



WWF

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THE SAOLA'S BATTLE FOR SURVIVAL ON THE HO CHI MINH TRAIL

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WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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Ta Oi hunter in Vietnam's A Luoi valley with his saola horns.

1. INTRODUCTION

With the opening of new roads in and between Vietnam and Laos, opportunistic hunters and loggers are moving into treacherous terrain where leeches, horse flies and deadly diseases used to keep outsiders at bay.

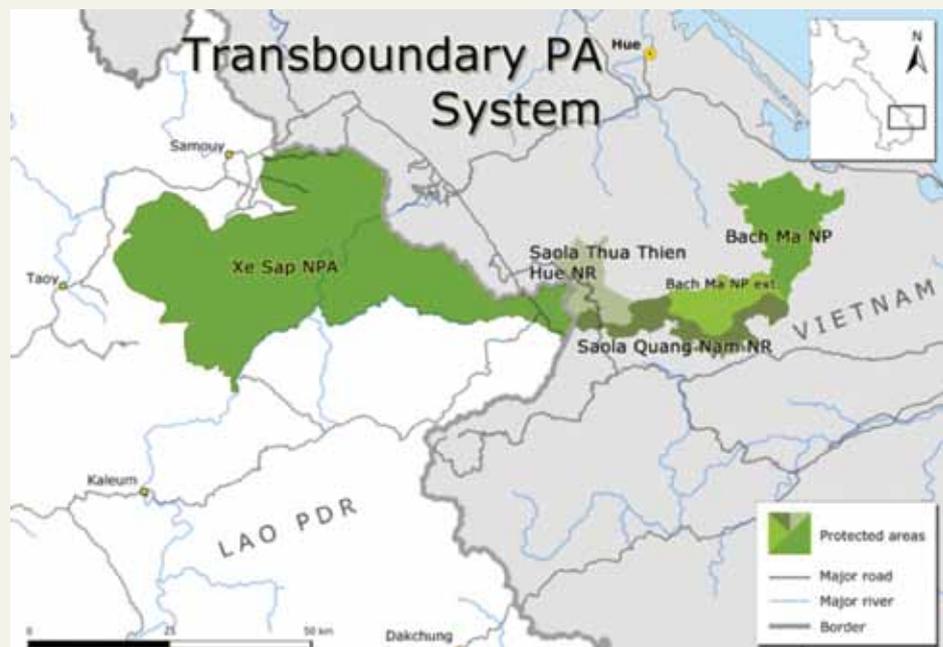
Forest guards in the rugged Annamite Mountains straddling these two countries are battling against time, racing to remove deadly traps and rescuing endangered animals before they are killed or tracked down by highly trained dogs.

The guards are patrolling nature reserves and protected areas along the infamous Ho Chi Minh Trail, destroying thousands of snares and shutting down scores of illegal hunting camps in an all-out bid to save the rare eight million year old saola (*Pseudoryx nghetinhensis*) from extinction. Each time a trap is eliminated, the saola's chances for survival increases.

Efforts in Vietnam and Laos, the only countries where tiny saola populations struggle for survival in the upper reaches of isolated forest patches in border areas in the Annamite Mountain range, were stepped up dramatically in 2012, during the 20th anniversary year of its discovery by scientists in 1992.

Between February 2012 and February 2013 – in two nature reserves alone in central Vietnam – locally-employed WWF guards and Forest Protection Department (FPD) rangers uprooted 336 hunting camps and removed some 13,394 snares. In neighbouring Laos, during six months of activity between September 2011 and November 2012, Wildlife Conservation Society (WCS) patrol teams in the Phou Sithone Endangered Species Conservation Area wiped out 7,058 traps (Saola Working Group 2013).

Believed to be a relic species of the last Ice Age, the saola was probably squeezed into a narrow strip of evergreen forests along the mountains and foothills of the Annamites, referred to as *Truong Son* in Vietnam, and as *Sai Phou Louang* in Laos. So far, the animal has been recorded in Nghe An, Ha Tinh, Quang Binh, Quang Tri, Thua Thien Hue and Quang Nam provinces in Vietnam and Bolikhamxay, Khammouane, Savannakhet, Xe Khong and Xieng Khouang provinces in Laos.



Despite daily law enforcement sweeps through saola reserves, trappers penetrate the steep, wet, evergreen forests and are still capturing hundreds of animals each month. In protected areas, where a thousand traps a night are sometimes set, terrified wardens and guards describe close escapes from organized criminals armed with new technology: automatic weapons, chainsaws, sophisticated satellite phones, and all-terrain vehicles that have infiltrated the once secluded hideouts of the world's remaining saola.

The Critically Endangered saola is not the main target for hunters and traders, but it has become a victim of lethal wire snares, whose numbers have skyrocketed in the past decade. The traps are mainly set to meet the burgeoning demand of Vietnam and China's growing appetite for game meat and traditional Asian medicines. In Asia, most of the wildlife trade is underground, operates through secret networks and is not included in government statistics; countries including Cambodia, Laos, Indonesia and Vietnam are major sources of wildlife trade and consumption (Secretariat of the Convention on Biological Diversity 2011).

Escalating affluence in urban areas, combined with improved transport infrastructure is leading to a spiraling demand for many wild species, according to TRAFFIC International, a joint programme of WWF and IUCN that monitors global wildlife trade.

The in-migration of profiteers into the Annamites in search of precious timber and lucrative bushmeat has driven up the earnings of wildlife traders at the top of the supply chain, but most local communities that harvest the wild animals are not benefitting from the big profits. In fact, they are losing one of their main sources of nutrition and coping mechanisms: bushmeat.

TRAFFIC warns that the scale of current hunting is perilous to many forest species and ecosystems not only in Vietnam and Laos, but also around the world; an unprecedented level of hunting threatens communities and the biodiversity upon which they rely. "The development of small-scale alternatives to the unsustainable bushmeat harvest and trade is of paramount importance" (Secretariat of the Convention on Biological Diversity 2011).



© W. Robichaud

Patrol team member with wire snares collected in the Nakai Nam Theun National Protected Area in Laos.

