmed periodically before the culm became too tall for banteng to feed on them, but the other three species were grazed sufficiently by banteng and deer to retain a lower height. Weed removal proved to be the major consumer of time. Airborne and bird dispersed seeds of forbs, shrubs and woody plants frequently shower the Tomanggong road, and germinate rapidly, one of the worst being *Clidemia hirta*. The multi-mineral blocks proved to be a very significant attraction to the banteng. Actual usage by banteng is impossible to gauge, as the same blocks were licked by many other wild mammal species. Rainfall hastened loss.

It was found that a small number of videos provided far more information than any number of still images. Video imagery captured a greater proportion of a herd, the subtle differences between individuals that are usually unclear in still images could usually be seen, deciding on individual body condition was more accurate, and interactions could be seen between individuals, providing further clues on age, relatedness and dominance. We found that perineal markings were visible in about 30% of all individuals from as early as six months of age, with size, shape and configurations of the markings unique to each individual and not changing with time. Demography, births and overall herd size of the Tomanggong road banteng, as observed from camera trap videos and images, are summarised in Table 1.

Table 1. Demographic data of the Bornean banteng recorded along Tomanggong Road in Tabin Wildlife Reserve from 2019 to 2024, based on observations from camera trap images and videos.

Year	**2019**		**2020**		**2021**		**2022**		**2023**		**2024**	
Age Categories	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dominant bull	2	5	4	4	2	3	3	4	2	3	3	4
Adult bull	1	2	2	3	1	3	1	3	2	3	4	6
Heifer bull	2	3	3	4	1	5	2	3	4	5	5	5
Cow	5	6	5	6	6	7	6	6	8	8	10	10
Heifer	1	3	3	3	3	5	1	4	3	4	4	5
Calves	3	3	3	3	3	3	6	6	8	8	6	6
Total	14	22	20	23	16	26	19	26	27	31	32	36
Average	**18**		**21.5**		**21**		**22.5**		**29**		**34**	

CONCLUSIONS

The observed increase in calving percentage (number of calves born / number of 'exposed' females × 100) in the Tomanggong road banteng herd from 48% for years 2019 – 2021 to 86% for 2022 – 2024 suggests that the grassland and mineral block intervention has been beneficial. Recovery of seladang and Bornean banteng must involve creation and maintenance of more managed grasslands as well as anti-poaching effort. Captive breeding effort has stagnated and requires governmental leadership.

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