Gajah 35 (2011) 36-42

Current Status of Asian Elephants in Cambodia

Matthew Maltby[1]* and Gavin Bourchier[1,2]

[1]*Fauna & Flora International, Phnom Penh, Cambodia*
[2]*Perth Zoo, South Perth, Australia*
**Corresponding author's e-mail: matt.maltby.ffi@gmail.com*

Introduction

Elephants hold particular cultural significance in Cambodia, most famously for the critical role their harnessed power provided in the building of the 12th Century temple of Angkor Wat – the largest religious building in the world. Elephants are also depicted in numerous bas reliefs of ancient battles throughout the vaulted galleries of Ankgor Wat (Fig. 1), as well as at the Terrace of the Elephants (Fig. 3), located in the walled city of Angkor Thom. At 350 m in length and 3 m in height, the Terrace was once used by the King of Angkor to view his armies returning from battle.

Numerous ethnic minority groups use domestic elephants for transport and work. The Bunong tribe of Mondulkiri province (members of this group can also be found in significant numbers across the border in Dak Lak province, Vietnam) has a particularly close relationship with elephants and traditionally used to capture elephants from the wild for domestication. Capture of wild elephants has been illegal since the mid-1990's and only a handful of elders who know how to capture a wild elephant are still alive. The remaining Bunong elephants are rapidly approaching the end of their working lives and with cultural taboos prohibiting the breeding of domestic elephants combined with a preference for riding motorbikes instead of elephants, this shared culture of people and elephants is slowly dying out.

Cambodia has been signatory to CITES since 1997. The Asian elephant is protected under Cambodian law, with illegal killings and attempts to trade in elephant parts punishable by a lengthy jail sentence. However, the resources and capacity of law enforcement officials to combat wildlife crime, both at the provincial and national level is limited and combined with a weak penal system, successful prosecutions of offenders are seldom seen.

Wild elephants

Estimates of elephant numbers

Local people report a mass migration of wildlife, including elephants, between the Cardamom Mountains and Samlaut Hills across the agricultural plains of Battambang and Pursat provinces to the Tonle Sap Great Lake – the largest freshwater lake in southeast Asia, as recently as 50 years ago. Similar movements were reported on the north side of the Great Lake between Beng Per Wildlife Sanctuary and Boeung Tonle Chhmar (Kol Touch, Ministry of Agriculture, Forestry and Fisheries, pers. comm.). However, these seasonal rhythms have been steadily eroded over the past decades, as lowland forest habitat has been lost to development, the expansion of agricultural lands and the building of major roads and infrastructure. These factors were compounded by the civil war of 1975-79 where people suffering under the Pol Pot regime were forced to hunt elephants and other wildlife for food, as well as Khmer Rouge soldiers who commonly hunted elephants to sell ivory for cash. The following twenty or so years of political instability coupled with widespread firearm ownership resulted in what is now largely considered to have been a massive decimation of wildlife, especially large mammals, nationwide.

In 1993 the existing 2.2 M ha protected areas system was revised, with the proclamation by King Norodom Sihanouk of twenty-three new protected areas in an effort to safeguard what remained of Cambodia's natural heritage.

Figure 1. Bas relief at AngkorWat.

Indeed, elephants were referred to as a "national indicator of hope" (Ashwell, pers. comm.) when King Norodom Sihanouk returned to Cambodia after the civil war in 1993. Further protected areas have been designated since and it is tentatively estimated that approximately 70-80% of Cambodia's elephants are today found within the boundaries of the protected area system, with the remainder largely in adjacent areas of state forest. However, anecdotal reports prior to 1993 suggest that elephants were still widespread and locally abundant until this time, with a Uruguayan contingent of the UN Transitional Authority of Cambodia reporting a herd of two hundred elephants on the border of Mondulkiri and Ratanakiri provinces (Ashwell, pers. comm.); and local farmers along National Highway 4 between Phnom Penh and Sihanoukville reporting delays of several hours while waiting for elephants to cross the road at the Pich Nil mountain pass during the 1980's.