2. SAOLA SPAWNS DECADES OF SPECIES DISCOVERIES

Since the saola, a member of the bovid family, was discovered in May 1992 during a joint survey carried out by the Ministry of Forestry of Vietnam (MOF) and WWF in the Vu Quang Nature Reserve (north-central Vietnam), over a thousand new species have been uncovered by scientists in the Greater Mekong region (Cambodia, Laos, Myanmar, Thailand, Vietnam and Yunnan province of the People's Republic of China).

On the last day of the 1992 survey, Vietnamese biologist, Dr Do Tuoc, went off on his own with a list of the names of village hunters in hand. In the first two houses he visited, he collected saola skulls, and in the third he spotted a pair of unusual horns attached to a wooden pillar.

“The first time I saw them, I thought they must be from a new species”, he exclaimed. “The hunting trophy looked like it was from an Arabian oryx, which lives in a dry climate. But, the saola lives in humid evergreen forests where it is much cooler and wetter than the desert”, he added. Do Tuoc rushed off to show the skulls and horns to his research partner, Dr John Mackinnon, who recalled his reaction to the rare find: “I knew it was so ‘wow!’ so new! That day spawned a new wave of exploration and discoveries”.

The MOF/WWF team also found a total of 62 fish species during their first surveys, 41 more than was previously recorded. In addition, 20 species of amphibians and 37 reptiles were found. The big prize was the pair of saola horns, unlike anything the two seasoned field biologists had ever seen in Africa or Asia. Between May 1992 and early 1993, Vietnamese scientists made four additional trips and collected 20 specimens, including one complete skin, which was stuffed and mounted for exhibition at the Forestry Inventory and Planning Institute (FIPI) in Hanoi. Tissue samples were dispatched to Denmark and the US for testing.

In March 1993, WWF and the Vietnamese government announced the remarkable results. To the astonishment of the world's scientific community and members of the general public, not only was the primitive animal a new species, but also an entirely new genus in the bovid family, which includes cattle, sheep, goats and antelopes.

The following year, the saola attracted international attention again when a female calf was captured just outside Vu Quang in May 1994. The young saola, estimated to be about four to five months old and which weighed 18 kg, one-fifth the size (100 kg) of a large adult saola, was transported on 9 June to a 3-hectare botanic garden at FIPI in Hanoi. In the first two weeks of care by Do Tuoc and FIPI staff, the juvenile gained four kilos. The conservation community, especially in Asia, was spellbound by the striking features of the shy animal with its large facial scent glands and the dark thin stripe down the middle of its back. Its horns were only six centimetres, unlike the unmistakable long straight sweptback horns of a mature saola. Unfortunately, the calf died in captivity because its diet was inappropriate.

Two years later in 1996, a pregnant female saola was held in captivity in Laos in Bolikhamxay province. William Robichaud, Coordinator of IUCN's Species Survival Commission Saola Working Group (SWG), was fortunate enough to observe the animal for three weeks before it died because of its inadequate diet. Of the experience he recalls: “The most remarkable thing about the animal was her calm nature. The

only thing she was afraid of was dogs. Otherwise, she was tame, more so than a village cow. A Buddhist monk came to see the animal and told me, 'we call the saola the polite animal, because it always walks quietly and slowly through the forest'."

The most recent saola to be taken into captivity was captured in 2010 by a group of Hmong villagers. It was caught in Bolikhamxay province in Laos, but the animal died only a few days later.

How The Saola Got Its Name

Initially dubbed the Vu Quang Ox, the animal was renamed to reflect the nomenclature used by local communities on both sides of the border: saola. Villagers throughout the Annamites say the animal, which was a part of their diet and communal ceremonies, was named after the long straight parallel posts (sao), which support the spindle (la) of the spinning wheel. The sturdy tapered supports resemble the saola's horns. Pictured here, Bounkieng, a weaver in Thongcare village, Laos, who has seen the saola in the wild, explains to her children how the "saola" spindle is the source of the primitive animal's name.



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3. THE BIG EIGHT OF THE TWENTIETH CENTURY

For over half a century, the kouprey, or wild forest ox, which existed nowhere else but in Cambodia, Laos, Thailand and Vietnam, remained the last largest terrestrial mammal to be classified as a new genus since 1940: “The discovery of the kouprey, a new genus of bovid, in Cambodia in French Indo-China in 1937 is quite as unexpected as Sir Harry Johnston’s discovery of the Okapi in 1900 in the Ituri Forest of the Belgian Congo” (Coolidge 1940).

In 1993, the saola joined in the distinction of being one of only six new large mammal species discovered in the 20th century. By 1997, the number increased to eight, thanks to the discovery of two species of deer, the large-antlered or giant muntjac (*Muntiacus vuquangensis*), found in Vu Quang in 1994, and the Truong Son or Annamite muntjac (*Muntiacus truongsoneensis*) discovered in Pu Mat Nature Reserve in Vietnam in 1997 – and concurrently in the Annamite Mountains and adjacent hill ranges in central and southern Laos.

The saola and the large-antlered muntjac are classified by IUCN’s Red List as Critically Endangered and Endangered, respectively, while the dark Annamite muntjac is classified as Data Deficient. The latter is a poorly known species, and “its coat coloration and markings remain unknown” (Schnell et al. 2012). However, local long-term indigenous residents know the small dark deer and have hunted it for food for centuries.

Sadly, of the new mammal species discovered in Indochina in the past 76 years, the kouprey is believed to be extinct, and if conservation efforts and budgets on both sides of the border are not boosted significantly, the saola will continue – as the SWG warns – “sliding towards extinction”.



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Nguyen Xuan Hieu (right), traditional healer living in Vu Quang in Vietnam in 2012, shows author Elizabeth Kempf, the saola trophy he obtained in the area in 1998.

Investing In The Saola, Symbol Of Survival And Recovery

The saola (*Pseudoryx nghetinhensis*), discovered in 1992 by scientists in Vietnam's Vu Quang Nature Reserve (expanded and now a national park), is one of the world's rarest mammals. Although it looks somewhat like an antelope with its long tapered horns, it is actually a member of the cattle family. It is so distinctive from other bovid species (bison, buffalo, sheep and wild cattle) that it was given its own genus. Due to its highly elusive nature and remote habitat, very little information about the species has been collected since its discovery in the dense evergreen forests of the Annamite Mountains bordering Vietnam and Laos.



