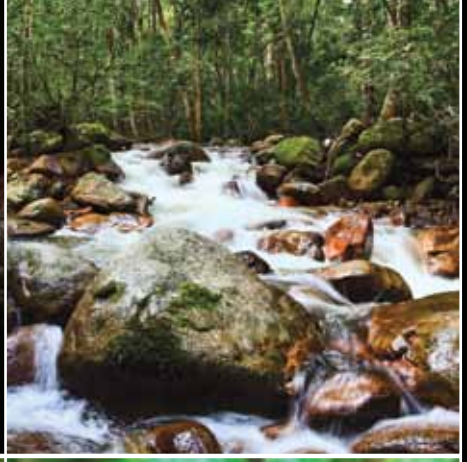
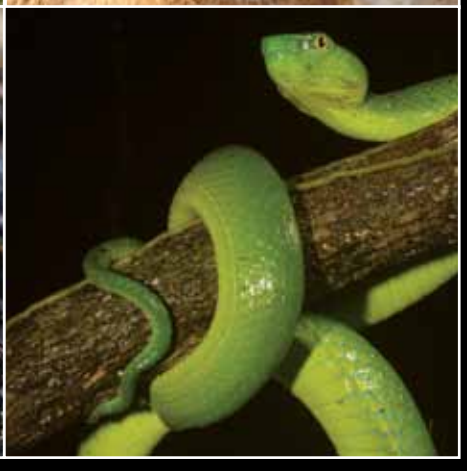



The Biodiversity Of Chu Yang Sin National Park, Dak Lak Province, Vietnam









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The Biodiversity of Chu Yang Sin National Park, Dak Lak Province, Vietnam

Compiled and edited by
Ross Hughes



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Other field biologists who have taken part in surveys include:

At the Institute of Ecology and Biological Resource (IEBR): Dr. Ha Van Tue (Vegetation), Dr. Dang Ngoc Can (Mammals), Mr. Nguyen Truong Son (Mammals), Mr. Le Manh Hung (Birds), Ms. Ho Thu Cuc (Herpetofauna). At the Forest Inventory and Planning Institute (FIPI): Mr. Le Van Cham (Vegetation) and Mr. Dang Thang Long (Mammals). At the Hanoi National University of Education: Dr. Nguyen Huu Duc (Fish). At the Russian Zoological Institute: Dr. Nikolai Orlov (Herpetofauna).

Jonathan C. Eames, Le Trong Trai and John Pilgrim provided review comments on this document. Phuong Nguyen designed the layout and selected photographs for the report.

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Acronyms

CYSNP	**Chu Yang Sin National Park**
EBA	**Endemic Bird Area**
FIPI	**Forest Inventory and Planning Institute**
GEF	**Global Environment Facility**
IEBR	**Institute of Ecology and Biological Resources**
IUCN	**The World Conservation Union**
IWBM	**Integrated Watershed and Biodiversity Management Project**
WWF	**World Wide Fund for Nature**

Taxonomy and Nomenclature

Plants: Species names and taxonomy follow Pham Hoang Ho (1999-2000) **[An illustrated flora of Vietnam].** Vol. 1-3. 2nd edition. Ho Chi Minh City : Young Publishing House. In Vietnamese. Gymnosperms, palms and other species assessed by the IUCN follow IUCN Red List online.

Mammals: Species names follow Wilson, D. E. and Reeder, D. M. (2006) **Mammal Species of the World: a Taxonomic and Geographic Reference,** Third edition, Baltimore: Johns Hopkins University Press. Vietnamese names follow Dang Ngoc Can, Endo, H., Nguyen Truong Son, Oshida, T., Le Xuan Canh, Dang Huy Phuong, Peter, D., Kawada, S. H., Akiko, H., Sasaki (2008) **Danh lục các loài thú hoang dã Việt Nam [Checklist of the Wild Mammal species of Vietnam].** Japan: Primate Research Institute, Inuyama, Japan and Department of Vertebrate Zoology.

Birds: Species taxonomy, nomenclature and order, follow BirdLife International (2009). Vietnamese name follow Nguyen Cu, Le Trong Trai and Karen Phillipps (2000) **Chim Việt Nam.** Hanoi: BirdLife International Vietnam Programme.

Reptiles and Amphibians: Scienticfic names follow the Reptile and Amphibian Database online at: www. jcvi.org/. Vietnamese names follow Nguyen Van Sang and Ho Thu Cuc (1996) **[Checklist of reptiles and amphibians in Vietnam.**] Hanoi: Scientific and Technical Publishing House. (In Vietnamese.)

Butterflies: Species names follow Alexander L. Monastyrskii (2007) **Butterflies of Vietnam.** Hanoi: Vietnam-Russia Tropical Centre.

Foreword by the World Bank

The World Bank has been honoured to support the conservation of Chu Yang Sin National Park. Beginning with the first project discussions in the Bank over a decade ago, our biodiversity team has worked with the Global Environment Facility (GEF), the Government of Vietnam, BirdLife and the local authorities to move this project forward. Early in the process, BirdLife was able to convince the Bank and the GEF of the special biological importance of this little-known site. The biological surveys that have since been carried out have confirmed that indeed the Park is of special importance, hosting some of the best remaining habitats in Vietnam for many species, and indeed the only known home on earth for several endemic species and taxa. This publication does a marvellous job of compiling available information to not only document its biological riches but to once again bring home the urgency of more research and continuing support to the protection of the national park.

Much has been accomplished over the last ten years and we salute the efforts of the local park staff, BirdLife International *in Indochina* and other actors who have worked so hard to protect the Park. At the same time, the Bank is concerned about the future of the Park in the light of what is known about planned investments in roads and hydroelectric developments in the Park. There are many other national parks in Vietnam that are similarly challenged by ongoing or planned infrastructure investments. Protected areas, with the rarest exceptions, should be "no-go" areas for major infrastructure developments. The Bank will continue to work with Vietnamese authorities in the strengthening of the national park system and we will certainly count on a rich experience acquired from our support to Chu Yang Sin National Park.

Douglas J. Graham

Environment Sector Coordinator
Sustainable Development - Vietnam

The World Bank

Foreword by BirdLife International

The first time I saw Mount Chu Yang Sin its peak rose above distant sea of clouds way off on the horizon. At that moment I was standing atop Mount Bi Doup another high peak in the central highlands. It was May 1991. Up to that moment I had only read of Chu Yang Sin but seeing it at last made me realize that the goal of visiting to survey its unexplored slopes was at last within reach. The need to survey Chu Yang Sin, standing 2,442 m was even greater at that moment because we had just discovered a new subspecies of what is now called Indochinese Fulvetta on Bi Doup and it seemed almost a certainty that other undescribed species would be revealed on the fabled Chu Yang Sin. It wasn't until January 1994 that I stood atop Chu Yang Sin together with Dr. Nguyen Cu. We found the fulvetta again and rediscovered the enigmatic Grey-crowned Crocias too. It was during that visit that the idea first occurred to me of developing a GEF project to support the management of the site. At that time the biodiverse and globally-important peaks of the central highlands were neglected and lacked conservation investment. Conservationists were then chasing dreams of conserving the last of Vietnam's mega-fauna and repeated calls to invest in endemic birds, primates and conifers fell on deaf ears. I persisted, and with the support and encouragement of World Bank colleagues like Dr Kathy McKinnon and Dr Tony Whitten, finally a project was developed and ultimately approved. However it wasn't until 2005 after numerous revisions that the grant agreement was signed between the World Bank and BirdLife International. Sixteen years since that first ascent I have still not returned to the summit of the mountain.

The GEF project presented us with the opportunity for thorough and comprehensive exploration of the biodiversity of the national park. Constraints placed upon us by the Government of Vietnam both at the time of signing the grant agreement and subsequently during project implementation undermined attempts to fully understand the biodiversity riches of the area. Doubtless many secrets remain. However, we have struggled and persevered and I am proud of this report and the dedication of the scientists involved in compiling it. Most notable have been the results of the herpetological surveys which have yielded eight species new to science, including a spectacular frog *Rhacophorus chuyangsinensis* and at least one new species of gecko named *Cyrtodactylus ziegleri*. Sadly, we have had less luck with birds and we have not discovered any new species. However, as a result of numerous recent taxonomic revisions the global importance of this site for bird endemism and conservation has only increased further.

Grey-crowned Crocias *Crocias langbianis*

When the project was first conceived and developed we were naive. We totally underestimated the impact of hordes of land hungry northern Vietnamese who would overrun and transform the landscapes of the central highlands. Predictably this onslaught of humanity has not respected the borders of the national park. Not only have levels of hunting and logging dramatically increased but we now have a hydroelectric reservoir in the protected area and brace ourselves for the construction of a national highway and a whole network of patrol roads. The park will survive but many of the species, some of the endemic, probably won't be able to survive these threats and the looming cataclysm of climate change. This biodiversity report then is a snapshot in time of a wonderful and globally irreplaceable site that deserves more respect, appreciation and exploration.

Jonathan C. Eames

Programme Manager

BirdLife International *in Indochina*

Executive summary

Chu Yang Sin National Park is one of the remaining jewels of Vietnam's protected areas system but it faces escalating threats from infrastructure development, logging and hunting. The Park protects forests of enormous significance for biodiversity conservation and protection of the upper watersheds of the SrePok River – one of the largest tributaries of the Mekong River. The importance of these forests was recognized in the early 1990s and this eventually led to the upgrading of the Park from nature reserve to national park status in 2005. The same year, the Global Environment Facility (GEF), World Bank, BirdLife *in Indochina* and Dak Lak Peoples Committee agreed to implement the *Integrated Watershed and Biodiversity Management* (IWBM) project in order to strengthen the management of the Park within the context of the wider watershed. This report is funded by the IWBM project and brings together the growing body of information on the biodiversity of the Park, and the challenges facing its conservation, based on the findings of surveys and studies that date back to 1993.

The Park is located in the central highlands of Vietnam in Krong Bong and Lak Districts of Dak Lak Province. The Park covers 58,947 ha with elevations ranging from less than 600 m to 2,442 m elevation at the summit of Mount Chu Yang Sin. The Park is the largest protected area on the Da Lat Plateau, and together with adjacent forests including those protected by Bi Doup Nui Ba National Park, offers protection to the largest remaining block of contiguous forest in the central highlands. This includes an unbroken transition of forest from lowland evergreen to montane forest.

The landscapes of these two districts have seen major changes since the end of the war in 1975. Commercial logging of these forests ended in 1994 when the nature reserve was established and there has also been a general movement of ethnic Ede and M'nong people down from the slopes of the mountains to the valleys – supported in part many government policies, programs and changes to the land law. Since 1975 there has been large scale inmigration of Kinh Vietnamese into the area surronding the Park and in recent years, a large influx of H'mong people from northern provinces has placed a new set of pressures on the Park and surrounding land and natural resources. Outside what is now the Park, the forests of the landscape have become increasingly fragmented mostly through clearance for the expansion of agriculture (mostly commodity crops) and for road construction.

Available evidence suggests that the forests of Chu Yang Sin are a centre of active speciation. Based on current knowledge, Chu Yang Sin is biologically the richest mountain in the Da Lat Plateau Endemic Bird Area. The wide altitudinal range, varied topography and past forest management practices give rise to a patchwork of different forest habitat types. The dominant vegetation type in the Park is broadleaved evergreen forest and the Park protects the largest block of this forest type on the Da Lat Plateau - covering over 38,000 ha or 65% of the National Park. At elevations below 900 m, the Park protects lowland semi-evergreen forest, characterised by *Lagerstroemia calyculata* and *Terminalia nigrovenulosa*, and lowland evergreen forest, dominated by *Hopea odorata, Dipterocarpus alatus* and *Dipterocarpus turbinatus*. Sub montane and montane evergreen forest is widely distributed above 900 m, and dominated by members of the Fagaceae and Lauraceae. Montane evergreen forest is characterised by a higher proportion of gymnosperms, such as *Pinus dalatensis, Pinus krempfii, Pinus kesiya var. langbianensis, Podocarpus imbricatus* and *Fokienia hodginsii*. On mountain summits and ridge lines, elfin forest formations are distributed, dominated by *Lyonia annamensis, Lyonia ovalifolia* and the dwarf bamboo *Arundinaria sp.* Coniferous forest, dominated by *Pinus kesiya*, occupies more than 10,600 ha of the Park. The species grows in pure stands on well-drained exposed ridges and also grows as a secondary vegetation type in areas subject to periodic burning. A significant proportion of the Park supports bamboo forest, often colonizing areas formerly used for swidden farming and now regenerating slowly back to forest.

The Gymnosperm flora of the Park is particularly rich in the Vietnamese context and the Park supports populations of one third of the total number of conifer species known to occur in Vietnam and eighteen species of Gymnosperms in total. The presence of large stands of *Fokienia hodginsii,* a globally-near threatened species that is restricted to South China, Laos and Vietnam, is a feature of particular conservation interest and also concern – the species is much sought-after for furniture making, house-building, ornaments and even for medicinal purposes and therefore commands high market prices in Vietnam. This demand is driving high levels of illegal logging of this species inside the Park.

65 mammal species have been confirmed to occur in the Park. 12 mammal species known to occur in the Park are considered globally Endangered, Near Threatened, Vulnerable or Data Deficient. These include Sunda Pangolin *Manis javanica*, Small-tooth Mole *Euroscaptor parvidens*, Black-shanked Douc Langur *Pygathrix nigripes*, Northern Pig-tailed Macaque

Macaca leonine, Bear Macaque *Macaca arctoides*, Yellow-cheeked Crested Gibbon *Nomascus gabriellae*, Sun Bear *Helarctos malayanus*, Large Indian Civet *Viverra zibetha*, Owston's Banded Civet *Chrotogale owstoni*, Asiatic Golden Cat *Pardofelis temminckii*, Sambar *Rusa unicolor,* Giant Muntjac *Muntiacus vuquangensis*, Gaur *Bos gaurus* and Chinese Serow *Capricornis milneedwardsii*. Surveys have started to assemble a baseline of knowledge of bat and small mammal populations, but further work is needed on these groups.

A total of 250 bird species have now been recorded in the Park, including 15 threatened and endemic species. The Park is the only site known to support all of the restricted range bird species which characterise this EBA. The Park is of particular importance for the two endangered species: Collared Laughingthrush *Garrulax yersini* and Grey-crowned Crocias *Crocias langbianis*, and is thought to constitute the global stronghold of the latter species and hold a significant population of the former. The Park also supports populations of all three species known to be confined to the Da Lat Plateau: Collared Laughingthrush *Garrulax yersini*, Grey-crowned Crocias *Crocias langbianis* and Vietnamese Greenfinch *Carduelis monguilloti*. The lower parts of the Park also support two of the three restricted-range species which characterise the South Vietnamese Lowlands EBA: Germain's Peacock-pheasant *Polyplectron germaini,* and Grey-faced Tit-babbler *Macronous kelleyi*. Altitude is the most important factor determining species distributions - with measures of forest architecture (such as species richness and forest structure) having much less influence on species distributions than altitude. This gives rise to distinct bird communities at different altitude ranges within the Park.

The Park supports impressive species richness of reptiles and amphibians. This is a consequence of the varied topography of the Park, its diverse hydrological network and different forest types which makes ideal conditions for rich taxonomic diversity of amphibians. A total of 112 species of amphibians and reptiles were discovered – comprising 53 species of frog, 1 caecilian, 27 lizards and 31 species of snake. No less than 17 possible new species to science were discovered during the surveys in October 2007 and in April and May 2009, of which only two have so far been described formally.

Only indicative information on the fish diversity of the Park is so far available and the composition of the Park's fish diversity remains poorly understood. In total, 81 fish species have been tentatively recorded based on the 2006 surveys and overall, the fish fauna appears

typical for the upper Mekong River Basin: seventy four species of the total number are native to the Mekong River whilst others have been introduced from other regions of Vietnam but are now relatively common. Interestingly, the species composition of each river system sampled appears to be relatively distinct.

A total of 248 butterfly species were recorded, belonging to 10 families. Two newly-described species, *Stichophthalma uemurai* and *Aemona falcata* were recorded during the survey. A total of 9 species of 4 families were found in the Da Lat mountains for the first time. Some species recorded during the survey were not previously recorded for central Vietnam. For example, *Flos apidanus* was only known from southern Vietnam prior to surveys undertaken in 2006. Riverine vegetation was found to support the richest butterfly communities of the Park – nearly 70% of species were found in this habitat, compared with 33% for bamboo forest, 32% for evergreen forest, and 10% in forest edge habitats. Butterfly species richness generally declined with altitude with greater diversity in butterfly communities at lower elevations.

The forests and biodiversity of the Park face a number of very real threats and the IWBM project found that populations of key species had deteriorated between 2005 and 2008. When the Park was first designated, the most pressing threats were probably posed by hunting and trapping by subsistence hunters and wood collectors inside what is now the Park and buffer zone forests; and selective logging of high value species such as *Fokienia hodginsii*. In recent years, the level of hunting and illegal logging activity within the Park have increased to very worrying levels, associated largely with spontaneous and rapid in-migration of H'mong people into the buffer zone of the Park and driven by stronger market demand for wildlife and rare timber. However, it is now plans for the development of hydropower and roads that pose the major threat to the Park, through direct loss of forests and by 'opening-up' pristine forest areas to higher levels of illegal logging, land clearance and hunting.

The good news is that considerable progress has been made since the establishment of a management board in 1998, and especially since 2002 following the upgrading of the area to National Park status. Dak Lak Province Peoples Committee has provided substantial support for staffing and basic Park infrastructure, such as the construction of a new Park headquarters

and several new guard stations. The Park has also benefited from strong leadership at the management board level. However, much still needs to be done to strengthen capacity and to maintain and expand conservation action at field level. The construction of roads and hydropower infrastructure inside the boundaries of the Park are clearly incompatible with its National Park status, and will degrade the regional and global contribution the Park makes to the protection and supply of environmental services such as watershed protection, biodiversity conservation and carbon storage. On economic grounds alone, the longer-term value of these services may well exceed the short-term benefits that roads and hydropower might bring. It is the role of local and national authorities to find a better balance between conservation and infrastructure development than has been the case so far.

Central to the longer-term vision for the Park is an expansion of boundaries to include the adjacent forests currently under the management of a range of different management authorities, including the Lak Landscape Reserve, the Lak Forest Enterprise and the Krong Bong Forest Enterprise. The management authorities for these various forest management units currently lack the expertise, capacity and financial resources to implement appropriate management. Expansion therefore provides a golden opportunity to coordinate conservation management across a larger forest landscape and introduce improved incentives for local communities to participate in forest management, for example through community forest management, the expansion of existing co-management arrangements and development of community-based ecotourism. These approaches could help balance sustainable use with biodiversity conservation and the protection of environmental services such as watershed protection and carbon storage – both of which could generate significant future revenues for forest management.

In the longer term, the financing of the Park, whether expanded or not, will require considerably more financial resources than have been made available so far. Equally important will be a stronger commitment from national and provincial decision-makers to ensuring that the unique biodiversity and environmental values of the Park are not degraded further by a narrow, infrastructure-led vision for landscape development. Given the considerable improvements made in conservation management at the Park in recent years, coupled with strong local leadership and increasing awareness of the extraordinary biodiversity values of the Park, the future for the Park is promising. Major challenges remain and these can only

be addressed if recent progress can be sustained and expanded into the future. This will require a long-term commitment by national, provincial and district authorities to enforce the law, to ensure that infrastructure development does not damage the Park's ecosystems and to make available the funding needed for appropriate conservation work. Progress over the past few years shows that committed and targeted conservation efforts and financing can achieve tangible impacts. It is hoped that this document will excite and encourage further efforts to conserve the Park, its unique biodiversity and the environmental services it provides to millions of downstream water users.

Tóm tắt

Vườn Quốc Gia Chư Yang Sin (VQG CYS) là một trong những viên ngọc hiếm hoi còn sót lại trong hệ thống các khu bảo vệ của Việt Nam. Tuy nhiên VQG đang gặp phải rất nhiều những mối đe dọa ngày càng gia tăng như: xây dựng cơ sở hạ tầng, chặt phá rừng và săn bắn trái phép. VQG đang bảo vệ một diện tích rừng có tầm quan trọng rất lớn về đa dạng sinh học cũng như bảo vệ vùng đầu nguồn của sông Srepok – một trong những chi lưu lớn nhất của sông Mê Kông. Đầu những năm 1990 đã xác nhận được tầm quan trọng của rừng ở khu vực này và từ chỗ chỉ là một khu bảo tồn thiên nhiên, CYS đã được nâng cấp lên thành Vườn Quốc Gia vào năm 2005. Cũng cùng năm này, Quỹ Môi trường toàn cầu (GEF), Ngân hàng thế giới và tổ chức BirdLife tại Đông Dương cùng với Ủy Ban Nhân Dân tỉnh Dak Lak đã đồng ý thực hiện dự án *Lồng ghép quản lý nguồn nước và đa dạng sinh học* (IWBM) nhằm củng cố công tac quản lý của vườn trong bối cảnh một vùng đầu nguồn rộng lớn. Bản báo cáo này được tài trợ bởi dự án IWBM nhằm tổng hợp những thông tin về tính đa dạng sinh học của Vườn cũng như những thách thức mà Vườn đang gặp phải trong công tác bảo tồn, dựa trên những số liệu phát hiện được từ các cuộc điều tra và nghiên cứu suốt từ những năm 1993 tới nay.

Vườn nằm ở Tây Nguyên Việt Nam, thuộc địa phận hành chính hai huyện Krông Bông và Lăk của tỉnh Dak Lak. Với diện tích 58.947 ha, trải rộng từ dưới 600 m cho tới 2,442 m là đỉnh núi Chư Yang Sin. Đây là khu bảo vệ lớn nhất ở Cao Nguyên Đà Lạt. Chu Yang Sin cùng với những khu rừng nằm liền kề, bao gồm cả VQG Bi Doup Núi Bà tạo thành một khối rừng được bảo vệ lớn nhất của Tây Nguyên. Tại đây không thấy có sự gián đoạn giữa rừng thường xanh đất thấp và rừng thường xanh núi cao.

Cảnh quan của 2 huyện Krông Bông và Lak thay đổi đáng kể từ khi cuộc chiến tranh kết thúc năm 1975. Khai thác gỗ thương mai trong rừng chấm dứt vào năm 1994 khi mà khu bảo tồn thiên nhiên được thành lập và cũng vào thời điểm này hai nhóm dân tộc bản địa Êđê và M'Nông di chuyển từ những những nơi rừng sấu, sườn dốc xuống vùng bằng và thung lũng. Có được điều này một phần là do các chương trình, chính sách mới của chính phủ và những thay đổi trong Luật Đất Đai. Từ năm 1975 có một đợt di dân diện rộng của người Kinh tới khu vực xung quanh vườn quốc gia và trong một vài năm trở lại đây cũng có một làn sóng di cư người H'mong từ các tỉnh miền bắc xuống cũng tạo lên một sức ép dân số tới vườn, các khu vực xung quanh và các nguồn tài nguyên thiên nhiên. Bên ngoài khu vực ranh giới của Vườn, quang cảnh rừng đang ngày càng bị chia cắt thành dạng khảm nghiêm trọng, chủ yếu qua hoạt động khai phá đất rừng để mở mang đất nông nghiệp và xây đường.

Có nhiều bằng chứng cho thấy rừng ở Chư Yang Sin là trung tâm của quá trình tiến hóa hình thành loài. Dựa trên những kiến thức hiện tại, Chu Yang Sin được đánh giá là khối núi phong phú nhất về đa dạng sinh học của vùng Chim đặc hữu Cao Nguyên Đà Lạt. Độ cao trải rộng, địa hình đa dạng và thực tiễn quản lý rừng đã góp phần tạo nên ở đây có những kiểu sinh thái rừng khác nhau. Kiểu thảm thực vật chủ yếu của Vườn là rừng lá rộng thường xanh, kiểu rừng này có diện tích lớn nhất ở Cao nguyên Đà Lạt – với diện tích hơn 38,000 ha (65% diện tích của Vườn quốc gia). Ở độ cao dưới 900 m, Vườn bảo vệ rừng bán thường xanh trên đất thấp với các loài thực tiêu biểu như: Bằng lăng *Lagerstroemia calyculata* và Chiêu liêu gân đen *Terminalia nigrovenulosa*, và rừng trên đất thấp với nhiều loài cây họ Dầu ưu thế như: Sao đen *Hopea odorata,* Dầu rái *Dipterocarpus alatus* và Dầu con quay *Dipterocarpus turbinatus*. Rừng thường xanh trên núi thấp và núi trung bình phân bố ở độ cao trên 900m, với các loài phổ biến trong các họ Dẻ Fagaceae và họ De Lauraceae. Rừng thường xanh núi cao với các loài ưu thế là các loài thực vật hạt trần như Thông Đà Lạt *Pinus dalatensis*, Thông hai lá dẹt *Pinus krempfii*, Thông ba lá *Pinus kesiya var. langbianensis,* Thông tre *Podocarpus imbricatus* và Pơ mu *Fokienia hodginsii*. Trong khi đó kiểu rừng lùn có thể tìm thấy ở các đỉnh dông và sườn núi cao với các loài thường gặp là các loài Đỗ quyên *Rhododendron spp*., Nam trúc Trung Bộ *Lyonia annamensis*, Nam trúc lá xoan *Lyonia ovalifolia* và các loài Sặt *Arundinaria spp*. Rừng lá kim với loài ưu thế Thông ba lá *Pinus kesiya*, với diện tích hơn 10,600 ha trong diện tích vườn. Đây là loài mọc thuần loại ở những sườn dông nơi thoát nước và cũng là những loài tạo thành kiểu rừng thông thứ sinh khi rừng bị đốt hoặc cháy định kỳ. Một diện tích đáng kể của Vườn là rừng tre nứa, chủ yếu ở những khu vực trước đây là nơi du canh nương rẫy và hiện nay rừng đang dần dần phục hồi trở lại.

Hệ thực vật hạt trần ở Vườn đặc biệt giàu có trong bối cảnh ở Việt Nam, nhất là khi Vườn là nơi phân bố của 1/3 tổng số loài thông đã biết của ở Việt Nam và 18 loài cây hạt trần. Sự hiện diện của loài Pơ mu *Fokienia hodginsii* – loài gần bị đe dọa mức toàn cầu và chỉ phân bổ ở Nam Trung Quốc, Lào và Việt Nam – cũng là loài đáng lưu tâm của công tác bảo tồn. Loài cây này thường được khai thác để làm đồ gỗ, dựng nhà, đồ trang trí và cả mục đích y học. Vì thế, trên thị trường loại cây này có giá trị kinh tế rất cao, cũng là lý do mức độ khai thác trái phép loại gỗ này trong Vườn ngày càng cao.

65 loài thú đã ghi nhận khẳng định có ở VQG. Trong đó, 12 loài được xếp vào nhóm Nguy cấp toàn cầu, Sắp bị nguy cấp, gần bị đe dọa, hoặc Thiếu dữ liệu. Các loài này bao gồm: Tê tê Nam Dương *Manis javanica*, Chuột chũi răng nhỏ *Euroscaptor parvidens*, Chà vá chân đen

Pygathrix nigripes, Khỉ đuôi lợn *Macaca leonine*, Khỉ mặt đỏ *Macaca arctoides*, Vượn đen má vàng *Nomascus gabriellae*, Gấu chó *Helarctos malayanus,* Cầy giông *Viverra zibetha*, Cầy vằn bắc *Chrotogale owstoni,* Báo lửa *Pardofelis temminckii*, Nai *Rusa unicolor,* Mang lớn *Muntiacus vuquangensis*, Bò tót *Bos gaurus* và Sơn dương *Capricornis milneedwardsii*. Các đợt khảo sát đã bắt đầu cung cấp một vài kiến thức nền tảng về các loài dơi và thú nhỏ nhưng vẫn cần có nhiều nghiên cứu xa hơn nữa.

Trong tổng số 250 loài chim được ghi nhận trong vườn, có 15 loài bị đe dọa và đặc hữu.Vườn là nơi duy nhất được biết có toàn bộ các loài chim có vùng phân bố hẹp đặc trưng cho Vùng chim đặc hữu (EBA). Đồng thời Vườn cũng đặc biệt quan trọng bởi có 2 loài đang bị đe dọa Nguy cấp là Khướu đầu đen má xám *Garrulax yersini,*và Mi Lang Biang *Crocias langbianis*; và có thể nói rằng VQG là nơi nắm giữ quần thể toàn cầu của loài Mi Lang Biang và nơi nắm giữ quần thể quan trọng của loài Khướu đầu đen má xám. Ngoài ra vườn còn là nơi sinh sống của tất cả 3 loài chim đặc hữu của Cao nguyên Đà Lạt là Khướu đầu đen má xám *Garrulax yersini,* Mi Lang Biang *Crocias langbianis*, và Sẻ thông họng vàng *Carduelis monguilloti*. Phần rừng trên đất thấp của Vườn cũng có 2 trong số 3 loài có vùng phân bố hẹp của Vùng chim đặc hữu đất thấp Nam Bộ là Gà tiền mặt đỏ *Polyplectron germaini,* và Chích chạch mặt xám *Macronous kelleyi*. Độ cao là yếu tố quan trọng nhất quyết định sự phân bổ loài - bằng phương pháp đo đếm (như sự đa dạng của các loài thực vật và cấu trúc rừng) cho thấy chúng ít ảnh hưởng đến phân bố của loài hơn so với đai độ cao. Điều này đã tạo nên một sự khác biệt về thành phần loài chim theo đai độ cao trong phạm vi của vườn.

Các loài bò sát và ếch nhái của VQG cũng rất phong phú và ấn tượng. Đây là kết quả của sự đa dạng về địa hình, mạng lưới thủy văn và các kiểu rừng của VQG. Tất cả tạo nên những điều kiện lý tưởng tạo nên sự đa dạng của các loài ếch nhái. Trong tổng số 112 loài bò sát và ếch nhái được phát hiện thì có 53 loài ếch, 1 loài ếch giun, 27 loài thằn lằn, và 31 loài rắn. Không ít hơn 17 loài được cho là loài mới cho khoa học, tất cả đều được tìm thấy trong 2 chuyến khảo sát Tháng 10 năm 2007 và tháng 4 và 5 năm 2009. Tuy nhiên cho tới nay mới có 2 loài trong số đó được mô tả và công bố chính thức loài mới cho khoa học.

Về loài cá thì mới chỉ có các thông tin cơ bản về tính đa dạng của khu hệ cá, thành phần loài cá của VQG hiện tại chưa được biết tới một cách đầy đủ. Tổng số có 81 loài cá ghi nhận cho VQG dựa trên kết quả khảo sát năm 2006 và nhìn chung hệ cá ở đây mang tính điển hình của lưu vực thượng nguồn sông Mekong. Trong đó 74 loài bản địa của sông Mê Kong, còn

lại các loài khác được mang tới từ các vùng khác của Việt Nam nhưng cũng tương đối phổ biến. Điều thú vị là thành phần loài cá của các con suối có sự khác biệt qua kết quả thu mẫu và phân tích mẫu.

Tổng số có 248 loài bướm được ghi nhận, thuộc 10 họ. Có 2 loài vừa được mô tả và công bố loài mới cho khoa học là *Stichophthalma uemurai* và *Aemona falcate* đã ghi nhận trong khảo sát thực địa. Có 9 loài thuộc 4 họ đã được tìm thấy lần đầu tiên ở vùng núi Đà Lạt . Một vài loài ghi nhận trong chuyến khảo sát này thậm chí chưa từng ghi nhận ở miền trung Việt Nam. Ví dụ như trước cuộc khảo sát tiến hành năm 2006, loài *Flos apidanus* chỉ được ghi nhận ở miền nam Việt Nam. Thảm thực vật ven sông là nơi có khu hệ bướm phong phú nhất của vườn – gần 70% các loài bướm được tìm thấy ở sinh cảnh này, so với 33% ở rừng tre nứa, 32% ở rừng thường xanh và 10% ở sinh cảnh bìa rừng. Nhìn chung là sự phong phú của các loài bướm càng giảm dần khi mà độ cao càng tăng. Ở các độ cao thấp có thành phần loài bướm càng đa dạng.

Rừng và sự đa dạng sinh học của Vườn đang gặp phải rất nhiều các mối đe dọa. Theo dự án IWBM, quần thể của các loài quan trọng đã giảm đi đáng kể trong khoảng thời gian từ năm 2005 tới năm 2008. Khi mà vườn mới nâng cấp thành Vườn quốc gia, mối đe dọa nghiêm trọng nhất trong thời gian này chủ yếu do hoạt động săn bắn và đặt bẫy thú rừng vì sinh kế do các thợ săn và những người thợ khai thác gỗ trong địa phận của Vườn quốc gia và vùng đệm; khai thác gỗ cũng diễn ra có chọn lọc đối với các loài cây có giá trị cao ví dụ như Pơ mu *Fokienia hodginsii*. Trong một vài năm trở lại đây, mức độ săn bắn và khai thách gỗ trái phép trong phạm vi Vườn quốc gia ngày càng gia tăng một cách đáng lo ngại, và mối đe dọa này có liên quan nhiều tới làn sóng di dân tự do và rất nhanh của người dân tộc H'mong vào sống ở vùng đệm của vườn. Cùng với đó là nhu cầu rất cao của thị trường đối với các loài động vật hoang dã và các loại gỗ quý hiếm. Tuy nhiên, hiện tại các kế hoạch xây dựng nhà máy thủy điện và xây đường đã thành những mối đe dọa lớn nhất đối với VQG, các dự án phát triển cơ sở hạ tầng đã và sẽ gây nên những ảnh hưởng xấu trực tiếp, mở rộng cửa tới những khu vực rừng nguyên sinh cho các hoạt động bất hợp pháp như: khai thác gỗ, săn bắn và chặt phá rừng để canh tác nông nghiệp.

Tín hiệu vui là đã có một vài tiến bộ đáng kể từ khi ban quản lý mới được hình thành năm 1998 và đặc biệt là năm 2002 sau khi từ khu bảo tồn Chu Yang Sin đã được nâng cấp lên thành Vườn quốc gia Chư Yang Sin. Ủy ban nhân dân tỉnh Đak Lak đã nỗ lực cung cấp nhân

sự và các cơ sở vật chất cho vườn, ví dụ như việc xây dựng trụ sở mới của vườn, các trạm kiểm lâm mới. Vườn cũng hưởng lợi nhiều từ sự lãnh đạo kiên quyết từ ban quản lý VQG. Tuy nhiên, vẫn còn rất nhiều việc cần phải làm để nâng cao năng lực và giữ vững cũng như tăng cường công tác bảo tồn của vườn. Việc xây đường và công trình thủy điện trong địa phận của vườn rõ ràng là không phù hợp với tình trạng của Vườn Quốc Gia và cũng làm giảm đi đáng kể tầm quan trọng của Vườn đối với khu vực và quốc tế khong việc bảo vệ và mang lại các hoạt động liên quan tới môi trường như bảo vệ nguồn nước, bảo tồn đa dạng sinh học và lưu trữ Cacbon. Về mặt kinh tế nói riêng, lợi ích lâu dài các dịch vụ này sẽ lớn hơn rất nhiều so với các các lợi ích trước mắt mà việc xây đường và các công trình thủy điện mang lại. Đây là vai trò của các cấp lãnh đạo địa phương và quốc gia để tìm ra một sự cân bằng tốt hơn giữa việc phát triển các công trình hạ tầng và công tác bảo tồn hơn là những gì đã thực hiện.

Phần trọng tâm của tầm nhìn lâu dài cho Vườn là việc mở rộng diện tích, bao gồm cả những khu rừng nằm liền kề hiện đang thuộc quyền quản lý của rất nhiều cấp khác nhau, trong đó có cả Khu bảo vệ cảnh quan Hồ Lak, Công ty Lâm nghiệp Lak và Công ty lâm nghiệp Krông Bông. Các ban quản lý của các cơ sở lâm nghiệp này hiện còn đang thiếu chuyên môn, năng lực và các nguồn tài chính để tiến hành công tác quản lý một cách thích hợp và hiệu quả. Vì thế, việc mở rộng diện tích này sẽ là một cơ hội vàng để điều phối việc quản lý bảo tồn một diện tích rừng rộng lớn và mang vào đó những sáng kiến cải thiện cho cộng đồng địa phương để họ có thể cùng tham gia vào quá trình quản lý rừng. Ví dụ như thông qua sự quản lý rừng cấp cộng đồng mà sự đồng quản lý và phát triển du lịch sinh thái tại cộng đồng được mở rộng. Những hướng tiếp cận này có thể giúp cân bằng việc sử dụng bền vững bảo tồn đa dạng sinh học với sự bảo vệ các dịch vụ môi trường như bảo vệ nguồn nước và lưu trữ cacbon, cả hai đều mang lại những nguồn lợi tương lai quan trọng cho công tác quản lý, bảo vệ rừng.