Previous estimates of the elephant population of Cambodia range from 2000 (Kemf & Jackson 1995), to 500 to 1000 (Osborn & Vinton 1999), to 250-600 (Murdoch 2008), of which the authors consider the latter to be the most accurate. However it must be noted that large areas of habitat remain recoverable (particularly in the Cardamom Mountains). Although threatened by a range of factors comparable to those in other range states, the available habitat is still large enough to support an elephant population much larger than exists today, assuming adequate levels of support to law enforcement and protected area management are in place.

Current elephant distribution

The two largest elephant populations are located in the eastern plains of Mondulkiri province and the Cardamom and Elephant Mountains in the countries' southwest (Fig. 2). Both landscapes are mosaics of National Parks, Wildlife Sanctuaries, Protected Forests and state forests (the latter are not classified as protected areas) and at a size of approximately 1.5 million ha each, they are the two largest PA complexes in Cambodia.

There are smaller trans-boundary populations inside and outside protected areas along the northern border with Lao PDR in Preah Vihear and Ratanakiri provinces, and also a small (rumoured to be around 30 individuals) population in Samlaut district, western Battambang province which form part of a trans-boundary population shared with Thailand. There is also a small population (number unknown by generally thought to be less than 20) in Prey Long forest, which straddles the boundaries of Kompong Thom, Kratie and Stung Treng provinces and is not a protected area.

The Greater Cardamoms Landscape (GCL, often generally referred to as just "the Cardamoms") is a forested mountain complex consisting of the Cardamom (Kravanh) Range, the Elephant Mountains, and Phnom Aural, spanning portions of the provinces of Battambang, Pursat, Koh Kong, Kampong Speu, and Kampot. The area is vast – with almost unbroken forest cover remaining between Phnom Samkos in the northwest of the range to the coastal lowlands of Botum Sakor National Park – a distance of over 170 km. Appoximately 1.5 M ha or roughly 75% of the GCL is designated as some form of protected area, with the remainder classified as state forest, much of which was commercially logged until a national moratorium on logging was passed in 2002.

The vegetation of the GCL can be characterized as largely lowland moist evergreen forest below 600 masl with sub-montane moist evergreen forests associated with elevations higher than 600 masl. Other vegetation formations include coniferous forests associated with ridgetops and sub-montane shrublands, as well as grasslands

associated with ridgetops and shallow soils at higher elevations in the Cardamom Range. There are also bamboo forests with areas that were commercially logged during the 1980s-1990s.

Fauna & Flora International, Conservation International and Wildlife Alliance are the major conservation NGO's currently working in the Cardamoms, supporting a range of activities on strengthening PA management, law enforcement, improving local livelihoods inter alia. However there are numerous areas of significance for elephants currently receiving little by way of direct protection. The area between the Areng valley in the southeast of the Central Cardamoms Protected Forest (CCPF) and Chi Phat village in the Southern Cardamoms Protected Forest appears to hold a greater elephant population than anywhere else in the GCL and encounters between locals and elephants along with low-level HEC are common.

The Eastern Plains (EP) of Mondulkiri province are largely characterized by a mosaic of semi-evergreen and deciduous forests below 600 masl. There is some remaining sub-montane forest above 600 masl but this has largely been converted to grasslands up to an elevation of approximately 900 masl. A number of large protected areas cover the majority of the province, which in 2005 was estimated to have a staggering 94% forest cover. There are currently a range of international conservation NGOs working in the landscape including WWF, WCS and PRCF. The Seima Protection Forest in particular is confirmed to hold a large (ca. 120 individuals) genetically diverse and relatively well protected population (Pollard 2007). It should be noted that the EP are also being proposed as the primary Tiger Conservation Landscape (TCL) in Cambodia which should naturally afford greater protection to elephants and other wildlife as the proposed National Tiger Recovery Program (NTRP) comes into effect over the next decade or so.