Adult saola weigh between 80 to 100 kg, can stand about 85 cm or more at the shoulder and grow horns that can reach 50 cm in length. The sharp tapered horns rest on adults' backs when their heads are raised. Saola have large maxillary glands, which indigenous hunters say the animals rub against the side of young plants in the forest. Since no scientist has ever seen a saola in the wild, despite years of searching and camera trapping, biologists fear that the total global population is plunging, due mainly to intensive hunting pressure. Although usually not specifically targeted by trappers, the saola has become a victim of bycatch, entangled accidentally – sometimes intentionally – in lethal snares. The animal's numbers are estimated to be in the low hundreds, and possibly as low as in the tens, according to the SWG.



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A rare camera trap photo of the elusive and Critically Endangered saola in its threatened forest habitat in the Annamite mountains which straddle the borderlands of Laos and Vietnam.

4. THREATS: TRAPPING, ILLEGAL WILDLIFE TRADE AND HABITAT FRAGMENTATION

The immediate threats to the saola are hunting, logging and fragmentation of its unique wet evergreen forest habitat. The species faces numerous dangers, mainly from commercial hunting with wire snares, steel traps and dogs. According to the WCS, which is supporting restaurant raids carried out by WCS Wildlife Crime Teams, Vietnam has made a number of large wildlife seizures in recent years. Some criminals have been prosecuted with heavy fines, but almost none has been given the maximum sentence of seven years imprisonment. Within months of raids on restaurants, they are back in business serving illegal wildlife to indifferent customers.

Conservationists and public officials have warned that the public is eating its biodiversity into extinction, consuming some 3,400 tonnes of wild meat every year. At a high-level meeting in Vietnam in 2009, an official from Vietnam's National Assembly said that more than 66 per cent of poached wildlife is used for food, 32 per cent is exported, and a small number of animals are used for pets and medicinal purposes (BBC 2009).

Snares are set to satisfy the voracious and growing appetite for game meat, purchased mainly by the prosperous. The blame for the spiraling wildlife trade has shifted away from families with low incomes to the growing number of rich people willing to pay for exotic game meat, some of which they obtain by choosing from live animals kept in cages at the restaurants.

The supply of wildlife has boomed as access to once remote craggy cliffs and dense forests has been opened up to professional trappers and loggers. Scientists contributing to IUCN's Red List assessment of the status of the saola concur: "All available information indicates that the species is in a clear and protracted decline throughout its small range due to intense hunting pressure, accelerated by continued fragmentation of its habitat to increased human access (mainly through road construction)...Threats from hunting are exacerbated by other factors including loss of habitat. The new Ho Chi Minh Road through the Annamite Mountains in Vietnam (with additional roads branching to Lao PDR) is a major and probably unmitigatable threat. Rates of decline are likely to increase rather than decrease, and a population reduction of 80 per cent over three generations is estimated for the past, present and future (=A2cd+3cd+4cd)" (IUCN Red List 2008).

The ultimate threats to the saola and the other spectacular species discovered in the mysterious Annamites in the past 20 years are large-scale development and logging. Riverbanks covered in vegetation and steep ravines shrouded in evergreen forest – known by local people to be the very heart of the saola's breeding and feeding grounds – are being bulldozed, flooded and severed by infrastructure projects.

According to IUCN, Laos' forests "have shrunk steadily in recent decades, from 71 per cent of its land area in 1940 to 41 per cent in 2002, and an estimated 35 per cent today. Clearing for rubber and cash crop plantations, uncontrolled logging and spill-over effects from hydropower and mining ventures are among the main drivers of this loss" (IUCN 2012). The Environmental Investigation Agency (EIA) asserts that logging in Laos is feeding timber-processing industries in neighbouring China, Thailand and mainly Vietnam, countries that have strict logging controls inside their own borders. "On paper, Laos has a raft of laws controlling logging and timber trade, but on the ground the situation is chaotic and prone to corruption" (EIA 2011).



Laos' forests have shrunk steadily in recent decades, from 71 per cent of its land area in 1940 to an estimated 35 per cent today.

5. TUG OF WAR ON THE HO CHI MINH TRAIL

A tug of war between conservationists and developers has intensified on the Ho Chi Minh Trail – the infamous network of secret transport routes that formed a north-south supply line during the American War. Vietnamese conservationists, protected area managers and a number of NGOs tried to put the brakes on the Ho Chi Minh Highway as asphalt began replacing the Ho Chi Minh Trail, which bisects protected areas and endangered forest habitat in the Annamite mountains, its foothills, and the country's Central Highlands.

The highway, which has provoked road rage among Vietnamese and international conservationists since its planning stage, slices through ten national parks including the country's first, Cuc Phuong, and Phong Nha-Ke Bang, declared a UNESCO World Heritage site in 2003, six years before the amazing discovery of the world's largest cave inside the protected area in 2009. A local farmer led scientists to the 150 metre tall cavern, which he had found ten years earlier and dubbed: *Hang Sơn Đòong*, or Mountain River Cave.

Conservationists contend that huge swathes of concrete sever some of the region's critically important protected areas, the first of which was inaugurated by President Ho Chi Minh in 1962. The highway, which already runs for lengthy stretches, mainly in Vietnam, pierces the heart of the mysterious Annamite Mountain range. This critical ecoregion straddles the once war-torn Vietnam-Laos border, most of which was until recently only approachable by foot or by elephant.

"Ho Chi Minh would not like a road bisecting a national park which he approved as president", states Prof Vo Quy, the pioneer of Vietnam's conservation movement: "The road in Cuc Phuong was not part of the Ho Chi Minh Trail and we conservationists wanted it to be outside of the park. Sensitive animals like the Delacour's langur (*Trachypithecus delacouri*) found in Cuc Phuong, or animals such as the saola (*Pseudoryx nghetinhensis*), found further south, will never cross big roads, so small populations of animals are cut off from each other".



