

IUCN Regional Conservation Strategy for Wild Cattle and Buffaloes in South-east Asia, 2011 to 2020



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Chapter 1

Summary

South-east Asia is globally important for wild cattle and buffaloes; eight of the world's 12 wild cattle and buffalo species are found here. Five of these species only occur in this region. Wild cattle and buffalo species play a major role in maintaining functioning ecosystems, both as an important prey species and by maintaining habitat diversity through grazing and browsing, and through such behaviours as creating wallows. Also these species are important as a major reservoir of genetic material that could help safeguard and improve domestic cattle breeds throughout the world.

Conserving the eight species of South-east Asian wild cattle and buffaloes presents many challenges with the growing human population in most range States of this region. These challenges include the high rate of land use change and the contrasting low levels of capacity to deliver conservation actions. The species' need for large ranges means their management must be integrated with human land-use requirements and into development plans. Since several of the wild cattle and buffalo species are distributed across South and South-east Asia, effective conservation and management can only be achieved when planned at a regional scale. This effective conservation can be described as being successful by maintaining these species' genetic, ecological, and behavioural diversity as well as facilitating the varying human cultural and economic aspirations associated with these species.

This IUCN-led Regional Conservation Strategy is the first step in a programme to develop National Conservation Action Plans for all wild cattle and buffalo species across their geographic ranges. This Regional Conservation Strategy, which was initiated at an international workshop held in Vietnam in June 2008, is the result of a collaboration between national wildlife authorities from South-east Asia and the IUCN/SSC Asian Wild Cattle Specialist Group in partnership with the Wild Cattle Conservation Project in Vietnam (CIRAD, National Institute of Animal Husbandry of Vietnam, Cat Tien National Park), the Wildlife Conservation Society (WCS), and the Earthwatch Institute.

All Asian wild cattle and buffalo species are threatened with extinction. They suffer from similar threats across the region and several species' ranges overlap so there are clear benefits in planning their conservation together. For some trans-boundary populations of Asian wild cattle and buffalo cooperation between neighbouring countries would allow development of a comprehensive and more effective conservation approach. Additionally, such conservation planning is likely to benefit other species, such as deer, pigs, and the carnivores that require wild cattle and buffaloes as prey.

The geographic ranges of nearly all South-east Asia's wild cattle and buffalo species have contracted considerably due to habitat loss across Asia. Effectively managed protected areas are vital to the maintenance of the distribution of these species. However, many populations still survive in unprotected areas, such that the management of both protected and unprotected areas must be integrated into land use planning.

Populations of all Asian wild cattle and buffalo species are still in decline. Some sites were identified to have stable populations by government participants at the regional workshop, while other sites were stated to have the potential for reintroduction. However, because all species are in decline, the primary focus of this Regional Conservation Strategy is on maintaining current wild populations, rather than reintroducing populations.

This IUCN-lead Regional Conservation Strategy for wild cattle and buffalo species in South-east Asia recognises the need to:

- (i) Eliminate the threat to wild cattle and buffalo populations posed by **killing** or removal of wild animals by people;
- (ii) Maintain and, where appropriate, expand the area of wild cattle and buffalo **habitat**, and increase the proportion of that habitat that is well managed, to ensure the viability and ecological functionality of wild cattle and buffalo populations;
- (iii) Manage interactions with **livestock** to control competition, disease transmission, and genetic introgression;
- (iv) Inform effective conservation and management of wild cattle and buffaloes by collecting, analysing, interpreting and exchanging high-quality and timely **data**, in collaboration with key stakeholders locally, nationally, and internationally;
- (v) Ensure consistency between existing **policies** and, where needed, develop new policies for habitat and species conservation, and promote their implementation at local, national and international levels;
- (vi) Strengthen human, financial, and technical **resources** for conserving wild cattle and buffaloes within range States.
- (vii) Increase the species' profiles by promoting **appreciation** for the economic, ecological, cultural and intrinsic value of wild cattle and buffalo conservation locally, nationally, and internationally;
- (viii) Where necessary, and in accordance with international best practices (e.g. IUCN guidelines), increase the number and long-term viability of wild populations of buffalo and wild cattle through **active management** using modern techniques from genetics, population biology, and other disciplines;

It is proposed that the above objectives are achieved through the development and implementation of National Action Plans for the conservation of all Asian wild cattle and buffalo species. Implementation at the national level is important because most conservation efforts are conducted within the framework of national policies and under the jurisdiction of national wildlife authorities. For this reason, this Regional Conservation Strategy has been written in a format that will facilitate translation into National Action Plans. It is expected that these plans will be implemented by national wildlife authorities, in partnership with relevant NGOs and other institutions.

This report is structured as follows: background information and threats to Asian wild cattle and buffaloes, and introduction to the workshop are outlined in Chapter 2; the status and distribution data compiled at the workshop is summarized in Chapter 3; the threats are described in Chapter 4; and the conservation strategy developed by the workshop participants is described in Chapter 5 and presented as a logframe in Appendix 4 (A logframe or logical framework is a matrix and is used as a management tool to improve the design of intervention).

Chapter 2

Introduction

2.1 **Background**

The South-east Asian wild cattle and buffalo species are today among the most challenging species to conserve. Once wide-ranging, these species have suffered serious declines in numbers of individuals and geographic range over recent decades (IUCN 2010). As large ungulates they require large areas for survival; and with human populations in the region rising and encroaching into their habitat, this is causing increasing pressure from multiple threats to wild cattle and buffalo populations.

All wild cattle and buffalo species are threatened with global extinction (IUCN 2010 Table 2.1). Conserving these species is important for many reasons; they play an important role in their natural environments, with many constituting important prey species for carnivores such as Tigers (*Pathera tigris*) and Dholes (*Cuon alpinus*), and they also help maintain habitat diversity through grazing, browsing and the effects of such behaviours as wallowing. Wild cattle and buffalo species also represent a major reservoir of genetic material that could help safeguard and improve domestic cattle and buffalo breeds throughout the world. For example, the Wild Water Buffalo and Banteng have domestic analogues in domestic Water Buffalo and the so-called Bali cattle.

Table 2.1 Common names, Latin names, and IUCN Red List Status (2010) for the wild cattle and buffalo species that occur in South-east Asia.

Common name	Latin name	IUCN Red List status 2010
Lowland Anoa	<i>Bubalus depressicornis</i>	Endangered
Mountain Anoa	<i>Bubalus quarlesi</i>	Endangered
Banteng	<i>Bos javanicus</i>	Endangered
Gaur	<i>Bos gaurus</i>	Vulnerable
Kouprey	<i>Bos sauveli</i>	Critically endangered (Possibly extinct)
Saola	<i>Pseudoryx nghetinhensis</i>	Critically endangered
Tamaraw	<i>Bubalus mindorensis</i>	Critically endangered
Wild Water Buffalo	<i>Bubalus arnee</i>	Endangered

The only previous conservation planning for all Asian wild cattle and buffalo species occurred in 1995, with the production of the Conservation Assessment Management Plan (CAMP) for Asian Wild Cattle (Byers et al. 1995). Single species action plans have been produced for the Anoas (Mananseng et al. 1996), Kouprey (MacKinnon & Stuart 1989), Tamaraw (de Leon et al. 1996), and for Saola in Laos (Robichaud 1999) and in Vietnam (FPD 2006). Unfortunately, none of these plans resulted in as much effective conservation action 'on the ground' as had been hoped. This problem, a lack of implementation of 'Action Plans', compelled the IUCN Species Survival Commission (SSC) to convene a Strategic Conservation Planning Task Force in 2007. This Task Force recommended a new approach to species conservation planning, presented in a Handbook that was launched at the World Conservation Congress in Barcelona in October 2008 (IUCN 2008a). Key elements of the new SSC process include defining what is meant by saving the species in question and inclusion of

range State government agency staff in the development of the range-wide or regional conservation strategies as well as the national action plans. The new SSC conservation planning approach was used at the June 2008 workshop that resulted in this strategy document.

Three factors hinder conservation activity for South-east Asian wild cattle and buffaloes:

- (1) Capacity to effectively conserve these species is insufficient in most range-state countries, especially in terms of resources and trained management staff.
- (2) Sufficient information is lacking on some species' distribution and local status.
- (3) Lack of interest / awareness / profile of wild cattle and buffaloes

These factors highlight the need for a range-wide or regional conservation planning process, conducted in close partnership with government authorities, that aims to develop a coordinated array of national conservation action plans for all range States. Range-wide or regional conservation planning using an approach similar to that described in the IUCN Handbook (IUCN 2008a) referred to above has successfully been applied to the African Elephant in western Africa (IUCN 2005), Lion in eastern and southern Africa (IUCN 2006), and Cheetah and Wild Dog in eastern Africa (IUCN 2007) and southern Africa (2009). In 2008, recognizing the serious conservation problems facing Asian wild cattle and buffaloes, the IUCN/SSC Asian Wild Cattle Specialist Group in partnership with the Wild Cattle Conservation Project in Vietnam (managed by CIRAD), the Wildlife Conservation Society (WCS), and the Earthwatch Institute, initiated a range-wide conservation planning process for all the species for which it is responsible. The conservation issues associated with these species are being addressed together because, despite their differing ranges, these species share many ecological similarities and face similar threats.

The rangewide conservation planning process used (IUCN 2008a) had six objectives:

- (1) To foster appreciation for the need to conserve Asian wild cattle and buffaloes, particularly among conservation practitioners in range States; this appreciation is to include recognition of the need to maintain ecologically functional populations and to maintain genetic resources.
- (2) To collate information on Asian wild cattle and buffalo distribution and abundance on an ongoing basis, in order to direct conservation efforts and to evaluate the success or failure of these efforts in future years.
- (3) To identify key sites for the conservation of Asian wild cattle and buffaloes, including areas not currently legally protected.
- (4) To prepare specific global, regional, and national conservation action plans for Asian wild cattle and buffalo species
- (5) To encourage policymakers to incorporate conservation requirements of Asian wild cattle and buffalo into land use and development planning at both national and regional scales.
- (6) To develop local capacity to conserve Asian wild cattle and buffaloes by sharing knowledge on effective tools for planning and implementing conservation action.

To achieve these objectives it is vital to bring together specialists on the species' biology with conservation managers from the range States' governments and non-governmental conservation organizations in a series of workshops. Close involvement of government representatives is absolutely critical since they represent the agencies with the authority to implement recommendations at site and policy levels. The range-wide conservation planning process will

eventually cover the entire geographic range of all species of Asian wild cattle and buffaloes.

The large number of wild cattle and buffalo range States makes it difficult to invite sufficient numbers of people and to hold productive discussions if there were only to be a single workshop, thus the AWCSG decided to host two workshops: one covering South-east Asia and the other covering South Asia.

Although most of the Asian wild cattle and buffaloes species' extensive ranges demand conservation planning on a very large spatial scale, wildlife conservation policy is formulated, authorized, and enforced at the national level. It is critical, therefore, that conservation actions be planned at the national level; thus, national action-planning workshops are a vital component of the new IUCN species conservation planning process (IUCN 2008a; 2008b). Both of the wild cattle and buffalo regional workshops will therefore be followed by national action-planning workshops. For example, the South-east Asian regional workshop of June 2008 was followed immediately by a Vietnam national workshop. This process will eventually lead to the development of national action plans for all Asian wild cattle and buffalo species in all range States.

2.2 *Biology and conservation needs of South-east Asian wild cattle and buffaloes*

All cattle and buffalo species belong to the family Bovidae, which contains all artiodactyl (even-toed) ungulates possessing non-deciduous horns mounted on bony cores. The number of wild cattle and buffalo species is far higher in South-east Asia than anywhere else; of the world's 12 extant wild cattle and buffalo species, eight are found in South-east Asia. The complex evolutionary history of the region and the large ranges of wild cattle and buffalo species have led to this high diversity of species (Hassanin and Douzery 1999, Ritz et al. 2000) and to considerable variation in morphology, genetics, and population structure within at least some of these species (Burton in prep., Corbet & Hill 1992). Unfortunately, the biological features of this group, which typically include a slow growth rate, delayed maturity, and low fecundity, exacerbate the threats they face by limiting their ability to recover from the more serious dangers posed by human exploitation.

Species of Asian wild cattle and buffaloes inhabit a high variety of ecosystems, from grasslands, forests, mangroves, and scrubland, to alpine tundra and cold desert regions, and they range from sea level to 6000m elevation. Most of the species are thought to have large home ranges, and these large home ranges make it difficult to maintain large populations that are genetically viable and ecologically functional.

All eight species of wild cattle and buffalo living in South-east Asia are in decline, which is not surprising considering the similar trend among other terrestrial species in South-east Asia (Schipper et al. 2008). This decline is largely due to the high levels of illegal hunting of these species and the loss and degradation of their habitat. However, accurate assessment of their conservation status is made difficult because of their low population density and by the limited surveys so far conducted.

2.3 *The South-east Asian regional conservation planning workshop for wild cattle and buffaloes*

The South-east Asian regional workshop on conservation planning for wild cattle and buffaloes was held from 9th-13th June, 2008, at Tam Dao National Park in Vietnam. Forty delegates attended, including government and NGO representatives from Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam as well as species specialists from the USA, UK, and France. In addition, range State representatives from outside South-east Asia (India and

China), who were involved in the status review, were also present for the discussion about conservation strategy (Figure 2.1). A number of people who were unable to attend the workshop also contributed data (these people are listed in the acknowledgments section and in Appendix 1).



Figure 2.1 Delegates to the conservation planning workshop for South-east Asia wild cattle and buffaloes, held at Tam Dao National Park, Vietnam in June 2008. See Appendix 1 for full list of participants.

The South-east Asian workshop had two principle objectives: 1) to collate information on Asian wild cattle and buffaloes' status and distribution within the region, in a format that could be used to inform conservation planning; and 2) to prepare a range-wide conservation strategy for the species' conservation. The intention was that the conservation strategy that resulted from the Vietnam workshop could be used as a template, with fairly minor modifications, to develop national action plans for all the species' range States in South-east Asia.

Chapter 3

The Distribution and Status of Wild Cattle and Buffaloes in South-east Asia

3.1 Current distribution

3.1.1 Categories of current geographical range

As the distribution of wild cattle and buffaloes is imperfectly known across South-east Asia, the mapping process recognized six categories of current geographical range that incorporates the status as well as the geographic extent (Confirmed, Unconfirmed/Possible, Doubtful, Extirpated, Recoverable and Unknown). Full details of the definitions can be found in Appendix 3.

3.1.2 Current distribution across different range categories

Figures 3.4 to 3.9 show the distribution of six species of wild cattle and buffaloes from the South-east Asian geographic range mapped, in 2008, according to these six categories; Table 3.1 presents the same data in a quantitative format. Information of significance is highlighted below each species map.

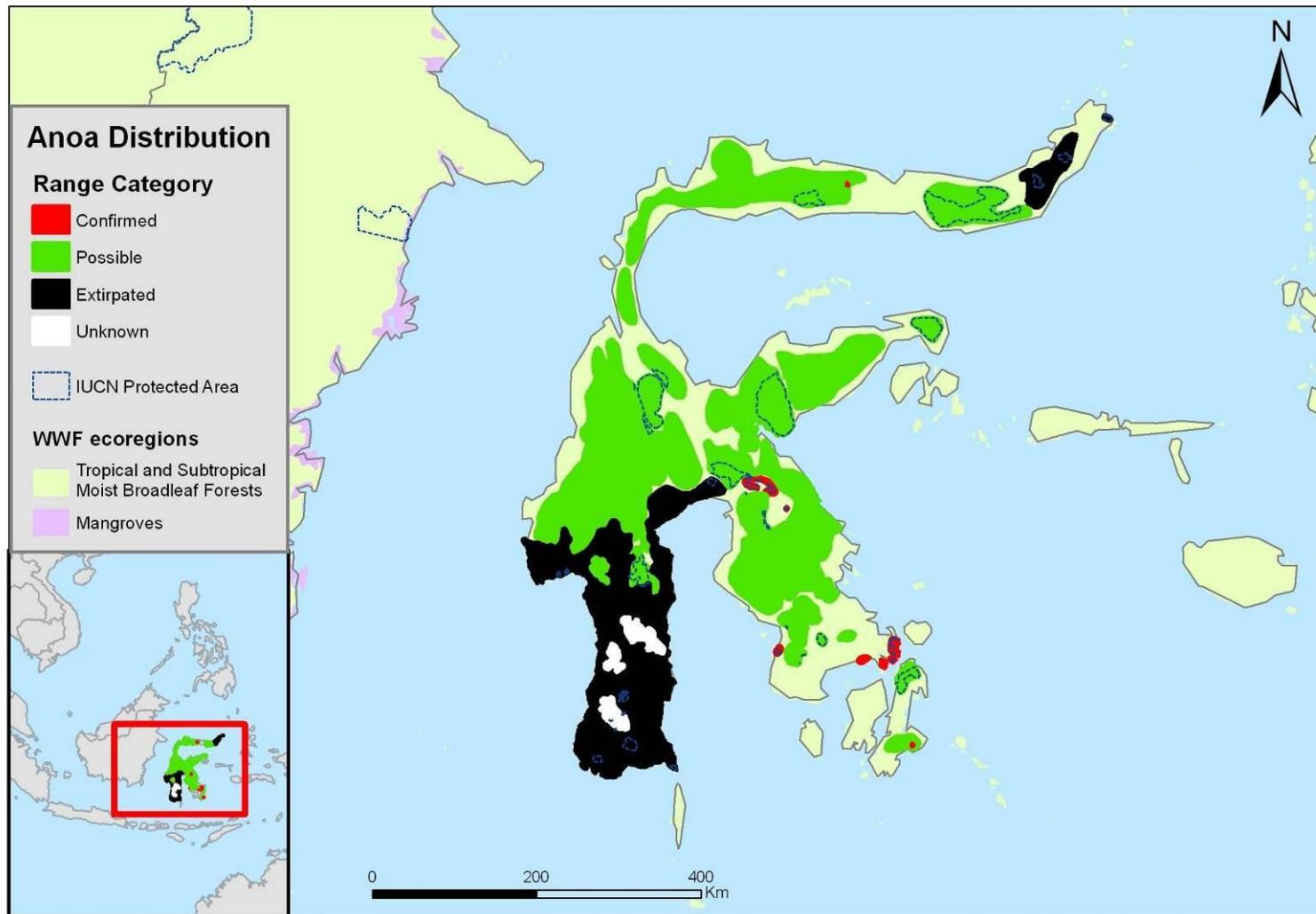


Figure 3.4 Anoa distribution in Indonesia in 2008. Note that the two currently recognized species – Lowland Anoa and Mountain Anoa – are combined on this map because of the controversy surrounding the number of Anoa taxa and the difficulties of distinguishing between the different forms using the often poor-quality data on their distribution.

