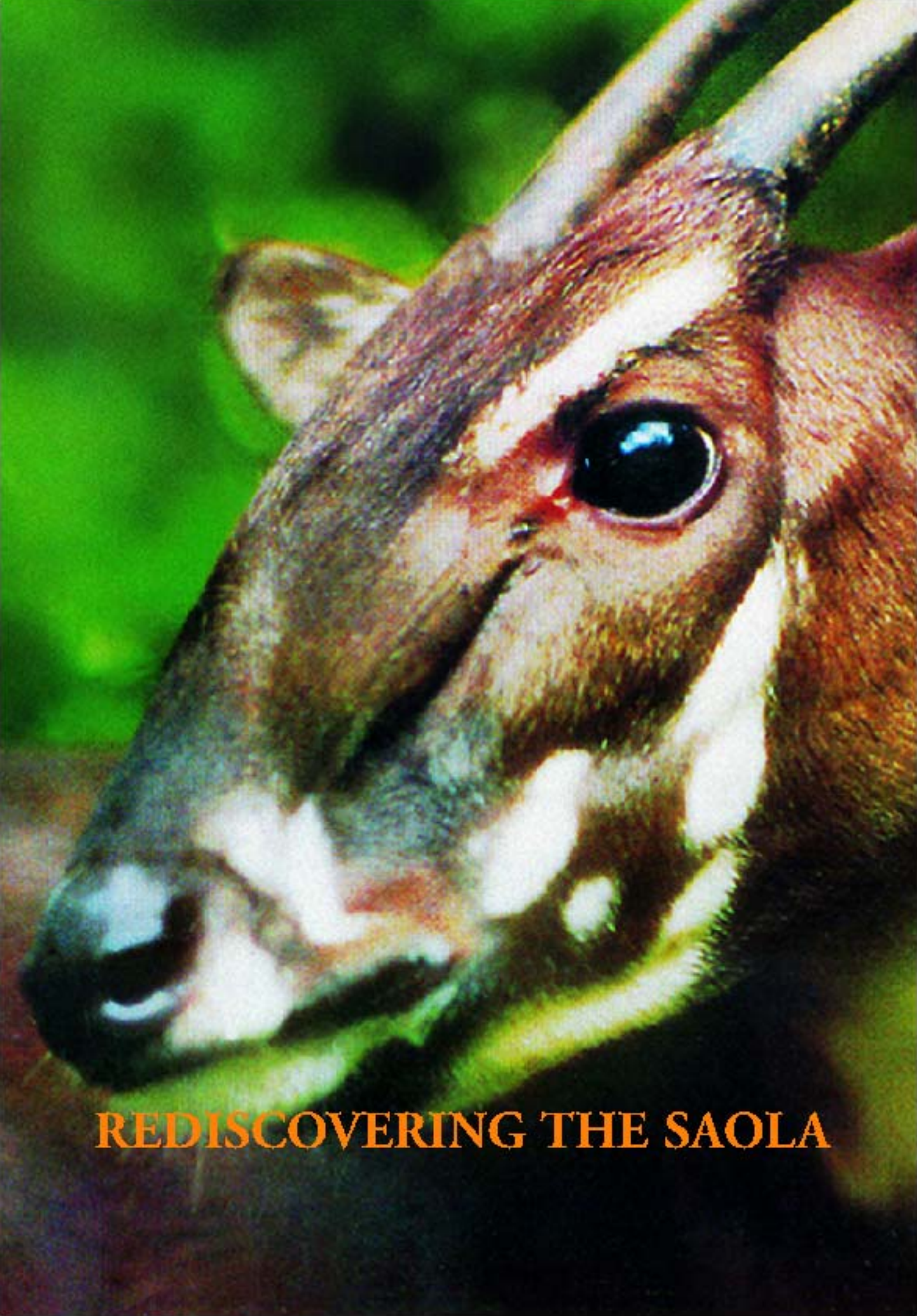

REDISCOVERING THE SAOLA

"REDISCOVERING THE SAOLA"

WORKSHOP PROCEEDINGS

Hanoi, 2004

"REDISCOVERING THE SAOLA"

Proceedings of the "Rediscovering the saola - a status review and conservation planning workshop"

Pu Mat National Park, Con Cuong District, Nghe An Province

VIETNAM

27-28 February 2004

Prepared and edited by

James Hardcastle

with

Steph Cox

Nguyen Thi Dao

and **Andrew Grieser Johns**

Workshop minutes compiled by:

Kerin Seward

Cover photo: **Toon Fey**

Design and Layout:

GraphicLink

Printed in Hanoi, Vietnam 2004

Published by

WWF Indochina Programme

SFNC Project

Pu Mat National Park

ACKNOWLEDGEMENTS

The workshop was not possible without the support from WWF Indochina Programme and SFNC Project. Special thanks go to Mr. Andrew Weir, Mr. Dinh Van Cuong, Mr. Andrew Grieser Johns from SFNC Project, Mr. Nguyen Thanh Nhan from Pu Mat National Park, Mr. Eric Coull and Ms. Tran Minh Hien for their support towards this workshop.

Thanks to James Hardcastle and Nguyen Thi Dao, WWF, for their preparation and coordination of the workshop and follow-up. Thanks also to Ms. Mac Tuyet Nga, WWF, and Ms. Phan Minh Thu, SFNC for their great work on arranging logistics for the workshop.

Thanks also go to Mr. Dang Cong Oanh, vice director, PMNP and other park staff for their great work in arranging accommodation and support to the workshop.

Special thanks to Tony Whitten, Mr Vu Van Dzung; Mr. Chu Van Dzung, Mr Nguyen Huu Dzung for chairing the workshop, and James Hardcastle, Mr. Le Van Lanh and Mike Baltzer for facilitation of the workhop.

Finally, thanks to all participants who traveled internationally, regionally, nationally and locally to the workshop and made it a success.

PREFACE

The saola workshop represents the first time that both scientists and decision makers in Vietnam have concentrated on strategic planning for a single species. The saola has this honour both because of its unique charisma, which gives it the position of flagship species for the Annamite fauna, and because of its extremely precarious existence. This unique species stands on the very brink of extinction in the wild and there are no saola anywhere in captivity.

The idea to hold this workshop, to focus national and international attention on the saola, has developed from the convergence of two programmes.

Firstly, at the Pu Mat National Park, an important segment of the saola's remaining range, the EC-funded SFNC project has supported a programme of conservation activities since 1997. Work has focussed on surveys and research, and on the implementation of activities to protect the forests and biodiversity. The National Park itself has recently adopted the saola as its emblem, making it a visible symbol of the park's conservation efforts.

Secondly, working from the level of regional and national conservation strategy development, WWF Indochina has also focussed down on the saola as a symbol of the Annamites Ecoregion and one of its most important, and rare, species.

And hence these three organisations, Pu Mat National Park, the SFNC project and WWF Indochina have combined efforts to hold this workshop - a first step towards conservation of the saola and the region that it symbolises. These Proceedings of the workshop, which document the discussions and conclusions reached, are also only an initial step. Talk alone will not save the saola.

Following on from this workshop and these Proceedings, the SFNC project and WWF Indochina will again work together to assist the Forest Protection Department of Vietnam to develop a national-level Action Plan for the saola, complementing one already completed by Lao PDR. Together these documents will provide a framework to succeed in rescuing the saola from the brink of extinction. Providing, of course, that the various stakeholders - international organisations, Vietnamese and Laotian authorities and local people - can be engaged to work together to conserve the saola and its habitat, and providing that the international community can provide 'added value' through financial means for them to do so.

Dinh Van Cuong
Co-director
SFNC

Andrew Weir
Co-director
SFNC

Tran Minh Hien
Vietnam Country Director
WWF Indochina Programme

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
CBD	Convention on Biological Diversity
EC	European Commission
EU	European Union
FFI	Fauna and Flora International
FIPI	Forest Inventory and Planning Institute
FPD	Forest Protection Department
IUCN	The World Conservation Union
Lao PDR	Lao People's Democratic Republic
MARD	Ministry of Agriculture and Rural Development
NBCA	National Biodiversity Conservation Area
NP	National Park
PA	Protected Area
PC	People's Committee
PMNP	Pu Mat National Park
SFE	State Forest Enterprise
SFNC	Social Forestry and Nature Conservation in Nghe An Province (SFNC) Project: ALA/VIE/94/24 supported by the European Commission
SSG	Species Specialist Group
UNPD	United Nations Development Programme
WB	World Bank
WCS	World Conservation Society
WWF	World Wide Fund for Nature

TABLE OF CONTENTS

WORKSHOP OVERVIEW

Discovered to science in 1993, the saola *(Pseudoryx nghetinhensis)* was the first large mammal to be described in more than half a century. As we move into 2004, the saola still remains elusive, and its very existence is severely threatened. Scientific research on the saola has been limited to date, due in part to the difficulty in accessing its habitat, scant knowledge of its distribution and status, and the low profile that the saola has been given until recently. This remarkably distinctive animal has one of the smallest ranges of any large mammal in the world. It is known for sure to inhabit only six provinces in Vietnam and three in Lao PDR. The saola is adopted here as a flagship species, representative of the fate of biodiversity in Indochina's forests. It resides in the central mountain chain of the Annamites – an area of notably high global biodiversity value in itself.

In the eleven years since the discovery of the saola, the population is believed to have rapidly declined, and it is listed as endangered by both IUCN and the Vietnam Red List. This eight-million year old animal may very well be facing the most difficult and dangerous period in its existence. The quest for development and progress in the region is taking its toll on the fragile saola, as infrastructure development results in the fragmentation and destruction of existing pockets of remaining habitat. Its range has already contracted mostly to nominally protected areas. Even so, hunting remains one of the biggest threats to the survival of this species. The saola is so new to science, and research so limited, that there may be other threats to the saola that conservation managers are currently not fully aware of.

Its rarity, distinctiveness and the high degree to which it is threatened makes the saola one of the greatest priorities for conservation in Southeast Asia. The saola has become the flagship species for new efforts for the conservation of the Annamites Ecoregion (known as *Truong Son* in Vietnam and *Sai Phou Luoang* in Lao PDR). Conserving the saola is one of the ten key actions identified as immediate priorities for the successful preservation of this globally important ecoregion. This first ever workshop on the saola engaged a range of partners to "raise the standard" for conserving the saola across the Truong Son ecoregion. It focused discussion on underlying issues and practical solutions. Existing information from Vietnam and Lao PDR was pooled, reviewed and used together with indigenous knowledge to define a broad range of specific conservation actions that urgently need to be undertaken.

The two-day workshop, "Rediscovering the saola," was hosted by the Pu Mat National Park with the support of the EC-funded project Social Forestry and Nature Conservation in Nghe An province (SFNC) and WWF-Indochina. The workshop was attended by Vietnamese and Lao scientists, international specialists, representatives of conservation and protection agencies and representatives from upland communities. The workshop agenda and list of participants are provided in Annexes 1 and 2 respectively. Annex 3 details a rapid situation analyisis to give an overview of what we know, and what we have done over the past decade, to fuel the workshop discussion on appropriate conservation action to take forward.

WORKSHOP CONCLUSIONS

The workshop concluded with a list of next steps required for more effective conservation of the saola. The participants shared their own experiences and information, and together discussed and recommended a broad range of strategies and activities as practicable solutions.

A recurring issue raised was the lack of standardised data on saola distribution and status in both Vietnam and Lao PDR, which has inhibited conservation efforts to date. Application of common research methods, to deliver compatible results on the distribution and ecology of the saola, is an urgent priority to underpin all conservation work. There is a danger that too little information may lead researchers in the wrong direction. Known pressures affecting the saola, specifically hunting and snaring, and habitat loss and disturbance, are a priority to address. As yet unknown factors that may be affecting the saola also need to be evaluated where possible, as soon as possible.

In Lao PDR a saola Conservation Action Plan was developed in 1997 and updated in 1999, which provided a national framework for saola conservation activities. During this workshop the Lao PDR participants reiterated the key recommendations of the action plan, which include the need to conserve habitat, reduce hunting, stabilise the human population in areas where the saola is present, and to identify and manage the key areas that need to be conserved for the saola. They also confirmed their commitment to further developing monitoring and research of the saola in Lao PDR and to revising and up-dating the Lao PDR Action Plan, and bringing it to the forefront of Lao conservation legislation.

The most significant result of the workshop was a united call for a comprehensive saola Conservation Action Plan for Vietnam, building upon that developed in Lao PDR. The results of group work were synthesised during the workshop to produce a draft outline of a ten-point conservation action plan that will, in Vietnam:

1. Identify needs for further research on saola distribution and ecology
2. Introduce saola monitoring within protected areas, possibly as part of community participatory monitoring systems
3. Strengthen management capacity and identify training needs for key enforcement units
4. Strengthen law enforcement in saola inhabited areas through engagement of inter-agency task forces established under Directive 12 (May 2003)
5. Raise the awareness of communities adjacent to key saola habitats through education programmes
6. Sensitise and engage district and provincial planning authorities responsible for implementing national poverty alleviation and rural development programmes to support saola conservation, and ensure that existing development programmes do not adversely impact on remaining saola habitat
7. Examine the possibilities for expanding or establishing new saola protected areas
8. Strengthen transboundary cooperation at all levels, particularly for the Vu Quang

and Nakai-Nam Theun area, and possibly for the Quang Nam – Thua-Thien Hue – Xe Sap area and the Pu Mat – Nam Chouan corridor. One transboundary priority for saola conservation is the collaborative reduction of cross-border poaching and wildlife trade flows.

9. Establish commitments from the Government of Vietnam, donors, NGOs, universities and institutions for financing and implementation of saola conservation programmes.
10. Critically review the current IUCN Red List status, and if required, submit a petition to IUCN for a shift to 'Critically Endangered'

The workshop emphasised the need to forge partnerships between governments, institutions, NGO's and donors to support saola conservation. Since the discovery of the elusive saola in 1993, much has been learned and some positive steps have been taken, but not enough. During the workshop additional measures were taken to coordinate saola conservation activities within and between Vietnam and Lao PDR. This should be followed up with ongoing communication and exchange of information such that these transboundary partnerships can be applied to other species in the future. Current saola conservation efforts should be supported and intensified, which in some instances will require additional funding. It will also require a concerted and coordinated international support group to ensure that saola activities are of added value to the conservation portfolio in each country. An international 'saola Action Group', under the IUCN SSC/Antelope Specialist Group, is one option considered.

Effective and focused conservation action over the next ten years is critical for the survival of the saola. This will require strong and immediate commitments from governments, institutions, NGOs, and donors. The saola, a flagship species of the Annamite ecoregion, needs concerted efforts from all partners to prevent its extinction within our lifetimes.

DAY ONE

OPENING SPEECH

Mr. Nguyen Thanh Nhan
Director of Pu Mat National Park,
Con Cuong Town, Nghe An Province
Vietnam

Pu Mat National Park is located on the east side of the Truong Son Mountains, lying along the Vietnamese-Lao border in the southwest of Nghe An Province, 120 km from Vinh City. This is one of the areas with the richest biodiversity in the Truong Son Mountains, and is identified as an important area for many rare and endemic species, including those discovered only in the late 20th century, such as the saola.

Pu Mat National Park is very proud to be within the area of distribution of the saola, and uses the saola as the logo of the national park. We are delighted to have the approval of the Nghe An People's Committee, and financial support from WWF Indochina and the SFNC Project to hold this saola workshop in Pu Mat National Park.

For the past few years, the conservation of wild animals and particularly the saola has received special concern from the Government, the provincial Communist Party Committee, the People's Committee at different levels as well as many local and international organizations. The Nghe An Forest Protection Department (FPD) has been supplying professional guidance and the SFNC Project has been providing considerable financial support to the conservation of the saola. The great collaboration between various agencies and organizations in the province, the support of the local people, as well as the effort of the national park's staff and the press in communication activities to increase the awareness of the local communities about the protection of forests and the saola have also been key contributions to the success. During 1998 - 2003, many surveys on the distribution and ecology of the saola were carried out, as part of the research programme under the SFNC Project. Scientists obtained photographic evidence of the saola in Pu Mat National Park, from which it was confirmed that Pu Mat National Park was one of the main areas with saola distribution.

However, the saola in the Truong Son Mountains is now facing the same threat as many other wild species in most of the provinces in Vietnam, which is the serious decrease of the population due to extensive hunting and trapping. Although the Government has been taking numerous measures to prevent the reduction of species, particularly those that are rare and endangered, it is a very challenging task. There are various direct and indirect causes of the continuous decrease of the animals' populations, namely:

- Reduced and fragmented habitats of the species;
- Hunting and trapping for commercial purposes;
- Low awareness of the communities about conservation;

- Demand for food of the communities in buffer zones;
- Lack of concern, respect and sense of responsibility of several local governments in the forest protection;
- Unpractical, inappropriate and insufficient legal documents; and
- Other direct and indirect causes of the biodiversity degradation.

To carry out immediate action to save the rare saola from these threats and possible extinction, Pu Mat National Park has collaborated with the SFNC Project and WWF Indochina in organizing this workshop to formulate an action plan to conserve the saola.

On this occasion, on behalf of the staff of Pu Mat National Park, I would like to express our sincere thanks to all ministries and agencies from the central to the local levels for their special concern and support. I would also like to thank scientists, as well as government offices, non-governmental offices, international organizations, donors and press agencies, who have provided valuable assistance. I would like to take this opportunity to thank people and staff in the three districts of Con Cuong, Anh Son and Tuong Duong for their cooperation with us in the conservation of nature, as well as of the saola and many other species.

We at Pu Mat National Park will endeavour to work closer with forest protection and management agencies, and ethnic minority communities in the province in our efforts to conserve the saola as a valuable treasure of Vietnam.

Now it is my honour to introduce to you the key participants in this workshop:

- Mr. Andrew Jacobs: the First Secretary for Cooperation and Development of the European Union mission in Vietnam.
- Mr. Veunevang Bouttalath, Vice-director of the Forestry Department of Lao PDR, as well as staff of various departments in Kham Muon and Bolykhamsay provinces.
- Mr. Andrew Grieser Johns, international conservationist
- Mr. Andrew Weir: Co-director of the SFNC Project
- Mr. Tony Whitten, senior expert in biodiversity of the World Bank
- Ms. Tran Minh Hien: Country Director of WWF Vietnam, and other staff of WWF Indochina in Vietnam and Laos.
- Dr. Richard Estes: Chair of the IUCN Antelope Specialist Group of the Species Survival Commission
- Experts and officers of IUCN, Birdlife, Traffic, FFI in Vietnam and of WCS in Laos
- Professor Nigel Leader-Williams: Durrell Institute of Conservation and Ecology, University of Kent at Canterbury, UK
- Ms. Uli Streicher, primate conservation expert of the Endangered Primate Rescue Centre at Cuc Phuong National Park

I would like to introduce the local participants who are also present here:

- Representatives of the Forest Protection Department
- Representative of the Nghe An People's Committee and officers of the People's

Committee

- Mr. Dinh Van Cuong: Vice-director of the provincial Department of Agriculture and Rural Development, co-director of the SFNC Project, and other experts and staff of the SFNC Project.
- Mr. Chu Van Dzung, Vice-director of the sub-FPD of Nghe An Province
- The leaderships of sub-FPDs from the provinces of Quang Nam, Hue, Quang Tri, Quang Binh, Ha Tinh, Nghe An; specialists from Hanoi University, the Forestry University, Vinh University, Hue University, the Institute of Ecology and Biological Resources, the Forestry Inventory and Planning Institute, and other forestry and environmental scientists.
- Representatives of the local governments of the three districts and other conservation-related agencies in these districts.
- Representatives of central and local press agencies, including: Vietnam Television, Vietnam News Agency, Lao Dong (Labour) Newspaper, Tuoi Tre (Youth) Newspaper, Khoa hoc va Doi song (Science and Life) Newspaper, the Vietnam News, the Le Courrier du Vietnam, Nghe An Television, Nghe An Newspaper, Con Cuong Television.

I wish you all good health and success in your career. I wish for a successful workshop.

WELCOME SPEECH OF THE NGHE AN PROVINCIAL PEOPLE'S COMMITTEE AT THE SAOLA CONSERVATION WORKSHOP

Hoang Nhat Quang
Deputy chief of the Administration Department
Nghe An People's Committee,
Nghe An Province, Vietnam

Dear Mr. Andrew Jacobs, First Secretary for Cooperation and Development of the EU in Hanoi

Distinguished guests, ladies and gentlemen,

Nghe An Province with the total area of 1,650,000 hectares is the biggest province in Vietnam. The total area comprises 1,237,000 ha of agriculture land, including 684,000 ha of forestry land, and 553,000 ha of bare land for forest plantation.

The special-use forests in Nghe An Province cover 206,000 ha, including one national park and one nature reserve which are already operational, one protected area which is being established, and one cultural site for tourists.

Nghe An also has large areas of primary forests of rich biodiversity. Many rare and endemic fauna and flora species listed in the Vietnam's and the world's Red Books, including the critically endangered ones facing extinction, are found here.

The provincial Communist Party Committee and the People's Committee are very concerned about the management, protection and development of forest resources. Many specific regulations and policies for forest development and socialisation, for the conservation and protection of valuable natural resources in general and of rare animals in particular, have been issued.

In the last decade of the 20th century, the saola was discovered by scientists in Ha Tinh and Nghe An provinces. This was good news for not only scientists, but also government officers and people in the saola distribution area.

In order to protect this species from threats, the Nghe An People's Committe developed a plan to establish the Pu Mat Nature Reserve (the forerunner of today's Pu Mat National Park), and assigned the park's management board and other sectors and agencies in the province to take the responsibility to protect the natural resources of the whole national park, and to take any approaches or measures to prevent the biodiversity degradation.

Seeing the importance and value of the biodiversity of the Pu Mat National Park, the European Union (EU) supported Nghe An Province in formulating and implementing the Social Forestry and Nature Conservation (SFNC) Project with the total funds of over

17.5 million Euros. The project has been carried out since 1997 and has achieved its target: to reduce the degradation of natural resources in the Pu Mat National Park, and in the buffer zone.

In 2002, the Government approved the project for developing the Pu Mat National Park in the period 2002 - 2011 including seven components. However, this project does not include species conservation activities.

The provincial People's Committe, while taking its responsibility, will continue to support the development of the national park, as an area of the richest biodiversity in the whole Truong Son Mountains.

Despite numeorous efforts, the current hunting, shooting and trapping of wild animals and particularly the saola have become major threats. The animal populations continue to decrease, the loss of ecological balance is worsening, in spite of the increase in the forest cover. At this workshop for reviewing the status and planning the conservation of the saola, the Nghe An provincial People's Committee wants to once again assign tasks to relevant parties as follows:

- The local governments of the districts of Con Cuong, Tuong Duong and Anh Son, and other authorized agencies are assigned to implement the Government's management function of forests and forestry land, in accordance with Decision No. 245 of the Prime Minister; to manage three types of forest in accordance with Decision No. 08 TTg; to strengthen urgent measures to protect and develop forest resources in accordance with Instruction No. 12 of the Prime Minister; to check and give penalties to the restaurants dealing in wildlife and wildlife products, as stated by the law. In the "trouble-spot" areas with serious deforestation and on-going hunting, trading, keeping and using of wild animals, the chairman of the district or communal People's Committee or the head of the authorised agency has to take the responsibility before the law and the provincial People's Committee.

- The provincial Forest Protection Department (FPD) instructs its branch units (sub-FPDs) in developing and implementing Circular No. 56 of the Ministry of Agriculture and Rural Development (MARD) and the FPD for developing the convention on forest protection and management in village communities; developing the convention on coordination for forest protection and management between the Pu Mat National Park and the sub-FPDs in the province; strengthening the forest management at the grassroots level, encouraging FPD staff to stay close to forests and liaise closely with local communities.

- The Pu Mat National Park's management board will coordinate closely with various sectors at different levels to protect natural resources in the park, preventing forest fire and repelling the hunting, trapping and catching of wild animals, particularly the rare and endangered ones, including the saola. The park staff also has to conduct regular communications activities for raising awareness of the local people about the benefits of the protection of forests, environment and biodiversity.

- The sub-FPDs, the police, border defense units, the people's court of investigation and other relevant agencies in the province will coordinate with the national park staff to prosecute the people who violate the laws on forest protection and development, and environmental protection.

- The People's Committees and police of the three districts will stop issuing licenses for guns in the districts, confiscate all the hunting guns without a license in the districts, and mobilize local people to turn in the hunting guns with fixed-termed licenses, for each of

which the owners will be compensated by the SFNC Project with part of the expenses. After the license is expired, the use of the gun will become illegal, the gun will be confiscated and the owner will be given a penalty.

- The provincial People's Committee proposes that the SFNC Project give priority to supporting the national park in a range of activities to reduce the impacts on the forest, and develop action plans to conserve large mammals in general and the saola in particular.

The Nghe An People's Committee welcomes the initiative of WWF Indochina, the SFNC Project and the Pu Mat National Park to organize this workshop, and is thankful to the Forest Protection Department for their valuable help. This workshop is significant in the current complicated context of wildlife hunting and trading, posing more and more threats to rare and endangered species. The provincial People's Committee would like to extend our thanks to the Central Government, the relevant ministries, governmental organizations and non-governmental organizations, as well as to the donors, scientists and media agencies. We recognize and highly appreciate the concern and support from the provincial Communist Party Committee, the local governments and people in the three districts who have been cooperating with the park's management board in the protection and development of forest resources.

Thank you very much and I wish you all a good health and successes. I wish for every success of the workshop.

OPENING REMARKS

Dr. Nguyen Ba Thu
Director, Forest Protection Department
Ministry of Agriculture and Rural Development
Vietnam

Ladies and Gentlemen,

First of all, on behalf of the Forest Protection Department, and the Ministry of Agriculture and Rural Development (MARD), I would like to warmly welcome you all to the workshop to review the status and plan for the conservation of the saola, at Pu Mat National Park, Nghe An province.

Vietnam is favoured by nature to have diversified genetic resources, fauna and flora species and ecosystems. Endemic species comprise a high rate compared to many other countries in the region. In the past 10 years, with the enhanced international cooperation in conservation, many new fauna and flora species have been discovered and described. The discovery of the saola *(Pseudoryx nghetinhensis)* in Vietnam in 1993 shows the big potential of Vietnam's biodiversity. It is also a symbol of the effective international cooperation in conservation in Vietnam.

The Vietnamese Government is concerned about the conservation of nature in general and of rare and endangered species in particular, including the saola. These efforts have brought certain achievements, including:

- Many documents on the law and law norms such as the Law on Protection and Development of Forests (1991), Decision No. 08 on the Management of Special-use Forests (2001), Decree No. 48 on the List of Rare and Endangered Fauna and Flora (2002), and other legal documents issued to protect wild animals and their habitat from being destroyed, exploited, hunted and traded. The saola is listed as a rare and endangered species under Group 1B in Decree No. 48, which "prohibits the exploitation and use" of this species.
- A system of 123 protected areas, including 27 national parks, 59 nature reserves and 37 cultural, historical and environmental protected areas has been established, which occupies 7% of the total national area. Some existing protected areas along the Greater Annamites, stretching from Nghe An province to Quang Nam province, are important habitats of the saola. With the availability of special regulations of protection, these protected areas are the safest habitat of wild animals, including the saola.
- The Forest Protection system with nearly 9,000 staff working throughout the country, from the central level to the provincial, district and communal levels, has become a key force that protects forests and wild animals.
- International cooperation between Vietnam and international organizations such as WWF, IUCN, FFI, Birdlife International, and bilateral and multilateral donors such as EU, UNDP, GEF, WB, ADB and so forth has been strengthened. With this cooperation, many conservation programmes and projects have been developed and

implemented. Vietnam also joins many international conventions for nature conservation, such as the Convention on wetlands (Ramsar), the Convention on international trade of endangered fauna and flora species (CITES), the Convention on Biodiversity (CBD). In 1994, Vietnam proposed to CITES, that the saola be listed in Annex 1 of the convention, which prohibits international trade of trophies of this rare and endangered species for commercial purposes. This proposal was accepted.

Although numerous efforts have been put and significant successes have been achieved, nature conservation in Vietnam faces enormous challenges. While the forest coverage has been increasing continuously for the past few years, forests and natural habitats continue to be degraded and fragmented. The illegal hunting and trade of wildlife still remain. The number of endangered animals is increasing dramatically. There are many causes of the degradation of wild fauna and flora resources: large human population, rural poverty; unsustainable development; the market economy with increased demands for wild animal products by a part of the population; limited awareness of the public about the role and value of nature, of ecosystems and fauna and flora; asynchronous legal documents; limited capacity in law execution; lack of knowledge and experience in the conservation of wildlife. These are all major causes of the exhaustion of natural resources, and the increase in the number of the species facing the risk of extinction. In the case of the saola, illegal hunting is still common in local communities, mostly to meet the demand of local consumption. The preliminary observation shows that many saola populations reside outside protected areas, and their existence is under big pressure coming from hunting and the process of transforming the use of land for agriculture development and infrastructure; while the understanding about the saola's ecology and distribution remains very limited due to lack of in-depth research and surveys and systematic observation of this species.

The rapid decrease of the populations of wild animals, especially of rare and endangered species, including the saola requires immediate implementation of a suitable action plan, based on the assessment of the status, distribution and ecology of the saola, and the analysis of the causes of the population decrease, as well as the proposal of feasible and practical solutions. The expansion of cooperation and exchange of information and experience between different countries, and between local and international conservation organizations is critical for identifying appropriate actions, in order to create favorable conditions for the effective use of financial and human resources. The programme for biodiversity conservation in the Greater Truong Son ecoregion in general and in the Central Truong Son landscape in particular, implemented by MARD in cooperation with WWF, forms a solid foundation for the development and implementation of the action plan to conserve the saola.

Ladies and gentlemen, as a Government agency for wildlife management, the Forest Protection Department highly appreciates comments and experience from all the workshop participants. I am sure your contribution of ideas and experience will help strengthen Vietnam's efforts in the saola conservation. The success of this workshop will provide good experience to the conservation of other rare and endangered species.

On this occasion I would like to sincerely thank the Pu Mat National Park, WWF and the Social Forestry and Nature Conservation Project funded by EU for your initiative to organize this workshop.

I wish you a good health, and interesting and exciting days ahead in the Pu Mat National Park. I wish for every success of this workshop.

Thank you for your attention.

THE SAOLA - BRIEF HISTORY

Tony Whitten,
Senior biodiversity specialist
the World Bank

In the last few years I have enjoyed visiting various provinces in Vietnam. New fish and snail species have recently been discovered here. If we looked around these limestone mountains, we could probably find new species even today. But no one expected to discover such a large animal as the saola. Certainly not in the narrow band of forest that is the saola's range. The world was so amazed when Do Tuoc first found something new in these forests. This was the first large mammal to be discovered in 50 years. The saola faces many threats, which we will discuss over the course of this two-day workshop. Very few people have seen the saola, including myself. The closest I have come to a saola was to meet someone who had once eaten a saola.

I would like everyone in the room to participate in a simple exercise. Firstly, can everyone in the room please stand up. Those people who have never seen a saola or any part of a saola, please sit. Next those people who have never seen a living saola, please sit. Only those that have seen a living saola remain standing. Now there are 12 people in this room who have seen a living saola (out of our workshop of almost seventy participants). Finally, those people who have not seen a living saola in the forest, please sit. Now there are three people standing. These are the only people in this room of experts to have seen a living saola in the forest. These are the people we need to seek information from.