© Elizabeth Kemp / WWF-Canon

Road construction in Thua Thien Hue and Quang Nam provinces in Central Vietnam has disrupted saola habitat and cut populations of animals off from one another.

Scientific studies, environmental impact assessments and objections made by Vietnam's leading conservationists, members of the academic community, and protected area managers, have been largely ignored. In Laos, some officials have said the country does not plan on upgrading the trail to highway status, but other roads are being forged through the Annamites. In the remote reaches of the mountains in the border areas of Khammouane and Bolikhamxay provinces, sport utility vehicles overtake farmers hauling timber on tractors while passing construction teams clearing away debris from landslides. In the wet evergreen forests, routes can become navigable only after bulldozers scoop up rocks and trees torn away by torrents of mud from steep mountainsides. The landslides are equally, if not more, dramatic in the parts of Vietnam where the Ho Chi Minh Highway criss-crosses saola habitat.

The highway has had an impact not only on the saola and its fragile forest habitat in the foothills and upper reaches of the Annamites: it has also affected long-term residents living near or displaced by roads and other development schemes. A study, commissioned by WWF (Arnhem 2007), of the socio-cultural impact of the highway on indigenous people in the central Annamites in Vietnam, asserts that "the heavy emphasis on transforming local subsistence economies into market-oriented production systems have boosted illegal, commercial hunting and logging with obvious environmentally detrimental consequences".

Commemorating the Souls of the Saola

The skulls of the wild animals including the saola, large-antlered muntjac, dark Annamite muntjac and wild boar that adorn the interior roofs of indigenous peoples' ceremonial houses are believed to be the vessels of their souls (Arnhem 2007). The Stieng group in the lower Mekong Region used to keep rhino horns on altars for use in rituals. The rhino horns have been sold to wildlife traders, as have many saola trophies. Today, most saola and other animal trophies are hidden from visitors because the hunters fear theft, fines or imprisonment. This is making it difficult to assess the number of saola that have been killed or even observed by long-term residents in the Annamites and their foothills in the past few years. Pictured here is a Katu chief in 1997 in a ceremonial house with decorated skulls.



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6. DISCOVERIES AND EXTINCTIONS

Among 1,700 species newly identified by science in the Greater Mekong region in Southeast Asia between 1997 and 2011 are: the Truong Son or Annamite muntjac; the world's largest huntsman spider, with a leg span of 30 centimetres; the Annamite striped rabbit (*Nesolaagus timminsi*) in Laos and Vietnam; and the grey-shanked douc (*Pygathrix cinerea*) in Vietnam.

While most species were searched for in remote jungles and wetlands, scientists encountered others in unexpected places. The Laotian rock rat, for example, thought to have gone extinct 11 million years ago, was first found in a local food market in Laos in 1996, by Rob Timmins, a British biologist who also discovered the Annamite striped rabbit in 1999, while the Siamese Peninsula pitviper was spied in the rafters of a restaurant by researchers who were dining in Khao Yai National Park in Thailand.

An astonishing number of new bird species have also been found in the Greater Mekong, including the golden-winged laughingthrush (*Garrululax ngoclinensis*) and the black-crowned barwing (*Actinodura sodangorum*), discovered in the Central Annamites, Vietnam in 1999. At the time, they were the first new bird species to be identified in mainland Southeast Asia for over 30 years. In 2012, the black-crowned barwing and the chestnut-eared laughing thrush, (*Garraulax konkakhensis*), first discovered in Vietnam in 2001, were confirmed in Xe Xap NPA in Laos.

Even as species are discovered on a weekly basis in the region, biologists are also warning of species extinctions. In October 2011, WWF and the International Rhino Foundation announced the first extinction of a large mammal in the 21st century in Vietnam: In April 2010, the last Javan rhino in Vietnam (*Rhinoceros sondaicus annamiticus*), was found in Cat Tien National Park in the lower range of the Annamites with a bullet in its leg and its horn removed. The sika deer (*Cervus Nippon pseudaxix*), Eld's deer (*C. eldi*), kouprey (*Bos sauveli*), wild water buffalo (*Bulbalus arnee*), and the Indochinese subspecies of hog deer (*Axis porcinus annamiticus*) have probably already become locally extinct in Vietnam (CRES 1997; Sterling, Hurley and Le 2006). Some viable populations of Eld's deer still exist in Laos and Cambodia. Tigers and Asian elephants (*Elephas maximus*) could become the next high profile large mammals to disappear from Vietnam, unless the saola vanishes first.

7. WHAT IS BEING DONE TO SAVE THE SAOLA?

Forest guard training and patrols

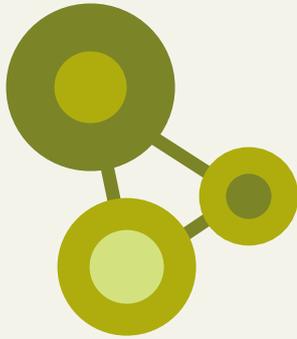
Villagers living in the saola's range report that there used to be far more saola and other animals than there have been in the past few years: "The forest we knew no longer exists". Recent interviews with communities have confirmed that sightings of the saola have plummeted over the past two decades.

In 2011, poaching reached epidemic levels. To counter the deadly trend, teams of forest guards in Thua Thien Hue and Quang Nam provinces in central Vietnam, were recruited from local communities, trained and are patrolling protected areas on a daily basis. The guards are funded primarily by the German Development Bank as part of WWF's Carbon and Biodiversity (CarBi) Project 1, which is aimed at the long-term conservation of carbon sinks and biodiversity in more than 200,000 hectares of forest in Vietnam and Laos.



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Forest guards recruited from local communities in Quang Nam province in Vietnam record the count of leeches collected during their daily patrol of saola territory.