Anoas are only found on Sulawesi and Buton Islands in Indonesia. Anoas are ‘confirmed’ in relatively small areas in the south-east and north Sulawesi and on central Buton Island. Most of the remaining parts of these islands are considered as ‘possible’ Anoa range and they are thought to have been extirpated from much of the south and eastern end of the northern peninsula.

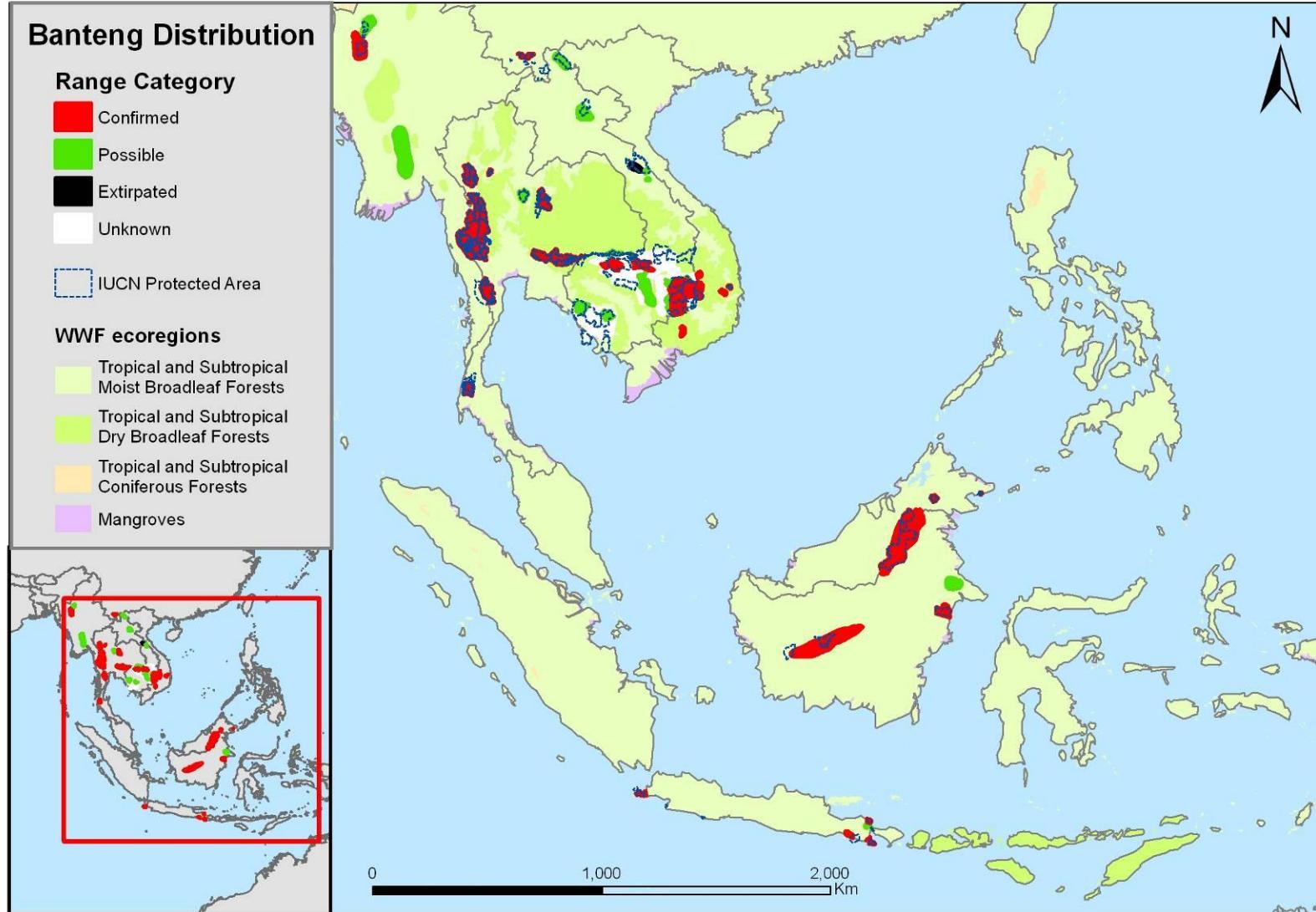


Figure 3.5 Banteng distribution in South-east Asia in 2008 (note: the entire range of Banteng is shown on this map).

Banteng are confirmed across the majority of range states in South-east Asia. The largest 'confirmed' areas exist in Kalimantan (Indonesian Borneo) and Thailand. Other 'confirmed' range areas for Banteng are located in Myanmar, Cambodia, Java (Indonesia), Sabah (Malaysian Borneo), and Vietnam.

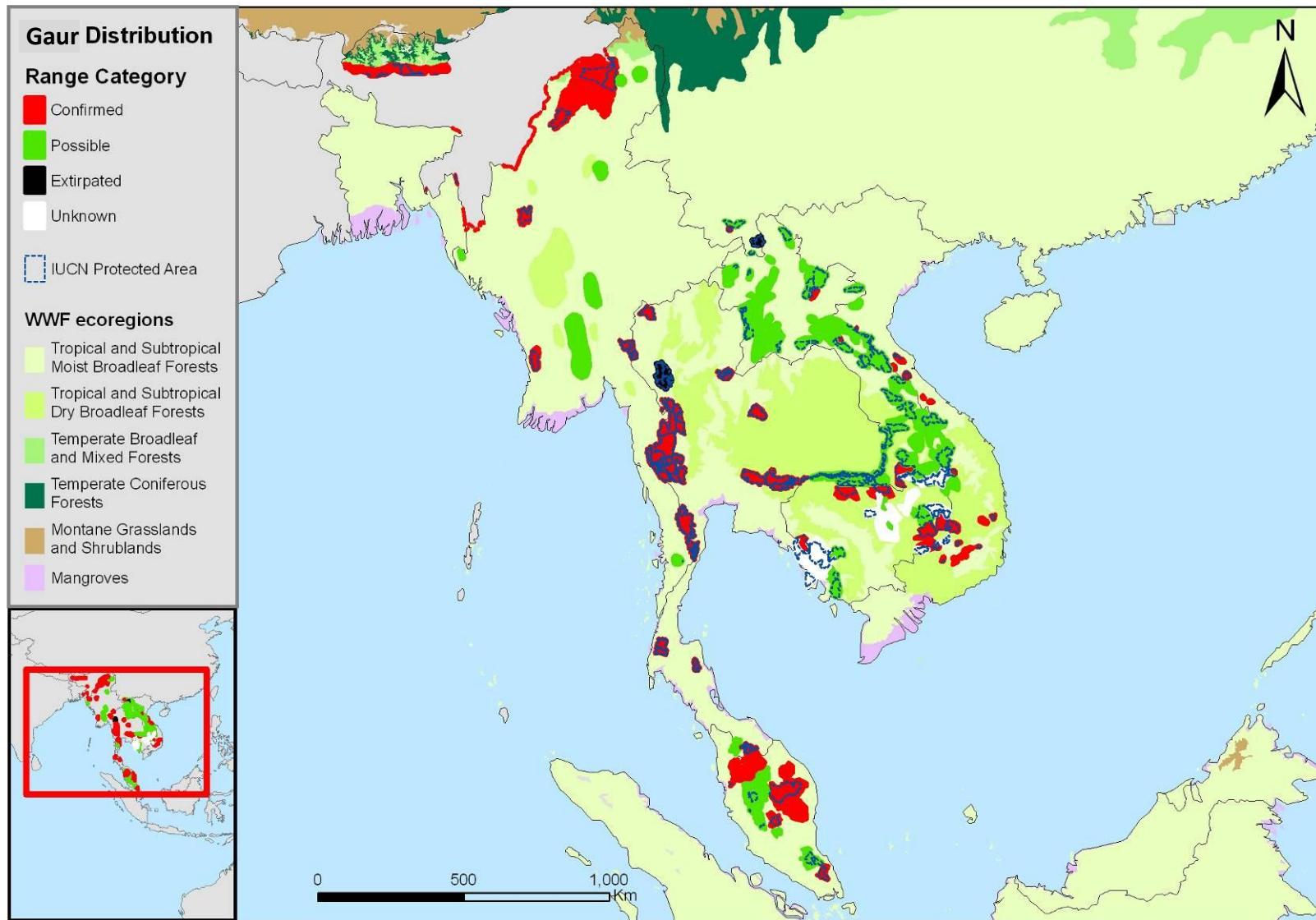


Figure 3.6 Gaur distribution in South-east Asia in 2008.

Gaur are a widely distributed species. However, the remaining populations in South-east Asia are mainly small and isolated. Gaur are confirmed from all range States within their South-east Asian range, with the larger areas of 'confirmed' range existing in Malaysia and Thailand. There are considerable areas of 'possible' and 'unknown' range in the Lao PDR and Cambodia.

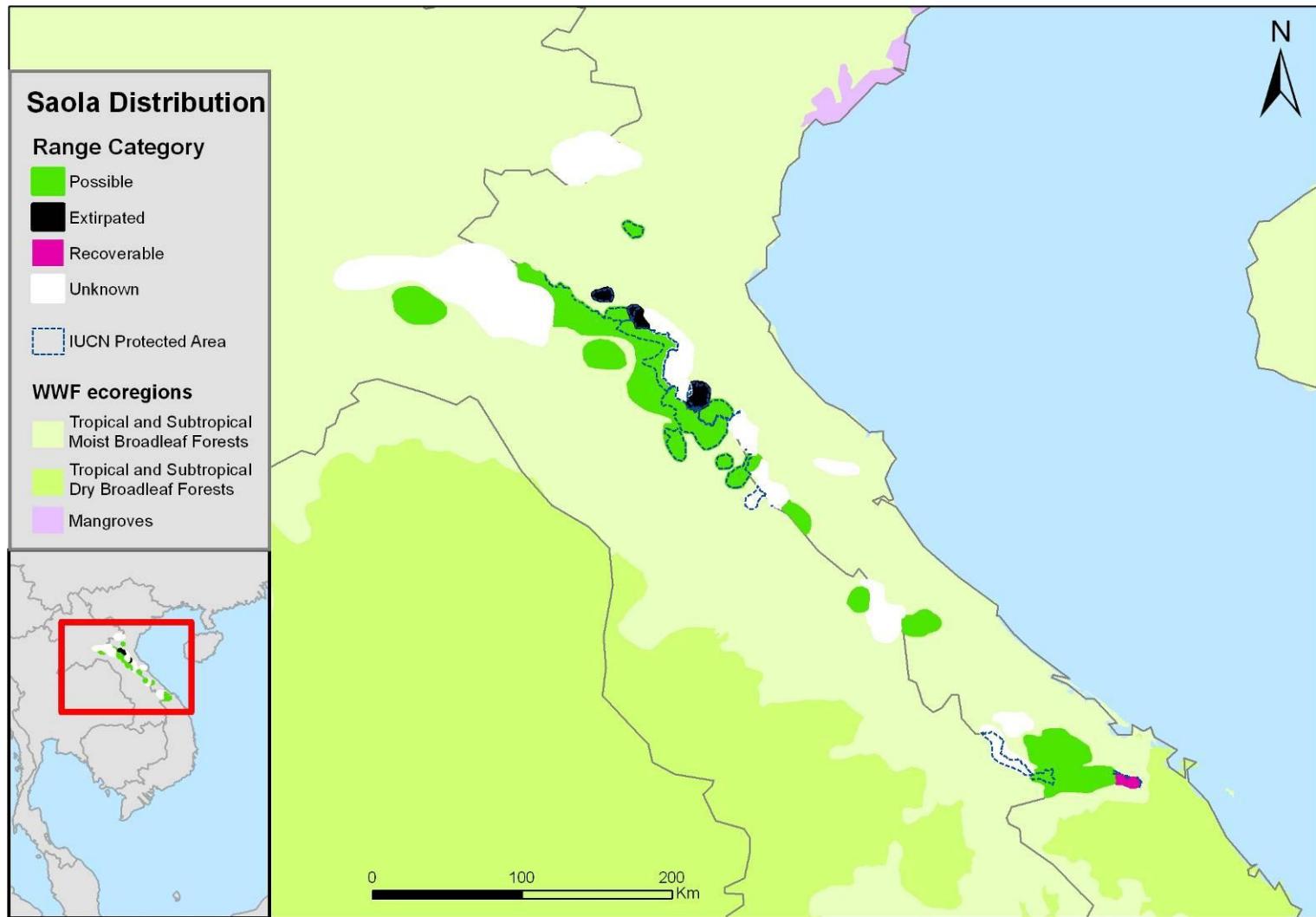


Figure 3.7 Saola distribution the Lao PDR and Vietnam in 2008 (note that this is the entire range of the species).

The distribution and status of Saola is poorly understood; the presence of this species has not been confirmed in any areas since 1999. However, many areas are identified as ‘possible’ or ‘unknown’ Saola range. Saola are known to have been extirpated from at least four areas.

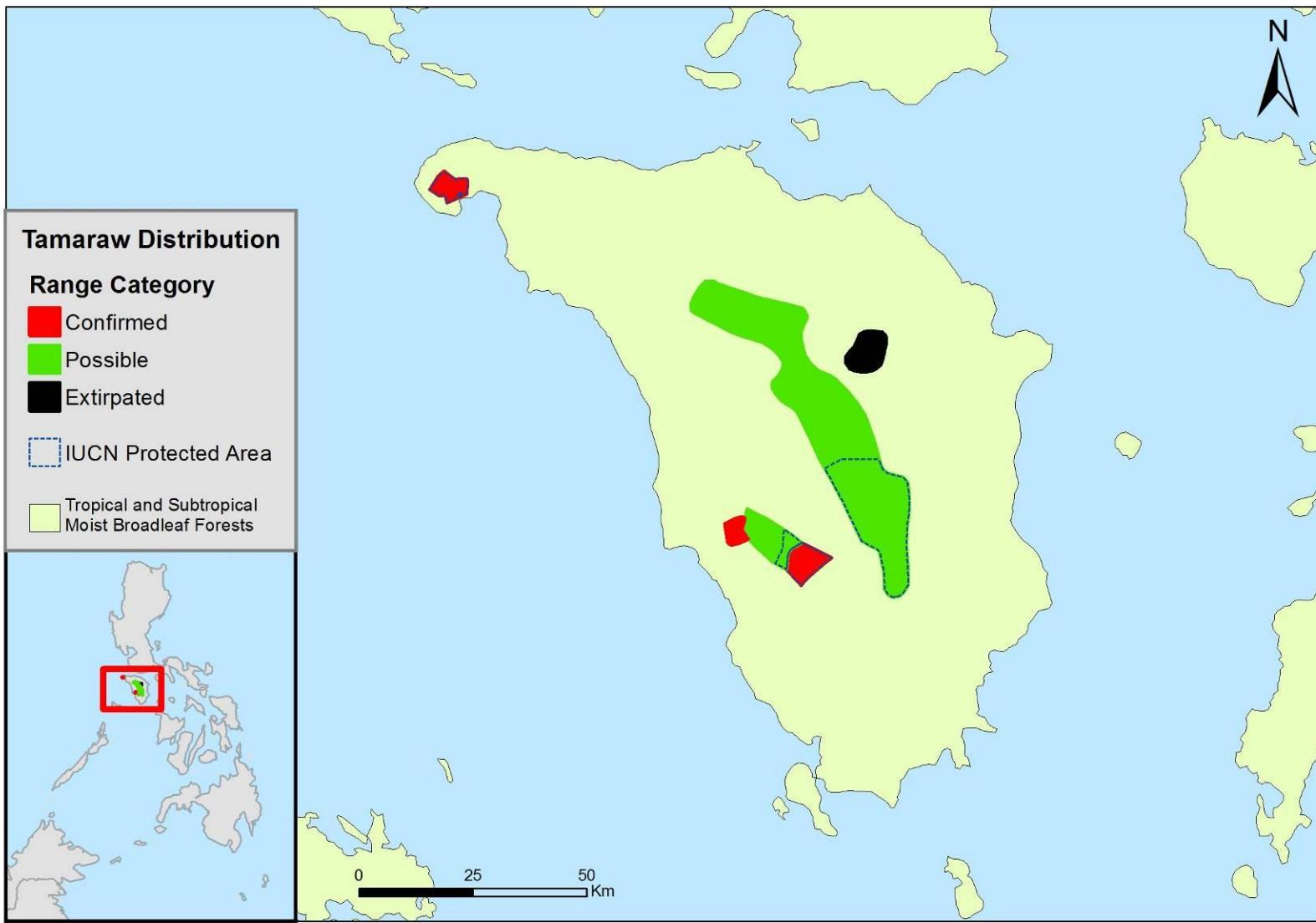


Figure 3.8 Tamaraw distribution in the Philippines in 2008 (note: the entire range of the species is shown on the map).

Tamaraw are confirmed in just three locations on Mindoro Island in the Philippines. Two of these areas are within protected areas (Mount Calavite and Mounts Iglit – Baco), and one is just outside the latter area. Two additional areas, mostly outside protected areas, were identified at the June 2008 workshop as ‘possible’ Tamaraw range. All populations are thought to be very small, with fewer than 300 individuals in all three populations combined (de Leon pers comm.).