Về lâu dài, nguồn tài chính cho Vườn dù vườn có mở rộng hay không cũng sẽ cần thêm nhiều nguồn tài chính hơn nữa. Cũng quan trọng không kém là sự cam kết nhiều hơn từ phía các nhà lãnh đạo ra quyết định cấp quốc gia và cấp tỉnh nhằm đảm bảo rằng tính đa dạng sinh học độc nhất vô nhị và cá giá trị môi trường của VQG không bị xuống cấp bởi tầm nhìn hạn hẹp, chỉ chú tâm vào phát triển cơ sở hạ tầng. Tuy vậy trong những năm gần đây đã có một vài tiến bộ đáng kể trong công tác quản lý bảo tồn ở Vườn, đi cùng với sự lãnh đạo địa phương mạnh và nhận thức ngày càng tăng về các giá trị đa dạng sinh học đặc biệt của Vườn, tương lai của Vườn trở nên rất hứa hẹn. Những thử thách lớn nhất vẫn còn tồn tại và chúng chỉ có thể được giải quyết nếu những tiến bộ được duy trì và phát triển trong tương

lai. Điều này đòi hỏi phải có một sự một sự cam kết lâu dài từ phía chính quyền quốc gia, tỉnh và huyện nhằm củng cố pháp luật, đảm bảo rằng việc phát triển cơ sở hạ tầng không tàn phá hệ sinh thái của vườn và huy động những nguồn tài trợ cần thiết cho các công tác bảo tồn hợp lý. Những tiến bộ trong các năm qua đã cho thấy những nỗ lực có trọng tâm và mang tính cam kết cùng với nguồn tài chính có thể tạo ra những tác động nhìn thấy được. Hi vọng rằng tài liệu này sẽ khuyến khích thêm nữa những nỗ lực xa hơn nhằm bảo tồn Vườn, tính đa dạng sinh học độc đáo và các dịch vụ môi trường mà Vườn mang lại cho hàng triệu người sử dụng nguồn nước ở vùng hạ lưu.

Chapter 1

Introduction

Purpose

This report seeks to bring together information on the National Park's biodiversity, the threats it faces and on ongoing and future conservation management. The report is targeted at a broad range of readers. These include local and national decision-makers to promote awareness of the ecosystem values of the Park and the need for sensitive and appropriate approaches to economic development. It is hoped that conservation planners, including those at provincial and national level, will benefit from clear documentation of the Park's biodiversity values and a sharing of ideas on management and monitoring aspects. The wider public, including universities and colleges are another important audience and it is hoped this report will encourage interest in the significant research and learning opportunities that the Park offers. Currently, tourism is limited to a small amount of recreational tourists but in future, the Park may well make a substantial contribution to provincial and local economic development through ecologically-sensitive tourism development. It is hoped this report will help encourage efforts to promote the tourism potential of the Park

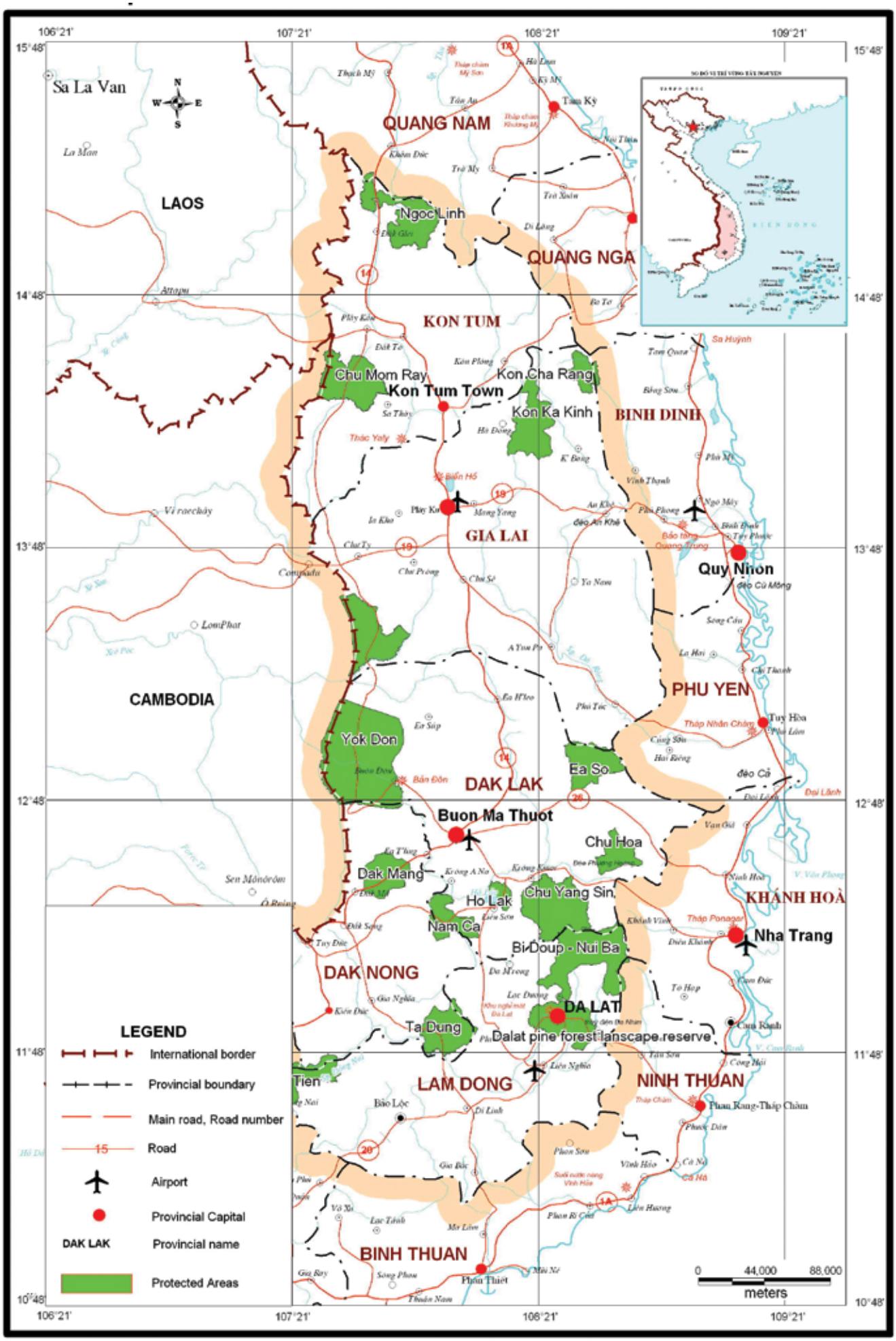
This report provides an overview of the internationally-important biodiversity and ecosystem service values of Chu Yang Sin National Park (hereafter termed 'the Park'). The Park also protects one of the largest remaining blocks of intact forest on the Da Lat Plateau - forests that are vital for the protection of the upper watershed of the Srepok River, one of the largest tributaries of the Mekong. The Park protects contiguous forests along the the greatest possible intact altitudinal gradient remaining on the Da Lat plateau from 600 m to 2,440 m. Together with the adjacent Bi Doup Nui Ba National Park, the Park protects montane forests with globally-significant conservation value on the Da Lat Plateau.

The land and forests that now comprise the Park were designated as a nature reserve by statute of the Government of Vietnam in 1986[1] and the government prepared a management 'feasibility study[2] in 1993 shortly after the Vietnam Biodiversity Action Plan (BAP)[3] was completed. The Reserve was decreed by law in 1986,[4] but there was no management authority for the reserve until 1998 when the provincial government established a management board. On 31 July 2002, the Government of Vietnam upgraded Chu Yang Sin from nature reserve to national park status.[5]

The Park is located in the central highlands of Vietnam in Krong Bong and Lak Districts of Dak Lak Province 60 km southeast of Buon Ma Thuot City (Map 1). The Park covers 11 communes[6] and is bordered to the south by Bi Dup Nui Ba National Park and Da Nhim Watershed Protection Forests in Lam Dong Province, and to the west by the Lak Lake Landscape Protection Forest. Elevations range from less than 600 m to 2,442 m elevation at the summit of Mount Chu Yang Sin. The total area of the nature reserve was 59,278 ha at establishment, but subsequent decrees and decisions have reduced its size to 58,947 ha, mostly as a result of land de-gazetted from the Park in 2005 for hydropower development.

The Park is located in a transitional landscape between the Dak Lak lowland plain and the central highlands and is the largest protected area on the Da Lat Plateau. The Plateau is classed as a distinct bio-geographic unit within the South Annam bio-geographic province[7]. The Park is dominated by several peaks over 2,000 m elevation, including Mount Chu Yang Sin at 2,440 m, one of the highest peaks in the central highlands. Between the highland peaks and the lowland plain to the northwest is a complex of rolling hills, narrow tablelands and flat-bottomed valleys.

Map 1: Chu Yang Sin National Park in the central highland provinces



The Park plays a key role in protecting the upper catchments of one of the word's most important and productive riverine systems, that of the Mekong River. The forests of the Park are drained by the Ea K'Tuar and Ea Krong Kmar streams, which flow north to join the Ea Krong Ana River. Streams in the south of Chu Yang Sin flow into the Krong No River. Both the Ea Krong Ana and Krong No Rivers flow west and north before joining the Srepok River[8]. This tributary then merges with the Sesan River before meeting the mainstream of the Mekong near Stung Treng in Cambodia.

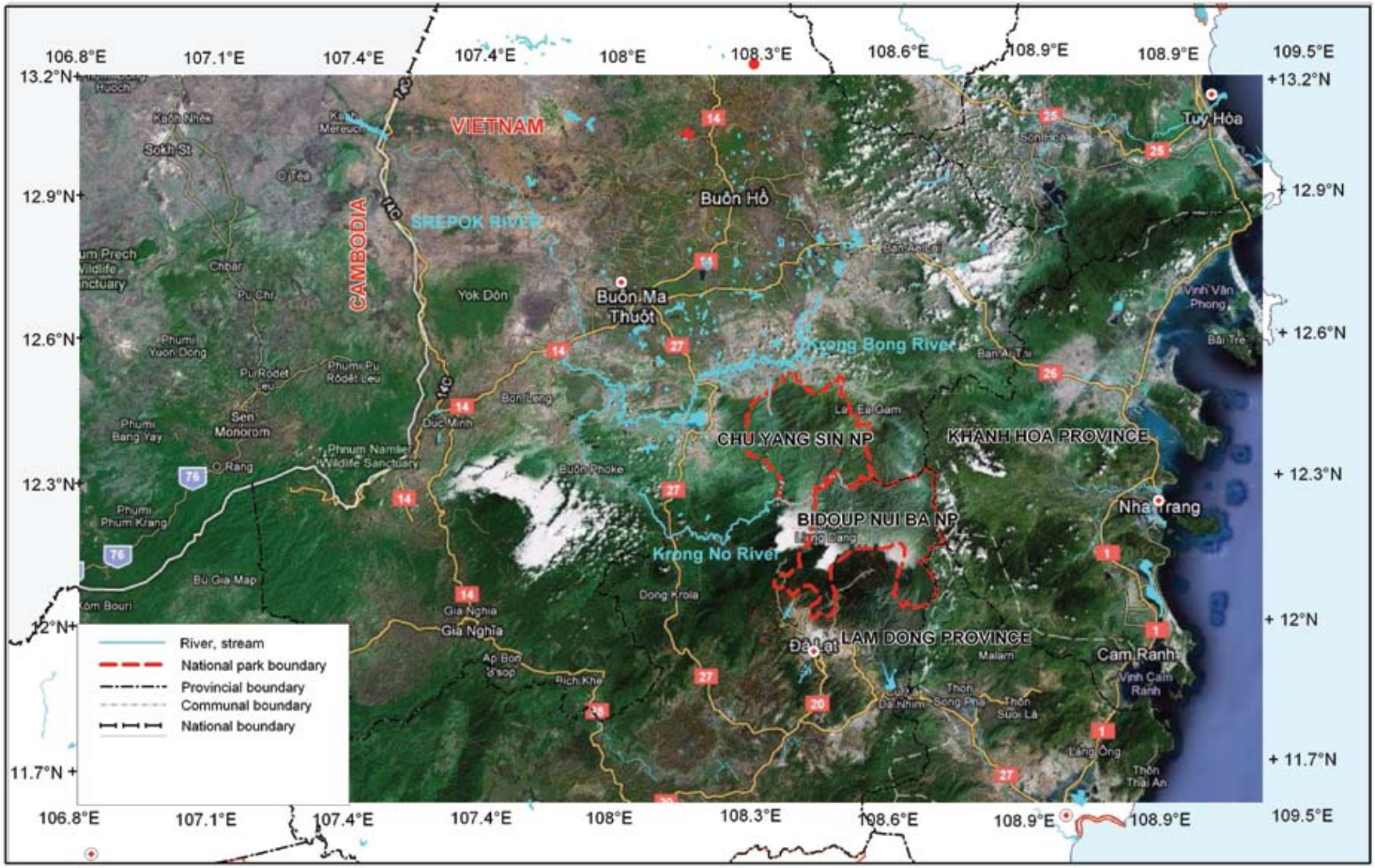
The landscapes of Krong Bong and Lak Districts have undergone major changes since the end of the war in 1975. Prior to the war, extensive dipterocarp forests covered the lower hill slopes and valleys and it is likely that these forests were inhabited by healthy populations of large mammals (including Asian Elephant *Elephas maximus,* Gaur *Bos gaurus,* and Tiger *Panthera tigris*) and other wildlife species. Indigenous M'nong and Ede people inhabited the area, growing rain-fed rice on the valley floors and swidden agriculture on higher ground and hillsides. Their impact on forests and wildlife was limited because they lacked saws and guns and because population density and thus demand on the forests was low in relation to the size of these forests. Since the 1970s, there has been a general movement of people down from the hills into the valleys supported in part by government programmes both during and after the war. Irrigated wet rice and animal husbandry was introduced to the region by the government, and as part of this process, Kinh (ethnic-Vietnamese) people from the north moved into the region. The large numbers of Kinh people who migrated into the buffer zone have pushed many of the Ede and M'Nong off the better lands around the Park.

Commercial-scale logging of the dipterocarp forest started in 1978 and continued until 1994. Cropping activities were further concentrated following the 1993 land law, which banned shifting cultivation and granted land-use certificates to villagers for agricultural land around the Park. Most hillside swiddens on the lower slopes were abandoned following these changes but their mark on the forests is still evident by the band of bamboo re-growth that has developed on the abandoned swidden land and this now separates the forest of the Chu Yang Sin hills from settled agricultural areas in many areas, especially in Krong Bong District.

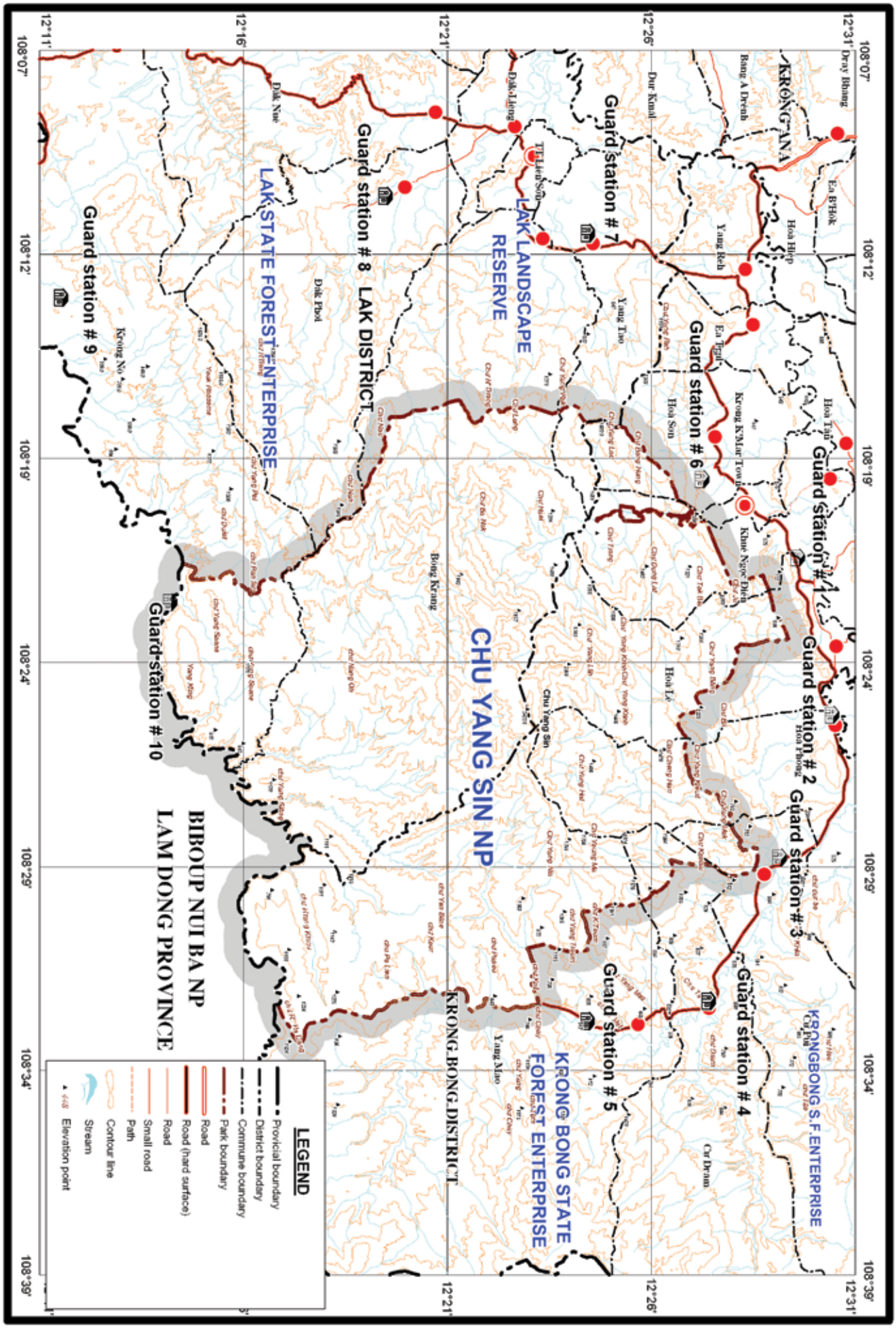
The designation of Chu Yang Sin as a nature reserve in 1986 curtailed legal access to the forests for subsistence use – at least on paper. In reality, the province lacked the resources to enforce this change in forest management. Whilst the change eventually curtailed commercial logging operations inside the Park, local exploitation continued more or less as before and it was the prohibition of shifting cultivation by the Land Law in 1993 that had the most significant impact on levels of local use. More recently, the arrival of spontaneous migrants of H'mong ethnicity from northern provinces is placing new pressures on land availabililty, forests and wildife populations of the Park. By 2008, there were 12,000 such migrants in Krong Bong District and this figure continues to grow rapidly[9].

The establishment of a fully-functioning management board for the Park offers the prospect of a higher level of enforcement activities. Curtailment of hunting of high conservation value species and illegal logging of *Fokienia hodginsii* and other species for commercial gain are current conservation priorities, but there is also a realisation that the needs of ethnic groups with a long history of customary uses of forest resources need to be addressed. The management board is promoting the use of direct conservation payments for protection activities under the National Target Programme on Forests and in future, it is likely that various forms of co-management will be needed to strike an appropriate balance between customary uses and and global and national conservation priorities. Such arrangements are not yet permitted under national legislation but ongoing policy reforms make this a real possibility in the not-too-distant future.

Map 2: Chu Yang Sin and the upper watershed of the Srepok River



Map 3: Topographical map showing roads, guard stations, highest peaks and main biodiversity field survey locations



Globally-important values

Available evidence suggests that the forests of Chu Yang Sin are a centre of active speciation[10] and one of the main reasons why the Park is considered to be globally-important for biodiversity conservation. The Park supports all of the eight restricted-range species that define the Da Lat Plateau Endemic Bird Area (EBA) in which the Park is located (Box 1 provides more background on EBAs worldwide). The global ranges of three bird species and a larger number of sub-species are confined to the Da Lat Plateau EBA. Based on current knowledge, Chu Yang Sin is biologically the richest mountain in the Da Lat Plateau EBA.

International support

By global standards, the National Park is very new and much work is still needed to improve our understanding of the Park's biodiversity, to inform conservation management and to generate public interest in conserving the Park. This information is also needed to engage and persuade officials at national, provincial and district level whose decisions are already beginning to shape the future of the Park.

BirdLife International has been working with the Government of Vietnam since the early 1990s. Early support focused on developing better information on the biodiversity of Vietnam's key habitats. These efforts were

Box 1: Endemic Bird Areas (EBAs)

Most species on Earth are quite widespread and have large ranges. However, a minority of the world's species have small, restricted ranges, being confined to a particular area, and they are thus said to be endemic to that area. EBAs contain nearly all of the world's restricted-range (defined as species which have a total historical breeding range of less than 50,000 square kilometres) bird species – only 7% of restricted-range species do not overlap with other such species and therefore do not occur in EBAs. BirdLife has identified 218 regions of the world where the distributions of two or more of these restricted-range species overlap. These regions of overlap, which are relatively rich in endemic bird species compared to other parts of the world, are termed Endemic Bird Areas (EBAs). The majority of EBAs are also important for the conservation of restricted-range species from other animal and plant groups. For example, there is an overlap of seventy percent between the location of EBAs and areas which are similarly important for endemic plants globally. Examples of such endemic plant species in the Park include *Pinus dalatensis, P. krempfii, Rhododendron langbianense* and several species of orchids, including *Agrostrophyllum breviceps.* Globally, the unique landscapes where restricted range species occur amount to just four and a half percent of the earth's land surface.

supplemented from the mid 1990s onwards with conservation support to specific high value conservation areas, of which Chu Yang Sin National Park is one. Surveys of the Park and adjacent watershed forests started in 1993 with support from World Wildlife Fund (now World Wide Fund for Nature – WWF). These early surveys confirmed the extreme conservation importance of this area and the findings prompted collaboration between Dak Lak Province, BirdLife International and the World Bank on the preparation of a project to provide basic support for Park management within the context of the watershed. Funding was approved by the Global Environment Facility (GEF) in 2005, since which time BirdLife International and the management board for the Park have been working together closely (Box 2). Considerable progress has been made over recent years. The Park now has a much higher profile at provincial and national level and has also attracted researchers from other national and international institutions, including the Forest Inventory and Planning Institute (FIPI), the Institute of Ecology and Biological Sciences (IEBR), the Vietnam Academy of Science and Technology, the Russian Academy of Sciences and the Vietnam – Russia Tropical Science Centre.

In 2006, the Provincial Peoples Committee of Dak Lak Province made a substantial funding commitment for basic staffing of the Park and infrastructure such as a new Park headquarters and guard stations. However, new threats have emerged, most notably from hydropower and transport infrastructure development and from in-migration into the buffer zone. These threats now pose the major new challenge for Park managers, disrict and provincial planning authorities.

Surveys and studies

Surveys supported by the *Integrated Watershed and Biodiversity Management* (IWBM) Project have addressed many gaps in our undertanding of the Park's ecosystem. Currently, access restrictions remain to some areas including the highest peak, but much more is now known about the unique biodiversity of this Park. Exciting discoveries of species new to science continue to take place including the discovery of a new species of tree frog *Rhacophorus chuyangsinensis*[12] named recently after the mountain that gives the National Park its name and a new species of gecko (Gekkonidae) assigned to the *Cyrtodactylus irregularis* complex. Crucially, enough is now known from these surveys and other studies supported by the IWBM to build informed and sensible management strategies that should help safeguard key biodiversity of this park in future.

Prior to 2006, the main sources of information on the biodiversity of the Park came from surveys undertaken by a joint BirdLife, Institute of Ecology and Biological Resources (IEBR) and Forest Inventory and Planning Institute (FIPI) team in January 1994[13,14], a follow-up survey in 1995 and a survey undertaken as part of the preparation process for the investment plan, published in 1996. The findings of these surveys underscored the extreme biodiversity importance of this area. The surveys undertaken in 1994 and 1995 included the re-discovery of a species of babbler last recorded in April 1938 the Grey-crowned crocias *Crocias langbianis*[15] a Vietnamese endemic species now known from a handful of other sites in the central highlands. These surveys also found (in adjacent forests in Bi Doup) what was thought to be a new sub-species of the Spectacled Fulvetta *Alcippe ruficapilla.* Recent taxonomic changes now classify this as a sub-species of Indochinese Fulvetta now

Box 2: The Integrated Watershed and Biodiversity Management (IWBM) Project

Following the biodiversity surveys undertaken in 1993 and 1994 supported by WWF[16], efforts were made by BirdLife International to draw conservation attention and funding to what is now the Park. The Global Environment Facility (GEF) and World Bank decided to make a major investment in the conservation of this area via the Integrated Watershed and Biodiversity Management (IWBM) project. This project focussed on the national park and the values of the surrounding forests for watershed protection. The grant agreement was signed between World Bank and BirdLife International in June 2005. At the time of design, there was minimal local or national awareness of the Park's values in protecting watersheds and biodiversity and the direct threats at the time were mostly linked to rapid encroachment within the Park boundaries for agriculture, and high levels of hunting and illegal logging. For these reasons, the project aimed to:

- Establish public support and effective management for Chu Yang Sin National Park.
- Promote integrated watershed and biodiversity management.
- Stabilise the interface between natural and agricultural landscapes,
- Support the efforts of the management board to protect key biodiversity values.
- Create the conditions necessary for realising the future development benefits of the Park.

During early implementation of the project, it became apparent that new threats had emerged. The first of these was the threat posed by infrastructure, particularly the construction of new roads and hydropower facilities that are now beginning to 'open-up' previously inaccessible areas of forests for illegal exploitation especially logging and hunting of high value species. The second new threat is posed by a new round of in-migration, most recently by ethnic H'mong people from the northern provinces of Vietnam. These new in-migrants are placing increased pressure on natural resources in the buffer zone of the Park and have proved adept at illegal logging and hunting, the former driven by strong market demand from illegal sawmills and wood traders active in the buffer zone of the Park. H'mong in-migrants have been involved in some of the most significant recent cases of illegal exploitation including a case in 2007 when over 55 Black-shanked douc langur *Pygathrix nigripes*, a globally endangered primate species, were confiscated from H'mong hunters. The skins and bones of these animals were reputedly destined for medicinal 'glue' manufacture– a fact that draws attention to the difficulties facing enforcement when such small financial incentives drive such strong illegal demand.

The IWBM project has helped the Park management authorities to address these new threats by supporting better environmental planning and management of infrastructure development; and providing support for strengthening the Park's patrolling and enforcement systems.

confirmed to also occur in the Park. These latter discoveries came at a time of growing awareness of the biodiversity importance of Vietnam's rapidly-diminishing forests and at a time when Vietnam was gradually beginning to 'open-up' to biologists and conservationists.

The information presented in subsequent chapters was assembled from the surveys mentioned above, and then extensively supplemented by subsequent surveys supported by the IWBM project. The first of these field surveys were undertaken in 2006[17] and the last completed in December 2009. The surveys undertaken in 2006 included studies of vegetation and flora, mammals (including bats), birds, fish and butterflies. The first area to be surveyed in 2006 were the south-eastern mountain ranges, including the west part of Yang Mao Commune, Krong Bong District and east part of the Bong Krang Commune, Lak District, Dak Lak Province. The second area surveyed were the north-eastern mountain ranges including parts of Cu Pui and Hoa Phong communes, Krong Bong District. These areas are dominated by three habitat types: lowland evergreen forest between 500 m and 900 m above sea level; lower montane evergreen forest (900 -1,800 m); and upper montane evergreen forest (1,800 to 2,405m). Forests in this area are relatively undisturbed, as evidenced by the presence of large tree species of high economic value such as *Dacrycarpus imbricatus* and *Fokienia hodginsii*. The fish survey looked at the two main river systems, the Dak Tuar and Krong Kmar in the core zone and the Krong Bong river in the buffer zone of the Chu Yang Sin National Park. The butterflies were surveyed in the lowland and lower montane forests in the Cu Pui and Hoa Phong areas.

There are still limitations and uncertainties associated with the information and data presented in this report. In most part, this reflects incomplete knowledge of biodiversity at national and regional levels, making comparisons with other areas difficult, and also incomplete or uncertain taxonomies of some species groups, most notably plants and fish. Nonetheless, it is now known that the flora and fauna of Chu Yang Sin National Park is very species rich, and is characterised by high levels of endemism (Table 2). The Park protects lower, hill and montane forests of the Indo-Malayan realm. To date a total of well-over 900 species of vascular plant have been recorded in the Park, 486 vertebrate species, comprising 67 species of mammal, 250 species of bird, 58 species of reptile, 54 species of amphibian and 81 species of fish. In addition, 248 species of butterfly have been recorded in the National Park (although information on butterflies is far from complete). Species lists for all groups are included in Annex 1.

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[2] A feasibility study is intended to enable decision-makers to decide whether a site should become a candidate for inclusion on the list of Special-use Forests (nature reserves and national parks currently being the only subcategories for strict protected areas). If a site is deemed suitable for designation as a Special-use Forest and is approved at the provincial level, an investment plan can be prepared.

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[5] **Decision No. 92/2002/QĐ-TTg** issued by the Prime Minister

[6] Yang Reh, Ea Trul, Hoa Son, Khue Ngoc Dien, Hoa Le, Hoa Phong, Cu Pui, Cu Dram and Yang Mao in Krong Bong District, and Yang Tao, Bong Krang, Dak Phoi and Krong No in Lak District.

[7] Systematic conservation planning frameworks at the global scale employ hierarchies of planning units. Conservation planning in the Indo-Malayan realm is based on the Dasmann-Udvardy biogeographic framework, namely a spatial hierarchy of biogeographic realm, biogeographic province and biogeographic unit (biounit).

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[9] Lindskog, E. (2008). **Assessment of traditional forest resource use by local communities, and impacts of establishment of Chu Yang Sin National Park.** Hanoi: BirdLife International *in Indochina*.

[10] Speciation is the evolutionary process through which new species arise.

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Chapter 2

Forests and Vegetation

Forest cover

The dominant vegetation type in the Park is broadleaved evergreen forest and the Park protects the largest block of this forest type on the Da Lat Plateau. This forest type covers over 38,000ha or 65% of the National Park. Broadleaved evergreen forest is dominated by members of the Fagaceae, Lauraceae, Meliaceae and Illiciaceae families with a canopy height often in excess of 35 m. This habitat is characterised by the presence of emergent coniferous trees along ridgelines such as *Pinus krempfii* and *P. dalatensis*. Figure 1 provides a profile of this forest type. Another conifer species *Fokienia hodginsii* grows in single species stands on certain ridges, particularly along the northern side of the Chu Yang Sin range in the centre of the Park, between Chu Banak to Chu Yang Nia and Chu Pui. It is thought that there are approximately two thousand mature *Fokienia hodginsii* in the Park[18] making this perhaps the most important site for this species remaining in Vietnam.

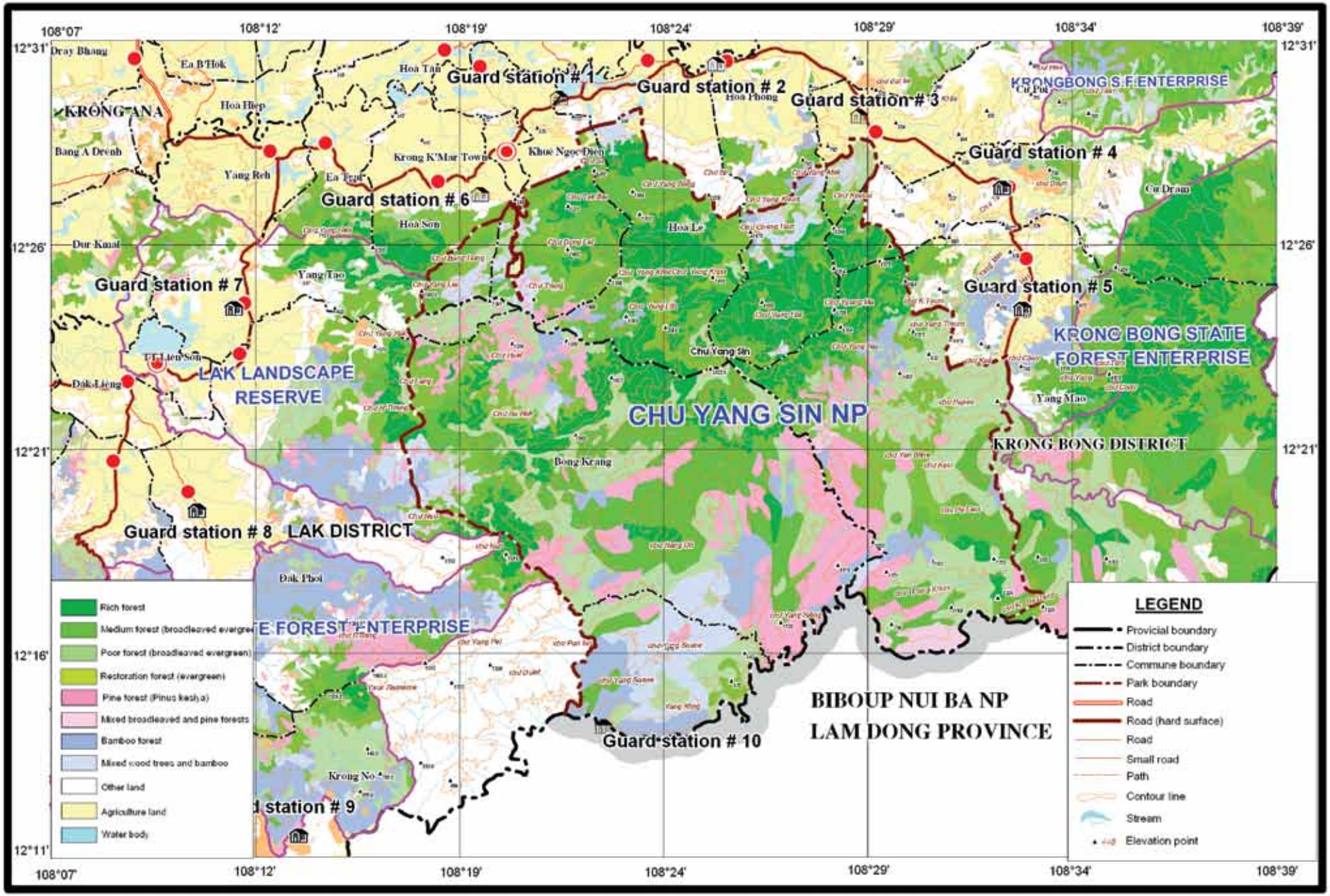
The wide altitudinal range, varied topography and past forest management practices give rise to a patchwork of different forest habitat types. Map 2 shows forest cover by different forest types in the Park and upper watershed based on Spot satellite image analysis prepared by the IWBM project. Broadly speaking, at elevations below 900 m, the Park protects lowland semi-evergreen forest, characterised by *Lagerstroemia calyculata* and *Terminalia nigrovenulosa*, and lowland evergreen forest, dominated by *Hopea odorata*, *Dipterocarpus alatus* and *D. turbinatus*. Canopy height for this type of forest exceeds 30 m. Sub montane and montane evergreen forest is widely distributed above 900 m, and dominated by members of the Fagaceae and Lauraceae. Montane evergreen forest is characterised by a higher proportion of gymnosperms, such as *Pinus dalatensis*, *P. krempfii*, *P. kesiya* var. *langbianensis, Podocarpus imbricatus* and *Fokienia hodginsii*. Canopy height is usually in the range of 20-30 m and decreasing with altitude. On mountain summits and ridge lines, elfin forest formations are distributed, dominated by *Lyonia annamensis*, *Lyonia ovalifolia* and the dwarf bamboo *Arundinaria* sp. Coniferous forest, dominated by *Pinus kesiya*, occupies more than 10,600 ha of the Park. The species grows in pure stands on well-drained exposed ridges and also grows as a secondary vegetation type in areas subject to periodic burning. A significant proportion of the Park supports bamboo forest, often colonizing areas formerly used for swidden farming and now regenerating slowly back to forest. These areas are dominated by *Oxytenanthera nigrociliata* and *Bambusa procera*. Open secondary growth, scrub and grassland cover less than 1% of the total area of the National Park[19].