Over the next two days and beyond we need to talk and share information, to work together to discuss the situation in Lao and Vietnam and figure out how to help conserve the saola in the future.

INTRODUCTION FROM SFNC

Andrew Weir and Dinh Van Cuong
Co-directors, SFNC Project
Nghe An Province,
Vietnam

The SFNC Project is pleased to co-host 'REDISCOVERING THE SAOLA: a status review and conservation planning workshop', held at the Pu Mat National Park Headquarters, Nghe An province, on 28-29 February 2004.

The SFNC project was conceived in 1994 and focussed on the Pu Mat forest at the request of Government. The Pu Mat had just been gazetted as a nature reserve in order to protect rare and endemic animals, such as elephants. Pu Mat was also recognised in the 1993 feasibility study as the largest remaining habitat in Vietnam of the saola.

Funded by the EC and operating since 1997, the SFNC has explored a variety of approaches towards preventing the degradation of forest resources, including livelihoods development, off-farm activities, and conservation and management programmes.

Studies of saola were initially conducted in 1998 and 1999. Estimates of saola numbers derived from interviews with hunters suggested around 18 animals survived in the Khe Bong in the south east of the reserve, and perhaps another eight in the Khe Chat and Khe Choang in the centre. Follow-up studies in 2003 suggested that this number had been reduced by about half in the intervening five years, despite the best efforts of the forest protection authorities and other responsible agencies.

To a hunter the total remaining population of the saola at the PMNP is worth less than USD 1000. The Government and various conservation projects and organisations are spending USD millions on trying to protect the animal and its habitat at the Pu Mat and elsewhere. Many strategies have been developed and thousands of words have been written. And nothing has yet worked.

It is important to ask why all this expenditure and conservation effort are having little success. To this end, the SFNC Project, with the support of the EC Delegation in Vietnam, has co-financed this important workshop.

We need to develop answers very quickly. And when we have answers, we need to develop and implement an action plan effectively to protect the saola in Vietnam.

The saola is the emblem of the Pu Mat National Park. But without discussion, decision and immediate action, even in relatively well-funded and well-protected areas like the Pu Mat National Park, the saola will soon disappear altogether.

THE DISCOVERY OF THE SAOLA *(PSEUDORYX NGHETINHENSIS)* IN VIETNAM

Vu Van Dung and Do Tuoc,
Forest Inventory and Planning Institute of Vietnam

In accordance with Decision No. 194/CT, dated 9 August 1986, issued by the Chairman of the Ministers' Council, a system of special use forests of Vietnam was established, including Vu Quang Nature Reserve (now Vu Quang National Park), in Huong Khe district (now Vu Quang district), Ha Tinh province. In order to evaluate the biodiversity value, and to prepare factual economic and technical foundations (now called a Feasibility Study) of this newly nominated protected area, a survey team of the Ministry of Forestry was established, with the support from WWF, to accomplish the above tasks. The team was composed of the following members:

- Mr. Vu Van Dzung, officer of the Forest Inventory and Planning Institute (FIPI), head of the team.
- Mr. Do Tuoc, officer of FIPI, member
- Mr. Le Van Cham, officer of FIPI, member
- Dr. Nguyen Van Sang, officer of the Institute of Ecological and Biological Resources (IEBR), member.
- Dr. Nguyen Thai Tu, lecturer of Vinh University, Nghe An Province, member
- Dr. John MacKinnon, WWF staff, member.

When the team arrived in Ha Tinh, the provincial Forest Protection Department (FPD) assigned Mr. Binh, and the Vu Quang NR assigned Mr. Ngon to join the survey team.

The survey was carried out from 9 to 31 May 1992. In 4 days, from 18 to 21 May, the team stayed at the Vu Quang Border Defence Unit (Border Defence Unit No. 567) in Kim Quang commune to investigate the central area of the Vu Quang Nature Reserve (NR). In the afternoon of 21 May, before leaving for another survey area, the team was divided into two groups, one group stayed in the Border Defence Unit to process the newly collected animal and plant specimens, and the other conducted an economic and social survey and talked to the hunters living in the villages around the border defending unit. The second group was composed of Mr. Dzung, Mr. Sang, Mr. Tu and Mr. Tuoc. In the house of a young hunter, this group saw two pairs of horns of wild goats, or serow *(Naemorhedus sumatraensis)* and a pair of very strange horns, which were long and pointed. According to the hunter, these were horns of a local animal similar to the "son duong" (serow), which was black, bigger and heavier than the wild goat, and its horns were much longer than the ones of the wild goat. The team took pictures of this pair of strange horns and brought them back to the defending post.

Two pairs of saola horns found in Hoa Mai commune, Huong Khe district, Ha Tinh, in 24 Nov, 1992

On 22 May, the team moved to Man Tran to investigate the northeast area of the NR. Here the team collected two more pairs of horns of the above mentioned animal. Then the team decided that this was a new species in the *Bovidae* family, and gave the species a Vietnamese name "long-horned goat" to avoid being mistaken with the serow, which are quite common in limestone mountain areas in Vietnam. The new species was given an English name "Vu Quang Ox". The discovery was then reported to the Ministry of Forestry and WWF office in Hanoi. A news bulletin published by WWF International in Gland, Switzerland on 17 July 1992 officially announced the discovery of a new species in Vu Quang NR in Ha Tinh province in Vietnam. Many local and international media agencies also published this news.

In order to collect more information and specimens of this new species, WWF in Hanoi funded a second survey in Vu Quang NR, particularly in the areas of Huong Son and Huong Khe districts of Ha Tinh province. The survey was carried out from 12 November to 25 November 1992, and the team was composed of 3 members: Mr. Vu Van Dzung and Mr. Hoang Trong Tri from FIPI and Mr. Pham Mong Giao from the FPD. During the two week survey, the team found more than 20 pairs of horns, and collected a complete skin of the "long-horned goat" in Hoa Hai commune in Huong Khe district. The skin was brought to Hanoi for stuffing, and a small piece of head skin was separated and sent overseas for DNA testing. (Figure 1 and 2)

In early 1993, during a biodiversity survey to write the Feasibility Study for the creation of the Pu Mat Nature Reserve (now Pu Mat National Park) in Nghe An province, Mr. Nguyen Ngoc Chinh, of FIPI and other members of the survey team found and collected some specimens of the long-horned goat in Con Cuong district and Tuong Duong district in Nghe An province. In these areas this new species had a local name of "sao la", as its horns look like the two standing spindles of the spinning-frame (*sao la* in Thai ethnic group's language means the standing spindles).

One year after the discovery of horns of the new species in Vu Quang NR, on 3 June 1993, this new large mammal was officially described in Edition 363 of Nature magazine, and was announced under the scientific name of *Pseudoryx nghetinhensis.* Vu Van Dzung, Pham Mong Giao, Nguyen Ngoc Chinh, Do Tuoc, Peter Arctander & John MacKinnon announced the existence of the new species. Peter Arctander is a Danish scientist, who carried out the DNA analysis and identified the position of the

Saola feather found in Hoa Mai commune, Huong Khe district, Ha Tinh, in 24 Nov, 1992

new species within the *Bovidae* family. Since 1993, the temporary name "long-horned goat" has been replaced by the name "sao la" in all Vietnamese publications.

Around the same time of the announcement of the new species, in late May 1993, a live young saola was captured by local people in Khe Tre in the northwest area of the Vu Quang NR, in Son Kim commune, Huong Son district, Ha Tinh Province. The saola was about 4-5 months old, weighing 18 kg. Its shoulder height was 61 cm, and the body length was 103cm. This saola was brought to Hanoi on 6 June and FIPI was assigned by the Ministry of Forestry to keep the saola in captivity in FIPI headquarters in Van Dien. Two months later the saola weighed 32 kg, but died due to parasitic liver flukes.

In early 1993, saola horns were seen in Nakadok village in the Nakai- Nam Theun NR in Lao PDR, next to the Vu Quang NR. saola is also the Lao name of this mammal.

By now, the investigation work in both Vietnam and Lao PDR has helped identify the saola distribution areas, which stretch from north Nghe An province to north Quang Nam province in Vietnam and from south Houaphanh province to north Savannakhet province in Lao PDR. The saola is distributed between $15^{0}30'$ – 20^{0} N (latitude); and 104^{0} – 108^{0} E (longitude).

When evaluating the scientific and conservation value of this species, in 1996, IUCN ranked the saola as Endangered in the Red List of Threatened Species. The saola is also listed in Annex I of the CITES Convention and in Vietnam's Red Book published in 2000, as well as in List 1B of rare fauna species with high scientific and economic values, which are facing a high risk of extinction, under the Government of Vietnam's Decree 48 2002/ND-CP, dated 22 April 2002.

Following the discovery of the saola in 1992, scientists at FIPI and other agencies also discovered the giant muntjac *(Megamuntiacus vuquangensis)* in Vu Quang NR in 1994 and the Truong Son muntjac *(Muntiacus truongsonensis)* in north Quang Nam in 1996. These were important discoveries for the biological sector in Vietnam and confirm the high biodiversity in Vietnam. Thanks to these discoveries international organizations have provided significant funds to help nature and biodiversity conservation in Vietnam.

THE NATURAL HISTORY OF SAOLA *(PSEUDORYX NGHETINHENSIS)* AND THE SPECIES' DISTRIBUTION IN LAOS

Based on the workshop presentation, entitled "saola ecology – the bare basics (ie, all we know)"

William Robichaud* and Robert Timmins
**Centre for Biodiversity Research*
Dept. of Zoology - University of British Columbia
6270 University Blvd.
Vancouver, BC V6T 1Z4
Canada

Introduction

More than ten years after the discovery of the saola by the scientific world, we still know little about the animal. These modest pages encompass most of the available information on the species' biology and ecology.[1]

The first known written reference to saola is from an early twentieth century Lao-French dictionary, where the word "saola" is defined as 'Species of antelope, antelope of the rocks' [English translation] (Guignard 1912, Proschan 1994). The species was first described scientifically in 1993 from horns found in hunters' houses in Vu Quang Nature Reserve, Vietnam (Vu Van Dzung *et al.,* 1993). It was subsequently confirmed to occur in Laos, first in Nakai-Nam Theun National Biodiversity Conservation Area (NNT NBCA, Salter 1993).

In the Lao and Lao-related languages in the animal's range on both sides of the Laos-Vietnam border, *saola* is the word for a pair of parallel wooden posts that support the 'wheel' or drum of a traditional spinning wheel used to make cotton thread (sao = post(s); *la* = spinning wheel). Indigenous people gave this name to the animal because the tapering posts resemble in size and shape a pair of saola horns. An approximate English translation of the species' common name, then, is 'spinning wheel posts'.

Phylogeny

Genetic analysis shows saola to be a primitive member of the family Bovidae, which includes antelope, buffalo, bison, cattle, goats and sheep. Beyond this there is disagreement on its taxonomic placement. In the original scientific description of the species, Vu Van Dzung *et al.,* (1993) used DNA analysis of the mitochondrial cytochrome b gene to propose that saola was allied to the subfamily Bovinae (cattle and spiral-horned antelopes), with a provisional placement amongst the tribe Boselaphini, represented by the Nilgai Boselaphus tragocamelus of the Indian subcontinent. Subsequently, Schaller and Rabinowitz (1995) presented information on additional characters and suggested affinity with the tribe Bovini (cattle), noting its many primitive features.

A morphologically-based phylogenetic analysis by Thomas (1994) placed the species

[1] Some sections of this paper are based on sections that first appeared in the *saola Conservation Action Plan for Lao PDR: 1999 Revision (*Robichaud 1999).

as the sister taxon to the subfamily Caprinae (goats, sheep and their allies) and noted again the many ancestral primitive characteristics of the species. A provisional (but not phylogenetically supported) relationship to the serows and gorals *Naemorhedus* was postulated. Robichaud (1998a) presented information on additional physical and behavioural characteristics that supported placement in the Bovinae rather than the Caprinae, if saola didn't merit its own, monospecific subfamily. Hassanin and Douzery (1999) concluded the species was most probably a sister taxon of the cattle and bisons, excluding water buffaloes *Bubalus* and African Buffalo *Syncerus caffer*, based on nuclear and mitochondrial genes from four loci. The most detailed analysis to date, by Gatesy and Arctander (2000), analysed seven gene loci, both mitochondrial and nuclear, and also considered the cranial data of Thomas (1994). The results suggest placement in the subfamily Bovinae and probably the tribe Bovini.

In many ways saola resemble the forest duikers of Africa, small antelopes in the tribe Cephalophini. However, this may be due simply to parallel retention in both groups of features of ancestral bovids. This is interesting speculation; possibly, the first bovids were forest animals, which diversified in or before the Miocene as savannah and grassland habitats evolved. Some forms such as duikers perhaps remained largely in the forest, and saola may be a similar forest relict. Certainly, the species is very old.

saola favour evergreen forests with little or no dry-season. Such forests are naturally quite localised in Southeast Asia, but they appear to be more widespread than are saola. This might be explained by the fact that during the Pliocene and Pleistocene geological periods (from about 8 million years ago), Southeast Asia experienced dramatic climatic changes as the world alternated through a series of ice ages and warm spells. As the climate changed so did the distribution of different forest types. During the cold, dry periods, the area of evergreen forests shrank at the expense of expanding grasslands and savannahs. During warmer, wetter phases the reverse occurred. Today, we are in a warm period, which probably means that during the last ice age, some 100,000 years ago, evergreen forests, especially those with little or no dry-season, were even more limited than they are today. The current distribution of saola may reflect where these ice age refugia were, and in turn suggests that these forests are old and have been climatically stable. This is supported by saola's shared distribution with other localised species, such as the Annamite Striped Rabbit Nesolagus timminsi, Short-tailed Scimitar Babbler Jabouilleia danjoui and Crested Argus Rheinardia ocellata. And like saola, the Annamite Striped Rabbit, for example, also appears to be a conservative ancestral forest form. We can only guess what other unusual species these forests may harbour.

Biology

Unless specifically noted, the information presented in this section has been assembled from Vu Van Dzung *et al.,* (1993, 1994 and 1995), Dawson (1995), Schaller and Rabinowitz (1995), Kemp *et al.,* (1997), Robichaud (1998a), Robichaud and Stuart (1999) and Timmins (2001). Much of the information about the ecology of saola, published or otherwise, has come from local people in its range on both sides of the Laos-Vietnam border. Although such information needs verification, much of it is quite consistent across languages, ethnic groups and national borders, which suggests general accuracy. Only information consistently and independently reported from multiple sources and/or verified in the field is included below, unless otherwise noted.

Adult saola probably weigh 80 to 100 kg, and one captive adult female stood 84 cm tall at the shoulder. The species possesses some striking physical characteristics, such as long, nearly

straight horns, striking white markings on the face and very large maxillary/preorbital glands.

Horns are found on both sexes, with no known dimorphism, and can reach more than 50 cm in length. The points are sharp and the horns are unusually strong owing to the fact that the bony core extends most of the length of the horn shaft. These may be adaptations for defense against predators.

Massive maxillary glands (measuring at least 9 cm L x 3.5 cm W) along the upper muzzle are probably the largest maxillary or preorbital glands of any extant animal species. Each is covered by a muscular lid that saola can raise like an awning to expose the gland. Maxillary glands of a captive adult female secreted a pungent, musky paste-like substance, which the animal deposited on points of rock by flaring open the gland's lid and stroking the underside across the rock.

The droppings of a captive adult saola were distinctive in being formed into large boluses (although as a concretion of pellets). In this they might be distinguishable in the field from the droppings of sympatric ungulates of roughly similar size, namely *muntjacs Muntiacus*, Sambar *Cervus unicolor*, Southern Serow *Naemorhedus sumatrensis* (all of which generally drop small, discrete pellets) and wild pigs *Sus*. However, this requires confirmation - it is not known if the droppings of the captive saola were typical of the species in the wild.

The wet evergreen forests where saola are typically found are broadleaf formations along the Laos-Vietnam border. They experience unusually long rainy seasons, up to ten months per year, with no month receiving less than 40 mm of rain. In central Laos these forests are found opposite dips in the Annamite Mountains that allow penetration of the northeast winter monsoon from Vietnam, normally blocked from the rest of Laos by the high Annamite ridge. As noted earlier, saola may be a relict species squeezed with its habitat into its present small range by pronounced climatic shifts during and following the Pleistocene. It could be that saola have remained stranded in this small habitat 'island' since that time, along with other species such as Heude's Pig *Sus bucculentus* and Annamite Striped Rabbit. In addition, forest clearance and hunting by humans may have further reduced the range of saola.

Do saola actually prefer (or require), at least seasonally, this wet forest habitat, or are they found there because such areas are more remote from human disturbance? There is circumstantial evidence both for and against the supposition that wet evergreen forest is the preferred habitat of saola. The evidence in favour includes these observations:

- In Laos, saola are absent from extensive, little disturbed, but drier montane evergreen/semi-evergreen forest only a short distance from their zone of occurrence in wetter forests near the border. This absence is particularly conspicuous in the western half of NNT NBCA, and in Nam Kading NBCA less than 50 km southwest of areas near the border that harbour saola.
- saola are apparently absent from western and central Xe Sap NBCA (Salavan and Xekong Provinces, Laos), opposite an area in Vietnam where the species has been reported. A high mountain ridge along the border here probably keeps the climate drier on the Lao side.
- Other species not particularly sensitive to human pressure, such as Short-tailed Scimitar Babbler and Annamite Striped Rabbit, also appear to be restricted to the Annamite wet forests.

Evidence against saola requiring climatically wet forest is its reported occurrence in Laos near the upper Nam Xan river (Bolikhan District, Bolikhamxay Province), an area quite distant from what is believed to be the zone of wet forest. However, the habitat and climate of the area has not been investigated, and could prove to be wetter than assumed.

saola is a mid-altitude species, at least in the present day, with most records coming from between 400 and 1000 m. Formerly, it may have occurred (and even preferred) wet forest at low elevation (below 400 m), but in Vietnam such areas are now densely settled by people and highly degraded and fragmented, and in Laos wet forest at low elevation does not occur. In fact, seasonal altitudinal movements of saola have been reported in Vietnam (based on some local reports, not field studies), where saola are thought to move lower during the winter months. There the species might occur even below 100 m in the remotest valleys.

Within hill forests where it is found, saola reportedly favour the vicinity of small, deeply shaded streams. One reason may be that at least one of its reported preferred food plants, an Araceae identified as *Schismatoglottis cochinchinensis* (Peter Boyce, Royal Botanic Gardens, Kew, pers. comm.), grows more or less only along such streams. Local people in Laos claim that only saola feed on *S. cochinchinensis* and that stems nipped of their leaves are conclusive evidence of the presence of the animal, but there is no confirmation of this.[2]

Local informants report that saola visit mineral licks, and in fact cannot survive without access to them (Phaengsintham 1996). The first photograph of a saola in the wild was taken in the vicinity of a presumed mineral lick, in Vietnam's Pu Mat Nature Reserve (Grieser Johns 2000).

Observations of a captive animal suggest that saola are crepuscular, or crepuscular and diurnal. Informants familiar with the animal in the wild report that it is most active in the morning, late afternoon and sometimes at night. At these times it reportedly descends to feed on streamside vegetation, then retreats to forested mountainsides to lie up and chew cud. However, this could be a response to human patterns of activity.

Of the two camera trap photos of saola taken in Laos in 1999, one is of an animal standing in a stream at noon, and the other of one descending a forested slope at 17:00 in the evening.

saola are generally solitary with the exception of mothers accompanied by young. Intraspecific sparring with the horns has been observed in captive juveniles. The species seems to have a fixed breeding season, and births in Laos probably occur at the beginning of the rains, between April and June, based on local reports and examination of a pregnant animal that died after her capture in Laos. Gestation has been estimated at about eight months, so mating probably occurs between August and November. A single fetus pregnancy has been documented and is probably the norm; local people have sighted adults with calves several times, but have never reported seeing more than one calf per adult.

saola reportedly have a curious behavior of snapping small saplings in half, not as part of any foraging effort. Video shows one of the captive juveniles in Hanoi with only stubby, nascent horns doing this with its teeth, and they made motions of attempting it with their short horns (J. MacKinnon, pers. comm.). Local guides familiar with the species in Laos say that saola break saplings by intentionally wedging them between the horns and giving a sharp twist of the head. All the reputed examples they showed were of saplings about the diameter of one's little finger. The function of this behavior, if indeed

[2] saola's affinity for an Araceae has also been reported by local people in Vietnam. But whether the Araceae in Vietnam is also *S. cochinchinensis* or not, it has been misidentified in some published reports as *Homalomena aromatica*, a species restricted to the Himalayas (Peter Boyce, Royal Botanic Gardens, Kew, pers. comm.).

it occurs, is not known, but based on similar behavior in other ungulates it may serve as territorial marking. Most adult saola show considerable wear on their horns, including the inner sides and tips, suggesting that like species of wild oxen they are prone to rubbing and perhaps thrashing vegetation and possibly also soil, as some form of social and/or sexual activity. This could also inadvertently lead to the snapping of smaller saplings.

Principal non-human predators of saola are probably the pack-hunting Dhole Cuon alpinus, Tiger Panthera tigris and Leopard Panthera pardus. Additional potential predators of young animals are Clouded Leopard Pardofelis nebulosa, bears Ursus and pythons Python.

saola exhibit intense, rigid reactions to domestic dogs. When pursued by domestic hunting dogs a saola is likely to descend to a stream and make a stand in the water with its rump against the bank, fending off the dogs with lowered horns. This may be an evolutionary adaptation to co-existence with Dholes. According to local people, the behavior makes it relatively easy to kill saola with the aid of dogs. Table 1 summarises known human-caused saola mortality in Laos by all methods and for all reasons from 1992, through 1998. This is presented only as an overview of the causes of mortality. The data are not the result of a comprehensive survey but have been gleaned from sporadic records in published sources and sporadic interviews with villagers.They include saola killed only by Lao residents, not transborder poachers. The actual number of saola lost to humans in Laos during this period is certainly far greater.

Table 1: Human-caused saola mortality in Laos, 1992 - 1998.

Hunted (method not known) and killed for meat	Snared for meat or intended captivity	Killed; methods or reasons unknown	Caught (method not known) for captivity[1]	Total
21 – 23[2]	5	2 - 10[2]	11	39-49[2]

[1]All died except one that was released; most died in the process of capture or while being moved to a holding site.

[2]A range is given because the year for some records is not known, and could be pre-1992.

Records are from Timmins and Evans (1996), Tizard (1996), Robichaud (1998a and 1998b), Robichaud and Stuart (1999), Souvannalath (1998), G. Schaller (pers. comm.), S. Vannalath (pers. comm.), and WR's interview notes.

In contrast to their pronounced fear of dogs, saola in captivity have exhibited little fear of humans. Despite their apparent tameness, captive animals have proven frail. The reasons are not clear, but probably relates to precise dietary requirements and/or stress. At least thirteen saola were held captive under various conditions between 1993 and 1997 (and others died during attempted capture), six in Vietnam and seven in Laos. All soon died in captivity except two that were released back to the wild.

DISTRIBUTION IN LAOS

saola are distributed mainly in a discontinuous band along the northwest-southeast Laos-Vietnam border, with easternmost distributions in Laos at the border.

To the south in Laos, it is has been confirmed to occur today in the southern portion of Nakai-Nam Theun NBCA, at about 17º49'N (Timmins and Evans 1996, Robichaud and Stuart 1999, Timmins 2001). It is apparently absent from Hin Namno NBCA, a predominantly limestone karst area along the Vietnam border immediately southeast of NNT NBCA (Timmins and Khounboline 1996, Walston and Vinton 1999). However, during a wildlife survey of Hin Namno in 1998, local residents along the upper Xe Bangfai river, south of Hin Namno, reported that saola were once found near their villages, and probably still occur in remoter areas further south, around the Xe Bangfai headwaters in southern Khammouane and northern Savannakhet Provinces (Walston and Vinton 1999). Satellite imagery of this area shows a block of apparently suitable habitat extending south to about 16º57'N, and the species is apparently present in adjacent contiguous areas of Vietnam (Quang Binh and Quang Tri Provinces), where fresh saola trophy horns have been seen (Le Manh Hung *et al.,* 2002a and 2002b). Local villagers in this area of Vietnam report that the species is still present on both sides of the international border (Tham Ngoc Diep *et al.,* 2004).

The only known recent reports of saola south of this in Laos come from local villagers in the A'Loui valley in Thua Thien Hue Province and Tay Giang District of Quang Nam Province, Vietnam (Hoang Ngoc Khanh pers. comm., Tham Ngoc Diep *et al.,* 2004). These people report the species to be present in the uppermost headwaters of the Xe Kong river in Xe Sap NBCA and adjacent areas (Salavanh and Xekong Provinces), which is more easily accesible from Vietnam, than it is from inhabited areas of Laos. In this area there is a brief break in the high Annamite ridge. saola are apparently absent from other, more westerly and drier portions of Xe Xap (villagers there do not know the animal; Timmins and Vongkhamheng 1996, Showler *et al.,* 1998, Steinmetz *et al.,* 1999). There is good evidence that the species still also occurs in a contiguous forest area across the international border in Vietnam in mountains along the border between Thua Thien-Hue and Quang Nam Provinces (Hoang Ngoc Khanh *et al.,* 1998, Tham Ngoc Diep *et al.,* 2004).

There is a single report of an animal killed in the early or mid-1980s south of Dakchung town in Xekong Province (Schaller 1995), and there is a vaguely reported sighting of an animal that may have been a saola in about 1991 in Phou Xang He NBCA in central Savannakhet Province. Other information from Phou Xang He indicates that, even if the animal seen was a saola (and there is doubt about this), it is unlikely the species survives there today (Boonratana, undated, and pers. comm.).

To the north in Laos, a pocket of saola has been reported from Bolikhan District, Bolikhamxay Province, to about 18°54' (Souvannalath 1998). Nearer the Laos-Vietnam border it occurs at least as far north as the southern edge of Nam Chouan proposed NBCA in Bolikhamxay Province, at almost 18°50'N (Tizard 1996, Robichaud 1998b). However, Nam Chouan encompasses a large block of remote, unsurveyed habitat that spreads north and west of this locality into southeastern Xieng Khouang Province, to 19°16'N. This may include a significantly large area of suitable habitat for saola, perhaps one of the largest areas of potential habitat in Laos. The species was reported absent by residents of a village in Xieng Khouang Province at 19°11'N, but this locality is in degraded habitat more than 30 km west of Nam Chouan pNBCA (Schaller and Robichaud 1996). Much further north, local people did not recognise the species in Nam Xam NBCA, eastern Houaphanh

Province (Hansel *et al.,* 1998), less than 15 km from a reported record in Vietnam (Vu Van Dzung *et al.,* 1994).

Although generally confined in Laos to a band less than 10 km wide along the Vietnam border, there is a considerable western bulge in saola distribution through Bolikhamxay Province. saola horns, reportedly from animals killed locally, have been found in villages west of the Nam Xan river in Bolikhan District (Souvannalath 1998). This is more than 50 km direct-line from the Annamite spine along the Vietnam border to the northeast, and there are a scattering of recent records along a 165 km line east-southeast through Bolikhamxay to the border (Tizard 1996, Robichaud 1998b). saola likely occur in patches along this band rather than a continuum, as the forest is now severely fragmented.

Parts of the saola's confirmed Lao range lie within only one national-level protected area, NNT NBCA, which may enclose less than one-quarter of the animal's distribution in the country.

Figure 1 shows saola's probable distribution in Laos, based on known records and an assessment from topographic maps and satellite images of likely but unsurveyed habitat.

Figure 2 shows the species' known global distribution.

Population

An early population estimate for saola in Vietnam was "a few hundred" (Vu Van Dzung *et al.,* 1993) before its occurrence to the south in Quang Nam Province and north of the Song Ca River was reported. Attempting a more accurate estimate would be very difficult, and is not possible at this time (Henshaw 1997). Nonetheless, reports more than ten years after its discovery suggest that "a few hundred" in Vietnam would now be an overly optimistic estimate.

A few years ago the population in Laos was broadly estimated at between 70 and 700 (Timmins 2001). Subsequent surveys indicate that the upper figure is now undoubtedly too high, and the current population is probably much closer to the lower figure. Beyond this we know with certainty only that the species is very rare, evidenced by the fact that, despite its large size and considerable distinctiveness, it remained unknown to the world until the last decade of the twentieth century, and residents in its range regularly go years without seeing an animal.

Indications are that saola, like all large wild mammals in Indochina, are in a population decline. Schaller and Rabinowitz (1995), for example, suggest a shrinking distribution in Laos over the previous twenty years.

References

Boonratana, R. undated. *Field Management of Nam Poui and Phou Xang He National Biodiversity Conservation Areas.* IUCN, Vientiane.

Dang Huy Huynh, Pham Trong Anh, Khien, H.M., Le Xuan Canh, Thang, T.V. and Phuong, D.H. (1997). Supplemental data on distribution of saola *Pseudoryx nghetinhensis* in Vietnam. *Tap Chi SINH HOC* 19:16-19 (in Vietnamese; English translation by FFI Indochina Programme).

Dawson, S. (1995). saola *Pseudoryx nghetinhensis* Studies in Nghe An and Ha Tinh Provinces, Vietnam. Unpublished report. World Wildlife Fund for Nature - Indochina Programme, National Wildlife Federation and World Conservation Union, Hanoi.

Gatesy, J. and Arctander, P. (2000). Hidden morphological support for the phylogenetic placement of *Pseudoryx nghetinhensis* with bovine bovids: a combined analysis of gross anatomical evidence and DNA sequences from five genes. *Systematic Biology* 49: 515-538.

Grieser Johns, A. (ed.) (2000). Pu Mat: A *Biodiversity Survey of a Vietnamese Protected Area.* SFNC Project, Vinh, Nghe An Province, Vietnam.

Guignard, T. (1912). *Dictionnaire Laotian-Français.* Imprimerie de Nazareth, Hong Kong.

Hansel, T., Loungkham, D. and Khounboline, K. (1998). Appendix 4: Trip Report for a Participatory Biodiversity Assessment of Nam Xam NBCA. In Showler, D.A., Davidson, P., Salivong, K. and Khounboline, *K. A Wildlife and Habitat Survey of Nam Xam National Biodiversity Conservation Area, Houaphanh Province, Lao PDR.* Wildlife Conservation Society, Vientiane.

Hassanin, A. and Douzery, E. J. P. (1999). Evolutionary affinities of the enigmatic saola *(Pseudoryx nghetinhensis)* in the context of the molecular phylogeny of Bovidae. *Proc. R. Soc. Lond. B Biol. Sci.* 266: 893-900.

Henshaw, J. (1997). Status of saola *Pseudoryx nghetinhensis.* Oryx, 31: 89-91.

Le Manh Hung, Pham Duc Tien, Nguyen Duc Tu and Vu Huu Trac. (2002a). *A rapid field survey of Huong Hoa District, Quang Tri Province, Vietnam.* Birdlife International Vietnam Programme, Hanoi.

Le Manh Hung, Pham Duc Tien, Andrew W. Tordoff and Nguyen Dinh Dung. (2002b). *A Rapid Field Survey of Le Thuy and Quang Ninh Districts, Quang Binh Province, Vietnam.* Birdlife International Vietnam Programme, Hanoi.