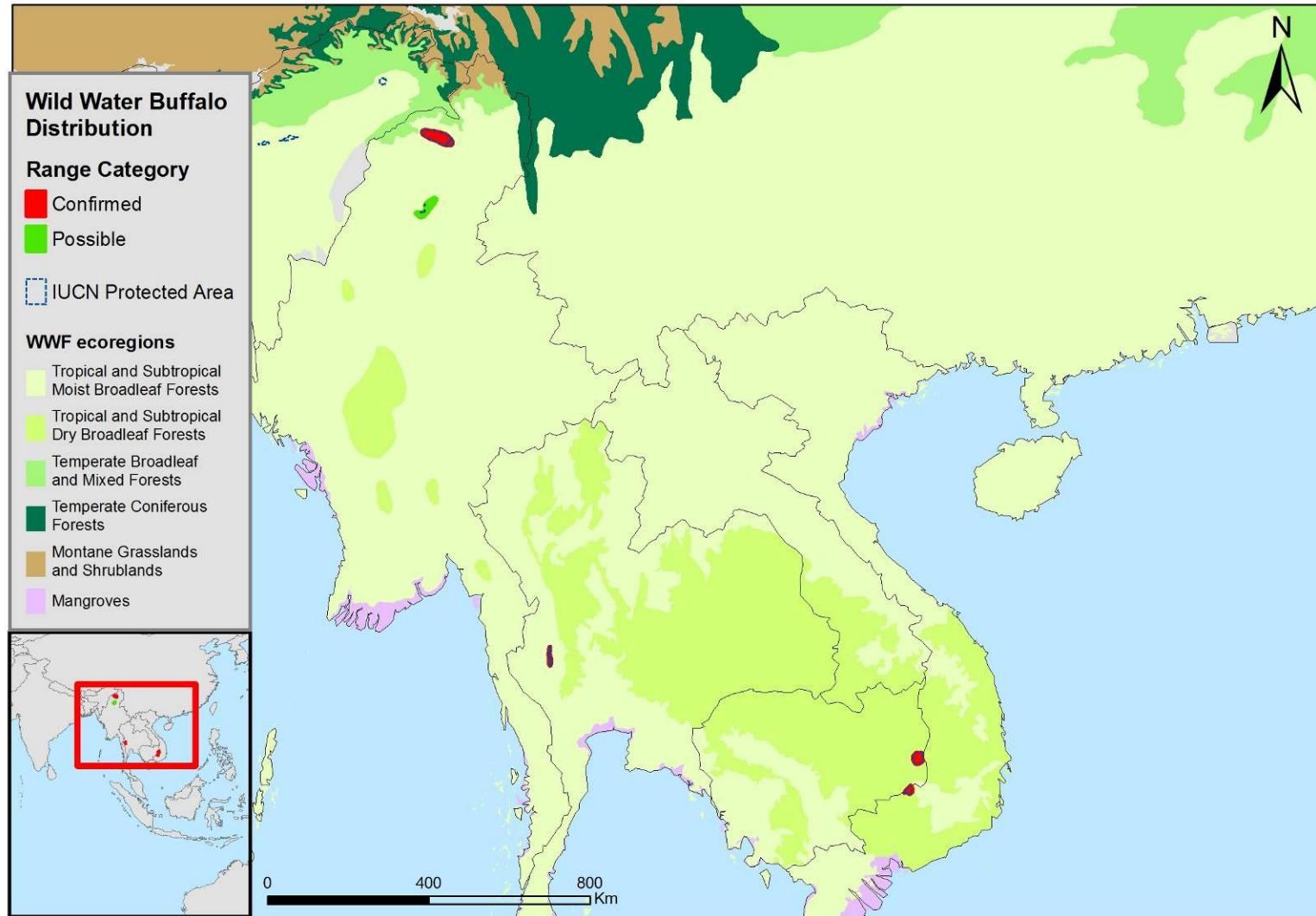


Figure 3.9 Wild water buffalo distribution in South-east Asia in 2008.

Wild Water buffalo are thought to occur only in four small populations in South-east Asia, two in the vicinity of the Cambodia/Vietnam border and one in Thailand and one in Myanmar, with another possible population also in Myanmar. The genetic status of the buffalo in all these populations is questionable (i.e. it is by no means certain that any of these populations contain pure wild buffalo as opposed to feral buffalo or hybrids between domestic/feral buffalo and wild buffalo).

Table 3.1 Status of Asian wild cattle and buffaloes in South-east Asia

Species	Area of each range category (km ²) and percentage of total species range										
	Confirmed	%	Possible	%	Extirpated	%	Recoverable	%	Unknown	%	Total Area
Anoa	958	0.9	76558	69.5	30424	27.6		0.0	2167	2.0	110107
Banteng	112586	53.3	39612	18.8	1302	0.6	370	0.2	57235	27.1	211106
Gaur	122339	40.5	147134	48.7	4404	1.5		0.0	28072	9.3	301949
Saola		0.0	6992	44.4	399	2.5	133	0.8	8206	52.2	15730
Tamaraw	101	9.7	888	84.8	57	5.5		0.0		0.0	1047
Wild water buffalo	2488	99.1	22	0.9		0.0		0.0		0.0	2510

The very low percentage of ‘confirmed’ range for the Anoas, Saola, and Tamaraw (0.9, 0, and 9.7%, respectively) shows the difficulty of surveying these species, combined with limited survey effort within the last five years (see Table 3.1). Considering the highly threatened status of these species, assessing presence or absence across their range is a high priority; repeated distribution surveys should be a priority in the future. Banteng and Saola have the highest percentage of area categorised as ‘unknown’, 27.1 and 52.2%, respectively. These areas should be a high priority for assessment of the presence or absence of these two species.

3.1.3 Distribution across protected areas

The proportion of the ranges of each species that are protected differs from 9.9% to 64.1% (see Table 3.2). Although the species are protected by law, this is an important potential risk and actions may need to be put into place to mitigate it and increase the area of each species range that is protected. This difference in proportion of range within protected areas can be partly explained by the fact that some species distribution are well-known and suitable habitat outside protected areas is very limited, such as the Wild water buffalo; while other species such as the Anoa and the Saola, may survive in large areas of suitable habitat outside of protected areas.

Although a number of species have nearly half their range within protected areas, this is only of importance as long as the protected areas are effective in maintaining the populations they contain.

Table 3.2 Proportion of the Confirmed and Possible range of Asian wild cattle and buffaloes that is within protected areas.

Species	Area of Confirmed range category (km^2) inside and outside of Protected Area and percentage of range inside Protected Area		
	Inside PA	Outside PA	% Inside PA
Anoa	10251	110107	9.3%
Banteng	104272	211106	49.4%
Gaur	125268	301949	41.5%
Saola	2718	15730	17.3%
Tamaraw	393	1047	37.6%
Wild water buffalo	2510	0	100%

3.1.4 Distribution across international boundaries

As shown in Figures 3.5, 3.6, and 3.9, confirmed populations of three species of Asian wild cattle and buffalo straddle international boundaries. For Banteng, 21% of confirmed populations (5 of 24 confirmed populations) straddle international boundaries; for Gaur, 38% (16 of 42 confirmed populations) straddle international boundaries, and for Wild water buffalo 50% (2 of 4 confirmed populations) straddle international boundaries. If the ‘possible’ range category is included, the number of populations of Saola that potentially straddle international boundaries increases to 40% (4 of 10 populations) between Vietnam and Lao. In many cases, populations appear to reach boundaries in one country, but do not cross the boundary. Although this may represent the true distribution, such areas should be highlighted as areas that require clarification of the species’ distribution.

3.1.5 Distribution across ecoregions

The distribution of the species was matched against WWF ecoregions identified within South-east Asia (Olson *et al.* 2001). This allowed the assessment of the ‘ecological settings’ (Sanderson *et al.* 2002) within which Asian wild cattle and buffalo populations occur. Polygons that were ecologically unique (and therefore particularly valuable) because they fell within under represented ecoregions, could be identified.

These species are distributed across a wide range of ecoregions within South-east Asia. They are largely found in various moist forest types, although they also inhabit Indochina dry forest, Sunda shelf mangroves, and Terai-Duar savannas and grasslands. One ecoregion important for three species is the Indochina dry forest for Banteng, Gaur and Wild water buffalo.

It should be noted that as well as focusing on the important ecoregions for multiple species it is important to also prioritize those areas that are examples of ecological niches that a population of a single wild cattle or buffalo species may inhabit. For example, the Gaur is found in 139 km² of Terai-Duar savannas and grasslands, as well as much larger areas of moist forest across the region. So these small areas that may represent a distinct ecological niche of the wild cattle or buffalo species should also be a conservation priority.

Table 3.2 Area of Asian wild cattle and buffaloes ranges (confirmed and possible categories combined) that are found in each ecoregion (km²).

Ecoregion type	Species range that are found in each ecoregion (km ²)						
	Anoa	Banteng	Gaur	Saola	Tamaraw	Wild water Buffalo	Total Area (km ²)
Philippines moist forests					1047		1047
Annamite Range moist forests		1827	9846				11673
Borneo lowland and montane forests		42965					42965
Cardamom Mountains moist forests		16456	17108				33564
Eastern Himalayan alpine meadows			1				1
Eastern Himalayan broadleaf and conifer forests			7573				7573
Greater Sundas mangroves		126					126
Indochina dry forests		90022	81683			853	172614
Kayah-Karen/Tenasserim moist forests		24895	31184			1657	56321
North Indochina subtropical moist forests		3887	17367	1336			22590
Peninsular Malaysia lowland and montane forests			39136				39136
Sulawesi lowland moist forests	109315						109315
Eastern Deccan plateau moist forests							2319
Eastern Himalayan broadleaf and conifer forests							138
Naga-Manapuri-Chin Hills moist forests							2720
Terai-Duar savannas and grasslands			139				1352
No Distinction		30795	49024	4547			88350

3.2 Conclusions

This summary of the distribution of wild cattle and buffaloes in South-east Asia shows that significant populations are present in many range states that are highly important for conserving these species. The collation of this data shows that we generally have good knowledge of these species' distribution patterns. However, large proportions of the ranges of a number of species need to be surveyed to enhance the knowledge of their distribution. For example, the areas identified as

'possible' range of Anoa, Gaur, Saola, and Tamaraw should be clarified, and the areas currently classified as 'unknown' range for Banteng and Saola should be resolved.

Many of these possible or unknown category populations cross international boundaries. These may also serve as linkages between known populations and so play an important role in maintaining connectivity between populations.

All species have some confirmed or possible category populations in protected areas, so continued and enhanced protection of these areas is critical to the species' survival. A high % of the range of a number of species also occurs outside these protected sites. So unprotected areas make up an important proportion of the range of some species and therefore there is the opportunity to increase the protection status of these locations and so effectively protect the species. The distribution information provides the basis for the following section, of assessing the threats to the wild cattle and buffalo species.

Chapter 4

Threats to Asian Wild Cattle and Buffalo Populations in South-east Asia

4.1 Introduction

The participants at the June 2008 workshop attempted to diagnose the processes threatening Asian wild cattle and buffalo. The aim was to accurately and comprehensively identify the primary threats to all the species' persistence. If the wrong threats are identified, proposed actions may fail to halt or reverse population declines. Identification of threats therefore needs to be a thorough process, subject to peer review wherever possible, involving critical analysis of the best available data. The threat analysis process also needs to be participatory, recognising where appropriate how threats vary spatially and temporally across the species' geographic range. To the extent possible, we tried to collate evidence for particular threats, for each population. A threat is any factor that causes either a substantial decline in the numbers of individuals or a substantial contraction of the geographic range. Crucial gaps in our knowledge, and any constraints on achieving effective conservation, were also identified.

4.2 Threats

Information on threats to Asian wild cattle and buffalo populations was contributed by workshop participants and other members of the IUCN/SSC Asian Wild Cattle Specialist Group. Workshop participants first mapped known populations and then described factors believed to threaten those populations and provided evidence that each factor represented a threat. The information was collated for each species separately; however, as the threats identified were largely common to all species, these will be discussed together. The threats are listed first below. Unless stated, the threats below relate to the Anoa, Banteng, Gaur, Saola, Tamaraw, and Water buffalo. The Kouprey was not included in this section due to the lack of data and the possibility that Kouprey are already extinct.

4.2.1 Killing for subsistence or commercial gain

Killing ranks as the greatest threat to Asian wild cattle and buffaloes in South-east Asia. The demand for high value meat and trophies (heads or horns) accounts for the majority of the killing. Of these, meat explains the largest demand for all species. The demand is driven by two causes, for local subsistence consumption by villagers, and for commercial gain. The magnitude and extent of the impact of these two demands on populations can be quite different, so effective solutions also need to be different to tackle these two demands. The threat from killing may be compounded by accidental capture of Asian wild cattle and buffaloes while snaring other more common species. Depending on the species, both demands (meat and trophies) may occur at the national or international level. For example, trade in Anoa products is national, while Banteng and Gaur heads and horns are sold both nationally and internationally.

4.2.2 Habitat loss, fragmentation and degradation

Habitat loss, fragmentation, and degradation together represent one of the two main threats to Asian wild cattle and buffalo populations, impacting all species. The causes of human induced habitat change include logging, agricultural expansion, development schemes and also the lack of

complete protection across the species' ranges. Protection is a huge challenge because all Asian wild cattle and buffaloes require considerable areas for foraging. One impact of this threat on Asian wild cattle and buffalo species has been the isolation of small populations, which has been caused by the expansion of human dominated landscapes and the intensification of their management. This has led to these species using such areas far less frequently, thus reducing opportunities for gene flow between populations. Habitat change can also significantly affect food availability; while burning may increase the availability of food plants, as for some populations of Tamaraw and Banteng, it can also reduce the diversity of available food plants and reduce overall biodiversity. Extensive clearing of land also eliminates areas these species need for shelter.

4.2.3 Interactions with livestock (the Anoas, Banteng, Gaur, Tamaraw, Water Buffalo)

Interactions between livestock and wild cattle can cause multiple threats to Asian wild cattle and buffalo populations. Most species of wild cattle may be negatively impacted by competition for resources such as food and water, and by the risk of disease transfer from domestic stock. Disturbance by or conflict with people also affects all Asian wild cattle and buffalo species. Hybridisation, causing genetic dilution of wild populations' genetic diversity, can be accidental or through deliberate breeding, posing a significant threat to Banteng and Water Buffalo.

4.3 Constraints on alleviating threats

There are a number of underlying factors that drive or exacerbate the proximate threats to wild cattle and buffaloes listed above and constrain attempts to alleviate them; these are called constraints and the following major constraints were identified.

4.3.1 Lack of species information and conservation knowledge

Lack of information on presence, population status, and ecology of all species has contributed to an absence of effective conservation. This is compounded by insufficient national expertise in biodiversity conservation. Other knowledge gaps are relevant only to some species, for example, the uncertain taxonomy of the Anoas.

4.3.2 Insufficient legal protection

Insufficient legal protection has a major impact on Asian wild cattle and buffalo populations. One example of this is where habitats are not protected, and so degraded, causing the decline of a protected species. Another example is that non-supporting or conflicting policies may prevent protection. Where proper policies exist weak implementation of national and international laws and agreements and insufficient international cooperation (e.g. at trans-frontier sites) may hinder protection. This is often due to low priority in range states for wildlife conservation, no visible benefit for government, and lack of political will at the national level.

4.3.3 Lack of Capacity

Weak capacity of enforcement staff through inadequate training and lack of funding is a serious threat to all Asian wild cattle and buffalo populations. This lack of capacity is present at the local, national and international level, and also covers land use change and related environmental assessments. In protected area management many other issues also lack capacity, including technical skills and local community engagement.

4.3.4 Lack of conservation motivation

The lack of conservation motivation among local people and governments as well as the low profile of these species means that they are not sufficiently valued by society to ensure their protection, exacerbating the threats described in this report.

4.3.8 Absence of population management

Small population size over the long-term could lead to extinction through demographic and genetic stochasticity (including catastrophic events). This represents a long-term constraint on all species due to the absence of active population management for Asian wild cattle and buffalo populations.

This summary of problems facing Asian wild cattle and buffalo conservation was used to inform a problem analysis, which is a critical step in the new IUCN conservation planning process (see below).

4.4 The 'problem tree'

One of the most important parts of the strategic planning process is the development of a problem analysis based on the threats facing the species under consideration and the constraints on conservation action. Threats are the specific issues that negatively impact on Asian wild cattle and buffaloes. Reducing these threats can be hindered by constraints (e.g. lack of funds or low levels of technical capacity in range State wildlife departments) and gaps (e.g. lack of information). The problem tree is a way to structure the results of a discussion and to identify the major threats and constraints. These factors were identified by workshop participants for each species (Figure 4.1 and 4.2). Ultimate threats such as poverty (which drive the proximate threats such as illegal killing and habitat loss) were judged beyond the remit of the group. The workshop participants' efforts therefore focused on issues that could be addressed by the stakeholder group (range State government conservation agencies, conservation NGOs, etc.).

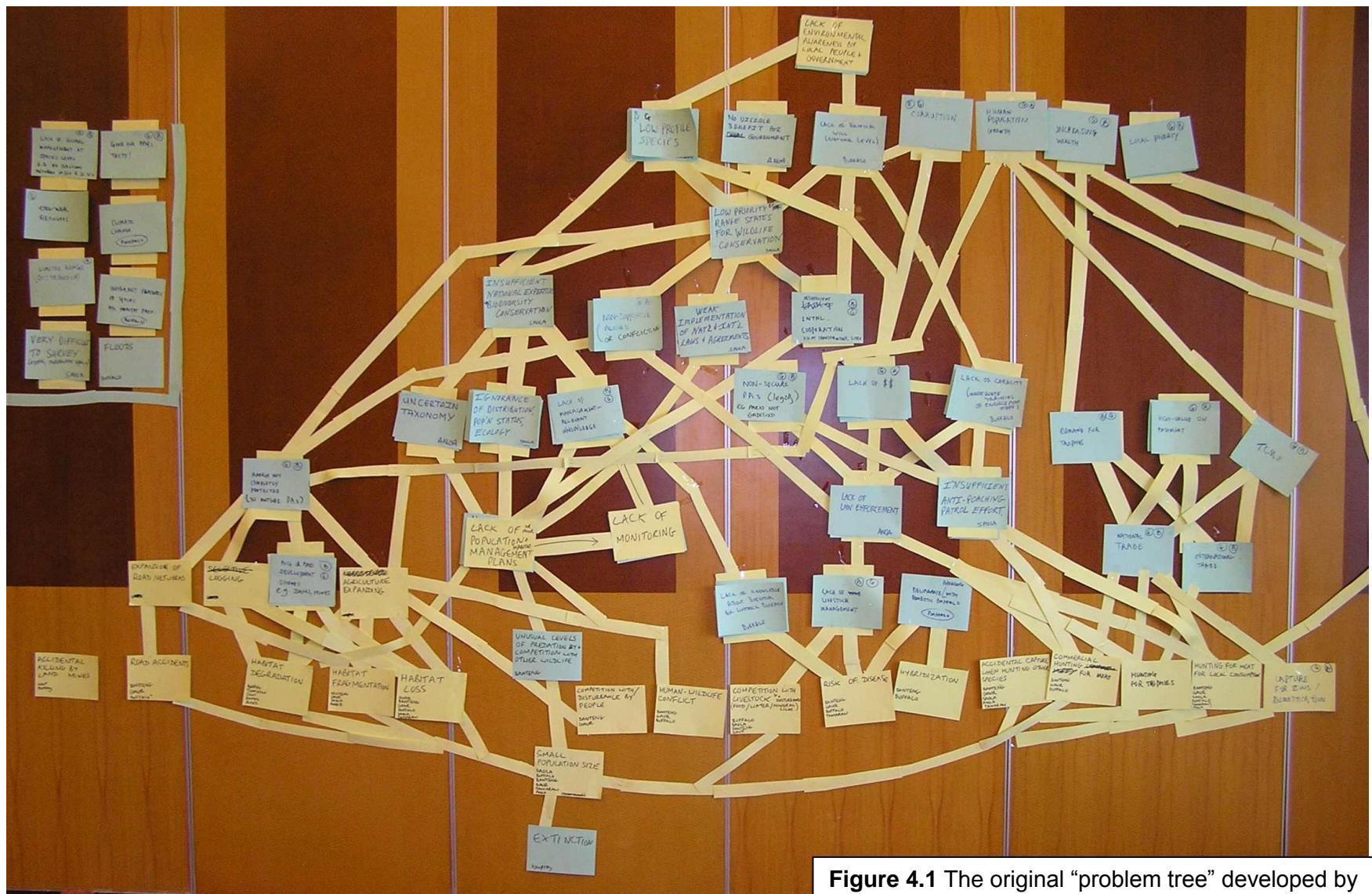


Figure 4.1 The original “problem tree” developed by participants in the South-east Asian regional workshop. Figure 4.2 shows the same information in a more readable form.

