



BIODIVERSITY VALUES OF THE SEIMA PROTECTION FOREST

The Seima Protection Forest (SPF) is located in eastern Cambodia in Mondulkiri and Kratie provinces, along the border with Viet Nam. It was declared in 2002 as a Biodiversity Conservation Area. In recognition of its importance for biodiversity and environmental services the area was declared a Protection Forest by Prime Minister Hun Sen in 2009. The total size of the Protection Forest is 2,927 km² (292,690 ha). The Core Protection Forest is 1,879 km² (187,983 ha). The combined area of the Buffer Protection Forests east and west of the core is 1,047km² (104,707 ha).

The area is now managed for conservation of biodiversity, environmental services and livelihoods by the Department of Wildlife and Biodiversity of the Forestry Administration. Technical assistance is provided by the Wildlife Conservation Society (WCS), who have been working in Cambodia since 1999, and active in southern Mondulkiri since 2000.

Recognising the high biodiversity and socio-cultural importance of area the 10 year vision of the SPF is *a well-managed forest landscape that supports increasing wildlife populations and improving livelihoods for the people who currently live there.*

Habitat

The SPF remains approximately 98% covered by natural vegetation and contains an unusually high diversity of forest types. These forests form a very complex mosaic that may be dependent on water availability, soil type, topography and other physical factors that are not fully understood. Four forest types are generally recognised in SPF:

- Evergreen forest. This forest is typical of the southern Annamite range, and is found in the hilly southern parts of the conservation area. It is characterised by being almost entirely evergreen, with a tall canopy (up to 40 m), three layers of vegetation and an understory that is rich in rattans and lianas.
- Semi-evergreen forest has a similar structure to evergreen forest but includes a varying proportion of deciduous trees that lose their leaves in the dry season. It is found throughout the conservation area often forming gallery forest along rivers and water courses through the more deciduous forest, or on isolated hills.
- Mixed deciduous forest, which in SPF is usually dominated by *Lagerstroemia* tree species. This can have a very open understory, or sometimes a dense bamboo understory.
- Deciduous dipterocarp forest, which is more widespread in the north and west of the conservation area. This forest is open with low canopy (20m) and only two strata. The tree flora is dominated by a few deciduous dipterocarp species. The understory is grassy or rich in short stemmed bamboo.

Other vegetation types that are found in SPF include dense patches of bamboo, areas of regenerating *chomkar* and the unusual grasslands of the Sen Monorom plateau. These areas do not have as many species as the major forest types, but are important habitat for some wildlife species. Bamboo, for example appears to be important for Elephants and Orange-necked Partridges.

Globally Threatened Species

The SPF is unusual in south-east Asia in that it conserves large areas of both Annamitic evergreen forest and deciduous dipterocarp forests of the eastern plains, and the transition between the different forest types. This mosaic of forest types probably contributes to the high species richness

in the area. To date 334 bird species, 93 mammal species and over 60 reptile and amphibian species have been recorded in SPF. There are likely to be many more reptiles, amphibians and small mammals that have not yet been recorded. The flora and invertebrate life of the SPF have not been studied in detail and are very poorly known.