Kemp, N., Dilger, M., Burgess N., and Chu Van Dung. (1997). The saola *Pseudoryx nghetinhensis* in Vietnam - new information on distribution and habitat preferences, and conservation needs. Oryx, 31: 37-44.

Hoang Ngoc Khanh, Nguyen Van Tri Tin, and Nguyen Dai Anh Tuan. (1998). *[Results of a Survey for saola* (*Pseudoryx nghetinhensis*) *in Thua Thien Hue Province].* Thua Thien-Hue Province Forestry Management Survey Section, Hue, Vietnam (in Vietnamese)

Phaengsintham, P. (1996). *Survey of Food Plants and Saltlicks Used by saola (Pseudoryx nghetinhensis).* Dong Dok Pedagogical University and Wildlife Conservation Society, Vientiane.

Proschan, F. (1994). *The /saavlaa/* (*Pseudoryx nghetinhensis*). Unpublished report. Research Center for Language and Semiotic Studies, Indiana University, Bloomington, USA.

Provincial Forest Protection Department of Quang Nam-Da Nang. (1996). *[Results of a Preliminary Survey on the saola, Pseudoryx nghetinhensis, in Quang Nam-Da Nang Province]*. Provincial Forest Protection Department of Quang Nam-Da Nang (in Vietnamese with English translation).

Robichaud, W. (1998a). Physical and behavioral description of a captive saola *Pseudoryx nghetinhensis. J. Mamm.,* 79: 394-405.

Robichaud, W. (1998b). *WCS trip report: Bolikhamxay saola Survey, 15-24 January 1998.* Internal trip report. Wildlife Conservation Society, Vientiane.

Robichaud, W. (1999). *saola Conservation Action Plan for Lao PDR: 1999 Revision.* Wildlife Conservation Society and IUCN. Vientiane.

Robichaud, W. and Stuart, B.L. (1999). *saola, Herpetological and Wildlife Trade Studies in Nakai-Nam Theun National Biodiversity Conservation Area and the Proposed Nam Theun Extension.* Wildlife Conservation Society and IUCN. Vientiane.

Salter, R.E. (compiler). (1993). Wildlife in Lao PDR. A Status Report. IUCN, Vientiane.

Schaller, G.B. (1995). *A Wildlife Survey in the Annamite Mountains of Laos, December 1994 – January 1995.* Internal trip report. Wildlife Conservation Society, Vientiane.

Schaller, G. B. and Rabinowitz, A. (1995). The saola or spindlehorn bovid *Pseudoryx nghetinhensis* in Laos. *Oryx,* 29:107-113.

Schaller, G. and Robichaud, W. 1996. *Field Trip Report: Preliminary Wildlife Survey in Xieng Khouang Province, May 16-25, 1996*. Internal trip report. Wildlife Conservation Society, Vientiane.

Showler, D.A., Davidson, P., Vongkhamheng, C. and Salivong, K. (1998). *A Wildlife and Habitat Survey of the Southern Border of Xe Sap National Biodiversity Conservation Area and the Dakchung Plateau, Xe Kong Province, Lao PDR.* Wildlife Conservation Society, Vientiane.

Souvannalath, P. (1998). *[Wildlife Survey (saola, or "Nyu-ja") From Villages in Bolikhan District, Bolikhamxay Province].* Unpublished report to WCS. Bolikhamxay Province Forestry Office, Pakxan, Lao PDR (in Lao).

Steinmetz, R., Stones, T. and Chan-ard, T. (1999). *An Ecological Survey of Habitats, Wildlife, and People in Xe Sap National Biodiversity Conservation Area, Saravan Province, Lao PDR.* WWF Thailand Office, Bangkok.

Tham Ngoc Diep, Dang Thang Long and Do Tuoc. (2004). Report of survey on saola *Pseudoryx nghetinhensis.* Unpublished report. SFNC, WWF Indochina, Hanoi.

Thomas, H. (1994). Anatomie crânniene et relations phylogénétiques du nouveau bovidé *Pseudoryx nghetinhensis* découvert dans la cordillère annamatique au Vietnam. *Mammalia,* 58:453-481.

Timmins, R. J. (2001). Chapter 37: Lao PDR, pp 194-199 in: Mallon, D. P. and Kingswood, S. C. (compilers). Antelopes. Part 4: *North Africa, the Middle East, and Asia. Global survey and regional Action Plans.* SSC Antelope Specialist Group, IUCN, Gland, Switzerland and Cambridge, UK.

Timmins, R.J. and Evans, T.D. (1996). *A Wildlife and Habitat Survey of Nakai-Nam Theun National Biodiversity Conservation Area, Khammouan and Bolikhamsai Provinces, Lao PDR.* Wildlife Conservation Society, Vientiane.

Timmins, R.J. and Khounboline, K. (1996). *A Preliminary Wildlife and Habitat Survey of Hin Namno National Biodiversity Conservation Area, Khammouan Province, Lao PDR.* Wildlife Conservation Society, Vientiane.

Timmins, R.J. and Vongkhamheng, C. (1996). *A Preliminary Wildlife and Habitat Survey of Xe Sap National Biodiversity Conservation Area and Mountains to the South, Salavan Province, Lao PDR.* Wildlife Conservation Society, Vientiane.

Tizard, R.J. (1996). *A Preliminary Wildlife and Habitat Survey of the Proposed Northern Extension to the Nakai-Nam Theun National Biodiversity Conservation Area and the Adjacent Nam Gnouang Area, Bolikhamxay Province, Lao P.D.R.* Wildlife Conservation Society, Vientiane.

Walston, J.L. and Vinton, M.D. (eds.). (1999). *A Wildlife and Habitat Survey of Hin Namno National Biodiversity Conservation Area and Adjacent Areas, Khammouan Province, Lao PDR.* WWF Project Office and WCS Lao Program, Vientiane.

Vu Van Dung, Pham Mong Giao, Nguyen Ngoc Chinh, Do Touc, Arctander P., and MacKinnon, J. (1993). *A new species of living bovid from Vietnam. Nature,* 363:443-445.

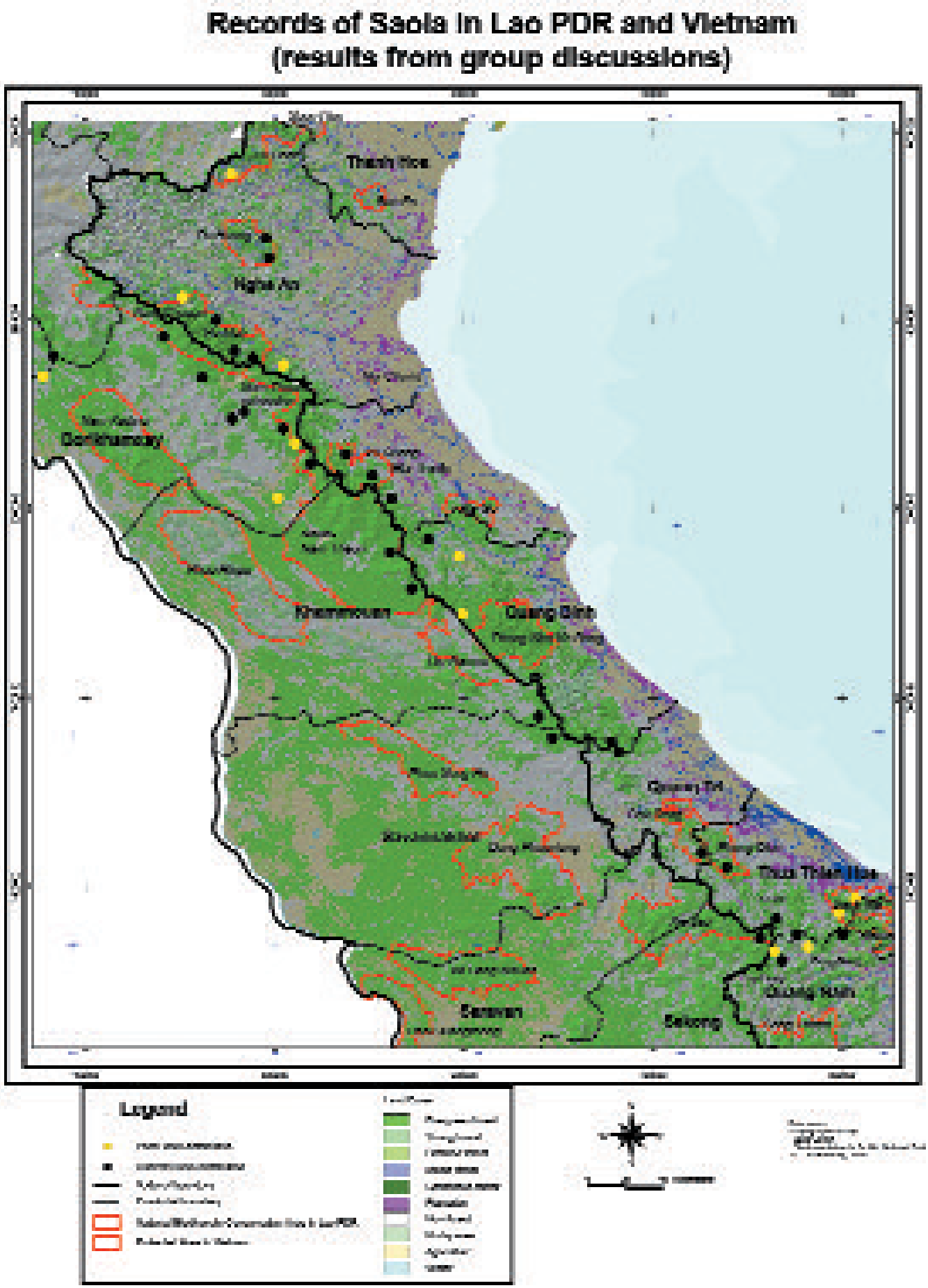
Vu Van Dung, Pham Mong Giao, Nguyen Ngoc Chinh, Do Tuoc and MacKinnon J. (1994). *Discovery and conservation of the Vu Quang ox in Vietnam. Oryx,* 28:16-21.

Vu Van Dung, Nguyen Ngoc Chinh, Ebregt, A. and Santiapillai, C. (1995). *The status of the newly discovered large mammal, the long-horned bovid, in Vietnam. TigerPaper,* 22:13-19.

GROUP WORK: WHERE DO THE SAOLA REMAIN?

The participants of the workshop were divided into four groups according to their geographical expertise (northern, central, Lao PDR, general). The groups discussed and mapped out areas where saola are believed to exist and areas where saola have been found.

The group maps were combined to show the saola sightings and distribution in Vietnam and Lao PDR. Both maps indicate that the saola population is clustered around the Annamites. This area is currently characterised by a high incidence of poverty amongst the local population, and by rapid and extensive infrastructure development as a government measure to reduce rural poverty.


Records of Saola in Lao PDR and Vietnam
(results from group discussions)
Thanh Hoa
Nghe An
Khammouan
Quang Binh
Thua Thien Hue
Quang Nam
Sekong
Legend

GROUP WORK: WHAT ARE THE MAIN THREATS TO THE SAOLA?

In groups, the participants discussed the principle threats that the saola is facing, Trends in these threats and possible underlying causes. The threats were ranked using a scale of 1-10.

The main threats to the saola were identified as hunting and habitat loss or disturbance, all of which were reported by at least some groups as increasing.

Hunting is carried out for both personal and commercial reasons. Loss of habitat is attributed to a range of underlying causes from shifting cultivation in Lao PDR to increased infrastructure development in the Vietnamese Truong Son. The incidental capture of saola in traps targetted at other species was also considered to be major threat throughout the central Truong Son. The most serious current threat, hunting, could be reduced through stricter law enforcement aimed at both hunters and traders (suppliers) and urban outlets (consumers).

Poverty was considered to be a cause of saola hunting in the northern Truong Son, which potentially, through increased livelihood assets may be reduced. However, in other areas, hunting is the result of a demand for saola meat or trophies from other areas, such as cities.

The results of the group work is presented in Tables 1-4. The groups were divided according to geographic areas of expertise (northern, central, Lao PDR, general).

Table 1. Group 1: The Greater Annamites

	Threat	Direct cause	Scale (score from 1 to 10)	Tendency (increasing/decreasing)
1	Hunting	For meat, horns, bones; also for domestic breeding	8	Increasing
2	Habitat loss and fragmentation	Land clearance for agriculture Expansion of residential areas Infrastructure construction (roads, electric power, irrigation...)	6	Increasing
3	Disturbance to habitat	Noise Increased human activities in the forests such as harvesting of forest products Exploitation of minerals	5	Increasing
4	Collection of trophies	Display and sale of trophies	2	Neither increasing nor decreasing
5	Poor natural resource management	Lack of funds Insufficient basic research Low capacity	3	Decreasing
6	Transmission of cattle diseases	Cattle grazing inthe forests	2	Increasing
7	Loss of genetic resources	Small population	3-4	Increasing

Table 2. Group 2: The Northern Annamites

	Threat	Direct cause	Scale (from 1 to 10)	Tendency (increasing/decreasing)
1	Trapping live	For food and commercial purposes mostly incidentally in trap lines set for higher value species	9	Increasing
2	Hunting	For food and commercial purposes	6	Decreasing
3	Loss of habitat	Humanimpact: Construction Forest exploitation: Forest fires	4	Increasing
4	Awareness	Ineffective communications	4	Decreasing
5	Law	Execution Sanctions and penalties	3	Decreasing
6	Policy	Inappropriate	3	Decreasing
7	Livelihood	Difficult	5	Decreasing

Table 3. Group 3: The Central Annamites

	Threat	Direct cause	Scale (from 1 to 10)	Tendency (increasing/decreasing)
1	Traps	Traps to catch other animals	10	Increasing
2	Loss of habitat	Illegal logging	5	Normal ?? what does this mean
3	Hunting (with guns/dogs)	For food	2	Decreasing
		For bait	1	Decreasing
		Slow speed of the saola	6	Increasing
		Poverty	9	Decreasing
4	Fragmented and disturbed habitat	Transportation, irrigation, power projects	10	Increasing
		Illegal gold mining	5	Decreasing
		Increased access to forest	9	Increasing

Table 4. Group 4: Lao PDR

	Threat	Direct cause	Scale (from 1 to 10)	Tendency (increasing/decreasing)
1	Loss of habitat	Shifting cultivation	6	Decreasing
2	Hunting	Outsiders	4	?
		Local people	3	Decreasing
3	Natural disasters	?	?	?
4	Lack of knowledge about the saola population and its importance	?	?	Decreasing

During the group presentations poverty was often cited as a cause, however it was noted that wealth is also contributing to the loss of saola through increased pressure from urban environments and middle-class people for wildlife products. This was reiterated when discussing hunting as there is a trend of increasing hunting and trapping in some areas, which in many instances it is by people other than those living nearby in buffer zones. The commercialization of the saola is believed to be from people outside of the buffer zone, who are richer people.

Scientists and researchers agreed that they have a vital role to play when visiting households and viewing saola specimens. To date, numerous pairs of horns and skulls have been collected by visiting researchers: this may inadvertently fuel a demand for more saola products. It was agreed that measurements and photographs could be taken, but that original samples should remain in the house.

The groups reached a general consensus on the three direct threats identified during this exercise: trapping, hunting, and loss of habitat, although there were discrepancies in the scale and take on whether the threat is increasing or decreasing.

SOME ENDANGERED ANTELOPES AND THE LESSONS WE CAN DRAW ON FOR THE SAOLA

Example notes given by
Dr. Richard. D. Estes,
Chairman,
IUCN Antelope Specialist Group

Aders' Duiker *Cephalophus adersi*

This small, solitary antelope is found only on the islands of Zanzibar and a small relict forest on the Kenya coast. It typically inhabits dense undergrowth in 'coral-rag' forest, and like the saola, it is rarely seen.

A similar two-day workshop, held on Zanzibar island between the 17th and 19th February 2004, was convened to make a conservation action plan. As in this workshop for the saola, much discussion rounded on whether to change its status from Endangered to Critically Endangered. The discussions were indecisive because the number of animals in any of the identified populations is unknown, but certainly the jury is out. Aders' duiker is considered to be a relict species, replaced by more advanced red duikers from the Congo Basin during interglacial periods when rainforest extended to Indian Ocean. The unfortunate capture of 7 or so duikers by netting, and translocation to a small island (Chumbe), resulted in deaths of 4 duikers (probably from stress). There is maybe a lesson there for the saola too. At all costs, keep the populations alive in the wild!

Abbotts' Duiker *Cephalophus abbottii*

This large duiker (80 kg, similar in size to a saola) is closely related to the more common yellow-backed duiker *C. silvicultur*. It is found only in several isolated populations on mountains in Tanzania. It is listed as critically endangered. The only photos taken in the wild have, like the saola, been taken with camera traps (Udzungwa Mts. National Park). There is a similar problem, as with the saola, in putting any kind of number on the population. Camera-trapping is a good way at this point to keep a handle on the species status.

Hirola or Hunter's Antelope *Beatragus hunteri*

Another "relict" species, once widespread, it is now confined to a shrinking, semi-arid area of acacia savanna in eastern Kenya. It may represent a species that predates the evolution of hartebeest *Alcelaphus buselaphus* and topi/blesbok *Damaliscus* species. Its population fell from an estimated 12,000 in mid-1970s to possibly only 350 in mid-1990s, when 30 were captured and translocated to Tsavo National Park. Five animals that were herded into a V-trap by helicopter died during, and after transport, (again, probably due to stress from 'capture myopathy'. Please note again a lesson for attempting to capture and keep, or relocate, saola.

Sahelo-Saharan Antelopes

A group of antelope species inhabit one of the most extensive of the world's ecosystems, including sub-Saharan and Saharan biomes, stretching from the Atlantic to the Nile. However, a diverse and abundant array of large antelopes and gazelles have been reduced by hunting to small, isolated populations within this large area. The scimitar-horned oryx *Oryx dammah* has been exterminated in the wild, and no more than a few hundred addax *Addax nasomaculatus* survive. *Gazella dama*, largest of the gazelles, is down to hundreds, as are all the other gazelles except for *G. dorcas* and *rufifrons*. Efforts to reintroduce zoo-bred addax, scimitar-horned oryx, and dama gazelle to protected areas in Tunisia, Morocco, and Senegal are underway. One of the key issues here is hunting, and uncontrolled fragementation and desertification of habitat. Lets hope the saola can keep 'corridors' open to its neighbours

Saiga Antelope *Saiga tatarica*

One of the most abundant antelopes until the break-up of the Soviet Union, it once numbered nearly 2 million in the vast Asian Steppe. Now, saiga populations have been reduced by 90% within the last two decades. Uncontrolled hunting for meat and especially the horns (males only), in demand for Chinese medicinal trade, caused the decline. Males reduced to such a small percentage of the population that reproduction is affected. On the basis of the drastic decline in numbers, the saiga is now considered Critically Endangered. The root cause of this demise, is in large part, the wildlife trade. It is mildly encouraging to hear that the saola is not specifically targeted as yet in any great demand, but it would take one large order from an unscrupulous trader, and the saola could be in very great peril indeed.

The IUCN Antelope specialist group has nominally 'adopted' the saola ahead of the Wild Cattle specialist group. However, with the majority of antelope species in Africa and Western Asia, it is a useful addition to the group's portfolio. It is hoped that the group can continue to draw together expertise and provide support for ongoing efforts by all parties towards saola survival over the next decade or so.

IUCN CATEGORIES AND CRITERIA: PRINCIPLES AND OPTIONS FOR LISTING THE SAOLA

Nigel Leader-Williams,
Durrell Institute of Conservation and Ecology,
University of Kent, Canterbury,
Kent, CT2 7NS
United Kingdom

Introduction

The IUCN Red List has been used to list globally threatened species since 1963. Until 1994, the Red Listing process used a qualitative system for listing species. However, a quantitative system of listing globally threatened species was developed in the early 1990s, based on the Mace-Lande criteria (Mace and Lande 1991). This new quantitative system was adopted in 1994 (IUCN 1994) and was first applied for the 1996 Red List of Threatened Animals (Baillie and Groombridge 1996). The system was revised slightly in 2001 to take account of some problems identified during the first attempts to use quantitative criteria (IUCN 2001). This revised system has been used for the 2002 and 2003 Red Lists (Hilton-Taylor 2003).

More recently, a set of quantitative criteria has been developed for listings made below the global level, either regional or national Red Lists (Gardenfors *et al.,* 2001). To date, very few national Red Lists have been compiled using these new quantitative criteria. Because the saola only occurs in the two countries of Vietnam and Laos, and because the level of threat that the species faces is unlikely to differ between the two countries, this paper will concentrate on providing background to help both Vietnam and Laos consider how to ensure that appropriate and better data are available for a future global listing for the saola *(Pseudoryx nghetinhensis).*

The IUCN Categories

The most serious and least retrievable Red List categories comprise Extinct (EX) and Extinct in the Wild (EW). Hopefully, such a charismatic flagship species (Leader-Williams and Dublin 2000, in Mace 2001) as the recently discovered saola (Vu Van Dung *et al.,* 1993) will never fall into either of these two categories.

There are three categories of threat in the new quantitative criteria:

- **Critically Endangered (CR)**
  Facing extremely high risk of extinction in wild.
- **Endangered (EN)**
  Facing very high risk of extinction in wild.
- **Vulnerable (VU)**
  Facing high risk of extinction in wild.

These categories are nested, so all taxa listed as CR also qualify as EN and VU, while all taxa listed as EN also qualify as VU.

There are certain consequences of listing. Extinction is a chance process, and a listing in a higher category of threat implies a higher expectation of extinction. However, a listing in a higher category does not necessarily imply a greater need for conservation action. Nevertheless, a higher listing does attract greater international "attention", and possibly greater chances of funding any required conservation actions. For example, the US Endangered Species Act provides funds for certain groups of endangered species, such as elephants, rhinoceros and tigers.

Role of the criteria

Any one of five criteria can be used to list a taxon as CR, EN or VU. Meeting any one of these criteria qualifies a taxon for listing at that level. The different criteria (A-E) are derived from a wide review of the risk factors likely to affect a wide range of organisms and the diverse life histories they exhibit. The five criteria are as follows:

A) Reduction in population size;

B) Range size and other factors;

C) Population size and other factors;

D) Small population size alone; and

E) Quantitative analysis showing probability of extinction.

Each category of threat has different values for each criterion. For example, Criterion D, population size alone, has the following values:

CR < 50 mature individuals;

EN < 250 mature individuals; and

VU < 1000 mature individuals.

Likewise, Criterion E, quantitative analysis, has the following values:

CR > 50% probability of extinction within 10 years;

EN > 20% probability of extinction within 20 years; and

VU > 10% probability of extinction within 100 years.

While the criteria are quantitative in nature, the absence of high quality data should not deter attempts to apply the criteria. Methods involving estimation, inference and projection are acceptable. Inference and projection may be based on extrapolation of current or potential threats into the future.

Red Listings of mammals and birds

All known species of birds were first Red Listed in 1988, while all known species of mammals were first Red Listed in 1996. The listing process serves as a baseline to monitor population trends both across single species and across much wider elements of species diversity. A total of 5205 species of animals were listed in 1996 (Baillie and Groombridge 1996). A total of 25% of known mammals and 11% of known birds were listed as threatened. There has been an increase in the number of threatened species listed since

1996, and a total of 5483 species of animals were listed in 2003 (Hilton-Taylor 2003). Such figures support claims that the earth is currently experiencing a massive loss of species at unprecedented rates, mainly as a result of human activity.

Past and Current Red Listing of the saola

Following its discovery in 1992 (Vu Van Dung *et al.,* 1993), the saola was immediately Red Listed, in 1994, as EN, using the old qualitative criteria. It was again listed as EN in 1996 when the new quantitative criteria were first applied (Baillie and Groombridge 1996).

The new quantitative criterion used to Red List the saola was C1 + 2a(i), which for an EN listing assumes:

C) A population size of <2500 mature individuals, and either:

C1) an estimated continuing decline of at least 20% within five years or two generations, whichever is longer; or

2a(i) a continuing population decline and no sub-population of more than 250 mature individuals.

The relevant IUCN specialist group is the Red Listing authority for each species. In the case of the saola, this is the IUCN-SSC Antelope Specialist Group. The saola was again re-assessed as EN by the listing authority in 2002 and 2003, based on the same criterion (Hilton-Taylor 2003).

Future options for listing of the saola

This workshop has no authority to change the global Red Listing of the saola, whatever concerns there may be for its current status (Robichaud and Timmins, Tham Ngoc Diep *et al.,* in this proceedings dossier). However, the workshop can examine ways to provide better data on changes in population status, and make recommendations for future approaches to listing the saola. Some of the options will now be examined.

Criterion D:

There are very wide and differing estimates for the numbers of saola that there once were or that may still survive (again, Robichaud and Timmins, Tham Ngoc Diep *et al.,* 2004). The very uncertain nature of these figures, many of which appear little better than guesses, suggests that Criterion D cannot be yet used for the saola. Furthermore, its use in the future will only be possible when more formal surveys have been carried out to estimate the global population of saola.

Criterion B:

The saola is known to have a small and restricted range of some 4000 sq km, across the Annamite Mountains [Please cross-reference to workshop papers with range size in them]. This suggests that the saola is correctly listed as EN if Criterion B were to be used, because this requires a geographic range of <5000 sq km. However, it is not clear whether the geographic range of the saola is even more restricted within this overall range. For example, does the saola make full use of all the habitats within the Annamite moist forests?, or is it even more restricted, for example only to stream beds within the forest? If future research were to show that the saola is highly restricted within its range, its area of occupancy would need to be <100 sq km to qualify as CR.

Fragmentation within criteria:

The distribution of the saola is possibly fragmented, but little is known of the extent of such fragmentation. There is a suggestion that there may have been a natural disjunct in the distribution of saola as a result of the low ground lying between the north and central Annamites (refer to maps in this proceedings document). The range of the saola may also be further fragmented as a result of habitat loss, for example through the building of roads through the forest, and as a result of over-hunting by man. Without better knowledge of the extent of fragmentation, it will be difficult to build this into the options available for listing within Criteria B (see above) and C (see below).

Best trend data:

Although of very ancient lineage, the saola was only "discovered" for science in 1992, when some biologists saw unusual horns over the door of a hunter's house (Vu Van Dzung *et al.*, 1993). Even now, it still appears that hunters are much more familiar with the saola, and know its past and current distribution much better, than any biologist. Indeed, it appears that trend data could be compiled on the changing distribution of saola over a period of 10 years, based on where hunters once found, and now still find, saola (Schaller 1995; Robichaud 1999). If these data were to be appropriately and consistently compiled, this raises the possibility for the listing authority of being able to use Criterion C with more informed and appropriate data, as well as to consider using Criterion A on saola for the first time.

Future use of Criterion C:

Criterion C is based on population size, and either:

1) a specified continuing decline; or

2) an observed, projected or inferred decline; and at least one of the following:

   a) a measure of fragmentation; or

   b) a measure of extreme fluctuations (not relevant to saola).

The relevant splits between categories of threat for Criterion C are:

Population size: EN < 2,500 mature individuals; CR < 500 mature individuals;

Continuing decline: EN > 20% in 5 years; CR >25% in 3 years; and,

Fragmentation: EN no subpopulation >250 mature individuals; CR no subpopulations >50 mature individuals.

Even if the data from hunters were to be compiled, there is an important disadvantage in continuing to use Criterion C. Such continued use would require a better population estimate than is currently available (see above).

Possible first use of Criterion A:

Criterion A is based on a reduction in population size, based on any of the following:

2) observed, estimated, inferred or suspected, where reduction or its causes may not have ceased, may not be understood, or may not be reversible (ie past declines);

3) projected to be met (ie future declines); or

4) observed, estimated, inferred, suspected or projected (ie combination of past and future declines).

The use of this criterion can be based on any of the following:

a) direct observation (not yet relevant for the saola);

b) index of abundance appropriate to the taxon (not yet applicable to the saola);

c) decline in area of occupancy and/or quality of habitat (which could well suit the type of data on past and present distributions of saola that could be compiled from hunters);

d) actual or potential levels of exploitation (this could also be used in future if hunters and biologists cooperated to locate and log all hunted saola); or

e) effects of introduced taxa, hybrids, disease, pollutants, competitors or parasites (none of which are known to apply to saola).

If Criterion A were to be applied, the relevant splits between categories of threat are: EN > 50% decline in last 10 years; CR > 80% decline in last 10 years.

RECOMMENDATIONS

The following recommendations accept that past and present distributions of the saola are still best known by hunters, and that no formalised surveys have been undertaken to estimate saola numbers accurately, yet that hunting poses a key threat to saola (Tham Ngoc Tham Ngoc Diep *et al.,* 2004).

Biologists should continue to work with hunters to compile their available knowledge (Schaller 1995; Robichaud 1999), using systematic data collection protocols and validating former and current sites where hunters say saola once existed and now still occur. Once consistently compiled, such data would seem ideally suited for use with Criterion A1(c), which requires measures showing a reduction in area of occupancy.

If sufficient rapport is built up between hunters and biologists, biologists could also seek the hunters' cooperation to locate and log all hunted specimens. If it were possible to compile these data, they would seem ideally suited to use with Criterion A1(d), which requires measures of actual levels of exploitation.

It goes without saying that such recommendations can only be implemented if hunters are not punished or outlawed for having admitted to hunting saola. Given both data needs and the obvious need to discourage further hunting of the saola, it is recommended that biologists use social science approaches to work cooperatively with hunters to encourage positive incentives for conserving saola (Robichaud 1999). Such an approach is likely to be considerably more productive than using a heavy handed approach that causes hunters to mistrust biologists and conservationists (also Robichaud 1999), while they still probably continue to hunt saola illegally and unsustainably.

REFERENCES

Baillie, J and Groombridge, B (1996) *1996 IUCN Red List of Threatened Animals.* IUCN, Gland, Switzerland and Cambridge, UK.

Gardenfors, U, Hilton-Taylor, C, Mace, GM, and Rodriguez, JP (2001) *The application of the IUCN Red List Criteria at regional levels*. Conservation Biology, 15: 1206-1212.

Hilton-Taylor, C. (2003) *2003 IUCN Red List of Threatened Species.* IUCN, Gland, Switzerland and Cambridge, UK.

IUCN (1994) *IUCN Red List Categories.* IUCN-SSC, Gland, Switzerland and Cambridge, UK.

Mace, GM and Lande, R (2001) *Assessing extinction threats: towards re-evaluation if IUCN threatened species categories.* Conservation Biology, 5: 148-157.

Robichaud, W. (1999). *saola Conservation Action Plan for Lao PDR: 1999 Revision.* Wildlife Conservation Society and IUCN. Vientiane.

Robichaud, W., Timmins, R. 2004. *The natural history of saola (pseudoryx nghetinhensis) and the species' distribution in Laos.* Unpublished report.

Schaller, G. B. and Rabinowitz, A. 1995. *The saola or spindlehorn bovid Pseudoryx nghetinhensis in Laos. Oryx,* 29:107-113.

Tham Ngoc Diep, Dang Thang Long and Do Tuoc (2004). *Report of survey on saola Pseudoryx nghetinhensis.* Unpublished report. SFNC, WWF Indochina, Hanoi.

