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Terrestrial wildlife survey

for

The Lower Se San 2HH project, Stung Treng province, Cambodia

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Contents

Abbreviation

ADB	Asia Development Bank
Danida	Danish International Development Assistance
DDF	Deciduous Dipterocarp Forests
FA	Forestry Administration
IUCN	The World Conservation Union
LMDFE	Lower Mekong Dry Forest Ecoregion
LSP	Lower Srepok River
LSS	Lower Sesan River
LWS	Lomphat Wildlife Sanctuary
MAFF	Ministry of Agriculture, Forestry and Fisheries
MDF	Mixed Deciduous Forests
MoE	Ministry of Environment
NTFPs	Non-Timber Forest Products
PA	Protected Area
PF	Protected Forest
PPWS	Phnom Prich WIldlife Sanctuary
RGC	Royal Government of Cambodia
SBCA	Seima Biodiversity Conservation Area
SEF	Semi-evergreen Forest
SFLC	Social Forest Land Concession
UNDP	United Nations Development Program
VNP	Virachey National Park
WWF	World Wide Fund for Nature
WCS	Wildlife Conservation Society

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1. Introduction

The needs for economic development are considered a high priority for developing countries in order to contribute to poverty reduction and ensuring a long term sustainable development strategy *(National Strategic Development Plan 2006-2010)*. While such development comes up with both positive and negative impacts and if the plans are ignored the consequences of the developments may have long term adverse effects to the environment and society and this is because of resulting from development for short term benefits, for instance forest exploitation without considering on its impact behind and may results in drought or flood for long period of time.

In recent years, Cambodia is on the way up in terms of development. For instance, the infrastructure of road networks has been improved along with schools and bridges in particular. Currently, there are several proposed development projects in Cambodia concerning the construction of hydro-electricity dams which will be located in areas with high potential for dams in the country[1].

This study has been focused on the environmental impact assessment on terrestrial wildlife of the proposed resettlement areas and in reservoir area for the Lower Sesan II Hydropower dam in Stung Treng province.which is part of the hydropower dam masterplan for Cambodia[2]. Furthermore, the entire catchments in the northeast and eastern were also assessed and analyzed. The assessments of the catchments are to look into the entirely aggregate of the impact which associated with the impact from the dam project and resettlement areas. The dam will impact wildlife along both the Sesan and Srepok Rivers which are major tributaries of the Mekong River. The rivers' habitats support biodiversity richness especially aquatic species of fishes, reptiles and waterfowl in the northeast and eastern part of the country *(WWF, Khou Eang Hourt per.com, 2008 and Mekong River Commission, Mekong Fishes, 2002)*. The whole area of east and northeast Cambodia have significant conservation values for the Lower Mekong Dry Forest Ecoregion (LMDFE), due primarily to rich of biodiversity and support variety of flora and fauna and its ecosystems. The large area of mixed deciduous and dipterocarpus forest, however, are under threat of habitat degradation and fragmentation, especially those forest areas where they can be accessed by roads *(Robert Timmins and Ou Rattanka, et.al.,2001)*. The selective logging, land grabbing and hunting for local consumption are visible and disturb the habitats for wild animals.

2. Previous wildlife research and surveys

There have been several wildlife research and surveys undertaken in the catchments of the Sesan and Srepok Rivers which are mainly focused on the forest types, habitat

[1] *There are presently several proposed hydropower dams in Cambodia, at least 29 sites countrywide including in the Cardamom Mountains and in the northeast and east of Cambodia in the Mekong and its tributaries such as Sesan and Srepok Rivers. (Ministry of Industry, Mine and Energy, Cambodia, - The Master Plan Study of Hydropower Development in Cambodia, 2007).*

[2] *The proposed hydropower dams are located along the Sesan and Srepok Rivers. There are, at least considered about five cascades of the hydropower sites in those rivers.*

characteristics and wildlife conservation values. Those research/surveys identify the existing issues and the presence of a variety of flora and fauna species in the river catchments (see below for details). The findings are significantly important for conservation values both nationally and internationally. The research and surveys that have been undertaken include:

- Status of conservation of globally threatened primates in the Seima biodiversity conservation area, Cambodia, (Danida and US Fish & Wildlife Service, 2007).
- Biodiversity conservation corridors initiative (Pilot Site Implementation, Status Report, Greater Mekong Subregion, ADB, 2007).
- Biodiversity vision for the Lower Mekong Dry Forest Ecoregion (WWF Greater Mekong-Cambodia Country Program, 2006).
- A survey for wild cattle and other large mammals and feasibility of establishing a pilot game reserve in O'Yadav district, Ratanakiri province (Forestry Administration, Wildlife Protection Office, 2006)
- Biological assessment of the Lower Mekong Dry Forest Ecoregion, (WWF, 2005).
- Abundance, distribution, and reproductive success of Sanbar nesting birds below the Yali Falls Hydropower Dam on the Sesan River, northeastern Cambodia (Supported by WWF, Danida, WCS and BirdLife International, 2004).
- Report on first participatory biodiversity assessment, eastern plains, Cambodia, by WWF MOSAIC Eastern Plain Team, 2003.
- Directory of important bird areas in Cambodia (in Sesan River, Lumphat, Upper Srepok Catchments, Mondulkiri lowland, BirdLife International 2003).
- Initial assessment of community resource use in four communities in Mondulkiri province (WWF, MoE and MAFF, 2001).
- The importance of Phnom Prich Wildlife Sanctuary and adjacent areas for the conservation of tigers and other key species (WWF, 2001)
- The forest of the Lower Mekong Ecoregion Complex (WWF, 2001)
- Toward a vision for biodiversity conservation in the forests of the Lower Mekong Ecoregion Complex, 2001.

The findings from those researches and surveys have addressed the significant consideration for conservation values of the biodiversity, especially wildlife protection of the entire catchments in the northeast and east of the cuntry. Any development efforts, therefore, occur in the LMDFE of the northeast and eastern part of Cambodia can be seen as additional aggregation the impact to the biodiversity not only direct threat to increase habitat loss, fragmenting and diminishing the habitats but also threat to wildlife movements/migration within the limited area. It is noted that Lower Mekong Dry Forest Ecoregion (LMDFE) is located at the northeast and eastern Cambodia and Cardamom Mountains, in the west and southwestern part is a part of LMDFE as well.

3. Study area

The study area is located along the Sesan and Srepok Rivers in Stung Treng and Ratanakiri Provinces (see figure....). The existing data in relation to the Srepok and Sesan catchment areas have been mainly used to assess and analyze on the status of wildlife. In

addition, some field observations were made recently in April 2008. Almost two weeks from observations conducted by national ecologist through supervision and Consultative Sub-agreement with Key Consultant Cambodia (KCC). Ltd., within the proposed resettlement sites and the proposed reservoir in the Lower Sesan and Lower Srepok Rivers in Stung Treng province.

The Sesan River originates in the mountainous central region of Vietnam, and the Srepok River originates in the southwest highlands of Vietnam before they both run downward to northeast Cambodia. There are four sites proposed for resettlement sites where they are located at the Lower Sesan (LSS) and Lower Srepok Rivers (LSP), Stung Treng province. Amongst the proposed four resettlement sites, there are two sites situated along the Lower Srepok's riverbank on the south of the river-body and another two sites are on the north, along the riverbank of Lower Sesan River, and those resettlement sites are in Sesan district, Stung Treng province.

The Sesan River runs downward from the northeast of the country by passing near Virachey National Park (VNP), Ratanakiri province while the Srepok River runs from the eastern Cambodia and then passing through the Lomphat Wildlife Sanctuary (LWS) in Ratanakiri province before they converge, about 20km upstream of the provincial town of Stung Treng. Both rivers then converge with the Sekong river before that river merges with the Mekong River.

The proposed resettlement sites are in the Sesan district, Stung Treng province. The sites are surrounded by the dry forest of mixed deciduous and dipertocarpus forest. Accessibility to the sites can be reached either on foot but there are several trails or tracks for ox-cart, in according to the recent observation conducted on April 2008.