Expanding and linking protected areas is an important strategy to help preserve saolas from extinction

Expanding and linking protected areas

Vietnam and Laos have established a network of protected areas in the saola's core range and some reserves are pursuing innovative approaches to tackle rampant poaching, mentioned above. WWF and other conservation agencies have also been active in helping the governments in surveying, setting up, managing and creating public awareness of these protected areas. WWF funded its first projects in the region over a quarter of a century ago, starting in 1985 with Public Awareness for Vietnam's National Conservation Strategy (Kemf 1986) and a regional project to prepare the groundwork for an international effort to Save the Kouprey in Indochina (Mackinnon 1986). These pioneer projects catalyzed support for conservation activities in Cambodia, Laos and Vietnam, including funding creation and strengthening of new and existing protected areas in the Annamites. In 1986, scientists from the three countries drew up the region's first international conservation agreement since the end of the American War in 1985. The agreement called for "cooperation between Laos, Kampuchea [Cambodia] and Vietnam in the field of environmental protection and the conservation of shared natural resources" (Kemf 1986; Mackinnon 1986). By 1992, WWF was supporting six projects as part of its Vietnam Nature Conservation programme, including an umbrella project supporting Conservation of Large Mammals in nature reserves including Vu Quang and Muong Nhe in Lai Chau province in northwest Vietnam.

More recently, as part of a plan to protect the saola, Laos created the Phou Sithone Endangered Species Conservation area in Bolikhamxay province, and the central Vietnamese provinces of Thua Thien Hue and Quang Nam created two nature reserves of more than 28,000 hectares and added 14,000 hectares to Bach Ma National Park. The Vietnamese reserves connect to cover a continuous protected landscape of approximately 2,920km² – stretching from the Vietnamese coast to the Xe Sap National Biodiversity Conservation Area in Laos. "This initiative secured a landscape corridor which is less vulnerable to the impacts of development, climate change and human pressure," says Dr Barney Long, WWF Manager of Asian Species Conservation. Other species protected by the enhanced green corridor include the Annamite muntjac and several species of primate including the red-shanked douc (*Pygathrix nemaeus*), and the grey shanked douc (*Pygathryx cinerea*), as well as many other new and yet to be described species.

The WCS Laos, Mining and Metals Group (MMG) and the Government of Laos are cooperating in a joint project in Xepon-Laving Lavem-Khoun Xe Nong Ma protected areas in the northern Annamites which aims to develop a strategic and comprehensive plan for ongoing biodiversity conservation. The project's main focus is implementing landscape-scale conservation planning. This approach is intended to guide wildlife management within large landscapes of human influence and uses, and involves multiple stakeholders, GIS modelling, and monitoring and evaluation.

Trans-boundary protected area project

WWF's CarBi Project, the largest trans-boundary project in WWF's Greater Mekong Programme, spans Annamite forests in Laos (Xe Xap NPA in Saravane and Xekong provinces) and Vietnam (Quang Nam and Thua Thien Hue provinces). The project focuses on four protected areas and two connecting forest corridors, including two saola nature reserves and the Bach Ma National Park extension in Vietnam, and Xe Sap NPA in Laos. These areas are connected with Phong Dien and Song Thanh Nature Reserves in Vietnam, via natural forest corridors. Besides a strong integrated biodiversity/livelihood enhancement approach, including an extensive forest restoration project, CarBi is also focused on addressing illegal timber trade

in its planning domain, and also includes a strong Payment for Ecosystem Services component in its sustainable financing model.

The Saola Working Group (SWG)

The SWG is a working group of the IUCN Species Survival Commission's (SSC) Asian Wild Cattle Specialist Group, which consists of more than 40 experts from a diverse range of specialities from 14 countries (www.savethesaola.org). Founded in 2006, the SWG comprises 18 scientists. The SWG coordinates saola conservation activities of scientists and conservationists from Global Wildlife Conservation, the Smithsonian Institution, IUCN Lao PDR Programme, the Wildlife Conservation Society, White Oaks Conservation and WWF.

At the May 2013 meeting of the IUCN SWG it was unanimously decided that, in addition to in-situ conservation activities, establishing a captive population of saola was a necessary step to prevent the species' global extinction. Captive saola would remain in Laos or Vietnam and would be maintained to the highest international standards to serve as a security population to avoid species extinction, to produce critical knowledge applicable to conservation and augment wild populations, including possible reintroduction release of captive-bred animals.

Biodiversity surveys

Biologists from Vietnam and Laos and international organizations intensified surveys in the Annamites after the spectacular discovery of the saola in the Vu Quang Nature Reserve, which at that time protected "the only example of wet evergreen dipterocarp forest in Vietnam and the only example of *Hopea millissima* formations in Indochina" (Cox 1992).

The most recent biodiversity surveys of Xe Sap NPA in southern Laos conducted by the WWF CarBi project, the first thorough surveys undertaken in the NPA since the late 1990s, have revealed that the site supports a characteristic suite of Greater Annamite endemic birds and plants. A large population of the conifer, (*Pinus dalatensis*), commonly known as the Vietnamese white pine, dominates the montane evergreen forest in large sections of western Xe Sap NPA above 1,000 metres. Previously, this endemic species was known only from central and southern Vietnam and the Phou Ak in Nakai Nam Theun NPA in Laos. A number of sightings of the black-crowned barwing and the chestnut-eared laughingthrush suggest that Xe Sap NPA may support the largest populations of these globally threatened species. Previously, it was thought the birds existed only in central Vietnam.

Landscape scale conservation planning

In addition, WCS is conducting landscape field studies in Phou Chomvoy, Bolikhamxay province in order to identify areas which support core populations of saola. Forest guard training, capacity and awareness building, and input and consultation with local government and villages are integral components of this project. Outreach programs will be implemented utilizing social marketing tools to increase knowledge and understanding of biodiversity principles.

Leeches reveal rare species survival



Leeches will help find the saola DNA

Since so few saola sightings by local people have occurred in the last 21 years, and all 20 known animals held in captivity have died, scientists and forest guards are collecting leeches in addition to photos and droppings. They are hoping to find saola DNA, which the leeches extract from their victims and store for up to four months.

Nicholas Wilkinson, a British wildlife ecologist who was based in Vietnam, with support from the UK Darwin Initiative, also collaborating closely with WWF, collected leeches on the Vietnamese side of the Annamites and sent them to a team of geneticists at the University of Copenhagen, Denmark.

In April 2012, the test results showed that none of the 21 out of 25 leeches sampled contained saola DNA. However, they did harbour DNA from other mammals, including the Annamite muntjac and the Annamite striped rabbit discovered in 1997 and 1999, respectively.