Descriptions of main forest types

Lowland broadleaved evergreen forest

Lowland semi-evergreen forest is distributed at elevations below 800 m. This forest type covers less than 3% of the Park and has been much reduced by clearance for agriculture prior to the designation of the Park. The dominant species of this forest formation are members of the Dipterocarpaceae such as *Hopea helferi*, *Dipterocarpus alatus* and *D. turbinatus*; and Meliaceae, Sapindaceae, Caesalpiniaceae, Fabaceae, Mimosaceae, Euphorbiacea and Fagaceae. Canopy cover is in the range of 50-90%. Figures 1 and 2 provide profiles of this forest type from lowland and lower montane

Map 4: Forest cover in Chu Yang Sin National Park and buffer zone



elevations (respectively).

Montane and Sub -montane forest

At altitudes above 900 m, lowland evergreen and coniferous forests begin to give way to sub montane and eventually montane forests. The canopy heights of these types of forests declines with increasing altitude in response to thinner soils, lower temperatures and increasing exposure to wind. At 1,780 m, mean canopy height was found to be around 12 m in some areas, with *Pinus dalatensis* and *Fokienia hodginsii* comprising the emergent species in the canopy. Figure 3 provides a profile of this forest type. At this altitude, the vegetation consists mainly of broadleaf species. Shrubs include species of the family Arecaceae, such as *Licuana* sp.. Plant families in this area include, primarily Orchidaceae, Melastomataceae, Zingiberaceae, Cyberaceae. Regenerating tree species are principally of *Podocarpus neriifolius*, *Dacrydium elatum* and *Fokienia hodginsii*. In another area at the same altitude (1,780 m), the canopy was found to reach 25 m and the forest stratified into two or three layers. *Fokienia hodginsii* and *Pinus krempfii* were the common emergent species, with lower tree layers containing species of Fagaceae, Lauraceae, Theaceae and Hamamelidaceae. The canopy tree layer consisted of species

Figure 1: Profile of forest at 574 m altitude

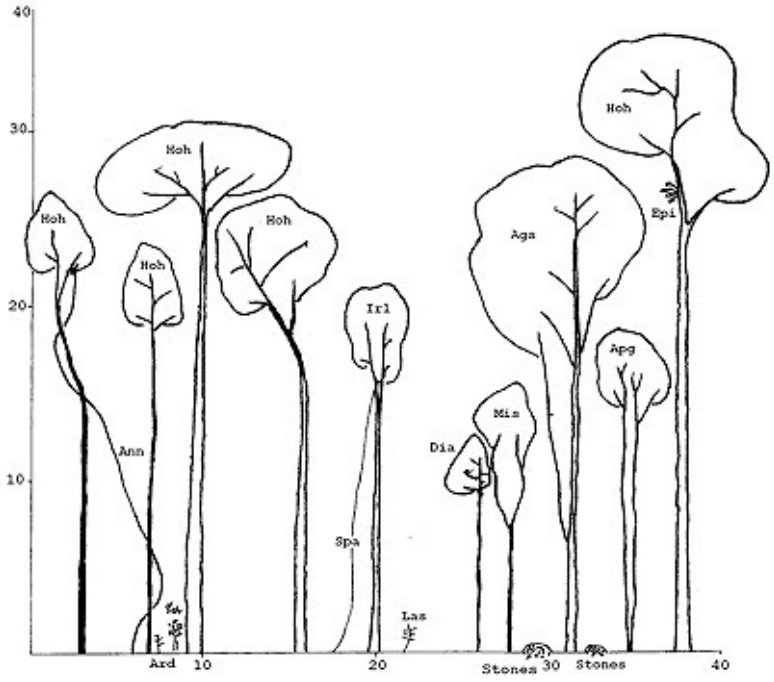
Dia = Dipterocarpus alatus *Epg = Epipremnum giganterum* *Drg = Dracaena gracilis*	*Gao = Garcinia oblongfolia* *Hoh = Hopea helferi* *Sch = Schizostachyum dullooa*	*Spa = Spatholobus harmandii* *Syw = Syzygium wightianum*

from the Illiciaceae and Ericaceae families and the shrub layer included species from families such as Melastomataceae, Rubiaceae and Celastrabiaceae and Celastraceae. The ground layer includes species of *Sonerina* sp. and *Dicranopteris linearis*. Elfin forest is found at the highest elevations, along the mountain ridge from Chu Phan Phan to Chu Yang Sin peak. Trees in this forest type exhibit stunted and xerophytic morphology due to strong winds, low nutrient availability and thin soils. Figure 4 illustrates the structure of this forest type at 2,181m.

Coniferous forest

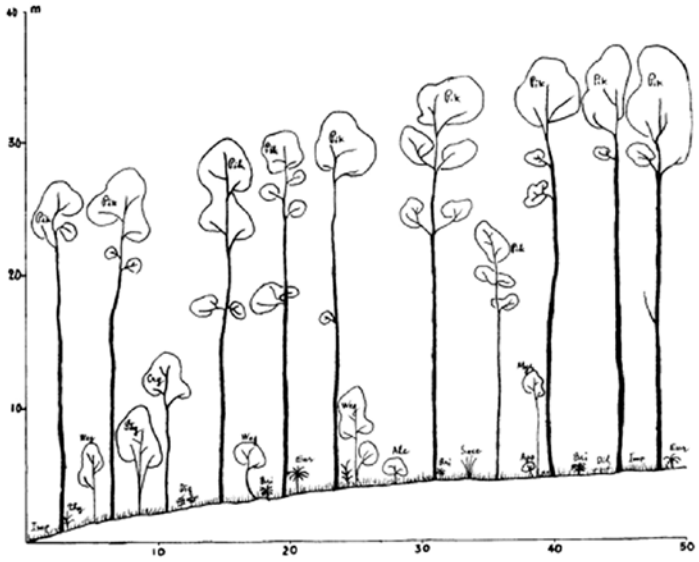
Coniferous forest dominated by *Pinus kesiya* comprises a distinctive forest type in the Park. This fire climax vegetation has a grassy understory and is maintained by regular burning. It covers nearly 7,000 ha or 12% of Chu Yang Sin National Park, with other Gymnosperm species, such as *Cycas insignis* also distributed widely.

Figure 2: Profile of forest at 744 m altitude



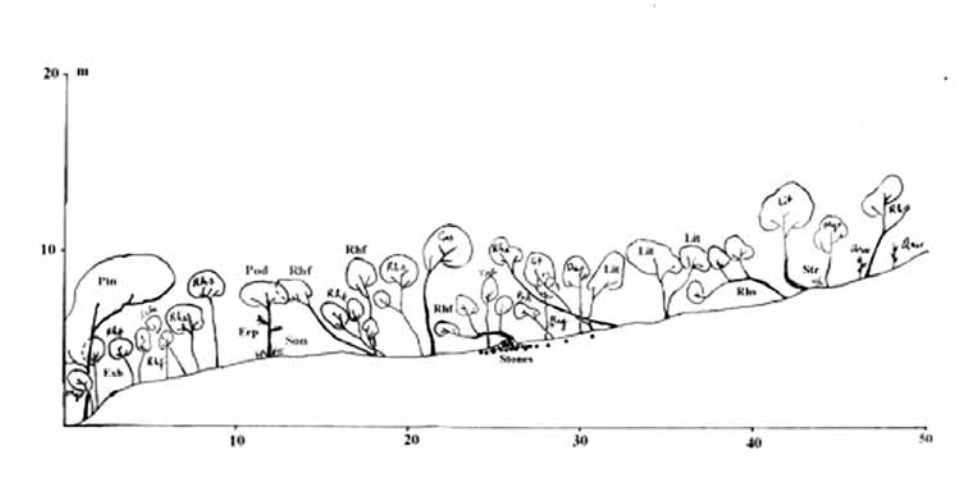
Ags = Aglaia spectabilis	*Car = Caryota mitis*	*Las = Lasianthus balansae*
Ann = Annonaceae	*Dia = Dipterocarpus alatus*	*Mis = Mischocarpus sundaicus*
Apg = Aphanamixis grandiflora	*Hoh = Hopea helferi*	*Spa = Spatholobus hasmandii*
Ard = Ardisia crenata	*Ire = Irvingia malayana*	*Epi = Epipremnum giganteum*

Figure 3: Profile of coniferous forest at 872 m altitude



Alc = Alchornea tiliaefolia	*Dis = Dicranopteris spendida*	*Sacc = Saccharum spontaneum*
Apo = Aporosa serrata	*Eur = Eurycoma longifolia*	*Sty = Styrax benzoin*
Cry = Crypteronia paniculata	*Imp = Imperata cylindrica*	*Thy = Thysanolaema maxima*
Bri = Brainea insignis	*Myr = Myrica esculenta*	*Weg = Wendlandia glabrata*
Dil = Dicranopterio linearis	*Pik = Pinus kesiya*	

Figure 4: Profile of elfin forest at 2,818 m altitude



Aru = Arundinaria sp.	*Myr = Myrsine segninii*	*Sche = Schefflera aff. lucescens*
Cas = Castanopsis aff. chevalieri	*Pod = Podocarpus neriifolius*	*Son = Sonerina neodriessenioides*
Erp = Eria paniculat	*Pin = Pinus dalatensis*	*Str = Strolanthes pennstemonoides*
Exb = Exbucklandia populnea	*Rha = Rhododendron arboreum delavayi*	*Vab = Vaccinium bracteatum*
Dap = Daphniphyllum glaucescens	*Rhf = Rhododendron flleuryi*	*Mag = Magnoliaceae*
Lit = Lithocarpus echinocarpus	*Rhs = Rhododendron aff. sororium*	

Species richness

The high altitudinal range and varied topography gives rise to high vascular plant diversity (Table 1). Le Trong Trai *et al*. (1996)[20] counted a total of 876 vascular plant species belonging to 475 genera, and 142 families of four plant phyla. A survey report compiled in 2003 notes slightly higher species richness comprising 948 species, 591 genera and 155 families of five plant phyla for the Park[21,22].

Table 1: Vascular plant species richness at the Park

Phylum/class	Le Trong Trai *et al.* (1996)			Anon. (2003)		
	Family	Genus	Species	Family	Genus	Species
Lycopodiophyta	2	2	4	2	4	7
Equisetophyta	-	-	-	1	1	1
Polypodiophyta	13	18	32	13	20	35
Pinophyta	5	7	15	5	10	17
Magnolyophyta						
Magnoliopsida	107	342	591	116	360	644
Liliopsida	15	106	234	18	228	244
Total	142	475	876	155	623	948

Gymnosperm[23] flora of the Park is particularly rich in the Vietnamese context. The Park supports populations of one third (eleven species) of the total number of conifer species known to occur in Vietnam (Table 2) and eighteen species of Gymnosperms in total. For this reason, the botanical components of the 2006 and 2007 surveys focussed mostly on this group of species[24,25]. Of these species, ten are listed in the IUCN Red List[26] and eight species are included in Vietnam's red data book[27]. The status of these species, globally, nationally and at Chu Yang Sin National Park is summarized in Table 3.

Table 2: Numbers of conifer taxa in Vietnam and in the Park

Family	Vietnam*		CYSNP			
	Genus	Species	Genus	%	Species	%
Cephalotaxaceae	1	1	0	0	0	0
Cupressaceae	8	8	1	13	1	13
Pinaceae	5	12	2	40	6	42
Podocarpaceae	4	6	2	50	4	67
Taxaceae	2	6	0	0	0	0
Total	20	33	5	25	11	33

Follows Nguyen Tien Hiep *et al.* (2004)[28]

Table 3: Conservation status of Gymnosperms found in the Park

Species of conservation concern	Conservation status	Status throughout range	Status in Chu Yang Sin National Park
Dacrydium elatum	Globally lower risk/ Least Concern	This species is thought to being undergoing a continuing rapid population decline as a result of illegal exploitation for commercial use and a reduction in the extent and quality of montane forests.	Found scattered in small numbers with other coniferous species such as *Nageia wallichiana*, *Pinus dalatensis*, and *P. krempfii*, together with species of some tropical Asiatic angiosperm families such as Fagaceae and Lauraceae. These species form the lower montane sub-tropical vegetation type that is found in the Cu Pui and Hoa Phong areas. The data collected in the plots indicated a low regeneration rate of this species.
Nageia wallichiana	Globally lower risk/ Least Concern	This species is considered nationally Vulnerable because it is undergoing a continuing rapid population decline as a result of illegal exploitation for handicraft production (mostly for chopsticks) and other commercial uses.	Found in small numbers in almost all surveyed areas (Yang Mao, Cu Pui and Hoa Phong) in the Park. The trees found were almost all 20-25 m in height and 40-50 cm in diameter, inhabiting lower montane evergreen forests at 600 m and above. Often found together with other coniferous species such as *Dacrydium elatum*, *Dacrycarpus imbricatus*, *Podocarpus neriifolius*, *Pinus dalatensis*, and *P. krempfii*, and broad-leaved species of some tropical Asiatic families such as Fagaceae, Lauraceae, Aeraceae, and Eleocarpaceae
Pinus krempfii	Globally Vulnerable	Endemic to the south Annamites of Vietnam, this species is considered to be facing extinction as a result of illegal exploitation for commercial use and a reduction in the extent and quality of montane forests	Found only in the north eastern part of the Park and in large numbers above 1,300 m. Regeneration was not particularly high, but saplings and seedlings were found.

Species of conservation concern	Conservation status	Status throughout range	Status in Chu Yang Sin National Park
Pinus dalatensis	Globally Data Deficient	As *Pinus krempfii* (above)	Recorded at 1,500 m and higher in north eastern and south eastern parts of the Park. In the north eastern area, found in large patches on ridges from 1,500 m to Chu Yang Sin peak. Regeneration does not appear to be high and only very few seedlings and saplings were found during the surveys.
Fokienia hodginsii	Nationally Endangered/ Globally Near Threatened	Restricted to South China, Laos and Vietnam. This species is thought to be facing extinction mainly as a result of illegal logging.	Found only in the north-eastern area of the Park from 1,500 m upwards. Some very large trees (70-150 cm in diameter) with some large blocks of mature mono-specific *Fokienia* forests.

Two species of particular conservation concern emerged from the findings of the surveys. *Fokienia hodginsii* is one of these and is widely distributed in the Park. It is known in Vietnam as *Po Mu* or in English by the name Fujian cypress. *Fokienia hodginsii* is the only species in the genus *Fokienia* and usually grows as scattered individuals within broad-leaved forest above 1,400 m altitude, requiring open, light areas to regenerate and grow. Interestingly, the species in the Park only grows along narrow ridges and on mountain tops. This gives rise to a patchy distribution within the Park. The 2007 survey estimated there to be in the region of two thousand mature individuals of this species in the Park. Unfortunately, *Fokienia* timber is much sought-after for furniture making, house-building, ornaments and even for medicinal purposes and therefore commands high market prices in Vietnam. For this reason, the species is a favourite target of illegal loggers within the Park. Monitoring undertaken by the Park management board indicates that this species in now in rapid decline. The severity of this decline was underscored by the complete removal of all individuals of this species from fixed survey plots by illegal loggers during 2006. The good news is that regeneration of this species in open areas of the Park was very good, indicating that this species may recover if illegal logging can be better-controlled. The species is extremely slow-growing and so the removal of large tress, some of which might be as old as 1,000 years will nonetheless diminish the value of these forests and will have impacts on biodiversity dependent on mature specimens. Another species of conservation concern is *Calocedrus macrolepis*, known in Vietnam as *Bach xanh* and in English as Chinese incense-cedar. This is a lower elevation species categorized as vulnerable in the IUCN Red List (2009). This species is also targeted by loggers for use in furniture-making, house-building and for the value of its resinous wood as a natural insect repellent. Given that this species grows at low elevations, the species has a restricted range as a result of forest clearance for agriculture throughout the central highlands.

Elfin forest (above)
Coniferous forest (right)

Fokienia hodginsii tree, wood and leaves (opposite page)

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[21] Anon. (2003) [**Investment plan for Chu Yang Sin National Park, Dak Lak province**]. Buon Me Thuot: Dak Lak Provincial Department of Agriculture and Rural Development. In Vietnamese.

[22] Anon (2003) does not include a full plant list and so these latter figures cannot be verified. Table 3. Vascular plants reported for the Park

[23] Gymnosperms include conifers and cycads

[25] Dang Ngoc Can, Ha Van Tue, Le Manh Hung, Nguyen Truong Son, Nguyen Huu Duc, Monastyrskii, A., Do Anh Tuan, and Nguyen Duc Tu (2007) **First biodiversity report for Chu Yang Sin National Park, Dak Lak Province, Vietnam.** Hanoi: BirdLife International *in Indochina*.

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Chapter 3

Mammals

Black-shanked Duoc Langur *Pygathrix nigripes*

Overview

Sixty five mammal species have been confirmed to occur in the Park, a figure that includes twelve species of bats. Much work will be needed to determine the population status of several key mammal species. Recently - deployed camera traps and ongoing monitoring by Park rangers will help to identify additional species in the Park (Box 3). Mammals were recorded by direct observations, by examination of tracks and trails and for smaller mammals and bats, through the use of larger numbers of traps and nets of various sorts. So far, twelve mammal species found in the Park are considered globally Endangered, Near Threatened, Vulnerable or Data Deficient[29].

Large and medium sized mammals

High levels of hunting and relatively low encounter rates within the forests indicates that poplulations of most larger species of mammals are likely to be depressed and spread thinly across the forests of the Park and watershed forests. Confiscations of hunted Black-shanked Douc Langur *Pygathrix nigripes* mostly from in-migrant H'mong hunters are becoming more frequent, and this suggests that good numbers of this species are still to be found in the more remote parts of the Park and surrounding watershed forests but is also an indicator of the high threat levels facing this globally Endangered species.

Aside from species of conservation concern, various other species were confirmed during the 2006 survey on the basis of observation, vocalisation, identification of tracks, captive animals or hunting trophies, including Yellow-throated Marten *Martes flavigula*, Small Indian Civet *Viverricula indica*, Masked Palm Civet *Paguma larvata*, Common Palm Civet *Paradoxurus hermaphroditus*, Particoloured flying squirrel *Hylopetes alboniger*, Leopard Cat *Prionailurus bengalensis*, Wild Pig *Sus scrofa* and Indian Muntjac *Muntiacus muntjak*. A number of other species were also recorded in interviews with former hunters conducted during the survey but remain unconfirmed.

Box 3: Early results of camera trap monitoring

Camera traps were deployed for the first time in February 2009 to learn more about the mammals of the Park. Early results were encouraging with seven species recorded using eight cameras during the first month of monitoring. The results included some of the first photographs in Vietnam of Giant Muntjac *Muntiacus vuquangensis,* a species first discovered in central Vietnam in 1994 and about which very little is yet known. The cameras also recorded images of Indian Muntjac *Muntiacus muntjak*, Sambar *Rusa unicolor*, Bear Macaque *Macaca arctoides* and Northern Pig-tailed macaque *Macaca leonina* and two species hitherto not recorded in the Park: Leopard Cat *Priolainurus bengalensis* and Large Indian Civet *Viverra zibetha*. The cameras will be deployed once again during the 2009-2010 dry season and it is expected that this technique will continue to fill gaps in knowledge of the mammal fauna of the Park.

Giant Muntjac *Muntiacus vuquangensis* camera trapped
in Chu Yang Sin National Park.

Key species accounts

Key species are defined here as those which are globally threatened. Global conservation status information in this section is based on IUCN (2009)[30]. National conservation status is based on the Vietnam Red Data Book[31]. Mammal records from 1996 are published in Le Trong Trai *et al* (1996)[31] and records from 2006 are also published in Dang Ngoc Can *et al.* (2007).[33]

Sunda Pangolin *Manis javanica* This species is listed globally as Endangered. The species ranges over much of mainland South-East Asia, from southern Myanmar through central and southern Laos, much of Thailand, central and southern Vietnam, Cambodia, to Peninsular Malaysia, Sumatra, Java and adjacent islands to Borneo (Malaysia, Indonesia, Brunei). This species is thought to have declined precipitously over much of its range and especially since 1990 when the commercial trade in pangolins began to escalate. A specimen of this species was identified in a hunter's house in Hoa Son Commune on 28 March 2006. Informants reported that this species occurs in the Park and it is threatened by trade.

Small-toothed Mole *Euroscaptor parvidens* This species was listed as globally Critically Endangered until 2008 and is now listed as Data Deficient since very little is known about the global distribution of this species. Until its discovery in the Park, the species was known only from three widely separated sites: the Di Linh Plateau (type locality) in Lam Dong Province, Vietnam; from one site in Bac Kan Province, northern Vietnam; and southern Yunnan, China, near the border with Vietnam. It almost certainly occurs more widely, especially in places between the currently known locations. Evidence of this species' occurrence in the Park comes from two specimens caught at 980 m and 800 m altitude in evergreen forest in March 2006.

Black-shanked Douc Langur *Pygathrix nigripes* This species is listed as globally Endangered. Reasonably large populations of this species still occur in some areas of Cambodia (especially the Seima Protection Forest) but in southern Vietnam, this species survives in small, isolated forest fragments, making this species highly vulnerable to hunting and habitat loss. They are found in evergreen, semi-evergreen and semi-evergreen-mixed deciduous forest mosaics, as well as in coastal dry forest. The overall population size of this species in the Park is is not known but regular confiscations of this species from hunters indicate that reasonable numbers still remain. A group of ten individuals was observed in forest of the Hoa Phong area in March 2006 and there have been various incidents where dead specimens of this species have been confiscated by rangers from hunters operating inside the Park, including one incident in October 2009 when two dead specimens were confiscated, another incident in January 2007 when forty four specimens were confiscated, and in another in October 2009 when two specimens were confiscated (although several more were likely to have been hunted). In all cases, it is thought that the carcasses were destined for medicinal purposes or even glue making.

Northern Pig-tailed Macaque *Macaca leonina* This species is listed as globally Vulnerable and populations of this species are decreasing over much of its range. In Vietnam, it is estimated that the population has declined by about 30% in the last 30-35 years[34]. No direct sightings of the species were obtained during the field survey, but one male was observed in captivity in Village No. 4, Hoa Phong Commune, Krong Bong District. The macaque's owner said that he bought the animal from a H'mong in Cu Pui Commune. This species was listed for the Park on the basis of interview records in 1996 and was also recorded by camera traps in February 2009[35].

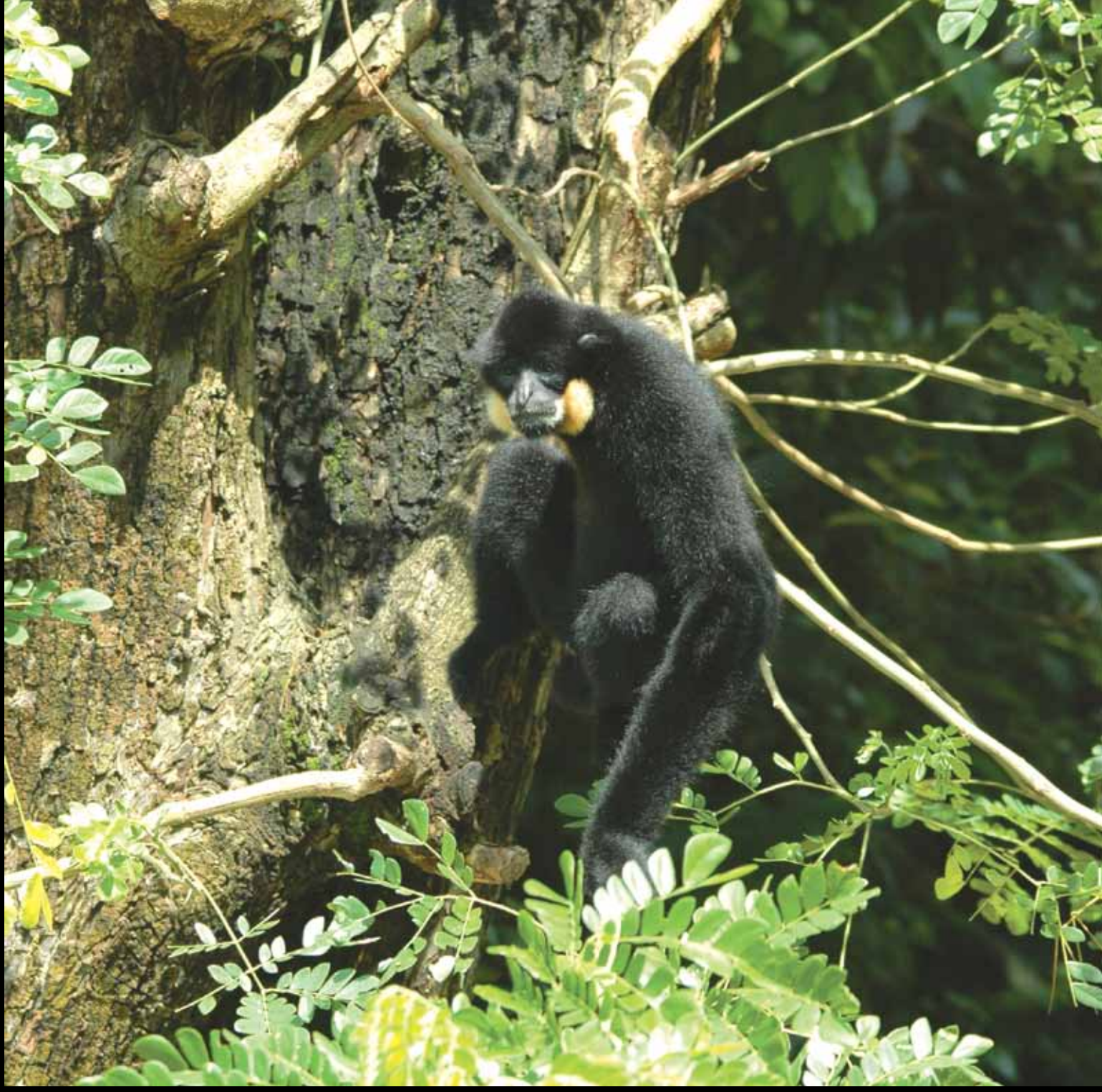
Sunda Pangolin *Manis javanica* (above)
Small-toothed Mole *Euroscaptor parvidens* (below)

Black-shanked Douc Langur *Pygathrix nigripes*

Northern Pig-tailed Macaque *Macaca leonina*

Bear Macaque *Macaca arctoides* This species is listed as globally Vulnerable. Populations of this species are critically threatened in India, declining in Myanmar, stable in Thailand, and declining rapidly in China and Vietnam. Two groups were encountered during the 2006 survey. The first group consisted of eight individuals in forest near the Dak Me stream in the Buon Dong area on 13 March 2006. Another group of seven individuals was sighted on 16 March in forest of the Buon Kieu area. In addition, three animals were observed in captivity in Krong Kmar village, Khue Ngoc Dien Commune, Krong Bong District. This species was also observed in 2006 and the species was photographed by camera traps in February 2009[36].

Yellow-cheeked Crested Gibbon *Nomascus gabriellae* This species is listed as globally Endangered. The species is highly arboreal in tall evergreen and semi-evergreen forest and usually occurs in group sizes of three to five inviduals. This species is found in central and southern Vietnam and parts of Laos and Cambodia, east of the Mekong River. The species is declining across its range. Two groups were observed during the field survey, both in forests of the Bong Krang area. The first group, one male and two females, was observed on 11 March 2006. The second group, comprising one male and one female, was observed in forest near old Buon Kieu village at 904 m on 16 March 2006. Another single male was also reported at the same forest area on 15 and 16 March 2006. Songs were often heard in the mornings during the 2006 field survey; earliest songs were heard at 06h00 and the latest at 06h59. Based on sight and vocal records, it was estimated that at least eight distinct gibbon groups occur in the areas studied during the survey. A total of six individuals were observed during the field survey in March and April 2009 in the south-west of the Park.



Yellow-cheeked Crested Gibbon *Nomascus gabriellae* male

Sun Bear *Helarctos malayanus* This species is listed as globally Vulnerable. Sun Bears occur in mainland South-East Asia as far west as Bangladesh and northeastern India, as far north as southern Yunnan Province in China, and south and east to Sumatra and Borneo, respectively. It now occurs very patchily through much of its former range, and has been extirpated from many areas, especially in mainland South-East Asia. Reliable estimates of sun bear populations across its range are lacking. However, rapid loss of forests throughout their range and an active trade in wild bears and their parts is strong evidence of a declining trend. Old claw-marks, believed to belong to this species, were found on a tree in primary montane forest on the trail from Camp No. 3 to Chu Yang Sin peak on 21 March 2006. Local informants reported that one Sun Bear was trapped by a H'mong hunter from Phung village, Cu Pui Commune in the area in 2004. The species was also recorded in 1996 on the basis of tracks. Scratch marks on the bark of trees have been discovered on two occasions. This species seems to be rare with a scattered distribution and is under significant hunting pressure.

Large Indian Civet *Viverra zibetha* This species is listed as globally Near Threatened. Populations of this species across its range in South-East Asia are thought to be in decline. In Vietnam and China, the meat of this species is sought by wildife restaurants and because this species is ground-dwelling, its is vulnerable to the large number of snares used in the Park by illegal hunters. The species was first recorded in the Park during the 2006 field survey.

Owston's Banded Civet *Chrotogale owstoni* This species is listed as globally Vulnerable because of an ongoing population decline, estimated to be more than 30% over the last 15 years due to over-exploitation, habitat destruction and degradation. Hunting is a severe threat and is estimated to greatly impact populations across most of the range. This is because the species is primarily ground-dwelling and so is exposed to the very high levels of snaring and other forms of ground-level trapping throughout its range. This species is known to occur in northern and central provinces of Laos, Vietnam and southern China in Yunnan and Guangxi provinces. The first direct observation of this species was a single individual observed inside the Park at an elevation of 1,377m on 16 March 2009. Prior to this record, the only evidence of the occurrence of this species was on the basis of a specimen kept in the National Park Headquarters reported to be made from a dead civet collected during a forest patrol in 2002. These are the southernmost records of this species.[37]

Asiatic Golden Cat *Pardofelis temminckii* This species is listed as globally Near Threatened. Global population numbers and trends for this species are poorly understood but the species is thought to be scarce and declining. The species is thought to exploit open areas of forest to a greater extent than other forest cats (such as Clouded Leopard *Neofelis nebulosa* a species that has not yet been discovered in the Park). A wounded Asiatic Golden Cat was confiscated from a trader in Hoa Phong Commune in December 2004. The cat was then released into the forest in January 2005. Another Asiatic Golden Cat was confiscated by park rangers from a local hunter and later moved to the Saigon Zoo in Ho Chi Minh City at the end of 2005.

Sambar *Rusa unicolor* This species is listed as globally Vulnerable as a result of sustained declines across its range caused by habitat loss, fragmentation and hunting for wild meat. The species has a wide range distribution as far west as India and east as far as Kalimantan, although distribution within this range is now highly fragmented. In Vietnam, the species is now rare (with the exception of Cat Tien National Park) as mostly as a result of hunting, but also habitat loss. This species was first recorded in the Park during surveys undertaken in 1993 and 1994 and has since been recorded during surveys undertaken in 1996 and 2006.

Giant Muntjac *Muntiacus vuquangensis* This species is listed as globally Endangered. The species is known only from the Annamite mountain chain and associated hill ranges of Laos, Vietnam and, on the basis of trophied antlers, eastern Cambodia. In March 2009, a male was photographed by a camera trap at an elevation of 900 m. This is the first confirmed record for the Park and perhaps the first time this species has been photographed in Vietnam. Several frontlets with antlers belonging to this species were found kept as trophies in local houses in Hang Nam village, Yang Mao Commune and near Guard Station No. 5 in Cu Pui Commune on 28 March 2006. Informants from Yang Mao and Cu Pui communes also reported the occurrence of this species in the Park.

Asiatic Golden Cat *Pardofelis temminckii*

Gaur ***Bos gaurus*** This species is listed as globally Vulnerable. The population of the sub-species *Bos gaurus laosiensis* that occurs in Myanmar (Burma), Laos, Vietnam, Cambodia, Thailand, and West Malaysia (and presumably southern China) has declined precipitously especially in Indochina and Malaysia, and perhaps also Myanmar and China. The decline is likely to be well over 70% over the last three generations (generation length estimated at 8–10 years). No direct observations have yet been made of this species but fresh footprints and droppings, identified to this species, were recorded at several localities in the Bong Krang area, Lak District during field surveys in 1996. Fresh footprints and droppings that were believed to belong to two Gaur were also found at 1,178 m altitude and at 1,142 m on 10 March 2006 and near a stagnant water-hole on 11 March 2006. Fresh footprints of two individuals were found in wild banana (*Musa* sp.) forest along a stream near old Buon Dong village at 783 m on 12 March 2006. One frontlet with horns of this species was identified in a hunter's house in Krong Kmar town on 19 March 2006. This trophy was reportedly from a Gaur killed in the Yang Mao area ten years earlier. Information recorded from the interview of hunters in 1996 also indicated the presence of this species.

Chinese Serow ***Capricornis milneedwardsii*** This species is listed as globally Near Threatened and occurs in Myanmar, Cambodia, south and central China, Laos, Thailand, and Vietnam. In Vietnam the species was at least historically likely to have been widespread, except perhaps for the far southern Mekong Delta region. There are still no direct observations of this species in the Park but fresh droppings of this species were found on several occasions on steep mountain ridges and cliffs in the Yang Mao-Bong Krang areas on 11 March 2006 and on Chu Yang Sin mountain on 24 March 2006. Serow frontlets with horns were found in several local houses in Yang Mao and Cu Pui communes on 28 March 2006 indicating that this species is targeted by hunters as it is elsewhere across its range.

Gaur *Bos gaurus* (above)

Sun Bear *Helarctos malayanus* (below)

Small mammals

The 2006 surveys put in place a good baseline of knowledge although it is likely that there remains much more to be discovered about the small mammal fauna of the Park. Well-over two hundred diurnal pitfall traps and thirty five diurnal mole traps were set during the survey and a total of five hundred and eighty nocturnal tomahawk traps were employed to collect rodent species. Most small mammals were recorded at elevations of 780 m to 1,200 m. The most frequently observed species in both surveyed areas was Cambodian Striped Squirrel *Tamiops rodolphii*, followed by Malayan Porcupine *Hystrix brachyura*, Particolored Flying Squirrel *Hylopetes alboniger* and Finlayson's Squirrel *Callosciuris finlaysonii*. Small mammal species found during the surveys were members of the Sciuridae, Pteromyidae, and Muridae families and various bat families. In total, 33 species were recorded, belonging to 12 families and 4 orders; Insectivores (Insectivora: 1 species, 1 family), Tree-shrews (Scandentia: three species, one family) and Rodents (Rodentia: 17 species, five families). The only mole species recorded was the little-known Small-toothed mole *Euroscaptor parvidens* which is listed as globally Data Deficient. Two specimens of this mole were collected in the Cu Pui area, and molehills (presumably of this species) were often seen along the trail at elevations of 780-1,200 m. Two tree shrew species (Scandentia) were confirmed records, namely Northern Tree Shrew *Tupaia benlangeri* and Northern Smooth-tailed Tree Shrew *Dendrogale murina*. The most common rodent species recorded was Cambodian Striped Tree-squirrel *Tamiops rodolphii* (Sciuridae). The most common rat species (Muridae) recorded was Red Spiny Rat *Maxomys surifer* with a total of 8 animals trapped during the survey. Malayan Porcupine was also a common rodent, with evidence of this species often seen in the forest and around local habitation.