Vu Van Dzung, Pham Mong Giao, Nguyen Ngoc Chinh, Do Tuoc, Arctander P., MacKinnon, J. (1993). *A new species of living bovid from Vietnam. Nature,* 363:443-445.

BRIEF RESPONSE TO PROF. LEADER-WILLIAMS ON THE QUESTION OF 'CR' STATUS FOR THE SAOLA

Mr. ***Vu Van Dzung****, senior botanist*
Professor ***Dang Huy Huynh****, senior zoologist*

The Red List for Vietnam, first published in 1993, currently classifies the saola as endangered. By placing the saola on the list as endangered, it allowed a baseline from which population estimates and assessments could be made. The Red list for Vietnam includes over 400 faunal species, and is based on IUCN criteria and the practical situation in Vietnam. Estimating the number of the species, and evaluating changes in the population is based on the current status and the reproductive ability of the species. Some scientists believe that the saola should be upgraded to critically endangered on the list due to the severe threats facing the species, however no consensus was reached during previous discussions. No consensus can be reached as yet because of a lack of data and appropriate analysis. It is recommended that a review is carried out to look into the criteria further.

DAY TWO

INTRODUCTION SESSION - WHAT CAN WE DO TO PROTECT THE SAOLA?

James Hardcastle, WWF

Key strengths and opportunities that exist to protect and save the saola were identified as:

- Signifying the saola as a flagship for Vietnamese diversity
- Utilizing hunter's knowledge of the saola ecology
- Enforcing strict laws to protect against any hunting/trapping in protected areas
- Using rangers—a large work force of conservators, educators
- Promoting community-based conservation activities
- Harnessing international cooperation as an opportunity for the saola

SAOLA CONSERVATION IN THUA-THIEN HUE PROVINCE

Hoang Ngoc Khanh,
Director
Forest Protection Department of Thua Thien – Hue Province, Vietnam

Background information

Thua-Thien Hue Province is located in the northern area of central Vietnam, and is the last province in the northern Truong Son area. It borders the city of Danang and the East Sea to the east, Lao PDR and Quang Tri Province to the west, Danang and Quang Nam Province to the south, and the East Sea to the north.

Geographic co-ordinate: 16^0 00'- 16^0 45' N (latitude)

$107^0$01'-$108^0$12' E (longitude)

The total area of the province is 505,399 km^2. The province is a narrow belt of land running a length of 127 km and with an average width of 60 km, and has various types of terrain including mountains, hills, plains, lagoons and sea.

With a typical tropical and monsoon climate, the year in Thua-Thien Hue is clearly divided into two seasons. The rainy season lasts from October to the next March, when rains last for days together with northeast monsoons. The dry season lasts from April to September, with high temperature and southwest winds.

Many rivers flow through the province, including the Huong River, Bo River, Truoi River and O Lau River. The Huong River basin is the most important, consisting of 28 large and small rivers, among which Ta Trach and Huu Trach are the two main rivers. The rivers in Thua Thien Hue are usually short and sloping, with many waterfalls, rapids and narrow estuaries. This leads to high floods in the rainy season and low level of river water in the dry season, which affects agriculture.

According to a land inventory in 2002, the planning area of forestry land is 353,589 hectares (including 288,144 hectares of forest land and 125,445 hectares of bare hills and land). The forest is further classified into:

- Production forests and forest land: 122,554 hectares.
- Prevention forests and forest land: 160,168 hectares
- Special use forests and forest land: 70,867ha.

Thua Thien Hue is located between two climate zones, so the fauna and flora here are characteristic of both geographic and biological zones. Thua-Thien Hue is also recognized by local and international scientists an important area for biodiversity conservation

because of its location in the area with remaining primeval forests linking the forests from the East Sea coast to the high mountains along the Vietnam – Lao border. In this area many important and rare species inhabit different landscapes. Three endemic large mammals, unknown to science until recently, were found here: the saola *(Pseudoryx nghetinhensis),* the giant muntjac *(Megamuntiacus vuquangensis),* and the Truong Son muntjac *(Mantiacus truongsonensis).* These species were described in 1992, 1994 and 1997 respectively (Vu Van Dzung *et al.*, 1993; Vu Van Dzung *et al.*, 1998, Pham Mong Giao *et al.,* 1998). Moreover, the endemic Edward's pheasant and imperial pheasant *(Lophura edwardsi* & *Lophura imperialis),* which were previously considered extinct, are present here (Nguyen Cu and Eames, 1993). This province is also home to the crested argus *(Rheinardia ocellata),* another endemic species of the region, and many other vulnerable or endangered species, including the gibbon, *(nomascus spp.),* the tiger *(Panthera tigris),* the Asian bear, *(Ursus thibetanus),* the loris *(Nycticebus spp.)* and the Asian wild dog *(Cuon alpinus),* (Eve, 1996a; Wikramanayake, 1997; Duckworth and Hedges, 1998; Hoang Ngoc Khanh, 1998).

FINDING OUT ABOUT THE SAOLA IN THUA THIEN-HUE

Vietnamese scientists first discovered the new species, the saola, in Vu Quang National Park in Ha Tinh Province in 1992. It is an undeniable fact that all observations and descriptions of this species are based only on the horn and skull specimens collected, and that there has not been sufficient reporting on the saola in the wild.

In a survey conducted in 1996 in the districts of Nam Dong, A Luoi, Huong Tra and Huong Thuy, the provincial Forest Protection Department collected specimen saola horns and skulls from the local houses. Interviews with the local people indicated that the saola existed in historical and development periods of the communities, bearing the name in Ta Oi language of "Cinsor". A communications campaign focusing on this species was launched by the provincial Forest Protection Department (FPD) immediately following the survey. The most significant achievement of this campaign was the fact that the local communities cooperated closely with the Thua-Thien Hue FPD in the effort to protect this species. In two years of 1998-1999, local people discovered and informed the FPD three times about the saola sightings in different areas in the province.

The saola was photographed for the first time in Thua-Thien Hue in January 1998, when a mature male saola was caught in Ho village (in Duong Hoa commune, Huong Thuy district), 15 km away from Hue city centre. According to the report on the scene, the saola was chased by a domestic dog from Re Mountain (near Ho village) to the rice field, where it was caught by the local people who later informed the FPD about the saola. Unfortunately, this saola died before the specialists arrived at the scene. The specimen of this saola is presently stored at the Thua Thien Hue FPD office.

Another case: on 28 May 1998, some pupils of A'Roang commune in A'Luoi district, on the way to visit the rice field, saw a saola being chased by a herd of dogs. The pupils took advantage of a dried stream and built up a fence to protect the saola. Then they informed the local government and the FPD. The FPD set up a team to immediately set off to the scene to rescue the saola. It was a pregnant saola, weighing approximately 75-80 kg. After taking pictures of the saola, the team released it into the forest in the Ong stream area (sub-area 1097, Huong Nguyen commune, A Luoi district)

The third saola was a baby male saola (when it was found its umbilical cord was still

attached to it), which weighed 8-10 kg, and was discovered by FPD staff at Nguyen Van Hinh's house (in village 4, Hong Tien commune, Huong Tra district) on 6 August 1999. The young male saola was caught by Mr. Hinh when he was going to But village (in the former Huong Nguyen commune in A'Luoi district) to do some rattan work. As the saola was young, it was deemed to have little chance of survival if released back to the forest, so the FPD sought the approval of the provincial People's Committee to keep the saola in a half-wild environment in Bach Ma National Park. Although the saola was well taken care of by the Bach Ma National Park staff, the young male saola died after 8 days of captivity due to a navel infection. Scientists of the Institute of Biological Technology under the National Centre of Natural Science and Technology got biopsy samples from this saola for research purposes.

RESEARCH ACTIVITIES TO CONSERVE THE SAOLA

After the confirmation of the presence of saola in Thua Thien Hue Province, field studies on this species were carried out with the financial and technical supports from WWF Indochina as well as the Xuan Mai Forestry University in Ha Tay Province and the Hue Forestry and Agricultural University.

The first survey was carried out from November 1996 to February 1999 by staff of the provincial FPD and Bach Ma National Park. The survey team interviewed farmers' households in 40 communes in 5 districts including A'Luoi, Nam Dong, Huong Thuy, Huong Tra and Phong Dien, and investigated the saola scene in Huong Son commune (Nam Dong district). The local people reported in the interviews that the saola still remained in 19 among the 40 communes, and 27 pairs of saola horns were collected in these communes. In the investigation on the scene, the team found many footprints similar to the ones of the deer along the stream banks, on rocky mountain slopes and rocky rapids. These footprints were compared to the ones printed in document ORYX VOL1, published in January 1994 by Vu Van Dung, Pham Mong Giao, Do Tuoc and Mackinnon, and were confirmed as saola footprints.

Larger scale surveys were carried out in 1998 and 2000, which aimed to draw a map of saola distribution in Thua-Thien Hue. These surveys were conducted by Professor Pham Nhat of the Department of Forest Resources Protection and Management of the Xuan Mai Forestry University and Dr. Tran Minh Duc, deputy head of the Forestry Department of the Hue Forestry and Agricultural University. The results of the survey in 7 survey areas in the above mentioned districts, combined with the independent results of the Hue Forestry and Agricultural University's survey, helped determine the following findings on the status and ecological characteristics of the saola in Thua Thien Hue Province:

- The saola is still present in some natural forest areas in Thua Thien Hue Province, especially in the sub-forest areas (45 sub-forest areas) in four districts of Nam Dong, A'Luoi, Huong Thuy and Huong Tra. It is estimated that there are 120-150 individual saola in these four districts. They inhabit mainly upstream areas of the Huu Trach, Ta Trach and Bo rivers, covering a territory of 58,000 hectares.
- The habitat suitable for the saola is the evergreen multi-layer close canopy forests located in the remote areas with fragmented terrains, or with many streams and high slopes. These landscapes are usually less than 1,000 metres in height.
- In the areas inhabited by the saola there are more than 50 species which form the forest floor. These species that serve as indicators of habitat, medicine and food for the saola. These carpets grow in huge volume and high density, so it can be said

that food for the saola is abundant here.

- The saola seeks food during the day, starting in the morning. The time for sighting the saola is usually from 5am to 10 am. After that the saola looks for a place to rest.
- The saola usually travels alone or in pairs, normally as mother and child, not in a herd. Its areas of residence and for activities are quite stable unless there is a change caused by natural environment or by humans.
- It is very rare that the saola seeks food with other species
- The saola is not able to protect itself very well, but it has the ability to spot enemies from afar thanks to its good sense of smell and hearing. When it spots enemies, it runs very fast on the rocks or from the mountain slopes down to the stream to hide.
- Hidings places are usually small caves in perilous rough areas in the mountains, which are difficult for other species to access, and provide a broad view for the saola to easily spot enemies and avoid humans.
- The breeding season of the saola is unknown, but specimens of young saola collected in the surveys with local communities were considerable. This shows that the saola is gregarious and has a good reproductive ability.

Advantages and difficulties

Advantages:

- The discovery of the saola in the wild is an advantage in that it attracts the interest of local and international organizations and persuades them to invest in the research and conservation of this new mammal.
- The awareness of the local people about forest protection and management in general and the wildlife conservation in particular has increased considerably. This has made a big contribution to the effort to manage the natural resources of the province.
- The province has been supported by the government at different levels, and built good cooperative relationships with many agencies and organizations, research centres and universities.
- Scientists have identified Thua Thien Hue Province as one of the hot spots for biodiversity, so it deserves more support from local and international organizations.

Difficulties:

- The limited awareness and low living standard of the local people living near the forests, especially in the areas with information on the saola, has impacted negatively on the forests. Moreover, illegal wildlife hunting also affects the management and conservation of the saola.
- Due to limitations in time, funding and equipment for scientific research, there are shortcomings in the results of these studies. Therefore, more money and technology needs to be invested to better determine the ecological characteristics and distribution areas of the saola in Thua-Thien Hue Province.
- The professional qualifications of the conservation staff in the province are low and they lack of skills and knowledge. Regular support and help from top specialists in

the field has not been received.

- Inter-provincial and international coordination between the saola distribution areas in Thua Thien Hue and in neighbouring Quang Nam Province, Danang and Lao PDR need to be established for effective conservation management.

CONCLUSION:

Thua-Thien Hue can be considered one of the key saola distribution areas in central Vietnam. It is critical now to conserve the saola and manage the protection of this species. In order to do this, the provincial FPD has been carrying out many activities. Besides economic solutions, one technical approach is to research the establishment of a monitoring and evaluation system for this species, and study the feasibility of establishing a saola conservation zone in A'Luoi district.

Thua-Thien Hue Province, in central Vietnam, has a variety of geographical zones and is rich in biodiversity. Through footprints, markings and photos it is estimated that there are between 120 and 150 saola living in the province. Provincial officials lack the necessary skills and knowledge to fully protect the saola and request the support and cooperation other provinces and international organizations to improve conservation efforts. Currently, low standards of living in the province pose the greatest threat to saola protection activities.

STUDY AND CONSERVATION ACTIVITIES ON SAOLA (*PSEUDORYX NGHETINHENSIS*) IN PU MAT NATIONAL PARK FROM 1993 TO 2003

Dang Cong Oanh,
Vice Director,
Pu Mat National Park,
Con Cuong Town, Nghe An Province,
Vietnam

Introduction of Pu Mat National Park

Pu Mat National Park is located in the north of the Annamite (Truong Son) mountain range. It is found in the southwest of Nghe An province (at about 120 km from Vinh city) along the Vietnam – Lao international border. This area is of high biodiversity and is home to many rare and precious animal species including the saola.

Decision 174 QD/ TTg of 8 Nov 2001, officially declared Pu Mat a national park. The area is intended to conserve the biodiversity of the most important tropical and sub-tropical forest ecosystems in the northern Annamites. The core zone of the park covers around 90,000 ha. Within its territory, 95% of the area is covered by forest vegetation, of which 65% is almost undisturbed evergreen forest and 30% is heavily disturbed forest. The topography is strongly fragmented by many ridges making the altitude of the area varied from 200m to 1841m. The highest peak in the park is that of Pu Mat Mountain.

Natural characteristics of Pu Mat National Park

Location and boundary of Pu Mat National Park

Co-ordinates: $18^0$46' - $19^0$12'N

$104^0$24' -$104^0$56' E

PMNP is divided between three administrative districts: Tuong Duong district in the west, Con Cuong district in the centre and Anh Son district in the south-east. The southern boundary of Pu Mat National Park includes 61km of the international border between Vietnam and Lao PDR.

Geography

Ninety per cent of the park's area is less than 1,000 m above sea level. The most extensive high altitude areas are situated in the western part of the park, where both the main ridge of the Annamite Mountains and the international border between Lao PDR and Vietnam is found. The highest peak of the park, the Pu Mat Mountain, is found in this major ridge formation. From this ridge, steep sided valleys run northwards forming a system of ridges extending at 90 degrees from the main ridge. These ridges are generally

very steep and peak between 800-1.500m. Within the area of Pu Mat National Park, there are four major rivers: Khe Thoi, Khe Bu, Khe Choang and Khe Khang. There are some restricted areas of level lowland on the banks of the Khe Thoi and Khe Khang which have allowed villages to be established in the past. At present, households from the area of Khe Thoi have been resettled outside of the park, but two villages of Dan Lai people are still based in the area of Khe Thoi.

The geology of Pu Mat National Park was not studied but the Annamites have experienced various geological periods including Devonian, Carboniferous, Permian, and Triassic.

Climate and hydrology

Pu Mat National Park experiences a tropical climate which is heavily influenced by both northeast and southwest monsoons. The Annamites themselves influence the weather systems resulting in considerable variations in the climate conditions in the area. The mean annual temperature is 23-24^{0}C. The winter is from December to February and heavily affected by the northeast monsoons. The mean temperature in these months is under 20^{0}C and the minimum is under 18^{0}C. The southwest monsoons, during summer, produce a hot dry climate; the mean temperature is 25^{0}C, and the maximum recorded is over 42^{0}C. The lowest annual rainfall is 1,260 mm in the area of Tuong Duong, while in Con Cuong, the mean annual rainfall is 1,791 mm. All rivers drain northeastwards into the Ca River. The tributaries on the right bank such as Khe Thoi, Khe Choang and Khe Khang flow southwest to northeast and then run into the Ca River.

Forest habitat

As defined by satellite imagery taken in 1998, the core zone of Pu Mat National Park covers 56.200 ha of primary tropical forest and 24.700 ha of secondary, disturbed forest. The buffer zone of the park is covered by more than 86.000 ha of secondary regenerating forest. Pu Mat National Park is the largest natural forest area in the north of Vietnam located in the Truong Son range.

Conservation values of Pu Mat National Park

- Pu Mat National Park is one of the priority areas for biodiversity conservation within the country and in the region, and plays an important role in conservation of the Truong Son ecoregion. The contiguous area consisting of Pu Mat NP and Nakai – Namthuan NBCA in Lao (with a combined total area of 200.000 ha) is of high importance for transboundary conservation.
- The areas of lower montane vegetation structures in Pu Mat NP and valley ecosystems are important to large mammals. These are the highest prioritized areas for conservation, especially the valley of Khe Bong in the headwater of Khe Khang.
- Pu Mat NP has high biodiversity: More than 2,600 vascular plant species have been identified. There are 131 mammal species, 295 bird species, 48 reptile species, 22 amphibian species and 82 fish species. Of these, 55 plant species, 40 mammal species, 12 bird species, 16 reptile species, 3 amphibian species and 6 fish species are listed in Vietnam Red Book.
- Pu Mat NP is home to many mammal species which are in danger of extinction, including many which are endemic to the Annamites. The number of endemic and precious species in Pu Mat National Park, including the saola *(Pseudoryx nghetinhensis)*, is of great interest to national and international scientists

Study and conservation activities on saola in Pu Mat NP

Surveys to identify the distribution of saola in Pu Mat NP

The discovery of the saola, a species new to science, was a great event for scientists in the beginning of the 1990s. During the same period, there were records of the species in the areas of Anh Son and Con Cuong districts in Nghe An province. In its strategic plan for conservation, Pu Mat NP pays the most attention to the study of animals, especially the saola. However, results of studies on the distribution and ecological behaviour of the species in Pu Mat NP are limited. A map is presented at the end of this paper showing recorded locations of the saola.

A number of surveys on large mammals confirmed the presence of the saola in Pu Mat NP from 1993 to 2003 (work from 1998 to date was financed by the SFNC project):

- Survey on animal resources for the feasibility study of Pu Mat NR conducted by FIPI, 1993
- A biodiversity survey in Pu Mat with the technical support of FFI, 1998-1999
- Survey for developing a participatory conservation strategy in Khe Bong valley, Pu Mat conducted by Barney Long and Do Tuoc, 1999
- Camera trapping programme conducted by foreign experts and park staff, 1998 - 2002
- Survey on large mammals conducted by Scientific Section, Pu Mat NP, January - April 2002
- In 2003, the staff of the Scientific Section of Pu Mat NP researched the distribution and ecology of saola. The results of this research confirmed the presence of the saola in the core zone of the park. However, the number of saola individuals is small. There are from three to five individuals in the Khe Chat area (a tributary of Khe Choang), about ten individuals in Khe Bong area (the upper stream of Giang River) and less than five individuals in the Khe Yen area (southern part of the park).

Records related to saola distribution in Pu Mat NP:

- Five photographs of saola were taken by camera traps at a mineral spring in Khe Bong valley (co-ordinate: UTM 0470800; 2080600, altitude: 400m) in Oct and Nov, 1998.
- Fresh tracks of saola were observed over a period of 4 days on the steep slopes of the hills surrounding Khe Bong valley from 19-21 June 1998 and tracks of two individuals were also observed in the area on 16 June 1999. (Barney Long and Do Tuoc, 1999).
- Tracks were observed at a shallow stream (UTM 0486155; 2079750) on a steep and rocky mountain flank in the area of Khe Poong and Khe Bong in the period from 2 to 13 April 2001 (Pham Nhat, 2001).
- saola tracks of 6.7 cm wide and 3.3 cm deep were found in the area of Khe Bong (UTM 0487177; 2080404) in the period from 3 to 12 April 2002. (Survey on large mammals –Science Department 2002).
- During research on the distribution and ecology of saola in 2003 (with 70 days of field survey), six localities of saola presence were discovered in Pu Mat NP:

- Tracks of 4.5cm long and 4.2 cm wide was discovered on 9 Oct 2003 in the area of Khe Tun (0473061;2093025), a tributary of Khe Chat; another track of 6.5cm long and 5.5 cm wide was recorded on 29 Jun 2003; track of 7cm long and 7cm wide was recorded in Khe Bong ($18^0$48'59"; $104^0$52'39") on 9 Jul 2003; another track of 5.6 cm long and 5.1 cm wide was recorded in the same area on 22 Oct 2003; a track of 6 cm long and 5 cm wide was recorded in the area of Khe Yen on 19 Jul 2003.
- Tracks were recorded on occasion by guard patrols conducted from 2003 to the present in the Khe Bong and Khe Chat areas and are documented in the PMNP database.

It can be assumed from the records that the saola population in Pu Mat NP is very small. Its distribution is restricted to certain sites: Khe Chat, Khe Bong and Khe Yen. There is no evidence of saola presence in the north of the park (the area of Khe Bu and Khe Thoi). Dawson (1994) noted that the forest area in the northern part of the park is dryer than in the southern part (the area of Khe Bong and Khe Yen). Research findings in Pu Mat confirm those in Lao PDR, in that the saola is attracted by the mineral springs (Robichaud, 1999). At present, the mineral spring in the area of Khe Bong (UTM 0470800; 20806000) has the highest recorded number of sightings of saola in Pu Mat.

Records show that saola observed in Pu Mat NP were sighted at between 200-500m. There is no record of saola being sighted at over 600m. The characteristics of saola distribution in Pu Mat NP is different from other places such as Pu Huong and Vu Quang NP.

Ecological characteristics of saola in Pu Mat NP

saola generally inhabit relatively undisturbed forest on steep slopes and in the upper reaches of rocky streams or mineral springs. There are very few records of saola tracks found on the small paths in the forest. The saola is more active in the late afternoon or early morning but there are also records of saola during the night (two nighttime photographs of saola were recorded by camera traps in 1998). The saola is solitary. It often follows an unchanging route for foraging and returns to the previous place after two or three days.

39 plant species found in Pu Mat NP are identified as being the preferred diet of the saola. saola eat plant species belonging to Polypodiophyta and Magnoliophyta. Species eaten by saola include 3 species of Polypodiophyta, 30 species of 19 families of Magnoliopsida , 4 species of Liliopsida. According to local people the species only eaten by saola is *Euphorbia hirta L.* belonging to Euphorbiaceae family.

saola conservation in Pu Mat NP

Many research programmes on large mammals including saola have been carried out since the SFNC project was launched. However, a project focusing only on saola conservation has never been conducted in Pu Mat NP.

In 1999, Barney Long and Do Tuoc developed a participatory conservation strategy for Khe Bong valley in which saola conservation was highlighted as being of great concern. This strategy was developed with the participation of six villages in Phuc Son and Mon Son communes together with border army forces and aimed to protect the area from illegal logging and hunting. It included patrols, prevention of all sort of human

encroachment to the area, and raising awareness of conservation in the area of Khe Bong. These conservation activities received financial support from the SFNC project and were considered as urgent measures to mitigate illegal activities in the area of Khe Bong. In 2001, the SFNC project stopped supporting these activities and local people still fish, hunt and exploit forest products in the area. This may be one of the reasons for the reduction of saola habitat in the area of Khe Bong. Forest protection forces patrol the area regularly, but patrols are not effective if the underlying causes are not resolved.

With a buffer zone population of approximately 65,000 people, Pu Mat NP is under great pressure from the human population. Though the SFNC supports agriculture production, livestock breeding and agro-forestry development, which in many areas have brought local community certain benefits, many households still depend on the forest and continue to hunt and collect forest products. Conservation efforts including saola conservation activities made by Pu Mat NP are influenced by these activities.

Besides population pressure and the limited awareness of local people of the need for conservation, Pu Mat National Park, with only 40 forest guards, does not have the capacity to manage the entire forest area and its biodiversity. Recommendations for conserving the saola in Pu Mat NP include a zone for a strictly protected area or special protected area to execute intensive protection measures in the area, and the development of a specific saola conservation programme in the park. The focus of this should be the area where the saola is present (based on the findings of the surveys). The participatory conservation strategy in Khe Bong valley developed by Barney Long and Do Tuoc in 1999 should be continued.

Priority conservation activities include:

Restrict forest access

- Control the entrance of saola conservation area (special protection area). People entering the area without the permission of the park would be forced to leave.
- Control the entrance to Khe Bong area by small paths from Cao Veu station, Yen village and Pha Lai;
- Relocate Dan Lai households in the area of Khe Khang to another place that is suitable for their development
- Plan and zone the upper stream of Khe Chat for the conservation of saola and other large mammals.
- Increase patrols in the area and strictly punish violence.

Scientific research

- Conduct regular surveys and monitoring activities to determine the status of the saola in Pu Mat NP in order to adjust the saola conservation plan when appropriate.
- Establish an information network on the saola.

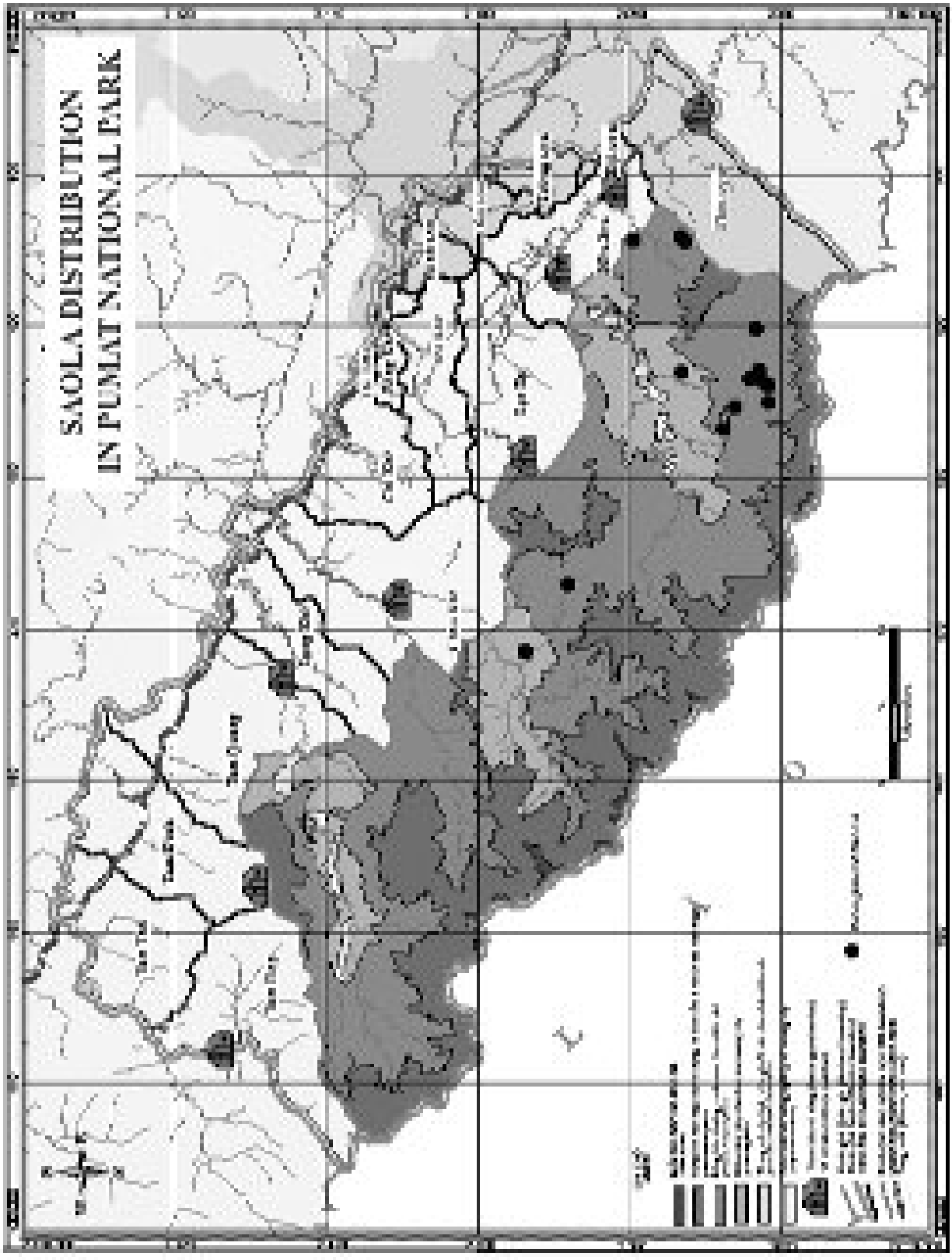
Gain local support

- Establish a network of village collaborators for saola conservation.
- Conduct a campaign to raise awareness of the need to conserve the saola.
- Train local communities, local staff and forest protection staff in conservation.

- Conduct programmes which support the livelihoods of local communities living near the strictly protected area.
- Provide equipment for conservation and share benefits of conservation with local community.
- Establish a contractual mechanism to allow local people to become involved in conservation work (since the park staff is not sufficient to manage such a large area of forest)

Seek financial support

- Investment in the buffer zone, especially in Mon Son area and in the area of Dan Lai people should be a priority for Government investment. Encourage local people to be committed to protecting the area of Khe Bong and Khe Chat before receiving any loan.
- The government should provide funds to carry out saola conservation activities.
- International NGOs should provide financial support and develop a project for species conservation.



Map of saola Distribution in Pu Mat National Park

STATUS OF THE SAOLA IN PU HUONG NATURE RESERVE, NGHE AN PROVINCE AND THE POTENTIAL FOR CONSERVATION

Dr Hoang Xuan Quang,
MSc Cao Tien Trung,
Vinh University
and Nguyen Thanh Nham, Pu Huong NR,
Nghe An Province, Vietnam

Introduction

Pu Huong Nature Reserve (PHNR), with an area of 49,000 ha, is located in the centre of Nghe An province. It was identified as an important area for biodiversity conservation in the early 1990s and original surveys for the development of a Feasibility Study for its gazettement as a Nature Reserve were conducted by FIPI in 1994-1995. The results of the FIPI surveys were included in the 2002 Feasibility Study and Investment Plan produced as a requirement for gazettement as a Nature Reserve (FPD Nghe An & PC Nghe An 2002). The NR is under the management of the Nghe An People's Committee and the Nghe An Forest Inspection Branch.

Apart from the initial Feasibility Study, the only mammal survey work undertaken at PHNR was conducted by the international NGO Frontier from April to July 1995 (Kemp & Dilger 1996; some of the work is reported in Kemp *et al.,,* 1997). Some brief surveys of the elephant population in the Pu Huong region were undertaken as part of a wider study of human-elephant conflict (Walston *et al.,,* 1996; see also Duckworth & Hedges 1998). Information on the Pu Huong NR remains very sparse. However, the NR has been identified as part of the Northern Truong Son Landscape (WWF-Indochina 2001).

In order to support management planning for the PHNR, a rapid biodiversity assessment was undertaken by staff of Vinh University and Pu Huong NR during 2003. The rapid assessment had the specific aim of providing baseline data on key fauna species in the PHNR and to conduct a preliminary survey of the saola.