National Road No.78 connects from National Road No.7 about 10kms south of Stung Treng and runs eastward to the provincial town of Banlung, Ratanakiri province. This road passes through the forest area which is located between the Lower Sesan and Lower Srepok Rivers. The forests in this area are mostly disturbed and damaged primarily due to road building and fragmentation of the forest in this area. The conversions of forest land into agricultural activities and other development purposes on both sides of the road are visibly evident and it is very damaging to the wildlife habitat on which they depend for their home. One resettlement of the Lower Srepok River is situated closely the National Road No. 7, also under degradation from land encroachment for agricultural land and other forms of land use, for instance, clearing land for speculation opportunity. Recently field observation, brief discussion with two old people met at the site, they said that due to some information hinted in relation to resettlement that why it is leading certain concerns over clearing forest for land. Additionally, the other three resettlements have the same threats of the selective logging, and hunting as well as some certain signs of land grabbing.

4. Methods

The designed method for undertaking the field survey focused on assessing the habitat rather than directly assess wildlife. Such an assessment method can indicate the presence and absence of the wildlife within the proposed sites. In addition, the existing data and information from the previous surveys can be used to further assess wildlife upstream and in the Sesan and Srepok river catchments as a whole. Therefore, during field survey, three tools were used in the assessment;

- A transect line (1000m long by 10m wide in various locations). The transect was used to record about certain disturbances caused by wild-animals and/or human activities inside the areas, for instance, digging, grazing, scratching from animals and/or fire scar including other associated evidences such as tracks, nearby water sources of pond/lake and so on. Such data is useful to identify the level of disturbance which occurs in particular area of the resettlements.
- Species counting and measuring of tree density (quadrat of 35meter radius in various locations). This method used to identify a number of plant species occurs in the particular habitat, for example in the dry deciduous dipterocarp forest and it is indicating about tree density as well.
- Anecdotal discussion with key local informants and conservationists/experts

It is noted that the team consists of five people during the field observation, conducted from 4th to 17th of April 2008. The team worked together and moves from one site to another site. Additionally, brief dialogues with key informants, especially hunters, and elderly people were made in order to get some information in relation to wildlife status of the surrounding areas.

Each transect was applied in the four resettlement sites and two other sites downstream of the LSS and LSP Rivers in order to observe/detect the evidences of animals (see figure... showing transect locations). The observations within the transect focused on the disturbances from wild animals, for instance: footprints, digging, grazing and voices, as well as other key factors such as places of salty soil, ponds/lakes, trails/tracks, cultivation, ring-barking, partial clearing, fires, and selective logging and so on). Both disturbances from wildlife and human activities gave certain evidence in relation to the wildlife status in the area.

Species counting and measuring tree density was conducted to identify the species diversity of the forests. However, forests in the northeast and eastern Cambodia mostly represent of the deciduous dipterocarp forest (DDF) in the Lower Mekong Dry Forest Ecoregion (LMDFE) *(2006. WWF: Biodiversity Vision for the Lower Mekong Dry Forest Ecoregion)*. Meanwhile, short discussions with key informants, especially local hunters, elderly people and rangers were made during the recent field observation[3]. Additionally,

[3] *Key informants are in the Phluk, Srae Kor and Talat communes where they are located at the Lower Sesan River and other informants in the Kbal Romeas (Chrab and Krabei Chrum villages) of Lower Srepok River.*

further discussions were arranged with local experts and/or conservationists in the conservative program and site managers[4].

5. Results and discussion

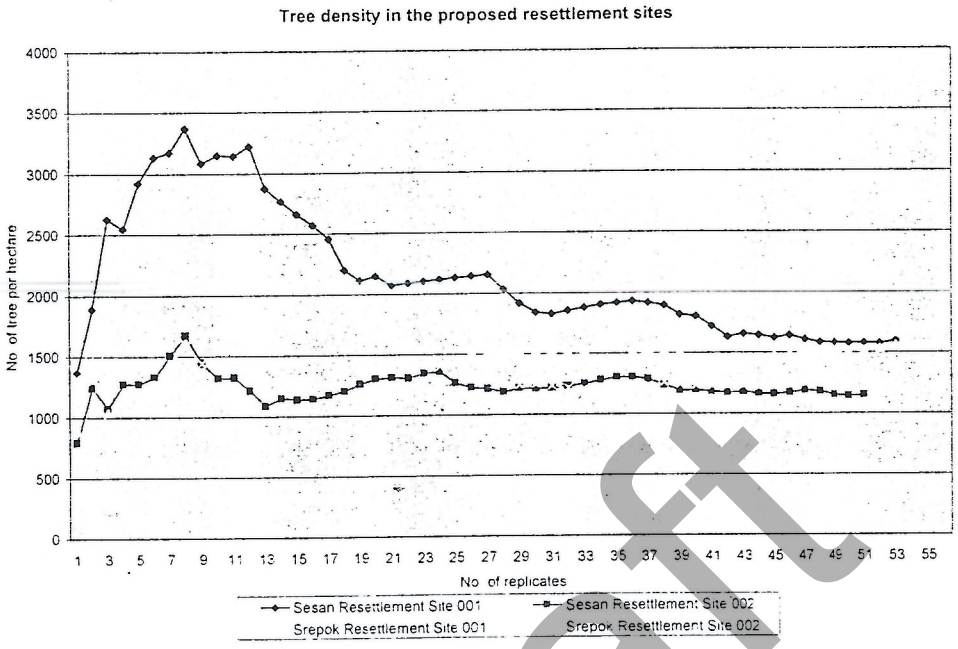
5.1. Major types of flora and fauna

Generally, the major forest types in the northeast and eastern Cambodia are classified as dry forest of deciduous dipterocarp forest (DDF) but also include other habitat types such as mixed deciduous forest (MDF), and semi-evergreen forest (SEF) as well. The flora species occur in this forest type is not as much diverse as other forest types, for instance, mixed evergreen and evergreen forests. However, such forest type supports variety of large wild animals and its preys because of it covers a huge size in the northeast and eastern part of the country which has a relatively low population density.

The species in the family of Dipterocarpaceae is the dominant species which occur in this forest type. The deciduous dipterocarp forest typically has open canopy and individual tree stand sparsely and the tall species consists of *Dipterocarpus obtusifolius, Dipterocarpus tuberculatus, Dipterocarpus intricatus, Hopea ferra, Hopea odorata, Shorea obtusa Shorea siamensis, Pterocarpus pedatus, Dalbergia bariensis*. Understory is dominated by grassy, shrubs and subshrub and short bamboo, indicated from survey and *(C. Daltry & Frank Momberg. Cardamom Mountains; Biodiversity Survey, 2000)*.

Figure 1 Tree density in the deciduous dipterocarp forest

[4] *NGOs include the World Wide Fund for Nature, and BirdLife International. In addition, discussions via phone by KCC with site managers who come from Lomphat and Phnom Prich Wildlife Sanctuaries, and Virachey National Parks were made.*



Source: Survey team, April 2008

Previous surveys indicate that LMDFE in the northeast and eastern part of the country is internationally recognized and as global biodiversity assets for support of large wild animals as listed in the IUCN Red Data Book as threatened with global extinction (IUCN, 2003). The large mammals include *Kouprey*, tiger, Asian elephant, Banteng, wild water buffalo, eld's deer, golden cat, fishing cat, black bear and gibbons.

The Figure 1 shows a sparse density of the mature trees (circumference measured is bigger than 40cm or Diameter at Breast Height (DBH) is bigger than 12.7cm), wichi represent in the deciduous dipterocarp forest. Within this tree density give more open space and ground understory covers with short bamboo and other vegetable for animal diet for prey and it is also favorable for carnivorous species to hunt its preys. Additionally, it also provides suitable habitat for animals of preys to escape and for their home. As discussed with elderly people and hunters, certain species often spend time for food and during the delivery stage such as Banteng, Gaur and Deer.

5.2. Srepok resettlement area

5.2.1. Habitat characteristics

The KCC site survey found that the entire forest area in and around the Srepok resettlement area is characterized by deciduous dipterocarp forest, and the understory species are dominanted by shrubs, subshrubs, and short bamboo. The trees which occur within this habitat is relatively sparse and small in circumference but the larger size of girth are under selective cutting especially species with high commercial values for construction materials. Generally, within such habitat of deciduous dipterocarp forest has

average height in between 7.5m to above 18m of the canopy trees. The emergent trees have average height of approximately 23m.