Bats

The biodiversity survey undertaken in 2006 included the first survey of the bat fauna (Chiroptera) of the Park, with survey effort limited to two areas of the Park - Yang Mao commune (in the drainage basin of the Dak Gui and Dak Mei streams) and Cu Pui commune. Caves were explored during the daytime to check for the presence of bats. Hand nets were used to catch bats inside caves. Harp and mist nets were set in front of cave entrances and along and/or across streams and paths with closed canopy where bats often fly. Depending on the terrain, nets were set separately or together to increase catching efficiency. The netting time was usually between 18h00 and 23h00 and between 04h00 and 05h00, when bats fly in and out from their roosts. Surveys discovered twelve species of five families. The most common species recorded was *Rhinolophus affinis*. Records of other species were limited to one or two specimens each, and so there is a strong likelihood that more species will be discovered in future. Four species each of the Hipposideridae and Vespertilionidae families were found. Table 4 provides a list of the species recorded during the 2006 surveys. Of the eleven species recorded, one species, *Eudiscopus denticulus,* is listed as Data Deficient Previously, this species was known only from single locations each in Laos, Myanmar, Thailand and one location in southern Vietnam (Cat Tien National Park).

Table 4: Bat species recorded during the 2006 surveys in the Park

English and scientist names	Number of specimens		Total
	Yang Mao	Cu Pui	
Ratanaworabhan's Fruit Bat *Megaerops niphanae*	1	-	1
Greater False Vampire Bat *Megaderma lyra*	-	1	1
Great Himalayan Leaf-nosed Bat *Hipposideros armiger*	-	1	1
Andersen's Leaf-nosed bat *Hipposideros pomona*	-	1	1
Intermediate Horseshoe Bat *Rhinolophus affinis*	14	-	14
Pearson's Horseshoe Bat *Rhinolophus pearsonii*	-	3	3
Least Horseshoe Bat *Rhinolophus pusillus*	1	-	1
Round-eared Tube-nosed Bat *Murina cyclotis*	-	1	1
Indian Pipistrelle *Pipistrellus coromandra*	-	1	1
Horsfield's Bat *Myotis horsfieldii*	1	-	1
Disc-footed bat *Eudiscopus denticulus* (Provisional identification only)	3	-	3

Ratanaworabhan's Fruit Bat *Megaerops niphanae*

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Chapter 4

Birds

Vietnam Greenfinch *Carduelis monguilloti*

Bird surveys and studies

Several ornithological surveys were carried out in the Chu Yang Sin area in the mid 1990s. The first surveys were undertaken in 1993 and early 1994.[38] Subsequent studies by BirdLife and FIPI took place in 1995. Data collected during these surveys were used to analyze habitat associations, status and population sizes of endemic and threatened taxa[39,40]. Bird surveys were also undertaken in 2006, 2008, 2009 and 2010[41,42]. Records collected during these various surveys were based mostly on direct field observations during which trails in the forest were walked slowly, with frequent stops to observe mixed feeding flocks or birds feeding at fruiting trees. Birds were detected both by sight and by call. Mist nets were used during surveys undertaken in 1995, 2006, 2008, 2009 and 2010.

The survey undertaken in 2006 used a modification of the method outlined in MacKinnon and Phillips (2000)[43]. This involved making lists of the first ten species recorded, and then repeating the process until ten such lists were made. By plotting the accumulated total number of species recorded against the number of lists made gives a species discovery curve, where steepness reflects species richness and indicates how many more species are likely to still be found at the locality. Species occuring on a high proportion of lists are the most abundant or conspicuous species of the local avifauna.

Species diversity

A total of 250 species have now been recorded in the Park, including fifteen threatened and endemic species (see below). Data from these surveys indicates that the Park is the only site known to support all of the restricted range bird species which characterise this EBA. The Park is of particular importance for the two Endangered species: Collared Laughingthrush *Garrulax yersini* and Grey-crowned Crocias *Crocias langbianis*, and is thought to constitute the global stronghold of the latter species and hold a significant population of the former. The Park also supports populations of all three species known to be confined to the Da Lat Plateau (Collared Laughingthrush, Grey-crowned Crocias and Vietnam Greenfinch *Carduelis monguilloti)*. The lower parts of the Park also support both of the two restricted-range species which characterise the South Vietnamese Lowlands EBA: Germain's Peacock-pheasant *Polyplectron germaini*, and Grey-faced Tit-babbler *Macronous kelleyi*. Because it is irreplaceable in a global context for bird conservation it is also classified as an Important Bird Area[44].

The most important of these species from a conservation perspective, is Grey-crowned Crocias, which is endemic to the Da Lat plateau and classified as globally Endangered. Thus far, 13 species are listed as globally Endangered (EN) or Near Threatened (NT) by BirdLife International (2009)[45] and one species categorized as Least Concern which is endemic to the Da Lat Plateau (Orange-breasted Laughingthrush *Garrulax annamensis*):

- Germain's Peacock-pheasant *Polyplectron germaini* (NT)
- Crested Argus *Rheinardia ocellata* (NT)
- Great Hornbill *Buceros bicornis* (NT)
- Austen's Brown Hornbill *Anorrhinus austeni* (NT)
- Blyth's Kingfisher *Alcedo hercules* (NT)
- Yellow-billed Nuthatch *Sitta solangiae* (NT)
- Black-hooded Laughingthrush *Garrulax milleti* (NT)
- Orange-breasted Laughingthrush *Garrulax annamensis* (LC)

- Collared Laughingthrush *Garrulax yersini* (EN)
- Short-tailed Scimitar-babbler *Jabouilleia danjoui* (NT).
- Grey-crowned Crocias *Crocias langbianis* (EN)
- Black-crowned Parrotbill *Paradoxornis margaritae* (NT)
- Vietnamese Cutia *Cutia legalleni* (NT)
- Vietnam Greenfinch *Carduelis monguilloti* (NT)

Altitudinal ranges

Altitude is the most important factor determining species distributions, with measures of forest architecture (such as species richness and forest structure) having much less influence on species distributions than altitude[46]. Most species were common either at lower altitudes or higher altiudes although some species, such as Mountain Fulvetta *Alcippe peracensis*, Lesser Raquet-tailed Drongo *Dicrurus remifer* and Golden-throated Barbet *Megalaima franklinii* were present over most of the altitude range. Species characteristic of upper elevations include Vietnamese Cutia *Cutia legalleni*, Brown-throated Treecreeper *Certhia discolor*, Rufous-winged Fulvetta *Alcippe castaneceps*, Ashy-throated Warbler *Phylloscopus maculipennis*, Black-headed Sibia *Heterophasia melanoleuca*, Mrs Gould's Sunbird *Aethopyga gouldiae*, Green-tailed Sunbird *A. nipalensis* and White-spectacled warbler *Seircus affinis*.

A distinct lower montane forest bird community features Red-headed Trogon *Harpactes erythrocephalus*, Grey-headed Canary Flycatcher *Culicicapa ceylonensis*, Yellow-billed Nuthatch *Sitta solangiae*, Mountain Bulbul *Hypsipetes mcclellandii*, Black-hooded Laughingthrush *Garrulax milleti*, Maroon Oriole *Oriolus traillii*, Mountain Fulvetta *Alcippe peracensis,* Black-crowned Parrotbill *Paradoxornis margaritae*, Grey-chinned Minivet *Pericrocotus solaris*, Long-tailed Minivet *P. ethologus* and Long-tailed Broadbill *Psarisomus dalhousiae*.

At elevations below 800 m, lowland bird communities feature species, including Ochraceous Bulbul *Alophoixus ochraceus*, Blue-throated Flycatcher *Cyornis rubeculoides*, White-cheeked Laughingthrush *Garrulax vassali* and Blue Pitta *Pitta cyanea*.

Key species accounts

Global conservation status information in this section is based on the 2009 version of an international dataset managed and updated by BirdLife International on an ongoing basis[47]. Key species are defined here as endemic and globally-threatened species. National conservation status is based on a dataset managed by the Ministry of Science, Technology and Environment (MOSTE)[48].

Germain's Peacock-pheasant *Polyplectron germaini* (Near Threatened) is endemic to southern Indochina. It is known only from south Annam and Cochinchina, Vietnam, and southern and eastern Mondulkiri and Ratanakiri provinces, Cambodia. It appears to occupy a range of forest types from montane, dipterocarp-dominated evergreen and semi-evergreen forest, including logged secondary forest and thorny bamboo brakes. Its use of disturbed and secondary forest habitats also suggests that projected declines on the basis of habitat clearance may not be as severe as previously supposed. This species was frequently recorded in Yang Mao to Dak Gui communes at elevations as low as 670 m and as high as 1,150 m. This species is also listed as nationally Vulnerable.

Crested Argus *Rheinardia ocellata* (Near Threatened) Crested Argus is one of the restricted-range species that define the Da Lat Plateau EBA[49]. In Laos and Vietnam, it is resident in primary and secondary evergreen forest from sea-level up to 1,500 m, and from 1,700-1,900 m on the Da Lat Plateau. It has been frequently recorded from degraded forest habitats, including active logging concessions. This species is listed as globally Near Threatened and as nationally Vulnerable. The loud and distinctive calls of this species were recorded during the survey in areas of evergreen forest with steep slopes at altitudes between 1,060 m and 1,900 m.

Great Hornbill *Buceros bicornis* (Near Threatened) Great Hornbill occurs throughout South-East Asia. It frequents evergreen and mixed deciduous forests, ranging out into open deciduous areas to visit fruit trees and ascending slopes to at least 1,560 m. The abundance of this species tends to be correlated with the density of large trees, and it is therefore most common in primary forests and is threatened by logging. It is particularly susceptible to hunting pressure as it is large, visits predictable feeding sites (such as fruiting trees) and casques are kept or sold as trophies. Therefore, this species is listed as globally Near Threatened. In Vietnam, Great Hornbill is a rare and declining resident due to pressure from hunting, habitat loss and fragmentation. No direct observations were made of this species during the survey. However, local hunters in the Cu Pui area reported that two small groups (of three or four birds) still inhabit forests on the Cu Pui-Chu Yang Sin ridge. A casque of this species was found in March 2006 in a house in Dak Tuar village. The householder reported buying it from H'mong hunters in 2004.

Austen's Brown Hornbill *Anorrhinus austeni* (Near Threatened) This species occurs in China, India, Myanmar, Thailand, Laos, Vietnam and Cambodia. The species inhabits evergreen broadleaved forest up to around 1,500 m and is threatened by forest loss through intensive shifting agriculture and widespread logging activities, and because of high levels of hunting in many parts of its range. In the Park, five birds were observed near the Krong K'Mar Dam in April 2008. In Vietnam, the population of this species is declining as a result of hunting. It is listed as globally Near Threatened and nationally Vulnerable.

Blyth's Kingfisher *Alcedo hercules* (Near Threatened) One bird was caught in nets set by the bat survey team on 12 March 2006 when flying along a small stream. Elsewhere in its range, it is found along streams in evergreen forest from 200 -1,200 m and is still widespread at low densities within its historical range, although deforestation is reducing and fragmenting its habitat. Human disturbance and river pollution are possibly also threats. Given its linear distribution along rivers, and thus restricted extent of occurrence, the total population size is potentially modest.

Yellow-billed Nuthatch *Sitta solangiae* (Near Threatened) is known from several widely–separated areas: the Hoang Lien Son mountains in north-east Tonkin, the Da Lat plateau in southern Annam, the Kon Tum plateau of Vietnam and south-east Laos, and Hainan island, south-east China. Small groups of two to four birds were observed in both coniferous and evergreen forest at altitudes ranging from 1,180 m to 1,850 m, sometimes feeding in mixed flocks with Mountain Fulvetta *Alcippe peracensis*, White-bellied Erpornis *Erpornis zantholeuca* and Yellow-browed Warbler *Phylloscopus inornatus*. This species is listed as nationally Lower Risk.

Orange-breasted Laughingthrush *Garrulax annamensis* (above)
Yellow-billed Nuthatch *Sitta solangiae* (below)

Black-hooded Laughingthrush *Garrulax milleti* (Near Threatened). This species is usually found in flocks in dense undergrowth of broadleaved evergreen forest between 800 and 1,650 m, although it has been found in remnant patches of forest in Laos. In the Park, this species was usually recorded in evergreen forests at elevations between 800 m and 1,300 m, usually feeding in flocks of six to ten birds. As it occurs at relatively low altitudes, it is vulnerable to habitat destruction through agricultural encroachment, charcoal burning and fuelwood collection, particularly as the human population of the area is increasing because of in-migration and population growth. This species is also listed as nationally Lower Risk.

Orange-breasted Laughingthrush *Garrulax annamensis* (Least Concern) This species is endemic to the Da Lat Plateau and has a restricted range, although it is not believed to approach the thresholds for Vulnerable under the range size criterion. This species was formerly considered to be a subspecies of Spot-breasted Laughingthrush *Garrulx merulinus*, restricted to the Da Lat Plateau. However, it is now considered a full species in its own right. This species occurs in secondary forest, edge habitats and undergrowth and even in cultivated habitats adjacent to forest patches. It was observed in the Park in broadleaved evergreen forest at 930 m elevation during survey in 1995 by BirdLife and FIPI[50].

Collared Laughingthrush *Garrulax yersini* (Endangered) Collared Laughingthrush is one of the endemic bird species that defines the Da Lat Plateau EBA[51]. It is listed as globally Endangered because it has a very small, declining, and severely fragmented range as a result of forest degradation and fragmentation. The species is resident in dense undergrowth of logged and primary montane evergreen forest, secondary growth and scrub bordering forest, occupying a narrow altitudinal band from 1,500 m to 2,440 m. It is generally encountered in monospecific flocks of four to eight individuals. Juveniles have been collected between April - June, suggesting the main breeding season is probably from March-May. In March 2006, small groups of this species numbering between two and six birds were observed in evergreen forest at altitudes varying from 1,820 m to 2,200 m in mixed forest with bamboo trees. This species is also listed as nationally Endangered.

Short-tailed Scimitar-babbler *Jabouilleia danjoui* (Near Threatened) This is one of the restricted-range species that define the Da Lat Plateau EBA. It is listed as globally Near Threatened and Threatened at national level. The species is known from east Tonkin, north, central and south Annam, Vietnam, where small numbers have been recorded at many sites, and central Laos. The subspecies *Jabouilleia danjoui danjoui* is found in montane evergreen forest between 1,500 and 2,100 m and often forages on the ground. It is threatened by deforestation throughout its range, particularly where it prefers forest at lower altitudes. The species was first recorded in 1993 in the Park and calls of this species were also recorded in March 2006 near a large stream inside evergreen forest at 1,300 m and at another site at 1,670 m.

Grey-crowned Crocias *Crocias langbianis* (Endangered) Grey-crowned Crocias is one of the endemic bird species that define the Da Lat Plateau EBA[52] and is listed as globally Endangered because it has a very small, declining range as a result of destruction and degradation of its montane evergreen forest habitat. The species is only found from 910 m to 1,450 m[53]. Generally encountered in singles, pairs, and occasionally small groups of up to five, it is arboreal and forages with mixed-species flocks for invertebrates, particularly caterpillars, primarily in the

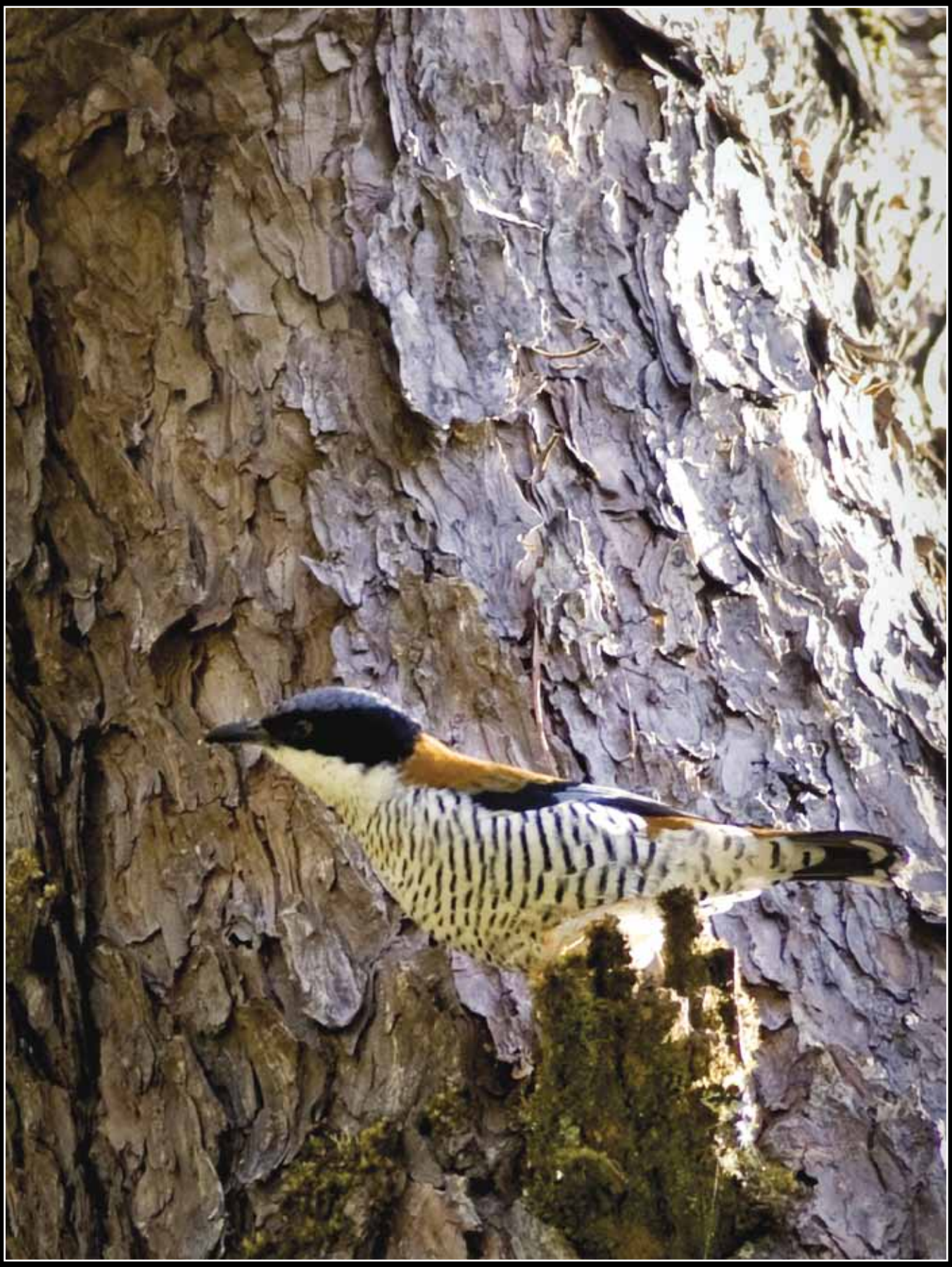
Collared Laughingthrush *Garrulax yersini* (above)
Grey-crowned Crocias *Crocias langbianis* (below)

outer canopy of broadleaved evergreen trees. It is endemic to the Da Lat plateau, Vietnam, where it is known from Lam Dong and Dak Lak Provinces. Previously known from only five specimens collected at two localities in 1938-1939, it was rediscovered in 1994 at Chu Yang Sin[54]. It appears to be very locally distributed and is considered fairly common only in the Park[55]. One bird was observed on 12 March 2006 in evergreen forest at 1,400 m. Another bird was encountered on 15 March 2006 in evergreen forest at 1,300 m. A juvenile, with a browner head and small flank-streaks, was seen on 21 March 2006 in evergreen forest at 1,280 m.

Black-crowned Parrotbill *Paradoxornis margaritae* (Near Threatened) This species is confined to the Da Lat Plateau in Vietnam and adjacent Mondulkiri Province in Cambodia and occurs in primary and secondary forest and at the forest edge, mostly at lower montane altitudes. It is most often observed in large flocks moving through the forest canopy. The species is considered to be globally Near Threatened due to its moderately small range in which forest conversion to coffee is rapid and ongoing. The species was first recorded at the Park in 1993/94 and has since been recorded in 1995 and 2009.

Vietnamese Cutia *Cutia legalleni* (Near Threatened) This species is suffering an ongoing and moderately rapid reduction in its range, caused by a decline in habitat quality owing to conversion of forest to coffee cultivation. It occurs in broadleaved evergreen forest, mixed broadleaved and pine forest, and sometimes pure pine forest (but usually when close to broadleaved forest). Although it may use secondary growth or logged primary forest it probably has an association with primary forest. Typically seen in the canopy and sub-canopy of primary forest, travelling either in pairs or groups of up to ten birds feeding amongst epiphytes or moss covered branches and around bowls in large trees. This species has been recorded by most surveys undertaken since 1993.

Vietnam Greenfinch *Carduelis monguilloti* (Near Threatened) This species is endemic to the Da Lat plateau where it is locally common in open pine forest. This species was first recorded and photographed in the Park in May 2009 near the Krong K'mar dam and reservoir[56]. Flocks of twenty five and twelve birds were recorded that month mostly at elevations between 600 m and 850 m which is significantly lower than its previously recorded range of 1,050 m to 1,900 m[57]. One small flock was also observed in scrub rather than the open coniferous forest in which this species is more frequently recorded. Vietnam Greenfinch is endemic to south Annam and currently listed as globally Near Threatened.



Vietnamese Cutia *Cutia legalleni*

Black-hooded Laughingthrush *Garrulax milleti*

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Chapter 5

Amphibians and Reptiles

Rhacophorus chuyangsinensis

Cyrtodactylus ziegleri

Survey approach

The first studies of the herpetofauna of the Park were undertaken in October 2007 at eight sites ranging in elevation from 500 m to 1,600 m on the north-western slopes of mountain ridges, including the slope of Mount Chu Yang Sin in the Krong K'Mar River basin[58]. The second survey was in April 2009 at ten sites of elevation from 800 m to 2406 m in the upper Krong K'Mar and Dak Tour River basins. These studies were undertaken by the Institute of Tropical Biology, the Russian Academy of Sciences and the Institute of Ecology and Biological Sciences (IEBR). Most surveys were conducted at night, due to the nocturnal habits of most amphibians and reptiles. Diurnal fieldwork was targeted at recording diurnal lizards, such as agamids and scincids. Surveys were undertaken by walking along streams and inspecting both the water and banks and walking along forest trails whilst inspecting the ground, trunks and canopy of trees. For frogs, data were collected on vocalizations, microhabitat preference, location in the microhabitat and behavior, in particular, feeding and reproductive behavior. For reptiles, location and time of records were collected as well as data on patterns of spatial distribution, feeding and reproductive activity, gestation state and the number of eggs in oviducts. Sex and age of all individuals was determined.

Species diversity

The Park supports impressive species richness of herpetofauna. The varied topography of the Park, its diverse hydrological network and different forest types make ideal conditions for rich taxonomic diversity of amphibians. A total of 112 species of amphibians and reptiles were discovered, comprising 53 species of frog, one caecilian, 27 lizards and 31 species of snake[59]. The studies found17 possible new species to science of which only two have so far been described formally (Box 4). A number of species thought to be endemic to the central highlands, and a number of species more typical of Eastern Himalayan and Tonkin regions such as *Philautus cf carinensis*, *Rhacophorus feae* and *Euprepiophis manadarinus* were also discovered.

Table 5: Herpetofauna species of conservation concern recorded in the Park

Scientific name	Common English name	Elevation (m)	IUCN conservation status*	Endemic to Central Highlands?
Brachytarsophrys intermedia	Annam Spadefoot Toad	1300-1400	VU	Yes
Leptobrachium pullum	Vietnam Spadefoot Toad	745-1300	DD	Yes
Ophryophryne sp.1	Mountain Toad 1	745-760	_	Yes
Ophryophryne sp.2	Mountain Toad 2	900-1600	_	Yes
Kurixalus cf. carinensis		900	DD	
Philautus sp.1	_	1600	_	Yes
Philautus sp.2	_	1600	_	Yes
Rhacophorus annamensis	Annam Flying Frog	745-900	VU	
Rhacophorus calcaneus	Vietnam Flying Frog	745-900	NT	
Rhacophorus sp.	_	1600	_	Yes
Cyrtodacrtylus irregularis		745-900		Yes
Ophisaurus cf. sokolovi		760		Yes
Trimeresurus sp.	_	1300-1600		Yes

The high taxonomic and ecological diversity of amphibians and reptiles is due to a number of factors including the geographic position of the Park, its geological history, the presence of a richly-branched hydrological system, the favorable climate with clearly developed monsoon period and the large altitudinal gradient. If current findings are confirmed, the amphibians and reptiles of the Park represent 16% of the total herpetofauna of Vietnam (c. 500 species). This figure is likely to underestimate the total number of species actual present in the Park, and it is highly likely that further studies will add additional species.

The survey concluded that the herpetile community of the Park is similar to that on other massifs in the central mountains of Vietnam, and shows some similarity to the fauna of south-east China, eastern Himalayan and southern Tibetan regions, south-Malaya and Sumatra. The more the herpetofauna of Vietnam is studied, the more common faunal elements are found between high altitude areas in the north and south of the country. Perhaps the most interesting of these findings is the discovery of species common to the high altitude forest of Vietnam's highest mountain peaks from Fan Si Pan (Hoang Lien Mountains Region) 3,143 m in the north, to Ngoc Linh (Kon Tum plateau) 2,598 m and Chu Yang Sin 2,442 m in the south. For instance, *Rhacophorus feae, Philautus carinensis, Vibrissaphora spp., Euprepiophis mandarinus, Dinodon septentrionale, Protobothrops mucrosquamatus* and others have recently been found on Ngoc

Box 4: New herpetofauna species discoveries

The discovey of eight new species of herpetofauna helped draw attention to the biodiversity importance of the Park and also to the potential for future new discoveries. The two new species described so far comprised a new species of tree frog *Rhacophorus chuyangsinensis*[60] and at least one new species of gecko *Cyrtodactylus ziegleri* belonging to the *Cyrtodactylus irregularis* complex[61]. Three specimens of the tree frog were found at an altitude of around 1,600 m, in forest close to a rocky stream. Specimens of the gecko were collected in forest at altitudes of 900 m.

Linh and Chu Yang Sin Mountains, over 1,000 km south of previously known locations in the Hoang Lien Mountains. Preliminary analysis of community composition on the Chu Yang Sin and Ngoc Linh Mountains demonstrate considerable similarity to the herpetofauna of north- west Tonkin in that they contain species typical of southeastern Tibet and the eastern Himalayas. However, the amphibian and reptile community in the Park also shows a strong affinity with the herpetofauna of southern Indochina. For instance, the surveys discovered *Microhyla pulchra, Physignatus cochinchinus, Ptyas korros, Bungarus candidus, Ophiophagus hannah, Naja kowtia, Oligodon cyclurus,* amongst others that are more characteristic of the southern Indochina region.

A more accurate comparison of the taxonomic diversity of Chu Yang Sin Mountain and other mountain ranges in northern and central Vietnam and Southern Indochina will only be possible after conducting further fieldwork at the site during the dry season. Given that species assemblages found between wet and dry seasons can be nearly entirely different, it is possible that the actual species richness of the Park might be considerably greater than the figure found during the 2007 survey. Further surveys are needed of higher altitude areas of the Park close to and above 2,000 m which may well yield exciting new discoveries. Furthermore, given that only eight sites have so far been studied within the Park, it is highly likely that further species of amphibians and reptiles will be found in these forests in the future.

Philautus sp. is an undescribed endemic frog from the central highlands

Trimeresurus sp. (female)

Protobothrops mucrosquamatus (male)

Annam Spadefoot Toad *Brachytarsophrys intermedia*

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Chapter 6

Fish

Survey approach

Fish surveys took place for the first time in March 2006 at nine sampling locations and along the two main river systems – the Dak Tuar and Krong Kmar in the core zone; and the Krong Bong river in the buffer zone of the Park. Fish specimens were collected in different habitats: both swift-flowing water dominated by waterfalls and rapids as well as gently-flowing water, and including water flowing through both forested and non-forested areas. Local fishermen were employed to assist in collection of specimens and additional information was collected through interviews with local people. Fish specimens were collected using single nets, casting-nets and push-nets of different sizes and supplementary information was also collected through interviews conducted with local people.

Fish diversity

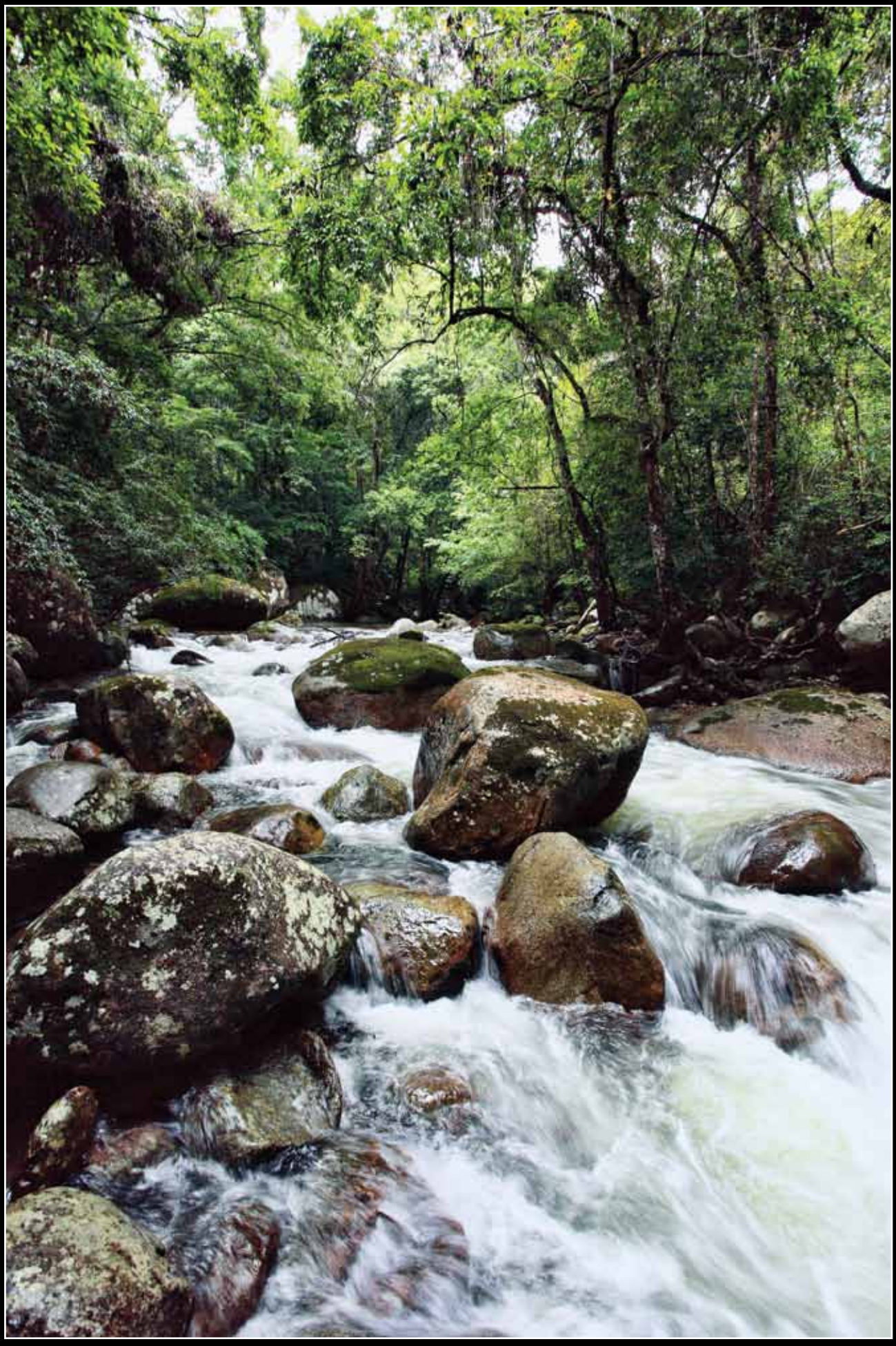
The 2006 surveys provided only indicative information on the fish diversity of the Park and the composition of the Park's fish diversity remains poorly understood. In total, 81 fish species have been tentatively recorded based on the 2006 surveys and overall, the fish fauna appears typical for the upper Mekong River Basin: 74 species of the total number are native to the Mekong River whilst others have been introduced from other regions of Vietnam but are now relatively common. The species composition of each river system sampled appears to be relatively distinct: 27 species were found in Dak Tuar stream, 17 species in Krong Kmar stream and 53 species in Krong Bong river.

A comparison of the fish fauna of Chu Yang Sin with three other protected areas comprising Phong Nha-Ke Bang[62], Hin Namno[63], and Pu Mat[64] shows that the number of fish species collected in the the Park is equal to Pu Mat but much less than Phong Nha-Ke Bang. However, much work is still needed to build a more complete picture of the fish diversity of the Park, particularly sampling of upper tributaries and springs at high elevations.

Table 6: A comparison of the fish fauna of some protected areas in Laos and Vietnam

	Chu Yang Sin			Pu Mat			Phong Nha			Hin Namno		
	Sp.	Gen.	Fam.	Sp.	Gen.	Fam.	Sp.	Gen.	Fam.	Sp.	Gen.	Fam.
All species	81	56	18	82	56	19	177	95	36	65	56	18
Native species	74	50	18	78	53	18	167	86	35	65	56	18
Exotic species	7	6	2	4	4	2	10	9	2	0	0	0

From top: *Schistura sp1.*, *Acantopsis sp.*, and *Schistura sp2.*



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Chapter 7

Butterflies

Key species recorded

Two newly-described species, *Stichophthalma uemurai* and *Aemona falcata* were recorded during the survey. A total of nine species of four families were found in the Da Lat mountains for the first time: *Elymnias malelas*, *Mycalesis mucianus*, *Neope bhadra* (Satyridae), *Charaxes kahruba* (Nymphalidae), *Flos apidanus*, *Flos anniella* (Lycaenidae), *Bibasis harisa*, *Bibasis amara*, *Abraximorpha davidii* (Hesperiidae). Some species recorded during the survey were not previously recorded for central Vietnam. For example, *Flos apidanus* was only known from southern Vietnam.

One swallowtail species recorded during the survey, Common Birdwing *Troides helena* (Papilionidae), is listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Although relatively common in Vietnam, this species is listed by CITES as being threatened by commercial exploitation and trading. Another species included in the proposed national Red List is the recently described *Stichophthalma uemurai*. So far this habitat-restricted species has been found only in Vietnam. In addition, although not recorded during this survey, the nationally threatened *Teinopalpus aureus* is believed to occur in the Park as it was previously recorded in the adjacent Bi Doup and Hon Ba montane areas.

The butterfly fauna of Chu Yang Sin National Park has not been previously studied, but previous work on the Da Lat plateau has demonstrated high butterfly diversity with nearly four hundred butterfly species now known to occur, including a high number of endemic species. Previous surveys in the adjacent forests of Bi Doup and Hon Ba discovered seven new species and two new subspecies endemic to the central highlands[65].

Butterfly surveys in the Park were undertaken in April 2006 and focussed on two sites within the Park at Cu Pui and Hoa Son. Five habitats at these sites were surveyed comprising primary evergreen forest, riverine vegetation, forest edge, bamboo forest and scrubland. A total of 248 butterfly species were recorded, belonging to ten families (Table 7).

Table 7: Numbers of butterfly species by family

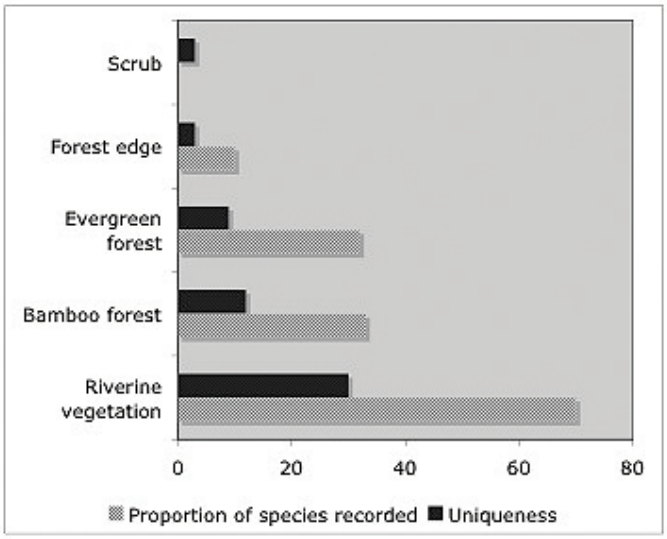
Family	Cu Pui	Hoa Son
Papilionidae	21	17
Pieridae	18	16
Danaidae	10	4
Satyridae	25	9
Amathusiidae	7	3
Nymphalidae	48	25
Libytheidae	3	1
Riodinidae	5	8
Lycaenidae	23	24
Hesperiidae	45	18
Total	**205**	**125**

Habitat preferences

Riverine vegetation was found to support the richest butterfly communities of the Park (Figure 5) – nearly 70% of species were found in this habitat, compared with 33% for bamboo forest, 32% for evergreen forest, and 10% in forest edge habitats. Figure 5 and Table 8 summarize records according to habitats. Riverine vegetation also showed high levels 'uniqueness' for butterflies as measured by the number of species found in only one habitat but not others. 30% of the total number of species were found only in riverine vegetation, as compared with 12% for bamboo forest, 9% for evergreen forest and only 3% each for scrub and forest edge habitats.