Saola conservation

The first descriptions of the saola (Vu Van Dung *et al.,,* 1993) were followed up by a broad assessment of its conservation status (Vu van Dung *et al.,,* 1994). However, there have been no following studies on conservation of the species in Vietnam, despite the fact that incidental evidence suggested that the population of saola was decreasing faster than that of most other species in the region.

About 15 years ago, the hunting of saola started to soar. At that time, the saola came under particular pressure as local communities turned to wildlife trapping in order to make a living. Populations continue to decrease for the following reasons:

- Limited distribution in Vietnam (preferred habitats occupy small areas).

- The needs of local people to make a living pushes the saola into landscapes not to their choosing and to which they are not specifically adapted.
- High level of knowledge of local people as to the habits of the saola – distribution, habits, etc.
- The value of saola trophies on the market.
- Weak and improper control by the authorities.

Review of the status of the saola in the Pu Huong NR

Significant conservation research has not yet been carried out in Pu Huong Nature Reserve. Local hunters, though discouraged from hunting saola, still do so and the 125 villages and 10,000 households in the area surrounding the Nature Reserve primarily subsist based on hunting for food and trade. There are many professional hunters, including seasonal local hunters and hunters from other areas. Trophies of saola are commonly displayed in households in this area. Informal interview with hunters in the area revealed that 30 saola were killed in the Pu Huong area between 1995 and 2003.

Surveys conducted along transects across the Pu Huong NR (totalling 166 km in length) indicate at least three places where populations of saola are still distributed (Table 1). Accompanying hunters reported that saola were recently shot at all of these three places, as these extant populations are well known locally.

Table 1. Frequency of occurrence of saola *Pseudoryx nghetinhensis* at Pu Huong NR

Transect no.	Area / Habitat	No. tracks encountered	Km surveyed	Tracks / km
T1.1	Khi village to Kho Khe: swidden and secondary forest	0	12	0
T1.2-1.6	Co stream and ridges around Pu Huong mountain: primary forest	2	51	0.04
T2.1, 2.3	South of Cuom village and disturbed areas around Bo stream: swidden fields and bamboo forest	3	25	0.12
T2.2, 2.4	Bo stream and central ridge systems: riverine and primary forest	1	20	0.05
T3.1, 3.2	Ta village to foothills of Pu Lon: swidden and secondary forest	0	24	0
T3.3-3.5	Moc Pan and Ton streams and Pu Lon ridge: primary forest (small amount of secondary forest)	0	32	0

In interviews held with hunters and local communities, the hunters estimated that there were about 5-7 individuals of saola remaining in the Chau Cuong area (Co stream). Hunters in Diem Lam commune (Quy Chau) estimated that the saola population in the area around the Bo stream was 20-30 individuals. These data are very similar to the results of research reported by Kemp & Dilger (1996), who reported that around 30 individuals of saola may have remained in the Pu Huong NR at that time.

If the Pu Huong NR really hosts that many individual saola, it will have the largest population of saola of any protected area in Vietnam (considerably exceeding the number in the much larger Pu Mat National Park). However, further surveys and research are needed to confirm these figures.

Habitat preference. Surveys and interviews suggested that the distribution of the saola was limited to evergreen primary forest and bamboo forest along streams and in rocky areas (mainly in upper watersheds). It was formerly known to occur in 16 areas of the NR (past hunting records) but it now remains only in the south-east part of the Pu Huong NR. No saola have been sighted recently in the northern area (Que Phong and Tuong Duong districts).

Hunting records from Pu Huong NR

Ten community groups and 30 local hunters were interviewed. Researchers were told that approximately 27 saola individuals have been hunted in the Chau Cuong (Co stream) area in the period 1995-2003. The number hunted in the Bo stream area was put as high as 50-70 individuals during the same period.

In all villages in Diem Lam and Chau Guong communes, saola horns and skulls were found being used as decorations in peoples' homes. The survey team recorded 15 pairs of horns as being offered for sale in Quy Chau district centre during July-September 2003, priced at VND 400,000 - 1,000,000.

Questionnaires used in the survey showed different reasons given for hunting saola: 94.5% of hunters reported that saola were trapped for food, 74% reported that saola products were sold, and 28% reported that horns were used as decorations.

The saola is a rare species. Most of the community groups and local hunters are aware of the importance of the saola and its biodiversity value. However, the biggest threat to the saola remains illegal hunting. Illegal logging, which destroys their habitat, is also of importance.

Participatory conservation in Pu Huong NR

In 2003 Pu Huong Nature Reserve decided to employ a strategy for conservation of the reserve that involved the surrounding communities. The approach is to identify and work with the people that have a specific interest in utilising natural resources. The most important stakeholders when trying to manage wildlife are the hunters and it soon became clear that there is an interest among the local hunters to conserve wildlife if they could be allowed to utilise the wildlife legally. At the same time it was identified that the main threat to wildlife is hunters from other areas with commercial purposes. Some of the local hunters in communities close to the main road did also commercialise the hunted animals. But when no one has the legal right to utilise wildlife, local interest to protect it is limited, and as the level of resources needed for policing is very high and far beyond what is and probably ever will be available, hunting becomes open to everyone.

Due to the local dependency on wildlife the participation of the local community has become an important factor for biodiversity conservation. With the support of the Danish government a wildlife protection project has been initiated, in which nine "Hunters' Clubs" have been established as an educational tool. Meetings and training courses have been organized with the local people, hunters and village staff, to share information on wildlife, and a local group carry out communication activities on forest laws and participate in monitoring and patrolling activities for forest protection. Club members provide information on where wild animals can be found, where traps are set, and so forth. It was agreed that these Wildlife Management Club could be granted the right for restricted hunting on specific species in a specific period in the buffer zone of the reserve on the condition that the club is responsible for patrolling. Furthermore, as

part of monitoring and awareness raising, the clubs are actively involved in the monitoring process thus a vital part of the Pu Huong NR monitoring system. Until now the interest of establishing and joining a wildlife management club has been very high in the 9 villages involved. During the next years all villages bordering the reserve are expected to be involved and have a wildlife management club.

The Pu Huong NR benefits from improved protection of the vulnerable species in the reserve and can dedicate more time to work with the villages in a positive atmosphere. The villages and the hunters benefit by having the legal tools to keep hunters from outside away from their areas and by being able to hunt legally in restricted areas outside the reserve.

Priorities to conserve the saola at Pu Huong NR

Conservation action must be based on the ecology of the saola. The local communities and particularly the people who work regularly in the forest have the best knowledge of the saola and its ecology. Engaging indigenous knowledge in developing conservation action is very important.

The responsibilities of the local communities for conserving the saola must be clearly identified, and the significance of the saola understood by the communities. The expansion of Wildlife Management Clubs will both establish responsibilities and determine benefits that will accrue to participating villages.

The expansion of local communities, on the other hand, can have an adverse effect on saola habitat and the spreading of swidden agriculture and illegal logging must also be controlled as part of the conservation approach.

At a district and provincial level, the biodiversity value of the saola and the degree to which it is threatened needs to be further understood.

References

Duckworth, J.W. & Hedges, S. (1998). *A review of the status of tiger, Asian elephant, gaur and banteng in Vietnam, Lao, Cambodia and Yunnan province (China), with recommendations for future conservation action.* WWF-Indochina, Hanoi.

FPD Nghe An & PC Nghe An (2002). *Report of the feasibility study to establish the Pu Huong Nature Reserve, Nghe An*. Forest Protection department and Peoples' Committee of Nghe An Province, Vinh, Vietnam. (In Vietnamese)

Kemp, N. & Dilger, M. (1996). *Site description and conservation evaluation: Bu Huong proposed Nature Reserve,* Quy Chau district, Nghe An province, Vietnam. Society for Environmental Exploration and Xuan Mai Forestry College, Hanoi.

Kemp, N., Dilger, M., Burgess, N. & Chu Van Dung. (1997). *The saola Pseudoryx nghetinhensis in Vietnam - new information on distribution and habitat preferences, and conservation needs.* Oryx, 31, 37-44.

Walston, J., Do Tuoc & Trinh Viet Cuong (1996). *Assessment of human / elephant conflict in Vietnam:* Nghe An province. FFI Indochina / MARD, Hanoi.

WWF-Indochina (2001). *Towards a vision for biodiversity conservation in the forests of the Lower Mekong ecoregion complex.* WWF Indochina, Hanoi.

Vu Van Dung, Pham Mong Giao, Nguyen Nghia Chinh, Do Tuoc, Arctander, P. & MacKinnon, J. (1993). *A new species of living bovid from Vietnam. Nature* 363, 443-445.

Vu Van Dung, Pham Mong Giao, Nguyen Nghia Chinh, Do Tuoc, & MacKinnon, J. (1994). *Discovery and conservation of the Vu Quang ox in Vietnam. Oryx* 28 (1), 16-21.

SAOLA CONSERVATION IN LAOS

Vongdeuane Vongsiharath,
Director of the Division of Forest Resources Conservation,
Department of Forestry
Ministry of Agriculture and Forestry
Lao PDR

The precarious status of the saola in Indochina is not well documented, and conservation activities for the saola in Lao PDR have been few. A prioritized programme for saola conservation in Lao PDR recommends:

- **Conservation of habitat**

Activities under this programme include stabilising shifting cultivation through land use and village development planning, controlling illegal logging through participatory patrolling and law enforcment and mandatory assessment of large scale infrastructures for their environment impact.

- **Reduce wildlife hunting**

Activities under this programme include increasing awareness through producing and distributing appropriate informative materials, effective implementation of legislation through enforcement of specific laws and regulations and improving livelihoods through an integrated conservation and development approach.

- **Stabilize human population**

Activities under this programme include prohibiting the establishment of new villages through control of resettlement programmes, village grouping by establishing focal development centres comprising several small villages.

- **Identifying and managing key areas that need to be conserved for the saola**

Activities under this programme include finalising and approving National Biodiversity Conservation Area management plans, improving the management skills of responsible officers through training in effective management plan implementation and demarcating different zones within the conservation areas.

- **Monitoring and researching the saola.**

Activities under this programme include surveys on distribution and status of the saola in all potential areas, an ecological study on saola habitat and development of a methodology for monitoring the saola population and its habitat.

SAOLA CONSERVATION PARTNERSHIPS WITH RURAL VILLAGES IN LAO PDR

William Robichaud
Centre for Biodiversity Research
Dept. of Zoology - University of British Columbia
6270 University Blvd.
Vancouver, BC V6T 1Z4
Canada

The initial goals of this project were concerned with protecting camera traps in remote forest areas. As the project developed the goals expanded to include motivating villagers to protect saola and enlisting their support and expertise to study the animal, and in some way supporting the Government of Lao PDR's rural development and poverty alleviation goals.

The perceived problem in this area was twofold: firstly that there was both local and outside hunting of the saola, and secondly that there were limited income opportunities for remote villages. A potential solution was seen as providing an economic incentive for villagers to protect saola, this was done by using the approach of joint camera trapping with shared profits. Villagers were offered $200 per saola photo, $50 per tiger photo, $5 for any other wildlife photos, and $5 per day for labour.

During 1998-99 this approach was piloted in seven villages in the areas surrounding Nakai-Nam Theun NBCA and Nam Chat/Nam Pan PPA. The project was supported by the Department of Forestry, The World Bank, WCS and IUCN and involved the collaboration of central and local government, NGOs and villages.

The project agreed contracts with villagers and equipment and implementation of the camera trapping was turned over to them. Five of the villages were successful in carrying out the contract and the combined income gained from camera trapping was $2,800 (equivalent to 18 buffaloes, the salary for 5 village teachers for two years, the value of swidden rice cultivated by 10 families for 1 year or the price of 2 hand tractors). The pilot project proved to be a promising model of non-extractive use of NTFPs and also demonstrated goodwill on the part of the villagers.

The next phase of this project plans to monitor village attitudes and use of village funds, distribute the funds over a wider area (including the protected area) and monitor the saola and other wildlife. The sustainability of this approach is also questioned and needs to be developed.

RESULTS OF A RAPID SAOLA SITUATION ANALYSIS FROM VIETNAM

Tham Ngoc Diep,
Research consultant for SFNC/WWF, Vietnam

Ms. Tham Ngoc Diep and Professor Do Tuoc undertook a rapid situation analysis in the areas of Pu Mat National Park, Vu Quang Nature Reserve, and the provinces of Quang Binh, Quang Nam, and Thua Thien Hue.

Methods: Through a community survey in these areas they organized interviews with hunters, women, and children in these areas to determine the presence of saola in these locations. As the information was gathered from secondary sources, the accuracy of the information is not clear. The full report of this situation analysis is presented in Annex 3.

Conclusions: In all areas, the numbers of saola are reported to have reduced sharply in recent years due to threats from the construction of the Ho Chi Minh National Highway and hunting. A full discussion of the conclusions is presented in Annex 3.

Recommendations:

The saola needs specific conservation measures. All conservation activities to date in saola areas have failed to identify, mitigate or combat the main threats to saola populations

- Specific research on the status and population size of saola,
- Training for conservation staff on how to tackle the threats to the saola,
- Research on the habitat and behaviour of the saola,
- Improved coordination between research institutes,
- Increased awareness among the people living in the key areas,
- Developing a national saola conservation action plan for Vietnam.

In order for saola conservation to be effective the following important factors are considered essential:

- The concerted commitment of the Governments of Vietnam and Lao PDR
- Effective application of existing legal systems
- Enhanced communications activities
- Habitat conservation too general
- Policy on special use forests
- Strengthened conservation teams
- Responsibility and participation of the local community

SOME INTERRIM THOUGHTS ABOUT THE SAOLA

Tony Whitten,
Senior biodiversity specialist
the World Bank

It is important to be cautious of too little information leading researchers in the wrong direction. Researchers have performed surveys of the saola in protected areas, but surveys must be conducted in places other than protected areas. Scientists need to determine where the saola do not exist in order to conclusively state where they do exist.

There is no substitute for one or more long-term field studies aided by local hunters; surveying the saola should not go on the same way it has been done for the past 12 years.

We also need to focus on what is most important. It is currently believed that the saola population is decreasing because of hunting, habitat loss, and disturbance. However, there may be all sorts of other interactions and different things going on that researchers and scientists are unaware of, including a lack of awareness among decision makers. There is no one 'recipe for success' that everyone can follow. Likewise there is no reason to do captive breeding. Earlier today someone mentioned an integrated conservation and development programme as a potential solution. We cannot assume that making a villager richer will make him a conservationist. It could turn him into a bigger taker from the forest.

GROUP WORK: ACTIONS FOR THE SAOLA

Facilitated by **James Hardcastle**,
WWF Indochina Programme

The participants worked in four groups to identify opportunities and constraints to potential conservation interventions on five main themes: research, training, law, policy and education. The results of the groups is summarised in Table 5.

Table 5. Opportunities and constraints to potential conservation interventions

Theme	• Opportunities	• Constraints
Research	• Capable staff, • Newly discovered, rare species, • Broad information exists, • Distributed in protected areas and neighbouring areas, • Have support and concern from international organisations, • Good international relationships (VN and Lao). • Lack of suitable research methods,	• Lack of investment, • Lack of information exchange, • Lack of funds.
Training	• Local communities support training programmes, • Availability of scientists and equipment, • Support from international and national experts, • Time constraints.	• Lack of specialised staff, • Lack of documents, information and knowledge, • Number of training/staff fluctuates, • Lack of funds.
Law	• Have a basic legal system, • Stable political system, • saola is recognised as endangered, • Availability of legal documents, • Concern and support from local government, • Can learn from other projects • Able to take initiative, • Clear legislation, • Concern and support of local government • Focus to conserve saola (in species and habitat protected areas),	• Lack of strict enforcement, • Conflicting laws, • Lack of coordination mechanism amongst law executing agencies. • Lack of means, funds, low professional skills of enforcement officials, • Lack of awareness of the law in rural areas, • Lack of respect for the law amongst local communities, • Ignorance of the law may be linked to deprived livelihoods and few income opportunities, • Success required the agreement and commitment of local communities
Policy	• General policies exist, • Mass participation of local people is straightforward, • Have the support and concern of governments and international organisations, • Measures to support protection of the forest and saola are of prime concern of government.	• Lack of coordination between different policies, ragged implementation, • Small scale project implementation is not specific enough, • Imbalance between conservation and economic development priorities, • No separate investment funds for the saola, • Low management capacity, • Need to coordinate between different sectors and programmes
Education	• Initial experience in environmental education exists,	• Documents and approaches may not be suitable for ethnic minorities or local

	• Government policy to add environmetnal education into the school curriculum, • Communication work is developing rapidly, • Priority for education is in mountainous areas (saola areas), • Have the cooperation of local communities.	customs, • May need to be translated into rural languages, • Lack of experience in rural areas, • Irregular media communications, • Lack of coordination in relevant sectors, • Lack of materials, • Low funds for communications activities.

Although mentioned in several cases during the earlier threat analysis, this table does not include reference to the fact that the single most important factor supporting hunting is the existence of the urban and international market for wildlife, and that the middle-class well-educated Vietnamese are as much in need of 'education' as the rural ethnic minorities if the trade that fuels the hunting is to be effectively addressed.

Within the five main theme areas the group prioritised the following twelve actions as requiring urgent attention:

1. Research on distribution and ecology
2. Training
3. Enhanced international cooperation
4. Education and communication
5. Increased livelihood
6. Strengthened conservation capacity
7. Expanded conservation system
8. Collect traps, forbid the production of traps and illegal use of hunting guns and dogs
9. Build a "green corridor" between saola areas in the Quang Nam – Thua-Thien Hue area; and across the border between Vu Quang and Nakai-Nam Theun.
10. Enhanced coordination in policy and capacity strengthening
11. Use saola conservation model as a species conservation model
12. Commitment of relevant agencies and organizations

The link between poverty and saola conservation was made clear during this workshop, increasing the living standard of the local people in the buffer zone, and a more inclusive approach to conservation which encourages the participation of local people in nature conservation are vital next steps. The threat to the saola due to increasing hunting to supply urban markets was made clear. It was also made clear, that addressing the urban markets was as important as attempting to improve livelihoods around protected areas. Since many professional hunters and traders come from outside the immediate area, any amount of poverty relief in buffer zones will not affect the network supplying animals to the urban market.

The proposed actions were discussed further and developed into a ten-point action plan which is intended to form the draft outline of a conservation action plan for the saola in Vietnam. A synthesis of the conclusion of this session is presented at the beginning of this report, in the section entitled 'Workshop conclusion.'

CLOSING OF THE MEETING

The saola film, produced by WWF Indochina with financial support from the SFNC project in early 2004, was shown to the participants. The film is an informative and educational tool to raise awareness of the plight of the saola and has been shown on national television. [Copies are available from SNFC and WWF Indochina]

Participants agreed that the workshop was successful as a first step to achieving closer partnership between governments, institutions, organisations and individual scientific researchers. There is an urgent need to follow up on recommendations and actions agreed during this workshop. Effective saola conservation relies on the commitment of responsible government agencies to follow up on actions agreed during this workshop, particularly the development of a conservation aciton plan for Vietnam. WWF, SFNC project and other NGOs and donors are also called upon to assist this process.

CLOSING REMARKS BY SFNC PROJECT

Andrew Grieser Johns
(on behalf of Dinh Van Cuong and Andrew Weir, SFNC Co-directors)
SFNC Project
Nghe An, Vietnam

On the closing of the workshop we would like to make a few remarks concerning the extent of the problems that have been identified and the solutions proposed. These remarks are based on experience with the SFNC project, which was designed to address the central problem of how to protect forest resources in an environment whereby a reliance on forest products by local people was common, and commercialisation of forest products was on the increase.

The workshop has made many recommendations for increased forest protection, environmental education, and so on. Most of these have been tried already. By the end of 2004 the Government and the SFNC project will have invested US$ 23 million at the Pu Mat National Park (PMNP), with another US$ 6 million already approved under the PMNP Investment Plan. Most investment to date has been in rural development, aimed at reducing forest dependence by the buffer zone population, but substantial amounts have also been spent in improving forest protection and enforcement (increased guard patrols, zonation of totally protected areas), environmental education and dissemination. It is important to ask the question 'Is all this technical support and investment making a difference?'

The monitoring programme initiated at the PMNP in 2000 provides information to answer this question.

Firstly, if we look at trends in the number of people encountered by patrols in the core zone of the PMNP (Figure 1) we find that the number of illegal entries has not decreased significantly: data suggest that the same number of people are inside the PMNP engaged in illegal activities. These data are not conclusive, however, as a reduction in the number of people inside the forest might be masked by an increase in Guard efficiency in apprehending people over this time period.

Secondly, if we look at the extent of illegal activities recorded by direct and indirect evidence (Figure 2) we find that the incidence of illegal activities, although fluctuating, has not decreased significantly over the last four years of project investment. Of particular relevance is the lack of change in the incidence of hunting in the PMNP.

Figure 1. Trends in numbers of people found in the core zone.

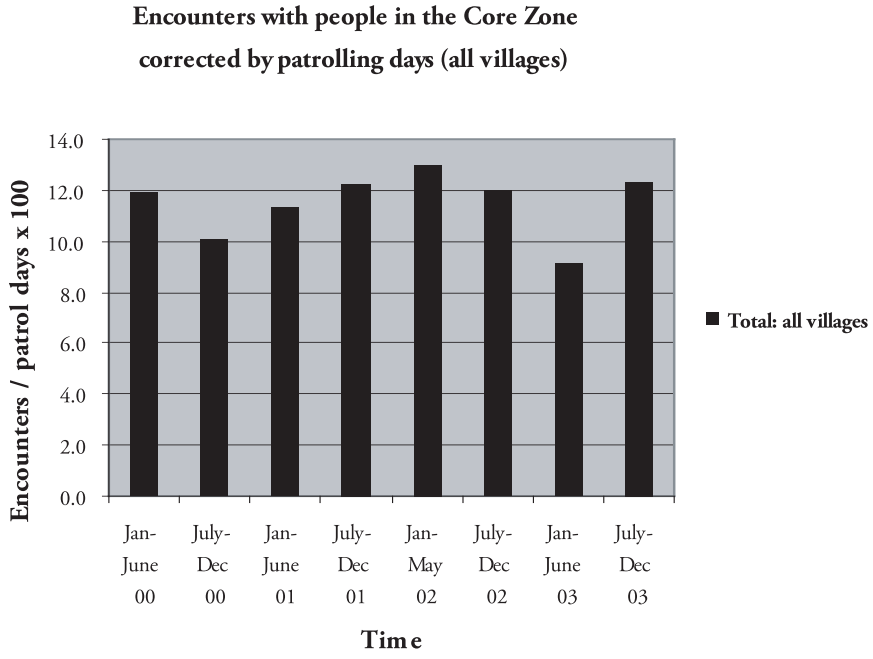
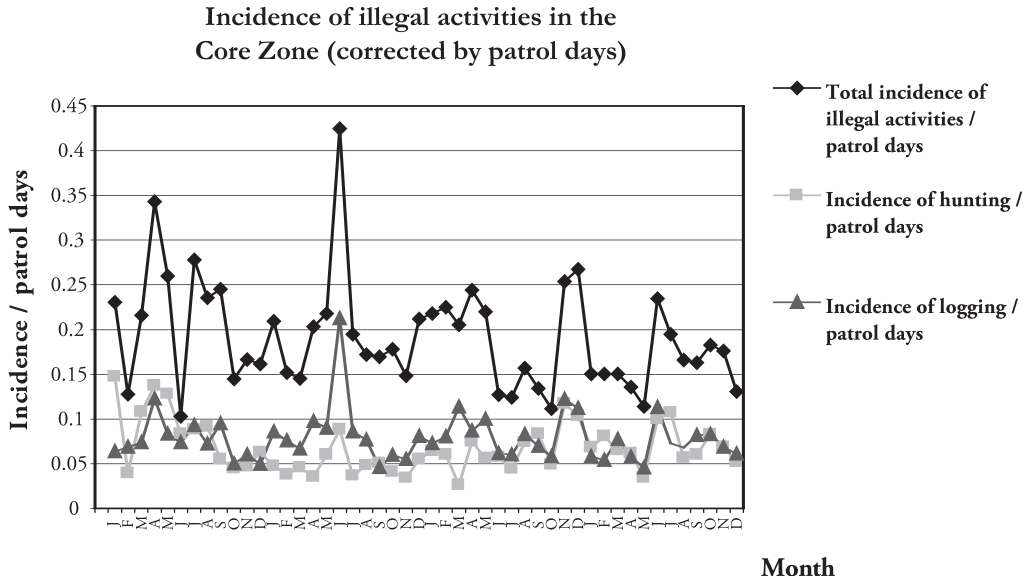


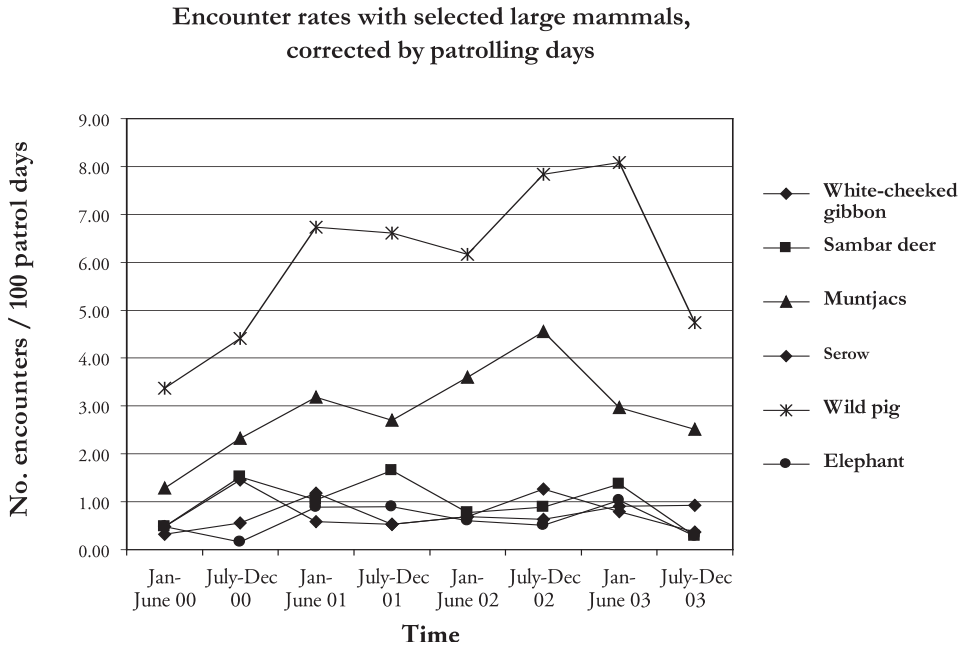
Figure 2. Illegal activities in the core zone of the PMNP (Jan 2000 – Dec 2003)



All the people and all the illegal activity in the PMNP is expected to result in a decrease in the populations of target timber trees and target animal populations. Encounter rates with selected key animal species (Figure 3) are somewhat ambiguous as they appear to indicate recovering animal populations, but this might equally reflect increased competence of the guard force in recording biodiversity.

There were insufficient encounters with saola to include these in the statistics. However, specific studies of the saola have indicated (as pointed out by the SFNC Co-directors at the beginning of the Workshop) that all the technical support and investment provided by the SFNC project and the best efforts of GOV partners has not resulted in protection of the population of the saola at the Pu Mat - which has declined by 50% during the time that all these investments were being made

Figure 3. Encounter rates with selected large mammals in the core zone



It would appear from this preliminary analysis that the large integrated rural development and conservation approach implemented by the SFNC project has been rather ineffective in protecting biodiversity in general, and the saola in particular, although it has helped improve rural livelihoods and income-generating possibilities among the buffer zone population. This is at least partly due to a lack of Government support for many interventions that could have been applied and were indeed recommended (closing wildlife restaurants, prosecuting sellers and buyers of saola trophies, etc.). In general, it reflects the lack of an enabling environment to implement improved conservation.

As we think about how to develop an Action Plan for conservation of the saola in Vietnam, we should perhaps consider that the large integrated project approach is not necessarily the answer. At the PMNP, large investments in rural development and improved livelihoods, law dissemination, environmental education, supporting the Guard force, and so on, has not resulted in improved conservation. Small-scale projects such as the village-run photo-trapping and conservation programme piloted in Laos and the conservation club approach piloted at Pu Huong may provide alternatives.

The experience of the SFNC project shows that it is of limited value to focus solely on rural populations, when what is needed is the creation of an enabling environment for improved conservation at all levels. Certainly getting the local people on the side of conservation is crucial, and we need to consider how this can best be achieved. But we also need the support of Government and Party to address other root cause of biodiversity depletion, such as the urban markets and the flourishing trade in wildlife.

In closing, the SFNC project thanks the participants for their efforts and hopes that the results of the workshop will help in focusing conservation action into effective channels. We look forward to the next saola workshop, perhaps in 10 years time, and hope that by that time we will be discussing whether to take the saola OFF of the critical list.

CLOSING SPEECH OF THE NGHE AN PEOPLE'S COMMITTEE

Hoang Nhat Quang
Deputy chief of the Administration Department
Nghe An People's Committee
Distinguished guests, Ladies and gentlemen,

During the two days of the workshop, with high sense of responsibility and serious attitude, the participants discussed various issues in details and contributed numerous important ideas regarding saola conservation. This is the first time an international workshop on the conservation of a large mammal has been held in Nghe An Province, and the Pu Mat National Park is very proud to be selected to host this significant workshop.

Ideas from the participants focus on finding specific and feasible measures and solutions to protect the rare and endangered saola from dangers and even from the threat of extinction. The provincial People's Committee has assigned the local district governments, relevant agencies and the Pu Mat National Park to take any measures to protect wild animals in general and the saola in particular.

At the workshop the People's Committee assigned the provincial FPD to instruct the Pu Mat National Park and the sub-FPDs in developing a specific action plan to conserve this species. The local government and the police of three districts should support the national park in the effort to confiscate all the hunting guns without a license in the area and mobilize the local people to turn in the hunting guns with licenses of use.

The sub-FPDs will have to follow the conventions for managing and protecting forests in the communities and monitoring and supervising the implementation of the village convention.

The provincial People's Committee hopes that after this workshop for reviewing the status and planning the conservation of the saola, relevant sectors and agencies will turn the workshop results into a specific and practical action plan to conserve this species. We also hope that local and international organizations and donors will support the national park in the effort to conserve and increase the saola population.

Attending this workshop, the provincial People's Committee would like to once again express our thanks to and acknowledgement of the valuable help of the EU in Hanoi, and of various ministries and agencies, government organizations and non-government organizations, donors, scientists, and media representatives. We particularly acknowledge and highly appreciate the special concern and support from the Communist Party Committee, the local governments and people in the three districts who have coordinated with the national park's management board in the protection and development of forest resources. We would like to thank WWF and the SFNC project for their initiative to organize the workshop in the Pu Mat National Park.

The Nghe An People's Committee hopes to continue to receive more valuable support from different agencies, organizations, and donors in the development of the park, and in protecting the forest and forest land of high biodiversity potential, and conserving the rare saola.

Thank you and I wish you all good health.