The habitat extends largely on the southern side of the Srepok River and it is a vast habitat which connects to two protected areas which are managed by the MoE: the Lomphat Wildlife Sanctuary in Ratanakiri Province and Phnom Prich Wildlife Sanctuary; and the Seima Biodiversity Conservation Area (SBCA)[5] in Mondulkiri Province which is a Protected Forest and is managed by the Forest Administration. The two protected areas and SBCA Protected Forest are upstream of the proposed sites for resettlements in the Lower Srepok River. Furthermore, the catchments continue expending into the southern Vietnam where it is considered as transboundary forest area. Therefore, the forests cover a large area in the eastern part of Cambodia and southern Vietman and this gives favorable conditions for large populations of wildlife, especially large animals such as Kouprey (*Bos sauveli*), Asian Elephant (*Elephas maximus*), Tiger (*Panthera tigris*), Eld's Deer (*Cervus eldii*), and so on. However, this habitat is also damaged and fragmented due primarily to the roads have been built through such habitat. Additionally, the obtained information also addressed about the social forest land concession outside protected areas can be seen as a vast conversion for development and go along with other land grabbing for speculation *(CEPA per.com, 2008)*. However, certain maps indicate about area of Social Forest Land Concession (SFLC) were not revealed in relation to how large of the areas have been used under such concession.

5.2.2. Forest products

The KCC study team found that the collection of non-timber forest products (NTFPs) such as resins, wildfriuts and honey are not so active in the project area but selective logging is undertaken in according to field observation. Several tracks/trails give more access into the deep forest for logging and wildlife hunting as well. Noises from chainsaws could be heard in the forest and woodpiles were visible when the KCC study team was working in the areas. The selective logging of precious wood and the first quality wood for local consumption is still prevailing in the vast forest.

5.2.3. Wildlife

At the Srepok resettlement sites, there was no significant evidence of wild animals, especially large animals occurring within the transect line. Signs of animal digging from wildpig, grazing from cattle (Banteng, Gaur or Deer) and other disturbance from animals

[5] *Seima Biodiversity Conservation Area (SBCA) is the protected forest established in 2002 and managed by Forestry Administration (FA) which is under decree of the Ministry of Agriculture, Forestry and Fisheries. The total size of the conservation area is 3,034km^2. Currently, there are two protected forests established and under management from FA and these areas are namely; Seima Biodiversity Conservation Area and Mondulkiri Protected Forest. Additionally, two protected areas were designated under Royal Degree on November 1993 and they are managed by Ministry of Environment. Both protected areas and protected forests have been under several researches and surveys. Most surveys/researches have been done through cooperation between donors funded projects/programs with the Ministry of Environment and MAFF.*

were not seen. There was not place for salty soil found during the surveys at the transect site. However, forest birds, especially bulbuls, woodpeckers, hornbills, sunbirds, and mynas are still common in this forest. Due to human activities access through this area can give evidence of disturbance to wildlife. There are several trails/tracks inside the forest area that allow more access for hunting. A few lizards (water monitors) were sold in the village while the study team passed through. In addition, the status of wildlife and wood products has been in strong decline for the last ten years (*Phork, ranger to Virachey National Park per.com*). However, large wild-animals such as Banteng (*Bos javanicus*), Gaurs (*Bos gaurus*), Bears, Elephants and Gibbon are still at large elsewhere in the northeast and eastern Cambodia but they are under pressures from human disturbance.

5.3. Sesan resettlement area

5.3.1. Habitat characteristics

The forest type is typically of deciduous dipterocarp forest as already described above. The proposed resettlement sites at the Sesan River are located on the northern side of the river, and they are a few kilometers away from the riverbank (see Map.....). This area is located in between the Sesan and Sekong Rivers and also extends north and north-eastward towards the Virachey National Park in Ratanakiri Province. Virachey National Park covers and supports a vast size of forest types including semi-evergreen and evergreen forest and it extends to the far northeast into the mountainous central Annamites in Vietnam. It is also adjacent to the Xe Pian protected area in Laos in the far north. The whole area can be considered as transboundary of the LMDFE of the Indochinese countries. In addition, the forest habitats support a large population of wildlife, in particularly the globally threatened species[6] of large mammals and other endangered species for conservation values.

The forest area of the resettlement site was previously under a logging concession of large-scale operation *(Head of Srae Kor Commune per com. April, 2008)* so that large trees of high commercial value have been logged and fragmented habitats. Hunting activities were also rampant without controlling or monitoring from the competent authorities. The large wild animals, for instance, Banteng, Gaur, Deers and wildpigs were usually poached. The gunfire was heard in the forest around the villages at night time and most hunting was for food and local consumption except products from tiger and bear which was made for sale (*Former head of commune in Srae Kor per.com, 2008*).

Currently, the forests at the Sesan resettlement sites are disturbed because trails/tracks provide easy access within the area. The negative impacts from human activities can be an indicator to address on wildlife disturbance within the area in which go along with rampantly selective logging.

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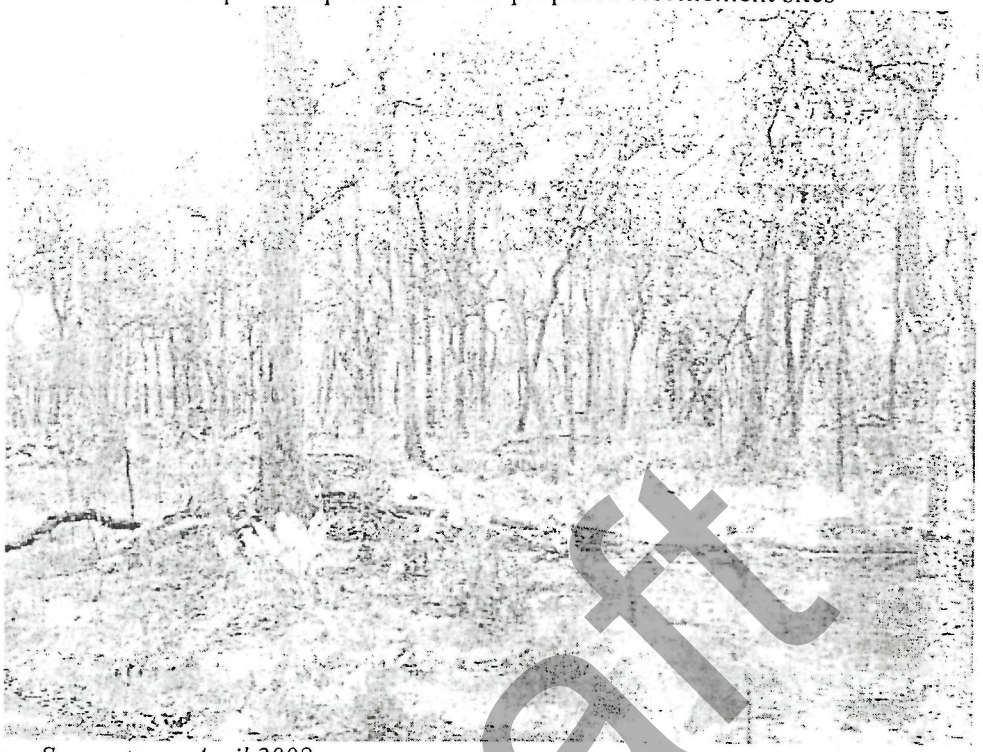
[6] *Globally threatened species include a population of large animals such as Banteng, Gaur, Elephant, Wild Water Buffalo, Tigers, Bear, Eld's Deer, Sambar Deer, Gibbons, Pangolins, group of primates as well as group of birds, for instance, Ibises, Storks, Fisheagles, Vultures, Peafowl and so on. For further detailed in the attached Appendix.*

Figure 2 Deciduous dipterocarp forests in the proposed resettlement sites



Source: Survey team, April 2008

5.3.2. Forest products

As earlier mentioned, the collection of NTFPs of resins, honey and wild-fruits in the resettlement areas is not so much but selective logging can be seen as a rampant activity. Noises from chainsaws being operated during the day time were heard by the study team. Hidden woodpiles with covered of leaves can often be found in the forest and at places where the wood can be easily transported out.

5.3.3. Wildlife

According to the key informants interviewed there has been a decline of wildlife in the area for the last ten years (*villagers at Srae Kor commune per.com*). In addition, signs of animal disturbance, for instance, digging, grazing, animal dung and salty soils, were not found within the transect line for the resettlement areas. The proposed sites for resettlement can be accessed easily so that the disturbance will be high to wildlife in the area. There is an ox-cart trail that is used for wood transportation and provides more access into deep forest for hunting as well.

