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CHAPTER 11

Human-wildlife conflict: Perspectives from Sabah, Malaysian Borneo

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Abstract: Human-wildlife conflict happens when wild mammals with a large adult body mass enter lands cultivated by humans and feed on or damage human crop plants. There are only two options for solving human-wildlife conflict: either provide the problematic wildlife with alternative food sources forever, or keep the numbers of individuals at agreed, low numbers by culling or contraception. Other actions can be supplementary (notably electric fencing if located, built and maintained properly and consistently), but no other method will solve the problem. Two examples are offered: providing wild elephants with an alternative food to oil palms, with proven positive results in Sabah, and vasectomy of macaques, an option that is entirely feasible, but currently resisted.

INTRODUCTION

The concepts of 'weeds' or 'pests' or invasive species are used when referring to human conflict that occurs with plants, invertebrates, fish, amphibians, reptiles, birds or small mammals. These are generally addressed by extermination using chemical poisoning and other similarly fatal methods. Review of related literature and observation of social media content suggests that 'human-wildlife conflict' refers specifically to cases when wild mammals with an adult body mass exceeding about 5 kg enter lands cultivated by humans and feed on or damage human crop plants. Descriptions of human-wildlife conflict are not new, whether in Sabah (De Silva 1968), or Peninsular Malaysia (Foenander 1952, Guérin *et al.* 2018, Teckwyn and Campos-Arceiz 2021). Not many species are involved in human-wildlife conflict in Sabah. Obvious ones include elephants and macaques, to which porcupines, wild pigs and orangutans can be added in some agricultural contexts, along with some mustelids and viverrids in animal farming contexts. Those mammals come into conflict with humans because of a combination of three main factors: (a) mammals, like all life, strive to reproduce, (b) to reproduce, they need regular nutritious food, (c) the habitats in which residual clusters of these mammals exist are too small or of too low quality to supply sufficient year-round daily food to sustain reproduction, so they venture into farms, plantations and villages to obtain sufficient food for their health and reproduction. Once this is understood, the potential bases for managing the conflict becomes clear.

There are only two underlying approaches to solving human-wildlife conflict. One is to limit growth in numbers of the existing cluster of individuals. The other is to provide alternative food sources for the problem mammals, sources that are at least as good and productive as the cultivated or farmed foods managed by humans for human use. In either case, human society has to accept that there will be an upper limit to the number of individuals of the target wildlife species alive at any one time in any given cluster (although we do not need to know exactly what that number is). Any other form of purported method aimed at solving human-wildlife conflict will either fail, or make a small and unsustainable dent in the conflict, or be supplementary to the two fundamental approaches. Other solutions seem to be largely reactive (rather than proactive), aimed at specific clusters of animals (rather than population level), specific sites (rather than regional), and either emotion-based (rather than science-based) or academic (rather than pragmatic).

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In contrast to common practice in North America, Europe and African nations, there is an extremely strong sentiment in Malaysia amongst a vocal minority of predominantly urban citizens that condemns culling or contraception. Again, in the minds of those who oppose culling or contraception, there is a link to body mass, as they seem to have the same view in relation to problematic feral dogs and crocodiles, but not for rats, squirrels or bats. In other words, the objections are emotional and neither ethical nor rational. The minority objections over-ride the personal loss and anguish of tens of thousands of farmers whose crops are ruined annually, the dozens of nature tour guides who see macaques wiping out eggs and hatchlings from every wild bird nest, as well as orangutans under constant stress, and the thousands of cases annually of *Plasmodium knowlesi* malaria incurred by Malaysian human residents from the wild macaque zoonotic reservoir. A minority public opinion seems to have bullied the wildlife authorities into minimising or stopping culling, and ignoring contraception as a possible alternative approach (e.g., Mayberry 2013). As noted by Thomas Sowell, '*It is hard to imagine a more stupid or more dangerous way of making decisions than by putting those decisions in the hands of people who pay no price for being wrong.*'

Human conflict with Bornean elephant

Wild elephant clusters can grow at an annual rate of increase of 3% or more (Sukumar 1989), meaning that the cluster will double in size every 24 years in the absence of culling, poaching, poisoning, contraception or starvation. In Sabah, annual elephant mortality from human causes in recent years has been about 30 elephants (Sabah Wildlife Department, unpublished data), the majority from poisoning. This number is probably not much less than the number of elephant births annually, thereby accounting for the otherwise mysterious seeming stability in elephant population size in Sabah. In other words, elephant culling occurs, but unregulated by government and through a particularly horrible and painful means.