In 1997, after the Institute of Zoology at the University of Copenhagen analysed genetic tissue samples from a number of skulls, the Annamite muntjac was confirmed as a new species of muntjac. All current descriptions are based on interviews with local villagers, examinations of skulls and camera trap photos.

So far, forest guard teams and scientists carrying out intensive saola surveys have collected over 25,000 leeches with more than 2,000 geographically discrete samples from saola protected areas in Hue and Quang Nam provinces in Vietnam and eastern Xe Sap NPA in Laos.

Recent preliminary analysis carried out in 2013 by WWF and the Kunming Institute of Zoology on a small proportion of leech samples collected from the Hue-Quang Nam-Xe Sap landscape, reconfirm the continued presence (detected with reasonable levels of confidence) of the Annamite muntjac and the Annamite striped rabbit. Among other species detected are the serow (*Capricornis sumatraensis*) and another yet to be identified muntjac.

“The latest leech studies have confirmed the potential of this methodology to revolutionize the search for saola by demonstrating it can detect a suite of mammal species. We are confident that when further leech samples are analyzed, including those from elsewhere in the saola’s putative range, saola DNA will be found,” asserts Dr Thomas Gray, WWF-Greater Mekong Species Manager.



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Forest guards in the Thua Thien Hue Saola Reserve in Vietnam treat an injured serow they rescued from a snare, before releasing it back into the forest.

8. THE SAOLA'S TIPPING POINT

In the wake of the 20th anniversary year of the discovery of the saola, there is a revived sense of hope and realism among conservationists. Rob Timmins, member of the SWG and a biologist who discovered two new mammal species in the Annamites in the 1990s, has dedicated a great deal of his life to biodiversity conservation in the region. Speaking in Vientiane in 2012, he said: “All areas where the saola exist are being hunted on both sides of the border. Around 90 per cent of the saola probably used to be in Vietnam, with around 10 per cent in Laos. Today, the 10 per cent in Laos may be all that remains. We're not at the ‘tipping point’ yet. But the best bet for survival of the saola may now be in Laos”.

William Robichaud adds that, “A small window of opportunity remains open, but that we must act with the greatest sense of urgency. We cannot continue to let one of the rarest and most distinctive large animals in the world slip toward extinction through complacency”.

Seasoned biologists Do Tuoc and Vu Van Dung, part of the first team of Vietnamese biologists to discover the saola and champion biodiversity conservation in the Annamites, under the auspices of FIPI, are past the age of retirement, but they both remain active in the conservation movement. Do Tuoc, who can be truly credited as the scientist who discovered the saola in 1992, spends more time in the leech infested forests than he does at his home in Hanoi. He is promoting the creation of a new protected area for the saola in Quang Binh province to complete the green corridor spanning the Vietnam-Laos border.

“We’re not at the ‘tipping point’ yet. But the best bet for survival of the saola may now be in Laos.”

Rob Timmins, member of the SWG and a biologist

9. TACKLING THE ISSUES: WHAT NEEDS TO BE DONE?

The Indo-Burma hotspot for biodiversity, of which Indochina is a part, “ranks as one of the top five most threatened biodiversity hotspots in the world, with only five per cent of its natural habitat remaining“ (WWF 2008; Tordoff et al 2007). Shrinking forests and biodiversity are not unique to Indochina, but a number of species are and they exist nowhere else on earth. Once inhospitable areas, including the disappearing wet evergreen forests, which the saola has inhabited for millions of years, are being transformed into economic frontiers and centres of unsustainable investment. We must be mindful of the socio-economic imperatives of the Annamites and accentuate the critically important role that the iconic saola can play in helping raise the importance of the need to maintain and restore essential ecosystem services.

If the saola is to escape the fate of the Javan rhino, which became extinct in Vietnam in 2010, and the kouprey, which has not been seen in Indochina since the 1980s, Laos and Vietnam must step up and make an all-out joint effort to save the world's most primitive bovine.

Both countries have developed action plans for the saola, but neither has officially endorsed one. Both countries have laws to safeguard endangered species, but enforcement remains weak, despite stepped up patrolling in saola protected areas, and the massive monthly collection of snares and traps with an annual collection rate in the thousands on both sides of the border. The following issues need to be tackled:

Unsustainable Hunting, Wildlife Trade And Restaurants

Pressure on trapping must be sustained and increased until practically no more snares are found in the forests

Commercial hunters and traders who are caught should be prosecuted to the full extent of the law. If members of the military are found trapping, trading or killing endangered species, they should be reprimanded and charged with a criminal offence like civilians. The military should be trained like forest wardens to become guardians not only of national security but also of natural forest heritage. Local communities should continue to be enlisted in combating illegal hunting with new sources of livelihood guaranteed to them as well as food security and sanitation.

Communities and stakeholders should be consulted officially before hunting laws are put into place. This is required under Vietnamese law. Blind banning or the sudden announcement of hunting, collection and capture bans of wild animals and plants can drive the practice underground. Village hunters who fear fines and imprisonment are already refusing to cooperate with researchers and enforcement officers.

Local indigenous communities have engaged in trapping and collection of wildlife for centuries. Their wildlife products were for consumption, often as part of communal feasts or harvest celebrations, their trophies were displayed, and many products were used for medicinal and spiritual purposes. Decades of uninterrupted warfare against the French, the Americans and among competing tribes and political parties have left a legacy of weapon use and guns in the hands of former soldiers and civilians.

Consumption of bushmeat is still a staple part of the local diet in rural and remote areas of Vietnam and Laos, but is on the rise in towns and cities in provinces that were much less densely populated before Vietnam's *Doi Moi* or economic reform began in the late 1980s. Certainly, no stigma should be attached to hunting for subsistence needs.

WWF and NGOs have been campaigning for years to stop the impact that the commercial wildlife trade is having on endangered species such as the tiger and the Asian elephant, both of which are at risk of extinction in Vietnam. The last Javan rhino in Vietnam was found dead in Cat Tien National Park in April 2010. The animal had a bullet in its leg and its horn was removed. Two years later, in July 2012, a public outcry followed the posting on Facebook of three soldiers torturing and killing two endangered grey-shanked douc (*Pygathrix cinerea*). One of the soldiers was dismissed from military service, while two others were reprimanded, receiving only warnings for their involvement in the brutal killings, broadcast internationally. Over a thousand protests were posted online and sparked debate among lawmakers and the public.