Most of the species found in riverine vegetation were opportunist species belonging to the Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperiidae. Species assemblages in evergreen forest contained far fewer opportunistic species (Papilionidae and Pieridae families) with most species representative of rather restricted-range butterfly groups such as Amathusiidae, Nymphalidae, Riodinidae, Lycaenidae and Hesperiidae. Many of these groups are characterised by territorial behaviour and a number of species occur only in the vicinity of food plants. Butterfly communities of bamboo forest, forest edge and scrubland were surveyed only in the Cu Pui area. Bamboo forest was characterised by high species richness, mostly belonging to the Satyridae, Nymphalidae, Lycaenidae and Hesperiidae. Many satyrids and skippers were found only in this habitat, because of the specific life cycle of these butterflies (most developing on monocotyledons such as grasses and bamboos). Most species found in scrubland and forest edge were common species that were also found in riverine vegetation and bamboo forest.

Figure 5: Uniqueness and habitats preferences of butterflies at the Park



Vindola erota

Table 8: Numbers of butterfly species recorded in different habitats in the Park

Family	Type of habitat				
	(PEF)	(RV)	(BF)	(FE)	(SL)
Papilionidae	2	22	5	3	8
Pieridae	7	18	2	2	1
Danaidae	4	6	1	4	0
Satyridae	7	12	18	1	2
Amathusiidae	5	5	3	0	0
Nymphalidae	23	42	25	6	10
Libytheidae	0	3	0	0	0
Riodinidae	7	8	1	0	0
Lycaenidae	7	31	7	3	3
Hesperiidae	18	23	20	6	6
Total	**80**	**170**	**82**	**25**	**30**

Table 9: Key forest butterfly species recorded in the Park

Species	Family	Preferred habitat in Vietnam	Food plants
Byasa polyeuctes	Papilionidae	Evergreen forest at medium and high elevations	*Aristolochia spp.*
Byasa dasarada	Papilionidae		
Graphium agetes	Papilionidae		
Delias agostina	Pieridae	Forest at medium and high elevation	*Loranthus sp.*
Prioneris thestilis	Pieridae	Forest at medium and high elevation	*Crateva spp.,*
Capparis spp.			
Lethe sinorix	Satyridae	Evergreen forest with bamboo at medium and high elevations	Poaceae, Bambusae
Neope bhadra	Satyridae	Evergreen forest mainly at high elevation	Poaceae
Ragadia crisilda	Satyridae	Evergreen forest at medium to high elevations	*Selaginella spp.*
Aemona falcata	Amathusiidae	Evergreen forest at high elevations	Poaceae
Enispe euthymius	Amathusiidae	Evergreen forest at high elevations	Monocots
Sumalia daraxa	Nymphalidae	Forest at medium to high elevations	*Populus spp.* (Tiliaceae)
Abisara fylla	Riodinidae	Evergreen forest medium to high elevations	*Maesa chisia*
Abisara savitri	Riodinidae	Mainly evergreen forest at high elevations	Myrsinaceae
Heliophorus ila	Lycaenidae	Evergreen forest at medium and high elevations	
Lampides boeticus	Lycaenidae		
Udara placidula	Lycaenidae	Evergreen forest at high elevations	
Flos apidanus	Lycaenidae		
Celaenorrhinus putra			
Celaenorrhinus leucocera			
Celaenorrhinus patula	Hesperiidae	Primary evergreen forest	*Jasminum spp.*

Key species are mostly stenotypic species that characterize forest habitats.

Altitudinal distribution

The 2006 butterfly survey focused on butterfly communities at elevations between 500 m and 1,600 m. Habitats at the highest elevations were not studied. It is known that butterfly communities at lower elevations are usually more diverse and abundant than those in higher ones[66]. Results from the survey of riverine habitats and primary evergreen forests in the Park provided a good example of altitudinal variations in species richness. 238 butterfly species were recorded between 500 and 1,000 m, while only 37 species were observed between 1,000 m and 1,600 m. In spite of this, butterfly species richness in some habitats at lower elevation was rather low. For example, forest edge and scrubland at 500 m supported a lower number of species than elevations between 500 m and 1,600 m.

Endemic butterflies of the Da Lat plateau

Stichophthalma uemurai male (above)

Opposite: *Aemona falcata* female (above) and male (below)

Elymnias malelas (male) found for the first time in Chu Yang Sin National Park during this study

Troides helena is listed under CITES

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Chapter 8

Conservation issues

Illegally-felled *Fokiena hodginsii*

The changing nature of threats

The forests and biodiversity of the Park face a number of very real threats. The IWBM project has helped the management board to assess pressures on the Park as part of efforts to ensure that resources are used as effectively as possible for conservation management. The first results of this ongoing work were compiled in 2008[67], a process that used a number of Pressure, State and Response (PSR) indicators to track the changing nature of threats to the Park, the impacts they are having on forests and biodiversity and the capacity of management authorities to respond to these challenges.

The assessment found that the habitats of the Park and populations of key species had deteriorated between 2005 and 2008. Outside the Park, there has been a very significant loss and fragmentation of natural forest. Inside the Park, logging of valuable timber species is increasing and, although trends are unclear, key mammal species may also be declining due to hunting. By 2008, conservation action such as patrolling efforts had improved with the support of the IWBM project and improved provincial support to the Park. Figure 6 shows changes in patrolling effort since 2007 and Figure 7 shows trends in violations recorded by the Park authorities. The increased patrolling efforts now taking place in the Park have no doubt contributed to increasing numbers of violations recorded, but the figures nonetheless show there remains high levels of hunting and illegal logging continue. Most indicators used in the PSR analysis were scored as 'Very Bad' in large part a reflection that the Park is a new protected area with modest enforcement resources and young and relatively inexperienced staff

When the Park was first designated, the most pressing threats were probably posed by hunting and trapping by subsistence hunters and wood collectors inside what is now the Park and buffer zone forests, and selective logging of high value species such as *Fokienia hodginsii*. In recent years, the level of hunting and illegal logging activity within the Park have increased to very worrying levels, associated largely with spontaneous and rapid in-migration of H'mong people into the buffer zone of the Park and driven by stronger market demand for wildlife and rare timber. However, it is now plans for the development of hydropower and roads that pose the major threat to the Park, through direct loss of forests and by 'opening-up' pristine forest areas to higher levels of illegal logging, land clearance and hunting.

Management capacity

As noted earlier, the introduction of active conservation efforts has come only recently. Considerable progress has been made since the establishment of a management board in 1998, and especially since 2002 following the upgrading of the area to National Park status. Dak Lak Province Peoples Committee has provided substantial support for staffing and basic Park infrastructure, such as the construction of a new Park headquarters and several new guard stations. The Park has also benefited from strong leadership at the management board level. However, much still needs to be done to strengthen capacity and to maintain and expand conservation action at the field level. Despite the availability of domestic funding for basic staffing and infrastructure development, the Park's management authorities like most protected areas in Vietnam, lack access to the necessary funding for operational activities. Such funds are essential if outreach, enforcement, capacity development and monitoring efforts are to continue beyond the lifetime of current international support being provided through the IWBM project.

Figure 6: Trends in patrolling effort from 2007 to September 2009

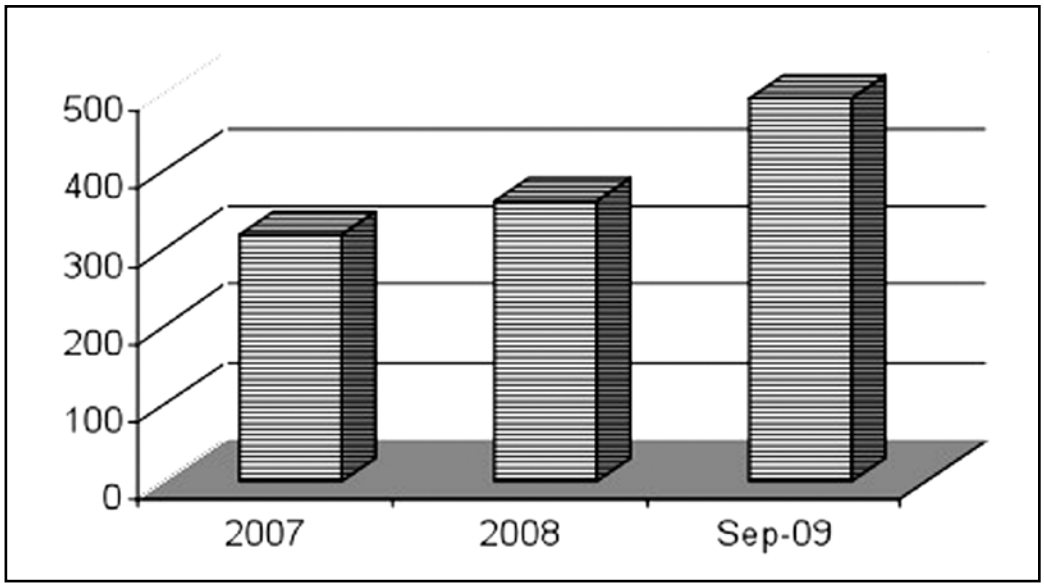
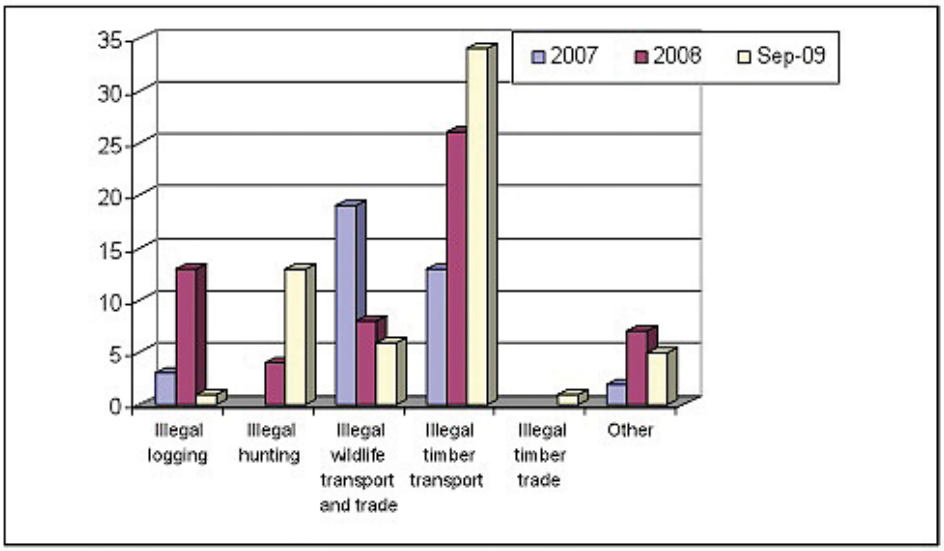


Figure 7: Trends in recorded violations since 2007.



Infrastructure development

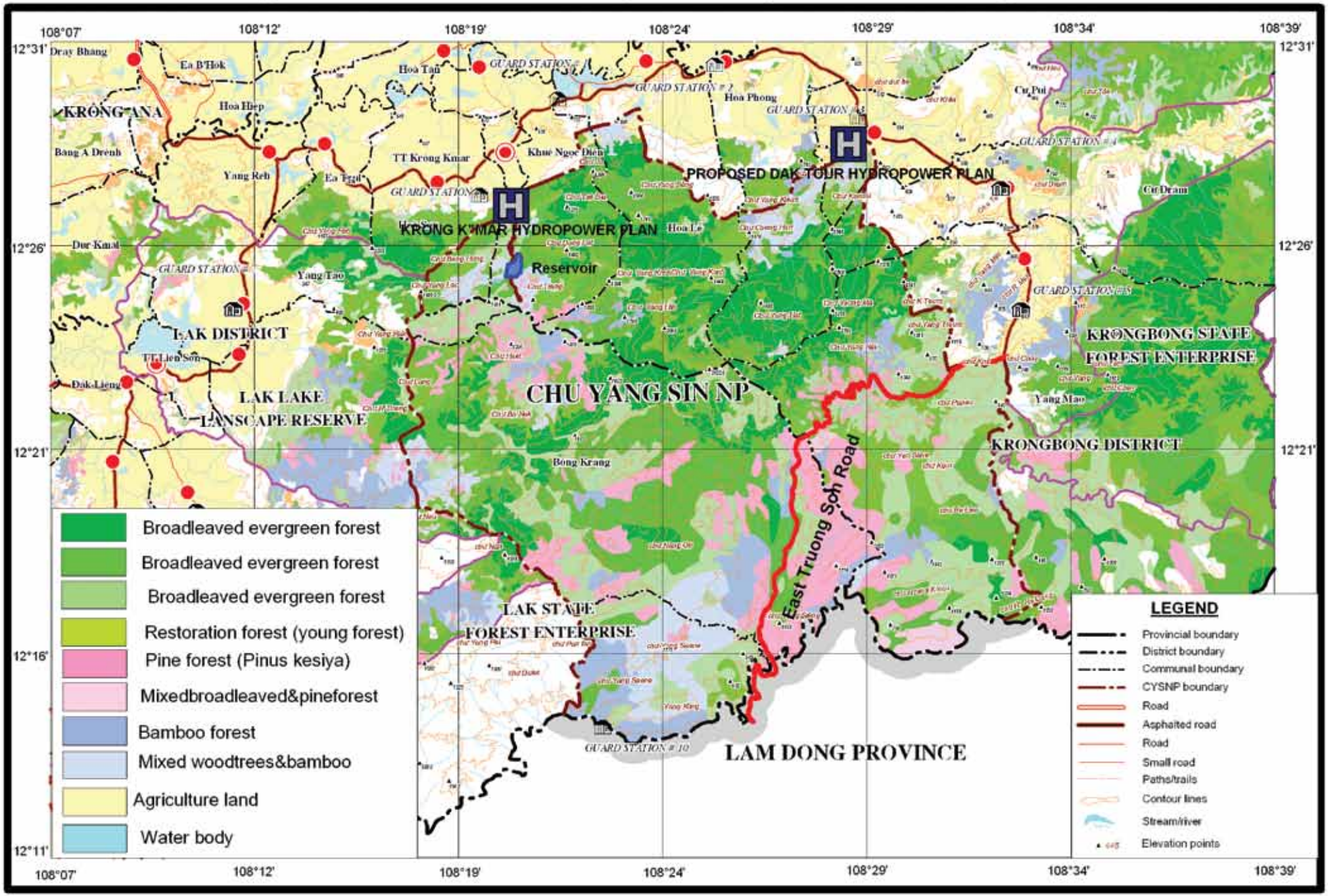
The development of the Krong K'mar hydropower plant within the original boundaries of the Park signalled the beginning of an escalation of plans to 'develop' the National Park through damaging infrastructure. The plant will generate only modest amounts of electricity with a maximum installed capacity of 11 MW[68], but its construction severely degraded the integrity of the Park. Construction of the dam was completed in 2007 and involved de-gazettment of nearly 100 ha of the Park, forest clearance and construction of a road and water transfer conduit for 11 km through high biodiversity value forests, together with the flooding of the reservoir area. The longer-term impacts of this development may also be significant, as the development has opened-up the forests to increased exploitation and so will have increased longer-term management costs. The dam has also impacted on downstream fish populations through sedimentation damage. Two further proposals for hydropower development inside the Park have been proposed. One of these is for a hydropower development that will be considerably larger than Krong K'Mar to be built on the Dak Tour stream, one of the most pristine areas of the National Park. If constructed it would affect six forest compartments and would negatively impact an important historic site, the Dak Tour Cave. The construction of access roads to the dam would further expose these forests inside the Park to illegal exploitation and potentially, clearance of forest for agriculture. Both proposals are currently on hold but may well re-surface when economic condiitions allow.

The Ministry of National Defence has also decided to build a 'national defence road' through the Park and this road is now under construction. This will cut across the south eastern part of the Park in Yang Mao Commune from where it will join up with an existing road which runs through Da Nhim Watershed Protection Forest. The road will be 32 km in length and will pass through twelve forest compartments. Construction of the road will destroy 120 ha of forest. The preliminary assessment of the route chosen for the national defence road shows that this development will cut through primary forest in the strict protection zone of the Park and will open up the core zone of the park to illegal hunting and logging. Two alternative routes for this road that would not have damaged the Park were not explored sufficiently, and according to a preliminary assessment of these routes, one of them would also have delivered improved poverty impacts by servicing particularly poor communes.[69] This example shows that better planning could have avoided unnecessary impacts and would have better-served local communities. Typical construction techniques in Vietnam take little account of environmental management and so this is likely to involve the bulldozing of spoil down-slope, a practice that leads to extensive environmental damage, including the destruction of extensive areas of forest on steep slopes and the clogging of streams and rivers. BirdLife International is working with the management board to encourage the Ministry of Defence and their contractors to avoid such impacts, but in any case, the road will still open-up this sector of the Park to illegal exploitation and the in-migration of people who will clear forest along its route for cultivation.

These developments show a need for real commitment from local authorities at provincial and national level to protecting the resources of the Park, and the environmental services the Park protects, through environmentally-sensitive approaches to development. The construction of roads and hydropower infrastructure inside the boundaries of the Park are clearly incompatible with its National Park status, and will degrade the regional and global contribution the Park makes to the protection and supply of environmental services such as watershed protection, biodiversity conservation and carbon storage.

The Krong K'Mar hydropower dam (above) and the new patrolling road (below) under construction

Map 5: Infrastructure Development Projects in Chu Yang Sin NP



A dried Black-shanked Duoc Langur

On economic grounds alone, the longer-term value of these services may well exceeed the short-term benefits that roads and hydropower might bring. It is the role of local and national authorities to find a better balance between conservation and infrastructure development than has been the case so far.

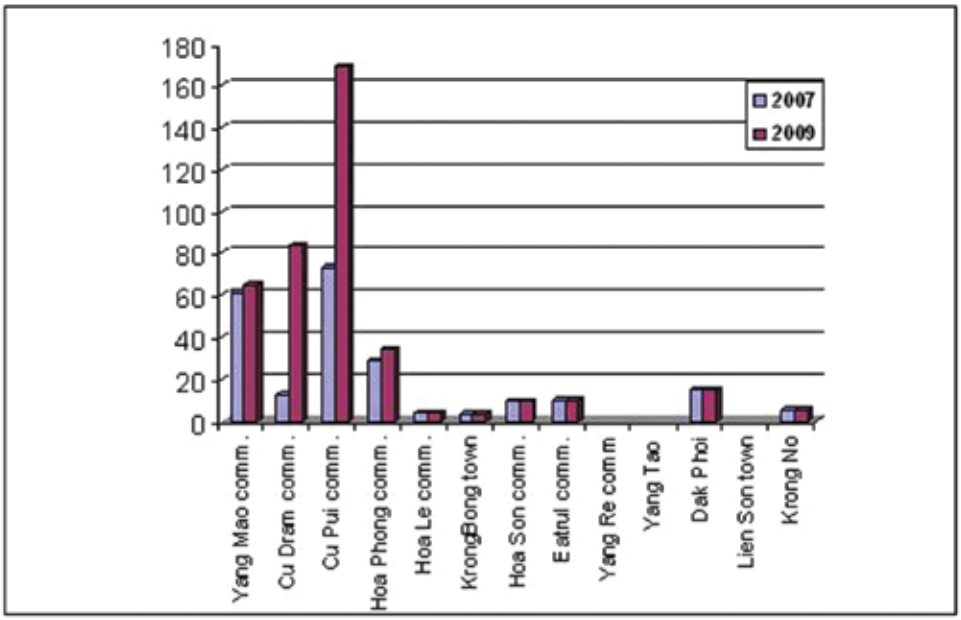
In future, the Park will have the potential to attract both domestic and international tourists. Recent experience of protected areas elsewhere in Vietnam has seen the development of tourism infrastructure including accommodation, roads and trails cause substantial impacts to the very resources that tourists come to visit. The Park has an opportunity to learn from this experience and work towards environmentally-sensitive development that avoids negative impacts on the Park's forests and biodiversity. Such approaches could also provide opportunities for communities in the buffer zone to benefit from the revenues that such tourists might bring. The homestay-based approach to community-based tourism, tried and tested at Pu Luong National Park in Hoa Binh and Thanh Hoa provinces, provides a useful demonstration model for such approaches.

Wildlife trade

The rate and scale of illegal exploitation of wildlife and timber has increased rapidly in Indochina in recent years, due to increasing domestic and international demand, the latter especially from China and Vietnam. To explore the nature and scale of the wildlife and timber trade issues in and around the Park, the IWBM project supported two surveys of wildife and timber trade chains, in 2007 and again in 2009 to assess changes in response to market demand, enforcement and management[70,71]. The information in this section draws on the findings from these two studies.

In combination with the increase in demand, the presence of skilled hunters, especially in-migrant H'mong people has extended the commercial wildlife trade network to the Park. The 2007 survey reported that an efficient wildlife and timber trade network was in place involving 513 people in the buffer zone of the Park, driven by the demand for wildlife and timber products in often distant urban centres. In 2007, there was at least one small-scale wildlife and timber trader in each commune and village to whom local hunters rapidly

Figure 8: Comparison of the numbers of hunters in communes in the buffer zone of the Park in 2007 and 2009



sold animals and their parts. In turn, there was one large-scale trader in each district, whom together with the owners of the largest wildlife meat restaurants, bought from the small-scale traders and who arranged the export of live animals and their parts to elsewhere in the province and as far away as Ho Chi Minh City.

Two years after the first survey, the survey was repeated, using the same methodology to evaluate the changes in wildlife trading situation in and around the Park. A disturbing finding of the re-survey was that the wildlife and timber trade network in and around the Park had grown by nearly 60% to 921 persons by 2009[72] (Figure 8) implying that overall offtake had grown considerably since 2007. Further, the price of wildlife meat had increased by three to five fold (depending on species) reflecting declining availability of animals, increased demand and general inflation in food prices. The impact that these increased levels of offtake are having on wildife populations inside the Park is difficult to measure, but is likely to be highly-damaging. Two 'large-scale' wildife traders interviewed during the 2009 re-survey study attributed a decline in the profitability of their business to the shrinking numbers of wildlife found in the Park and also to increased enforcement activity by the Park's management board and rangers.

To halt and reverse this worrying trend, the authors found that action was required on all the recommendations made in 2007 namely improving law enforcement inside the Park to combat illegal hunting and logging, capacity building of key park staff, increased co-ordination with other law enforcement agencies to target illegal trade and sales in the buffer zone; and public awareness campaigns to dissuade consumption of illegal wildife products.

Confiscated snares

Hunting techniques

Hunting, trapping and wildife trade techniques are now much better understood as a result of trade chain surveys undertaken by the IWBM project[73]. Hunting used to be a traditional livelihood activity of Ede and M'nong in the forests of what is now the Park, but today, most hunters are H'mong people who have migrated into the buffer zone communes from the northern provinces of Vietnam. The H'mong are known as the most rapacious hunters in Vietnam and there are a growing number of incidences where H'mong hunters have been caught with specimens of high conservation value species. Tiger *Panthera tigris* has become extinct in the Park as a result of hunting and several other species are on the verge of local extinction, including Sun Bear *Ursus malayanus*, Gaur *Bos gaurus*, Dhole *Cuon alpinus*, Owston's Palm Civet *Hemigalus owstoni*, Lesser Slow Loris *Nycticebus pygmaus*, Sunda Pangolin *Manis javanica*, Leopard *Panthera pardus* and Eurasian Otter *Lutra lutra*. Hunting activities also threaten the survival of pheasants and other ground birds.

Hunters from the M'nong and Ede ethnic groups are generally part-time hunters, only hunting during the parts of the year when there is little farming activity. In general, the animals hunted are consumed for subsistence purposes or sold to raise cash to local wildife restaurants in the buffer zone (the 2009 re-survey recorded 16 such wildife restaurants operating in the buffer zone). M'nong and Ede therefore use hunting to supplement their often marginal farming income with income generated from hunting and from trading wildlife meat and products.

Commercial hunting using a variety of different techniques (Box 5) poses a much more serious threat to the biodiversity of the Park. Commercial hunting is driven by growing market demand and made possible though the activities of wildlife traders living in villages near the Park boundary. These traders buy from professional hunters and then transport wildlife products to buyers in towns, including Buon Ma Thuot City. Middle men are employed to transport the animals, often concealed ingeneously inside vehicles (for example in 'gouged' petrol tanks) to ensure that traders escape detection. The traders are generally well-known in the buffer zone, but a general lack of commitment to enforcement means that these illegal traders can operate openly without much risk of prosecution.

Hunting and trapping are common in remote areas within the core zone, which are probably the most important part of the Park for the conservation of primates and ungulates. Evidence of hunting camps and trapping routes were frequently observed during the biodiversity surveys at all elevations and thousands of snares are removed from the forest each year by forest rangers. Hunting with guns declined following the launch of a national gun confiscation and management programme, but guns are still frequently heard in the forest and are used for species that such as douc langurs and gibbons.

Box 5: Hunting, trapping and fishing techniques

Hunters and trappers use both guns and wire snare traps to catch mammals. The main target species for hunters with guns are large mammals such as Sambar *Rusa unicolor* and arboreal species such as Black-shanked Douc *Pygathrix nigripes* and Yellow-cheeked Crested Gibbon *Nomascus gabriellae*. All hunters currently active in the Park own a gun and approximately half of the hunters own more than two guns. The in-migration of people of the H'nong ethnic minority from the north of Vietnam has led to an increase in gun ownership and use in the area surrounding the National Park. The H'nong are well known for their proficiency at hunting and their gun-making technology. The price of home-made guns in the Park buffer zone is as little as VND 80,000 (equivalent to around US$5).

Hunters use two main kinds of trap: steel wire snare traps and wooden box traps. All hunters use steel wire traps, which are invariably constructed out of bicycle brake cable. Snares are inexpensive and many traps can be set in the forest on one hunting trip with very little monetary investment. Hunters construct trap lines consisting of snares placed in gaps in low drift fencing, which is roughly constructed from cut brush and shrubs. The trap line is often more than one kilometer in length. The species most commonly caught using snare traps include galliformes (pheasants and patridges), ungulates (such as deer and muntjac) and civets. Wire snare traps are indiscriminate and also catch smaller terrestrial birds and lower value mammals. Rangers report that snare traps are usually found along hill ridges and during the dry season, near water sources. Hunters also construct box traps to catch small carnivores such as civets. In common with snares, these are usually placed along ridgelines.

Chu Yang Sin National Park experiences relatively little trapping of birds for sale as cage-birds, owing to its isolation from large towns. Nonetheless, there is some trapping, particularly of popular cage bird species such as White-rumped Shama *Copsychus malabaricus* and the laughingthrushes *Garrulax* spp, especially in the buffer zone.

Electro-fishing appears to be fairly common in parts of Chu Yang Sin National Park, particularly along the Krong K'mar stream. The access road to the Krong K'mar dam makes it easy for people to transport heavy car batteries to the stream using motorbikes. People also use this destructive fishing technique throughout the buffer zone, where access to rivers by vehicle is easier. Fishing using dynamite and poisons has also been recorded in both the buffer and core zones. Fish caught using these techniques are generally not traded, but are consumed locally.

National Park rangers inspect a logged tree

Illegal logging

Logging levels have declined since the nature reserve was established in 1999 but selective and illegal logging of certain high value timber species remains a significant conservation management issue. Logging is conducted mainly by the people of the M'nong ethnic minority, although their equipment is often provided by traders from Buon Ma Thuot (Box 6). Trees are cut into rough blocks or planks in the forest, and then transported out using domestic buffalos. Illegal trade in timber within the buffer zone often takes place in daylight hours, using farm vehicles, whilst timber transportation between the buffer zone and Buon Me Thuot is undertaken during the night to avoid detection by district and provincial Forest Protection Department officials all but one of which are in Krong Bong District[74]. Their wood supply comes from both legal and illegal sources. They trade large quantities of wood through their contacts in the trade network. The most common kinds of wood traded are Manglietia *spp*. (Gioi), *Pterocarpus macrocarpa* (Huong), *Afzelia xylocarpa* (Ca te), *Syzygyum sp.* (Tram do) and *Hopea siamensis* (Kien kien).

The species most at risk of local extinction is *Fokienia hodginsii*. Planks of this species sell for 7-8 million VND/m^3 (roughly US$500) in the buffer zone, a market price that makes its exploitation extremely attractive. Since 2001 an extensive area of *Fokienia* has been logged. Other species targeted in the Park for commercial trade and sale are *Aquilaria* spp., *Afzelia xylocarpa*, *Keteleeria davidiana*, *Pinus krempfii*, *Podocarpus neriifolius* and *Dacrycarpus imbricatus*. *Cinamomum spp.* used to be harvested for the extraction of fragrant oil but this species is now close to extinction in the Park as a result of over-exploitation. Similarly, *Aquilaria crassna*, a high value species used for incense-making, has been over-harvested and is now virtually extinct in the Park.

Ongoing illegal logging and the expanding trade in wildlife reflects a lack of official commitment to law enforcement at provincial and district level an issue that needs to be addressed with real urgency. Those facilitating the illegal trade in timber and wildife are well-known within the buffer zone and local enforcement agencies at commune, district and provincial level have a legal responsibility to enforce the law. Thus far, these agencies have made insufficient efforts to close down the drivers of illegal hunting and logging in the buffer zone.

Box 6: Drivers of illegal logging within the Park and buffer zone forests

The IWBM project supported two studies of the socio-economic aspects of resource use in and around the Park[75, 76] and these studies have helped identify issues of conservation management concern. The studies were based on a programme of interviews and Participatory Rural Appraisals (PRAs) in villages around the buffer zone, supplemented with discussions and information supplied by other development initiatives ongoing within the buffer zone. The studies found that the establishment of the Park in 1998 had not had significant impacts on local livelihoods. Of far more concern to M'nong, Ede and Kinh groups around the Park was the rapid in-migration of H'mong people into the buffer zone, especially in Krong Bong District where the H'mong population had reached around 12,000 by 2008. This sudden influx of people is now putting severe pressure on available land and where in-migrants are particularly active in forest clearance and illegal logging of timber in the forests of the buffer zone and the core zone of the Park itself.

The studies also highlighted the role of local timber traders in driving illegal logging within the Park. Interview data collected by Ksor (2008) suggests that in some villages, in particular at Buon Dong Yang and Buon Biep in Yang Tao Commune, households receive an income from illegal logging inside the Park. Wood traders hire local people and pay them in advance to bring timber out of forest. Traders often provide them with samples of certain high value tree species and hire them to search for those species. People can earn different amounts of money for undertaking different tasks. For transporting timber out of the forest to a point of sale or trade they would receive 100,000 – 150,000 VND/person per day (equivalent to US$6-10); for cutting a high value tree to order the group would receive 2,000,000 to 10,000,000 VND (equivalent to US$125 – 620). In some cases the traders also provide logging equipment, such as a sawmill or money to buy such equipment. Some of the men interviewed said 'We know that what we do is illegal, and it is very hard work and often we have to flee from rangers in the forest, but we need the money to meet our daily needs and to pay our debts'. The people said that for many years they lived close to valuable trees but they had no interest in felling them, until traders appeared and encourage them at a time when their life is difficult. Some of the illegal loggers are in debt to traders (having borrowed money to buy food during hard times) and are forced into illegal logging to repay their debts.

This information indicates that pressure on the Park's resources will only be reduced when the underlying poverty of buffer communities is alleviated and crucially, the issue of in-migration by the H'Mong is addressed effectively by national and provicial authorities. The Park's management authorities recognize this issue and are playing an important role in faciltiating direct cash payments to local communities in return for forest protection activities as part of the government's National Target Programme on Forests[77], facilitating the issue of 50-year leases on forest land within the buffer zone (also part of a central government programme and policy objective) and by supporting small-scale income generating activities such as rattan enrishment planting. Other government programmes, some supported by international donors such as the Asian Development Bank and Denmark, are providing support to village and communes in the buffer zone.

Extraction of other forest products

Firewood, bamboo, rattan and orchids are the main Non Timber Forest Products (NTFPs) extracted and this practice is often also associated with hunting and fishing. Rattan and orchid collection are the most commonly collected species and the Park is still thought to be rich in these products. Rattans are cut and sometimes then floated in rafts along the larger rivers to collection points and onward transport to traders.

More than one hundred species of orchid have been recorded in the Park, including many beautiful and economically valuable species such as the *Paphiopedilum* (slipper orchids), *Bulbophyllum*, *Dendrobium*, *Cymbidium*, *Phajus* and *Gelegyne* genera. Orchids have yet to be surveyed properly in the Park and so our knowledge of this family of species and the impact of orchid collection, is very limited. Given the proximity of Da Lat city ('the city of flowers'), a centre for orchid gardening and trading, there is a likelihood of orchid collectors from Da Lat expanding their operations to the Park in future. Several orchid collectors have already come to the Park and several shops have started to buy orchids from local people for sale elsewhere.

Fishing

Subsistence fishing may contribute an important source of protein to the livelihoods of local people near the Park boundary. Villagers settling near streams, such as Lak and Pung villages of Dak Tuar Commune or Za village of Hoa Son Commune, are M'nong ethnic people. Their income is low and fish from streams and rivers supplement their daily protein. The buffer zone villagers fish not only in Krong Bong river but also in streams and springs in the core zones. They often enter the Park to fish for a few days, then take dried fish home to eat or sell in local markets. The Park may also play an important role as a nursery and breeding area for migratory fish that then move to lower levels where they help sustain downstream fishing. More work is needed on this aspect of biodiversity.

Unfortunately, fish species in the Park are sometimes harvested through use of destructive methods such as explosives, electricity, poisons, and fishing nets and traps with small-sized mesh. The over-exploitation of fish is becoming a serious issue due to the use of these techniques and population growth associated with in-migration from northern provinces.

Forest fire

Despite the decline of shifting cultivation, forest fires remain a management issue. Fires generally tend to become most frequent at the end of the dry season – and can be started by land clearance around the Park boundary and by H'mong hunters who set fires to encourage regrowth for attracting ungulates. For this reason, effective enforcement of anti-hunting legislation inside the Park is also likely to lower overall fire risk.