There have been many surveys done in the river catchments in Stung Treng and Ratanakiri Provinces that show concrete evidence of the presence of large wildlife, especially the globally threatened species of Banteng, Gaur, Gibbons, Bears, Elephants and other endangered species of large birds and so on.

5.4 Discussions

5.4.1 Catchments

As aforementioned, the Lower Mekong Dry Forest Ecoregion (LMDFE) in the northeast and eastern part of the country covers in provincial territories of Stung Treng, Ratanakiri and Mondulkiri Provinces. The catchments raised for discussion at this time being, may address on the areas of Ratanakiri and Mondulkiri Provinces where they locate at the upper part of the proposed resettlement areas and Dam Project. In addition, there are four protected areas and two protected forests are considered as the upper catchments of this Dam Project. These protected areas are namely; Lomphat Wildlife Sanctuary (LWS), and Virachey National Park (VNP) in Ratanakiri province while in Mondulkiri province consists of Phnom Prich Wildlife Sanctuary (PPWS), and Seima Biodiversity Conservation Area (SBCA). Within these catchments, there have been several researches/surveys done in relation to ecological and wildlife surveys. Further information is in the appendix for the list of mammals, birds, reptiles and amphibians as well as plant species. The results from those surveys have been identified and found several species of wildlife populations, especially large mammals are globally threatened species. These catchment areas especially areas under protection are likely the last strongholds for wildlife populations and its habitat. However, it is generally said the management systems either inside and/or around the protected areas or protected forests are significantly important for conservation. Lack of appropriate plans and go along with limited financial assistance can lead to critical issues to survive certain species of globally endangered species like elephants, Banteng, Guar and primates and so on. Ideally, corridors between protected areas (PAs) linkage to protected forests (PF) should be established in order to provide more habitat available for the movement or migrating of wildlife within this area, LMDFE area in particular. Additionally, any proposed development inside the PAs and/or PFs should be critically considered or otherwise options elsewhere can be beneficial to conservation vs. development perspectives.

5.4.2 Reservoir area

There is uncertain data existing in relation to the surveys/researches within the reservoir area. However, recent filed observations were conducted randomly through dialogues with elderly people and local hunters indicated that the presence of the large animals, such as Banteng, Gaur, Asian Elephant, Bear and primates are nearly absence or rarely seen but small animals like wildpigs mouse-deer and other reptiles (monitor lizards and turtles) are often seen and these animals are under threats from local consumption.

5.4.3 Resettlement areas

There is not solid evidence about the wildlife presence within the areas of resettlements, base on the filed observations and discussion with key informants. However, forest birds likely occur commonly within such forest type, especially Hill Myna, Hornbills, and Woodpeckers and so on. Forest conditions likely support to the wildlife habitat but due to these areas are close to the existing villages and easily access have resulted in large

disturbance. For instance, selective loggings are considered as major causes and tracks provide more accessible for other human activities such as hunting in area vicinity, and land grabbing. The proposed areas for resettlements may needs certain development of infrastructures such as roads, health centers, and other necessary facilities within/inside the resettlement areas in order to ease public accessibility in and out.

5.4.4 Downstream area

There are uncertain data existing in relation to the previous surveys in the downstream area. The area supposed to be downstream for the resettlements of the Dam Project is mostly located in Stung Treng territory of the Lower Sesan and Lower Srepok Rivers. According to recent observations and dialogues with key informants in the targeted areas of the resettlements and other involved stakeholders indicated that most existing forest area are given for a so-called Social Forest Land Concessions (SFLC). The purposes of the SFLC are used for agro-industrial crops such as cassava, rubber plantation, cashew trees, and other tree plantations. These types of land uses are unlikely to be favorable for wildlife and its habitats. In addition, the proposed resettlements of the Dam Project may have some significant effects to the downstream, especially fish migration/movements. However, it is unlikely to impact directly to the loss of forest habitats and threat to wildlife at the downstream, especially large wild animals.

6. Present status of terrestrial ecology

As addressed from the previous researches/surveys within the LMDFE[7], there are existing problems and issues have continued to increase the biodiversity loss in the northeast and eastern Cambodia. Both inside the protected areas and outside the protected areas have been under threat from unsustainable exploitation of natural resources, and wildlife hunting in particular. If one looks at the whole area of the northeast and eastern Cambodia as a part of Lower Mekong Dry Forest Ecoregion (LMDFE) which includes the resettlement areas, there are several existing issues and problems considered as key factors in leading to natural resource depletion. These issues are:

6.1. Logging and NTFP collection

Most researches undertaken have identified logging and collection of non-timber forest products as major issues and causes of biodiversity loss and resulting in degradation for wildlife habitat in particularly.

The whole forest area in northeast and eastern Cambodia was previously under logging concessions except the protected areas but they have been under illegal logging too.

[7] Most surveys/researches activities have been conducted under cooperation between Government Institutions of the Ministry of Environment and Forest Administration with the donors-funded programs such as World Wide Fund for Nature (WWF), BirdLife International, The World Conservation Union (IUCN) and other associated activities.

Habitat loss represents the greatest long term threat to the integrity of biodiversity throughout the forest of the Lower Mekong. The selective loggings are being continued of small-scale operation but widespread in the forest where the products can be extracted availability.

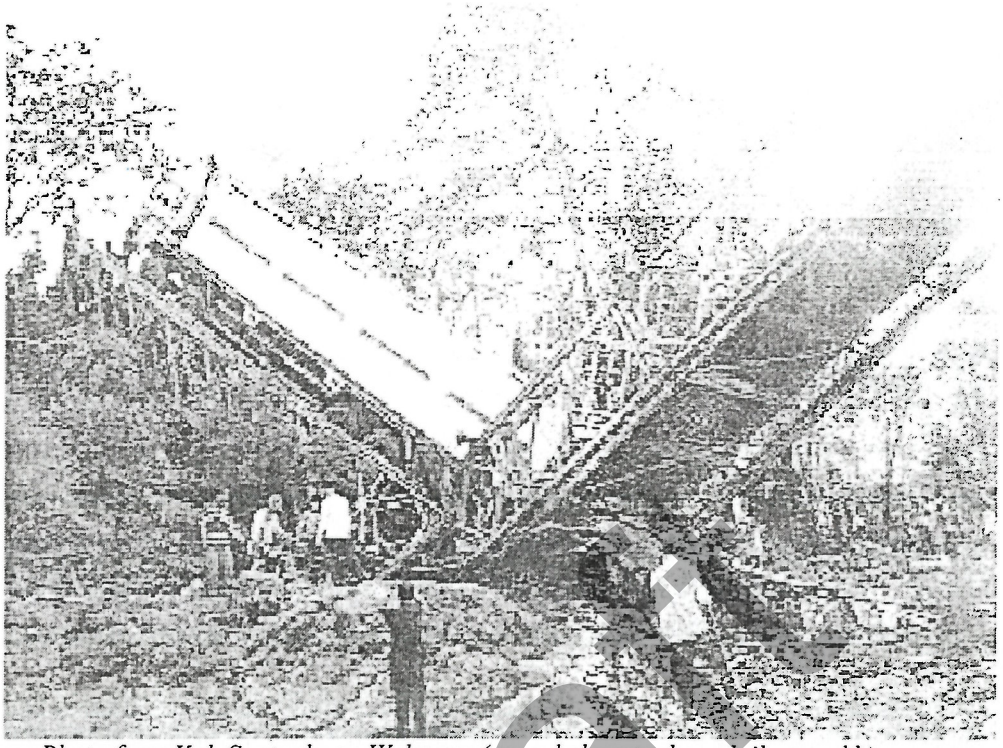
Evidence of the selective logging was seen within the survey areas and occasionally a few trucks with a full load of logs on the national road No. 78 in between Ratanakiri province and Stung Treng province were seen. Additionally, according to a press release on 30th April 2008, from local newspaper of *Kohsantepheap Daily News* referring to a collapse of Srepok's Bridge it is indicated that the logging activities in the northeast and eastern Cambodia can lead to forest fragmentation and habitat threatening.