Elephants are bulk feeders. It is well-known that their preference and physiological need is for monocot plants (e.g., palms and grasses) to dominate in their diet (Terborg *et al.* 2025). Most palms in Malaysia now are commercially cultivated oil palms. At any one time, Sabah has about 240 million oil palms with perhaps 5 million cut down and replaced annually. In the Tabin area of Sabah, wild elephants spend about half their time outside the Tabin Wildlife Reserve, feeding predominantly on the meristems and leaf shoots of recently-felled old oil palms (unpublished WWF-Malaysia satellite tracking data over nine years). Presumably, about half their food intake is now oil palms. To fulfil their monocot requirements, they are now dependent on oil palm plantations. While palm replanting is ongoing within the home range of elephants, growers, managers, authorities and NGOs seem content with minimal interventions. However, this will change when there is no felling of old palms, and the monocot food that elephants seek consists of young living palms. Oil palm small-holders in Johor report (personal communication) that nowadays more than one elephant collaborate to push over mature palms in order to access the meristem to eat. The amount of biomass eaten by elephants from a felled palm is unknown, but assuming 120 kg and 140 palms per hectare (MPOB, pers. comm.) with a replanting cycle of 25 years, we can say that the productivity of oil palm biomass eaten by elephants after felling is $120 \times 140 = 16{,}800$ kg divided by 25 = 672 kg per hectare per year.

In contrast, annual biomass production of Napier grass in pastures created and managed by BORA for wild elephants starting from 2021 to present is about 60 tonnes per hectare per year, some 90 times greater than palm. This point is crucial, because elephants (like all mammals) will favour sites where the productivity of their food is highest. Also, palms do not grow back if eaten, but grasses do. Grasses seem common but at landscape scale, they are not. Grass species that grow tall are mostly confined to roadsides. The single best way to wean elephants from their oil palm dependency is to replace oil palms with grass, with total grassland areas of tens to a few hundreds of hectares being equivalent to many tens of thousands of oil palm as well as of thousands of hectares of forest, where non-monocot

plants needed in addition to monocots are super-abundant. BORA started development of elephant grasslands on the southern border of Tabin Wildlife Reserve in 2021. There are now about 22 hectares of managed grasslands in 12 sites on the forest edge. The grass has to be managed by frequent cutting, to ensure most growth is young (therefore nutritious) and grass height is suitable for both immature and mature elephants. Also they avoid grasses that are flowering or have flowered.

It has been suggested (e.g, Pelan Urus Service, n.d.) to use monocot crops other than grasses as a means to draw wild elephant attention away from feeding on oil palms. This idea is often referred to as 'elephant food banks'. We believe that this is unwise. Bamboo growth produces biomass at rates less than half that of grasses. The portion of biomass edible to elephants in bamboo is less than half that of biomass edible to elephants in grass, and nutritional quality of bamboo edible biomass is less than half that of grass. This implies that when comparing bamboo with grass as elephant food, grass is at least four times superior to bamboo in terms of production of quality elephant food. In addition, the energetic cost to an elephant of eating bamboo is much higher than eating the same quantity of grass, as the edible part is smaller in bamboo and the balance of the stems is lignified, hard and produces splinters in the mouth, and cannot be digested. This argumentation does not apply to bananas, but use of bananas to draw elephants away from oil palm has an even more serious drawback: elephants cannot distinguish between plots of bananas planted for them to eat and bananas planted by people to sell. As a result, planting bananas for elephants will draw elephants away from oil palm plantations into serious conflict with village banana farms.

Ample multi-mineral blocks are supplied at grassland sites, as Borneo vegetation is poor in many essential elements notably calcium, phosphorus, sodium, and trace elements needed for growth and reproduction. Elephant visits to and feeding on the managed grasslands have become progressively more frequent over the period of 2021 – 2025. Grasses most favoured by the elephants are *Tripidium arundineceum* and *Cenchrus purpureus* (formerly *Pennisetum purpureum*), and management is done by BORA to promote growth of both. The authors have long experience and are completely confident that neither grass species is invasive. In fact, the opposite is true: many other grasses, forbs, shrubs and woody plants (including trees) out-compete the favoured grasses, and so frequent weed removal is necessary. Unfortunately, the general response to this work has been disappointing. There has been no policy support through the government or the palm oil industry, while NGOs, such as WWF, Hutan, and Seratu Aatai, prefer to persist with satellite tracking (to date, an estimated 100 tracked elephants in Sabah since 2005; Benoit Goossens, pers. comm.) or even promote elephants to freely enter into oil palm plantations. The grassland programme needs to be large-scale and long-term, with grasslands concentrated on the forest-oil palm plantation interface, and supplementary minerals and clean water available at each site. There is no point to plant grasses just because a site happens to be available.