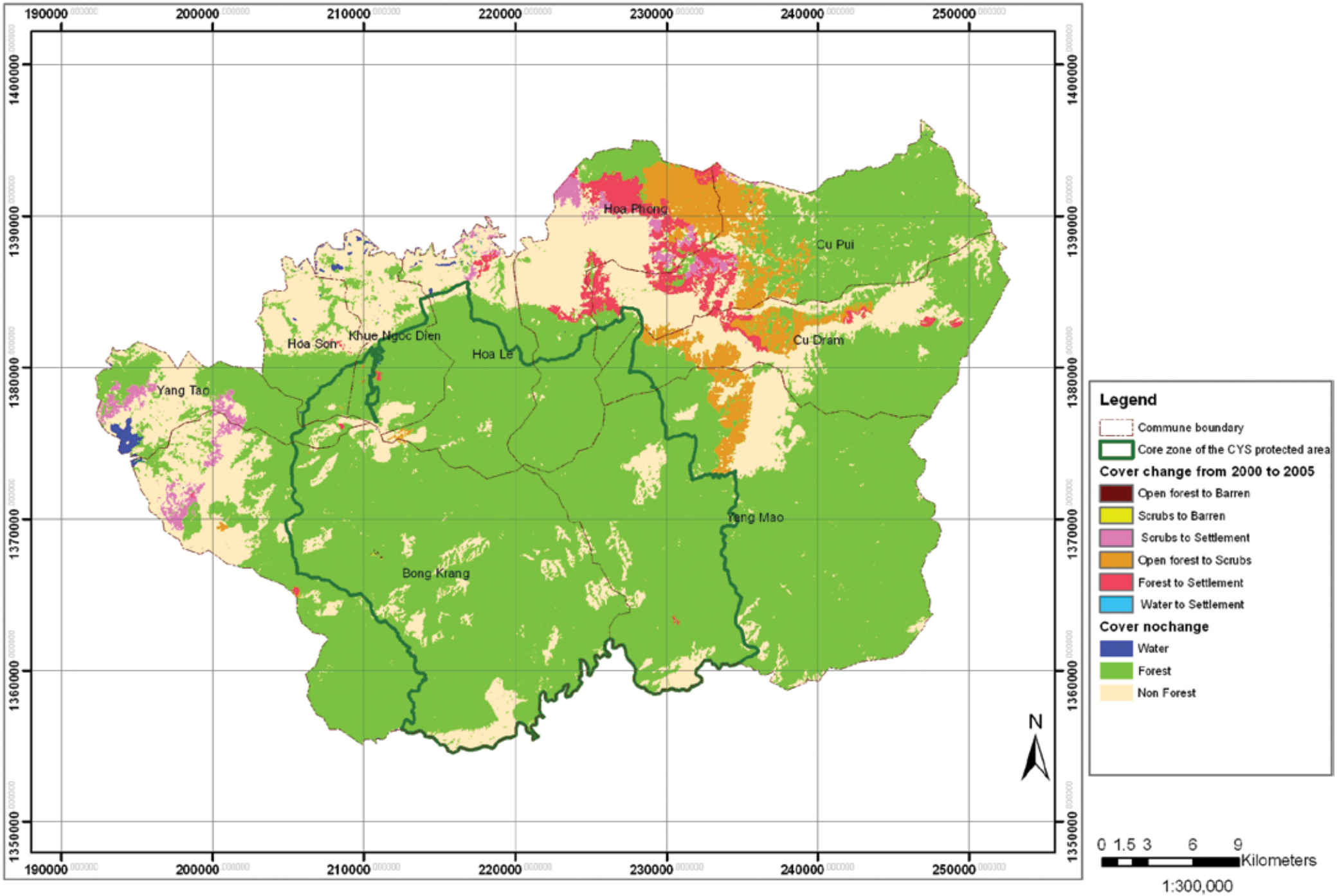
Forest fragmentation

Until very recently, the Park was part of a contiguous forest complex that covered much of the Da Lat plateau and virtually the entire upper watershed of the Srepok river. Today, the Park and adjacent Bi Doup Nui Ba National Park afford protection to the core of a rapidly-diminishing block of forest that comprises the upper watershed of three major rivers , the Sre Pok, the Dong Nai and the Cai rivers.

The conversion of forest to agriculture has largely ceased within the boundaries of the Park, but within the forest landscape of the upper watershed as a whole, the forest landscape is becoming ever-more fragmented. Map 5 shows forest cover fragmentation around the Park based on 1997 data. This shows the main block of forest extending in the south-west as far as the Ta Dung, Dak Plao, and Quang Khe Production Forests in Dak Nong Province (much of this area has been proposed as a Nature Reserve at a local level since 1995, but this has yet to be supported by the central government). After this complex, the link is broken to forest further southwest in Lam Dong Province. This complex of production forests is tenuously linked with the Chu Yang Sin – Bi Doup-Nui Ba complex by two or three forested connections, the biggest of which narrows to just 3 km in width. Further west, the forest block around Nam Nung Nature Reserve in Dak Nong Province is already largely separated from the main block and in turn, is completely separated from forests further west. To the east, connections are somewhat better, with southeastern Chu Yang Sin and eastern Bi Doup-Nui Ba connected to blocks of forest extending north (along the watershed between Dak Lak and Khanh Hoa provinces), east (into Khanh Hoa Province), and south to Da Nhim Protection Forest.

This process of fragmentation is being driven by forest clearance for agriculture and commercial tree crops (e.g. cashew and coffee) and the construction of roads. Of direct concern to the Park is the construction of the Eastern Truong Son Highway a development that will fragment and degrade forest within the Park. Adjacent to the Park, a new road running from Da Lat to Nha Trang has already severed the connection between the Da Nhim Protection Forest and Phuoc Binh Nature Reserve to the south and this road also cuts through Bi Doup Nui Ba National Park – separating Bi Doup, one of the two mountains that gives the Park its name, from Nui Ba. It seems inevitable that such a development will increase current levels of agriculture further diminishing overall connectivity and the ecological value of the forest block as a whole. Forest fragmentation of this nature is gradually reducing the viability of the Park to sustain large populations of herbivores, or to sustain populations of species that require large home ranges. Forest fragementation is likely to have played an important part in the disappearance of Elephant, Tiger and Dhole from much of the landscape. This process will also have broader environmental and economic impacts since these forests protect upper watersheds on which millions of people ultimately depend. Damage to these forests, especially given the rising threat posed by climate change, may well have far-reaching implications for the future.

Map 6: Forest cover change for Chu Yang Sin National Park 2000 - 2005



The area around the hydro power dam

REFERENCES:

[67] Anon (2008) **Chu Yang Sin National Park: Status and Trends 2005-2008.** Unpublished report to BirdLife International *in Indochina*.

[68] For comparison, this figure is broadly equivalent to the installed capacity of two to three modern large wind turbines.

[69] International Center for Environmental Management (2010) **Chu Yang Sin National Park: Assessment of Proposed Road and Trail Developments in the Core Zone. Preliminary Findings.** Draft Internal Document.

[70] Le Trong Trai, Mahood, S. P., Luong Huu Thanh and Mai Duc Vinh (2008) **The illegal wildlife and timber trade network around Chu Yang Sin National Park, Dak Lak Province, Vietnam.** Hanoi: BirdLife International *in Indochina*.

[71,73,74] Dang Ngoc Can, Loc Xuan Nghia, To Van Duong and Le Trong Trai (2009) **The illegal wildife and timber trade network around Chu Yang Sin National Park, Dak Lak Province, Vietnam**.Hanoi: BirdLife International *in Indochina*.

[72] By 2009, the wildlife trade network involved 505 individuals and the survey recorded 416 individuals involved in the timber trade network.

[75] Lindskog, E. (2008) **Assessment of traditional forest resource use by local communities, and impacts of establishment of Chu Yang Sin National Park.** Hanoi: BirdLife International *in Indochina*.

[76] Ksor, N. (2008) **Complementary Assessment of Traditional Forest Resource Use by Local Communities and Impacts of the Establishment of Chu Yang Sin National Park.** Unpublished report to BirdLife International *in Indochina*.

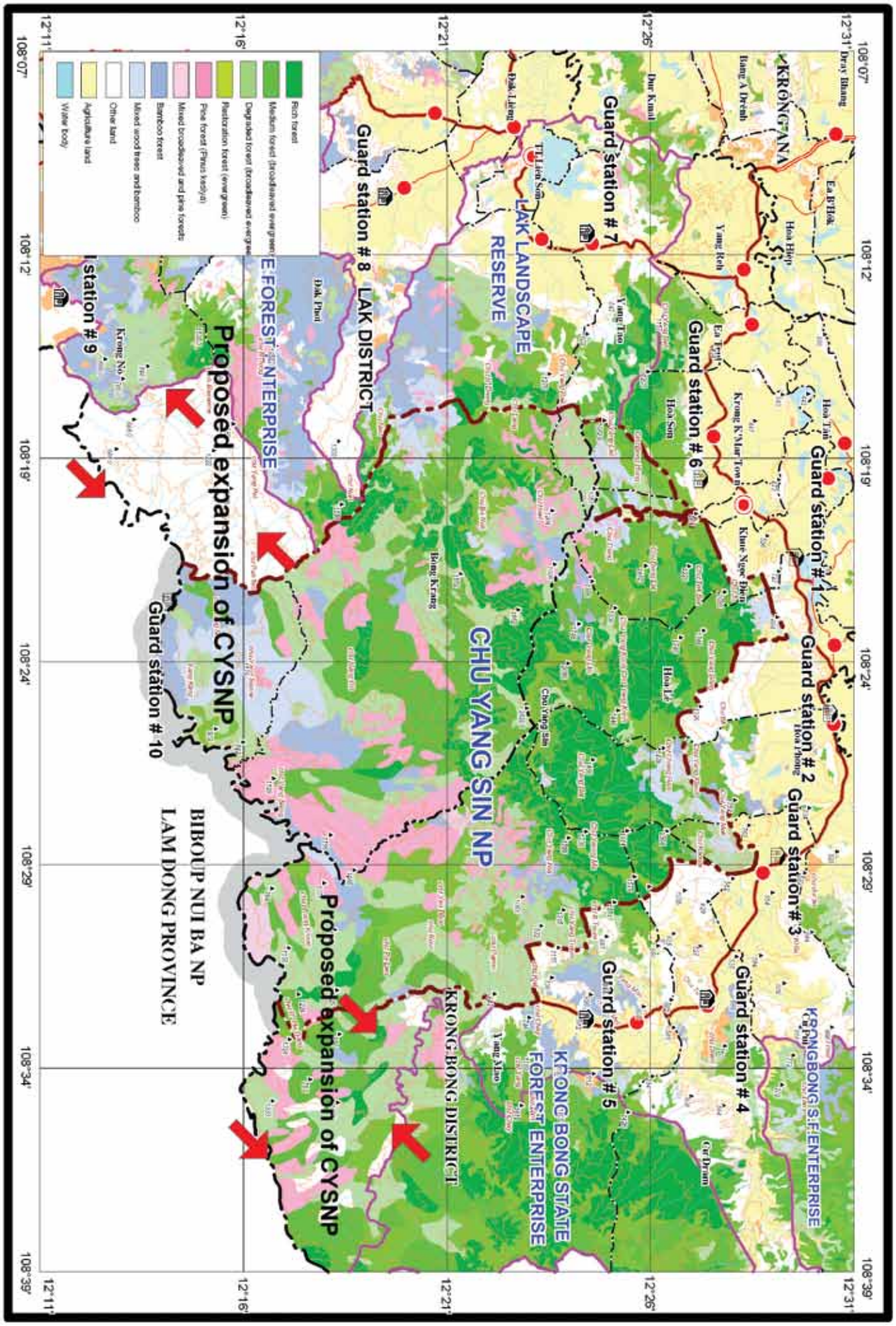
[77] Also known as the 661 Programme

Chapter 9

Conservation management

H'mong people farming in the buffer zone

Map 7: Proposed expansion of the Park



Clearly, the forests of the Park and upper watersheds are enormously important for biodiversity and environmental services, especially watershed protection and carbon storage. With this in mind, the IWBM project has heped the management board to develop an operational management plan for the Park that sets-out management priorities and support needs for the next 5 years[78]. Ultimately, this will need to form part of a broader vision and management strategy for the remaining forests of the Da Lat Plateau and this issue is now recognized by national and provincial planners.

The key elements of the Park plan are to:

- Strengthen the protection and conservation of the Park through better patrolling and enforcement efforts.
- Re-zone and expand the Park to ensure that boundaries are clearly marked, to enable ecotourism development in certain areas; and to expand the Park to extend protection to adjacent forests in Yang Mao and Krong No communes currently under the Lak Landscape Protection Forest Board and commune management.
- Strengthen capacity of the Park staff by providing better training, equipment and upgrading guard stations.
- Pilot community-based ecotourism development to generate income for local communities around the boundaries of the Park.
- Increase public awareness through work with schools, villages and other community-level groups.
- Develop alternative income generation options for local communities as a means of reducing pressure on Park resources, mostly through forest protection contracts funded by the National Target Programme on Forests[79].

Central to the longer-term vision for the Park is an expansion of the Park to include the adjacent forests currently under the management of a range of different management authorities, including the Lak Landscape Reserve, the Lak Forest Enterprise and the Krong Bong Forest Enterprise. The management authorities for these various forest management units currently lack the expertise, capacity and financial resources to implement appropriate management. Expansion therefore provides a golden opportunity to coordinate conservation management across a larger forest landscape and introduce improved incentives for local communities to participate in forest management, for example through community forest management, the expansion of existing co-management arrangements and development of community-based ecotourism. These approaches could help balance sustainable use with biodiversity conservation and the protection of environmental services such as watershed protection and carbon storage, both of which could generate significant future revenues for forest management.

In the longer term, the financing of the Park, whether expanded or not, will require considerably more financial resources than have been made available so far. Equally important will be a stronger commitment from national and provincial decision-makers to ensuring that the unique biodiversity and environmental values of the Park are not degraded further by a narrow, infrastructure-led vision for landscape development. Finding adequate financial resources to manage this area properly is certainly an issue, but not an insurmountable one. The financing costs for managing this protected area are estimated to be in the region of US$200,000 per year plus staffing costs for the next five years. This represents a very modest outlay given the economic contribution that the Park

Farms in the buffer zone

currently makes to watershed protection and the extraordinary biodiversity conservation values of these forests. In future, the revenues generated through management of the carbon assets of these forests through so called Reduced Emissions from Deforestration and Degration (REDD) alone could far outstrip the public investment costs required to safeguard this forest asset.

Given the considerable improvements made in conservation management at the Park in recent years, coupled with strong local leadership and increasing awareness of the extraordinary biodiversity values of the Park, the future for the Park is promising. However, major challenges remain and these can only be addressed if recent progress can be sustained and expanded into the future. This will require a long-term commitment by national, provincial and district authorities to enforce the law, to ensure that infrastructure development does not damage the Park's ecosystems; and to make available the funding needed for appropriate conservation measures (over and above essential conservation infrastructure which is now largely in place).

Progress over the past few years shows that committed and targeted conservation efforts and financing can achieve tangible impacts. It is hoped that this document will excite and encourage further efforts to conserve the Park, its unique biodiversity and the environmental services it provides to millions of downstream water users.

REFERENCES:

[78] BirdLife International (2009) **Operational Management Plan for Chu Yang Sin National Park, Dak Lak Province, Period: 2010-2015.** Hanoi: BirdLife International *in Indochina*.

[79] This program is also known as the Five Million Hectares Reforestation Program or '66 Program' and provides funding for tree planting and direct forest protection payments to local households.

Annexes

Species lists for all key taxa surveyed at Chu Yang Sin National Park

Plants

Species names and taxonomy follow Pham Hoang Ho (1999-2000) **[An illustrated flora of Vietnam].** Vol. 1-3. 2nd edition. Ho Chi Minh City : Young Publishing House. In Vietnamese. Gymnosperms, palms and other species assessed by the IUCN follow IUCN Red List online.

Division and family name	**Scientific name**	**Vietnamese name**
Polypodiophyta		**NGÀNH DƯƠNG XỈ**
Adiantaceae		**Họ tóc thần**
	Adiantum capillus-vencris	Tóc thần vệ nữ
	A. flabellulatum	Tóc xanh
	A. philippense	Tóc vệ nữ Phillipin
Angiopteridaceae		**Họ Móng ngựa**
	Angiopteris annamensis	Móng ngựa trung
	A. cochinchinensis	Móng ngựa nam
Aspidiaceae		**Họ yêm dực**
	Tectaria trifolia	Ráng ba cảnh
Aspleniaceae		**Họ Tổ điểu**
	Asplenium crinicaule	Tổ điểu long
	A. normale	Ráng cau xỉ thường
Blechnaceae		**Họ Ráng dừa**
	Woodwardia japonica	Cẩu tích
Cyatheaceae		**Họ Dương xỉ gỗ**
	Cyathea latebrosa	Dương xỉ thân gỗ
	C. grabla	Dương xỉ mộc
	C. podophylla	Ráng tiên toạ có cuống
Gleicheniaceae		**Họ Vạt, Tế**
	Dicranopteris linearis	Ráng tây sơn, tế, guột
Helminthostachiaceae		**Họ Lưỡi rắn**
	Helminthostachys zeylanica	Quản trọng
Lygodiaceae		**Họ Bòng bong**
	Lygodium conforme	Bòng bong tơ
	L. flexuosum	Bòng bong lá liễu
	L. japonicum	Hải kim sa
Nephtolepidaceae		**Họ Chân châu**
	Nephtolepis cordifolia	Cốt cán
Polypodiaceae		**Họ Dương xỉ**
	Drynaria bonii	Cốt toái bổ
	D. fortunei	Cốt toái đá

	D. quercifolia	Ráng đuôi phượng
	Phymatodes triphylla	Ráng thứ 3 cạnh
	Platycerium coronarium	Ô rồng
	P. grande	Ô rồng cảnh
	Pseudodrynaria coronans	Tổ phượng
	Pyrrosia adnascens	Tai chuột
Pteridiaceae		**Họ Chân xỉ**
	Pteridium aquilinum	Ráng đại dục
	Pteris biaurita	Sẹo gà hai tai
	P. ensiformis	Ráng chân xỉ hình gươm
	P. semipinnata	Ráng chân xỉ hai tai
Thelypteridaceae		**Họ Ráng**
	Cyclosorus parishii	Ráng chu mơ panish
Lycopodiophyta		**NGÀNH THÔNG ĐẤT**
Lycopodiaceae		**Họ Thông đất**
	Lycopodium casuarinoides	Thạch tùng dương
Selaginellaceae		**Họ Quyển bá**
	Selaginella dolichoclada	Quyển bá lá dẹt
	S. involvens	Quyển bá phân
Pinophyta		**NGÀNH THÔNG**
Cupressaceae		**Họ Tùng**
	Fokienia hodginsii	Pơ mu
Cycadaceae		**Họ Tuế**
	Cycas immersa	Tuế
Gnetaceae		**Họ Gắm**
	Gnetum montanum	Gắm
Pinaceae		**Họ Thông**
	Keteleeria davidiana	Tô hạp, Du sam núi đất
	K. evelyniana	Tô hạp, Du sam núi đá
	Pinus dalatensis	Thông đà lạt
	P. kesiya	Thông ba lá
	P. krempfii	Thông lá dẹt
	P. latteri	Thông hai lá
Podocarpaceae		**Họ Kim giao**
	Dacrydium elatum	Hoàng đàn giả

	Dacrycarpus imbricatus	Thông nàng
	D. neriifolius	Thông tre lá dài
	Nageia wallichiana	Kim giao núi đất
Magnoliophyta		**NGÀNH MỘC LAN**
Magnoliopsida		**LỚP MỘC LAN**
Acanthaceae		**Họ Ô rô**
	Acanthus leucostachyus	ô rô
	Adhatoda ventricosa	Hoa mỏ vịt
	Andrographis paniculata	Xuyên tâm liên
	Asystasia chelonoides	No nâm
	A. gangetica	
	Barleria prionitis	Gai kim
	B. strigosa	Gai kim dày
	Blepharis boerhaaviefolia	
	Dipteracanthus repens	Song dực
	Eranthemum tetragonum	Xuân hoa
	Gendarussa ventricosa	Dóng xanh
	Hemigraphis brunelloides	Bán tự vườn
	Lepidagathis incurva	
	L. nickeriensis	
	Neuracanthus tetragonos-tachyus	Lân chuỳ
	Perilepta auriculata	Chu bạc
	Stenogyne nelsonii	
	S. scandens	
	Strobilanthes pennitemonles	
	S. hypomalus	Chàm
Aceraceae		**Họ Thích**
	Acer calcaratum	Thích
	A. campbelii	Thích campel
	A. decandrum	Thích mười thuỵ
	A. crythrathum	Thích xẻ thuôn
	A. oblongum	Thích lá thuôn
Actinidiaceae		**Họ Dương đào**
	Actinidia latifolia	Dương đào lá rộng
	Saurauia nepanlensis	Sổ dã nepan

	S. trislyla	Sổ dã
Alangiaceae		**Họ Thôi ba**
	Alangium chinense	Thôi ba
	A. kurzii	Thôi ba lông
	A. salvifolium	Quảng lông
Altingiaceae		**Họ tô hạp**
	Altingia siamensis	Tô hạp nước
	A. takhtajanii	Tô hạp điệu biên
Amaranthaceae		**Họ Rau dền**
	Cyathula prostrata	Dơn ngọn đỏ
Ancardiaceae		**Họ Đào lộn hột**
	Buchanania latifolia	Mếu văn
	Choerospondias axillaris	Xoan như
	Dracontomelum schmidii	Sấu smit
	Lannea coromandelica	Cóc chuột
	Mangifera flava	Xoài vàng
	Semecarpus anacardiopsis	Sung
	S. humilis	Sưng lá nhỏ
	Swintonia griffithii	Xuân thon
	Rhus succedanea	Sơn lắc
	R. chinensis	Dã sơn
Annonaceae		**Họ Na**
	Alphonsea boniana	Thâu lĩnh bon
	A. philastreana	Thâu lĩnh
	A. tonkinensis	Thâu lĩnh bắc bộ
	A. harmandii	Móng rồng harmand
	A. pallens	
	Cyathocalyx annamensis	Bát đài
	Dasymaschalon glaucum	Mu tru
	Desmos cochinchinensis	Hoa dẻ lông đen
	D. dinhensis	Hoa dẻ núi đỉnh
	Fissistigma bicolor	Lãnh công
	F. machine	Dất maclure
	F. polyanthoides	Dất nhọt
	Friesodielsia fonicata	

	Goniothalamus donnaiensis	Giác đế đồng nai
	G. gabriacianus	Giác đế nhung
	Melodorum fruticosum	Dù dẻ trơn
	Miliusa baillonii	Song môi, Mật lựu
	M. campanulata	Mai liễu chuông
	Mitrephora calcarea	Cây dội núi
	Polyalthia angustissima	Nhọc cánh hẹp
	P. cerasoides	Quần đầu trái tròn
	P. harnandii	Quần đầu harmand
	Uvaria cordata	Bù dẻ lá tròn
	Xylopia vielana	Diền, Sai
Apiaceae		**Họ Hoa tán**
	Hydrocotyle nepalensis	Rau má núi
Apocynaceae		**Họ trúc đào**
	Aganonerion polymorphum	
	Aganosma marginata	Chè lông
	Alstonia scholaris	Sữa
	Alstonia angustifolia	Móp nhỏ
	Holarrhena antidysenterica	Mức hoa trắng
	Kopsia lancibracteolata	Sáng ngang
	Melodinus silvaticus	Giom rừng
	Rauvolfia cambodiana	Ba gạc
	Strophanthus caudatus	Sừng trâu
	Wrightia pubescens	Thừng mức lông
	W. coccinea	Lòng mức đỏ
Aquifoliaceae		**Họ Nhựa ruồi**
	Ilex fabrilis	Bùi núi
Araliaceae		**Họ Ngũ gia bì**
	Aralia chinensis	Thông mộc
	A. spinifolia	Cuồng cuồng
	Dendropanax chevalieri	Sâm cây
	Schefflera elliptica	Chân chim bầu dục
	S. octophylla	Chân chim tám lá
	S. pauciflora	
	Trevesia palmata	Đu đủ rừng

Asclepiadaceae		**Họ Thiên lý**
	Dischidia acuminata	Tai chuột nhọn
	D. hirsuta	Tai chuột lông
	Hoya carnosa	Hoa sao
	H. macrophylla	Hoa sao
	Tylophora ovata	Dây
Asteraceae		**Họ Cúc**
	Adenostemma lavenia	Cúc đính
	Ageratum conyzoides	Cứt lợn
	Anaphalis adnata	Cúc bạc
	Anisopappus chinensis	Dị mào
	Aster ageratoides	Cúc ba gân
	Bidens bipinnata	Cúc áo
	Blumea aromatica	Hoàng dâu lá to
	Centipeda minima	Cỏ the
	Conyza japonica	Cỏ bồng giả
	Eupatorium ordoratum	Cỏ lào
	Gynura nitida	Bâu dât, Cải giá
	Ixeris gracilis	Cúc đắng
	Laggera pterodonta	Xú linh đơn
	Siegesbeckia orientalis	Hy thiêm
	Sphaeranthus indicus	Cúc chân vịt núi
	Vernonia arborea	Bông bạc
	V. aspera	Bạc dầu
	V. pierrei	Bông bạc pierrei
	Vicoa auriculata	Sơn cúc
	Xanthium strumarium	Ké đầu ngựa
Aucubaceae		**Họ ô rô bà**
	Aucuba sp.	
Balsaminaceae		**Họ Bóng nước**
	Impatiens annamensis	Bóng nước trung bộ
	I. chevalieri	Bóng nước chevalier
	I. langbianensis	Bóng nước lâm viên
	I. luteola	Bóng nước vàng nhạt
	I. violacea	Bóng nước tím

Begoniaceae		**Họ Thu hải đường**
	Begonia aptera	Thu hải đường cánh không
	B. laciniata	Thu hải đường cánh xẻ
Berberidaceae		**Họ Hoàng mộc**
	Mahonia nepalensis	Mã hồ
Betulaceae		**Họ cáng lò**
	Carpinus poilanei	Duyên lan
	C. viminea	Duyên cánh mềm
	Ostryopsis davidiana	Dầu nóng
Bignoniaceae		**Họ Núc nác**
	Markhamia pienci	Đinh
	Bignonia floribunda	Chùm ớt
	Oroxylum indicum	Núc nác
	Stereospermum neuranthum	Ké núi
Bombacaceae		**Họ Gạo**
	Gossampinus malabarica	Gạo
Boraginaceae		**Họ Vòi voi**
	Tournefortia sarmemtosa	Bọp cạp trườn
Bursernceae		**Họ trám**
	Canarium littorale	Trám
	C. subulatum	Trám cà na
	Dacryodes dungii	Cóc đá
Caesalpinaceae		**Họ vang**
	Afzelia xylocarpa	Gõ đỏ
	Bauhinia bracteata	Móng bò lá bắc
	B. glauca	Móng bò lục phân
	B. penicilliloba	Móng bò thùy bút
	B. touranensis	Móng bò đà nẵng
	Caesalpinia major	Móc mèo
	C. pubescens	Móc mèo
	Cassia alata	Muồng trầu
	C. fistula	Bò cạp nước
	C. siamea	Muồng đen
	Delonx regia	Phượng vĩ
	Dialium cochinchinensis	Xoay

	Sindora tonkinensis	Gụ biển
Campanulaceae		**Họ Hoa chuông**
	Campanula colorata	Hoa chuông
	Codonopsis celebica	
	C. javanica	Đẳng sâm
	Lobelia alsinoides	
	L. griffithii	Lô biểu
	L. zeylanica	Lô biểu stilanca
Caprifoliaceae		**Họ Cơm cháy**
	Lonicera macrantha	Kim ngân hoa to
Caryophyllaceae		**Họ Cẩm chướng**
	Drymaria cordata	Cây lâm thảo
Chloranthaceae		**Họ Hoa sói**
	Chloranthus japonicus	Sói nhật
	C. angustifolius	Tuyết hương lan
Chrysobalanaceae		**Họ Cám**
	Parman annamensis	Cám
Clusiaceae		**Họ Bứa**
	Calophyllum bonii	
	C. ceriferum	Choi
	C. soulattri	Công trắng
	C. thorelii	Công…
	Garcinia bonii	Bứa
	G. cowa	Tai chua
	G. fusca	Bứa lửa
	G. harmandii	Bứa mọi
	G. multiflora	Dọc
	G. oliveri	Bứa oliver
	G. schefferi	Bứa scheffer
Combretaceae		**Họ Bàng**
	Anogeissus acuminata	
	Combretum quadrangulare	
	Terminalia alata	Chiêu liêu khê
	T. nigrovenulosa	Chiêu liêu gân đen
Convolvulaceae		**Họ Bìm bìm**

	Argyreia lanceolata	
	Hewittia sublobata	Dây rau lớn
	Ipomoea trichosperma	Bìm bìm
	Lepistemon binectariferum	Lâu chuỳ
Cornaceae		**Họ Thù Du**
	Cornus oblonga	Thu Du
Crassulaceae		**Họ thuốc bỏng**
	Kalanchoe laciniata	Trường sinh tách
Crypteroniaceae		**Họ Thồi lồi**
	Crypteronia paniculata	Thồi lồi
Cucurbitaceae		**Họ Bầu bí**
	Hodgsonia macrocarpa	Đại hái
	Neoalsomitra integrifolia	Dây song mão
	Trichosanthes quinquangulata	Qua lâu góc năm
	T. villosa	Qua lâu lông
Daphniphyllaceae		**Họ Đức Diệp**
	Daphniphyllum glaucescens	Đức diệp
Datiscaceae		**Họ Thung**
	Tetrameles nudiflora	Thung
Dichapetalaceae		**Họ A tràng**
	Dichapetalum longipetalum	
	D. tonkinensis	
	Aquilaria crassna	Trầm
	Wikstroemia longifolia	Niệt gió
Dilleniaceae		**Họ Sổ**
	Dillenia baillonii	Sổ…..
	D. indica	Sổ bà
	D. turbinata	Sổ con quay
	Tetracera scandens	Dây sứ giác
Dipterocarpaceae		**Họ Dầu**
	Anisoptera scaphula	Sao cát
	Dipterocarpus alatus	Dầu con rái
	D. costatus	Dầu mít
	D. intricatus	Dầu chai
	D. obtusifolius	Dầu trà beng

	D. turbinatus	Dầu con quay
	Hopea odorata	Sao đen
	H. pierre	Kiền kiền
	Parashorea stellata	Chò đen
	Shorea cochinchinensis	Cà doong
	S. obtusa	Cà chắc
	S. siamensis	Cẩm liên
Ebenaceae		**Họ Thị**
	Diospyros chevalieri	Thị chevalier
	D. longibracteata	Thị hôi
	D. maritima	Cẩm thị
	D. roi	Roi
	D. sylvatica	Thị rừng
	Maba parviflora	Ma ba
Elaeocarpaceae		**Họ Côm**
	Elaeocarpus bachmaensis	Côm bạch mã
	E. bidoupensis	Côm hổ đúc
	E. chanlos	Côm chandos
	E. darlacensis	Côm đăklăk
	E. dongnaiensis	Công đồng nai
	E. dubius	Công tầng
	E. floribundus	Côm nhiều hoa
	E. bojeri	Côm trâu
	E. nitentifolius	Công lông
	E. parviflorus	Côm hoa nhỏ
	E. thorelii	Côm lá kèm
	Sloanea kappleriana	Gai nang ke
Erycaceae		**Họ Đỗ quyên**
	Lyonia annamensis	Nam trúc trung bộ
	L. ovalifolia	Nam trúc lá xoan
	Rhododendron fleuryi	Đỗ quyên trắng
	R. langbianenis	Đỗ quyên lâm viên
	Vaccinium chevalieri	òng ảnh chevalier
	V. greenwayae	òng ảnh greenway
	V. harmandianum	òng ảnh harmand

Escalloniaceae		**Họ Da hương**
	Itea thorelii	Ý thiếp
Euphorbiaceae		**Họ Thầu dầu**
	Alchornea latifolia	Đom đóm, Lá đoan
	Antidesma ghaesembilla	Chòi mòi
	Aporosa microcalyx	Thầu tấu
	Baccaurea sylvestris	Du moóc
	B. sapida	Dâu đá
	Bischofia javanica	Nhội
	Breynia angustifolia	Bồ cu vẽ
	Croton caudatus	Cù đèn đuối
	C. murex	Cù đèn
	C. tiglium	Bã đậu
	Endospermum chinense	Vạng trứng
	Glochidion macrophyllum	Bọt ếch lá to
	Homonoia riparia	Rù rì
	Macaranga denticulata	Bo soi
	M. indica	
	Mallotus apelta	Bùm bụp
	M. paniculatus	Ba bét
	Phyllanthus emblica	Me rừng
	P. poilanei	
	P. reticulatus	Phèn đen
	Sapium discolor	Sòi núi
	Suregada multiflora	Kén
Fabaceae		**Họ Đậu**
	Clitoria macrophylla	
	Dalbergia mammosa	Cẩm lai vú
	D. nigrescens	Trắc đen
	Desmodium griffithianum	
	D. heterocarpon	
	Erythrina orientalis	Vông nem
	Milletia nigrescens	Thàn mát
	Ormosia balansae	Ràng ràng mít
	O. pinnata	Ràng ràng xanh

	O. semicastrata	Ràng ràng hom
	Pterocarpus macrocarpus	Giáng hương quả to
	Tephrosia candida	
	Uraria rufescens	
Fagaceae		**Họ Dẻ**
	Castanopsis carlesii	Cà ổi lá nhỏ
	C. chevalieri	Cà ổi chevalier
	C. echinocarpa	
	C. ferox	Gà ổi gai dữ
	C. fissa	Sồi phảng
	C. hystrix	Cà ổi đỏ
	C. indica	Cà ổi ấn độ
	C. tribuloides	Cà ổi gai chống
	C. wilsonii	Cà ổi uyn-xơn
	Lithocarpus aggregatum	Sồi đá tu
	L. annamitorum	Sồi đá trung bộ
	L. aurienlata	Sồi đá hình tai
	L. bonettii	Sồi tiên yên
	L. echinophotus	Sồi gai
	L. fenestratus	Sồi vàng
	L. harmandiii	Sồi xe
	L. hemisphacricus	Sồi nửa cầu
	L. magneinii	Sồi the
	L. silvicolatum	Sồi núi
	L. touranensis	Sồi đà nẵng
	L. truncatus	Sồi đá nhụt
	L. rubulosus	Sồi ống
	L. vestitus	Sồi lông nhung
	L. xylocarpus	Sồi đá cứng
	Quercus angustinii	Dẻ ô guystans
	Q. bambusacfolia	Dẻ lá tre
	Q. blakei	
	Q. donnaiensis	Dẻ đồng nai
	Q. helferiana	Dẻ helfer
	Q. kerrii	Dẻ ke

	Q. langbianensis	Dẻ Langbian
Flacourtiaceae		**Họ Mùng quân**
	Dankia langbianensis	Đan kia
	Hydnocarpus annamensis	Chùm bao trung bộ
	H. heterophyllum	Chùm bao lá dỗi
	H. serratus	Nang trứng
	Flacourtia jangomas	Mùng quân tùng
Gentianceae		**Họ Long đờm**
	Gentiana lomcitii	Long đờm
Gesneriaceae		**Họ Tai voi**
	Acschynanthus evrandii	Hoa kì
	Rhynchotechum latifolium	Mỏ bao
Hamamelidaceae		**Họ Sau sau**
	Symingtonia populnea	Chắp tay
	Symingtonia tonkinnensis	Chắp tay bắc
Hypericaceae		**Họ Ban**
	Cratoxylon formosum	Thành ngạnh
	C. prunifolium	Đỏ ngọn
	Hypericum patulum	Ban
Icacinaceae		**Họ Thụ đào**
	Gomphandra hainanensis	Tiết hùng
	Gonocaryum lobbianum	Cuống vàng
	Lasianthera donaiensis	
	Celastraceae	
	Euonymus chinensis	Chân danh, Đỗ trọng nam
	E. javanicus	Chân danh java
Illiciaceae		**Họ Hồi**
	Illicium griffithii	Hồi núi
Irvingiaceae		**Họ Cơ nia**
	Irvingia malayana	Cây cơnia
Ixonanthaceae		**Họ Hà nu**
	Ixonanthes cochinchinensis	Hà nu
Juglandaceae		**Họ Hồ đào**
	Engelhardtia chrysolepis	Chẹo tía
	E. colebrookeana	Chẹo trắng

	E. spicata	Chẹo lông
	E. wallichiana	Chẹo wallich
Lamiaceae		**Họ Hoa môi**
	Amsochilus pathdus	Di thân
	Gomphostemma oblanum	Đinh hùng
	Mesona prunelloides	Thuỷ cẩm
	Pogostemon parviflorus	Tu hùng
Lauraceae		**Họ Long não**
	Actinodaphne pilosa	Bộp
	Beilschmiedia sp.	Chấp
	Cinnamomum burmannii	Quế rành
	C. cambodianum	Xá xị
	C. cassia	Quế
	C.fitianum	Re bời lời
	C. obtusifolium	Re lá to
	C. validinerve var. poilanei	Quế gân lớn
	C. zeylanicum	Quế re
	Cryptocarya annamemsis	Mò trung bộ
	C. impressa	Mò quả xanh
	C. metcalfiana	Mò lung bạc
	Lindera chengii	Lòng trứng
	L. kwangtungensis	Lòng trứng quảng đông
	Litsea balansae	Bời lời
	L. cubeba	Màng tang
	L. longepedunculata	Bời lời dài
	L. glutinosa	Bời lời nhớt
	L. monopetala	Bời lời tròn
	L. polyantha	Bời lời hoa nhiều
	L. robusta	Bời lời lá to
	L. thorelii	Bời lời thorel
	L. vang	Bời lời vàng
	L. verticillata	Bời lời lá mọc vòng
	Machilus chinensis	Rè trung hoa
	M. cochinchinensis	Rè nam bộ
	M. odoratissimus	Rè hương