The SPF is particularly notable for the conservation of several species groups

- **Carnivores:** The SPF has an extraordinary richness of mammalian carnivores. To date 23 species have been recorded and several more are thought to be present. The area is likely to have eight species of wild cat and is notable for its small population of Tigers. In 2000 the first ever photo of a wild Cambodian Tiger was obtained from a camera-trap in the SPF and there have been many records since then, although fewer in recent years.
- **Primates:** The semi-evergreen and evergreen forests of southern Mondul Kiri are internationally important for the conservation of primates. The population of the Endangered Black-shanked Douc is estimated to be at least 42,000 individuals, probably the majority of the total world population. At least 2,500 Yellow-cheeked Crested Gibbons are also estimated to be present, a significant proportion of the world's population of this Endangered ape. In addition there are healthy populations of five other threatened primates including the Pygmy Loris and Germain's Silvered Langur. The latter is restricted to riparian forest in the deciduous dipterocarp forest, and is now highly threatened throughout its range.
- **Deer, Wild Cattle and Asian Elephants:** The diversity of forest types, permanent rivers and water sources, and large numbers of mineral licks provides a highly productive landscape which can support high numbers of large herbivores. A recent survey found the population of Asian Elephants in the SPF is around 115 animals, far larger than expected. Together with groups in neighbouring protected areas it is one of the most important Elephant populations in the Lower Mekong Region. Gaur, Banteng, Eld's Deer and Sambar are important in themselves, and are also a key prey species for large carnivores such as Dhole and Tiger. Good numbers of the Endangered Banteng are found on the flatter and more open parts of the SPF, photos of calves show that these are breeding successfully. Mondul Kiri Province is thought to be home to one of the largest populations of Banteng in the world. Similarly it appears that Gaur numbers are recovering, and southern Mondul Kiri may have one of the most important populations in Cambodia, and the region in general.
- **Galliforms:** SPF hosts globally significant numbers of three galliform birds. Monitoring of the Endangered Green Peafowl since 2002 suggests that numbers are recovering, the species is now seen regularly in most parts of the conservation area especially in open areas near to permanent water. The SPF population is part of what may be the last stronghold of this species. The Orange-necked Partridge (Near threatened) was first recorded in the SPF in 2003. This Restricted-Range species was previously only known from a few locations in southern Viet Nam. Since then the bird has been seen and heard often. Although the size of the population is unknown it may be highly significant given the available area of its preferred habitat of bamboo forest. The population of Germain's Peacock-pheasants in southern Mondul Kiri is so large that in 2005 it contributed to a change in the status of the species from Endangered to Near-threatened.
- **Large waterbirds and Vultures:** Four Critically Endangered bird species have been recorded in the SPF: Giant Ibis, White-shouldered Ibis, Red-headed Vulture and White-backed Vulture. All of these species have all been seen in recent years, mainly in the open forests in the west of the SPF. This area is also known to have breeding populations of Sarus Crane and Lesser Adjutant (both Vulnerable). White-winged Duck has been recorded on one river system and is reported to occur on several others. Although this area has had relatively

little survey effort, there have been multiple records of these species. This area may prove to be of global importance for these species.

As of 2009 58 vertebrate species that are Globally Threatened, Near-threatened or Data Deficient have been recorded in SPF¹. (see table below)

Class	Number of Globally threatened or near threatened species present in SPF (number of species that are not yet confirmed, but suspected to occur, in brackets)					
	Critical	Endangered	Vulnerable	Near Threatened	Data Deficient	Total
Mammals		9 (2)	11 (3)	6	1	27 (5)
Birds	4 (1)	3	5	8 (1)		20 (2)
Reptiles	(1)	2	2 (2)	2		6 (3)
Amphibians			2	1	2	5
Fish		(1)			(2)	(3)
Total	4 (2)	14 (3)	20 (5)	17 (1)	3 (2)	58 (13)

Global Assessment Criteria

In recent years many conservation organisations have carried out global assessments of biodiversity. These exercises are designed to highlight areas of high biological diversity or regions that are highly threatened with destruction. SPF overlaps several of these, reinforcing the conservation importance of the area.

The SPF overlaps with **two 'Last of the Wild'** areas identified in the Indo-Malayan Tropical & Subtropical Dry Broadleaf Forests biome. The Last of the Wild were identified by WCS in a global exercise that mapped the extent and intensity of human influence and then selected the ten least affected areas within each biome.

The southern, evergreen parts of SPF lie within the **South Viet Nam / Cambodia Lowlands Endemic Bird Area**. EBAs are defined as areas that contain a concentration of endemic bird species. This means areas that contain the entire breeding ranges of two or more restricted-range bird species (those with a breeding range less than 50,000 km²). SPF has breeding populations of the 3 restricted-range bird species that characterise this EBA: Germain's Peacock-pheasant, Orange-necked Partridge and Grey-faced Tit-babbler.