Effects of direct loss of large trees might be of only minor consequence to the majority of large mammals and bird communities. However, indirect effects of logging, particularly increased access to remote areas, could be much more severe and affect a much larger range of the natural community (*Robert Timmins & Ou Rattanak et.al. 2001*). In addition, the associated activities of woodcutters and NTFPs collectors also involve in hunting, fishing and land grabbing because of the accessible favors through tracks/trails available into the forest. Those activities are harmful and disturb to wildlife. Most NTFPs products within the Lower Mekong Dry Forest are resin of the large trees (Dipterocarpus species).

Non-timber forest products (NTFPs) consist of wild-fruits, vegetable, honeys, rattan, bamboo and parts of plants for traditional medicines and they are extracted for support livelihood.

Therefore, in conclusion, logging and collecting NTFPs which are associated with other activities of hunting and resource exploitation have resulted in continuing to significantly harm biodiversity, especially through the overexploitation of natural resources.

Figure 3 Collapsed of the Srepok"s Bridge caused by logging truck



Source: Photo from Koh Santepheap Webpage (www.kohsantepheapdaily.com.kh)

6.2. Land uses

The survey team saw several signposts of land grabbing and encroachment was seen within the survey sites and in the vicinity of the resettlement areas. Threats from conversion of forest land into non-forest land are widespread in northeast and eastern Cambodia including the resettlement sites, especially where the forest area can be easily accessed. Existing tracks/trails and roads built during the logging concession time have resulted in forest clearance for variety of land use forms and being considered as significant impacts to forest loss of wildlife habitats in particularly.

The social forest land concession (SFLC)[8] can also significantly affect land use impacting wildlife habitat. Additionally, a huge conversion of forest land along the roadsides of national road No. 78 and adjacent roads have another contributed to direct loss of wildlife habitat.

Figure 4 Clearance along the roadsides, downstream of Lower Sesan River

[8] *There are several forest areas in Stung Treng, Ratanakiri and Mondulkiri provinces that have been granted as social forest land concessions by the Royal Government of Cambodia (RGC). Most of SFLCs have been used for agro-industrial crop developments such as cassava, and monospecies planting of cashew trees, and tree plantation (eucalyptus and acacia sp) as well as rubber plantations.*

Source: survey team, April 2008

In addition, recent developments of the village roads where they are connected from the main roads have also resulted in jeopardizing and/or fragmenting the habitat and leading to large-scale potential of encroachment, for instance, settlement, agricultural land and often involve in speculation as well. The forests today are being diminished and divided into isolated areas. As results, such encroachment have involved in commercial interests of speculation. A continued loss of habitat in addition to capture/hunting may leads to the eventual extinction of the large animals of the globally threatened species within the next decade.

In conclusion, if the present threats and unsustainable land use are not intervened and/or mitigated, the unique biodiversity of the Lower Mekong Dry Forest Ecoregion is unlikely to persist into the future and tragedy of nature would be soon looming.

6.3. Anthropogenic activities

Impacts caused by human activities can be considered as adversely effects to environment and resource depletion. A slash and burn of shifting cultivation and other forms of clearance for land, for instance, killing trees by pruning bark around the treebase and then kept for a while before setting fire. In addition, inflow of local migrants from elsewhere may lead to land expansion for settlements and agricultural land and eventually

involved in land speculation because of opportunity of land business are lucrative at the present.

Furthermore, mining exploitation, occurs inside the Phnom Prich Wildlife Sanctuary, Mondulkiri province where locate at upstream of Srepok River is another significant effects to cumulatively accelerate the habitat loss in the area. Random clearance of forest and digging for gold mining has resulted in fragmenting habitats. In addition, the excavating of gold mining underneath the forests could be resulting in landslide and damage to forest as well. The pollution can be another indication which associated with environmental consequences of water quality. The gold miners in this forest area they also involve in hunting for their food (*Vichaboth, per.com, 2008*). However, no any reports of environmental impact assessment (EIA) of the gold mining exploitation are obtained. Such situations observed within the proposed resettlement areas are mostly indicated certain activities caused by human activities such as land clearance for ownership. Several signposts for land grabbing inside the resettlements were clearly seen. As earlier indication, the purposes of land grabbing and/or other kinds of conversion of forest land are certainly involved in speculation of commercial interests as well.

6.4. Hunting

Current hunting levels for some species in northeastern Cambodia have increased from previous decades and the already relatively small population of Banteng, Gaur and Asian Elephants could decline at even faster rates (*Robert Timmins & Ou Rattanak et.al, 2001*). The large wild-animals of the ungulate population such as Banteng, Kouprey, Gaur, Wild Water Buffalo, Eld's Deer and other carnivores have faced direct persecution from hunting and limited habitats to escape from those threats. Additionally, high market values of wildlife products for food and folklore of medicinal power have resulted to wildlife declination. The state of wildlife population in the northeast and eastern Cambodia is the greatest immediate threats (*Biodiversity vision for the Lower Mekong Dry Forest Ecoregion, WWF Greater Mekong, Cambodia Program, 2006*).

Findings from surveys show proof that hunting for local consumption of small species are still at large the in villages of the survey sites. Fresh and dried meats and other wildlife products are available at the market and restaurants in provincial town of Stung Treng province (*CEPA, per.com, 2008*).

7. Predicted impacts on resettlement sites

There are some key factors selected for critical consideration on the prediction of impacts to wildlife in the surrounding and catchments of the proposed hydropower dams in Sesan and Srepok Rivers. The below table describe about significant impacts that can be considered as critical concerns to threaten the wildlife.

Table 1 Description of predicted impact from the project

No.	Categories	Description of impact
Physical Environment		
1	Water resources	During the construction of dam, the water resources downstream will become less and less. While after construction, the volume of water of the upstream area will increase and lead to flooding of the surrounding area immediately upstream of the dam site. The riparian forest and other forests, especially the deciduous dipterocarp forest will be under permanently inundated and resulting in loss of forests. The forests loss is obviously seen to diminish the habitats of wildlife. Furthermore, the detritus of the death trees and other decomposed materials will cause some change of the water quality in the reservoir and may take several years to recover and will effect fish as well. In addition, the increasing sedimentation loads into rivers caused by deforestation, infrastructure development of roads, agricultural practices and do mining can result in increasing water pollution into the rivers. This can be considered as an associated indication on the change of water quality of the physical parameters especially.
2.	Landscapes	The loss of forest, settlements and associated paddy fields due to inundation upstream of the dam will lead to a change in the surrounding landscape. The resettlement areas will also lead to loss of landscape because of the conversion of forests to resettlement areas. Additionally, soils/rocks materials will be dredged and/or excavated around the areas for dam construction and this is also resulting in change of the surrounding geographical features and its landscapes. Mining exploitation of the upstream catchments has resulted in fragmenting forest and leading to water pollution as well.
3	Fragmenting forests and habitat degradation	A recent renovation of national road No 78 to Ratanakiri province from where it connects with the national road No. 7, runs through a large area of forest. This road provides more access and creates opportunities for land grabbing along both sides of the road. This is leading to loss of the forests and is also a direct threat to wildlife and its habitats. Furthermore, there are several small roads that have been constructed connecting to the main national road No. 78. These roads are considered as some significant concerns of habitats fragmentation and associated with land

No.	Categories	Description of impact
		encroachments as well. The wildlife habitats are gradually being plagued and diminished due primarily to the road networks provide not only more accessible for conversion of forests but also directly disturb to wildlife and its habitats. In addition, the inflow of local immigrants from elsewhere in the country is also considered as another indicator to pressure on natural resources because of the poverty and their basic needs for daily livelihood. This is, therefore, leading to overexploitation of the resources.
4	Existing anthropogenic activities and their settlements	According to the human population density, northeast and eastern part of the country is relatively in small density and sparse but their settlements are widespread in the forest area and they almost rely on the natural resources such as collecting forest and non-timber forest products (NTFPs), wild meats and other resources for support their daily livelihoods. The expansion of paddy farms and other land uses can lead to loss of the forest area gradually. Furthermore, intentional setting of fires as hunting techniques and/or shifting cultivation cause habitat depletion and pose threat to wildlife. As such the resettlement areas will likely have quite a large impact on the surrounding forests.
5	Protected areas and protected forests[9] at the upper catchments	It is expected that forests outside the protected area (PA) and protected forest (PF) may soon become the target of development efforts. As results, there will no longer be forests outside the PA&PF leading to habitat loss or fragmentation of habitat into isolated small patches of forests. The last stronghold of wildlife populations are inside the PA&PF. Unfortunately, there is not enough corridor established in between PA&PF and this is leading to limited distribution of wildlife, especially the large animals. In addition, if do looking for management in place inside the protected areas and/or protected forest at the present is lack of material and financial assistance in order to meet the conservation efforts and this might result in critical issues to wildlife protection. There are several settlements locate inside the PA&PF so that it is recommended that