	M. parviflora	Rè hoa nhỏ
	Neolitsea ellipsoidea	Bài nhài
	N. zeylanica	Bài nhài stilanka
	Phoebe cuneata	Sụ, kháo
Lecythidaceae		**Họ Lộc vừng**
	Barringtonia cochinchinensis	Chiếc
	Careya sphaerica	Vung
Leeaceae		**Họ Gối hạc**
	Leea rubra	Gối hạc
Loganiaceae		**Họ Mã tiền**
	Fagraea auriculata	
	F. fragrans	Trai nước
	Strychnos angustifolia	Mã tiền
Lythraceae		**Họ Tử vi**
	Lagerstroemia caudata	Bằng lăng ổi
	L. duperreana	
Magnoliaceae		**Họ Mộc lan**
	Magnolia annamemsis	Mộc lan trung bộ
	M. grandiflora	Dạ hợp
	Manglietia blaoensis	
	M. chevalieri	Mỡ chevalia
	M. conifera	Mỡ
	Michelia champaca	Ngọc lan
	M. constricta	
	M. floribunda	Giổi nhiều hoa
	M. mediocris	Giổi xanh
	Paramichelia baillonii	Giổi xương
	Tsoongiodendron odorum	Giổi thơm
Mastixiaceae		**Họ búi lửa**
	Mastixia arborea	Búi cây
Melastomataceae		**Họ Mua**
	Melastoma candidum	Mua bà
	M. chehardii	Mua cherhard
	M. polyanthum	Mua hoa nhiều
	Memecylon geoftiayi	Sầm

	M. scutellatum	Sầm núi
	Osbeckia crinita	Mua tép
Meliaceae		**Họ Xoan**
	Aglaia cambodiana	Gội campuchia
	A. gigantea	Gội nếp
	A. pyramidata	Gội tháp
	A. roxburghiana	Gội
	A. taynguyenensis	Gôi tây nguyên
	Chukrasia tabularis	Lát lông
	Dysoxylum poilanei	Huỳnh dương
	Sandoricum koetjape	Sấu đỏ
Menispermaceae		**Họ Tiết dê**
	Coscinium fenestratum	Vàng đắng
	Fibraurea recisa	Hoàng đằng
	Pericampylus incanus	
	Stephania hernandiifolia	Lõi tiền
Mimosaceae		**Họ trinh nữ**
	Acacia pennata	Dây sống rắn
	Adenanthera microsperma	Muồng ràng ràng
	Albizia chinensis	Sống rắn
	A. corniculata	Muồng móc
	A. lebbeck	Muồng giấy
	Entada phaseoloides	Bàm bàm
	Mimosa invisa	Trinh nữ vòng
	M. pudica	Trinh nữ
	Paralbizia lucida	Cứt ngựa
	Pithecellobium sp.	Mán đỉa
	Xylia kerrii	Đa đa
Moraceae		**Họ Dâu tằm**
	Artocarpus lanceolatus	Chay lá mác
	A. rigida	Mít nài
	Ficus annulata	Đa quả to
	F. auriculata	Vả
	F. cunia	Đa lá lệch
	F. fulva	Ngoã lông

	F. hannandii	Sung rừng
	F. heterophylla	Vú bò
	F. hispida	Ngái
	F. lacor	Sung quả nhỏ
	F. racemosa	Sung
	F. retuesa	Si
	F. villosa	Đa lông
	Streblus ilicifolius	Ô rô
Myricaceae		**Họ Dâu rượu**
	Myrica esculenta	Dâu tươi
Myristicaceae		**Họ Máu chó**
	Horsfieldia amygdalina	Săng máu
	Knema cinerea	Máu chó lá nhỏ
	K. furfuracea	Máu chó lá to
Myrsinaceae		**Họ Đơn nem**
	Ardisia capillipes	Trọng đũa
	A. adenanthera	Trọng đũa andaman
	A. annamensis	Trọng đũa trung bộ
	A. brevicaulis	Trọng đũa thân ngắn
	A. capillipes	Trọng đũa cọng mịn
	A. crenata	Trọng đũa ngu
	A. nemorosa	
	Maesa balansae	Đơn nem
	M. indica	Đơn nem
Myrtaceae		**Họ Sim**
	Rhodomyrtus tomentosa	Sim
	Syzygium albiflorum	Trâm hoa trắng
	S. chanlos	Trâm chalos
	S. cumini	Trâm trắng
	S. jambos	Trâm roi
	S. blancoi	Trâm rộng
	S. wightianum	Trâm trắng
	S. zeylanicum	Trâm vỏ đỏ
Nepenthaceae		**Họ Nắp ấp**
	Nepenthes annamensis	Nắp ấp

Ochnaceae		**Họ Mai**
	Ochna integerrima	Mai rừng
Oleaceae		**Họ Nhài**
	Osmanthus pedunculatus	Hoa thơm
	Balenophora fimgosa	Xà cô
	B. laxiflora	Dó đất
	Rhopaloensis phaloides	Dó đất núi, Sơn dương
Pentaphylaceae		**Họ Ngũ liệt**
	Pentaphylax euryoides	Ngũ liệt
Piperaceae		**Họ Hồ tiêu**
	Peperomia sp.	
	Piper sp.	Trầu dại
Polygalaceae		**Họ Viễn Chi**
	Salomonia ciliata	Sa môn
	Xanthophyllum glandulosum	Xăng đá
Proteaceae		**Họ Mạ Sưa**
	Helicia balansae	Mạ sưa
	H. cochinchinensis	Mạ sưa nam bộ
	H. grandis	Mạ sưa
Ranunculaceae		**Họ Hoàng liên**
	Anemone poilanei	Phong quỳ
	Naravelia zeylanica	Bạch tú
	Ranunculus japonicus	Mao cấn
Rhamnaceae		**Họ Táo**
	Ziziphus rugosa	Táo rừng
Rhizophoraceae		**Họ Đước**
	Carallia brachiata	Trúc tiết
Rhodoleiaceae		**Họ Hồng quang**
	Rhodoleia championii	Hồng quang
Rosaceae		**Họ Hoa hồng**
	Eriobotrya angustissima	Tì bà
	E. poilanei	Sơn trà
	E. serrata	Tì bà lá răng
	Malus doumeri	
	Photinia benthamiana	Sến đào

	P. prunifolia	Sến đào lá mật
	Prunus arborea	Xoan đào
	Rubus chevalieri	Mâm xôi
	R. trianthus	Ngây
	Sorbus granulosa	Hoa thu
Rubiaceae		**Họ Cà phê**
	Adina cordifolia	Gáo
	Alleizettella rubra	ái lợi
	Anthocephalus chinensis	Gáo
	Canthium dicoccum	Xương cá
	Galium dalatensis	
	Hedyotis corymbosa	Cốc mẩm
	Hydnophytum formicarum	Kỳ nam
	Ixora dolichophylla	Trang
	Lasianthus anamemsis	Chìa vôi trung bộ
	L. balansae	
	L. harmandianus	Chìa vôi Harmandi
	Morinda cochinchinensis	Nhàu nam
	Mussaenda crosa	Bướm bạc
	Neonauclea sessilifolia	Gáo vàng
	Pavetta indica	Cẳng vàng
	Psychotria serpens	Lấu
	Randia depauperata	Găng
	R. lanceolata	Mai táp xương cá
	R. oxydonta	Mai táp trơn
	Wendlandia glabrata	Chà hươu
	W. paniculata	Hoắc quang
Rutaceae		**Họ Cam**
	Acronychia pendunculata	Bưởi bung
	Euodia calophylla	Thôi chanh
	E. lepta	Ba gạc
	Glycosmis trichanthera	Cơm rượu
	Zanthoxylum nitidum	Xuyên tiêu
	Z. scabrum	
Sapindaceae		**Họ Bồ hòn**

	Allophylus brachycalyx	Ngoại mộc
	Lepisanthes langbianensis	Gió khơi
	Nephelium litchi	Trường vải
	Paranephelium spirei	Trường chôm
	Xerospermum donnaiensis	Vải gốc đồng nai
Sapotaceae		**Họ Sếu**
	Donella lanceolata	Săng sáp
	Eberhardtia aurata	Công sưa
	Madhuca alpina	Sên núi
	Sideroxilon cambodiana	Sên đất
Scrophulariaceae		**Họ Hoa mõm sói**
	Adenosma ramosum	Bồ bồ
	A. threlii	Bồ bồ
	Hysanthes serrata	Ráng cưa
	Lindernia macrobotrys	Mẫu thảo
	Melasma arvense	Ô núi
	Picradenia floribunda	Mật đất
	Torenia concolor	Tô liên
Simatoubaceae		**Họ Thanh Thất**
	Ailanthus triphysa	Thanh thất núi
	A. trithysa	Thanh thất
	Eurycoma longifolia	Bá bệnh
	Harrisonia penniformis	Xâu da
Solanaceae		**Họ Cà**
	Solanum torvum	Cà hoang gai
Sonneratiaceae		**Họ Bầu**
	Duabanga grandiflora	Phay vi
Staphyleaceae		**Họ côi**
	Turpinia montana	Côi
Sterculiaceae		**Họ Trôm**
	Melochia umbellata	Trứng cua rừng
	Pterospermum angustifolium	Lòng mang lá hẹp
	P. diversifolium	Lòng mang lá lớn
	P. lanceifolium	Lòng mang lá mác
	P. perrinnii	Lòng mang

	Scaphium lychnophorum	Ươi
	Tarrietia javanica	Huỷnh
Styracaceae		**Họ bồ đề**
	Rehderodendron macrocarpum	
	Styrax benzoin	Bồ đề vỏ đỏ
Symplocaceae		**Họ Dung**
	Symplocos adenophylla	Dung lá có tuyến
	S. anomala	Dung lá mỏng
	S. cambodiana	Dung lõng
	S. cochinchinensis	Dung nam
	S. globosa	Dung hoa chim
	S. lucida	Dung lá bóng
Tiliaceae		**Họ Đay**
	Colona thorelii	Bồ an
	Grewia abutilifolia	Cò ke lá rộng
	G. bulot	
	G. pandaica	Cò ke lá lõm
Theaceae		**Họ Chè**
	Anneslea fragrans	Chè béo
	Camellia caudata	Chè đuôi
	C. drupifera	Chè quả hạch
	Eurya tonkinensis	Súm trơn
	E. trichocarpa	Súm
	Gordonia bidoupensis	Gò đồng bidup
	G. gigantiflora	Gò đồng hoa to
	Pyrenaria jonquieriana	Thạch trâu
	Schima argentea	Vối thuốc
	S. crenata	Chò sót
	S. khasiana	Vối thuốc
	S. noronhae	Vối thuốc
	S. wallichii	Vối thuốc
	Ternstroemia javanica	Huỳnh nương java
Ulmaceae		**Họ Du**
	Celtis orientalis	Sếu
	Gironniera subaequalis	Ngát

	Trema orientalis	Hu đay
Verbenaceae		**Họ Cỏ roi ngựa**
	Callicarpa albula	Tu hú
	C. poilanei	Màng nàng
	Gmelina arborca	Lõi
	Vitex glabrata	Đẻn 5 lá
	V. pubescens	Bình linh
	Vitex trifolia	Đẻn ba lá
Violaceae		**Họ Hoa tím**
	Viola annamensis	Hoa tím trung bộ
	V. arcuata	Hoa tím cong
	V. dalatensis	Hoa tím đà lạt
Vitaceae		**Họ Nho**
	Ampelocissus polystachya	Hồ nho
	Cayratia japonica	Vác nhật bản
	Parthenocissus cuspidifera	Cọp trèo non
	T. planicaule	Tử thư đẹp
Liliopsida		**LỚP HÀNH**
Araceae		**Họ Ráy**
	Acorus calamus	Thạch xương bồ
	Aglaonema pierreanum	Môn xanh
	Alocasia evrardii	Môn evrand
	Atisoema petioluslatum	
	Epiprenum giganteum	
	Homalonema occulta	Thiên niên kiện
	Lasia spinosa	Chóc gai
	Pothos balansae	
	P. cathcartii	
	P. scandens	Ráy leo
Arecaceae		**Họ Cau dừa**
	Areca triandra	Cau rừng
	Calamus bousigonii	Mây lá rộng
	C. ceratophorus	Mây roi
	C. palustris var. cochinchin-ensis	Mây nam bộ
	C. poilanei	Mây poa lan

	C. pseudoscutellaris	Song bột
	C.rudentum	Sóng đá
	C. tetradactylus	Mây nếp
	Caryota mitis	Đùng đình
	C. urens	Móc
	C. sympetala	Khúa
	Daemonorops pierreana	Hèo
	Didymosperma caudatum	Song châu
	D. caudata var. tonkinense	Song châu bắc bộ
	Korthalsia laciniosa	Phuông
	Livistona saribus	Kè nam
	Licuala saribus	Kè nam
	Licuala ternata	Mật cật
	Pinanga paradoxa	Cau chuột
	P. banaensis	Cau chuột ba na
	Plectocomia elongata	Song voi
Asparagaceae		**Họ Thiên môn**
	Disporum calcaratum	Bảo đặc
	D. cantoniense	Bảo đặc quảng đông
	Ophiopogon japonicus	Tóc tiên nhật bản
	O. reptans	Cao cẳng
	Peliosanthes serrulata	Cẩu tử táng
	P. teta	Cẩu tử
Commelinaceae		**Họ Thài lài**
	Aneilema giganteum	Loã trai to
	Commelina communis	Trai thường
	C. longifolia	Trai hoa dài
	Cyanotis arachnoidea	Bích trai
	C. barbata	Thài lài xanh
	Forrestia mollis	Lâm trai không lông
	Floscopa glomerata	Đầu tiên
	Murdannia gigantea	Cỏ hôi
Costaceae		**Họ Mía dò**
	Costus speciosus	Mía dò
Cyperaceae		**Họ Cói**

	Carex baccans	Kiết
	.Carex finitima	Kiết
	C. indica	Kiệt ấn độ
	Fimbristylis squamulosa	Mao thư ké
	Scirpus petelotii	Hoàn thảo
	Scleria ciliaris	Cương lông
Dioscoreaceae		**Họ Củ nâu**
	Dioscorea glabra	Củ mài
Hypoxidaceae		**Họ Hạ trâm**
	Curculigo anamitica	Cổ nốc trung bộ
	C. tonkinensis	Cổ nốc bắc bộ
	Hypoxis aurea	Hạ trâm
Liliaceae		**Họ hành**
	Dianella ensifolia	Hương bài
	Dracaena gracilis	Bong bóng gây
	Iphigenia indica	Yến phi
Musaceae		**Họ Chuối**
	Musa uranoscopos	Chuối rừng
Orchidaceae		**Họ Lan**
	Aldrovanda vesiculosa	Lan túi
	Aerides falcatum	Giáng hương
	Agrostophyllum brevipes	Xích hu
	Anoectochilus albo-lineatus	Lan sữa
	A.geniculata	Lan sứa gối gấp
	Appendicula graminifolia	Lan sậy
	Biermannia sigaldii	Biếc man
	Bulbophyllum candidum	Thạch đậu
	B. averyanovii	
	B. evrardii	
	B. punctatisimum	Thạch đậu tráng nhỏ
	B. secundum	Hạt đậu lệch
	B. semiteres	
	Calanthe augusti-reigneri	
	C. triplicata	
	Ceratostylis evrardii	Giác thư evrand

	Ceratostrylis siamensis	Giác thư xiêm
	Cephalantheropsis lateriscapa	Lan nhuỵ đầu
	Cheirostylis sp.	
	Cleisocentrn klossii	Lan miệng kín kloss
	C. eberhardii	Lan miệng kín eberhard
	C. striatum	Lan miệng kín sọc
	Cleisostomopsis eberhardtii	Lan tua miệng kín
	Coelogyne calcarata	Thạch đạm
	C. eberhardtii	Thạch đạm eberhard
	C. lawrenceana	Hoàng hạc
	C. mooreana	Thạch đạm moor
	C. prolifera	Thạch đạm chồi
	C. radicosa	Thạch đạm sander
	Cymbidium ensifolium	Lan kiếm
	Deceptor bidoupensis	Lan lửa
	Dendrobium acinaciforme	Hoàng thảo lá cong
	D. amabile	Hoàng thảo đáng yêu
	D. aphyllum	Thạch hộc không lá
	D. bellatulum	Thạch hộc vàng lúa
	D. crumenatum	tuyết mai
	D. crystallinum	Hoàng thảo ngọc thạch
	D. dalatensis	Hoàng thảo đà lạt
	D. densiflorum	Thuỷ tiên trắng
	D. dentatum	Thạch hộc trắng
	D. filicaule	Thạch hộc thân tơ
	D. heterocarpum	Một Châm vàng
	D. hercoglossum	Thạch hộc tím huệ
	D. langbianensis	Hoàng thảo lâm viên
	D. leonis	Thạch hộc tai nhỏ
	D. loddigesii	Hoàng thảo xinh
	D. mannii	Hoàng thảo nam
	D. ochraceum	Thạch hộc hoàng đỏ
	D. parcum	Thạch hộc parcum
	D.parishii	Thạch hộc tím hồng
	D. porphyrophyllum	Thạch hộc lá tím

	D. primulinum	Thạch hộc
	D. pseudotenellum	Thạch hộc giả mảnh
	D. williamsonii	Thạch hộc lông đen
	Diglyphosa evrardii	Lan lá mỏng
	Eria bidupensis	Lan lông bì dúp
	E. boniana	Lan lông bon
	E. dacrydium	Lan lông hoa ít
	E. elata	Lan lông cánh
	E. floribunda	Lan lông hoa nhiều
	E. globifera	Lan lông cầu
	E. globulifera	Lan lông cầu nhỏ
	E. lanigera	Lan lông tơ
	E. longipes	Lan lông cuống dài
	E. muscicola	Lan lông tiên rêu
	E. paniculata	Lan lông chuỳ tròn
	E. pannea	Lan lông rách
	E. pulverulenta	Lan lông phấn
	E. pusilla	Lan lông nhỏ
	E. sp	Lan lông thảo
	Epigeneium annamense	Lan môi dây trung bộ
	E. cacuminis	Lan môi dầy
	Eulophia spectabilis	Lan luận đẹp
	E. sp1	
	E. sp2	
	Flickingeria stenoglosa	Thạch hộc mới
	F. sp.	
	Gastrochilus calceolaris	Lan môi túi
	Habenaria malinata	Ngọc phượng
	H. sp.	
	Herminium annamense	Giác bàu
	Liparis campylostalix	Lan tai dê
	L. dendrochiloides	Lan tai dê
	L. manii	Lan tai dê man
	Ludisia discolor	Lan gấm
	Malaxis acuminata	Lan chiễu nhọn

	M. tixieri	Lan chiểu tixica
	Nephelaphyllum pulchrum	Lan mây
	N. sp.	
	Oberonia dalatensis	Móng rùa đà lạt
	O. ensiformis	Lan nga bạch dạng gươm
	O. evrardii	Lan nga bạch evrandii
	O. rufilabris	Lan nga bạch đỏ
	Otochilus fuscus	Lan rau rút hồng
	O. pseudoporrectus	Lan rau rút vườn giả
	Panisea albiflora	Lan khúc thân hoa trắng
	Phaius indigofera	Lan hạc đính
	P. sp.	
	Pholidota articulata	
	P. convallariae	
	P. quibitrae	
	P. sp.	
	Platanthera angustata	Lan đại
	P. sp.	
	Pteroceras leopardinum	Lan môi sùng
	Plocoglottis sp.	Lan môi yến
	Renanthera imschootiana	Ngọn lửa
	Schoenorchis gemmata	Lan trứng bướm
	S. tixieri	Lan trứng bướm tixiea
	Smitinandia helferi.	Lan mã lai
	Spathoglottis pubescens	Lan chu đỉnh
	Sunipia andersonii	Lan đại bao
	S. racemosa	
	Tainia penangiana	Lan lá móng
	Thecostele alata	Lan củ chén
	Thelasis sp.	
	Trichotosia dalatensis	Lan len đà lạt
	T. dasyphylla	Lan len lá dây
	T. microphylla	Lan len lá mỏng
	Zeuxine affinis	Lan cột tuyến
Pandanaceae		**Họ dừa gai**

	Pandanus pierrei	
	Pandanus leucocephalus	Dừa trắng
	P. multidrupaceus	Dứa quả nhiều
	P. tonkinensis	Dứa bắc bộ
Poaceae		**Họ Hoà thảo**
	Alloteropsis semialata	Cỏ đỉnh lông
	Aristaria cuningiana	Cỏ dàm ba
	Arundinaria pusilla	Sặt nhỏ
	A. vicinia	Sặt
	Aristaria barbata	Trúc thảo
	Bambusa arundinacea	Tre gai
	B. procera	Lồ ô
	B. vulgaris	Tre tàu
	Cephalostachyum langbianensis	
	Coelachne infirma	Cỏ tiêu lệ
	Imperata cylindrica	Cỏ tranh
	Isachne albans	Cỏ lá liễu trắng
	I. chevalieri	Cỏ lá liễu chevaliea
	I. dioica	Xoan thư yếu
	I. globosa	Cỏ lá liễu câu
	Melocalamus compactiflorus	Giang đặc
	Nehouzeana dulloa	Núa
	Oxytenanthera nigrociliata	
	Saccharum sponta	
	Sporobolus sp	
	Thysanolaena maxima	Đót
Smilacaceae		**Họ Khúc khắc**
	Smilax aberrans	Cầm cang
	S. annamensis	Cẩm cang trung bộ
	S. balansacana	Cẩm cang balanxa
	S. glabra	Thổ phục linh
	S. lanceifolia	Cẩm cang lá gươm
	S. ocreata	Cẩm cang bẹ lá kèm
	S. riparia	Cẩm cang bờ suối
Zingiberaceae		**Họ Gừng**

	Alpinia bracteata	Sẹ
	Catimbium breviligulatum	Hoa bọ cạp
	Hedychium bousingonia	Khương hoa
	H. coronarium	Ngãi tiên
	H. ynnaense	Ngãi tiên vân nam
	Zingiber rubens	Gừng đỏ

Mammals

Yellow-cheeked Gibbon *Nomascus gabriellae* (female)

Species names follow Wilson, D. E. and Reeder, D. M. (2006) **Mammal Species of the World: a Taxonomic and Geographic Reference,** Third edition, Baltimore: Johns Hopkins University Press. Vietnamese names follow Dang Ngoc Can, Endo, H., Nguyen Truong Son, Oshida, T., Le Xuan Canh, Dang Huy Phuong, Peter, D., Kawada, S. H., Akiko, H., Sasaki (2008) **Danh lục các loài thú hoang dã Việt Nam [Checklist of the Wild Mammal species of Vietnam].** Japan: Primate Research Institute, Inuyama, Japan and Department of Vertebrate Zoology.

Family name	Scientific name	English name	Vietnamese name
Tupaiidae		**Tree Shrews**	**Họ Đồi**
	Tupaia belangeri	Northern Tree Shrew	Đồi
	Dendrogale murina	Northern Smooth-tailed Tree Shrew	Nhen
Lorisidae		**Lories**	**Họ Cu li**
	Nycticebus pygmaeus	Pygmy Slow Loris	Cu li nhỏ
Cercopithecidae		**Old-world Monkeys**	**Họ Khỉ**
	Macaca arctoides	Stump-tailed Macaque	Khỉ mặt đỏ
	M. fascicularis	Crab-eating Macaque	Khỉ đuôi dài
	M. leonina	Northern Pig-tailed Macaque	Khỉ đuôi lợn
	Pygathrix nigripes	Black-shanked Douc Langur	Chà vá chân đen
Hylobatidae		**Gibbons**	**Họ Vượn**
	Nomascus gabriellae	Yellow-cheeked Crested Gibbon	Vượn đen má vàng
Talpidae		**Moles**	**Họ Chuột chũi**
	Euroscaptor parvidens	Small-toothed Mole	Chuột chũi răng nhỏ
Pteropodidae		**Fruit Bats**	**Họ Dơi quả**
	Megaerops niphanae	Ratanaworabhan's Fruit Bat	Dơi quả không đuôi lớn
Rhinolophidae		**Horseshoe Bats**	**Họ Dơi lá mũi**
	Rhinolophus affinis	Intermediate Horseshoe Bat	Dơi lá đuôi
	Rh. pearsonii	Pearson's Horseshoe Bat	Dơi lá péc-xôn
	Rh. pusillus	Least Horseshoe Bat	Dơi lá mũi nhỏ
Hipposideridae		**Leaf-nosed Bats**	**Họ Dơi nếp mũi**
	Hipposideros armiger	Great Leaf-nosed Bat	Dơi nếp mũi quạ
	H. larvatus	Intermediate Leaf-nosed Bat	Dơi nếp mũi xám
	H. pomona	Pomona Leaf-nosed Bat	Dơi nếp mũi xinh
Megadermatidae		**Palse Vampire Bats**	**Họ Dơi ma**
	Megaderma lyra	Greater False Vampire Bat	Dơi ma bắc
Vespertilionidae		**Evening Bats**	**Họ Dơi muỗi**
	Pipistrellus coromandra	Indian Pipistrelle	Dơi muỗi nâu
	Eudiscopus denticulus	Disk-footed Bat	Dơi chai chân

	Myotis horsfieldii	Horsfield's Myotis	Dơi tai cánh ngắn
	Murina cyclotis	Round-eared Tube-nosed Bat	Dơi mũi ống tai tròn
Manidae		**Pangolins**	**Họ Tê tê**
	Manis javanica	Sunda Pangolin	Tê tê ja va
Felidae		**Cats**	**Họ Mèo**
	Pardofelis temminckii	Asiatic Golden Cat	Báo lửa
	Prionailurus bengalensis	Leopard Cat	Mèo rừng
Viverridae		**Civets**	**Họ Cầy**
	Arctogalidia trivirgata	Small-toothed Palm Civet	Cầy tai trắng
	Paguma larvata	Masked Palm Civet	Cầy vòi mốc
	Paradoxurus hermaphroditus	Asian Palm Civet	Cầy vòi đốm
	Chrotogale owstoni	Owston's Palm Civet	Cầy vằn bắc
	Prionodon pardicolor	Spotted Lingsang	Cầy gấm
	Viverra zibetha	Large Indian Civet	Cầy giông
	Viverricula indica	Small Indian Civet	Cầy hương
Herpestidae		**Mongooses**	**Họ Cầy lỏn**
	Herpestes javanicus	Small Asian Mongoose	Cầy lỏn tranh
	H. urva	Crab-eating Mongoose	Cầy móc cua
Ursidae		**Bears**	**Họ Gấu**
	Helarctos malayanus	Sun Bear	Gấu chó
	Ursus thibetanus	Asian Black Bear	Gấu ngựa
Mustelidae		**Weasels, etc.**	**Họ Chồn**
	Lutra lutra	European Otter	Rái cá thường
	Arctonyx collaris	Hog Badger	Lửng lợn
	Martes flavigula	Yellow-throated Marten	Chồn vàng
	Melogale personata	Burmese Ferret-badger	Chồn bạc má nam
	Mustela kathiah	Yellow-bellied Weasel	Triết bụng vàng
Suidae		**Pigs**	**Họ Lợn rừng**
	Sus scrofa	Wild Boar	Lợn rừng
Tragulidae		**Mouse-deer**	**Họ Cheo cheo**
	Tragulus kanchil	Lesser Mouse-deer	Cheo cheo nam dương
Cervidae		**Deer**	**Họ Hươu nai**
	Muntiacus muntjak	Red Muntjak	Mang thường
	M. vuquangensis	Large-antlered Muntjac	Mang lớn
	Rusa unicolor	Sambar	Nai

Bovidae		**Cattle, Antelopes etc.**	**Họ Trâu bò**
	Bos gaurus	Gaur	Bò tót
	Capricornis milneedwardsii	Chinese Serow	Sơn dương
Sciuridae		**Squirrels**	**Họ Sóc**
	Ratufa bicolor	Black Giant Squirrel	Sóc đen
	Hylopetes alboniger	Particolored Flying Squirrel	Sóc bay đen trắng
	Petaurista philippensis	Indian Giant Flying Squirrel	Sóc bay trâu
	Callosciurus finlaysonii	Finlayson's Squirrel	Sóc đỏ
	C. erythraeus	Pallas's Squirrel	Sóc chân vàng
	Dremomys rufigenis	Asian Red-cheeked Squirrel	Sóc mõm hung
	Menetes berdmorei	Indochinese Ground Squirrel	Sóc vằn lưng
	Tamiops rodolphii	Cambodian Striped Squirrel	Sóc chuột lửa
Spalacidae		**Bamboo Rats**	**Họ Dúi**
	Rhizomys pruinosus	Hoary Bamboo Rat	Dúi mốc lớn
Muridae		**Mice, Rats, etc.**	**Họ Chuột**
	Leopoldamys sabanus	Long-tailed Giant Rat	Chuột núi đuôi dài
	Maxomys surifer	Red Spiny Rat	Chuột su-ri
	Mus musculus	House Mouse	Chuột nhắt nhà
	Niviventer confucianus	Confucian Niviventer	Chuột khổng tử
	N. fulvescens	Chestnut White-bellied Rat	Chuột hươu bé
	N. langbianis	Indochinese Arboreal Niviventer	Chuột lang-bi-an
	Rattus tanezumi	Oriental House Rat	Chuột nhà
Hystricidae		**Old-world Porcupines**	**Họ Nhím**
	Atherurus macrourus	Asiatic Brush-tailed Porcupine	Đon
	Hystrix brachyura	Malayan Porcupine	Nhím đuôi ngắn

Birds

Indochinese Fulvetta *Alcippe danisi*

Birds: Species taxonomy, nomenclature and order, follow BirdLife International (2009). Vietnamese name follow Nguyen Cu, Le Trong Trai and Karen Phillipps (2000) **Chim Việt Nam.** Hanoi: BirdLife International Vietnam Programme.

Family name	Scientific name	English name	Vietnamese name
Phasianidae			**Họ Trĩ**
	Francolinus pintadeanus	Chinese Francolin	Đa đa
	Arborophila rufogularis	Rufous-throated Partridge	Gà so họng hung
	A. brunneopectus	Bar-backed Partridge	Gà so họng trắng
	A. choloropus	Scaly-breasted Partridge	Gà so ngực gụ
	Gallus gallus	Red Junglefowl	Gà rừng
	Lophura nycthemera	Silver Pheasant	Gà lôi trắng
	Polyplectron germaini	Germain's Peacock Pheasant	Gà tiền mặt đỏ
	Rheinardia ocellata	Crested Argus	Trĩ sao
Anatidae			**Họ Vịt**
	Dendrocygna javanica	Lesser Whistling-duck	Le nâu
Ardeidae			**Họ Diệc**
	Egretta garzetta	Little Egret	Cò trắng
	Bubulcus ibis	Cattle Egret	Cò ruồi
	Ardeola bacchus	Chinese Pond Heron	Cò bợ
	Butorides striatus	Striated Heron	Cò xanh
Anhingidae			**Họ Cổ rắn**
	Anhinga melanogaster	Oriental Darter	Cổ rắn
Accipitridae			**Họ ưng**
	Pandion haliaetus	Osprey	Ó cá
	Spilornis cheela	Crested Serpent-eagle	Diều hoa miến điện
	Elanus caeruleus	Black-winged Kite	Diều trắng
	Accipiter trivirgatus	Crested Goshawk	Ưng ấn độ
	A. badius	Shikra	Ưng xám
	A. virgatus	Besra	Ưng bụng hung
	Ictinaetus malayensis	Black Eagle	Đại bàng mã lai
	Spizaetus cirrhatus	Changeable Hawk-eagle	Diều đầu nâu
	Pernis ptilorhynchus	Oriental Honey-buzzard	Diều ăn ong
Falconidae			**Họ cắt**
	Falco peregrinus	Peregrine Falcon	Cắt lớn
Rallidae			Họ Gà Nước

	*Gallirallus striatus**	Slaty-breasted Rail	Gà nước vằn
	Amaurornis phoenicurus	White-breasted Waterhen	Cuốc ngực trắng
	*Porzana cinerea**	White-browed Crake	Cuốc mày trắng
	*Porphyrio porphyrio**	Purple Swamphen	Xít
Columbidae			Họ Bồ câu
	Streptopelia tranquebarica	Red Collared-dove	Cu ngói
	Stigmatopelia chinensis	Spotted Dove	Cu gáy
	Macropygia unchall	Barred Cuckoo-dove	Gầm gì vằn
	Chalcophaps indica	Emerald Dove	Cu luồng
	Treron curvirostra	Thick-billed Green-pigeon	Cu xanh mỏ quặp
	T. phoenicopterus	Yellow-footed Green-pigeon	Cu xanh chân vàng
	Ducula badia	Mountain Imperial-pigeon	Gầm ghì lưng nâu
Psittacidae			**Họ Vẹt**
	Loriculus vernalis	Vernal Hanging-parrot	Vẹt lùn
	Psittacula alexandri	Red-breasted Parakeet	Vẹt ngực đỏ
Cuculidae			**Họ Cu cu**
	Clamator coromandus	Chestnut-winged Cuckoo	Khát nước
	Cuculus sparverioides	Large Hawk-cuckoo	Chèo chẹo lớn
	C. micropterus	Indian Cuckoo	Bắt cô trói cột
	C. poliocephalus	Lesser Cuckoo	Cu cu nhỏ
	Cacomantis sonneratii	Banded Bay Cuckoo	Tìm vịt vằn
	C. merulinus	Plaintive Cuckoo	Tìm vịt
	Surniculus lugubris	Drongo Cuckoo	Cu cu đen
	Phaenicophaeus tristis	Green-billed Malkoha	Phướn
	Centropus sinensis	Greater Coucal	Bìm bịp lớn
	C. bengalensis	Lesser Coucal	Bìm bịp nhỏ
Strigidae			**Họ Cú**
	O. spilocephalus	Mountain Scops-owl	Cú mèo lalusơ
	Otus sunia	Oriental Scops-owl	Cú mèo nhỏ
	O. bakkamoena	Collared Scops-owl	Cú mèo khoang cổ
	Strix leptogrammica	Brown Wood-owl	Hù
	Glaucidium brodiei	Collared Owlet	Cú vọ mặt trắng
	G. cuculoides	Asian Barred Owlet	Cú vọ
Caprimulgi-dae			**Họ Cú muỗi**
	Caprimulgus indicus	Grey Nightjar	Cú muỗi ấn độ
	C. macrurus	Large-tailed Nightjar	Cú muỗi đuôi dài

Apodidae			**Họ Yến**
	Collocalia brevirostris	Himalayan Swiftlet	Yến núi
	Hirundapus cochinchinensis	Silver-backed Needletail	Yến đuôi cứng bụng trắng
	Apus affinis	Little Swift	Yến cằm trắng
Trogonidae			**Họ Nuốc**
	Harpactes erythrocephalus	Red-headed Trogon	Nuốc bụng đỏ
Coraciidae			**Họ Sả**
	Eurystomus orientalis	Dollarbird	Yểng quạ
Alcedinidae			**Họ Bồng chanh**
	Lacedo pulcella	Banded Kingfisher	Sả vằn
	Halcyon smyrnensis	White-throated Kingfisher	Sả đầu nâu
	Alcedo hercules	Blyth's Kingfisher	Bồng chanh rừng
	A. atthis	Common Kingfisher	Bồng chanh
	Megaceryle lugubris	Crested Kingfisher	Bói cá lớn
Meropidae			**Họ Trảu**
	Nyctyornis athertoni	Blue-bearded Bee-eater	Trảu lớn
	Merops leschenaulti	Chestnut-headed Bee-Eater	Trảu họng vàng
Upupidae			**Họ Đầu rìu**
	Upupa epops	Eurasian Hoopoe	
Bucerotidae			**Họ Hồng hoàng**
	Anorrhinus austeni	Austen's Brown Hornbill	Niệc nâu
	Anthracoceros albirostris	Oriental Pied Hornbill	Cao cát bụng trắng
	Buceros bicornis	Great Hornbill	Hồng hoàng
Ramphasti-dae			**Họ Cu rốc**
	Megalaima lagrandieri	Red-vented Barbet	Thầy chùa đít đỏ
	M. lineata	Lineated Barbet	Cu rốc bọng nâu
	M. faiostricta	Green-eared Barbet	Cu rốc đầu xám
	M. franklinii	Golden-throated Barbet	Cu rốc đầu vàng
	M. oorti	Black-browed Barbet	Cu rốc trán vàng
	M. australis	Blue-eared Barbet	Cu rốc đầu đen
	*M. haemacephala**	Coppersmith Barbet	Cu rốc cổ đỏ
Picidae			**Họ Gõ kiến**
	Picunmus innominatus	Speckled Piculet	Gõ kiến lùn đầu vàng
	Sasia ochracea	White-browed Piculet	Gõ kiến lùn mày trắng
	Dendrocopos canicapillus	Grey-capped Woodpecker	Gõ kiến nhỏ đầu xám
	Celeus brachyurus	Rufous Woodpecker	Gõ kiến nâu