Finally, on management of elephants, the role of electric fencing seems to be widely misunderstood, from three angles. Firstly, electric fencing can work only if sufficient food is available where humans want elephants to be, to incentivise elephants not to try to break through fences. Secondly, electric fencing is a psychological barrier, not a physical barrier. The idea is that any elephant that touches any electric fence will incur a 9,000 – 10,000 volt shock, ensuring that they will never try to break through again. Thirdly, the authors of this paper have examined many hundreds of kilometres of 'electric fence' established with the aim of stopping elephants passing through, in Sabah, Johor, Pahang, and Perak. Our estimate is that well over 95% is not functioning, either because there is no or very low voltage to shock an elephant, or the design of the electric fence was not done correctly to also protect the posts (by 'looping'). Thus, many elephants in Malaysia probably know by now that 'electric fencing' is highly unlikely to give them a shock or that the posts can be

pushed over. Electric fencing erected to keep out elephants in Malaysia is currently a failure. A total re-set is needed, in tandem with the development of grasslands. The great majority of fences need to be reformulated, and a system is needed whereby there is constant maintenance of all. This requires a governmental policy decision and diversion of funds currently wasted on ineffective 'elephant projects' to grasslands and functional electric fencing. By 'functional fencing', we mean the following elements: decide the alignment of electric fences at State-level scale (and not just along human-generated titles or Reserve boundaries); ensure that the design, specifications and construction are optimum (most are currently sub-optimal); and full-time field teams whose sole job is to maintain the fencing with 10kV pulses, 24/7, irrespective of the ownership of the fencing. This concept and approach seems to be alien to the various stakeholders involved in solving human-elephant conflict, yet would be cheaper and much more effective than all the other approaches tried over the past decades.

Human conflict with macaques

A targeted look through social media reports on macaques and humans in Malaysia shows that many people in many situations experience chronic problems with wild macaques. Hilborn and Smith (2023) demonstrated that arguments for the IUCN-approved 'Endangered' status of long-tailed macaques are ludicrous, and that annual population growth of 7 – 10% is normal for this species, equivalent to a doubling in population size in 7 – 10 years in the absence of culling or contraception. Data for Sabah is not available, but from the fact that in Peninsular Malaysia about 70,000 macaques are culled legally annually based on public complaints (i.e. reactive) (PERHILITAN 2022), but macaque numbers remain high, it is apparent that this form of reactive culling is merely freeing up space and food resources for unculled macaques to reproduce and thrive. A programme of proactive culling seems to be socially unacceptable in Malaysia (e.g., Payne 2024). The idea of translocating problem macaques not only perpetuates the reactive, localised and ineffective approach, but it is actually the worst option because it either to transfers the same problem to another site or causes death by starvation of the translocated macaques as pure forest habitats have much lower productivity of macaque foods. There is no need to conduct a study to demonstrate that fact. It is obvious to experienced field zoologists.

A properly funded and supervised programme of vasectomy of male macaques appears to be the only way forward to significantly reduce macaque numbers in Malaysia. Capture, sedation, vasectomy, and release at site of capture is a well-established, humane way to render the males infertile. The programme must be a long-term commitment by the authorities, with annual funding, sensible leadership that focuses on the most problematic sites, done by experienced veterinarians, and supported by dedicated and compassionate staff. The target at every site must be that at least 70% of all adult males are vasectomised. Several years will be needed to show the results. Pushback will happen, with the arguments of cruelty and (from academic circles) human interference with dominance and breeding in macaque troops to be expected. Reactive 'solutions' will surface, such as tying down garbage bins and water tanks, and urging people to stop feeding macaques. It is to be hoped that negatively affected parties such as orchard and plantations managers, rural smallholders, nature tour guides, students on campuses with macaques, people concerned with wild orangutan conservation, human communities affected by zoonotic malaria, and medical specialists in malaria will be vocal in support for a programme to reduction in macaque numbers.

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