Heffernan *et al*. (2001) noted the difficulties of surveying elephants at relatively low densities in forest, using dung encounter rates. However, more recently this issue has been redressed by the advent of molecular techniques and accurate studies based on faecal DNA have been conducted successfully. Faecal DNA based studies undertaken by WCS in the Seima Protection Forest (PF), Mondulkiri province and by FFI in the Cardamom Mountains have indicated a minimum number of individuals of 81 and 135 respectively. Capture mark-recapture (CMR) analysis indicates a maximum number of individuals of 116 in Seima PF, however CMR analysis was not possible for the Cardamom Mountains population due to a paucity of data from the DNA analysis. However, CR analysis yielded an absolute population estimate of 116 (±10) in Seima PF. A second survey in Seima PF was completed in 2011 and analysis of samples is currently underway. Results of this second survey will allow a preliminary trend analysis for this population, the first of its kind for Asian

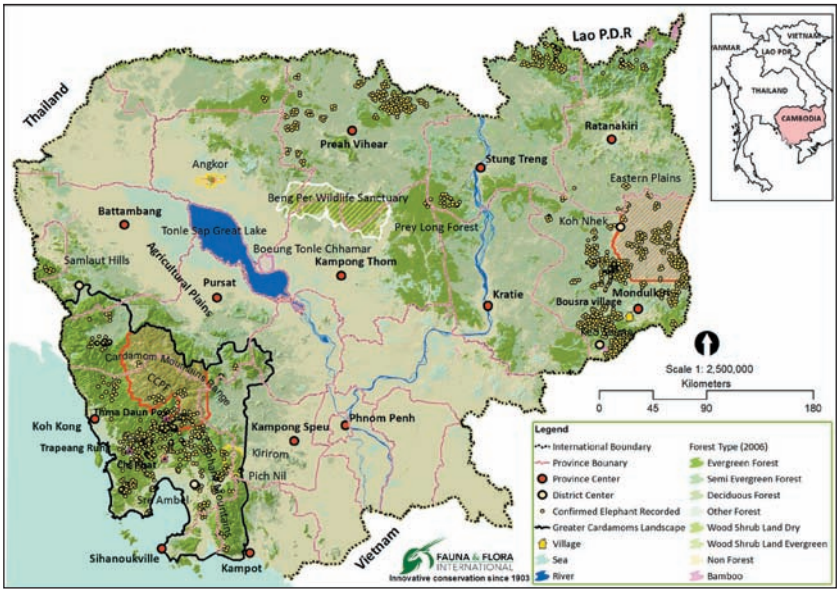

Figure 2. Elephant distribution (yellow) in Cambodia.

elephants in Cambodia. Analogous fecal DNA surveys have also been carried out by WCS in Preah Vihear Protected Forest in the Northern Plains and by WWF in Mondulkiri Protected Forest and Phnom Prich Wildlife Sanctuary, in the Eastern Plans. Both surveys are expected to yield absolute population estimates and the results of the genetic analysis are pending.

Illegal killing of elephants has occurred on an extremely low scale over the past five years, with 2010 being the first year since 2005 that a wild elephant was reported killed due to HEC. Coupling this with numerous field reports from FFI of new elephant calves during the same period, it has been speculated that each of the country's two major elephant landscapes could be tentatively estimated to hold a population of at least approximately two hundred animals (Tuy Sereivathana, pers. comm.). Indeed, new data from ranger patrols indicates that elephants are using huge areas of lowland forest in western Koh Kong province that were previously not thought to hold elephants and have not yet been comprehensively surveyed.