ANNEX 1: WORKSHOP AGENDA

Friday 27th February

Introduction, 8.30 to 9.00am

- Opening speeches by Pu Mat National Park, by the Nghe An provincial representative, by EU representative, and by FPD.
- Introduction of facilitators (James Hardcastle and Le Van Lanh) and lead team
- Introduction of key participants

Concluding remarks, 17.00pm to 17.30pm

Session 1: 9.00am to 12.00pm "The saola". Chairman, Mr. Tony Whitten

Time	Detail
9.00	**The saola – a brief history** *(Tony Whitten)* Why is it endemic? How was it discovered? The Annamite Ecoregion. Show several pictures and slides
9.20	**What do we know about the saola?** *(Facilitator)* Individually, fill in the interactive saola card, deciding questions on saola biology, status, habitat, diet and so forth. How do we know the information about the saola?
9.40	Coffee break
10.00	**Presentation 1: The saola** *(William Robichaud)* The ecology of the saola, diet, habitat, behaviour...how can we use this information for conservation? What are the information gaps?
10.30	**Questions and discussion on saola ecology** *(Chairman, then facilitator for questions)*
10.40	**Where do the saola remain?** *(Facilitator and groups, 4 Group coordinators)* Group work *(4 groups, for north Annamites VN, central Annamites VN, Sayphou Louang, Laos, and overall Truong Son area)*. Present large map of Annamites, and invite participants to place pins, and a population estimate, in the map – confirmed, unconfirmed.
11.10	**Presentation 2: saola distribution in Vietnam and Laos, questions and discussion** What we know, how we know it, and where we are guessing. Which are the most important sub-populations. How does distribution relate to ecology? Adjust map, discuss distribution and verify information and areas of information gap and research needs (*Mai Ky Vinh and Facilitators)*
11.30	**Questions and Discussion**
12.00	Lunch

Session 2: 14.00pm to 16.30pm "The Challenge". Chairman, Mr. Vu Van Dzung

Time	Detail
14.00	**Summary from Session 1 and lead in to Session 2:** *(Facilitator)* Why are saola hunted? are they targeted specifically? for trade? for food? if not, why are they threatened? What is the level of available information. Can we identify the root causes?
14.10	**Principle threats to the saola** *(Led by facilitors)* Group work (4 groups, geographic focus), using prepared charts, to list and prioritise threats & direct causes to saola populations
14.50	Coffee and prepare group presentation
15.15	Reconvene and introduce group presentations. Introduce reference list of available information on the saola. *(Chairman)*
15.20	**Group presentations and discussion** *(Facilitator and group reps)* A rep. from each group presents findings. Are findings different? are threats different in each location, or common across the range? Facilitation to summarise threats and issues. Chairman to comment
16.20	**Presentation 3: The IUCN endangered species classifications.** What are the criteria for 'endangered' and 'critically endangered'. What does this mean? *(Prof. Nigel Leader-Williams, DICE and Dr. Richard Estes, IUCN)*

16.40	**Discuss change on the IUCN status to 'critically endangered'** *(Chairman and facilitator)* Discussing a statement or proposal to present to IUCN specialist group.
17.00	**Closing Day 1**
17:20	**Premiere of VTV saola film** EU sponsored WWF/ VTV documentary of saola and threats, issues and opportunities across its range in Vietnam.

Saturday 28th February

Session 3: 9.00am to 11.30am "The Opportunities". Chairman, Nguyen Thanh Nhan, Director of PMNP

Time	Detail
9.00 (15)	**Opportunities for saola survival** *(Facilitators)* Brief brainstorm on opportunities that exist for saola conservation, such as enabling policy or positive action already underway
9.15	**Presentation 4: saola conservation in Thua-Thien Hue province** *(Hoang Ngoc Khanh, Hue FPD)*
	An overview of the activities, successes and constraints faced by the Hue FPD in saola research and conservation; and Q&A
9.45	**Presentation 5: saola conservation in Nghe An province** *(Dang Cong Oanh, Pu Mat NP)* An overview of the activities, successes and constraints faced by Pu Mat FPD and the Nghe An FPD, in saola research and conservation; and Q&A
10.15	**Presentation 6: saola conservation in Laos** *(Vongdeuane Vongsiharath, Lao PDR)* An overview of the saola Action Plan and the successes and constraints of saola conservation in Lao PDR; Q&A
10.45	*Coffee*
11.00	**Presentation 7: Status of the saola in Pu Huong Nature Reserve, Nghe An province and the potential for conservation** *(Cao Tien Trung, Vinh University)*
11.15	**Presentation 8: Results of a rapid saola situation analysis from Vietnam** *(Tham Ngoc Diep)*
11.30	**Discussion – key constraints to conservation action to date** *(Facilitator)*
11.45	**Further discussion on the IUCN status of the saola** *(Chairman)*
12.00	Lunch

Session 4: 14.00 am to 17.00pm "The Action". Mr. Nguyen Huu Dung, FPD

Time	Detail
14.00	**Overview of Session 4 activities and outputs** *(Facilitators: James Hardcastle and Le Van Lanh)*
14.05	**Presentation 7: A summary of views –** *(Tony Whitten)* Gaps in research, gaps in surveys, overview of key threats, summary of opportunities. Q&A.
14.25	**Action for the saola** *(Facilitators: Mike Baltzer and James Hardcastle)* 4 groups discuss effective conservation of the saola. Which are the most important areas/themes?
14.55	Coffee
15.15	**Towards an Action Plan for the saola** *(Facilitators, groups)* In each group, continue to develop more specific concepts for conservation action, detailing specific responsibilities and requirements.
15.30	**Presentation of group action planning** *(Group reps, facilitators)* with discussion on details.
16.30	**Prioritise action concepts,** and develop into specific, committed actions, in plenary. Results discussed until agreed upon. *(Chairman: Nguyen Huu Dung)*

- Measure meeting outputs against pre-set objectives and expectations (Facilitator)
- Closing speech, WWF
- Closing speech SFNC
- Closing speech and 'National Park Inauguration Ceremony' Pu Mat National Park
- Closing speech, EU commission, Vietnam
- Closing speech, Nghe An People's Committee representatives (district or provincial)

ANNEX 2 LIST OF PARTICIPANTS.

No.	Name	Position	Organisation
Pu Mat/SFNC			
1	Nguyen Thanh Nhan	Director	Pu Mat NP
2	Dang Cong Oanh	Deputy Director	Pu Mat NP
3	Nguyen Van Dien	Head of Planning & Finance Dept.	Pu Mat NP
4	Tran Xuan Cuong	Acting Head of Science Dept.	Pu Mat NP
5	Nguyen Tat Hoa	Forest Protection Station	Pu Mat NP
6	Nguyen Quoc Minh	Ecotourism Dept.	Pu Mat NP
7	Andrew Weir	Co-director	SFNC Project
8	Andrew Grieser Johns	Nature Conservation Advisor	SFNC Project
9	Dinh Van Cuong	Co-director	SFNC Project
10	Le Duy Thuong	Coordinator	SFNC Project
11	Phan Thi Minh Thu	Programme Officer	SFNC Project
12	Andrew Jacobs	Development Counsellor	Delegation of the European Commission to Vietnam
13	Mrs Y. Jacobs		Delegation of the European Commission to Vietnam
International			
14	Tony Whitten	Senior Biodiversity Specialist	World Bank
15	William Robichaud	Zoologist	
16	Rob Timmins	Zoologist	
17	Richard Estes	IUCN Species Survival Commission	IUCN
18	Nigel Leader-Williams	Professor	Durrell Institute of Conservation & Ecology, Dept. of Anthropology, University of Kent
19	Michael Hedemark	Conservationist	WildLife Conservation Society (WCS)
20	Ulrike Streicher	Conservationist and Veterinarian	Endangered Primate Rescure Centre, Cuc Phuong National Park
21	Mark Infield	Project Director	Pu Luong-Cuc Phuong Conservation Project, FFI
22	Nguyen Cong Minh	Biodiversity Support Officer	IUCN Vietnam
23	Le Trong Trai	Programme Officer	BirdLife International
24	Steven Swan	Project Manager	Hoang Lien Son Conservation Project, FFI
Lao PDR			
25	Veunevang Bouttalath	Deputy Director	Department of Forestry
26	Vongdueane Vongsihalath	Head Division of Forest Resource Conservation	Department of Forestry
27	Bounchanh Xayphanya	Deputy Director, Division of Forestry	Khammouane Province
28	Keovongdeuane Phanthanousy	Provincial Forestry Office	Bolikhamxay Province
29	Lene Loungvan-ang	Technical staff, Division of Forest Resource Conservation	Department of Forestry
30	Bounphiang Xayasensouk	Technical staff, Division of Forest Resource Conservation	Department of Forestry
31	Vonephasao	Technical staff	Science Technology Environment Agency
WWF			
32	Mike Baltzer	Conservation Director	WWF Indochina
33	Tran Minh Hien	Vietnam Country Director	WWF Indochina
34	Barney Long	MOSAIC Project Conservation Biologist	WWF Indochina

35	Nguyen Thi Dao	Truong Son Programme Manager	WWF Indochina
36	Mac Tuyet Nga	Truong Son Programme Officer	WWF Indochina
37	James Hardcastle	Programme Development Coordinator	WWF Indochina
38	Roland Eve	Lao Country Director	WWF Indochina
39	Mai Ky Vinh	GIS Officer	WWF Indochina
40	Minh Hoang	MOSAIC Project Biologist	WWF Indochina
Public Relation			
41	Kerin Stewart	PR Officer	
42	Hoang Thi Minh Hong	PR Officer	
National			
43	Nguyen Dao Ngoc Van	National Project Coordinator	TRAFFIC Southest Asia - Indochina
44	Nguyen Huu Dung	Head of Nature Conservation Division	FPD
45	Dang Huy Huynh	Zoologist	IEBR
46	Vu Van Dzung	Scientist	
47	Vu Ngoc Thanh	Zoologist	VN National University - Hanoi
48	Pham Mong Giao	Zoologist	
49	Nguyen Ngoc Chinh	Zoologist	
50	Le Xuan Canh	Vice director	IEBR
51	Pham Nhat	Zoologist	Xuan Mai University
52	Le Van Lanh	General Secretary	Vietnam NPs & NRs Association
53	Tham Ngoc Diep	Researcher	
Provincial			
54	Chu Van Dung	Deputy Director	FPD Nghe An
55	Nguyen Van Tu	Head of FP Management unit	FPD Nghe An
56	Ho Sy Luong	Deputy Director	FPD Nghe An
57	Nguyen The Trung	Chairman	Nghe An PPC
58	Nguyen Dinh Chi	Vice Chairman	Nghe An PPC
59	Thai Truyen	Deputy Director	Quang Nam FPD
60	Dang Dinh Nguyen	Head of Forest Protection Mgt.unit	Quang Nam FPD
61	Le Vu Phung	Ranger, Tay Giang Forest Protection station	Quang Nam FPD
62	Hoang Ngoc Khanh	Director	FPD Thua Thien Hue
63	Nguyen Van Tri Tin	Conservation officer	FPD Thua Thien Hue
64	Dang Vu Tru	Head of A Luoi District FPD	FPD Thua Thien Hue
65	Bui Ngoc Tu	Vice director	Quang Binh FPD
66	Phung Van bang	Head of Management Dept.	Quang Binh FPD
67	Cao Dang Viet	Head of Technical Dept.	Dakrong Nature Reserve
68	Le Thanh Tuyen	FP Mgt. Dept.	Quang Tri FPD
69	Ngo Tri Dung	Lecturer	Hue Agroforestry University
70	Nguyen Tat Dat	Lecturer	Hue Agroforestry University
71	Dao Thi Minh Chau	Lecturer	Vinh University
72	Hoang Xuan Quang	Lecturer	Vinh University
73	Nguyen Tien Trung	Lecturer	Vinh University
74	Ebbe Poulsen	Chief Technical Advisor	DANIDA Nghe An project
75	Joergen Korning	Wildlife Management Advisor	Danish Hunters Association
76	Nguyen Thanh Nham	Director	PuHuong NR
Media			
77	Mongkhon Vongsam-ang	Lao journalist	
78	Le Hanh	Journalist	Science&Life Newspaper
79	Viet Van	Journalist	Labour Newspaper
80	Que Dinh Nguyen	Journalist	People Newspaper
81	Vu Toan	Journalist	Youth Newspaper
82	Nguyet Hang	Journalist	Vietnam News Agency
83	Khanh Chi	Journalist	Vietnam News
84	Nguyen Van Khoa		VTV3
85	Representative		VTV Nghe An
86	Le Thanh Nga	Journalist	Le Courier du Vietnam

ANNEX 3
REPORT OF SURVEY ON SAOLA *PSEUDORYX NGHETINHENSIS.*

prepared by

Tham Ngoc Diep

Dang Thang Long

Do Tuoc

January, 2004

ACKNOWLEDGEMENT

The survey was carried out as an activity under the framework of the project 'Social Forestry and Nature Conservation in Nghe An province' funded by the European Commission.

The survey team is particularly grateful to WWF Indochina Programme for the support on desk research, consulting service and other technical advices.

We would like to thank Pu Mat NP, Vu Quang NP and FPD of Quang Binh, Thua Thien Hue and Quang Nam for their particular cooperation. We would like also to note our sincere thanks to staffs of district FPD who accompany and work with the team in the field.

Special thanks also go to James Hardcastle, Barney Long, Robert Timmins and Mike Baltzer for giving helpful commments on the draft of the report. The team would like to extend our thanks to Mr. Mai Ky Vinh at WWF who offered his generous help in preparing the map for the report.

Table of content

List of table

List of figures

I. Introduction to the survey

Since the discovery of saola *Pseudoryx nghetinhensis* in 1992 in Nghe Tinh province, efforts have been made to identify its distribution and to learn about its ecology and behavior, to in turn put in place effective conservation measures. It is found only in forests of the Annamite Chain (and some foothills) along the border of Lao PDR and Vietnam (Robichaud, 1997). In Vietnam, it is known to occurs from north of Ca river to northern Quang Nam province. However, the distribution of the species is fragmented and patchy. Densities of the species in its distribution areas are not known. Besides certain remarkable physical and behavioural characteristics, little is known about this species.

In December 2003, a research team of three members was commissioned to conduct a survey of human community. This study focused on areas where conservation activities are underway or planned. The aim of the survey was to:

- gather information from hunters and local communities to ascertain the current distribution and status of the species in areas of previously confirmed occurence
- collect additional anecdotal information on the saola's ecology and behavior
- identify threats to the survival of the saola within each area
- to make recommendations on threats to the survival of the saola in Vietnam, and on improved effectiveness of conservation activities and projects

I. 1. Surveyed sites

The surveyed communes and villages were selected base on the findings of previous surveys and consultations with specialists with prior experience in surveys on saola in each area. In general, the surveyed sites were chosen by the following criteria:

- Have high numbers of records of saola killed, verified by remains (horns, skulls, etc.)
- Prior, planned or ongoing conservation activities with a focus on saola

Some new villages were selected for survey during the field trip following new information obtained while visiting villages surveyed on previous project (see appendix 1).

I.2. Methodology

Villagers, including hunters, were interviewed. The interviewees included hunters with many years of experience, as well as younger hunters. Women and children were not in the target groups but they were also interviewed. Information obtained from various groups was cross-referenced.

Due to the need for simple communication tools and diverse cultural and linguistic background of the surveyed communities, semi-structured interview were employed as the most useful tool. The interviews were based on a prepared interview format (see appendix 2) but they were conducted in a flexible manner to create an open atmosphere, such that the interviewees, especially the hunters, felt free to talk about hunting practices and other extraction activities.

Attempts were also made to interview wildlife traders who were introduced to the team by villagers and hunters at certain sites.

To identify localities of saola reported, interviewees were asked to describe the location and to identify it on a map of the area. However, the points identified might not be accurate due to the unfamilarity of local people in using of map.

I.3. Limitations

Almost all local people, especially those living adjacent to protected areas, are aware that the saola is a rare and endangered species and that most hunting and collection practices are illegal, especially targeted at the saola. Thus, they might be cautious in giving information. Also, all records from local interviews are to be treated with caution, although they were corroborated where possible. Confusion over other animals and events may be common. For example, reports of saola tracks are to be taken as uncertain evidence, given the similarity between saola and serow tracks, for example.

In one case at Tung Quang village in Vu Quang NP, local people were not willing to cooperate with the interviewers. This may be due to the negative reaction following previous research activities, specifically by Vietnam TV. For instance, a neighbor of Mr. Dinh at Tung Quang village reported:

> I haven't seen saola for a long time because I haven't gone to the forest. All the people in this village haven't gone to the forest for a long time. If I know anything about this animal, I will not tell you. I won't get anything but the anger of the other people like the case of Mr. Dinh. He told the reporters from VTV that he and his son had caught a saola and then killed it for meat. The program was shown on TV, reporting that even a "respectable" teacher like Mr. Dinh had involved in hunting practices and had killed an endangered animal, so by default, other villagers are probably illegal hunters.

The scope of the survey was ambitious, while the availability of resources is limited (in terms of time, human, financial); the survey could only focus in certain areas where there were existing records of saola, and prior, present or planned conservation activities.

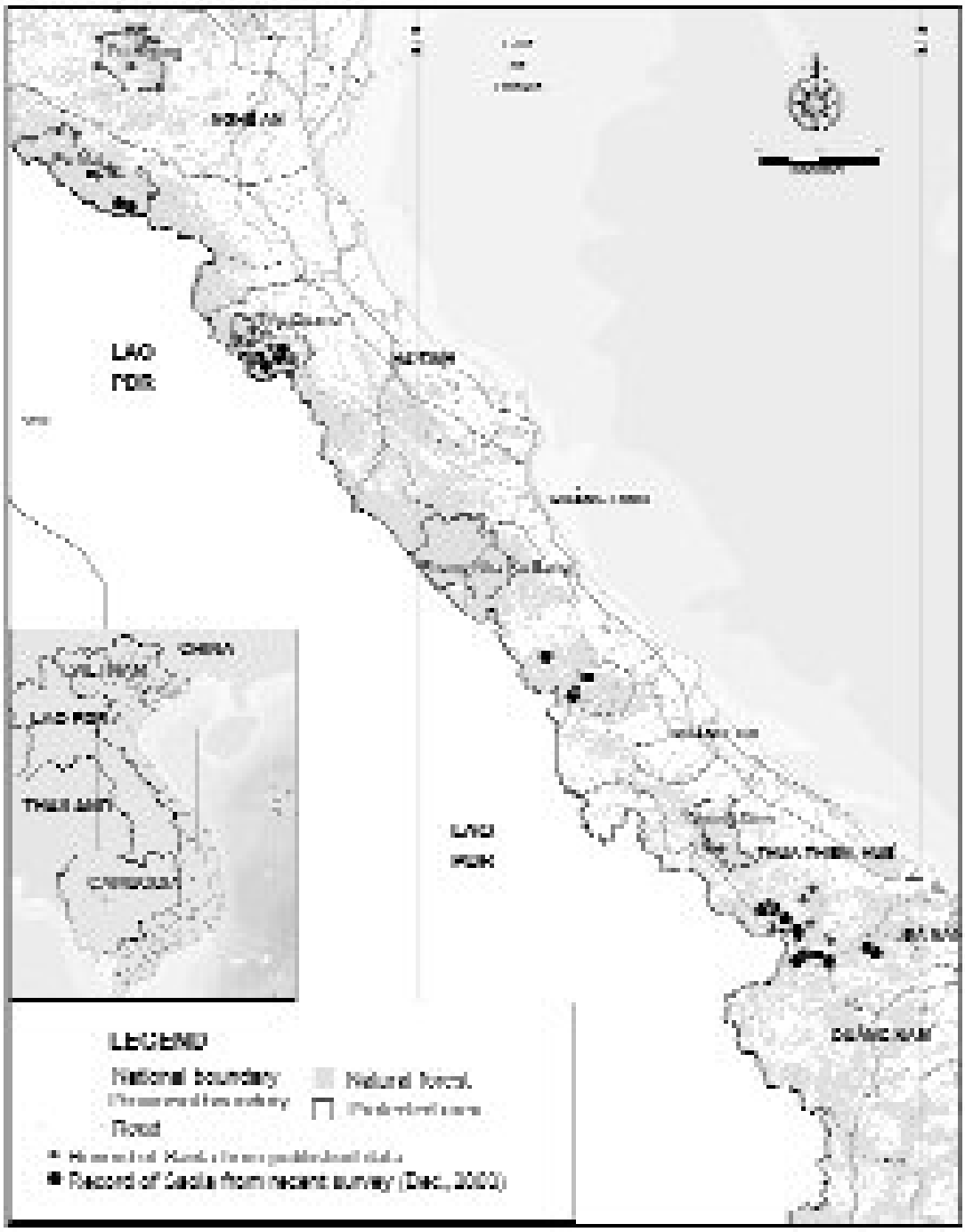
II. Main findings

II. 1. Recognition of saola distribution, abundance and specific threats

II.1.1. An overview of the distribution of saola in Vietnam

A synthesis of various data sources provides an approximate range for the current distribution of saola in Vietnam, that extents from the north of Ca river to northern Quang Nam province. The records of saola have been found as far north as about $19^{0}10'$N at Kham Muon commune in Que Phong district, Nghe An province (Nghe An PC, 1995a and Nghe An PC, 1995b) and as far south as $15^{0}50'$N at A Vuong and Lang communes in Tay Giang district, Quang Nam province (FPD Quang Nam Da Nang, 1996). However, the distribution of the species is fragmented and patchy. The original distribution of the species is uncertain. The sites where saola were recorded according to the available data are presented as red dots in figure 1.

Figure 1. Records of saola in surveyed areas



Data sources:

Pu Huong PA	Neville Kemp and Micheal Dilger, 1996
Pu Mat NP	FIPI, 1997
Vu Quang NP	Vu Van Dzung *et al.,* 1995.
Quang Binh province	Le Manh Hung *et al.,* 2002.
Thua Thien Hue province	FPD, 1997 , FPD, 1998 and FPD, 2000

Findings of this survey allow presenting more detail on the current saola range in Vietnam from the following sites: (current distribution of saola range are presented as black dots in figure 1):

- In Pu Mat NP, the presence of saola is predominantely to the southeast of the core zone.
- In Vu Quang NP, saola occurs mainly in the south and eastern parts of the core zone. Compared with the known range of previous records, the current distribution appears narrower. The most remarkable note is the absence of current saola records at certain localities in the north and western parts of the NP.
- The forests in the west of Quang Binh province, in the area adjacent to Vietnam/Lao border and the area adjoining to Quang Tri province has confirmed saola presence but the status of the species at these sites needs further evaluation.
- The current existence of saola is confirmed in A Roang and Huong Nguyen communes in A Luoi district in the southwest of Thua Thien Hue province. It may be an important current range of the saola since it has a relatively high number of recent records. There is also very high possibility of saola existence at Thuong Quang and Thuong Long in Nam Dong district.
- The contiguous area to the south of the above mentioned area also has current saola's existence. This area spreads over the north of Tay Giang district at Bhalee and A Vuong communes and north-western of Dong Giang district in Ta Lu and Song Kon communes (Figure 1).

II.1.2. saola distribution, abundance and specific threats in each surveyed area

Pu Mat National Park

Description of the survey sites

Pu Mat NP is in Nghe An province, and has confirmed records of saola (Anon, 2001). The two villages of Trung Huong and Trung Chinh in Yen Khe commune and Xieng village in Mon Son commune, were selected to be the focal survey sites. They are settlements adjacent to the core zone of Pu Mat NP and there were previously a number of saola specimens found (Do Tuoc pers comm.).

Local knowledge of the saola

Most of people in the area are Thai people and they call saola as Sáo lá (saola is the transcription of Sáo lá in Viet language). However, most of interviewees know the name saola since they have learnt about it through posters, TV programs and also through research and conservation activities carried out in the area. They are also well aware that the species is very rare and endangered.

Distribution of the saola

From the saola records obtained through the survey, there are several localities within the core zone of Pu Mat NP where there are prior and current records to confirm saola existence:

- In the area of Choang stream in the north of the NP, there used to have saola captured at its branch at the Chat stream. Locals report recent saola tracks at the locality.

- In the area of Toong Chinh, in the centre of the NP, there were a number of saola previously reported to be captured at its branch at the Kem streams. Recently however, there are no records of saola here.
- In the area of Khang stream in the east of the NP, there are records of saola at many branches of this main stream such as the Bong, Da Bet, Ca, Be, Cong, Tang streams, in which Bong stream seems to be the highest frequency of reporting. The photographs of saola taken by camera traps were also at Bong stream. However, recently saola tracks have only observed at Bong and Ca streams. They are most frequently observed at Bong stream and less frequently at Ca stream.
- In the area of Cao Veu, there are prior records of saola presence. The area reportedly had high density of saola (Dawson, 1995). However, there is currently no record of saola in the area.

In brief, there is no record of saola captured in the entire area recently but tracks of saola are still met at the localities of Chat, Bong, and Ca streams as reported by local people. According to recent survey conducted by Science Unit of Pu mat NP in July 2003, records of saola tracks were also observed in Bong, Chat and Yen streams. Thus, the areas of Chat stream and Khang stream (the main stream of Bong and Ca) in the south and eastern parts of Pu Mat NP may still have saola (Figure 2).

Changes in population size

Together with the absence of records of tracks observed in certain localities recently, all interviewees confirmed that there is a reduction of saola in the area.

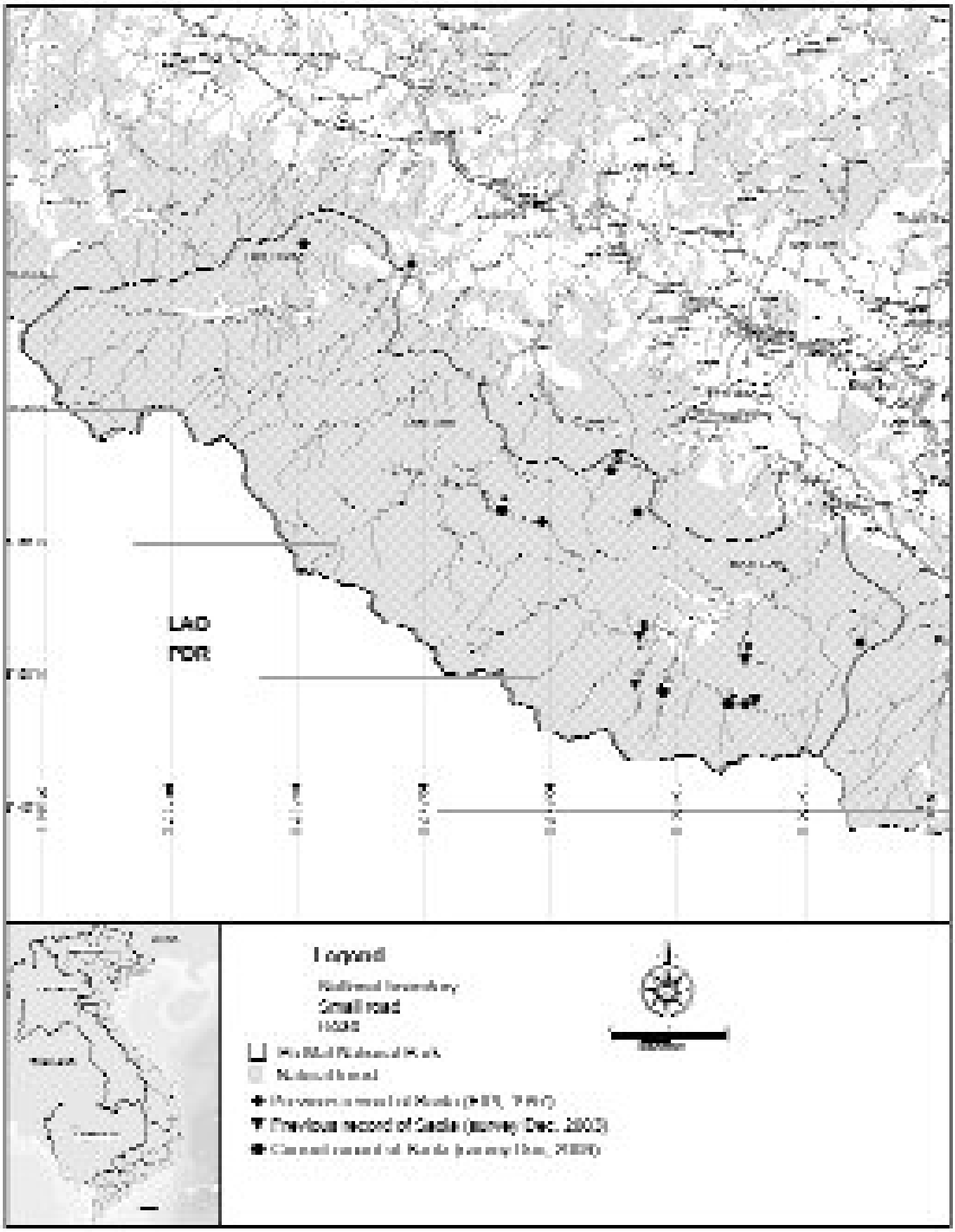
Specific current threats in the area

Currently, the most severe threat to saola in the area is hunting practice. Although saola is not an object of intensive hunting because of its low economic value, it is still under threat because it share habitat with other wild animals of higher values such as bear, wild pig, muntjac, sambar, porcupine, gecko, and so on. Bear seem to be the most wanted species by the local people. And thus it gets caught in the same traps.

There is still a high proportion of households dependent largely on the forest, using a variety of hunting practices. The fact is that hunting brings added income to many households. From information taken from the survey, the average income of a household from all activities (except for hunting) is about 11.000.000 VND/year. An experience hunter can reportedly get about 500.000-700.000 VND for a period of 10-15 days in the forest. Thus, a family which has more than 2 men in the age of 16-55 may get more than 2 million VND/year if they go to the forest one time a month during the main winter hunting season. At each village, there are some traders, who in fact are the people who equip and organize the hunting teams, providing food and advances to hunters, and then buy wildlife products from them at reduced rates.

Example of wildlife product price in Mon Son commune:	
Dry meat of saola:	30.000 VND/ kg
A pair of saola horns:	700.000 - 800.000 VND
Wild pig:	" 40.000 VND/ kg
Small bear ("10kg):	30.000.000VND
Gall ("3 kg):	5.000.000 VND

Figure 2: Records of saola in Pu Mat National Park



Furthermore, a number of 'outsider' hunters also exploit the area. They reportedly practice hunting more intensively and the techniques used are more developed. Hunting itself can hardly be controlled, especially for outsiders, since there are plenty of paths in the forest to evade the authorities and to transport hunting products. Enforcement needs to be revitalized and efficiently coordinated, working with the communities where possible.

Vu Quang National Park

Description of the survey sites:

Three villages, Tung Quang, Kim Tho and Kim Quang, in Vu Quang commune, located in the buffer zone of Vu Quang NP were selected as survey sites. These are the nearest human settlement areas adjacent to confirmed saola occurence. The first standard samples of saola horns were also found in this area. In 1993-1994, 30 individuals were captured in this area (Dawson, 1995).

Local knowledge of the saola

Local people used to call saola the 'longhorn goat' (de sung dai) or 'forest goat' (son duong). They can describe in good detail the appearance of saola and distinguish unmistakably between saola and serow. Local people here have a comparatively good knowledge of saola behavior and ecology compared to other surveyed sites. Since the discovery of saola as a species new to science, a number of research and conservation activities have been undertaken in the area, and villagers knew the name saola since then. People are well aware that the species is rare and of interest of Vietnam and foreign scientists.