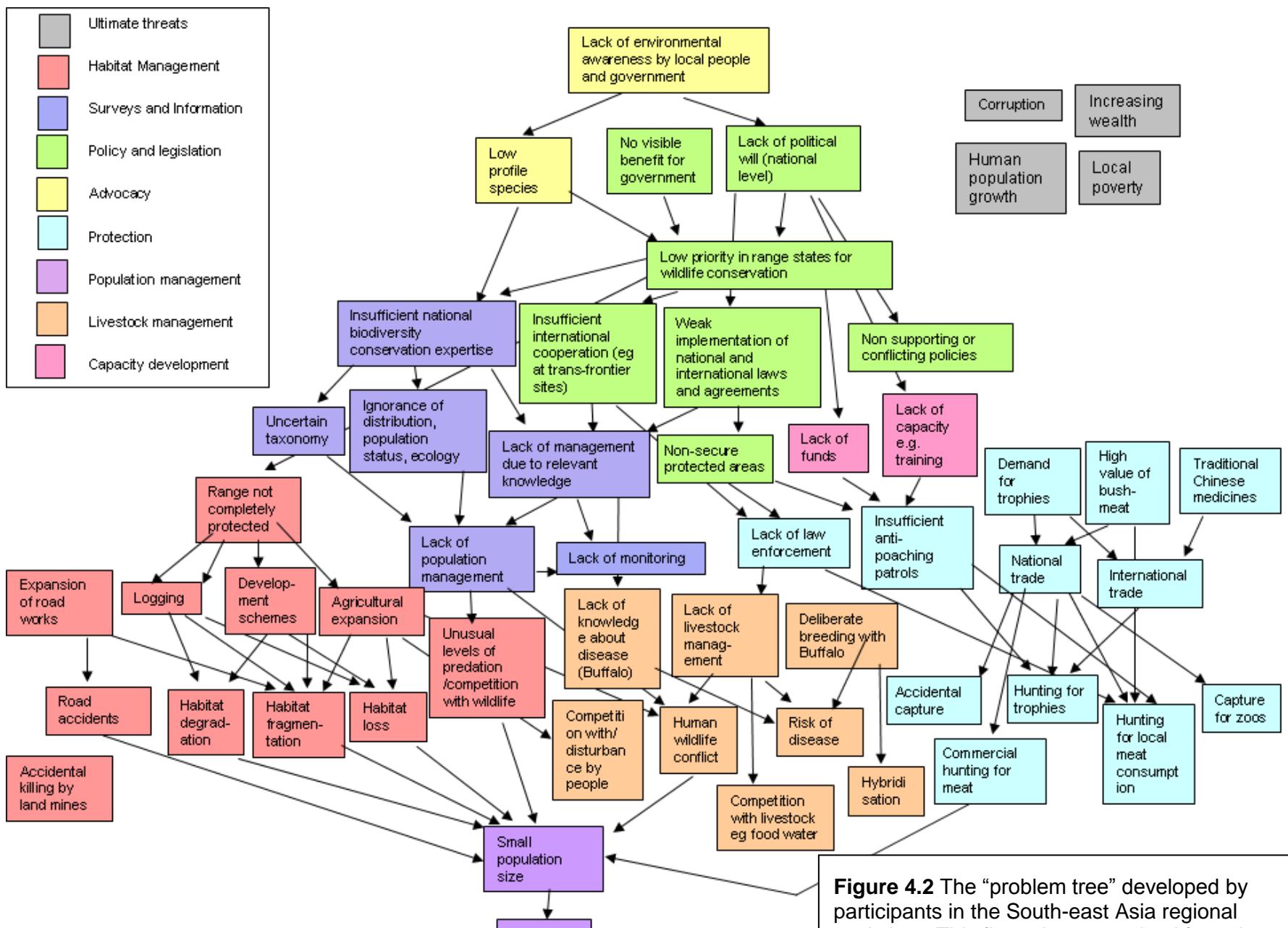


Figure 4.2 The “problem tree” developed by participants in the South-east Asia regional workshop. This figure is summarised from the original problem tree shown in Figure 4.1, for greater readability.

4.5 Conclusions

Overall, the problem analysis showed that very few problems, gaps, or constraints were relevant to just one or a few Asian wild cattle and buffalo species. The similarity in threats faced by these species suggests that, with very few exceptions, where multiple species inhabit an area, conservation activities implemented for one of the Asian wild cattle or buffalo species will likely benefit the others. For this reason, workshop participants formulated a single conservation strategy for all wild cattle and buffalo species in South-east Asia. The only difference between species is that each species' strategy has unique Goals and Goal targets, depending on the size of current populations and the magnitude of their decline factors (see Chapter 5).

The fact that many of these species are widely distributed across South and South-east Asia means that many if not all of the threats must be addressed over most or all of this large area. Finally, a single strategy can result in higher conservation leverage due to increased conservation benefits for the eight species.

Chapter 5

Conservation Strategy for Wild Cattle and Buffaloes in South-east Asia

5.1 Methodology

The development of the conservation strategy was intermeshed with the mapping exercise to allow the information on the species' distribution status and threats to influence formulation of the strategy. In the early stages of the workshop the focus was on mapping and developing the vision and goals. Draft maps were available to help with the problem analysis. The later stage of the workshop focused on developing the conservation strategy itself.

The workshop process employed the following components:

1. Engagement of stakeholders

Individuals and institutions best able to develop and implement the plan – including government authorities, species specialists and relevant NGOs – were involved in the strategic planning process where possible (participants are listed in Appendix 1).

2. Summary of knowledge

The mapping process within the workshop established up-to-date information on the status and distribution of all species (see Chapter 3). This provided essential information for the development of the strategy. Prior work, including previous action plans, was important in the process (MacKinnon & Stuart 1989, Manansang et al. 1996, de Leon et al. 1996).

3. Problem analysis

A problem analysis was conducted to identify threats, gaps, and constraints impacting participants' and others' ability to conserve Asian wild cattle and buffaloes. The problem analysis provided information critical for developing the objectives of the strategy.

4. Strategy development

Following the new IUCN (2008) process, a conservation vision for wild cattle and buffaloes was first identified and then this was used to develop more detailed goals and goal targets for each species. Once these goals and associated targets had been identified, the threats, gaps, and constraints were identified above and a problem tree approach used to identify the objectives and objective targets for the conservation strategy. Finally, actions associated with each objective were identified for all species (below and Figure 5.1).

Thus, this planning process was made up of seven stages (all of which were informed by the earlier mapping and status assessment part of the process):

- (1) The development of a vision
- (2) The development of a goal
- (3) The development of goal targets to address each goal
- (4) A problem analysis
- (5) The development of a number of objectives which address the proximate and ultimate threats identified by the problem analysis
- (6) The development of a number of objective targets to address each objective
- (7) The development of a number of actions to address each target

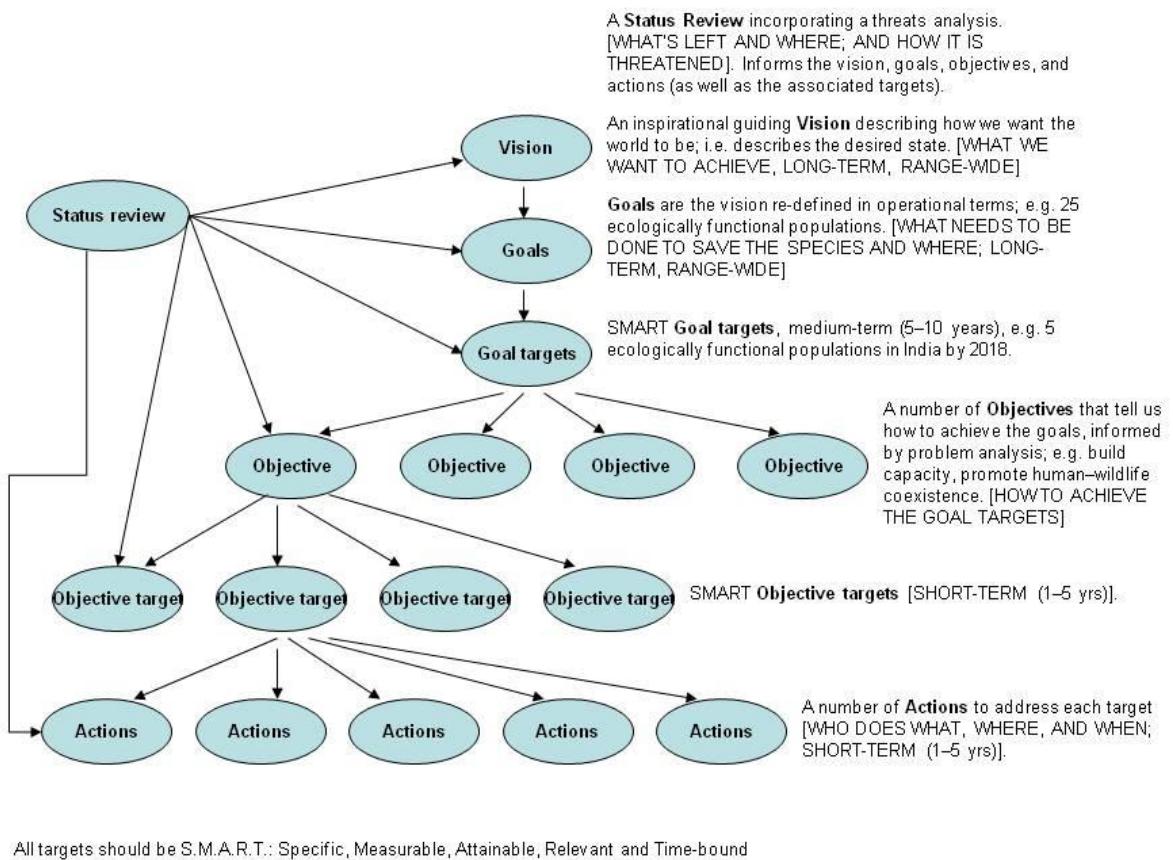


Figure 5.1 The structure of the conservation strategy (following IUCN 2008b).

5.2 Results of the strategic planning process

5.2.1 The Vision

The new IUCN/SSC Species Conservation Planning Guidelines (IUCN 2008b) define a ‘vision’ as an inspirational and relatively short statement describing the desired future state for the species. Hence, the vision describes, in broad terms, the desired range and abundance for the species, its ecological role, and its relationship with humans. The vision is an essential part of the new IUCN Species Conservation Strategic Planning process, which requires those writing an IUCN-lead conservation strategy to discuss explicitly what it means to save a species, and to use the answer to this question to develop the strategy’s goals. The vision, therefore, should be derived from an analysis of a species’ status, and from a detailed consideration of the long-term and range-wide (or regional) conservation needs of the species (informed by a threat analysis). The vision should be as ambitious and as inclusive as possible. For the present strategy, it was agreed to prepare a 100-year, South-east Asia-wide Vision for wild cattle and buffaloes.

The step-by-step process used to formulate the vision statement at the South-east Asian Wild Cattle and Buffalo Conservation Strategy Workshop, June 2008, was as follows:

- First, the workshop facilitator explained what a vision is (see IUCN (2008b) and the methodological explanation above) and presented a couple of examples of previous vision statements (see IUCN 2008a).
- Then, in an interactive plenary session, all the workshop participants were asked to suggest the concepts or values (e.g. ecological functionality and population viability) that they thought should be included in a vision statement for Asian Wild Cattle and Buffalo Conservation in Southeast Asia.
- Once a list of concepts/values had been compiled and discussed in the plenary session, a drafting group was formed to prepare the first draft of the vision statement.
- While the drafting group was meeting the other participants continued to update the species distribution maps and status review.
- When the drafting group had a first draft of the vision statement that draft was presented to all the workshop participants in another plenary session in which possible changes and additions were discussed and noted.
- The drafting group then met again to work on a second draft of the vision statement.
- This process was repeated until a final vision statement was agreed in a plenary session. At the June 2008 workshop, three drafts were prepared before the participants agreed on a fourth and final vision statement.

The agreed vision was:

Vision:

We envision viable, ecologically functioning populations of wild cattle and buffalo that are appreciated by humankind. These populations will represent the species' genetic diversity, in well-managed landscapes, replicated across their original ecological settings and in all range states.

The vision was carefully worded to reflect the following points:

- ‘Viable’ populations imply relatively large populations that are able to persist in the long-term.
- ‘Ecologically functioning’ was chosen to indicate that the group agreed that it was important to conserve populations across representative natural ecosystems, to ensure that each species was exposed to as full a range as possible of ecological challenges to which they would have been subjected in their evolutionary history, including their natural predators and parasites.
- ‘Appreciated by humankind’ was included to represent the need for an increased profile of these species and appreciation of them in and of themselves, as well as their utilitarian ecological functions within environments they occupy, such as seed dispersers, prey sources for threatened carnivores, and habitat architects.

5.2.2 *The Goals*

While vision statements of the type described above are inspiring; a more detailed set of range-wide, high-level goals are also required to encapsulate what needs to be achieved in order to save a species,. Therefore the new IUCN/SSC Species Conservation Planning Guidelines (IUCN 2008b) treat goals as the vision re-defined in operational terms. Thus goals specify, for example, the desired number of ecologically functional populations to achieve replication per major habitat type, or whether restoration (reintroduction) is needed. Goals thus have the same long-term time frame (100 years in this case) and wide spatial scale (South-east Asia-wide in this case) as the vision, and they are developed using the same criteria for what it means to save a species that were agreed when developing the vision (e.g. striving to achieve ecologically functioning populations).

The step-by-step process used to formulate species-specific goals from the vision statement used at the Southeast Asian Wild Cattle and Buffalo Conservation Strategy Workshop, June 2008, was as follows:

- Once the vision had been agreed, the goals could be developed. Since the goals represent the vision defined in operational terms (see above and IUCN (2008b)), a first step in developing the goals was to compare the species’ current status (as summarised in the status review part of the workshop) with the status it would have under a future scenario in which the vision had been achieved. One way this was done for the species covered by this strategy was to break down the vision statement into its component parts, and to then a type of “scorecard” to assess each remaining population’s contribution to achieving the vision.
- For example, as discussed above, the workshop participants developing the conservation strategy for wild cattle and buffaloes in South-east Asia agreed the following vision: “We envision viable, ecologically functioning populations of wild cattle and buffalo that are appreciated by humankind. These populations will represent the species’ genetic diversity, in well-managed landscapes, replicated across their original ecological settings and in all range states.”
- To develop the goals, this vision statement was broken down into its components; these included population viability, ecological functionality, appreciation by humankind, etc. Each component was then converted into a measure which could be applied to particular populations; for example, for Gaur a viable population was considered to be one numbering ≥ 500 animals, and an ecologically functional population was considered to be one which coexisted with a complete (or almost complete) set of native competitors and predators. These measures were then used to characterise each extant population according to whether or not it currently contributed to each component of the vision (Figure 5.2).

Figure 5.2 – Part of a spreadsheet used to compare extant populations of Tamaraw (*Bubalus mindorensis*) with components of the vision agreed for wild cattle and buffaloes in South-east Asia.

◆	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Species: Tamaraw												
2			population viability		geographical representation			ecological functionality			appreciation by humankind		
3	Polygon ID	Range type	population size	habitat well managed?	range state	habitat type	subspecies or race (if relevant)	wild or feral/ hybrid?	coexisting with other extant native bovids?	coexisting with non-bovid competitors?	coexisting with native predators?	local people sensitised to population?	wider community aware of population?
4	A	confirmed	<100 individuals	habitat secure but inadequately managed	philippines	mixed grassland and secondary forest	not applicable	wild	no native bovidae	all native competitors present	no native predators	yes	yes
5	B	confirmed	<100 individuals	habitat not secure or inadequately managed	philippines	mixed grassland and secondary forest	not applicable	wild	no native bovidae	all native competitors present	no native predators	yes	yes

- Characterising the extant populations using the method described above allowed the participants to determine how the conservation or management of each population would contribute to the vision. For example, some populations were already considered viable, ecologically functional, and appreciated by humankind; maintaining such populations was considered important to achieving the vision, and the sites where this was needed were therefore specified in the goals (see below). Elsewhere, management was needed to achieve the population characteristics defined in the vision (e.g. population size needed to be increased); once again, sites needing such management were specified in the goals (see below).
- Characterising the extant populations also allowed participants to conduct a form of gap analysis, determining what more would need to be achieved in order to reach the vision. For example, the vision for wild cattle and buffaloes in South-east Asia specifically expressed an aspiration to have viable, ecologically functional populations in all range States. Achieving this for some species in some range States would require that reintroductions be conducted; once again, likely sites were specified (see below).
- In performing these gap analyses, participants used information from the status review to ensure that the goals were realistic, in relation to the remaining geographic range of the species. For example, while the Goals for Gaur (a species with a broad geographic distribution) specified that at least 30 large, ecologically functional populations would be needed to achieve the vision, the goals for Tamaraw (a species endemic to a single small island) aimed for just three ecologically functional populations, of which only two could be expected to be viable.

The goals agreed for the species in the South-east Asian regional strategy were:

Goal for Anoa:

Ensure 10 viable, ecologically functioning anoa populations, with 2 populations in each biogeographic region (Buton, South-East, East, North and Central) and their habitat. All Anoa populations should co-exist with people supported by regional planning.

Goal for Banteng:

24 ecologically functional, large populations, with 17 populations in dry forest mosaic habitat types and 7 in evergreen forest habitat types; giving 4 populations in the Bornean subspecies/ESU, 4 in the Javan subspecies/ESU, and 16 in the mainland subspecies/ESU. Achieving this will require reintroductions to former range in Thailand and Indonesia. All populations should co-exist with people and their domestic animals, and be valued by people in range states and internationally.

Goal for Gaur:

30 ecologically functional, large Gaur populations, with 21 populations in mixed forest habitat types and 9 in evergreen forest habitat types; giving 4 populations in the *Bos gaurus hubbacki* subspecies/ESU and 26 in the *Bos gaurus readei* subspecies/ESU. Achieving this will require reintroductions to former range in Malaysia, Thailand, and Vietnam. All populations should co-exist with people and their domestic animals, and be valued by people in range states and internationally.

Goal for Kouprey:

Kouprey exist in the wild in multiple viable populations.