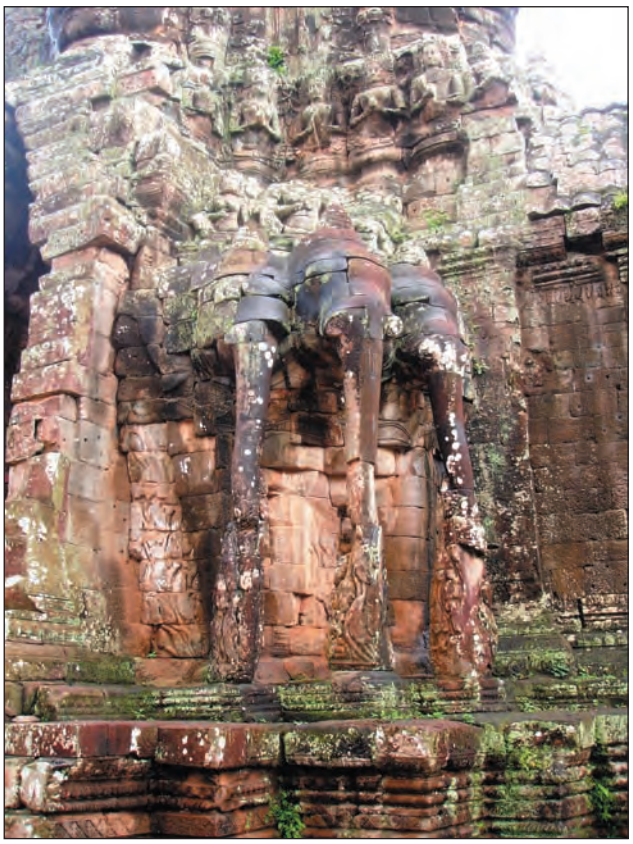

Figure 3. Terrace of the Elephants at Angkor Wat..

Observing elephants in Cambodia remains a huge challenge. Indeed, it is rare for field workers to catch more than an occasional fleeting glimpse of elephants disappearing into the forest. This is probably due to the historically high levels of elephant hunting and a heightened sense of wariness of elephants towards humans. Thus there is currently nowhere one can safely visit and have a high chance of observing wild elephants.

Threats

Four wild elephant deaths were reported in 2010. In Seima Protection Forest, Mondulkiri province, one pregnant female was poached, presumably for body parts and in a separate incident the remains of one juvenile elephant were found, although the cause of death was unknown (KOK Bunly, CHEA Virak, pers. comm. Forestry Administration). One male tusker was killed for ivory inside the Mondulkiri Protected Forest and one female died from suspected starvation in Prey Long forest, Kratie province after losing the end of her trunk to a snare (CHEA Virak, pers. comm.).

The 1999 sub-decree issued by the Royal Government of Cambodia "Management and Control of All Types of Firearms and Explosives" prohibited ownership of all firearms and has been largely successful in removing a lot of guns from the hands of hunters, however an extensive range of firearms still remain reasonably accessible on the black market. An FFI study tour of Indochina in 2010 indicated that Cambodia probably has the lowest level of illegal killings from both direct poaching and due to repercussions from HEC in the region.

25% of Cambodia's land cover is designated as a protected area, compared to a regional average of approximately 11%. Despite this fact, habitat loss and degradation remain the largest threat to Asian elephants in Cambodia.

With economic growth averaging 5.5% over the last decade, protected areas and forests at large are struggling to compete with competing land uses, such as mining operations, hydropower schemes, agribusiness and other forms of economic development. The Cambodia Daily newspaper

recently reported on the current "bonanza of concessions inside conservation areas", and calculated that 1100 km^2 of protected area land was privatized between February and April 2011. This equates to an average loss of 1997 ha per day during the same period. (*Cambodia Daily, 29th April 2011*). By comparison, small-scale land clearing by subsistence farmers remains a problem but is relatively manageable inside protected areas with management plans and assistance from external agencies. Moreover, protected areas receiving little or no technical and/or financial assistance from external agencies generally experience much higher incidence of illegal land clearance, hunting and trapping.

At the turn of the millennium, human elephant conflict in Cambodia was relatively localized but nevertheless acute, and resulted in a small number of injuries and deaths to both people and elephants, (HEC database, FFI, MoE, FA). Key HEC "flashpoints" are along the northern side of National Road No. 4 between Kirirom National Park and Sre Ambel town, Kompong Speu and Koh Kong Province; outer-lying villages around Chi Phat, Thma Daun Pov and Trapeang Rung communes, Koh Kong province; and to a lesser extent various communities around Keo Seima, Bousra and up into Koh Nhek district, Mondulkiri province. It should be noted that the majority of cases reported in recent years occur in areas where people have illegally encroached creating settlements or farmland inside protected areas.