Despite the media uproar, a month later police and forestry protection officers in Kon Tum province found another dead douc, tossed aside by a suspect fleeing the crime scene. On the same day, workers at the Dak Lak Rubber Company handed over a second live douc to the district forestry protection office, indicating that the role of the media in reporting wildlife crimes is finally having some effect in deterring wildlife crimes. Conservationists are pushing hard for enforcement of wildlife protection laws, notably that Vietnamese hunters engaging in capturing or snaring animals on the Lao side of the border be returned to Vietnam and fined or imprisoned.

Wildlife restaurants and open markets selling bushmeat and illicit traditional medicines should be shut down with immediate effect

In August 2012, WWF launched a global campaign calling on governments to combat illegal wildlife trade and reduce demand for illicit endangered species products. That same month, a report into the rhino poaching crisis in South Africa documented how the surging demand for rhino horn in Vietnam and China has led to a dramatic escalation in poaching in southern Africa, driven mainly by a Vietnam-South African connection.² A record 668 rhinos were killed in South Africa alone in 2012.

Vietnam banned the use of fireworks during its annual New Year (Tet) celebrations in the late 1980s with success and enforced a law requiring motorcyclists to wear helmets in the early 21st century. Surely, it can stop illegal hunting to supply insatiable and growing consumption of bushmeat and halt the supply to local wildlife restaurants and sophisticated criminal networks that are robbing Vietnam and neighbouring countries of species that exist nowhere else in the world.

² See Milliken and Shaw (2012). The South Africa—Viet Nam Rhino Horn Trade Nexus: A deadly combination of institutional lapses, corrupt wildlife industry professionals and Asian crime syndicates. Available in English, Vietnamese and Chinese at <http://www.traffic.org/home/2012/8/21/loose-horns-surg-ing-demand-and-easy-money-create-perfect-sto.html>

Logs being transported near tri-border of Vietnam, Cambodia, and Laos.



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Illegal Logging And Export

The author has observed a steady flow of logs streaming from Cambodia and Laos into Vietnam since the late 1980s, despite a ban on the export of raw logs in 1989. However, according to recent reports released by the EIA, (2011) and (2012), hundreds of thousands of cubic metres of logs stream out of Laos into Vietnam every year. IUCN (2012), which maintains an office in Laos has also expressed its concern: illegal logging is one of the most serious threats to the country's forests, and one which is increasingly vexing legislators, officials and citizens. There are few reliable figures on the scale of this problem, which centres on the forests bordering Vietnam, Thailand and China, but reports put the volume of illegal logging in recent years at between 45 per cent and 64 per cent of total production.

WWF urges countries to sign and enforce Voluntary Partnership Agreements (VPA), which aim to guarantee legal timber supplies from producer countries into EU markets, and to halt the illicit trade in logs. For years WWF has been strongly engaged in the European Union Timber Regulation³ and in the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan, especially the VPAs. Vietnam began negotiating a VPA in 2010 and has engaged in meetings and workshops to continue the process, most recently in early 2013.

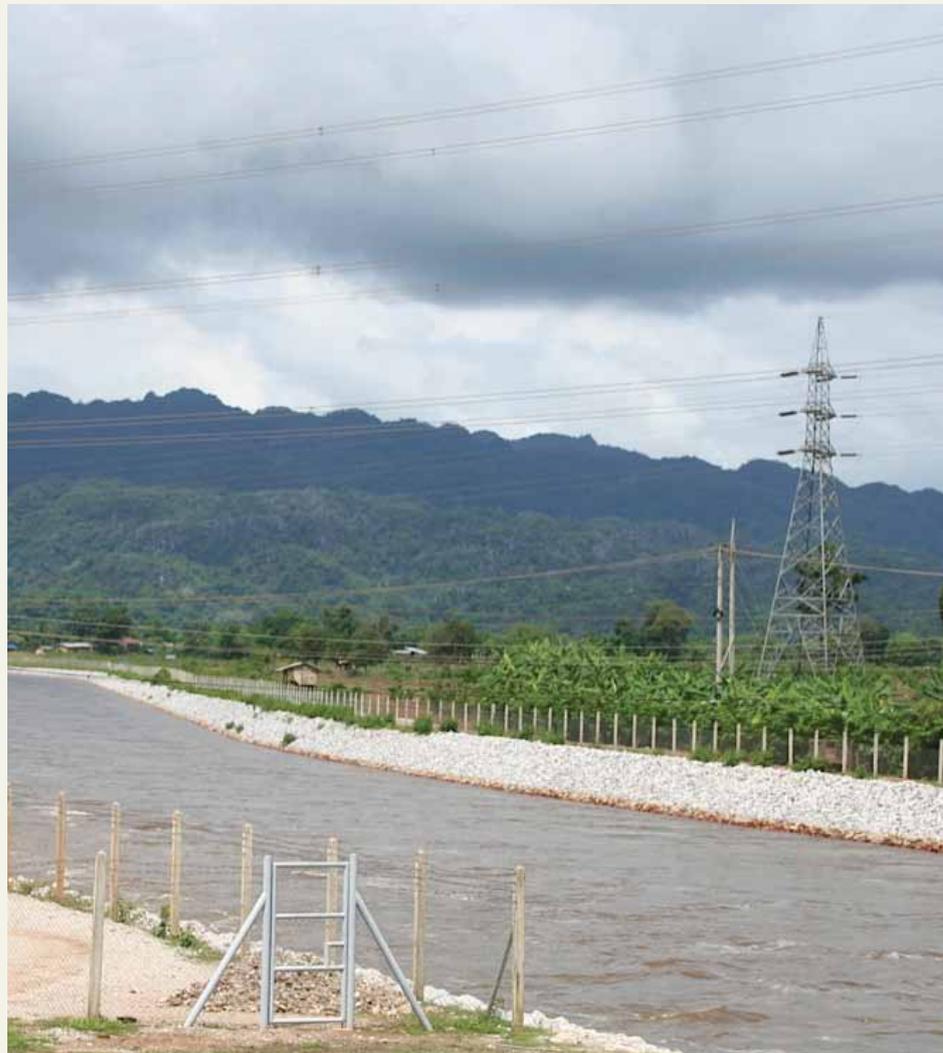
Dams And Roads

Sustainable development needs to be pushed forward in the planning and investment stages of infrastructure projects, notably dams and roads, and environmental and socio-economic impact studies must be taken seriously