Distribution of the saola

From the saola records obtained through the survey, it can be concluded:

In the area northwest of the NP, where there were a number of records of saola captured at Trap and Chi Loi streams, there are no recent records. According to local people, saola may have been extripated from these localities due to intensive hunting practices.

In the area in the south of the NP, there are records of saola captured in the past as well as tracks observed recently, especially at localities such as Rat, Ngay and Dau Rong streams.

The area in the eastern part of NP, the bordering area between Vu Quang and Hoa Hai communes, there are frequent reports of saola tracks. In the area, there are two localities with many saola records from previous studies: the Dieu Tra stream and the old 'saola station'.

Saola horns kept by Mr. Huu at Kim Tho village

It is apparent that the saola may still occur in the south and eastern parts of the NP. Vu Van Dung *et al.,* (1995) also reported the localities from where saola was recorded. The survey failed to obtain current saola records at certain localities in the north and northwestern parts of the NP, from where they were previously recorded. (Figure 3 – records of saola in Vu Quang NP)

Changes in population size

Although this survey may not be comprehensive, the number of records of individuals captured in the past is remarkable. Recently, the reduction of localities with tracks observed suggests a reduction in species population. All interviewees suggested that the number of saola has decreased over the past ten years.

Specific current threats to the species in the area

The major threat to the saola in Vu Quang is hunting practice. There is still a high proportion of households engaged in hunting. The reduction and possible extripation of saola at Trap and Chi Loi streams would be due to hunting activities. These localities are in the hunting area of people from Kim Quang and Kim Tho (also known as Co village) villages. Hunting is still occurring at all the other reported localities of saola existence.

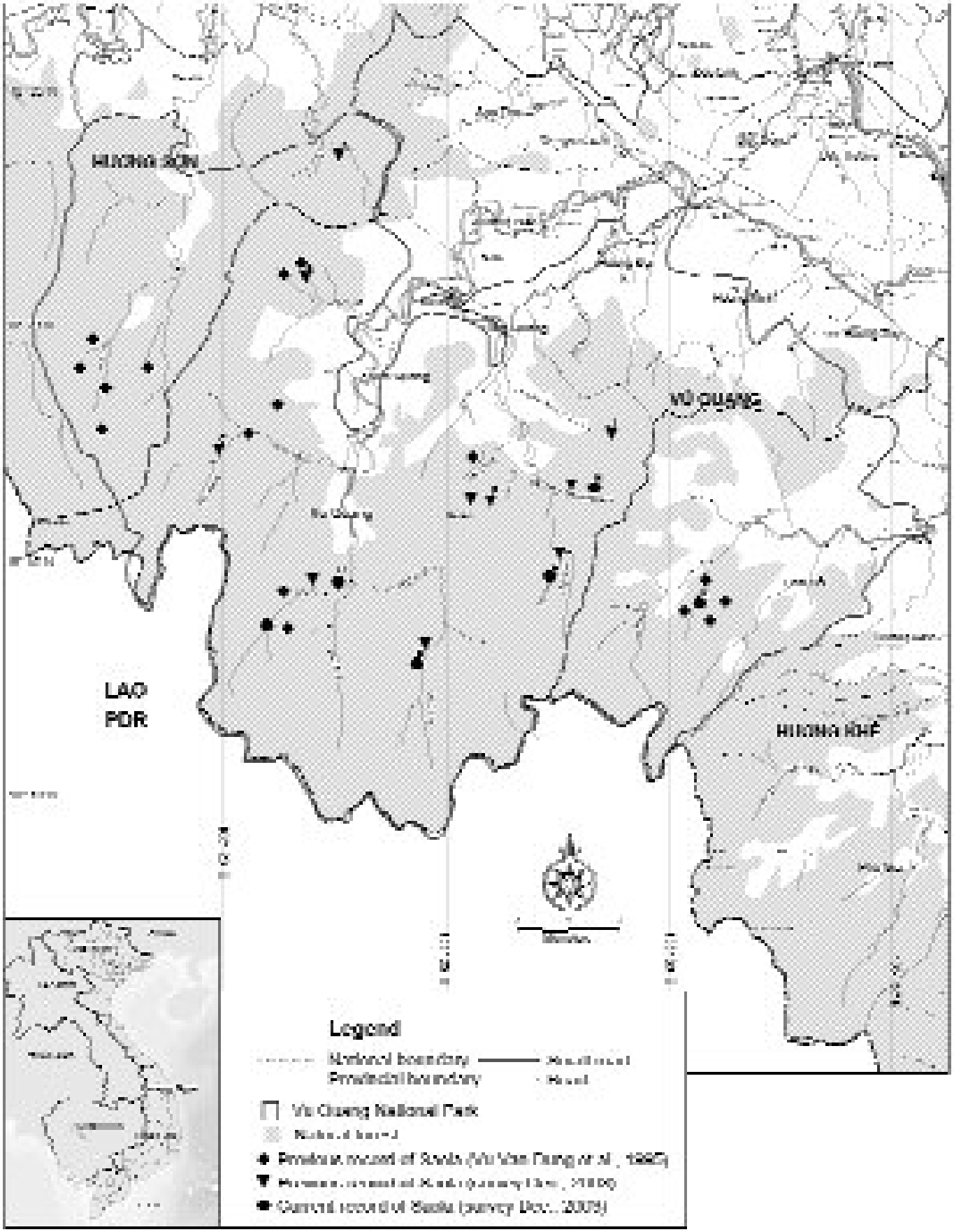
Hunting methods employed include snaring during the rainy season from Dec to Apr and using of dogs during dry season from May to Sep.

Interestingly, there are very few reports of 'outside' hunters made by local people and trading seems less developed (no clear evidence of wildlife traders based at village level).

It was noted that certain hunters are interested in hunting live saola. They were previously encouraged by the thought that they would earn a large sum of money if they could captured a live saola because many scientists want to know and to see the saola. Although this is no longer the case, it remains a potential threat.

Varied collection activities for forest products also occur in the area, but there is no clear evidence of their impacts on the survival of the species found, other than human disturbance in the forest.

Figure 3: Records of saola in Vu Quang National Park



South –western part of Quang Binh province

Description of the survey sites

Kim Thuy commune in Le Thuy district and Truong Son commune in Quang Ninh district were selected as survey sites since there are records of saola captured recently (Le Manh Hung *et al.,* 2002).

Saola horns (individuals caught in 2001) kept by Mr. Vo Van Ngoc at Lien Son village, Truong Son commune

Local knowledge of saola

Most of people in surveyed areas are of Bru-Van Kieu ethnic group. The saola is called 'Lagiang' in Van Kieu. The local people seemed generally unfamiliar with the saola. Very few hunters and old people have caught saola. Other local people are only familiar with saola because they have seen horn but many people have not even seen the horns or learnt about the species from some rare pairs of horns. When villagers and hunters were shown the photographs of a small saola, nobody recognized it, but a few recognized pictures of an adult.

Distribution of saola

In Le Thuy commune, the survey team obtained three records of saola captured in the area of Nuoc Trong stream, Thu Lu stream and the peak 1001 in the bordering area between Quang Binh and Quang Tri province.

In Truong Son commune, Quang Ninh district, although the number of samples of saola horns is more abundant, most of them were reportedly taken from Lao and in the border area. A couple of records of saola captured are at Lo O peak.

A great surprise is that these captures all occurred recently (in the past 5 years). The absence of records of saola in the past and also the unfamiliarity of local people with the species pose a big question. Part of the explaination appears to be that hunters are going further to hunt and that the number of hunters and the number of traps used is increasing. (Figure 4)

Changes in population size

The population of saola species may be of very low density in the area since there are few records. It's hard to give any conclusion of the abundance or changes in population size in the area.

Specific threats to the species in the area.

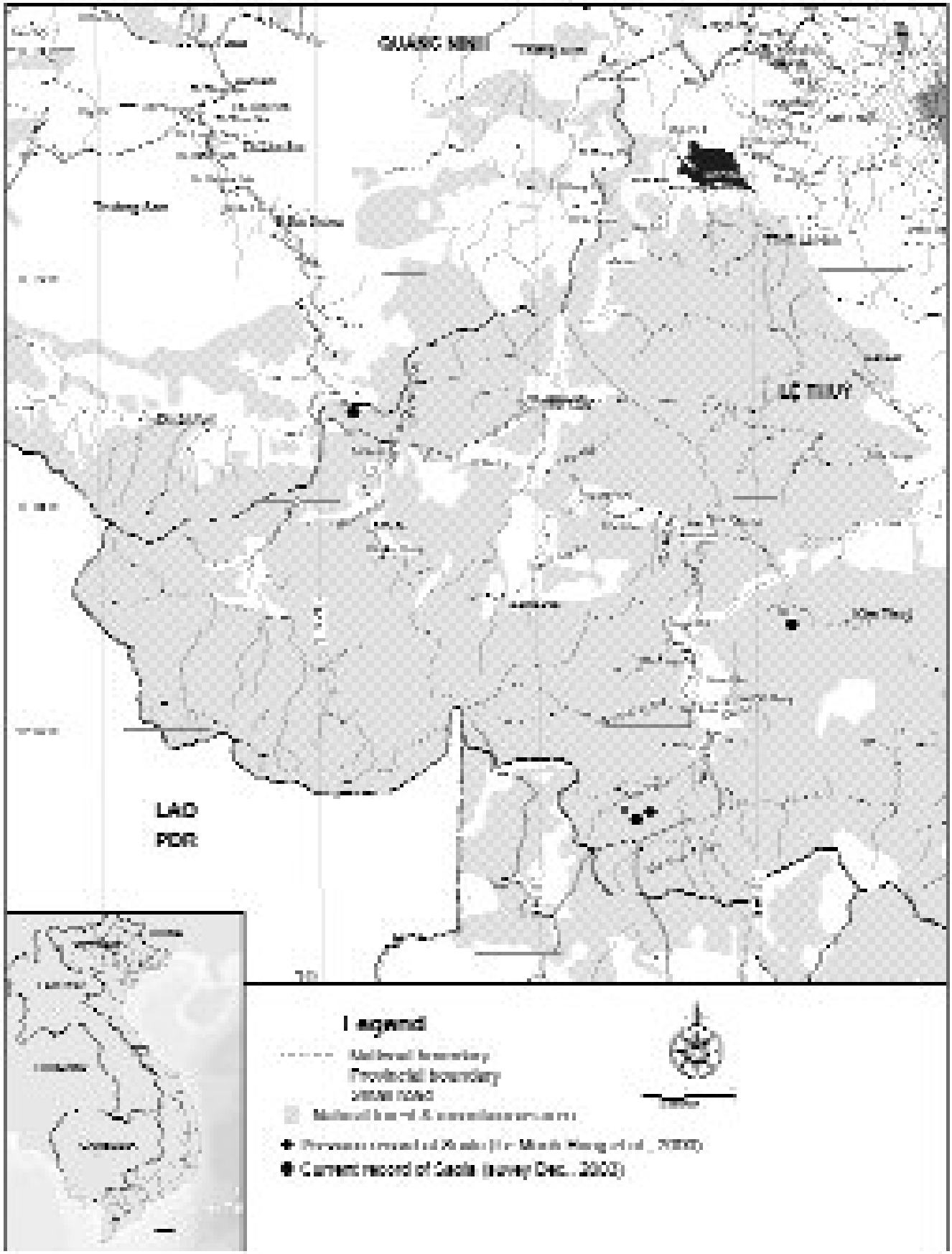
The Ho Chi Minh highway goes through the area of both Kim Thuy and Truong Son communes (figure 4). Road construction certainly posed impacts on wildlife (not exclusive to the saola) such as habitat fragmentation, forest degradation and other

disturbance caused by human encroachment, facilitation of hunting and logging.

This is the area of rich natural forest and besides logging conducted by the Truong Son SFE, there are also illegal logging activities carried out by local people and outsiders. Selective logging of Mun *Diospyros spp* and Hue *Dalbergia rimosa* occurs intensively in Truong Son commune. This kind of exploitation may lead to the change in forest structure and bring about habitat changes. Animals may be hunted for food by the people involved in these logging activities.

Hunting is still a severe threat. For most of the Van Kieu ethnic people in the area, hunting is the main activity. A proportion of Kinh residents and outside hunters also use the area and their hunting practices are more intensive and methods more diverse. The numbers of hunters has been increasing since the late 1990s but especially since construction of the Ho Chi Minh high way. The Van Kieu hunters have also somewhat increased their hunting activities. For both groups, snares are most popular, used in the months of Dec-Apr. During the months of May-Aug, dogs also are used in hunting but less than before and in the other place. Hunting mainly takes place in the border area between Vietnam and Lao and may encroach deep into Lao's territory because there is more wildlife in the area.

Figure 4: Records of saola in the South-west Quang Binh province



A Luoi district, Thua Thien Hue province

Description of the survey sites

The surveyed area is in the south of A Luoi district, Thua Thien Hue province. A Dot and A Roang communes were the focus of the survey since they encompass the area described as the appropriate habitat for saola and has the highest records of saola captured (FPD, 1997 and FPD, 1998). People originally in Huong Nguyen commune were surveyed in Hong Ha commune.

Local knowledge of the saola

Most of the people at the surveyed communes are Ta Oi and Ca Tu people. The Ta Oi people call saola as A Ngao and the Ca Tu people call saola as Xoong Xor. They can make correct description and distinguish between saola and serow. The knowledge of locals on saola's behavior is rather good. A large proportion of interviewees know the name saola since there were certain surveys and communication activities undertaken in the area. People are also well aware that the species is rare and it is illegal to catch them.

Distribution of saola

saola reportedly lives in the upper headwater forests of Bo and Huong rivers:

- In the area of Huong Lam commune, recent records of saola reported at Pa Ong and Pam Mrung streams.
- In the area of A Roang coomune, there are both prior and recent records of saola at Trung and Sap streams, close to adjoining area between A Roang and Huong Lam commune
- In the area of Huong Nguyen communes, there are many records of saola captured both in the past and recently. The localities with recently high number of saola captured and tracks observed frequently are Ta Lai, Cha Linh, A Du, A Par streams (Figure 5).
- Local people also claimed the existence of saola in the headwater forests of the Huong river spreading over the area of Thuong Quang and Thuong Long communes, Nam Dong district. saola used to be recorded in the area of Mu Nu in Thuong Quang commune (FPD TTH, 1998).

In brief, the current existence of saola is confirmed in A Roang and Huong Nguyen communes in A Luoi district, southwest of Thua Thien Hue province. It should be noted that the area may be an important current range of saola since it has relatively many recent records of saola recently. There is also very high possibility of saola existence at Thuong Quang and Thuong Long in Nam Dong district.

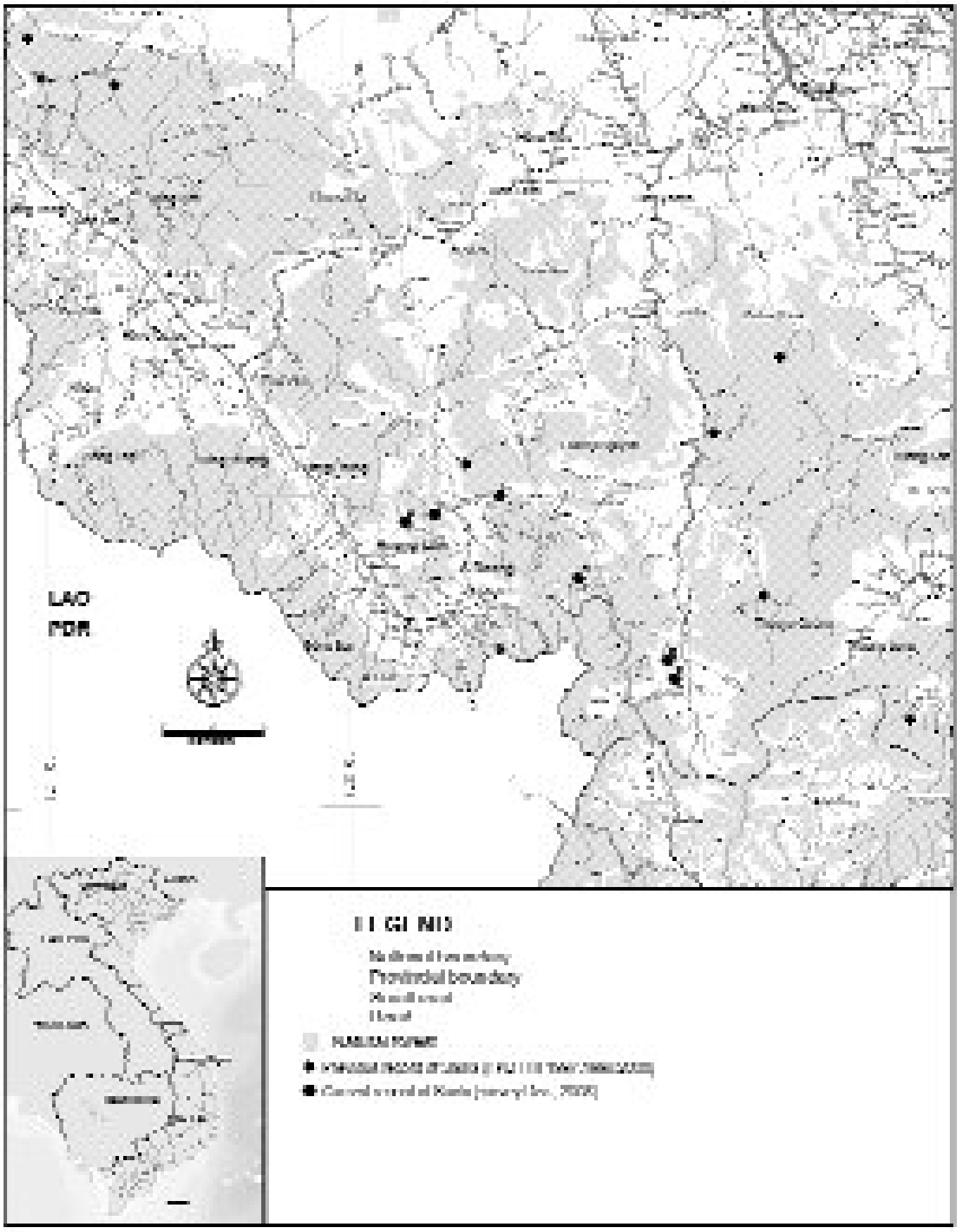
Changes in population size.

Records on the presence of saola and the number of individuals captured in the past as well as at present are all relatively high. The area is assessed to have rather significant quantity of saola at least to the present. However, most of interviewees confirmed that the number of saola is reduced compared with ten years ago.

Specific threats to the species in the area.

The Ho Chi Minh highway goes through the forest area of A Roang commune in A Luoi district, an area with many current and prior saola records. This will cause the fragmentation of the species habitat and the direct and indirect influences of road

Figure 5: Records of saola in the South-west Thua Thien Hue province



construction, and other human activities related to the opening of a new access route may cause more degradation of the saola's habitat and survival chances.

Hunting is the most significant threat to saola in the area. A large proportion of households involve in hunting activities. There is no information on the significant of hunting contribution to household's income. saola is not a specific object of hunting. The records of saola captured obtained through the survey, together with the records of 23 saola captured in A Luoi and Nam Dong during the years 1994-1996 (FPD Thua Thien Hue, 1997) shows that it has high possibility of being caught incidentally.

The Ca Tu people use a small trap[3] for hunting, possibly to target turtles. This kind of trap seems to be less effective and can only catch small animal like mouse and civet, etc. It does not pose a threat to saola. However, foot snares were introduced in the area in the past 7-8 years. Snaring is also practiced in the months of Dec-Apr during the rainy season. From May to Aug, during the dry season, people go to the forest with dogs, mainly to hunt turtles and some other small animals.

North and north-western part of Quang Nam province

Description of the survey sites

saola has been found in the northern and north-western part of Quang Nam – Da Nang province (FPD Quang Nam – Da Nang, 1996). Thus, Lang, A Tieng, Bhalee and A Vuong communes in Tay Giang district and Ta Lu commune in Dong Giang district were selected as the surveyed sites. The area has a large area of ever-green forest contiguous to the distribution area of saola in the south of Thua Thien Hue province. During the trip, the survey team saw several samples of saola horns taken from Song Kon commune in Dong Giang district, therefore Song Kon commune was also surveyed.

Local knowledge of the saola

Most of the people in the surveyed communes are Ca Tu people, and they call the saola 'Xoong Xor'. They can make correct description and distinguish between saola and Serow. The knowledge of locals on saola's behavior is rather good.

Distribution of saola

From the records obtained through the surveyed (appendix 3), it can be concluded that:

- In the area of Lang and A Tieng communes, in Tay Giang district there is no current evidence of saola though there are records of saola captured in the past.
- In the area of A Nong commune in Tay Giang district, there are reports that saola has been caught recently, but due to the bad access conditions, the survey team couldn't go there.
- In the area of Bhalee commune in Tay Giang district, there are relatively many reports of saola, most of them recent (in the last five years). The local area of saola distribution appears to include Tep stream (mainly at its branches that local people call Mxee and Prua, but due to the limitation in time and maps, the survey team could not find these location according to the description of the local people) and at small streams in the area of Ta Lang mountain.
- In the area of A Vuong and Ta Lu communes in Tay Giang and Dong Giang districts respectively, saola reportedly occur at small streams in the headwaters of M'Bon stream and Ta Moi stream (the border area between A Vuong and Ta Lu commune).

[3] Trap is made of tree branches and rock. It is set on the path of animals such that when an animal runs through the trap, it will hit the tree branch used to prop the rock and the rock will fall upon the animal.

- In the area of Song Kon commune in Dong Giang district, there are records of saola in the area of Ma Lu and Ta Vac streams. It should be noted that records of saola captured in Song Kon commune are very recent[4].

In brief, the current existence of saola occurs in the area north of Tay Giang district at Bhalee and A Vuong communes, and possibly south into Lang commune, and north-western Dong Giang district at Ta Lu and Song Kon communes. The forest between eastrn Bhalee, A'Vuong, Ta Lu and Song Kon is contiguous from the Ho Chi Minh highway and A'Vuong river, which cuts through Bhalee and A'Vuong communes. The specific localities of saola records include small branches in headwater forests of Tep, M'Bon, Ta Moi, Ma Lu and Ta Vac streams. The area of A Nong is also a potential saola site.(Figure 6)

Changes in population size

Records on the presence of saola and the number of individuals captured recently are relatively high compared to other areas visited in the survey. However, as reported by local people, the change in population size is not clear.

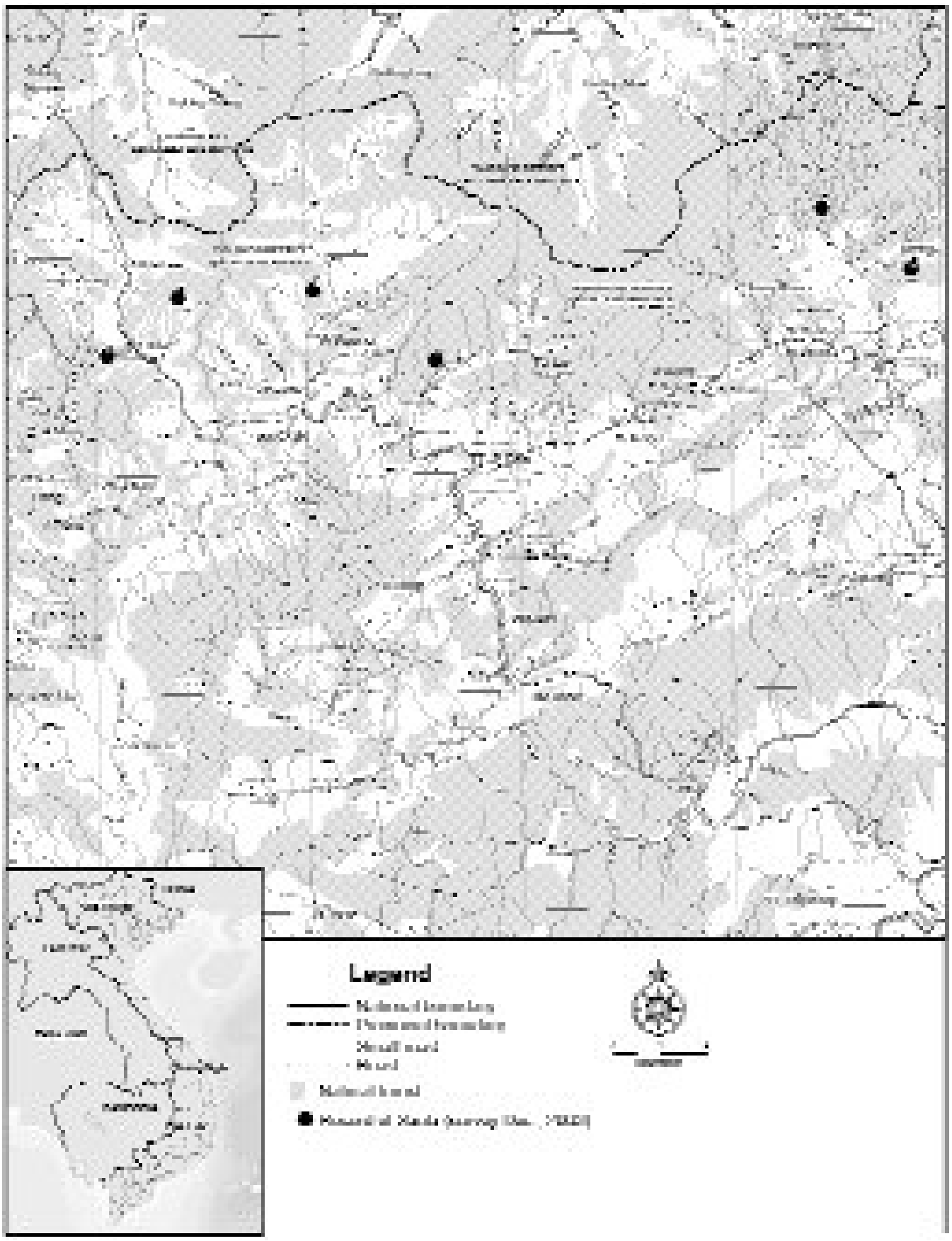
Specific threats to the species in the area

The newly constructed Ho Chi Minh road goes through the areas of A Vuong and Bhalee communes. Certain localities of saola records are located adjacent to the road. It can be deduced that the construction of this road has caused disturbance of saola habitat. A new road from Dong Giang to Tay Giang is under construction that will cut through further saola forest habitat. Other impacts on the saola related to road construction, including noise disturbance, and encroachment of human activities, may also occur.

saola is mainly threatened by hunting practice in the area. Hunting is carried out by most households in the surveyed villages, since it provides an alternative source of food. Hunting products are also sold, but only occasionally. saola appears to be mostly caught by local people incidentally. There are also few records of outside hunters. Traditional hunting methods using traps are reportedly used less, foot-snares are ever growing, yet it is unclear if new techniques and technologies are employed. It is reported that the local people use dogs less frequently for hunting in the forest.

[4] According to local hunters, only with the use of foot snare, saola is captured. It is not easy to kill saola by gun since they run very fast and they can sense very well the appearance of people and other animals. Foot snare is introduced to Ca Tu ethnic people in the area recently

Figure 6: Records of saola in the North-west Quang Nam province



II. 2. Notes of behavior and ecology of saola

Some notes on saola behavior and ecology were gathered from hunters, described below:

Habitat: saola reportedly lives in the "old forests" (closed canopy forests) on steep soil mountains (but not the limestone). Most records of saola captured, or its tracks, are from the upper reaches of forested rocky streams, with the slope of more than 35^0. Records of the location of individuals captured are never at the altitude of more than 1,000m. It appears that the saola only lives in the relatively undisturbed forest habitats.

Its tracks left on ground and marks on nearby plants show that its feeding grounds are the areas nearby streams with high humidity where have at least some of its preferred plants like Thien nien kien *Homalomena oramatica,* mon thuc *Aglanomena pierrei* and me chua dat *Oxalis corniculata.*

Not many people know about its shelter since it is difficult to encounter the species in the wild. According to certain old hunters it doesn't live in big caves but only small rocky hollows that can only fit it.

Feeding: From brief research with captured saola, and some correlation to initial field evidence, the species may prefer to eat broad-leaf plants which rich in white sap such as thien nien kien *Homalomena oramatica* and mon thuc *Aglanomena pierrei*, as well as plants with a 'sour' taste such as me chua dat *Oxalis corniculata*. It can also eat chuoi rung *Musa uranoscopos*. It appears to eat only the leaves. saola appears to use mineral salt like other grass-feeding animals.

Active time: saola appears to eat at any time during the day (perhaps because no observation has been made at night), but a certain proportion of hunters emphasized that it eats more frequently in the early morning and in the late afternoon during the sunny periods, while during the gloomy or rainy days its eating time is more varied.

Social structure: According to hunters who have encountered or killed them, the saola is solitary. There are also records of a couple of a mature female with young sighted in the wild, most frequently in June. It is suggested that young saola of about 40kg is still accompanied by their mother.

Breeding: Most of the records of captured pregnant happened in the months of Dec to Mar. Most records of juveniles captured in July. However, there were reported cases outside these dates.

Table 1: Records of pregnant individuals captured

Time	Description of pregnant and foetus	Location	Source
Feb 1980	foetus with hair	Pu Mat NP	Appendix 1 (initalic)
Mar 1983	foetus with hair, close to be born	Vu Quang NP	
Dec 1987	foetus of 30 cm in length, with hair	Pu Mat NP	
Nov 1989	foetus without hair	Vu Quang NP	
Dec 1992	foetus without hair	Vu Quang NP	
May 1998	Pregnant of 75-80 kg, pregnant is released after capture, no information of foetus	A Roang commune, Thua Thien Hue	

Table 2: Records of juveniles captured

Time	Description of small individuals	Location	Source
Mar (before 1990)	male of 12 kg without horns	Vu Quang NP	Appendix 1 (in italic)
Jul (before 1990)	25 kg, horns of 7-10 cm	Vu Quang NP	
Jul 1989	20 kg, horns of 6-7 cm	Trap stream, Vu Quang NP	
Jul 1992	15kg	in Lao, the area close to Pu Mat NP	
Jul 1994	raised 1 juvenile of less than 25kg	Kim Tho village, Vu Quang commune, Vu Quang NP	
Jul 1998	without horn	the area between A Vuong and Ta Lu communes, Quang Nam province	
Jul 1998	20 kg,	Rat stream, Vu Quang NP	
Jul 2003	a new-born saola, still have umbilical cord	Thua Thien Hue province	

Relation prey-predator: Dhole and tiger, possibly leopard, are among the natural predators of the saola.

Defensive-aggressive action: As reported by hunters, the only case of defensive action by the saola is against dogs. When it is chased by dogs, it runs and looks for a stream to plunge into the water. When it runs, its glands swell up and it snorts. It stands on the middle of the stream with the water level at its chest and faces the dog. It drops its head, pulls its muzzle toward its forelegs and uses its horns strikes against dog. saola seems to ignore the presence of humans when there are dogs nearby.