[9] *Protected area is under responsible for the Department of Nature Conservation and Protection (DNCP) while the outside protected areas and protected forest is under responsible for the Forestry Administration. However, both protected area and protected forest share common objectives and goals for conservation.*

No.	Categories	Description of impact
		management plan should be considered both improving livelihood alternatives through conservation program in order to meet the basic needs and conservation targets too.
Biological Environment		
6	Forest resources	The forest areas close to the Sesan and Srepok Rivers immediately upstream of the proposed dam will be under permanent inundation. Therefore, a vast area of the riparian and forest vicinity will no longer be forest leading to a loss of habitat and pose threats to wildlife as well. Furthermore, the fragmentation in which caused by roads impacts are another indicator to make forest area in the northeast and eastern Cambodia to become smaller. Meanwhile, conversion of forest area into the social forest land concessions (SFLC) can be considered as critical issues in relation to wildlife habitats. Most of forest land concession areas are located in Stung Treng province, where it is considered as downstream of the proposed hydropower dams in Sesan and Srepok Rivers. In northeast and eastern Cambodia, there are forest areas under the names of Social Forest Land Concessions. Therefore, the entire aggregation of forest losses have resulted in increasing the habitat loss and this is not only consideration from single impact from the resettlements of the dam project but also other associated development efforts as a whole. The entire of existing issues problems to the forest (such as selective logging, habitat fragmentation, land grabbing, infrastructure developments and other disturbances) have resulted in depleting not only to the forest resources but also effect to wildlife population and its habitat. This issue will be particularly a threat around the resettlement areas In addition, the proposed hydropower dam will lead to more critically significant effects to the forests which will be flooded, especially forest habitats nearby of the riverbank because of the water volume become larger size.
7	Wildlife	a) *Large mammals and small mammals*: the impacts from random settlements, forest fragmentation, road networking and other pressures from human activities, hunting and land encroachment can be a critical disturbance to large animals and its habitats. The habitats of large animals become small and smaller and leading to limited areas for their refuges. While, there are four protected areas upstream, the catchments are considered as last frontier for their habitats. However, the status of wildlife population depends on the management level in order to ensure for wildlife protection

No.	Categories	Description of impact
		in the whole area of the northeast and eastern Cambodia. b) *Birds*: the habitats of large waterfowl such as Grey headed Fisheagle, Woolly-necked Storks, and Ibis species will be under threat from the dam project due to changing of their nesting areas and food availability. Additionally, other birds (wader species) may loss their ground nesting while they also face competing else-where for new habitats. Other ground birds of junglefowls and pheasants may limited their distribution range while their habitat loss/change. *c) Reptiles and amphibians*: There is no significant impact or change of these species because of they are adaptable to aquatic habitats. However, the changes of water quality that is caused by death detritus of vegetation and other materials may result in significant effects. *d) Other living organism*: There will be several significant effects to most other living organisms because of the habitat degradation and fragmentation.

8. Measures taken and mitigation

8.1. Options for resettlement sites

Currently, the resettlement sites have been proposed in the forest areas and they are situated a little further from the riverbanks (see figure....). There is no existing infrastructure but cart-tracks and trails provide access to the areas. There are no appropriate roads, water resources or other infrastructure facilities. Accessibility, transportation, communication and other facilities are obviously seen as a difficulty and it is nearly impossible to access in or out of the resettlement areas during the wet season as the level of water in both rivers (Lower Sesan and Lower Srepok Rivers) can pose a risk at anytime for crossing the rivers.

In addition, the approaches to the resettlement areas require crossing rivers except one resettlement site of the Lower Srepok River which is located adjacent to national road No. 78. This one site can be considered as having more opportunities than the other areas in terms of facilities such as transportation, accessibility and communication and so on.

Considering the resettlement site locations, it is recommended that the proposed resettlement sites should be placed along the roadsides of the national road No. 78. This road runs through the forests in between Lower Sesan and Lower Srepok Rivers and up to the northeastward to Ratanakiri province. The forests locate along the roadsides can provide space available for such resettlement sites, in according to the existing population

density and land for agricultures. The resettlements along the roadside of National Road No. 78 should be located off the Srepok's Bridge along the way upward to Ratanakiri.

The table below shows on the population and other agricultural land and rice production in relation to three communes in Sesan district, in which under planning of resettlement sites of the Lower Sesan and Lower Srepok Rivers.

Table 2 Population and agricultural land and crops

Province	District	Commune	No. of villages	No. of families	Total population	Paddy field (ha)	Rice production (tone)
Stung Treng	Sesan	Kbal Romeas	4	620	2865	442	663
Stung Treng	Sesan	Srae Kor	2	311	1334	624	936
Stung Treng	Sesan	Ta Lat	4	618	2849	951	1426.5
Total			10	1,549	7,048	2,017	3,025.5

Source: Seila Commune Database, Stung Treng province, 2005

The important reasons of this option because of the resettlement sites along the roadsides of the national road No. 78 can provide more opportunities to local people whom under the plan of such resettlement. These opportunities include

- The existing infrastructures such as roads, primary school, and health center and commune headquarter can provide more favorable conditions in terms of mean of transportation, communication, accessibility to elsewhere and other services.
- Less disturbances and threats to wildlife population and its habitat if compared to the proposed resettlement sites.
- Reducing costs of transportation and easily access to elsewhere for businesses, for instance, selling agricultural products and other exchange items for livelihoods and seeking job opportunity outside.
- The settlements along the roadside may less negative impacts to wildlife threaten and habitat loss from conversion the forest.

8.2. Summary of impacts and suggested mitigation measures

Based on the field observations and existing data base analysis of the catchments in the down stream and upstream areas of the Srepok and Sesan Rivers, there are several key impacts from the dam development posing threats to wildlife and its habitats. These are:

Table 3 Summary of impacts to wildlife and habitats

No.	Categories	Threats to wildlife and habitats
1	Water resources and water quality	1. Increasing water volume of catchments = habitat loss and threat to wildlife; 2. Water quality changes = short term pollution but decreasing fish population and distribution
2	Landscapes	3. Change of geographical features due to excavating soils, rocks and other materials for construction = habitat loss and threat to wildlife;

No.	Categories	Threats to wildlife and habitats
3	Fragmenting forest and habitat degradation	4. Isolated forests = threat to wildlife 5. Land grabbing = habitat loss and threat to wildlife 6. Encroachment for settlements and agricultural land and associated activities = habitat loss and threat to wildlife population; 7. Intentionally set fire for hunting = degraded habitat and threat to wildlife 8. Mining exploitations have resulted in habitat depletion and threat to wildlife as well.
4	Logging and NTFPs collection	9. Habitat loss due primarily to fragmentation 10. Wildlife threaten 11. Diminishing habitat and pose pressure to wildlife
5	Hunting	12. Direct threats to wildlife and leading to extinct of the globally threatened species in particularly 13. Pose pressures to animal diet because of limited food diet 14. Habitat degradation caused by fire for hunting
6	Protected areas and protected forests	15. The PA&PF can be considered as last safe stronghold and/or natural zoo but the existing concerned issues have further continued and resulted in threat to wildlife and habitat. Finally, wildlife population is decreasing and habitat degradation. It is unlikely different to the area outside PA&PF, but level of threats may lesser speed than outside PA&PF. Therefore, level of management system might pose a critical significance to wildlife population within territory of PA&PF or the last wildlife stronghold under threats and resulting to deplete even extinct of the globally endangered species.
7	Proposed resettlement sites and hydropower dam of LSS and LSP	16. Habitat loss (further diminishing habitat through conversion into settlements and inundation) 17. Threats to wildlife population with limited habitat and then pressure on food diet of animals. 18. Adding negative effects that associate with the existing negative effects may have critical situation to wildlife population and their habitat.

As addressed in the above conclusion it is clear that existing issues/problems and additional impacts from the proposed hydropower dam and resettlement areas will fragment and deplete wildlife habitats and wildlife density. The loss of habitats, threat to wildlife and finally wildlife becomes in a severe situation leading to species extinction.