In 2000, the World Commission on Dams launched a report on dams and sustainable development, which found that while dams have delivered significant benefits, in too many cases the price for local people has been unacceptable and often unnecessary. Five years on in 2005, WWF took stock of what happened since the launch of the report, focusing on six case studies "where dam builders and countries have failed to clean up their act". This included the Nam Theun 2 hydropower project in Laos, which provided much-needed income from Thailand for electricity exports. However, the project impacted the livelihoods of translocated villagers and affected the habitat of the saola and other endangered species. WWF stated: "Of particular concern are the

³ For additional information see http://www.wwf.eu/what_we_do/natural_resources/eu_forests/our_work_eu_forests/

On the edge of the 45,000 ha Nam Theun 2 reservoir, created through the construction of one of Laos' largest hydroelectric schemes. There are 31 enclaves still inside the adjacent Nakai Nam Theun National Protected Area, habitat of many species endemic to the Annamites, including the saola.



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widespread social and environmental impacts, ranging from the resettlement of 5,700 villagers to the impacts on the Nakai Nam Theun Biodiversity Conservation Area and fisheries in the Xe Bang Fai watershed” (WWF 2005), where the livelihoods of some 50,000 people were affected. The positive and negative impacts of the Nam Theun 2 are not yet fully known.

Eight years later, conservationists' worries over flawed dam construction, particularly on the Mekong, remain high. In 2012, WWF urged Laos ministers to halt construction of the Xayabury dam for ten years to ensure that critical data is gathered and a decision can be reached using sound science and analysis. Xayabury is the first of 12 major dam projects proposed for the Mekong and would affect the livelihoods of 60 million people and hundreds of species on which their lives depend. WWF's appeal to defer construction follows on the heels of a ministerial level meeting of the Mekong River Commission (MRC) in December 2011 during which representatives from Cambodia, Laos, Thailand and Vietnam recommended that building the dam be delayed, pending further studies on the impacts of the controversial project. The participants also agreed to approach the Government of Japan and other international development partners to support further studies on the sustainable management of the Mekong River, including impacts from mainstream hydropower development projects.

WWF encourages countries in the Greater Mekong region to heed the conclusions of studies on infrastructure projects such as MRC Strategic Environmental Assessment (SEA) of the Xayabury dam, conducted over a 14-month period. The SEA concluded that “while the benefits of hydropower are potentially considerable for Mekong countries, the construction of one or more of the twelve hydropower schemes could have profound implications for the sustainable development of the basin and irreversibly affect the lives and livelihoods of millions of people in all four Lower Mekong Basin (LMB) Countries”.

Policies need to be backed by sufficient funding

The capacity of national and trans-border agencies need to be boosted with budget increases. Education and public awareness programmes need to be revived and campaigns launched in order to change consumer behaviour. Sustainable consumption of wildlife can only be achieved when species populations and habitats recover. Vietnam and Laos can succeed in stopping the killing of endangered wildlife such as the saola and the large-antlered muntjac. These species – whose discoveries were lauded by the world with great fanfare – have been photographed and filmed in hunters' snares.

Invest in ecosystem services

The governments of Laos and Vietnam should promote investment in and conservation of ecosystem services, notably those of the Annamites. Currently, ecosystems and their services are usually invisible in national accounts although they are a form of natural capital representing trillions of dollars. Their services must be brought into the decision making process because they are essential life support systems, and local stakeholders must be involved in the process because they are the stewards of these valuable assets. Protection of ecosystems and their services is not a luxury. Investment in them can provide high rates of return and business opportunities. Environmental challenges, such as the need to defer construction of the Xayabury dam or other infrastructure projects to ensure that critical data is gathered and decisions can be reached using sound science and analysis, represent opportunities for innovative solutions. All business value chains are linked with ecosystem services. Ecosystems such as those that support the saola also support the livelihoods of millions of people. They provide – and purify – freshwater and help regulate climate, floods, waste and disease. Once lost, they can never be replaced.

“The current destruction of our forests will lead to serious effects on climate, productivity and life. Forest is gold. If we know how to conserve and manage it well, it will be very valuable.”

Ho Chi Minh

As Ho Chi Minh said: “The current destruction of our forests will lead to serious effects on climate, productivity and life. Forest is gold. If we know how to conserve and manage it well, it will be very valuable”. This adage is engraved in a woodcarving with the image of Ho Chi Minh watering a young sapling, which is on display in the entry hall of the Forest Inventory and Planning Institute (FIPI) in Hanoi. The saola needs to live and breed in a wet evergreen forest with access to quiet riverbanks. It cannot survive in a monoculture such as a rubber, acacia or eucalyptus plantations or near heavily populated centres with roads. Now, more than two decades on since the saola was discovered, most scientists have concluded that the iconic and elusive species can only continue to exist in its own undisturbed ecosystem.

Villager collects eels in Vietnam in the buffer zone of Pu Mat National Park, part of a chain of protected areas adjacent to the Lao border.



10. WHAT'S AT STAKE?

The governments of Laos and Vietnam stand together at a crossroads and must decide if they will let the saola slip away quietly and become extinct like the Javan rhino in Vietnam in 2010 or will they make an all-out effort to save millions of years of regional and world heritage and invest in ecosystem services? Will they recognize that saving the saola and its habitat are part of the protection of their natural capital, sustaining and growing the livelihoods of its people, and putting more money into watershed protection and water management?

WWF appeals to the governments of Laos and Vietnam to commit more financial resources to conserve an iconic symbol of biodiversity and the ecosystem services it maintains, that signifies – as the countries themselves do – survival and recovery against some of the most difficult odds.

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