Vocalisation: None of the interviewees has ever heard saola call or make any noise.

III. Conclusions and recommendations

Vietnam saola exists in small areas often with little connectivity. It appears to be currently suffering a reduced distribution. Further, it is assumed that the densities of saola in their ranges are also reduced, compared with the time of its discovery, ten years ago (though at that time, the population of saola was estimated to be very small indeed). The threats to the species, especially hunting, have not been adequately controlled, especially in areas where specific conservation activities and projects have been operating, including protected areas. Thus, an overall conservation action plan for the species is needed, as there are currently no adequate saola conservation activities underway. Following is some recommendations of the actions needed to undertake immediately.

- Conduct specific surveys to understand more about population and status, and form the basis for direct conservation action
- After status surveys, consider opportunities for establishment of species and habitat conservation areas in the sites with significant populations currently outside of PAs;
- Develop and implement programs for conservation and monitoring of the saola population. Special attention should be made to the participation of local people, in tandem with wider conservation action. Despite the threats from habitat loss, infrastructure development and incidental catch by professional hunters, there is still a strong threat from local hunting and resource management practices, particularly trapping and snaring. Focuses attention on enforcement action in each province and protected area where there are remaining saola populations.

Equipment, training, manpower and incentives, partnerships and awareness-raising are essential. Current enforcement action is casual at best, and generally ineffective in all areas where saola occur. The most urgent need is for trap regulation in key saola areas, such as a ban on all trapping within locally zoned areas, and controlled trapping in other, lesser priority areas, such as around villages.

- Conservation resources need to be focused on the saola. Incidental 'species conservation' work has proved ineffective for saola conservation in all sites where such activities have been ongoing.
- Ex situ conservation of the species should be considered, but only as an emergency measure. Sufficient knowledge on the species' requirements is needed before any action should be initiated, and an expert feasibility study should precede any plans for captive breeding of saola. However, basic training and facilities should be established in the emergency case of a confiscated / captive live saola.
- Networks and partnerships should be established, with a database or information centre for all records and information related to the saola. It would be advisable for FPD or other agency to identify saola experts both nationally and locally to lead and coordinate saola conservation activities
- Further research into saola behavior and ecology should be linked to conservation activities at site level. Links to academic institutions should be encouraged, and research should be coordinated and mutually constructive.
- saola awareness-raising campaigns should be comprehensive, encompassing and very well designed and executed. There will be a trade-off in increased awareness and value in the saola, and motivated action, against a rise in the trade and demand for saola (or parts such as their horns) for curiosity and novelty value, as has been highlighted previously in Vu Quang.
- A comprehensive, yet practical saola action plan should be developed to include and Laos, with support and expertise in the design by all local and provincial stakeholders, and national and international expertise.

REFERENCE

DAWSON, S. 1995. saola *Pseudoryx nghetinhensis* studies in Nghe An and Ha Tinh Provinces, Vietnam. Unpublished report, World Wide Fund for Nature - Indochina Programme, National Wildlife Federation and World Conservation Union, Hanoi.

FIPI, 1997. Project on conservation and development of rare animals in Vietnam (in Vietnamese)

FPD Quang Nam, 1996. Results of preliminary survey on the saola *Pseudoryx nghetinhensis* in Quang Nam- Da nang province.

FPD Thua Thien Hue, 1997. Results of survey on the saola *Pseudoryx nghetinhensis* in Thua Thien Hue

FPD Thua Thien Hue, 1998. Results of survey on the saola *Pseudoryx nghetinhensis* in Thua Thien Hue (in Vietnamese)

FPD Thua Thien Hue, 2000. Results of survey on saola and endemic pheasants in the west of Phong Dien area, Thua Thien Hue province (in Vietnamese)

LE MANH HUNG, PHAM DUC TIEN, ANDREW W.TORDOFF and NGUYEN DINH DUNG, 2002. A rapid field survey of Le Thuy and Quang Ninh district, Quang Binh province, Vietnam

NEVILLE KEMP and MICHAEL DILGER, 1996. Site descption and Conservation Evaluation: Bu Huong proposed Nture Reserve Quy Chau district, Nghe An province, Vietnam

Nghe An People Committee, 1995 a. Feasibility study for establishment of Pu Huong Nature Reserve, Nghe An province (in Vietnamese)

Nghe An People Committee, 1995 b.Report of seminar on the resources of Pu Huong Nature Reserve, Nghe An Province (in Vietnamese)

ROBICHAUD, W.G. 1998. Physical and behavioral description of a captive adult saola *Pseudoryx nghetinhensis*. J. of Mammalogy 79, 394-405.

ROBICHAUD, W.G. 1997. saola conservation action plan for Lao PDR

SFNC, 2001. Pu Mat, a biodiversity survey of a Vietnamese Protected Area

VU VAN DUNG, PHAM MONG GIAO, NGUYEN NGOC CHINH, DO TUOC, P. ARCTANDER, and J. MACKINNON. 1993. A new species of living bovid from Vietnam. *Nature*, 363:443-445.

VU VAN DUNG, PHAM MONG GIAO, NGUYEN NGOC CHINH, DO TUOC, P. ARCTANDER, and J. MACKINNON. 1994. Discovery and conservation of the Vuquang ox in Vietnam. *Oryx,* 28(1): 16-21.

VU VAN DUNG, NGUYEN NGOC CHINH, A. EBREGGT and C. SANTIAPILLAI. 1995. The status of the newly discovered large mammal, the long-horned bovid, in Vietnam. *TigerPaper,* 22(2): 13-19.

APPENDIX 1. LIST OF SURVEYED VILLAGES

Survey area	**Commune**	**Village**
Pu Mat NP	Yen Khe commune, Con Cuong district	Trung Huong and Trung Chinh
	Mon Son commune, Con Cuong district	Xieng
Vu Quang NP	Vu Quang district, Vu Quang commune	Tung Quang ,Kim Tho, Kim Quang
South-west Quang Binh province	Kim Thuy commune, Le Thuy district	Ho and Mit
	Truong Son commune, Quang Ninh district	Tan Son, Long Son, Lien Son, Ben Duong, Da Chat
A Luoi district, Thua Thien Hue province (*)	A Dot commune	Ba Rit, Ado, A tin
	A Roang commune	A Roang 1, A Roang 2, Ka Ron, Ka lo, A Min
	Hong Ha commune	Pa hi,
	Huong Nguyen	Mu Nu
Quang Nam (*)	Lang commune, Tay Giang district	A Ro and A Chinh
	A Tieng commune, Tay Giang district	A Hu
	Bhalee commune, Tay Giang district	A Tep 1, A Tep 2, A Rung
	A Vuong commune, Tay Giang district	A Rec and A rot 1
	Ta Lu commune, Dong Giang district	A Rich, Po Nai 1, Po Nai 2
	Song Con commune, Dong Giang district	Bo hon 1, Bo hon 2

Note: (*)-in these areas, the survey team devided into 2 groups, together with FPD staffs, to conduct survey.

Appendix 2 - Guidelines for Interview

Information related to interviewee: (name, address, age, etc.)

General information on saola [5]

- The occasion that the interviewee knows about saola (through brochures, TV programs or by encountered or captured saola, etc.)
- Describe its appearance in detail (distinguish it with serow, describe its tracks, how can distinguish its tracks with other animals such as muntjac, serow, etc.)

Identification of location of saola's presence, habitat, and ecological behaviors

- saola used to occur or currently occurs in the area (evidence of saola presence: tracks, saola horns, skulls, etc.)
- More details on saola records (description of the situation occurred: time of the day, time of the year, description of the site, identification of locality on map, etc.)
- Description of catching methods and details on individual captured (sex, weight, young or pregnant, etc.) and other recognition.
- Plants that saola preferred, parts of the plant eaten by saola (explanation) and other recognition.
- Activities of saola associated with seasonal changes (dry and raining season). In what time of the year, saola is most frequently sighted or captured.
- The prey or predator of saola (and evidences)
- Defensive and aggressive activities of saola observed and description of situation
- Observation of saola shelters (and explanation)
- Observation of vocalization (and explanation)

Changes in population size

- Frequency of saola captured or encountered in the wild in comparison with before
- If there are some changes, suggest the reasons

Hunting and trading

- Number of saola captured annually at the village
- saola captured are killed for meat or sold (if so, identify the value of saola horns, meat...)
- Identification of changes in hunting practices recently. The reasons for this change (according to interviewee)
- Percentages of households in the village involve in hunting
- Main sources of income for household
- Identify the contribution of hunting to household income
- Are there wildlife trading activities in the village?

[5] Generally, interviewees were shown a poster of various animals including saola to ask whether these animals exist in the area. They name these animals in their language. If necessary, other pictures of saola were also used to help the interviewee recognize the animal.

APPENDIX 3. RECORDS OF SAOLA OBTAINED THROUGH SURVEY

Records of saola in Pu Mat NP

No	Interviewees	Address	Records of saola
1	Kha Van Ngoi, 32 year olds, used to take part in saola survey in 1996	Trung Huong village	- 1988-1996: captured 2 males and 1 females (by both snaring and chasing by dogs at Bong (E) streams, in Mon Son area and in Lao (*); the last one captured in 1996 was a male of approximate 80 kg in Lao
2	Vi Van Khoa, 26 year olds	Trung Huong village	- *Jul 1992: captured by dogs a juvenile of approximate 15kg* in Lao
3	Minh, 67 years old, the first man know how to lay trap in the village, 2 times participated in surveys with Vietnamese and foreigners scientists	Trung Huong village	- 1978: snared 1 male at Da Bet stream - Dec 1987: snared 1 pregnant, the foetus was of 30 cm in length, with hair - 1995-1996: snared 2 females and 1 male in Da Bet (*), Bong (E), Chat (A) streams - observed many tracks of saola in the areas of Kem, Bong (E), Tang (F), Trach, Ca (D) and Cong (C)
4	Quan, from 1997 didn't go to the forest	Trung Huong village	- Oct 1996: captured 1 male of 70 kg in the area of Kem (G) stream
5	A groups (app. 6) of medium age men	Trung Huong village	- Before 1989: there were many people in the village caught saola - 1996: tracks of saola observed in Kem (G) stream - 2002: tracks of saola observed in Bong (E) and Chat (A) streams
6	Vi Van Ky,	Trung Chinh village	- 1979: captured 1 male of about 80kg in Kem (G) stream, horns seen by survey team - saola still exists in the area in deep forest (several km from Kem (G) stream)
7	Kha Quang	Trung Chinh village	- Tracks of saola are still sighted in Ca (D) and Bong (E) stream
8	Loi	Trung Chinh village	- Tracks of saola are still sighted in Bong stream
9	Ha Van Noi	Xieng village	- 1992: captured 1 male in the area close to Tang stream - Tracks of saola are still sighted in Ca (D) stream
10	Lo Van Hanh	Xieng village	- *Feb 1980: captured 1 pregnant saola in Bong stream, foetus with hair* - Used to sight tracks in Tang (F) area, suggested it was a feeding ground - Tracks of saola are still sight recently in Chat (A) stream.

Note: (A) = Chat stream, (B) = Be stream, (C) = Coong stream, (D) = Ca stream, (E) = Bong stream, (F) = Tang stream, (G) = Kem stream, ( ) = record not mapped*

Records of saola in Vu Quang NP

No	Interviewees	Address	Records of saola
1	Le Van Ty, used to participate in saola survey	Tung Quang village	- 1984-1989: captured 2 males and 1 females by dogs at Dieu Tra (I) stream and 'old saola station' (*)
2	Pham Van Quang	Tung Quang village	- 1985: captured 1 females by dogs at Dieu Tra stream (I) - Tracks of saola are sighted recently in border area between Vu Quang and Hoa Hai commune (*)
3	Dinh and his son	Tung Quang village	- 1981: captured 1 individual at Lim stream (G)
4	Dao Xuan Ngu	Tung Quang village	- Tracks of saola are sighted recently at Hoa Hai commune (*)
5	Tinh	Kim Tho village	- 1983-1985: captured 4 individuals at Chi Loi (A), Co (*), Xe (*) and Na (I) streams in which 1 pregnant (Mar *- 1983: 1 pregnant, foetus with hair* - Tracks of saola are sighted recently the border area between Vu Quang and Hoa Hai commune (*)
6	Tien, Chairman of VQ commune PC	Kim Tho village	*- Jul 1994: raised 1 juvenile of less than 25 kg, estimated more than 3 month of age*
7	Huu, 60 years old	Kim Tho village	- 1979: met 1 male eaten by dhole - Nov 1989: captured 1 pregnant, foetus without hair - 2000: captured 1 male by snare adjacent to Can (F) stream, horns seen by survey team - Tracks of saola are sighted recently at Dau Rong (D) streams and at Hoa Hai commune (K)
8	Bui Nhung, 43 year olds,	Kim Quang village	- 1984: captured 1 male at Chay (*) stream, horns seen by survey team - Tracks of saola are still sighted in the area of Ngay stream (E)
9	Giang, at about 60,	Kim Quang village	- 1983-1995: captured 5 individuals both males and females at Trap (B), Vanh (C), Ngay (E) and Dau Rong (D) streams in which 1 pregnant *(Dec 1992 captured 1 pregnant, foetus without hair)* - Tracks of saola are still sighted in the area of Rat (D) and Ngay (E) streams
10	Hien	Kim Quang village	- before 1990: captured 3 males at Trap (B), Rat (D) streams in which 1 small *(Mar: male of 12 kg)* - Jun (????): sighted one female with their child at Vanh (C) stream
11	Nguyen Hong Lam, 43 years old,	Kim Quang village	- 1998: sighted 1 individual at Vanh (C) stream.
12	Son	Kim Quang village	- before 1990: captured 5 individuals at Rat (D), Ngay (E) and Dau Rong (D) streams in which (*Jul 1989) 1 juvenile of 25kg, horns of 7-10cm*
13	Chay	Kim Quang village	*- Jul 1998: captured 1 small saola of 20kg at Rat (D) stream* - before 1986: captured 2 males (by snare) at Trap (B) and Chi Loi (A) streams
14	Kim,	Kim Quang village	- 1996: captured 1 male by dogs at Dau Rong (D) stream
15	Hung,	Kim Quang village	*- Jul 1989: captured (by snare) 1 juvenile of 20 kg, horns of 6-7cm at Trap(B) stream*

Note: (A)= Chi Loi stream, (B) = Trap stream, (C) = Vanh stream, (D) = Rat and Dau Rong stream, (E) = Ngay stream, (F) = Cong and Can stream, (G) = Lim stream, (H) = Dieu tra stream, (I) = Na stream, (K) = Hoa Hai commune , (*) = points not mapped

Records of saola in Quang Binh

No	Interviewees	Address	Records of saola
1.	Ho Van Cuong	Ho village, Kim Thuy commune, Le Thuy district	- Jun 2002: snared 1 male in Nuoc Trong (B) stream
2.	Ho Thom, 34 years old	Ho village, Kim Thuy commune Le Thuy district	- Possess a pair of horns from1998. This individual was caught by a friend in the border area between Quang Binh and Quang Tri province (*)
3	Ho Bay,	chairman of Kim Thuy commune PC	- Jul 1998: his son captured 1 individual at the upper of Thu Lu stream (C)
4	Toan	Tan Son village, Truong Son commune	- 2001: captured 1 individual in Lao (information obtained per com villagers who practice hunting in the same area)
5.	Ho Sac, 50 years old,	Da chat village, Truong Son commune, Quang Ninh district	- May 2002: Possess a pair of horns which was gathered in the forest, horns seen by survey team. The saola was supposed to have fallen from the Lo O peak into a stream (A)
6.	Vo Van Ngoc	Lien Son village, Truong Son commune, Quang Ninh district	- 2001: *Captured 1 individual by snare in Lao (*),horns seen by survey team*
7.	Ho Huong	Da chat village, Truong Son commune, Quang Ninh district	- Possess (from 2000) a pair of horns taken from a hunter. The individual was reportedly captured at Lo O peak (A)
8.	Long	Long Son village, Truong Son commune, Quang Ninh district	- Apr 2002: captured 1 small individual in the border area (*)

Note: (A)= Lo O peak, (B) = Nuoc Trong stream, (C) = Thu Lu stream, (*) = points not mapped

Records of saola in Thua Thien Hue

No	Interviewees	Address	Records of saola
1.	Nguyen Dai Anh Tuan	Thua Thien Hue FPD staff	- *Jul 2003: raised a new-born saola;* This individual was captured in But village (*), Huong Nguyen commune, A Luoi district
2.	PLao Hung	Atin village, A Dot commune, A Luoi district	- Sighted saola in the upstream of Tam Giang stream (in Lao), the area adjacent to A Roang commune.(*)
3.	A Lai	Barit village, A Dot commune, A Luoi district	- Possess 2 pairs of horns bought at A Tep village, Bhalee commune, Tay Giang province, horns seen by survey team
4.	Ra Bac Minh	A Ro village, A Dot commune, A Luoi district	- 1996: sighted a dead saola in Lao (*)
5.	Bao	A Roang village, A Roang commune, A Luoi district	- Oct 1990: captured 1 male of 70 kg at A Du stream (F)
6.	Moonh	A Roang village, A Roang commune, A Luoi district	- Jun 1998: captured 1 individual of about 90 kg by dogs at A Du stream (F)

7.	A Kinh Phut	Ka Ron village, A Roang commune, A Luoi district	- 10 Dec 2003: The latest time sighted saola in the area at Cha Linh stream (D) - Tracks of saola observed frequently at the area
8.	Ho Van Hoi	Ka Ron village, A Roang commune, A Luoi district	- May 1998: Captured 1 pregnant of about 80kg at Pa Ong stream(A) - Tracks of saola can be met frequently at Ong stream (A) and the latest time was about a month ago.
9	Huynh Kha Khua	Ka Dich village, A Roang commune, A Luoi district	-1998: Captured 1 juvenile without horn at Ta Lai stream (C) -before 1998: captured 2 individuals
10	Quynh Nhan	KaLo village, A Roang commune, A Luoi district	- 2000: sighted 2 individuals (one female with young) at Sap stream
11	Quynh Hom	Klao village, A Roang commune, A Luoi district	- Sighted in Trung and Sap stream (*) in the adjoining area of Huong Lam and A Roang commune
12	Quynh Ninh	Kalo village, A Roang commune, A Luoi district	1991: gathered a pair of horns at Sap stream (*) (this individual was supposed to be eaten by dhole)
13	Ho Xuan Lim	A Luoi district FPD staff	2003: sighted 2 individuals at Cha Linh (D) stream and 1 individual at A Par stream.
14	Ka Lum Bao	A Roang II village , A Roang commune, A Luoi district	- Feb/2002: sighted 1 individual at Pam Mrung stream (run into Bo river).(B) - Jun/2003 sighted 1 female and her child Pam Mrung stream (B)
15	Nguyen Van Viet	Mu Nu village, Huong Nguyen commune, A Luoi district	Nov 1996: sighted 1 individual at Mu Nu stream (*)
16	Nguyen Van Lao	Mu Nu village, Huong Nguyen commune, A Luoi district	-1997: sighted 1 individual at A Gau stream (a branch of Mu Nu stream) (*) - sighted saola tracks at Tre stream (*)

Note: (A)= Pa Ong stream, (B) = Pam Mrung stream, (C) = Ta Lai stream, (D) = Cha Linh stream, (E)= A par stream, (F) = A Du stream, (*) = points not mapped

Records of saola in Quang Nam

No	Interviewees	Address	Records of saola
1	Bo Lang Dien	A Ro village, Lang commune, Tay Giang district	1977: 1 individual captured at the headwater of A Vuong river (*)
2	Blong Dan, 61 years old	A Chinh villatge, Lang commune, Tay Giang district	1989: sighted 1 individual in the border between Lao and Vietnam (*)
3	Brinh Phu, 39 years old	A Hu village, A Tieng commune, Tay Giang district	1977: sighted 1 individual in the border between Lao and Vietnam (*)
4	Ha Phuoc Phu	Tay Giang district FPD staff	Experience from previous survey on saola showed that distribution areas of saola is within the A Vuong, A Nong and Bhalee communes
5	Xuan	Prao town, Dong Giang commnune	Possess 2 pair of horns bought from Song Kon commune, horns seen by survey team
6	Tra Ruong Ui, 70 years old	A Tep 1, Bhalee commune, Tay Giang district	2000: sighted 1 individual in the area of Tep stream (at a small branch of the stream) (A)
7	A Von Pri	A Tep 1, Bhalee commune, Tay Giang district	1996,1998 and 2001: captured 2 males and 1 females the area of Ta Lang mountain (B)
8	A Von MLong	A Tep 1, Bhalee commune, Tay Giang district	Oct/2002: Captured 1 female of 50 kg at a small stream in the area of Ta Lang mountain (B)
9	Briu Blui, 65 year olds	A Tep 1, Bhalee commune, Tay Giang district	1999: captured 1 female at the upper of the stream run through the village (suggested in the area of Tep stream, at a small branch) (A)
12	A group of villagers in a meeting	A Tep 2, Bhalee commune, Tay Giang district	-saola used to be caught Ta Lang mountain areas
13	A Lang Voi	A rut 1, A Vuong district	-1990: Captured 1 male in the area of M Bon stream (C) -Heard of saola captured also in the area of Ta Moi stream
14	A group of medium age and young hunters	A rut 1, A Vuong district	- Tracks of saola are still sighted at small streams, in the area adjoining to Nam Dong district, Thua Thien Hue province - Heard of saola captured in the area of Ta Moi stream
15	Head of Dong Giang district FPD	Prao town	-Jul 1998: records of an alive juvenile without horns captured in the area between A Vuong and Ta Lu commune (suggested the area of Ta Moi stream) (D)
16	Bo Nuot	Po Nai 1, Ta Lu commune, Dong Giang district	-1976: gathered a pair of horns. The individuals was suspected to be eaten by dholes. Horns seen by survey team
17	A Lang But	Bohoon 1, Song Kon commune, Dong Giang district	-Aug - Oct 2002: captured 2 males and 1 female by snare at Cha Roong hill, the area adjacent to Ta Vac stream (F). A pair of horns seen by survey team
18	A Lang Vung	Bohoon 1, Song Kon commune, Dong Giang district	-2002: captured (by snare)1 individual at Ta Vac stream (F)
19	Da	Bohoon 2, Song Kon commune, Dong Giang district	-2000: captured (by snare) 1 individual at Ma Lu stream (E)
20	Mem	Bohoon 2, Song Kon commune, Dong Giang district	-2002: captured (by snare) 1 individual at Ma Lu stream (E)

Note: (A)= Tep stream, (B) = Ta Lang mountain, (C) = Mo Bon stream, (D) = Ta Moi stream, (E)= Ma Lu stream, (F) = Ta Vac stream, (*) = points not mapped

ANNEX 4: REPORT FROM QUANG NAM, VIETNAM,
NOT PRESENTED IN WORKSHOP DUE TO TIME CONSTRAINTS

SAOLA CONSERVATION IN QUANG NAM PROVINCE

Minh Hoang, Barney Long and James Hardcastle
WWF MOSAIC Project
Forest Protection Department
77 Tran Quy Cap
Tam Ky,
Quang Nam

Introduction

The saola is distributed between $15^{0}30'$ – $20^{0}00'$N and 104^{0} – 108^{0} E along the Annamite Mountains (Vu Van Dung, Tham Ngoc Diep, this volume). Quang Nam province is known to be the southern most limit of the saola's distribution, but its exact limits are not clearly understood (see Robichaud & Timmins, this volume). To ensure the saola's long-term future in Quang Nam, it is critical to identify its current and former distribution. This will allow prioritized and appropriate conservation efforts to be carried out.

Over the last two years, the Quang Nam Forest Protection Department in partnership with WWF have been implementing the MOSAIC project across Quang Nam. The results presented here represent saola data collected to date during this period. A focused saola initiative has just begun in the province, therefore data presented here should be treated as preliminary.

Methods

In order to assess saola distribution and conservation requirements the following methods have been used:

- Literature search
- Semi-structured interview surveys
- PRA surveys
- Participatory forest sketch mapping and associated forest management discussions
- Field surveys
- Camera-trapping

Results

saola is distributed in two districts of Quang Nam; Tay Giang and Dong Giang (prior to 2003 these were a single district called Hien). These districts are the northern most in Quang Nam bordering A'Luoi and Nam Dong districts in Thua-Thien Hue province, where confirmed saola populations exist. No confirmed field records have been obtained from Quang Nam, however hunted animals have been recorded and their capture location identified.

Communes where saola is thought to be currently present:

These represent communes in which hunted animals, with identified hunting location, have been recorded.

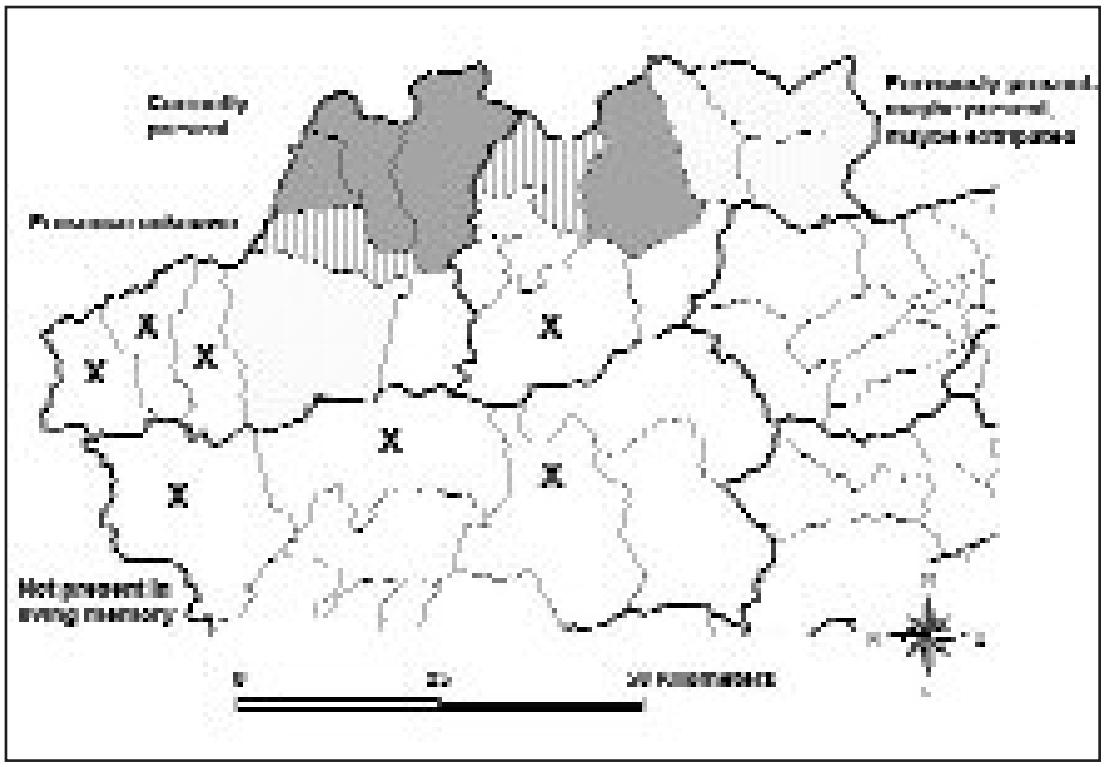
B'Halee commune	A saola driven by dogs was caught and killed in November 2003 (Ha Phuoc Phu pers. comm.) with another being snared and eaten by local communities in September 2002.
A'Vuong commune	Last trapped in a snare in 2000
A'Nong commune	Present according to (Ha Phuoc Phu, pers. comm.)
Song Kon commune	Last snared in 2002 (Tham Ngoc Diep, this volume), but recent interviews suggest people in this commune are traveling to adjacent Thua-Tien Hue province to hunt and not necessarily catching saola within Quang Nam

Communes where saola status has received no attention to date:

A'Tieng commune	Adjacent to known saola areas
Ta Lu commune	Between A'Vuong and Song Kon communes and known saola populations in Thua-Thien Hue province

Communes with historical saola records but not recent information:

Prao	Last hunted in 1999 in A'Dul village
A'Ting	No hunted animals recorded for 10 years
Tu	No hunted animals recorded for over 10 years
Ba	No hunted animals recorded for 10 years
Lang	No hunted animals recorded for 10 years



Current known state of saola distribution in northern Quang Nam province
Communes where surveys have occurred and communities are not aware of the saola (presumed non historical presence):

Tay Giang:	Tr'Hy, A Xan, Ch'Om, Ga Ri
Dong Giang:	Macooih, Jo Ngay, Za Hung
Nam Giang:	La Ee, Zouilh, Tabhing

A very old saola skull is present in La Ee commune (Vu Ngoc Thanh, pers. comm.). The people in La Ee were previously semi-nomadic, therefore the true origin of this saola skull is unclear.

Notes from interviews

Local Ka Tu people in A'Vuong commune believe the saola makes seasonal movements, moving into rocky, mountainous areas during the wet season to make use of caves, whilst moving to lower, but not flat, areas to feed in the dry season.

The Ka Tu name for the saola is 'Xoong Xor'.

The saola is not targeted at present by the Ka Tu communities, but if they do catch a saola in either a snare or using a bamboo stake trap, they will eat it. They then use the skull to adorn their house or the village meeting hall, as they do with the majority of hunting trophies.

Summary

Distribution

- Current saola distribution appears to be focused immediately east of the Ho Chi Minh Highway in B'Halee, A'Vuong, Ta Lu and Song Kon communes, with its distribution also stretching west of this area in B'Halee and A'Nong communes.
- saola was historically distributed, and may still be present, to the east of the above area, in eastern Dong Giang, in A'Ting, Tu and Ba communes, and to the south-west in, A'Tieng and Lang communes.
- saola does not appear to have been historically (living memory) distributed in the higher areas of western Tay Giang, west of the Ho Chi Minh highway, in Tr'Hy, A Xan, Ch'Om and Ga Ri communes.
- The lowland, inhabited valley running east-west through Dong Giang and Tay Giang appears to be the historical (living memory) southern limit of saola distribution.

Threats

- saola is not specifically targeted by hunters at present
- saola is typically eaten when caught with the frontlets used for house decoration
- Currently, no trade in saola appears to be present in Quang Nam although people from Da Nang recently have started visiting some communes to try and purchase skulls (in one case, in return for two fishing nets)
- saola is most often caught in snares
- Dogs and guns are sometimes used to hunt saola

RECOMMANDATION

- Complete removal of snares and other non-selective hunting methods from critical saola habitat
- Removal of hunting guns as part of community-based initiatives and forest protection charters
- Protection of the entire northern Tay Giang – Dong Giang forested landscape through an appropriate provincial-level conservation management designation
- Habitat protection in two priority sites:
  - Ho Chi Minh Highway
  - A'Vuong commune
- Focused field surveys and camera-trapping to obtain an accurate picture of the population's distribution
- Examine feasibility of the gazettement of a saola protected area in the populations' core area (possibly B'Halee to A'Vuong). This activity should be combined with similar feasibility studies in Thua-Thien Hue, and a trans-provincial reserve should be considered.
- An awareness raising campaign focused on communities and government officials to increase the status of the saola everyone's minds will help reduce direct threats to the species survival in Quang Nam

REFERENCES

Anon, 1996. Results of preliminary survey on the saola *Pseudoryx nghetinhensis* in Quang Nam - Da Nang province.