Goal for Saola:

The Saola is recognized in and beyond Lao and Vietnam as a flagship species of the Annamites, motivating effective conservation of the ecoregion. Saola will not be lost from any site in which they now occur and will recover to at least 800 free-ranging adults, with at least 3 sub-populations of over 200 adults each in landscapes larger than 1,000km².

Goal for Tamaraw:

Secure three ecologically functioning [including two viable] populations of Tamaraw co-existing with indigenous people and other stakeholders in the Island of Mindoro, Philippines.

Goal for Water buffalo:

10 viable, ecologically functional populations of wild and wild type buffalo (as well as feral populations of exceptional interest) in South-east Asia. Achieving this will require identification of populations of wild, wild type, and feral buffalo in all South-east Asian countries, especially in Malaysia and Indonesia. All populations should coexist with people and their livestock and be appreciated.

As with the vision, care was taken over the wording to reflect the following:

- ‘Co-existing with people’ indicated that the participants felt that in order to reduce threats to these species, they should live safely, even in areas neighbouring places occupied by humans and their domestic animals, wherever possible.
- ‘Biogeographic / forest types / ecoregion’ were included for some species to represent the variation in natural ecosystems in which these species are found and the need to conserve populations across these different ecological settings if the strategy was truly to ‘save the species’ in question.

5.2.4 Goal targets

In the new IUCN (2008b) process used to formulate this strategy, goals need to have a set of associated goal targets, which are a medium-term (typically 5–10 years) subset of the goals. Goal targets represent those goals (and/or the necessary steps towards those goals) that can realistically be achieved over the lifetime of the conservation strategy (in this case 10 years). Like all targets, goal targets should be SMART (Specific, Measurable, Achievable, Realistic, and Time-bound).

Thus, once the goals had been decided, species-specific goal targets were also developed for each species-specific goal. As part of the process, the names of locations, such as protected areas, and a timeline were identified for the goal targets. The goals targets agreed for the species in the South-east Asian regional strategy are listed in the logframe (Appendix 4). The goals targets for Banteng are given below as an example of how the strategic planning process was used for an Asian wild cattle species.

Vision for South-east Asian wild cattle and buffaloes (100 years; region-wide, which is range-wide for Kouprey, Tamaraw, the Anoas, Saola, and Banteng since Myanmar was treated as South-east Asia):

We envision viable, ecologically functioning populations of wild cattle and buffalo that are appreciated by humankind. These populations will represent the species' genetic diversity, in well-managed landscapes, replicated across their original ecological settings and in all range states.

Goals for Banteng (100 years; range-wide for Banteng since Myanmar was treated as South-east Asia):

26 ecologically functional, large populations, with 17 populations in dry forest mosaic habitat types and 9 in evergreen forest habitat types; giving 4 populations in the Bornean subspecies/ESU, 6 in the Javan subspecies/ESU, and 16 in the mainland subspecies/ESU. Achieving this will require reintroductions to former range in Thailand and Indonesia. All populations should co-exist with people and their domestic animals, and be valued by people in range states and internationally.

Goal targets for Banteng (for 10 year period, 2011–2020):

Maintain the secure Banteng populations in Ujung Kulon NP in Java (Indonesia) and Huai Kha Khaeng WS and the Eastern Forest Complex in Thailand.

Increase Banteng numbers in:

- Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yaten–Khao Yai Forest Complex (Thailand) by 2015;
- Baluran NP (Java, Indonesia) by 2013, and Alas Purwo and Meru Betiri NPs (Java, Indonesia) by 2015;
- Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar) by 2015;
- All Cambodian PAs by 2020;
- Stabilize the populations in the Ea So area and Yok Don NP (Vietnam) by 2015 and increase them by 2020.

Determine the species' range and status in Cambodia, China, Kalimantan (Indonesia), 6 protected areas in Lao PDR, and Myanmar by 2015, and in Malaysia by 2020.

Reintroduce Banteng to Leuweung Sancang NR and Cikepuh GR in Java (Indonesia; both evergreen habitat types) by 2020 and Om Koi WS (dry forest mosaic) and Chumporn Forest Complex (evergreen forest) in Thailand by 2020.

5.2.5 The Objectives

A set of 'objectives' which need to be met to achieve the goal targets over the stated time span (10 years in this case) were identified at the workshop. These objectives address the main threats to the species identified in the status review and threats analysis process and the other constraints on achieving the vision and goals. In fact, objectives are often the inverse of key threats and constraints. For example, if a lack of capacity is identified as a constraint (as it was) then an appropriate objective would be to build capacity. Each objective should also have a SMART objective target.

The problem analysis described in Chapter 5, Section 4 was an essential tool in developing the objectives of this conservation strategy for South-east Asian wild cattle and buffaloes. The problems identified were inverted to identify solutions to those problems. The objectives were then grouped into eight themes:

Theme: protection

This theme tackles the issue of Asian wild cattle and buffalo population declines as a result of killing and removal. The need for protection has increased significantly with increasing demand, at local, national, and international levels.

Objective: Eliminate the threat to wild cattle and buffalo populations posed by killing or removal of wild animals by people;

Theme: habitat management

This theme addresses the problem of insufficient and poorly managed habitat, which helps drive Asian wild cattle and buffalo population declines thus reducing population viability and preventing wild cattle and buffaloes from fulfilling their ecological roles at natural densities.

Objective: Maintain and, where appropriate, expand the area of wild cattle and buffalo habitat, and increase the proportion of that habitat that is well managed, to ensure the viability and ecological functionality of wild cattle and buffalo populations.

Theme: livestock management

This theme deals with the interactions with humans' domestic animals, specifically the poor livestock management that causes competition for food and water and creates the risk of disease transmission and genetic introgression.

Objective: Manage interactions with livestock to control competition, disease transmission, and genetic introgression

Theme: surveys and information

This theme concerns the problem of insufficient good-quality data and the poor analysis and dissemination of such data to allow effective conservation of wild cattle and buffalo species. Information gaps include data on distribution and abundance, habitat requirements, threats, and population management needs.

Objective: Inform effective conservation and management of wild cattle and buffaloes by collecting, analysing, interpreting and exchanging high-quality and timely data, in collaboration with key stakeholders locally, nationally, and internationally.

Theme: policy and legislation

This theme deals with the problems that stem from ineffective, absent, or contradictory policies and legislation. This theme includes both wildlife conservation and other relevant sectors.

Objective: Ensure consistency between existing policies and, where needed, develop new policies for habitat and species conservation, and promote their implementation at local, national and international levels;

Theme: capacity development

This theme focuses on the insufficient human capacity available to conserve Asian wild cattle and buffaloes and their habitats. This theme this encompasses manpower, resources, and training.

Objective: Strengthen human, financial, and technical resources for conserving wild cattle and buffaloes within range States.

Theme: advocacy

This theme is related to the low profile of wild cattle and buffalo species, and the lack of motivation among people and their governments to conserve these species. It was acknowledged that these issues could only be fully solved by engaging a wider group of stakeholders, for example linking wild cattle and buffalo with land use policy and economic development.

Objective: Increase the species' profiles by promoting appreciation for the economic, ecological, cultural and intrinsic value of wild cattle and buffalo conservation locally, nationally, and internationally;

Population management

This theme addresses the need to improve the potential long-term viability of populations of Asian wild cattle and buffaloes through managing them effectively using modern methods. The viability of many wild cattle and buffalo populations is threatened by their increasingly small size and their degree of isolation with consequent little or nonexistent gene flow between populations.

Objective: Where necessary, and in accordance with international best practices (e.g. IUCN guidelines), increase the number and long-term viability of populations of wild cattle and buffalo through active management using modern techniques from genetics, population biology, and other disciplines.

5.2.6 Objective targets

Objectives summarise the broad approaches to be taken in working towards the vision and goals; objective targets provide more detailed definitions of what needs to be done, and by what date. Objective targets thus help to group related actions into logically related clusters, which help to promote implementation. The timelines associated with objective targets can also be used as a way of prioritizing different clusters of actions; for example, if a particular threat requires urgent action, its associated objective targets might have short timelines.

Once the objectives were agreed at the June 2008 workshop, objective targets were developed to help meet the objectives. These objective targets were designed to be SMART, in other words specific, measurable, achievable, realistic and time-lined. There were a total of 33 targets set for all the objectives in the strategy (see Appendix 4 for more detail):

Protection:

Objective: Eliminate the threat to wild cattle and buffalo populations posed by killing or removal of wild animals by people.

Targets: a) Work with communities in and around wild cattle and buffalo habitat to eliminate the threat posed by killing or removal of wild cattle and buffalo by people by 2015,
b) Achieve effective protection through intensive law enforcement by 2013,
c) Reduce demand for wild cattle and buffalo products at the local, national, and international levels,
d) Enhance protection of wild cattle and buffalo through policy improvements at national and international levels by 2013.

Habitat Management:

Objective: Maintain and, where appropriate, expand the area of wild cattle and buffalo habitat, and increase the proportion of that habitat that is well managed, to ensure the viability and ecological functionality of wild cattle and buffalo populations.

Targets: a) Well managed protected areas with priority populations of wild cattle and buffaloes and maintain or where appropriate improve their management standards by 2014,
b) Appropriate management practices developed for other priority protected areas with wild cattle and buffaloes by 2014,
c) Appropriate management practices implemented for existing second priority protected areas with wild cattle and buffaloes by 2020,
d) Potential, currently unsecured, wild cattle and buffalo habitat assessed by 2020,
e) Unprotected habitat put under appropriate management by 2020 (and beyond).

Livestock management:

Objective: Manage interactions with livestock to control competition, disease transmission, and genetic introgression

Targets: a) Management protocol developed for livestock grazing in vicinity of wild cattle and buffaloes by 2014,
b) Strategies developed and implemented, where appropriate, for disease management by 2014,
c) Genetic introgression assessed and reduced, where needed, by 2014.

Surveys and Information:

Objective: Inform effective conservation and management of wild cattle and buffaloes by collecting, analysing, interpreting and exchanging high-quality and timely data, in collaboration with key stakeholders locally, nationally, and internationally

Targets: a) Range-wide database developed for all wild cattle and buffalo populations,
b) Reliable surveys to determine the presence or absence of wild cattle and buffaloes in identified possible and unknown ranges by 2020,
c) Surveys using appropriate peer reviewed methods to measure population size and trend conducted in priority sites by 2020,
d) Routine monitoring to determine intensity and distribution of threats in priority sites established by 2014,
e) Study the genetics, taxonomy, ecology and behaviour of wild cattle and buffaloes where necessary.

Policy and legislation:

Objective: Ensure consistency between existing policies and, where needed, develop new policies (and national action plans) for habitat and species conservation, and promote their implementation at local, national, and international levels.

Targets: a) National action plans for wild cattle and buffalo conservation in each range country developed by 2013 and continuously implemented through 2020,
b) Establishment of formal institutional arrangements to harmonize and/or address policy gaps are encouraged,
c) Inter-governmental arrangements on collaborative conservation of shared populations of wild cattle and buffaloes developed by 2012, and effected through 2020.

Capacity development:

Objective: Strengthen human, financial, and technical resources for conserving wild cattle and buffaloes within range States.

Targets: a) Regional needs assessment for national technical capacity completed in within 3 years,
b) Significantly improve dissemination and discussion of management-relevant information and methods within 1 year,
c) Funding support for wild cattle and buffalo conservation significantly increased within 5 years.

Advocacy:

Objective: Increase the species' profiles by promoting appreciation for the economic, ecological, cultural, and intrinsic value of wild cattle and buffalo conservation locally, nationally, and internationally.

Targets: a) Priority sites develop and implement programmes to encourage the appreciation of local stakeholders for the importance of wild cattle and buffalo conservation by 2013,
b) Raise the general public's support for Wild cattle and buffalo conservation by 2020,
c) National policy makers understand the importance of wild cattle and buffalo conservation for both biodiversity conservation and the animal husbandry industry by 2013,
d) The international cattle industry appreciate the need for conservation of wild cattle and buffaloes by 2013,
e) Significantly increase the importance that international conservation stakeholders place on wild cattle and buffalo conservation.

Population management:

Objective: Where necessary, and in accordance with international best practices (e.g. IUCN guidelines), increase the number and long-term viability of wild populations of buffalo and wild cattle through active management using modern techniques from genetics, population biology, and other disciplines.

Targets: a) Assess genetic and demographic structure to support conservation planning at the species level within 5 years,
b) Develop species-specific guidelines for techniques in translocation, reinforcement and reintroduction within 5 years,
c) Where appropriate, conduct wild cattle and buffalo reintroductions according to the established guidelines and following protocols validated by IUCN,
d) Promote species conservation through interactive management of wild and captive populations where appropriate,
e) Develop a genetic sample bank for priority species within 5 years and for all species within 10 years.

5.2.7 Actions

Actions are the activities which need to be performed in order to achieve the objectives, goals, and, ultimately, the vision. Range-or region-wide conservation strategies, like this one, that involve implementation by diverse management authorities will typically include a number of recommended

actions which are fairly broad in their scope. By contrast, the national or local action plans, which we hope will be informed by this region/range-wide strategy, will include actions which are much more specific. Whatever the geographic scope of a conservation strategy or action plan, lists of actions will often be most useful if they are highly specific, detailing not only what needs to be done, but also by whom (the “actors”), where (if appropriate), and by what date (the “timeline”). In addition, it may be useful to identify indicators of success for each action (“indicators”); these help to define what each action is intended to achieve, and to determine when the action has been performed successfully. The actions have the same short to medium time frame as the goal targets (1–10 years). Please see Appendix 4 for the full list of actions recommended in this conservation strategy for South-east Asia’s wild cattle and buffaloes.

5.3 *National planning approach*

An important requirement of the new IUCN (2008b) conservation planning approach is that a regional strategy like this one can be readily adaptable for the national action planning process that it is hoped will facilitate and promote implementation. The process recommended is to have a series of national action planning workshops that add the necessary country-specific detail to this region-wide conservation strategy. Such national action planning is best achieved through a participatory planning approach (typically at one or more workshops) involving relevant national stakeholders including those who attended the regional strategic workshop as well international conservation specialists familiar with the species and issues in question. It is expected that such a national workshop would take two days. In order to translate regional strategies such as this into national action plans the following steps are recommended:

- Present the regional strategy to the national workshop participants, along with background information, and request the mandate to use the regional strategy as a template for the national action plan.
- Add comments relating to the national implementation of the vision, goals, and objectives.
- For each objective, take each target and action, and decide whether to adopt or drop it, bearing in mind that some targets and activities may not be relevant to all species and all countries.
- If the target or activity is adopted, then the wording may need to be adjusted where appropriate.
- Timelines, actors, and verifiable indicators should be added to each action.

During the regional strategy workshop in June 2008 care was taken to ensure that the strategy’s structure, especially in the vision, goals, and objectives sections, allowed for easy translation into national action plan formats following the new IUCN process (IUCN 2008b).

Chapter 6

6.1 Review process for the Regional Strategy

The following process of review for this draft strategy was agreed at the June 2008 workshop in Vietnam:

- Send a first draft to participants and the Asian Wild Cattle Specialist Group members who were unable to attend the workshop for review, revision, and comments;
- Incorporate reviewers' comments into a revised second draft;
- Send this second draft to participants for final acceptance and request endorsement from all relevant range State government ministries;

The range State government representatives present at the June 2008 workshop agreed to help in acquiring governmental endorsements of this conservation strategy for South-east Asia's wild cattle and buffaloes.

6.2 Implementation of the Regional Strategy and National Action Plans

On completion of the regional strategy, the next step is to decide how best to implement it. The two-step process recommended by IUCN (2008b) of having range- or region-wide conservation strategies followed by, and informing, national action plans to identify 'who will do what where and with whom and whose money' was adopted for South-east Asian wild cattle and buffaloes at the June 2008 workshop in Vietnam.

This two-step approach has been used successfully for a number of other species in Africa as already discussed. To help ensure that this idea of having national action plans informed by this regional strategy is adopted it is included here and in the logframe (Appendix 4) as a specific recommendation. However, some aspects of this strategy require international agreement. For example, inter-governmental arrangements for collaborative conservation of shared populations of wild cattle and buffaloes are important. The IUCN/SSC Asian Wild Cattle Specialist Group was thus charged with promoting the international aspects of the strategy described in this report (see Appendix 4 for more detail).

Following the regional strategy workshop in Vietnam in June 2008, a national action planning workshop for Asian wild cattle and buffaloes in Vietnam was held with the Forest Protection Department of Vietnam. This workshop endorsed the regional strategy, showing that this strategy could be effectively transferred to the national level to allow quick development of a national action plan informed by a range- or region-wide conservation strategy. This national workshop included participation of a wide range of national delegates and is detailed in a separate document being prepared by the Vietnamese participants.

The drafting and implementation of national plan obviously requires financial support and technical, which may be provided by national governments, NGOs, and/or bilateral and multilateral donors. It is hoped that this conservation strategy and the national action plans it spawns will be used to help raise the necessary funds and facilitate cooperation between all stakeholders both national and international.

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Appendix 1: Workshop delegates

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* Was unable to attend workshop

Appendix 2: Agenda

SUNDAY 8TH JUNE 2008

Participants arrive in Tam Dao.