The area also includes parts of **two Important Bird Areas (IBA)**. These are identified as being areas of high bird diversity, or with concentrations of endangered bird species, that are of high conservation importance. The southern parts of SPF are in IBA KH027 (Snoul / Keo Seima / O Reang) which is important for the conservation of Orange-necked Partridge, Siamese Fireback, Green Peafowl, White-winged Duck, and Great Hornbill, amongst other species. The northern deciduous dipterocarp sections of SPF are part of IBA KH026 (the Kratie / Mondulkiri lowlands) which is important for vultures, ibises, Sarus Crane and Green Peafowl.

The SPF includes parts of **two Global 200 Ecoregions: Annamite range moist forests, and Lower Mekong dry forests**. Ecoregions are an large area of relatively uniform climate that harbour a characteristic set of species and ecological communities. WWF identified about 200 of the most threatened of these globally which are defined as "outstanding representatives of the world's terrestrial and marine ecosystems". Selection has been based on parameters such as species

¹ Based on the IUCN 2008 Red List www.redlist.org

richness, species endemism, higher taxonomic uniqueness, unusual ecological or evolutionary phenomena and keystone habitats.

The conservation area lies within the **Indo-Burma Hotspot**. This is an area identified by the conservation NGO Conservation International as a *biodiversity hotspot* with high levels of biodiversity and endemism and under high threat of destruction.

Southern Mondulkiri, including the SPF has been highlighted in two species level priority setting exercises. The area is part of the **Southern-central Annamites Tiger Conservation Landscape**. This area is classified as a Global Priority landscape offering the highest probability of persistence of Tigers over the long term. The SPF has, in addition, been proposed as part of an Asian Elephant Conservation Unit, recognising its global importance for the conservation of Asian Elephants

There has been as little botanical work carried out in SPF. Inventories and studies have shown that SPF has at least ten tree species that are listed on the IUCN red list as Vulnerable, Endangered or Critically Endangered. In addition inferences on the importance of the SPF for the conservation of plants can, be made from looking at studies of neighbouring areas. Cat Tien National Park in Viet Nam has semi-evergreen and evergreen forest that is similar to those in the south of SPF. These have been identified as a centre of plant diversity, with an estimated 2,500 species of vascular plants. Yok Don National Park in Viet Nam is dominated by deciduous dipterocarp forest, with semi evergreen forest along river banks. This area is very similar to the northern and western parts of SPF. Yok Don has also been identified as a centre of plant diversity. Yok Don has an estimated 1,500 species of vascular plants, many of which are unique to deciduous dipterocarp forest. Considering that SPF has large areas of forest that are very similar to Yok Don and Cat Tien it is likely that SPF would also qualify as a **Centre of Plant Diversity**.