It is also expected that other development efforts in the northeast and eastern Cambodia may further cumulate to adversely affect to the natural resources and environment in this

area. Therefore, in relation to establish resettlement sites and hydropower dam construction, the project owner and competent authorities should undertake take the following mitigation measures:

- Develop a proper land use planning for resettlement
- Build more access roads to ease transportation and other facilities inside the resettlements in term of public facilities.
- Provide incentive involve in integrated agricultural activities. This requires improving of the livelihood alternatives against to basic needs and reducing adverse impact to wildlife and its habitat
- Compensate for individual households' assets and public interests for resettlement.
- Set up warning system of flood control. This is important for such resettlement areas where they close to the inundation basin.
- Monitor changes in wildlife density and its required habitats through the management efforts in protected areas and protected forests, so that ensure to wildlife protection.
- Build Trust Fund for wildlife awareness to strengthen conservation efforts
- Build more corridors connect between protected areas and protected forest where it is possible for the movement/migration of wildlife in the areas of the northeast and eastern Cambodia.
- Strengthen management systems both inside the protected areas and protected forests. Additionally, tree plantation and fuelwood consumption should be considered into the natural resource action plans.

Obviously, the conversion of forest lands into resettlements may result in certain changes of ecosystem in the area, especially to wildlife population and its habitats as well. Additionally, hydropower project may also result in adversely environmental impact not only to biodiversity but also to socioeconomic of the local population. In association with the cumulative impacts, it is recommended that socioeconomic impact should be included as well. However, it is just aggregated impacts and the whole impact to the wildlife and habitat is unlikely to come from such single development because the whole areas still support a vast forest land with low density of human population. Additionally, it seems less impact the upper catchments where they support a rich biodiversity of wildlife and other ecosystems in the protected areas and protected forests.

The catchments of the upper areas have been identified as significant potential for conservation values of wildlife species, especially the globally endangered species. Most of the upper catchments have been designated as protected areas (PAs) and protected forests (PFs), so that wildlife safety through the management and protection efforts. It is also recommended to create specific corridor in order to ease the movement or migration of wildlife within the areas in the northeast and east of the country. However, the areas of the downstream are likely to impact from the integrated development efforts such as conversion of forest land into development purposes but the impact from the resettlements and Dam Project seem to be less but more detailed of the cumulative for a

whole area of the LMDFE in the northeast and eastern Cambodia may significantly considered.

Reference

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- 2001, Michael Baltzer, Nguyen Thi Dao, Robert Shore, James Hardcastle, Barney Long, Kristin Clay and Jenny Springer., The Forest of the Lower Mekong Ecoregion Complex. Worldwide Fund for Nature (WWF)
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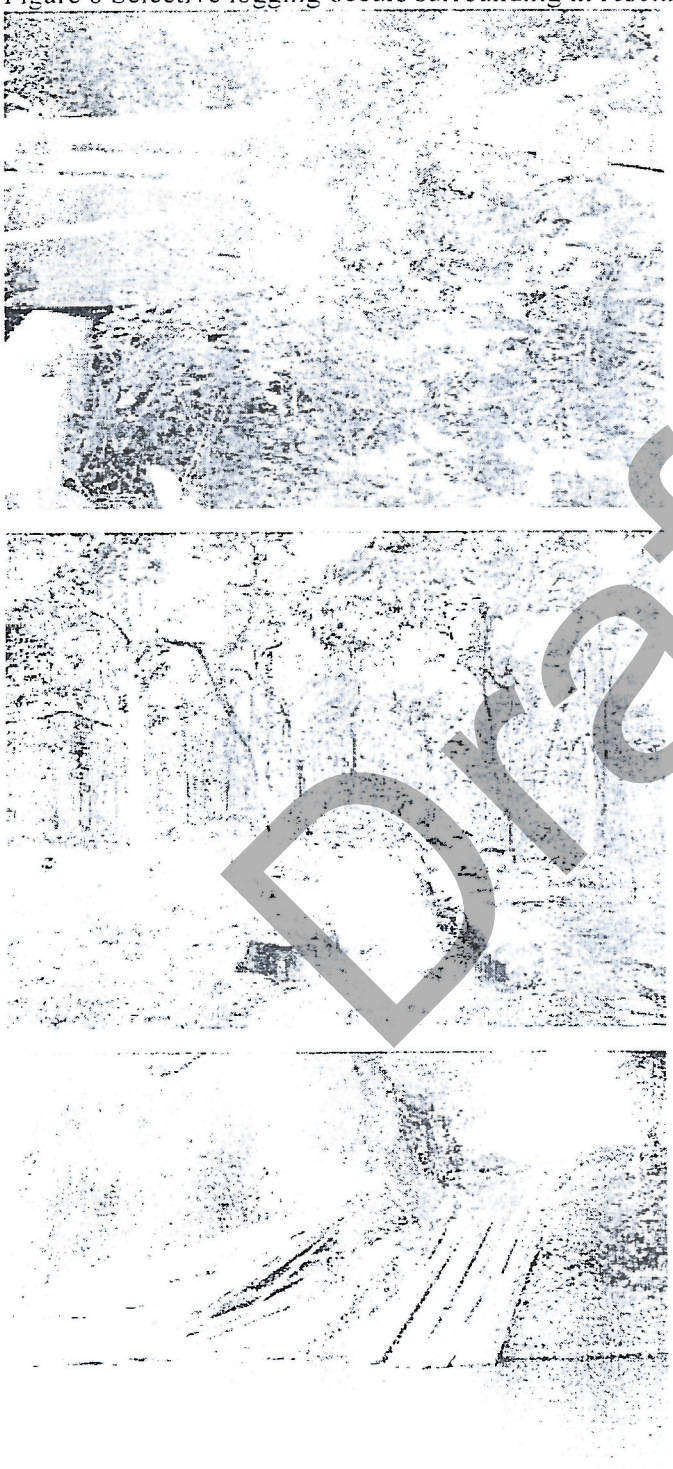
Appendix

Figure 5 Deciduous Dipterocarp Forest in the proposed resettlement sites

The forests in this habitat are remaining a large number of small trees. The large trees of the high commercial value are under selective logging. The proposed resettlement sites are located along the Lower Sesan and Lower Srepok Rivers, in Stung Treng province. Generally, it is said this type of forest supports large population of wildlife of large mammals including carnivorous species and its preys as well. However, there are several disturbances currently occur within this habitats, due primarily to accessibility is prevailing.

Source: *photo by team, field observation on April, 2008.*

Figure 6 Selective logging occurs surrounding in resettlement sites



The selective logging in the surrounding of resettlement sites and vicinity are often seen and heard of the chainsaw voice. No any monitoring measure taken during the field observations. The large trees of previous wood and first quality wood have been logged.

Source: *photo by team, field observation on April, 2008.*

Figure 7 Existing trails/track access into forest

Ox-cart tracks and trails are considered the main treats to forest resources and wildlife habitats as well as wildlife population. The tracks provide more accessible into the forest for logging, hunting and possibly involve in land grabbing and encroachment.