Small-scale crop and property damage is a regular but localized occurrence in a number of forest-edge communities in Koh Kong and Mondulkiri provinces, with individual farms commonly experiencing significant damage to crops overnight. Serious property damage is less common, however one example from Khmer New Year 2009 (Fig. 4) demonstrates the need for constant vigilance on guarding crops when the village-led elephant guarding group left their stations to celebrate in a nearby town. When they returned two days later they found numerous farm buildings and houses destroyed and access to a plantation blocked by trees dragged by elephants.

Elephant management and HEC mitigation

The remit of managing wild elephants is shared between two government ministries: the Forestry Administration (FA), responsible for the management of Protected Forests and the broader forest estate outside of protected areas; and the Ministry of Environment, responsible for the management of Cambodia's twenty three protected areas including National Parks, Wildlife Sanctuaries and Multiple Use Areas. All domestic elephants are required to be registered with the FA.

The initial mapping and design of protected areas in 1993 was largely informed by data on the diversity of vegetation, in an attempt to conserve all areas of floristic significance. Wildlife, including large mammals and elephant were generally abundant and roamed over larger areas in addition to the proposed protected areas. (Ashwell, pers. comm.).

Fortunately these areas (Protected Forests, National Parks and Wildlife Sanctuaries) now overlap with what are now considered to be of major importance for elephant, but this also explains why some areas were not designated as PA's and why "gaps" in the protection of wild fauna remain to date, particularly within the Greater Cardamoms Landscape.

There are no proactive attempts by government or other agencies to restrict the elephant population

Figure 4. Major damage by elephants at Khmer New Year.

to protected areas. This is partly because land use pressures are relatively low on state forests (although they are likely to increase as the country develops) and the likelihood that the majority of crop raiding is done by relatively few individual elephants, plus the fact that the two main PA complexes are so large. Thus, there has never been a need for elephant drives or similar measures to be conducted.

In close collaboration with the Royal Government of Cambodia's Forestry Administration and Ministry of Environment, FFI began work to assist villagers to mitigate HEC in 2003. A range of measures have been employed to date, including support to land use planning initiatives at a village level in an effort to relocate crops vulnerable to elephant depredation away from the forest edge to areas where they can be more easily guarded; a local language "*HEC Toolbox – A Guide for Farmers Living with Elephants*" have been distributed in communities experiencing HEC; and complementary technical support on the deployment of mitigation measures such as fireworks, other noisemakers, watchtowers, planting of bio-fences and solar-powered electric fences is ongoing.

All mitigation measures are very much focused on building community capacity to locally manage HEC without the need for long-term financial or technical support, thus reducing the pressure on under-resourced government departments to deal with the problem. Compensation is never paid to farmers experiencing crop loss or property damage and is deemed to be unsustainable in the Cambodian context, though an insurance scheme could be of use and warrants further investigation.

Data collected by the Cambodian Elephant Conservation Group (FA, MoE, FFI) in 2009/10 shows an average of 2-3 HEC events reported to government every week. Webber *et al*. (2011) reports that damage to crops recorded between 2003-2008 varied significantly by crop, with rice, banana, cassava, sugar cane and papaya most frequently raided, and a peak-raiding season recorded between October-December. Most crop raiding occurs in Koh Kong province, followed by Mondulkiri however there were no significant differences between years. Levels of crop damage were reported to decrease after mitigation strategies such as observation towers, deterrents and fences were implemented (Webber *et al*. 2011).

FFI has been piloting the use of low-cost solar-powered electric fences for four years now. Fence units are lent to community members on a long-term loan basis and after training are responsible for their maintenance. Practitioners in the field report multiple incidents of successful repels and not a single breach of fences to date.

One "rogue" elephant was captured in 2004 and re-housed in the Phnom Tamao Wildlife Rescue Centre after causing high levels of crop and property damage and posing a direct threat to the safety of villagers. The animal was found in a palm-oil plantation in Sihanoukville province and was thought to have originated from Bokor National Park nearby. Upon closer inspection it was discovered that a huge metal spike in the animals foot was the cause of the rampage, and after its removal the elephant made a full recovery in captivity. Translocation of wild elephants is currently not a practice used for elephant management in Cambodia.