Globally Threatened and other important Species of the SPF

English Name	Scientific Name	Status*	SPF importance
MAMMALS			
Malayan Pangolin	<i>Manis javanica</i>	EN	Regional
Pygmy Loris	<i>Nycticebus pygmaeus</i>	VU	Global
[Northern Slow Loris]	<i>Nycticebus bengalensis</i>	VU	Unknown
Northern Pig-Tailed Macaque	<i>Macaca leonina</i>	VU	National
Stump-Tailed Macaque	<i>Macaca arctoides</i>	VU	Possibly regional
Long-Tailed Macaque	<i>Macaca fascicularis</i>	lc	National
Germain's Silvered Langur	<i>Trachypithecus germaini</i>	EN	Possibly global
Black-Shanked Douc	<i>Pygathrix nigripes</i>	EN	Global
Yellow-Cheeked Crested Gibbon	<i>Nomascus gabriellae</i>	EN	Global
Dhole	<i>Cuon alpinus</i>	EN	Possibly regional
Asiatic Black Bear	<i>Ursus thibetanus</i>	VU	Possibly regional
Sun Bear	<i>Helarctos malayanus</i>	VU	National
[Smooth-Coated Otter]	<i>Lutrogale perspicillata</i>	VU	Unknown
[Asian Small-Clawed Otter]	<i>Aonyx cinereus</i>	VU	Unknown
Binturong	<i>Arctictis binturong</i>	VU	Unknown
Large-spotted Civet	<i>Viverra megaspila</i>	VU	Unknown
[Fishing Cat]	<i>Prionailurus viverrinus</i>	EN	Unknown
Asiatic Golden Cat	<i>Catopuma temminckii</i>	NT	Unknown
Marbled Cat	<i>Pardofelis marmorata</i>	VU	Unknown
Clouded Leopard	<i>Neofelis nebulosa</i>	VU	Possibly regional
Leopard	<i>Panthera pardus</i>	NT	Possibly regional
Tiger	<i>Panthera tigris</i>	EN	Regional
Asian Elephant	<i>Elephas maximus</i>	EN	Regional
[Large-Antlered Muntjac]	<i>Muntiacus vuquangensis</i>	EN	Unknown
Sambar Deer	<i>Rusa unicolor</i>	VU	Possibly regional
Eld's Deer	<i>Rucervus eldii</i>	EN	Regional
Banteng	<i>Bos javanicus</i>	EN	Global
Gaur	<i>Bos gaurus</i>	VU	Regional
BIRDS			
Orange-Necked Partridge	<i>Arborophila davidi</i>	NT	Global
Green Peafowl	<i>Pavo muticus</i>	EN	Global
White-Winged Duck	<i>Cairina scutulata</i>	EN	Regional
Pale-Capped Pigeon	<i>Columba punicea</i>	VU	Unknown
Sarus Crane	<i>Grus antigone</i>	VU	Unknown
Masked Finfoot	<i>Heliopais personata</i>	EN	Unknown
[Slender-Billed Vulture]	<i>Gyps tenuirostris</i>	CR	Possibly Global
White-Rumped Vulture	<i>Gyps bengalensis</i>	CR	Possibly Global
Red-Headed Vulture	<i>Sarcogyps calvus</i>	CR	Possibly Global
White-Shouldered Ibis	<i>Pseudibis davisoni</i>	CR	Possibly Global
Giant Ibis	<i>Pseudibis gigantea</i>	CR	Possibly Global
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	National
Manchurian Reed Warbler	<i>Acrocephalus tangorum</i>	VU	Unknown
Yellow-breasted Bunting	<i>Emberiza aureola</i>	VU	Unknown
Germain's Peacock-Pheasant	<i>Polyplectron germaini</i>	NT	Global
Oriental Darter	<i>Anhinga melanogaster</i>	NT	Unknown
Siamese Fireback	<i>Lophura dairdi</i>	NT	Regional
White-Rumped Falcon	<i>Polihierax insignis</i>	NT	Unknown
REPTILES			
Burmese Python	<i>Python molurus</i>	LR/nt	Unknown
[Siamese Crocodile]	<i>Crocodylus siamensis</i>	CR	Unknown
[South Asian Box Turtle]	<i>Cuora amboinensis</i>	VU	Unknown
Giant Asian Pond Turtle	<i>Heosemys grandis</i>	VU	Regional

English Name	Scientific Name	Status*	SPF importance
Yellow-Headed Temple Turtle	<i>Hieremys annandali</i>	EN	Global
Elongated Tortoise	<i>Indotestudo elongata</i>	EN	Global
[Impressed Tortoise]	<i>Manouria impressa</i>	VU	Unknown
Asiatic Softshell Turtle	<i>Amyda cartilaginea</i>	VU	Unknown
AMPHIBIANS			
Mouhot's Litter Frog	<i>Leptobrachium mouhoti</i>	DD	Described from SPF
O'Reang Horned Frog	<i>Ophryophryne synoria</i>	DD	Described from SPF
Marten's Floating Frog	<i>Occidozyga martensii</i>	VU	Unknown
Annam Tree Frog	<i>Rhacophorus annamensis</i>	VU	Unknown
Spotted Warty Tree Frog	<i>Theloderma stellatum</i>	NT	Unknown

* = Status from the 2008 IUCN Red List of Globally Threatened Species

Cr = Critically Endangered

En = Endangered

Vu = Vulnerable

LR/nt = Low Risk/near threatened.

[] = not yet confirmed in the SPF