	Dryocopus javensis	White-bellied Woodpecker	Gõ kiến đen bụng trắng
	Picus chlorolophus	Lesser Yellownape	Gõ kiến xanh cánh đỏ
	P. flavinucha	Greater Yellownape	Gõ kiến xanh gáy vàng
	Dinopium javanense	Common Flameback	Gõ kiến vàng nhỏ
	Chrysocolaptes lucidus	Greater Flameback	Gõ kiến vàng lớn
	Blythipicus pyrrhotis	Bay Woodpecker	Gõ kiến nâu cổ đỏ
	Hemicircus canente	Heart-spotted Woodpecker	Gõ kiến đen họng trắng
Eurylaimidae			**Họ Mỏ rộng**
	Psarisomus dalhousiae	Long-tailed Broadbill	Mỏ rộng xanh
	Serilophus lunatus	Silver-breasted Broadbill	Mỏ rộng hung
Pittidae			**Họ Đuôi cụt**
	Pitta oatesi	Rusty-naped Pitta	Đuôi cụt đầu hung
	P. cyanea	Blue Pitta	Đuôi cụt đầu đỏ
Artamidae			**Họ Nhạn rừng**
	Artamus fuscus	Ashy Woodswallow	Nhạn rừng
Aegithinidae			**Họ chim nghệ**
	Aegithina tiphia	Common Iora	Chim nghệ ngực vàng
	A. lafresnayei	Great Iora	Chim nghệ lớn
Campephagi-dae			**Họ Phường chèo**
	Tephrodornis gularis	Large Woodshrike	Phường chèo nâu
	T. pondicerianus	Common Woodshrike	Phường chèo nâu mày trắng
	Coracina macei	Large Cuckooshrike	Phường chèo xám lớn
	C. polioptera	Indochinese Cuckooshrike	Phường chèo xám nhỏ
	C. melaschistos	Black-winged Cuckooshrike	Phường chèo xám
	Pericrocotus solaris	Grey-chinned Minivet	Phường chèo má xám
	P. ethologus	Long-tailed Minivet	Phường chèo đỏ đuôi dài
	P. flammeus	Scarlet Minivet	Phường chèo đỏ lớn
	Hemipus picatus	Bar-winged Flycatcher-shrike	Phường chèo đen
Laniidae			**Họ Bách thanh**
	Lanius collurioides	Burmese Shrike	Bách thanh nhỏ
	L. cristatus	Brown Shrike	Bách thanh mày trắng
Oriolidae			**Họ Vàng anh**
	Oriolus chinensis	Black-naped Oriole	Vàng anh trung quốc
	O. traillii	Maroon Oriole	Tử anh
Dicruridae			**Họ Chèo bẻo**
	Dicrurus macrocercus	Black Drongo	Chèo bẻo

	D. leucophaeus	Ashy Drongo	Chèo bẻo xám
	D. aeneus	Bronzed Drongo	Chèo bẻo rừng
	D. remifer	Lesser Racket-tailed Drongo	Chèo bẻo cờ đuôi bằng
	D. paradiseus	Greater Racket-tailed Drongo	Chèo bẻo cờ đuôi chẻ
Rhipiduridae			**Họ Rẻ quạt**
	Rhipidura albicollis	White-throated Fantail	Rẻ quạt họng trắng
Monarchidae			**Họ giả Đớp ruồi**
	Hypothymis azurea	Black-naped Monarch	Đớp ruồi xanh gáy đen
	Terpsiphone paradisi	Asian Paradise Flycatcher	Thiên đường đuôi phướn
Corvidae			**Họ Qụa**
	Garrulus glandarius	Eurasian Jay	Quạ thông
	Cissa chinensis	Green Magpie	Giẻ cùi xanh
	C. hypoleuca	Yellow-breasted Magpie	Giẻ cùi bụng vàng
	Crypsirina temia	Racket-tailed Treepie	Chim khách
	Temnurus temnurus	Ratchet-tailed Treepie	Chim khách đuôi cờ
	Corvus macrorhynchos	Large-billed Crow	Quạ đen
Paridae			**Họ Bạc má**
	Parus monticolus	Green-backed Tit	Bạc má bụng vàng
	P. spilonotus	Yellow-cheeked Tit	Bạc má mào
	Sylviparus modestus	Yellow-browed Tit	Bạc má rừng
Hirundinidae			**Họ Nhạn**
	Hirundo rustica	Barn Swallow	Nhạn bụng trắng
	H. striolata	Striated Swallow	Nhạn bụng vằn
	Delichon dasypus	Asian House-martin	Nhạn hông trắng á châu
Aegithalidae			**Họ Bạc má đuôi dài**
	Aegithalos concinnus	Black-throated Tit	Bạc má đuôi dài
Cisticolidae			**Họ Chiền chiện**
	Prinia atrogularis	Hill Prinia	Chiền chiện núi họng trắng
	P. rufescens	Rufescent Prinia	Chiền chiện đầu nâu
	P. inornata	Plain Prinia	Chiền chiện bụng hung
Pycnonotidae			**Họ Chào mào**
	Pycnonotus atriceps	Black-headed Bulbul	Chào mào vàng đầu đen
	P. melanicterus	Black-crested Bulbul	Chào mào vàng mào đen
	P. jocosus	Red-whiskered Bulbul	Chào mào
	P. aurigaster	Sooty-headed Bulbul	Bông lau tai trắng
	P. finlaysoni	Stripe-throated Bulbul	Bông lau họng vạch

	P. flavescens	Flavescent Bulbul	Bông lau vàng
	Alophoixus pallidus	Puff-throated Bulbul	Cành cạch lớn
	A. ochraceus	Ochraceous Bulbul	Cành cạch bụng hung
	Iole propinqua	Grey-eyed Bulbul	Cành cạch nhỏ
	Hemixos flavala	Ashy Bulbul	Cách cạch xám
	Hypsipetes mcclellandii	Mountain Bulbul	Cách cạch núi
	H. leucocephalus	Asian Black Bulbul	Cành cạch đen
Sylviidae			**Họ Chim chích**
	Orthotomus cuculatus	Mountain Tailorbird	Chích bông đầu vàng
	O. sutorius	Common Tailorbird	Chích đuôi dài
	O. atrogularis	Dark-necked Tailorbird	Chích bông cánh vàng
	Tesia olivea	Slaty-bellied Tesia	Chích đuôi cụt
	T. cyaniventer	Grey-bellied Tesia	Chích đuôi cụt bụng xanh
	Urosphena squameiceps	Asian Stubtail	Chích á châu
	Phylloscopus maculipennis	Ashy-throated Warbler	Chích mày xám
	P. inornatus	Inornate Warbler	Chích mày lớn
	P. borealis	Arctic Warbler	Chích phương bắc
	P. trochiloides	Greenish Warbler	Chích xanh lục
	P. reguloides	Southern Blyth's Leaf-warbler	Chích đuôi xám
	P. davisoni/P.ogilviegranti	Davison's Leaf-warbler/ Kloss's Leaf-warbler	Chích đuôi trắng
	Seicercus affinis	White-spectacled Warbler	Chích đớp ruồi mày đen
	S. poliogenys	Grey-cheeked Warbler	Chích đớp ruồi má xám
	S. castaniceps	Chestnut-crowned Warbler	Chích đớp ruồi đầu hung
	Abroscopus superciliaris	Yellow-bellied Warbler	Chích đớp ruồi họng vàng
Timaliidae			**Họ Khướu**
	Trichastoma tickelli	Buff-breasted Babbler	Chuối tiêu đất
	Malacopteron cinereum	Scaly-crowned Babbler	Chuối tiêu đuôi ngắn
	Pomatorhinus hypoleucos	Large Scimitar-babbler	Họa mi đất mỏ dài
	P. schisticeps	White-browed Scimitar-babbler	Họa mi đất mày trắng
	P. ochraceiceps	Red-billed Scimitar-babbler	Hoạ mi đất mỏ đỏ
	Jabouilleia danjoui	Short-tailed Scimitar-babbler	Khướu mỏ dài
	Napothera brevicaudata	Streaked Wren-babbler	Khướu đá đuôi ngắn
	N. epilepidota	Eyebrowed Wren-babbler	Khướu đá nhỏ
	Pnoepyga pusilla	Pygmy Wren-babbler	Khướu đuôi cụt pymy
	Stachyris ruficeps	Rufous-capped Babbler	Khướu bụi đầu đỏ

	S. nigriceps	Grey-throated Babbler	Khướu bụi đầu đen
	Macronous kelleyi	Grey-faced Tit-babbler	Chích chạch má xám
	M. gularis	Pin-striped Tit-babbler	Chích chạch má vàng
	Garrulax leucolophus	White-crested Laughingthrush	Khướu đầu trắng
	G. milleti	Black-hooded Laughingthrush	Khướu đầu đen
	G. chinensis	Black-throated Laughingthrush	Khướu bạc má
	G. vassali	White-cheeked Laughingthrush	Khướu đầu xám
	G. annamensis	Orange-breasted Laughingthrush	Khướu ngực đốm Annam
	G. yersini	Collared Laughingthrush	Khướu đầu đen má xám
	Leiothrix argentauris	Silver-eared Mesia	Kim oanh tai bạc
	Cutia legalleni	Vietnamese Cutia	Khướu hông đỏ
	Pteruthius flaviscapis	White-browed Shrike-babbler	Khướu mỏ quặp mày trắng
	P. aenobarbus	Chestnut-fronted Shrike-babbler	Khướu mỏ quặp cánh vàng
	Minla cyanouroptera	Blue-winged Minla	Khướu lùn cánh xanh
	Alcippe klossi	Black-crowned Fulvetta	Lách tách đầu đốm
	A. danisi	Indochinese Fulvetta	Lách tách mày trắng
	A. peracensis	Mountain Fulvetta	Lách tách vành mắt
	A. grotei	Black-browed Fulvetta	Lách tách mày đen
	Crocias langbianis	Grey-crowned Crocias	Mi núi bà
	Heterophasia annectens	Rufous-backed Sibia	Mi lưng hung
	H. desgodinsi	Black-headed Sibia	Mi đầu đen
	Yuhina nigrimenta	Black-chinned Yuhina	Khướu mào đầu đen
	Erpornis zantholeuca	White-bellied Yuhina	Khướu mào bụng trắng
	Paradoxornis margaritae	Black-headed Parrotbill	Khướu mỏ dẹt đầu đen
Zosteropidae			**Họ Vành khuyên**
	Zosterops palpebrosus	Oriental White-eye	
Irenidae			**Ho Chim lam**
	Irena puella	Asian Fairy-bluebird	Chim lam
Sittidae			**Họ Trèo cây**
	Sitta nagaensis	Chestnut-vented Nuthatch	Trèo cây đít hung
	S. frontalis	Velvet-fronted Nuthatch	Trèo cây trán đen
	S. solangiae	Yellow-billed Nuthatch	Trèo cây mỏ vàng
Certhiidae			**Họ Đuôi cứng**
	Certhia manipurensis	Manipur Treecreeper	Đuôi cứng
Sturnidae			**Họ Sáo**

	Sturnus nigricollis	Black-collared Starling	Sáo sậu
	Gracula religiosa	Hill Myna	Yểng
	S. burmannicus	Vinous-breasted Starling	Sáo sậu đầu trắng
Turdidae			**Họ Chích choè**
	Monticola solitarius	Blue Rock-thrush	Hoét đá
	Myophonus caeruleus	Blue Whistling-thrush	Hoét xanh
	Zoothera citrina	Orange-headed Thrush	Hoét vàng
	Z. sibirica	Siberian Thrush	Hoét sibêri
	Z. dauma	Eurasian Scaly Thrush	Sáo đất
	Z. marginata	Dark-sided Thrush	Sáo đất nâu
	Brachypteryx leucophrys	Lesser Shortwing	Hoét đuôi cụt mày trắng
	Cochoa viridis	Green Cochoa	Cô cô xanh
	B. montana	White-browed Shortwing	Hoét đuôi cụt xanh
	Saxicola ferrea	Grey Bushchat	Sẻ bụi xám
Muscicapidae			**Họ Đớp ruồi**
	Luscinia cyane	Siberian Blue Robin	Oanh lưng xanh
	Copsychus saularis	Oriental Magpie-robin	Chích chòe
	C. malabaricus	White-rumped Shama	Chích chòe lửa
	Cinclidia leucurum	White-tailed Robin	Oanh đuôi trắng
	Enicurus schistaceus	Slaty-backed Forktail	Chích chòe nước trán trắng
	E. leschenaulti	White-crowned Forktail	Chích chòe nước đầu trắng
	E. maculatus	Spotted Forktail	Chích chòe nước đốm trắng
	Muscicapa dauurica	Asian Brown Flycatcher	Đớp ruồi nâu
	Ficedula mugimaki	Mugimaki Flycatcher	Đớp ruồi mugi
	F. strophiata	Rufous-gorgeted Flycatcher	Đớp ruồi họng hung
	F. parva	Red-breasted Flycatcher	Đớp ruồi họng đỏ
	F. solitaris	Rufous-browed Flycatcher	Đớp ruồi mày hung
	F. hyperythra	Snowy-browed Flycatcher	Đớp ruồi mày trắng
	F. westermanni	Little Pied Flycatcher	Đớp ruồi đen mày trắng
	Cyornis hainanus	Hainan Blue-flycatcher	Đớp ruồi hải nam
	C. rubeculoides	Blue-throated Flycatcher	Đớp ruồi cằm xanh
	Eumyias thalassinus	Verditer Flycatcher	Đớp ruồi xanh xám
	Niltava grandis	Large Niltava	Đớp ruồi lớn
	N. davidi/N. sundara	Fujian Niltava/Rufous-bellied Niltava	Đớp ruồi cằm đen
	Culicicapa ceylonensis	Grey-headed Canary-flycatcher	Đớp ruồi đầu xám

Chloropseidae			**Họ Chim xanh**
	Chloropsis cochinchinensis	Blue-winged Leafbird	Chim xanh nam bộ
	C. hardwickii	Orange-bellied Leafbird	Chim xanh hông vàng
Dicaeidae			**Họ Chim sâu**
	Dicaeum agile	Thick-billed Flowerpecker	Chim sâu mỏ lớn
	D. chrysorrheum	Yellow-vented Flowerpecker	Chim sâu bụng vạch
	D. concolor	Plain Flowerpecker	Chim sâu vàng lục
	D. ignipectus	Fire-breasted Flowerpecker	Chim sâu ngực đỏ
	D. cruentatum	Scarlet-backed Flowerpecker	Chim sâu lưng đỏ
Nectariniidae			**Họ Hút mật**
	Aethopyga gouldiae	Gould's Sunbird	Hút mật họng vàng
	A. nipalensis	Green-tailed Sunbird	Hút mật nêpan
	A. christinae	Fork-tailed Sunbird	Hút mật đuôi nhọn
	A. saturata	Black-throated Sunbird	Hút mật ngực đỏ
	A. siparaja	Crimson Sunbird	Hút mật đỏ
	Arachnothera longirostra	Little Spiderhunter	Bắp chuối mỏ dài
	A. magna	Streaked Spiderhunter	Bắp chuối đốm đen
Passeridae			**Họ Sẻ**
	*Passer domesticus**	House Sparrow	Sẻ nhà
	P. flaveolus	Plain-backed Sparrow	Sẻ bụi vàng
	P. montanus	Eurasian Tree Sparrow	Sẻ
Estrildidae			**Họ Di**
	Lonchura striata	White-rumped Munia	Di cam
	L. punctulata	Scaly-breasted Munia	Di đá
Motacillidae			**Họ Chìa vôi**
	Motacilla alba	White Wagtail	Chìa vôi trắng
	M. cinerea	Grey Wagtail	Chìa vôi núi
Fringillidae			**Họ Sẻ đồng**
	Carduelis monguilloti	Vietnam Greenfinch	Sẻ thông họng vàng

Note: * species were recorded in the buffer zone of the Park

Amphibians and reptiles

Ptyas korros

Reptiles and Amphibians: Scienticfic names follow the Reptile and Amphibian Database online at: www. jcvi.org/. Vietnamese names follow Nguyen Van Sang and Ho Thu Cuc (1996) **[Checklist of reptiles and amphibians in Vietnam.**] Hanoi: Scientific and Technical Publishing House. (In Vietnamese.)

Family	Scientific name	English Name	Vietnamese Name
Megophryidae			
	Brachytarsophrys_ intermedia	Annam Spadefoot Toad	Cóc mắt trung gian
	Leptobrachium pullum	Vietnam Spadefoot Toad	Cóc mày việt nam
	Leptobrachium sp 1.		
	Xenophrys major	Glandular Horned Toad	Cóc mắt bên
	Xenophrys sp 1.		
	Ophryophryne sp.1		Cóc núi
	Ophryophryne sp.2		Cóc núi
	Ophryophryne sp.3		Cóc núi
	Leptobrachium cf. *ngoclinhense*	Ngoc Linh Spiny Toad	Ếch gai hàm ngọc linh
Bufonidae			
	Ingerophrynus galeatus	Bony-headed Toad	Cóc rừng
	Duttaphrynus melanostic-tus	Asian Common Toad	Cóc nhà
	Bufo sp.		
Dicroglossidae			
	Fejervarya limnocharis	Rice Frog	Nhái, ngoé
	Hoplobatrachus rugulosus	Chinese Edible Frog	Ếch rừng
	Limnonectes poilani	Asian Giant Stream Frog	Ếch poi-lan
	L. kuhlii		
	L. dabanus		
	Occidozyga lima	Green Puddle Frog	Cóc nước sần
	O. martensii	Round-tongued Floating Frog	Cóc nước mac-ten
Ranidae			
	Babina chapaensis	Chapa Torrent Frog	Chàng sa pa
	Hylarana macrodactyla	Long-legged Grass Frog	Chàng hiu
	H. taipehensis	Taipei Frog	Chàng đài bắc
	Odorrana banaorum	Bana Frog	Ếch ba na
	O. chloronota	Green Cascade Frog	Ếch xanh
	O. tiannanensis	Brown Cascade Frog	Ếch màng nhĩ lớn
	O. morafkai	Morafkai Frog	Ếch mô-rap-kai
	Odorrana sp 1.		

	Hylarana attigua	Gia Lai Frog	Ếch at-ti-gua
	H. guentheri	Gunther's Frog	Chẫu chàng
	H. milleti	Dalat Frog	Chàng mi-le
	H. nigrovittata	Black-striped Frog	Ếch suối
	Hylarana sp. 1		Ếch
	Hylarana sp. 2		
Rhacophoridae			
	Kurixalus cf. *carinensis*	Karin Buble-nest Frog	Nhái cây ca-rin
	Philautus sp.1		Nhái cây
	Philautus sp.2		Nhái cây
	Philautus sp.3		
	Philautus truongsonensis		
	Polypedates leucomystax	Common Tree Frog	Ếch cây mép trắng
	Polypedates sp1.		
	Rhacophorus annamensis	Annam Flying Frog	Ếch cây trung bộ
	Rh. feae	Thao Whipping Frog	Ếch cây phê
	Rh. calcaneus	Vietnam Flying Frog	Ếch cây cựa
	Rh. chuyangsinensis		Ếch cây
	Theloderma stellatum	Arcuate-spotted Pygmy Frog	
Microhylidae			
	Microhyla heymonsi	Ornamented Pygmy Frog	Nhái bầu hay-mon
	M. ornata	Beautiful Pygmy Frog	Nhái bầu hoa
	M. pulchra		Nhái bầu vân
	M. picta		
	Microhyla sp1.		
	Kaloula pulchra		
	Calluella guttulata		
	Kalophrynus interlineatus		
Ichthyophiidae			
	Ichthyophis kohtaoensis		Ếch giun koh-tao
Agamidae			
	Acanthosaura coronata		Ô rô vương miện
	A. capra	Green Pricklenape	Ô rô cap-ra
	Calotes emma	Emma Gray's Forest Lizard	Nhông em-ma
	C. versicolor	Oriental Garden Lizard	Nhông xanh

	C. mystaceus		
	Draco indochinensis	Indochina Flying Dragon	Thằn lằn bay đông dương
	D. maculatus	Spotted Flying Dragon	Thằn lằn bay đốm
	Physignathus cocincinus	Chinese Water Dragon	Rồng đất
Gekkonidae			
	Cosymbotus platyurus		Tắc kè đuôi dẹp
	Cyrtodacrtylus ziegleri		Thạch sùng ngón vằn lưng
	Gekko gecko		Tắc kè
	Hemidactylus vietnamensis	Vietnam Leaf-toed Gecko	Thạch sùng việt nam
	H. frenatus	Common House Gecko	Thạch sùng đuôi sần
	Dixonius cf. siamensis		
Lacertidae			
	Takydromus sexlineatus	Asian Grass Lizard, Six-striped Long-tailed Lizard	Liu điu chỉ
	T. hani		
Scincidae			
	Sphenomorphus indicus	Indian Forest Skink	Thằn lằn phê-nô ấn độ
	S. rufocaudatus	Red-tailed ground Skink	Thằn lằn phê-nô đuôi đỏ
	S. maculatus		
	Scincella melanosticta		
	Plestiodon quadrilineatus		Thằn lằn em-me chỉ
	Lipinia vittigera	Banded Lipinia	Thằn lằn vạch
	Mabuya longicaudata		Thằn lằn bóng đuôi dài
	M. macularia		Thằn lằn bóng đốm
	M. multifasciata		Thằn lằn bóng hoa
Varanidae			
	Varanus bengalensis	Bangal Monitor	Kỳ đà vân
	Ophisaurus sokolovi		Thằn lằn rắn sô-kô-lôp
Colubridae			
	Ahaetulla nasuta	Long-nosed Tree Snake	Rắn roi mõm nhọn
	A. prasina	Oriental Whipsnake	Rắn roi thường
	Boiga guangxiensis		
	Chrysopelea ornata	Golden Flying Snake	Rắn cườm
	Dinodon septentrionale	White-banded Wolf Snake	Rắn lệch đầu thẫm
	Dryocalamus davisoni		
	Dendrelaphis subocularis		

	Lycodon sp.		
	Oligodon cyclurus	Cantor's Kukri Snake	Rắn khiếm đuôi vòng
	Euprepiophis mandarinus	Mandarin Ratsnakes	Rắn sọc quan
	Amphiesma boulengeri	Tai-yong Keelback	Rắn sãi bô-len
	A. modesta		
	A. stolata		
	Sinonatrix percarinata		
	Xenochrophis flavipuncta-tus		
	Pseudoxenodon macrops		
	Ptyas korros	Chinese Ratsnake	Rắn ráo thường
	P. mucosus	Indochinese Rat Snake	
	Pareas carinatus	Keeled Slug Snake	Rắn hổ mây gờ
	P. hamptoni	Hampton's Slug Snake	Rắn hổ mây ham-ton
	Rhabdophis subminiata	Red-necked Keelback	Rắn hoa cỏ nhỏ
	Rh. chrysargos	Specklebelly Keelback	
Viperidae			
	Trimeresurus albolabris		Rắn lục mép trắng
	T. vogeli	White-lipped Pit Viper	Rắn lục von-gen
	Trimeresurus sp1.		Rắn lục
	Protobothrops mucrosqua-matus	Chinese habu	Rắn lục cườm
	Ovophis monticola	Mountain Pit Viper	Rắn lục núi
Elapidae			
	Ophiophagus hannah	King Cobra	Rắn hổ chúa
	Bungarus candidus	Blue Krait	Rắn cạp nia nam
	B. fasciatus	Banded Krait	Rắn cạp nong
	Naja kaouthia	Monocled Cobra	Rắn hổ mang một mắt kính


Fish

Species names follow: www.fishbase.org

Family	Species	English name	Vietnamese name
Notopteridae			**Họ thát lát**
	Notpoterus notopterus		Thát lát
Cyprinidae			**Họ chép**
	Esomus dauricus	Flying Barb	Lòng tong
	Danio leptos		Xảm léptô
	D. ascrotomus		Xảm acrô
	D. gibber		Xảm gibơ
	Rajamas guttatus		Cá nhồng
	Ctenopharyngodon idellus	Grass carp	Trắm cỏ
	Barilius pulchelus		Cá xảm
	Rasbora hobelmani	Rasbora	Mại sọc
	Hampala macrolepidota	Hourse Barb	Ngựa nam
	Cyclocheilichthys apogon	Barb	Cóc đậm
	Sinibrama affinis		Cá nhác
	Tor stracheyi		Cá ngựa gai
	Puntius brevis	Barb	Cá rầm
	P. orphoides	Barb	Đỏ mang
	P. gonionotus	Barb	Mè vinh
	P. rhombeus	Barb	Cá rôm bơ
	Poropuntius laoensis		Chát lào
	P. bolovenensis		Chát bô lô ven
	P. normani		Chát thường
	Sikukia gudgeri		Cá gút gơ
	Toxabramis hotayensis		Dầu hồ
	Hypsibarbus lagleri		Cá la li
	Neolissochilus blanci		Cá nai
	Mystacoleucus chilopterus		Vây vàng
	Lobocheilos melanotaenia		Mo sừng
	L. rhabdoura		Cá mo
	L. davisi		Mo đa vít
	Crossocheilus reticulatus		Chuồn nút

	Cirrhina molitorella		Trôi ta
	C. mrigalla		Cá mrigan
	Osteochilus hasselti	Silver sharkminnow	Mè lúi
	O. waandersi		Lúi sọc
	O. schlegeli	Giant sharkminnow	Mè hương
	Labiobarbus siamensis		Linh xiêm
	Garra fuliginosa		Sứt mũi
	G. cambodgiana	Stonelapping minnow	Đá rằn
	G. fasciacauda		Đá đuôi sọc
	Cyprinus carpio	Common carp	Chép
	Puntioplites proctozysron		Dảnh nam bộ
Gyrinocheilidae			**Họ cá may**
	Gyrinocheilus aymonieri	Chinese algae-eater	Cá may
Cobitidae			**Họ chạch**
	Misgurnus anguillicaudatus	Oriental weatherfish	Chạch bùn
	Acantopsis delphax		Khoai sông
	Acantopsis sp1. “small spots”		Cá khoai
Balitoridae			**Họ chạch vây bằng**
	Schistura defectiva		Chạch suối
	S. kengtungensis		Chạch suối
	S. coruscans		Chạch suối
	S. sp1. “lineata”		Chạch suối
	S. sp2. “giant-sise”		Chạch suối
	Balitora annamitica		Vây bằng
	B. kwangsiensis		Vây bằng
	B. kwangsiensis		Vây bằng
	Annamia normani		Vây bằng
	A. cf. *normani*		Vây bằng
	Hemimyzon papilio		Vây bằng
	H. cf. *khonensis*		Vây bằng
Siluridae			**Họ nheo**
	Ompok bimaculatus	Butter catfish	Trèn bàu
	O. cf. *hypophthalmus*		Trèn mắt
Clariidae			**Họ trê**
	Clarias batrachus	Walking catfish	Trê trắng

Bagridae			**Họ ngạnh**
	Hemibagrus aff. *nemurus*	Asian redtail catfish	Lăng nha
	H. filamentus	Catfish	Cá cốt
	Pseudomystus guttatus		Chốt sọc
Sisoridae			**Họ chiên**
	Glyptothorax laoensis		Chiên lăng
	G. lampris		Chiên lam
	G. cf. *laoensis*		Chiên suối
Belonidae			**Họ nhái**
	Xenentodon canciloides		Cá nhái
Hemirhamphidae			**Họ kim**
	Dermogenis pusilla van		Lim kim ao
Monopteridae			**Họ lươn**
	Monopterus albus	Swamp eel	Lươn
Anabantidae			**Họ rô**
	Anabas testudineus	Climbing perch	Cá rô
Belontidae			**Họ sặc**
	Trichogaster trichopterus	Three spot gourami	Sặc bướm
	Trichopsis vittatus	Croaking gourami	Bã trầu
	Betta splendens	Siamese fighting fish	Thia xiêm
Channidae			**Họ chuối**
	Channa striata	Snakehead murrel	Cá quả
	C. gachua		Chành đục
Pristolepidae			**Họ rô biển**
	Pristolepis fasciatus	Catopra	Rô biển
Cichlidae			**Họ rô phi**
	Oreochromis niloticus	Nile tilapia	Rô phi vằn
	O. mossambicus		Rô phi đen
Mastacembelidae			**Họ chạch sông**
	Mastacembelus armatus	Zig-zag eel	Chạch chấu
Gobiidae			**Họ bống trắng**
	Rhinogobius giurinus		Bống đá
	R. sp.1		Bống khe
	R. sp.2		Bống khe

Butterflies

Cepora nerissa

Butterflies: Species names follow Alexander L. Monastyrskii (2007) **Butterflies of Vietnam.** Hanoi: Vietnam-Russia Tropical Centre.

Family	Scientific name
Papilionidae	
	Lamproptera curius
	L. meges
	Graphium sarpedon
	G.doson
	G. eurypylus
	G. chironides
	G. antiphates
	G. aristeus
	G. agamemnon
	G. agetes
	G. xenocles
	G. macareus
	Papilio memnon
	P. alcmenor
	P. paris
	P. helenus
	P. nephelus
	P. polytes
	P. demolion
	P. demoleus
	Byasa polyeuctes
	B. dasarada
	Chilasa clytia
	Troides helena
	Atrophaneura varuna
Pieridae	
	Delias acalis
	D. pasithoe
	D. agostina
	D. descombesi
	Prioneris philonome
	P. thestylis
	Appias indra
	A. pandione
	A. lyncida
	A. albina
	A. nero
	Cepora nadina
	Pareronia anais
	Dercas verhuelli
	Catopsilia pomona
	Leptosia nina
	Eurema ada
	E. hecabe
	E. blanda
	Hebomoia glaucippe
	Cepora nerissa
Danaidae	
	Parantica aglea
	Euploea core
	E. klugii
	E. sylvester
	E. doubledayi
	E. mulciber
	E. tulliolus
	E. radamanthus
	Danaus genutia
	Tirumala septentrionis
	T. limniace
Satyridae	
	Coelites nothis
	Elymnias hypermnestra
	E. malelas
	E. patna

	Erites medura
	Lethe minerva
	L. mekara
	L. sinorix
	L. verma
	L. europa
	L. confusa
	Melanitis phedima
	M. zitenius
	M. leda
	Mycalesis anaxias
	M. mucianus (New species for Vietnam)
	M. mnasicles
	M. mineus
	M. perseoides
	M. francisca
	M. perseus
	Neope bhadra
	Penthema darlisa
	Ragadia crisilda
	Ypthima singorensis
	Y. baldus
	Y. savara
Amathusiidae	
	Thaumantis diores
	Stichophthalma uemurai
	Faunis eumeus
	F. canens
	Aemona falcata
	Discophora sondaica
	Amathuxidia amythaon
Nymphalidae	
	Ariadne merione

	Athyma asura
	A. ranga
	A. perius
	A. selenophora
	A. zeroca
	A. cama
	A. nefte
	Cethosia biblis
	C. cyane
	Charaxes bernardus
	Ch. kahruba
	Cirrochroa tyche
	Cupha erymanthis
	Cyrestis nivea
	Cyrestis thyodamas
	C. cocles
	Doleschallia bisaltide
	Eulaceura osteria
	Euripus nyctelius
	Euthalia lubentina
	Hestina nama
	Hypolimnas bolina
	Junonia iphita
	J. atlites
	J. lemonias
	Kaniska canace
	Laringa horsfieldi
	Lebadea martha
	Lexias pardalis
	Moduza procris
	Neptis zaida
	N. manasa
	N. clinia

	N. hylas
	N. nata
	N.soma
	N. maha
	N. magadha
	Pantoporia hordonia
	Parthenos sylvia
	Polyura delphis
	P. athamas
	Rohana parisatis
	Stibochiona nicea
	Sumalia daraxa
	Tanaecia julii
	T. cocytus
	Terinos clarissa
	Vagrans egista
	Vindula erota
Libytheidae	
	Libythea myrrha
	L. geoffroyi
	L. narina
Riodinidae	
	Paralaxita telesia
	Zemeros flegyas
	Taxila dora
	Dodona deodata
	Abisara fylla
	A. savitri
	A. neophron
	A. echerius
	Stiboges nymphidia
Lycaenidae	
	Arhopala agaba

	Allotinus drumila
	Amblypodia anita
	*Anthene licates (*New species for Vietnam)
	Arhopala sp.
	Arhopala aurelia
	A. hellenore
	A. eumolphus
	A. pseudocentaurus
	A. bazalus
	A. ace
	A. aida
	A. abseus
	A. perimuta
	A. arvina
	A. muta
	A. elopura
	Caleta roxus
	Celastrina lavendularis
	Chilades pandava
	Curetis bulis
	Dacalana penicilligera
	Flos apidanus
	F. aniella
	Heliophorus ila
	Hypolycaena erylus
	H. amasa
	Jamides celeno
	Lampides boeticus
	Miletus chinensis
	Nacaduba sp.
	Poritia erycinoides
	Prosotas sp.

	Rapala varuna
	R. manea
	Surendra quercetorum
	Syntarucus plinius
	Tajuria sp.
	Ticherra acte
	Udara placidula
	Yasoda tripunctata
Hesperiidae	
	Tagiades litigiosa
	T. parra
	T. gana
	Celaenorrhinus leucocera
	C. patula
	C. putra
	Notocrypta feisthamelii
	Coladenia laxmi
	C. agnioides
	Matapa druna
	M. cresta
	Thoressa fusca
	Telicota linna
	Gerosis tristis
	Pelopidas agna
	P. conjuncta
	Iambrix salsala
	Parnara guttatus
	Halpe sp.
	Scobura phiditia
	Pelopidas assamensis
	Polytremis eltola
	Pithauria straminepennis
	Caltoris cahira
	Phynatades triphylla

	Bibasis oedipodea
	Astictopterus jama
	Lotongus calathus
	Hasora badra
	Suada swerga
	Parnara bada
	Halpe wantona
	Notocrypta curvifascia
	Pseudocoladenia dan
	Polytremis lubricans
	Tagiades menaka
	Hasora chromus
	Ancistroides nigrita
	Borbo cinnara
	Potanthus mara
	Choaspes subcaudata
	Gerosis phisara
	Halpe zola
	Bibasis harisa
	Bibasis amara
	B. sena
	Choaspes benjaminii
	Abraximorpha davidii
	Pirdana hyela
	Hasora taminatus
	H. vitta
	Halpe flava
	Scobura isota

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Black-shanked Douc Langur *Pygathrix nigripes.* - Tilo Nadler / Frankfurt Zoological Society.

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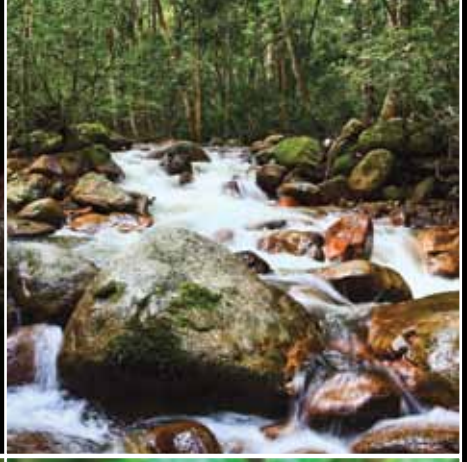

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