Captive elephants

The owners of captive elephants in Cambodia are required by law to register their animals with the Forestry Administration, and this has largely been done. There are perhaps a small number of animals that are not yet registered. The majority of captive elephants are privately owned by individuals, often members of ethnic minority groups in the northeast provinces of Mondulkiri and Ratanakiri. A handful of elephants are privately owned in Siem Reap province and used for tourism purposes around the temples of Angkor; and there are currently five elephants cared for at the government-run Phnom Tamao Wildlife Rescue Centre and Zoological Gardens, as well as three elephants at a poorly run private zoo in Kampot province.

Table 1. Breakdown of elephant numbers by province.

Province	Males	Females	Total
Mondulkiri	26	37	63
Ratanakiri	2	9	11
Takeo	1	4	5
Kampot	2	1	3
Siem Reap	3	15	18
Phnom Penh	0	1	1
Total	34	67	101

In the 1997 FAO report "Gone Astray", captive elephant numbers were estimated to be between 300-600, while Chheang *et al*. (2001) calculated the number to be approximately 162 based on field studies.

A 2009 study by FFI identified 101 captive elephants nationwide (Table 1). However, reports from 2010 suggest that six elephants have since died of old age in Siem Reap province and one male was donated along with one female from Ratanakiri to a zoo in South Korea in an act of "elephant diplomacy". This gives a tentative total of 93 known captive elephants in Cambodia today.

Privately owned captive elephants are largely managed in isolation from other captive elephants, with the exception of seven elephants working with the Elephant Valley Project in Mondulkiri province. However, where possible, captive elephants are often released by their owners to browse for food in surrounding forests. Breeding between captive elephants owned by indigenous groups is actively discouraged and is a cultural taboo. It is thought that past pregnancies were the result of interaction with wild bulls.

There is currently no effort to breed existing captive elephants with a view to maintaining the domestic population in Cambodia. Indeed, many of the animals are too old, with only a handful of candidates scattered across the country that might have breeding potential. Even if political will could be garnered for a breeding program, the cost would be prohibitive. Preserving Cambodia's heritage of elephant domestication is more a question of cultural conservation than it is a wildlife conservation priority and barring the import of animals from overseas or capture from the wild, it is likely that the current captive elephant population will continue to decline and eventually die out in the next 10-20 years.

Acknowledgements

Jessica Rose kindly assisted in the research and drafting of this paper. We thank Hannah O'Kelly and Jeremy Holden for their help with reviewing and editing.

References

Chheang D, Weiler H, Kuy T & Sam H (2001) The status, distribution and management of the domesticated Asian elephant in Cambodia. In: *Giants on Our Hands: Proceedings of the International Workshop on the Domesticated Asian Elephant*. Baker I & Kashio M (eds) Bangkok, Thailand.

Heffernan PJ, Chheang Dany, Venkataraman A, Sam Han, Kuy Tong, & Weiler H (2001) *Studies of the Asian Elephant (Elephas maximus) in Mondulkiri, Koh Kong and Kampong Thom Provinces, Cambodia*. Report to USFWS.

Kemf E & Jackson P (1995) *Asian Elephants in the Wild*. World Wide Fund for Nature, Gland, Switzerland.

Murdoch G (2008) Factbox – Threats facing Asia's endangered wild elephants. *Reuters* <www.reuters.com/article/latestCrisis/idUSSP266929> accessed Nov. 2011.

Osborn FV & Vinton MD (eds.) (1999) *Proceedings of the Conference: Conservation of the Asian Elephant in Indochina*. Hanoi, Viet Nam, 24-27 November 1999. FFI-Indochina. Asian Elephant Conservation Programme.

Pollard E (2007) Asian elephants in the Seima Biodiversity Conservation Area, Mondulkiri, Cambodia. *Gajah* **27:** 52-55.

Webber CE, Tuy S, Maltby MP & Lee PC (2011) Elephant crop-raiding and human–elephant conflict in Cambodia: crop selection and seasonal timings of raids. *Oryx* **45:** 243-251.