18:30 “Housekeeping” announcements including arrangements for reimbursements

18:35 Icebreaker: drinks followed by dinner
All participants

DAY 1 OF 5: MONDAY 9TH JUNE 2008

9:00 Official welcome and opening remarks

9:20 Welcome from workshop hosts (and repeat of “Housekeeping” announcements including arrangements for reimbursements)
Miguel Pedrono & James Burton

9:30 Introductions
All participants

9:40 Presentation of the agenda, goals, and expected outputs for this meeting
Simon Hedges

9:50 IUCN/SSC’s new strategic planning process for species conservation
Rosie Woodroffe

10:10 Biology and conservation of Asian wild cattle and buffaloes
Simon Hedges / James Burton / Bill Robichaud

10:40 COFFEE BREAK

11:10 Presentation of draft maps of Asian wild cattle and buffalo status and distribution; discussion of range categories and data coding.
Simon Hedges

11:40 How to go about revising maps of wild cattle and buffalo status and distribution
Tim Bean

12:00 LUNCH

13:00 Discussion of vision for wild cattle and buffalo conservation in Asia
All participants

13:30 Presentation on how the Working Groups will function
Rosie Woodroffe

13:35 Split into three working groups:

<i>Working Group 1</i>	<i>Working Groups 2–10 (one per species, fluid membership)</i>
Refine vision for South-east Asian Conservation Strategy	Revise information on distribution and status of wild cattle & buffaloes

17:30 End of day's working – bird-watching and/or pre-dinner drinks

19:00 DINNER

DAY 2 OF 5: Tuesday 10th June 2008

8:30 Presentation of revised vision
Working Group 1

8:40 Discussion of revised vision
All participants

9:00 Working groups reconvene (group membership can vary within & between sessions)

<i>Working Group 1</i>	<i>Working Groups 2–10 (one per species, fluid membership)</i>
Finalize vision for South-east Asia (incorporating earlier discussions)	Continue mapping, synthesis of data on status of wild cattle & buffaloes; review of maps for wild cattle and buffaloes

10:00 COFFEE BREAK

10:30 Presentation of finalized vision statement
Working Group 1

10:40 Discussion of goal-setting

11:00 Working groups reconvene (group membership can vary within & between sessions)

<i>Working Group 1</i>	<i>Working Groups 2–10 (one per species, fluid membership)</i>
Start compiling data needed for goal-setting.	Continue mapping, synthesis of data on status of wild cattle & buffaloes; review of maps for wild cattle and buffaloes

12:00 LUNCH

13:00 Working groups reconvene (group membership can vary within & between sessions)

<i>Working Group 1</i>	<i>Working Groups 2–10 (one per species, fluid membership)</i>
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Continue compiling data needed for goal-setting.	Continue mapping, synthesis of data on status of wild cattle & buffaloes; review of maps for wild cattle and buffaloes
15:00 TEA BREAK	
15:30 Working groups reconvene (group membership can vary within & between sessions)	
<i>Working Group 1</i>	<i>Working Groups 2–10 (one per species, fluid membership)</i>
Discuss and develop list of threats drawing on threat data contributed by participants	Continue mapping, synthesis of data on status of wild cattle & buffaloes; review of maps for wild cattle and buffaloes
17:30 End of day's working – bird-watching & pre-dinner drinks	
19:00 DINNER	

DAY 3 OF 5: Wednesday 11th June 2008

08:30	Presentation and review of finalized distribution maps. Draw attention to locations of populations relative to land cover, international borders, and protected areas. Also highlight congruence – or lack thereof – in wild cattle and buffalo distributions <i>Tim Bean and others as appropriate</i>
09:15	Presentation of the data compilation needed for goal-setting for discussion/revision <i>Working Group 1</i>
09:45	Discussion on setting goals and goal-targets
10:30	COFFEE
11:00	Working group session <i>Working Groups, one per species (fluid membership)</i> Develop Goals and Goal targets
12:00	LUNCH
13:00	Brief presentations by each working group on progress with goals and goal targets <i>Working groups</i>
13:30	Working groups reconvene to finalize goals and goal targets. <i>Working Groups, one per species (fluid membership)</i> Continue developing Goals and Goal targets
14:30	Brief presentations by each working group on final goals and goal targets

Working groups

- 15:00 TEA BREAK
- 15:30 Presentation and discussion about threats to buffaloes and wild cattle in Asia
Working Group 1 from Tuesday, then all participants
- 16:15 Problem analysis: what hinders achieving the vision and goals in South-east Asia?
All participants – split into working groups
- 17:30 End of day's working – bird-watching & pre-dinner drinks
- 19:00 DINNER

DAY 4 OF 5: Thursday 12th June 2008

- 08:30 Presentation of problem tree and explanation of how to use the problem analysis to formulate objectives.
Rosie Woodroffe
- 09:00 Split into working groups to develop first drafts of objectives
Working groups
- 09:30 Presentation and discussion of first drafts of objectives
Working groups
- 09:45 Split into working groups to develop second drafts of objectives
Working groups
- 10:15 Presentation of second draft objectives
Working groups
- 10:30 COFFEE BREAK
- 11:00 Explanation of how to use the objectives to formulate objective targets.
Rosie Woodroffe
- 11:05 Working group for each objective develops list of objective targets
Working groups
- 12:00 LUNCH
- 13:00 Presentation of objective targets and discussion
All participants
- 14:00 Working groups finalize objectives and objective targets
All participants
- 14:30 Presentation of final objectives and objective targets

Working groups

15:00 TEA BREAK

15:30 Presentation on actions – what are they?
Rosie Woodroffe

15:35 Identify and develop actions for each objective target in objective-based working groups
Working groups

17:30 End of day's working – bird-watching & pre-dinner drinks

19:00 DINNER

DAY 5 OF 5: Friday 13th June 2008

08:30 Present actions for each objective target, followed by discussion
Working groups

09:30 Working groups revisit and redraft actions informed by discussion, adding species, sites, actors, timelines, and indicators if and when appropriate
Working groups

10:30 COFFEE

11:00 Working groups continue redrafting actions informed by discussion, adding species, sites, actors, timelines, and indicators if and when appropriate
Working groups

12:00 LUNCH

13:30 Presentation of completed regional strategy for South-east Asia, followed by discussion
Simon Hedges, James Burton, & Miguel Pedrono, facilitated by Rosie Woodroffe

14:30 Discussion of plans for moving forward, including national action planning
All participants

15:30 Official close of regional meeting

16:00 International Workshop participants depart from Tam Dao.

Appendix 3: Mapping methodology

A3.1 **Assessing the species' distribution and status**

A3.1.1 *Participants in the mapping process*

Workshop participants contributed data on species distribution and status, drawing on their own and their colleagues' data and experience. Participants unable to attend the workshop were asked to contribute before and following the workshop. The process involved participants from Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam.

A3.1.2 *Point Locations*

Point locations provided much data on which the distribution maps were based. A point location is a site where wild cattle or buffalo species presence has been confirmed. Such records included sightings of live or dead animals, and field signs such as tracks or scats. Data associated with the point locations included the number of animals seen (if any), their age (adult or juvenile), and information on the level of experience of the person who made the observation (to allow accounting for data reliability). Participants were asked to map locations from the last 5 years, although older data was also informative for areas that had received little recent survey or monitoring effort, and to confirm historic range.

A3.1.3 *Range Polygons*

Point locations and other data were used to delineate geographic range polygons. All land previously occupied by these species was considered to fall inside the historical range. For some areas detailed historical data on distribution was available; elsewhere, historical distribution was estimated based on each species' broad habitat requirements.

None of the species still occupy all areas of their historical range. Hence, present day data can be used to divide the historical range of each species into several range categories:

(1) Confirmed Range (Red)

Confirmed in the last five years, i.e. since January 2003 to present. An area of suitable habitat in which there is no reasonable doubt that wild cattle/buffaloes occur based on confirmed reports such as direct field sightings, photographs, species remains.

(2) Unconfirmed / Possible Range (Green)

An area within the established/well-documented historical range, and in suitable habitat, which is based on (a) confirmed reports (as defined above) BUT which predate January 2003 and where there are no subsequent data to rule out the presence of cattle/buffaloes OR (b) unconfirmed reports, for example Sightings which do not meet the criteria for "Confirmed" reports (see above) or Photographs (including camera-trap photos) which are not clearly from the site in question and/or are undated

(3) Doubtful Range (Blue)

Evidence of past occurrence but extensive work has failed to find the species or their signs, or the site is obviously no longer suitable.

(4) Extirpated Range (Black)

Evidence of past occurrence, but the area no longer supports the species.

(5) Recoverable Range (Purple)

Land where habitat remains over sufficiently large areas such that either natural or assisted

recovery of the species might be possible within the next 10 years. Note that ‘recoverable’ is a sub-type of ‘extirpated’.

(6) Unknown Range (White)

Land where the species’ status is currently unknown.

In principle, conservation activities may be conducted in any of these types of geographic range. In addition to mapping each range polygon, participants also provided information on land use within the polygon, the size and status of the wild cattle or buffalo population it contained (if sufficient information was available), and potential threats.

A3.1.4 *Collating data from multiple participants*

Participants provided data on geographic areas of expertise prior to the workshop; these were then collated into the draft maps for the entire region. At the workshop itself these maps were reviewed and modified through discussion among participants.

The process of collating data from multiple participants led, in some cases, to substantial changes in the range polygons. In particular a number of polygons were merged when it became clear that populations mapped by participants from different areas (frequently in different countries) constituted single populations. In such cases, updated maps on population size and status, land uses, and threats for the new (merged) polygon were agreed by participants.

By this process, participants produced a digital map of the species distribution and status within South-east Asia.

A3.1.5 *Analysing of data on status and distribution*

Once the distribution maps were finalized and agreed by participants, these were used to evaluate the proportion of each species’ geographic range that fell inside vs. outside protected areas. This information helped to direct the strategic planning process by highlighting the importance of both protected and unprotected areas for the future conservation of wild cattle and buffalo species.

Distribution data were also compared with national boundaries and hence used to evaluate the likely importance of trans-boundary management; once again this informed the development of the Regional Conservation Strategy.

Range polygons were also compared with WWF ecoregions identified within South-east Asia (Olson *et al.* 2001). Following Sanderson *et al.* (2002) were used as a measure of the ‘ecological settings’ within which Asian wild cattle and buffalo populations occur. Mapping the species’ distributions across these ecoregions therefore provided one way for participants to pick out polygons that were ecologically unique (and therefore particularly valuable) because they fell within under represented ecoregions.

Appendix 4: Regional Conservation Strategy for South-east Asian Wild Cattle and Buffaloes - Logical Framework

Vision						
We envision viable, ecologically functioning populations of wild cattle and buffalo that are appreciated by humankind. These populations will represent the species' genetic diversity, in well-managed landscapes, replicated across their original ecological settings and in all range states.						
Goals						
Anoa Ensure 10 viable, ecologically functioning anoa populations, with 2 populations in each biogeographic region (Buton, South-East, East, North and Central) and their habitat. All anoa populations should co-exist with people supported by regional planning.	Banteng 26 ecologically functional, large populations, with 17 populations in dry forest mosaic habitat types and 9 in evergreen forest habitat types; giving 4 populations in the Bornean subspecies/ESU, 6 in the Javan subspecies/ESU, and 16 in the mainland subspecies/ESU. Achieving this will require reintroductions to former range in Thailand and Indonesia. All populations should be co-exist with people and their domestic animals, and be valued by people in range states and internationally.	Gaur 30 ecologically functional, large Gaur populations, with 21 populations in mixed forest habitat types and 9 in evergreen forest habitat types; giving 4 populations in the <i>Bos gaurus hubbacki</i> subspecies/ESU and 26 in the <i>Bos gaurus readei</i> subspecies/ESU. Achieving this will require reintroductions to former range in Malaysia, Thailand, and Vietnam. All populations should be co-exist with people and their domestic animals, and be valued by people in range states and internationally.	Kouprey Kouprey exist in the wild in multiple viable populations.	Saola Saola is recognized in and beyond Lao and Vietnam as a flagship species of the Annamites, motivating effective conservation of the ecoregion. Saola will not be lost from any site in which they now occur and will recover to at least 800 free-ranging adults, with at least 3 sub-populations of over 200 adults each in landscapes larger than 1,000km ²	Tamaraw Secure three ecologically functioning [including two viable] populations of tamaraw co-existing with indigenous people and other stakeholders in the Island of Mindoro, Philippines	Water buffalo 10 viable, ecologically functional populations of wild and wild type buffalo (as well as feral populations of exceptional interest) in Southeast Asia. Achieving this will require identification of populations of wild, wild type, and feral buffalo in all Southeast Asian countries, especially in Malaysia and Indonesia. All populations should coexist with people and their livestock and, be appreciated.

Goal targets						
Anoa	Banteng	Gaur	Kouprey	Saola	Tamaraw	Water buffalo
<ul style="list-style-type: none"> By 2011, define population structure of anoa, including taxonomic status. By 2012, determine species' status, threats to anoa and habitat condition in all areas of confirmed and possible range, including determining isolated populations. By 2014, determine species' status in areas of unknown range in South Sulawesi By 2016, achieve significant decline in poaching of anoa and habitat loss through awareness program and law enforcement around 10 populations By 2018, 5 populations to be stable or increasing, one in each of the biogeographic regions 	<p>Banteng Maintain the secure Banteng populations in Ujung Kulon NP in Java (Indonesia) and Huai Kha Khaeng WS and the Eastern Forest Complex in Thailand.</p> <p>Increase Banteng numbers in:</p> <ul style="list-style-type: none"> Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yen-Khao Yai Forest Complex (Thailand) by 2015; Baluran NP (Java, Indonesia) by 2013, and Alas Purwo and Meru Betiri NPs (Java, Indonesia) by 2015; Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahemyaing WS (Myanmar) by 2015; all Cambodian PAs by 2020; Stabilize the populations in the Ea So area and Yok Don NP (Vietnam) by 2015 and increase them by 2020. <p>Determine the species' range and status in Cambodia, China, Kalimantan (Indonesia), 6 PAs in Lao PDR, and</p>	<p>Gaur Maintain or increase as appropriate the priority populations in the Western Forest Complex and the Dong Phra Yen-Khao Yai Forest Complex (Thailand), Taman Negara NP and the Belum and Temenggor Forest Reserves (Malaysia), and the Hukaung Valley / Hukaung Tiger Reserve (Myanmar).</p> <p>Increase Gaur numbers in:</p> <ul style="list-style-type: none"> 2 Cambodian populations by 2015 and 2 further Cambodian populations by 2020 Khlong Saeng WS, Kaeng Krachan NP, Eastern Forest Complex, and Phu Khieo WS / Nam Nao NP (Thailand) by 2015; Tanintharyi NP, Rakhine Yoma Elephant Range, Alaungdaw Kathapa NP, and the Pegu Yoma area (Myanmar) by 2020; the Nam Et / Phou Louey NPA, Nakai Nam Theun NPA, Xe Pian NPA and the Bolikhamsay populations by 2015 and all other populations in the Lao PDR by 2020; 	<p>Kouprey 1A) Find any remaining Kouprey.</p> <p>1B) Create a genetic sample bank from trophies and other specimens held in private collections and museums.</p> <p>2) Secure any Kouprey found in the wild by creating a semi-captive protected ranch within the range State of origin.</p> <p>3) Evaluate the possibility of cloning Kouprey if none found are found in the wild / or if otherwise necessary (i.e. if too few wild animals are found to facilitate the establishment of viable populations).</p>	<p>Saola • Communities, provinces and national governments of saola range understand that the saola is found only in their areas, is threatened with extinction and requires their support to survive, and this understanding is shared by the international community</p> <p>• All areas currently with saola still have saola in 2020</p> <p>• In 2020 the best estimate is that at least 350 adult saola range free</p> <p>• Saola conservation is officially recognised as a land use function of the 3 landscapes of 'the Northern Annamites', 'Kham-Sav-Tri-Binh' and 'Hue-Quang Nam'</p>	<ul style="list-style-type: none"> Secure all three existing populations (Mount Iglit-Baco National Park, Aruyan and Calavite) of the Tamaraw by 2017 and ensure proper management by 2020. Establish species' status in two (2) areas of possible range (Mapad & FBH- Mount Iglit-Baco National Park corridor) by 2015. Develop and implement area-specific management plans, including habitat restoration plan for three confirmed ranges (Mount Iglit-Baco National Park, Aruyan & Calavite) by 2017 and for two possible ranges [depending on survey results] by 2020 	<p>Secure the three existing known populations of wild/wild type buffalo in Southeast Asia (those in Cambodia, Thailand, and Myanmar) by 2015.</p> <p>Determine the status of wild, wild type, and feral buffalo in all remaining areas in all range states in Southeast Asia by 2020</p> <p>Secure any newly-identified populations of wild or wild type buffalo (and exceptionally interesting feral populations) in Southeast Asia within 5 years of discovery.</p>

	<p>Myanmar by 2015, and in Malaysia by 2020.</p> <p>Reintroduce Banteng to Leuweung Sancang NR and Cikepuh GR in Java (Indonesia; both evergreen habitat types) by 2020 and Om Koi WS (dry forest mosaic) and Chumporn Forest Complex (evergreen forest) in Thailand by 2020</p>	<ul style="list-style-type: none"> ● Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2020; ● the Yunnan population in China by 2018; ● the Endau-Kota Tinggi / Endau Rompin complex in Malaysia by 2015. <p>Determine the species' distribution Cambodia, China, Lao PDR, Malaysia, and Myanmar by 2014.</p> <p>Determine the species' distribution and status (population size/trend) in 10 populations by 2015 and the remainder by 2020.</p> <p>Reintroduce Gaur to Vinh Chu and Dak Minh (<i>B. g. readei</i>, Vietnam) and Om Koi (<i>B. g. readei</i>, Thailand) by 2020</p> <p>Augment (through translocations) the existing populations in Khao Luang NP (<i>B. g. hubbacki</i>, Thailand) and Krau GR (<i>B. g. hubbacki</i>, Malaysia) by 2020.</p>			
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Objective 1	Objective Target	Action
Eliminate the threat to wild cattle and buffalo populations posed by killing or removal of wild animals by people	Work with communities in and around wild cattle and buffalo habitat to eliminate the threat posed by killing or removal of wild cattle and buffalo by people by 2017	<p>Identify priority sites where working with local communities is likely to reduce killing or removal of wild cattle and buffaloes <i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p>At priority sites, ensure local communities benefit from presence of live wild cattle and buffalo and other wildlife (e.g. through ecotourism) <i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng:</i> Mondulkiri Protection Forest and Keo Siema (Cambodia; by 2017), Huai Kha Khaen WS (Thailand) by 2013; Ea So and Yok Don (Vietnam) by 2013; and Ujung Kulon, Meru Betiri, Baluran, and Alas Purwo (Java, Indonesia) by 2013.</p> <p><i>Sites for Gaur:</i> Mondulkiri Protection Forest and Keo Siema (Cambodia; by 2017), Taman Negara and Krau (Malaysia), Dong Phra Yai Forest Complex, Eastern Forest Complex (Thailand) by 2017</p> <p><i>Sites for Saola:</i> 2 special conservation zones in Nakai Nam Theun, Lao that provide benefits to communities through direct payments for involvement in saola monitoring (by 2014), direct payments for snare removal in the Hue-Quang Nam landscape (by 2013)</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite, Aruyan-Malati</p> <p><i>Sites for Water Buffalo:</i> Mondulkiri Protection Forest and Keo Siema (Cambodia; by 2017)</p>
		<p>Increase awareness of communities in and around wild cattle and buffalo habitat of values of wildlife, and monitor success <i>Species:</i> All species</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng and Gaur:</i> all sites mentioned in Goal targets</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite, Aruyan-Malati</p>
		<p>Work with local communities and other stakeholders to develop and implement land use plans to reduce human-wildlife conflict in and around wild cattle and buffalo habitat (e.g. through habitat management) <i>Species:</i> Banteng, Gaur, Tamaraw, Water Buffalo</p> <p><i>Sites for Banteng:</i> Meru Betiri and Baluran NP (Indonesia), by 2014; Huai Kha Khaeng (Thailand) by 2012</p> <p><i>Sites for Gaur:</i> Eastern Forest Complex and Khao Yai NP (Thailand), by 2014</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite; Aruyan-Malati</p> <p><i>Sites for Water Buffalo:</i> Huai Kha Khaeng WS (Thailand) by 2014</p>
		<p>Work with local communities and other stakeholders to develop and implement land use plans to reduce killing of wild cattle and buffalo (e.g. through no-hunting zones) <i>Species:</i> Anoa, Saola, Tamaraw, any other species where relevant at particular sites</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Saola:</i> Establish community-agreed to Intensive Protection Zones in the Hue-Quang Nam landscape and Nakai-Nam Theun (by 2012), and landuse planning linked to alternative livelihood schemes in the Hue-Quang Nam landscape</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite; Aruyan-Malati</p>
	Achieve effective protection through intensive law enforcement by 2015	<p>Ensure sufficient patrol effort by well-trained and well-equipped ranger forces or other appropriate co-operators in and around wild cattle and buffalo habitat <i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/</p>

	<p>Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng:</i> Ujung Kulon NP (ongoing); Baluran NP, Alas Purwo NP, Meru Betiri by 2012; Kutai by 2014; Kayan Mentarang (ongoing) (Indonesia); Huai Khai Khaeng WS and the Eastern Forest Complex (Thailand), Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yaten-Khao Yai Forest Complex (Thailand); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; Ea So area and Yok Don NP (Vietnam) by 2015.</p> <p><i>Sites for Gaur:</i> Eastern Plains Landscape (Cambodia) by 2015, all other protected areas by 2020; Huai Khai Khaen WS (Thailand) and other Protected Areas ongoing; Cat Tien NP, Yok Don, Ea So (Vietnam) 2013; Taman Negara NP, Krau GR by 2015 (Malaysia); Hukaung Valley (Myanmar) by 2014, Alaungdaw Kathapa NP and Rakhine Yoma Elephant Range by 2014; Western Forest Complex, Dong Phra Yaten-Khao Yai Forest Complex (Thailand), Belum and Temenggor Forest Reserves (Malaysia), Khlong Saeng WS, Kaeng Krachan NP, Eastern Forest Complex, and Phu Khieo WS / Nam Nao NP (Thailand), Tanintharyi NP, Pegu Yoma area (Myanmar), Bolikahmxay populations, and all other populations in the Lao PDR by 2018; Nam Et / Phou Louey NPA ongoing (Lao), patrol effort in Nakai-Nam Theun increased by 50% by 2014.</p> <p><i>Sites for Saola:</i> WMPA investigates the possibility of supporting Nam Chat PPA in enforcement (by 2011); Snare-removal by rangers and local communities throughout the Hue-Quang Nam landscape and Nakai - Nam Theun NPA implemented by 2013; patrol effort in Nakai-Nam Theun increased by 50% by 2014; Rangers throughout the Hue-Quang Nam landscape trained and managed effectively by 2014.</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite, Aruyan-Malati.</p> <p><i>Sites for Water Buffalo:</i> Eastern Plains Landscape (Cambodia) by 2015, Northern Plains Landscape by 2017, all other protected areas by 2020.</p>
	<p>Monitor distribution of threats from killing and removal of wild cattle and buffalo and use to inform distribution of patrol effort and awareness programmes locally, nationally and internationally (as described in Objective 7 Increasing the species' profiles).</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite, Aruyan-Malati</p> <p><i>Sites for other species defined as per monitoring above in Objective 1.</i></p>
	<p>Where appropriate, establish intensive protection units (within ranger forces) and/or intensive protection zones (within PAs)</p> <p><i>Species:</i> Anoa, Kouprey (if located), Saola, Tamaraw</p> <p><i>Sites for Anoa:</i> Five sites to be selected</p> <p><i>Sites for Saola:</i> Management of a dedicated saola ranger force of the 3 protected areas of the Hue-Quang Nam landscape and 2 in Nakai Nam Theun focused on Intensive Protection Zone protection and snare removal</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite, Aruyan-Malati</p>
	<p>Where needed, increase awareness of communities in and around wild cattle and buffalo habitat of legal status of wild cattle and buffalo and penalties for poaching</p> <p><i>Species:</i> All species where needed at particular sites</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite; Aruyan-Malati</p>
	<p>Where needed, improve motivation to enforce wildlife protection e.g. by increasing awareness of legal status of wild cattle and buffalo among law enforcement staff, informant incentive schemes etc</p> <p><i>Species:</i> All species where needed at particular sites</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p>

		<p><i>Sites for Saola:</i> Complete management regulations for NNT NPA, and establish informant networks throughout the Hue-Quang Nam landscape (both by 2013)</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite; Aruyan-Malati</p>
		<p>Ensure cooperation between wildlife authorities, police, customs and other government agencies to enforce wildlife law</p> <p><i>Species:</i> all species</p> <p><i>Sites for Saola:</i> Maintain and improve efficiency of the provincial enforcement working groups of Hue and Quang Nam (Vietnam)</p>
		<p>Address problem of illegal gun ownership in and near wild cattle and buffalo habitat</p> <p><i>Species:</i> All species</p>
		<p>Reduce trading of wild cattle and buffalo products through patrolling of markets, transport routes etc</p> <p><i>Species:</i> all species</p> <p><i>Sites for Saola:</i> crackdown on wildlife restaurants throughout the Hue-Quang Nam landscape by 2012 and in the Tri-Binh landscape (Vietnam) by 2015</p>
		<p>Identify genetic markers which can be used to trace wild cattle and buffalo products in trade</p> <p><i>Species:</i> Anoa, Tamaraw, Other species as appropriate</p>
		<p>Where possible, establish a register of legally-owned live wild cattle and buffalo and wild cattle and buffalo products (e.g. in zoos and museums) and ensure that this register is well regulated</p> <p><i>Species:</i> All species</p> <p><i>Sites for Saola:</i> NNT NPA (Lao) and Hue Quang Nam landscape (Vietnam) by 2012, and Bolikhamxay (Lao) by 2014</p>
	Reduce demand for wild cattle and buffalo products at the local, national, and international levels	<p>Increase awareness of availability of alternatives to wild cattle and buffalo products e.g. resin horns as substitute for gaur horn</p> <p><i>Species:</i> all species where needed</p>
		<p>Increase awareness of the value and conservation status of wild cattle and buffalo, and the legal consequences of illegal ownership of wild cattle and buffalo products, among possible poachers, traders, buyers and consumers of such products</p> <p><i>Species:</i> All species where needed</p>
		<p>Link conservation of wild cattle and buffalo to food security e.g. by improving access to alternative sources of meat among communities likely to consume wild cattle and buffalo</p> <p><i>Species:</i> All species where needed</p>
		<p>Improve access to alternative means of income generation among people likely to be involved in poaching wild cattle and buffalo</p> <p><i>Species:</i> All species where needed</p>
		<p>Conduct studies of trade dynamics wild cattle and buffalo and use this to inform strategies for stopping the trade</p> <p><i>Species:</i> All species where needed</p>
		<p>Research and campaign to reduce urban demand for trophies</p> <p><i>Species:</i> Banteng, Gaur, Kouprey, Water Buffalo</p>
	Enhance protection of wild cattle and buffalo through policy improvements at national and international levels by 2016	<p>Amend national laws and regulations to ensure that they can effectively protect wild cattle and buffalo, and are enforced</p> <p><i>Species:</i> All species where needed</p>
		<p>Increase the profile of international trade in wild cattle and buffalo products in regional agreements e.g. ASEAN Wildlife Enforcement Network</p> <p><i>Species:</i> all species</p>
		<p>Review status of wild cattle and buffalo species on CITES appendices and amend where appropriate</p> <p><i>Species:</i> all species</p>

Objective 2	Objective Target	Action
Maintain and, where appropriate, expand the area of wild cattle and buffalo habitat, and increase the proportion of that habitat that is well managed, to ensure the viability and ecological functionality of wild cattle and buffalo populations	Well managed protected areas with priority populations of wild cattle and buffaloes maintain or where appropriate improve their management standards by 2015	<p>Assess management of protected areas Species: Ahoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Sites for Ahoa: Bogani Nani Wartabone, Panua-Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p>Sites for Banteng: Ujung Kulon NP in Java (Indonesia) and Huai Kha Khaeng WS and the Eastern Forest Complex in Thailand.</p> <p>Sites for Gaur: Western Forest Complex and the Dong Phra Yayen–Khao Yai Forest Complex (Thailand), Taman Negara NP and the Belum and Temenggor Forest Reserves (Malaysia), and the Hukaung Valley / Hukaung Tiger Reserve (Myanmar).</p> <p>Sites for Tamaraw: Mount Iglit-Baco National Park; Mount Calavite Wildlife Sanctuary</p> <p>Sites for Water Buffalo: Huai Kha Khaeng WS (Thailand)</p>
		<p>Review monitoring programmes and results in protected areas every 3 years Species: Ahoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p>Sites for Ahoa: Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p>Sites for Banteng: Ujung Kulon NP in Java (Indonesia) and Huai Kha Khaeng WS and the Eastern Forest Complex in Thailand.</p> <p>Sites for Gaur: Western Forest Complex and the Dong Phra Yayen–Khao Yai Forest Complex (Thailand), Taman Negara NP and the Belum and Temenggor Forest Reserves (Malaysia), and the Hukaung Valley / Hukaung Tiger Reserve (Myanmar).</p> <p>Sites for Saola: Nakai-Nam Theun NPA (Lao)</p> <p>Sites for Tamaraw: Mount Iglit-Baco National Park; Mount Calavite Wildlife Sanctuary</p> <p>Sites for Water Buffalo: all known sites in SE Asia</p>
		<p>Improve protected area management and monitoring programmes where they are deemed in need of improvement Likely sites: Where appropriate based on reviews described above</p>
	Appropriate management practices developed for other priority protected areas with wild cattle and buffaloes by 2015	<p>Assess management of protected areas Species: Ahoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Sites for Ahoa: Pantai timur – pantai barat, Tanjung Peropa, Latimojong</p> <p>Sites for Banteng: Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam); Xe Pian NPA (Lao).</p> <p>Sites for Gaur: all Cambodian PAs; Khlong Saeng WS, Kaeng Krachan NP, Eastern Forest Complex, and Phu Khieo WS / Nam Nao NP (Thailand); Tanintharyi NP, Rakhine Yoma Elephant Range, Alaungdaw Kathapa NP, and the Pegu Yoma area; Nam Et / Phou Louey NPA, Nakai Nam Theun NPA, and the Bolikharmxay populations; Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR; the Yunnan population in China; the Endau–Kota Tinggi / Endau Rompin complex (Malaysia).</p> <p>Sites for Saola: Nam Chat – Nam Pan PPA (Lao) and Bach Ma NP, Hue Saola NR and Quang Nam Saola NR (Vietnam) all by 2012; Xe Xap NPA (Lao) and Pu Mat NP and Vu Quang NP (Vietnam) all by 2015</p> <p>Sites for Tamaraw: Mapad Valley, Aruyan-Malati, and F.B. Harrison</p> <p>Sites for Water Buffalo: Mondulkiri Protected Forest (Cambodia), Hukaung Valley Wildlife Sanctuary, Indawgyi Lake WS (Myanmar) Huai Kha Khaeng WS (Thailand), Bu Gia Map NP (Vietnam).</p>
		Improve management and monitoring programmes of protected areas

	<p>Species: Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Sites for Anoa: Pantai timur – pantai barat, Tanjung Peropa, Latimojong</p> <p>Sites for Banteng: Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam); Xe Pian NPA (Lao).</p> <p>Sites for Gaur: all Cambodian PAs; Khlong Saeng WS, Kaeng Krachan NP, Eastern Forest Complex, and Phu Khieo WS / Nam Nao NP (Thailand); Tanintharyi NP, Rakhine Yoma Elephant Range, Alaungdaw Kathapa NP, and the Pegu Yoma area; Nam Et / Phou Louey NPA, Nakai Nam Theun NPA, Xe Pian NPA Lao and the Bolikahmxay population; Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR; the Yunnan population in China; the Endau–Kota Tinggi / Endau Rompin complex (Malaysia).</p> <p>Sites for Saola: Nam Chat – Nam Pan PPA (Lao) and Bach Ma NP, Hue Saola NR and Quang Nam Saola NR (Vietnam) all by 2012; Xe Xap NPA (Lao) and Pu Mat NP and Vu Quang NP (Vietnam) all by 2014</p> <p>Sites for Tamaraw: F.B. Harrison</p> <p>Sites for Water Buffalo: Mondulkiri Protected Forest (Cambodia), Hukaung Valley Wildlife Sanctuary, Indawgyi Lake WS (Myanmar) Huai Kha Khaeng WS (Thailand), Bu Gia Map NP (Vietnam).</p>
	<p>Review management results in protected areas every 3 years after strengthening management and monitoring</p> <p>Species: Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Sites for Anoa: Pantai timur – pantai barat, Tanjung Peropa, Latimojong</p> <p>Sites for Banteng: Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam) ; Xe Pian NPA (Lao).</p> <p>Sites for Gaur: all Cambodian PAs; Khlong Saeng WS, Kaeng Krachan NP, Eastern Forest Complex, and Phu Khieo WS / Nam Nao NP (Thailand); Tanintharyi NP, Rakhine Yoma Elephant Range, Alaungdaw Kathapa NP, and the Pegu Yoma area; Nam Et / Phou Louey NPA, Nakai Nam Theun NPA, and Xe Pian NPA in Lao and the Bolikahmxay population; Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR; the Yunnan population in China; the Endau–Kota Tinggi / Endau Rompin complex (Malaysia)</p> <p>Sites for Saola: Nam Chat – Nam Pan PPA and Xe Xap NPA (Lao), and Bach Ma NP, Hue Saola NR, Quang Nam Saola NR, Pu Mat NP and Vu Quang NP (Vietnam)</p> <p>Sites for Tamaraw: F.B. Harrison</p> <p>Sites for Water Buffalo: Mondulkiri Protected Forest (Cambodia), Hukaung Valley Wildlife Sanctuary, Indawgyi Lake WS (Myanmar) Huai Kha Khaeng WS (Thailand), Bu Gia Map NP (Vietnam).</p>
Appropriate management practices implemented for existing second priority protected areas with wild cattle and buffaloes by 2020	<p>Assess management of protected areas</p> <p>Species: Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Sites for Banteng: Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam); Xe Pian NPA (Lao).</p> <p>Sites for Gaur: Vinh Chu and Dak Minh (B. g. readei, Vietnam) and Om Koi (B. g. readei, Thailand); Khao Luang NP (B. g. hubbacki, Thailand) and Krau GR (B. g. hubbacki, Malaysia) by 2018.</p> <p>Sites for Saola: Pu Huong NR, Bac Huong Hoa NR and Phong Dien NR (Vietnam) by 2020</p> <p>Sites for Tamaraw: F.B. Harrison</p> <p>Sites for Water Buffalo: Any other sites that are identified during surveys</p>

		<p>Improve management and monitoring programmes of protected areas</p> <p><i>Species:</i> Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p><i>Sites for Banteng:</i> Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam); Xe Pian NPA (Lao).</p> <p><i>Sites for Gaur:</i> Vinh Chu and Dak Minh (B. g. readei, Vietnam) and Om Koi (B. g. readei, Thailand); Khao Luang NP (B. g. hubbacki, Thailand) and Krau GR (B. g. hubbacki, Malaysia) by 2018.</p> <p><i>Sites for Saola:</i> Pu Huong NR, Bac Huong Hoa NR and Phong Dien NR (Vietnam) by 2020</p> <p><i>Sites for Tamaraw:</i> F.B. Harrison</p> <p><i>Sites for Water Buffalo:</i> Any other sites that are identified during surveys</p>
		<p>Review management results in protected areas every 3 years after strengthening management and monitoring</p> <p><i>Species:</i> Banteng, Gaur, Tamaraw, Water buffalo</p> <p><i>Sites for Banteng:</i> Nam Nao NP, Kaeng Krachan NP, and Dong Phra Yayen–Khao Yai Forest Complex (Thailand); Baluran NP, Alas Purwo NP, and Meru Betiri NP (Java, Indonesia); Alaungdaw Kathapa NP, Bago Yoma Reserved Forest, and the proposed Mahamyaing WS (Myanmar); all Cambodian PAs; the Ea So area and Yok Don NP (Vietnam).</p> <p><i>Sites for Gaur:</i> Vinh Chu and Dak Minh (B. g. readei, Vietnam) and Om Koi (B. g. readei, Thailand); Khao Luang NP (B. g. hubbacki, Thailand) and Krau GR (B. g. hubbacki, Malaysia) by 2018.</p> <p><i>Sites for Saola:</i> Pu Huong NR, Bac Huong Hoa NR and Phong Dien NR (Vietnam) by 2020</p> <p><i>Sites for Tamaraw:</i> F.B. Harrison</p> <p><i>Sites for Water Buffalo:</i> Any other sites that are identified during surveys</p>
	Potential, currently unsecured, wild cattle and buffalo habitat assessed by 2020	<p>Survey of potential, currently unsecured, wild cattle and buffalo habitat</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Water buffalo</p> <p><i>Sites for Anoa:</i> Gunung Manembo- Nembo WR/ Mt Ambang NR, Gunung Lompobattang, Luwu, Pangkep-Sidrap (all by 2014)</p> <p><i>Sites for Banteng:</i> Cambodia, Kalimantan, Laos (all by 2012), Myanmar (by 2015), Malaysia (by 2020)</p> <p><i>Sites for Gaur:</i> Cambodia, Laos, Malaysai, Myanmar (all by 2012), China (by 2013)</p> <p><i>Sites for Saola:</i> Two areas in Bolikhhamxay (Lao), south of Pu Mat and the Tri-Binh landscape (Vietnam), area of northern Savannakhet and southern Khammouane provinces (Lao)</p> <p><i>Sites for Water Buffalo:</i> Across all SE Asian range states by 2020</p>
		<p>Propose national-level protected area network expansions where possible to secure priority areas for wild cattle and buffalo</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Water buffalo</p>
	Unprotected habitat put under appropriate management by 2020 (and beyond)	<p>Lobby national governments to gazette new protected areas for wild cattle and buffalo</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Water buffalo (where appropriate)</p> <p><i>Sites for Anoa:</i> Pegunungan Takolekaju, Matano, Gunung Vervek</p> <p><i>Sites for Saola:</i> ‘Truong Son’ proposed NR (Vietnam), Nam Chouan proposed NPA, Lao</p>
		<p>Develop management structures and plans for new protected areas</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Water buffalo (where appropriate)</p>
		<p>Support management strengthening of new protected areas</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Water buffalo (where appropriate)</p>
		<p>Where a protected areas cannot be established, implement appropriate management for wild cattle and buffalo</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo (where appropriate)</p> <p><i>Sites for Tamaraw:</i> Aruyan-Malati</p>

Objective 3	Objective Target	Action
Manage interactions with livestock to control competition, disease transmission and genetic introgression	Management protocol developed for livestock grazing in vicinity of Wild Cattle and Buffalo by 2015	<p>Conduct behavioural, ecological and epidemiological studies of interactions between wild cattle and buffalo and livestock <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Where needed, promote awareness among decision makers (e.g. livestock departments) of the need to separate livestock from wild cattle and buffalo <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Where needed, work with local communities and other stakeholders to develop land use plans to minimise interactions between livestock and wild cattle and buffalo (e.g. zoning of grazing areas, access to waterpoints etc) <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Where needed, encourage livestock husbandry practices which minimise interactions between livestock and wild cattle and buffalo <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p>
	Strategies developed and implemented, where appropriate, for disease management by 2015	<p>Conduct epidemiological research to determine which livestock diseases threaten which wild cattle and buffalo species, and under which circumstances <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Conduct epidemiological research to determine which livestock diseases are maintained within wild cattle and buffalo populations and present potential threats to livestock, and monitor <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Depending on results of previous two studies, evaluate potential management approaches to limit transmission of key diseases between wild and domestic species <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p> <p>Promote integrated health management for livestock and wild cattle and buffalo (e.g. vaccination, disease screening) where needed <i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</p>
	Genetic introgression assessed and reduced, where needed, by 2015	<p>Identify sites where genetic introgression should be evaluated <i>Species:</i> Banteng, Water Buffalo <i>Sites for Banteng:</i> Java and Indochina <i>Sites for Water Buffalo:</i> all sites</p> <p>Evaluate genetic introgression at identified sites <i>Species:</i> Banteng, Water Buffalo</p> <p>Develop strategies to halt genetic introgression, where needed, including livestock husbandry and land use planning measures developed above <i>Species:</i> Banteng, Water Buffalo</p>

Objective 4	Objective Target	Action
Inform effective conservation and management of wild cattle and buffaloes by collecting, analysing, interpreting and exchanging high-quality and timely data, in collaboration with key stakeholders locally, nationally and internationally	Range-wide database developed for all wild cattle and buffalo populations	<p>Take and compile all data compiled at the regional action planning workshop (note Saola database already under development)</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Make available through an on-line medium (e.g. website of the IUCN/SSC Asian Wild Cattle Specialist Group)</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Update database with data from National Action Planning workshops</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Maintain and regularly update on-line database</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p>
	Reliable surveys to determine the presence or absence of wild cattle and buffaloes in identified possible and unknown ranges by 2020	<p>Assess survey methods and, where appropriate, improve or develop new methods for use in verifying the presence of wild cattle and buffalo in possible ranges</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Conduct surveys in possible and unknown ranges to determine the presence or absence of wild cattle and buffalo</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Kouprey, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Gunung Manembo- Nembo WR/ Mt Ambang NR, Gunung Lompobattang, Luwu, Pangkep-Sidrap</p> <p><i>Sites for Saola:</i> Two areas in Bolikhhamxay (Lao), south of Pu Mat and the Tri-Binh landscape (Vietnam)</p> <p><i>Sites for Tamaraw:</i> Mapad Valley & F.B. Harrison</p> <p><i>Sites for Banteng, Gaur, Kouprey, Water Buffalo</i> (see Goal targets)</p> <p>Distribute reports of surveys to all relevant parties including through the IUCN/SSC Asian Wild Cattle Specialist Group website</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Identify which sites require population assessments</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p><i>Sites for Tamaraw:</i> Mapad Valley & F.B. Harrison</p>
	Surveys using appropriate peer reviewed methods to measure population size and trend conducted in priority sites by 2020	<p>Identify, discuss and assess methods to clarify appropriate peer reviewed methods for measuring population size in each wild cattle and buffalo species</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p>Species working groups identify sites requiring surveys of population size</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water buffalo</p> <p>Conduct surveys in priority sites and other sites requiring population assessments</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite & Aruyan-Malati</p> <p><i>Sites for Banteng:</i> See Goal targets above</p> <p><i>Sites for Gaur:</i> See Goal targets above</p> <p>Reassess the priority site list per species</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Tamaraw, Water buffalo as appropriate</p>
	Routine monitoring to determine intensity and distribution of threats in priority sites established by 2015	<p>Identify, discuss and assess methods (e.g. MIST (Management Information SysTem)) to monitor the intensity and distribution of threats over time in priority sites</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo as appropriate</p> <p>Implement monitoring programmes in priority sites by 2015</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water buffalo as appropriate</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p>

		Sites for Banteng and Guar: see Goal targets <i>Sites for Saola:</i> Nakai-Nam Theun NPA and Nam Chat – Nam Pan PPA (Lao), Bach Ma NP, Hue Saola NR and Quang Nam Saola NR (Vietnam) <i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park; Mount Calavite; & Aruyan-Malati
	Study the genetics, taxonomy, ecology and behaviour of wild cattle and buffaloes where necessary	By the end of 2011 The IUCN/SSC Asian Wild Cattle Specialist Group coordinates a needs assessment on what research is required for each wild cattle and buffalo species Follow-up on needs assessment as appropriate.

Objective 5	Objective Target	Action
Ensure consistency between existing policies and, where needed, develop new policies (& national action plans) for habitat and species conservation, and promote their implementation at local, national and international levels	National action plans for wild cattle and buffalo conservation in each range country developed by 2013 and continuously implemented through 2020	Conduct national action planning workshops in each range state <i>Species:</i> All National action plans officially endorsed by each range state <i>Species:</i> All Disseminate national action plans to all relevant stakeholders <i>Species:</i> All species
	Establishment of formal institutional arrangements to harmonize and/or address policy gaps are encouraged	Identify policy conflicts and gaps within each range country by 2012 Identify national policy conflicts with international agreements (e.g. Convention on International Trade in Endangered Species) by 2012 Disseminate results of policy review(s) through workshops, reports and other media including, explaining the threat to wild cattle and buffalo from conflicting policies, and offer appropriate solutions Encourage policy changes where needed, guided by policy review Ensure the 3 Saola landscapes are recognised by national policies such that their integrity is not harmed by other national policies by 2018
	Inter-governmental arrangements on collaborative conservation of shared populations of wild cattle and buffaloes developed by 2013, and effected through 2020	Compile and collate reviews of previous trans-frontier conservation initiatives and conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of such approaches Identify key trans-frontier populations of wild cattle and buffalo <i>Species:</i> Banteng, Gaur, Saola, Water Buffalo <i>Sites for Saola:</i> Northern Annamites, Kham-Sav-Tri-Binh, and Hue-Quang Nam Identify overlap of trans-frontier populations of wild cattle and buffalo with those of other species (e.g. tigers, elephants, rhinos and orangutans) on which planning for wild cattle and buffalo conservation could be consolidated <i>Species:</i> Banteng, Gaur, Water Buffalo as appropriate Identify constraints for implementing specific trans-frontier conservation plans for wild cattle and buffalo <i>Species:</i> Banteng, Gaur, Water Buffalo Facilitate dialogue between neighbouring countries in key trans-frontier wild cattle and buffalo areas <i>Species:</i> Banteng, Gaur, Water Buffalo Develop trans-frontier plans for key trans-frontier wild cattle and buffalo areas <i>Species:</i> Banteng, Gaur, Water Buffalo

Objective 6	Objective Target	Action
Strengthen human, financial and technical resources for conserving wild cattle and buffaloes within range states	Regional needs assessment for national technical capacity completed in within 3 years	<p>In each range state, assess needs for technical capacity to implement proposed or existing national action plans</p> <p>Collect national needs assessments in one place and prioritize in writing the recommendations and seek funding to support implementation of these priorities</p> <p>Implement the priority recommendations</p>
	Significantly improve dissemination and discussion of management-relevant information and methods within 1 year	<p>Asian Wild Cattle Specialist Group to devote a portion of its website dedicated to technical support</p> <p>Asian Wild Cattle Specialist Group to develop a listserv dedicated to discussion and improvement of techniques for wild cattle and buffalo conservation (e.g. surveys, threat assessments, management tools)</p>
	Funding support for wild cattle and buffalo conservation significantly increased within 5 years	<p>Encourage increased and committed long-term support from existing funding sources</p> <p>Identify and approach at least 3 novel funders for wild cattle and buffalo conservation e.g. foundations, livestock industry</p> <p>Identify potential alternative mechanisms for funding and sustainable financing of wild cattle and buffalo conservation</p>

Objective 7	Objective Target	Action
Increase the species' profiles by promoting appreciation for the economic, ecological, cultural and intrinsic value of wild cattle and buffalo conservation locally, nationally and internationally	Priority sites develop and implement programmes to encourage the appreciation of local stakeholders for the importance of wild cattle and buffalo conservation by 2015	<p>Identify priority sites for awareness-raising among local stakeholders</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011, Dong Phra Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Alaungdaw Kathapa NP by 2013 (Myanmar) by 2012; Mahamyaing WS by 2018; Taman Negara by 2012 (Malaysia), Krau GR continue; Nam Et and Phou Loey by 2011 (Lao); Baluran NP, Alas Purwo NP, Meru Betiri NP, Ujung Kulon NP; Kayan Mentarang by 2011 (Indonesia).</p> <p><i>Sites for Gaur:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011, Dong Phra Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Hukaung Valley (Myanmar) by 2012; Alaungdaw Kathapa NP by 2013, Tanintharyi NP and Pegu Yoma area by 2018; Taman Negara by 2012 (Malaysia), Krau GR continue.</p> <p><i>Sites for Saola:</i> Northern Annamites, Kham-Sav-Tri-Binh, and Hue-Quang Nam</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite and Aruyan-Malati</p> <p><i>Sites for Water Buffalo:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2012 (Thailand); Hukaung Valley (Myanmar) by 2012.</p> <p>At priority sites, develop locally applicable strategies for appreciation building.</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011, Dong Phra Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Alaungdaw Kathapa NP by 2013 (Myanmar) by 2012; Mahamyaing WS by 2018; Taman Negara by 2012 (Malaysia), Krau GR continue; Nam Et and Phou Loey by 2011 (Lao); Baluran NP, Alas Purwo NP, Meru Betiri NP, Ujung Kulon NP;</p>

		<p>Kayan Mentarang by 2011 (Indonesia).</p> <p><i>Sites for Gaur:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011, Dong Phra Yai-Khao Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Hukaung Valley (Myanmar) by 2012; Alaungdaw Kathapa NP by 2013, Tanintharyi NP and Pegu Yoma area by 2018; Taman Negara by 2012 (Malaysia), Krau GR continue</p> <p><i>Sites for Saola:</i> Northern Annamites and Hue-Quang Nam (by 2011), Kham-Sav-Tri-Binh (by 2013)</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite and Aruyan-Malati</p> <p><i>Sites for Water Buffalo:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011 (Thailand); Hukaung Valley (Myanmar) by 2012.</p>
		<p>Implement awareness-raising strategies in priority sites by 2015</p> <p><i>Species:</i> Anoa, Banteng, Gaur, Saola, Tamaraw, Water Buffalo</p> <p><i>Sites for Anoa:</i> Bogani Nani Wartabone, Panua- Nantu, Pati-Pati, Bakiriang, Morowali, Lore Lindu/ Pegunungan Takolekaju, Matano, Pergunungan Verbek, Buton Utara, Lambusango</p> <p><i>Sites for Banteng:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2012, Dong Phra Yai-Khao Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Alaungdaw Kathapa NP by 2013 (Myanmar) by 2012; Mahamyaing WS by 2020; Taman Negara by 2012 (Malaysia), Krau GR continue; Nam Et and Phou Loey by 2012 (Lao); Baluran NP, Alas Purwo NP, Meru Betiri NP, Ujung Kulon NP; Kayan Mentarang by 2012 (Indonesia).</p> <p><i>Sites for Gaur:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011, Dong Phra Yai-Khao Yai Forest Complex by 2012 (Thailand); Yok Don NP, the Ea So area, Cat Tien NP, and Chu Mom Ray NR (Vietnam) by 2011; Hukaung Valley (Myanmar) by 2012; Alaungdaw Kathapa NP by 2013, Tanintharyi NP and Pegu Yoma area by 2020; Taman Negara by 2012 (Malaysia), Krau GR continue</p> <p><i>Sites for Saola:</i> Northern Annamites and Hue-Quang Nam (by 2015)</p> <p><i>Sites for Tamaraw:</i> Mount Iglit-Baco National Park, Mount Calavite and Aruyan-Malati</p> <p><i>Sites for Water Buffalo:</i> Eastern Plains Landscape (Cambodia) by 2012, all other sites 2017; Huai Kha Khaeng WS by 2011 (Thailand); Hukaung Valley (Myanmar) by 2012.</p>
	Raise the general public's support for Wild cattle and buffalo conservation by 2020	<p>Develop national strategies for awareness building in each range state by 2020</p>
		<p>Make a film on Asian wild cattle and buffalo that is translated into the languages of all range states and shown on national television channels by 2015.</p> <p>Saola indicator: by 2013 have 5 stories in newspapers and 2 TV news spots on Saola conservation in Nakai.</p> <p>Saola indicator: by 2014 a photo trap exhibit at the National Cultural Hall</p> <p>Saola indicator: by 2013 in Vietnam numerous TV and newspaper articles on Saola are in the public domain</p>
	National policy makers understand the importance of wild cattle and buffalo conservation for both biodiversity conservation and the animal husbandry industry by 2014	<p>The IUCN/SSC Asian Wild Cattle Specialist Group to articulate the rationale for wild cattle and buffalo conservation to policy makers through a short document by 2012</p>
		<p>Translate this Asian Wild Cattle Specialist Group document into all range state languages by 2013</p>
		<p>Disseminate document to policy makers by 2015</p>
	The international cattle industry appreciate the need for conservation of wild cattle and	<p>The IUCN/SSC Asian Wild Cattle Specialist Group to articulate the rationale for wild cattle and buffalo conservation to the cattle industry through a short document translated into appropriate languages by 2011</p>

	buffalo by 2014	Disseminate document to major and local cattle industry leaders by 2013
	Significantly increase the importance that international conservation stakeholders place on wild cattle and buffalo conservation	Promote awareness that wild cattle and buffalo are key tiger prey by 2011 <i>Species: Banteng, Gaur, Water Buffalo</i>
		Promote awareness of the role of wild cattle and buffalo as important components of ecosystems (predation, herbivory, habitat manipulation etc) by 2012 <i>Species: Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</i>

Objective 8	Objective Target	Action
Where necessary, and in accordance with international best practices (e.g. IUCN guidelines), increase the number and long-term viability of wild populations of buffalo and wild cattle through active management using modern techniques from genetics, population biology and other disciplines	Assess genetic and demographic structure to support conservation planning at the species level within 5 years	<p>Prioritise populations for genetic research using current taxonomic information <i>Species: Anoa, Banteng, Gaur, Tamaraw, Water Buffalo</i></p> <p>Conduct population genetic studies on identified priority populations to determine subspecies, population structure and hybridization <i>Species: Anoa, Banteng, Tamaraw, Water Buffalo</i> <i>Species & sites: to be determined by prioritization</i></p> <p>Conduct modelling studies to determine the need for active management of wild cattle and buffalo populations and prioritize management options <i>Species: Anoa, Banteng, Tamaraw, Water Buffalo</i> <i>Sites for Banteng: all sites on Java</i></p> <p>Use this information to identify populations which may need genetic management, and the form(s) that such management should take (e.g. moving animals between populations, confident that they are from the same ESU) <i>Species & sites: dependant on outcome of research studies recommended above</i></p>
	Develop species-specific guidelines for techniques in translocation, reinforcement and reintroduction within 5 years	<p>Compile available information on translocation, reinforcement and reintroduction of wild cattle and buffalo and similar species <i>Species: Asian wild cattle and buffalo where data are available and also other species (e.g. bison, African buffalo)</i></p> <p>Develop species-specific guidelines, drawing upon existing best practices to ensure appropriate choice of sites and source animals for reintroduction, translocation, reinforcement and post-release monitoring (Philippines suggestion), taking into account genetic, health and other considerations, in collaboration with IUCN Specialist Groups on Conservation Breeding, Reintroduction and Wildlife Health <i>Species: relevant to all wild cattle and buffalo species</i></p>
	Where appropriate, conduct wild cattle and buffalo reintroductions according to the established guidelines and following protocols validated by IUCN	<p>Review sites for wild cattle and buffalo reintroduction proposed under goal targets and revise where needed <i>Species: Banteng, Gaur</i></p> <p>Document possible source populations for reintroduction including both wild and captive animals <i>Species: Banteng, Gaur</i></p> <p>Conduct studies to assess feasibility of specific reintroduction efforts <i>Species: Banteng, Gaur</i></p> <p>Develop site- and species-specific protocols for reintroduction and seek IUCN validation <i>Species: Banteng, Gaur</i></p> <p>Following established guidelines, conduct pilot wild cattle and buffalo reintroduction(s) and disseminate results to inform future active management</p>

		<p><i>Species:</i> Banteng, Gaur <i>Sites:</i> to be determined by feasibility studies described above</p>
		<p>Ensure post-release monitoring is sufficient to assess long-term success <i>Species:</i> Banteng, Gaur <i>Sites:</i> dependent on sites selected for reintroduction</p>
	Promote species conservation through interactive management of wild and captive populations where appropriate	<p>Develop management plan to establish global herd of selected wild cattle and buffalo species or subspecies, including <i>ex situ</i> and <i>in situ</i> populations <i>Species:</i> Anoa</p> <p>Ensure that <i>ex situ</i> populations constitute a source of funding to implement conservation projects or actions in the wild</p> <p>Ensure that captive animals are not released (deliberately or accidentally) into areas inhabited by wild populations of wild cattle and buffalo except under conditions stipulated in the established IUCN guidelines (or the species-specific guidelines once these are established) <i>Species:</i> Anoa</p> <p>Where appropriate, manage captive populations to maintain appropriate demographic stock, genetic diversity, behavioural and health characteristics for eventual release <i>Species:</i> Anoa</p> <p>Where appropriate, use captive animals to assess conservation tools for potential use in <i>in situ</i> conservation <i>Species:</i> Anoa</p> <p>Develop contingency plans for developing captive or semi-wild populations under emergency conditions (e.g. precipitous decline of a key wild population due to factors which would not operate in captivity) <i>Species:</i> Anoa, Kouprey, Tamaraw</p>
	Develop a genetic sample bank for priority species within 5 years and for all species within 10 years	<p>Identify existing genetic sample bank(s) to hold wild cattle and buffalo material for long term genetic conservation</p> <p>Develop protocols for sample collection and ownership within genetic sample banks <i>Species:</i> Anoa, Banteng, Gaur, Kouprey, Saola, Tamaraw, Water Buffalo</p> <p>Ensure protocols are followed to collect samples sufficient to represent the genetic diversity of each species <i>Species:</i> Anoa, Banteng, Gaur, Kouprey, Saola, Tamaraw, Water Buffalo</p> <p>Investigate the potential role of other modern techniques in wild cattle and buffalo conservation <i>Species:</i> Anoa, Kouprey, Tamaraw</p>

Appendix 5: Acknowledgments

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