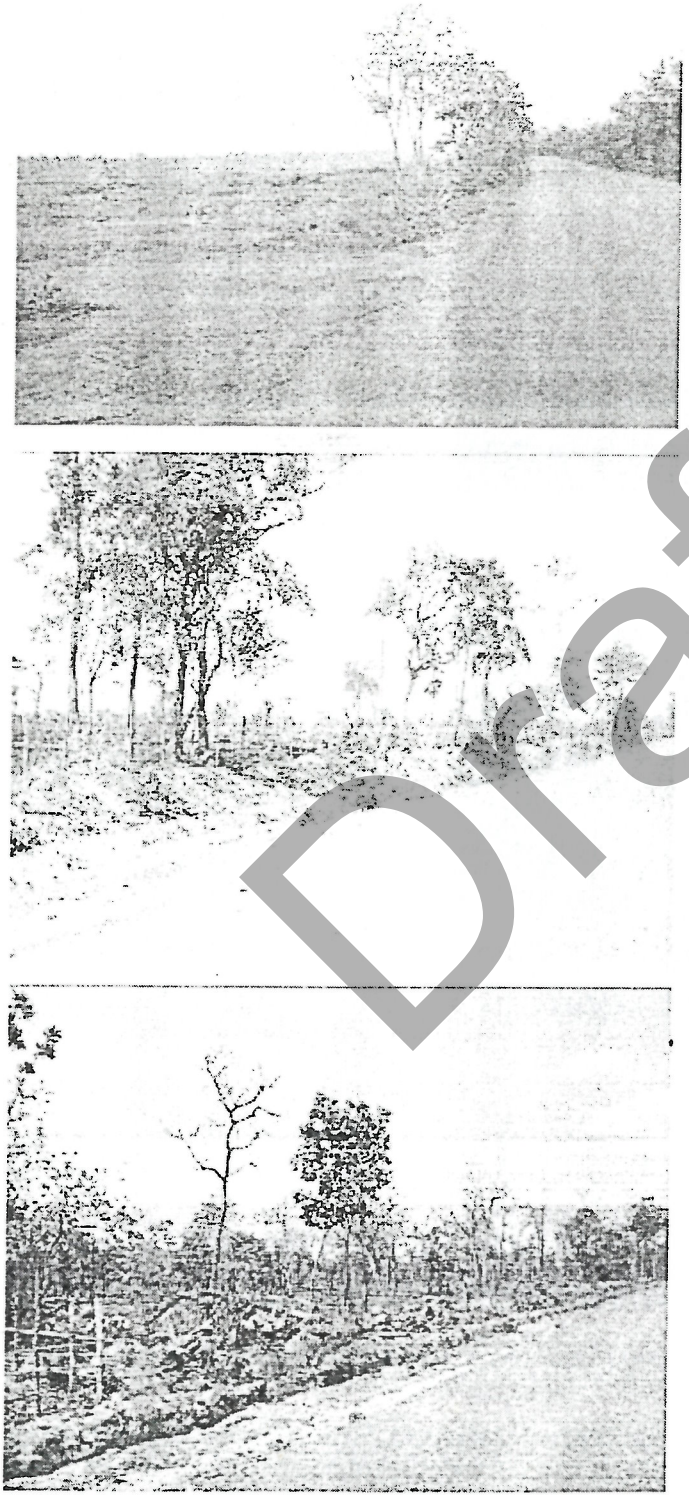
Source: *photo by team, field observation on April, 2008.*

Figure 8 Villages' roads connect from the national road No. 78

The village's roads were built in connecting from the main road and this is leading to fragment of habitats. The development efforts occur within the area might provide more accessible and opportunities involve in land encroachment and speculation as well.

Source: *photo by team, field observation on April, 2008.*

Figure 9 Habitat loss caused by road building



The roads impact may result in a vast size of forest area along the roadside disappear and this is due primarily to several key factors of forest management and development needs. The fragmentation of forests through such encroachment have resulted in long term impact to wildlife threatens and its habitats.

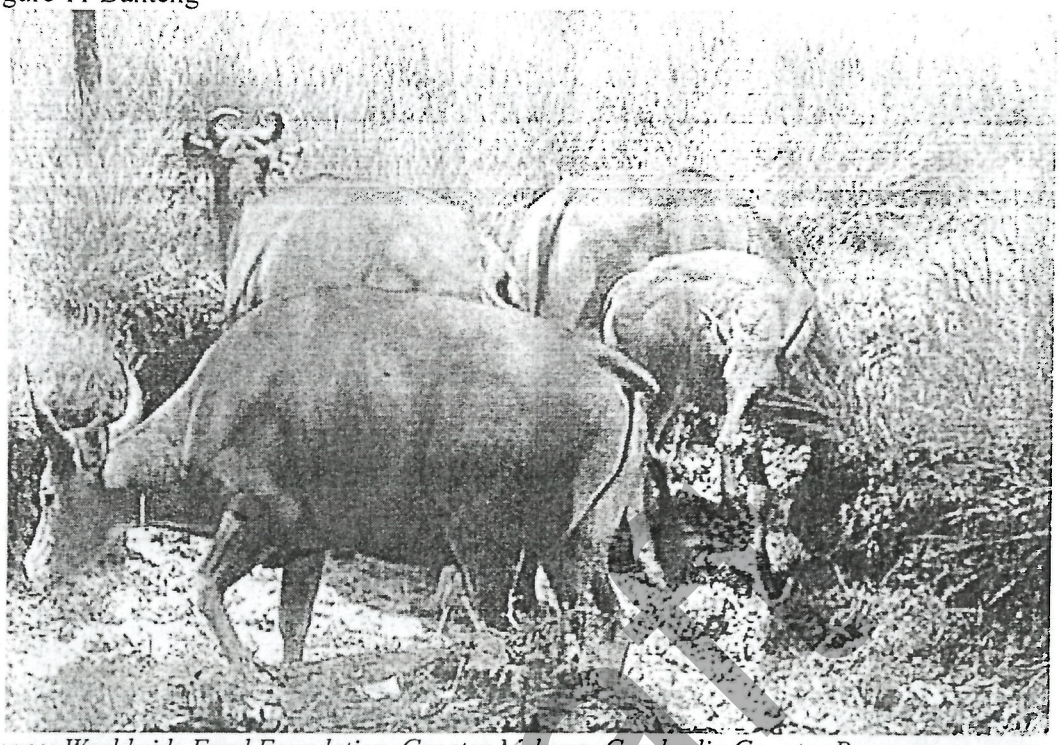
Source: *photo by team, field observation on April, 2008.*

Figure 10 Conversion and land grabbing for commercial interests

Roads provide more accessible to encroach forests and altering into non-forest area. The applied methods for killing tree for land, by pruning barks around the tree-base. After months the pruned trees dry-out and then death because of no water supply to nutrient the entire tree.

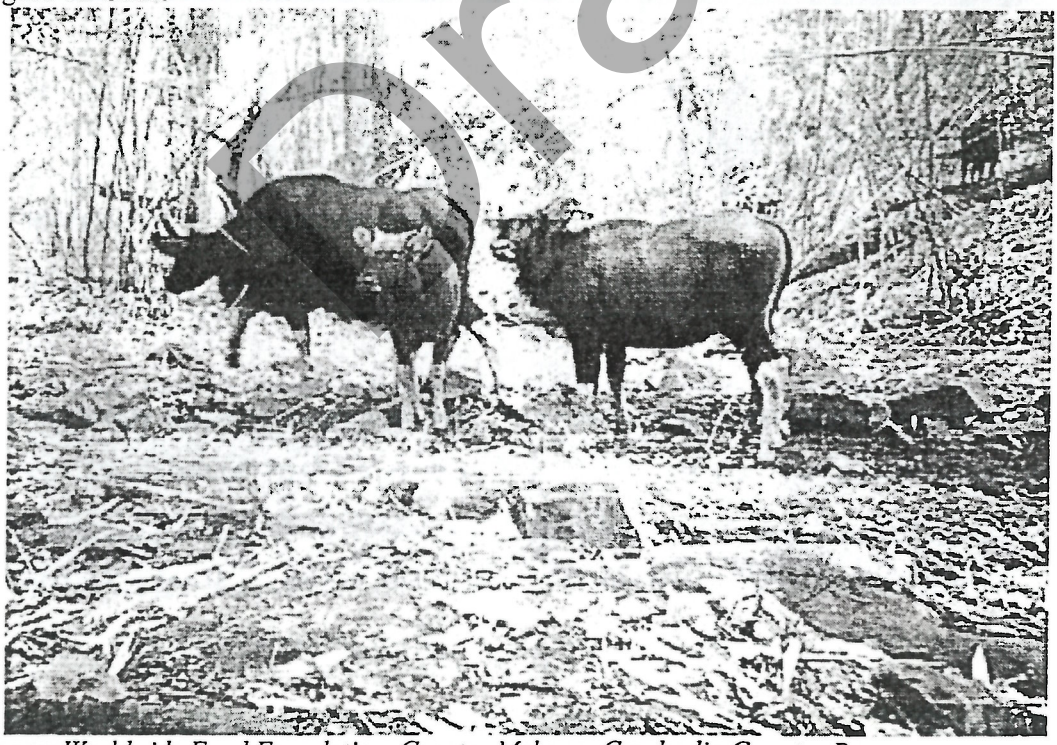
Source: *photo by team, field observation on April, 2008.*

Figure 11 Banteng



Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 12 Gaurs



Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 13 Wild water buffalo

Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

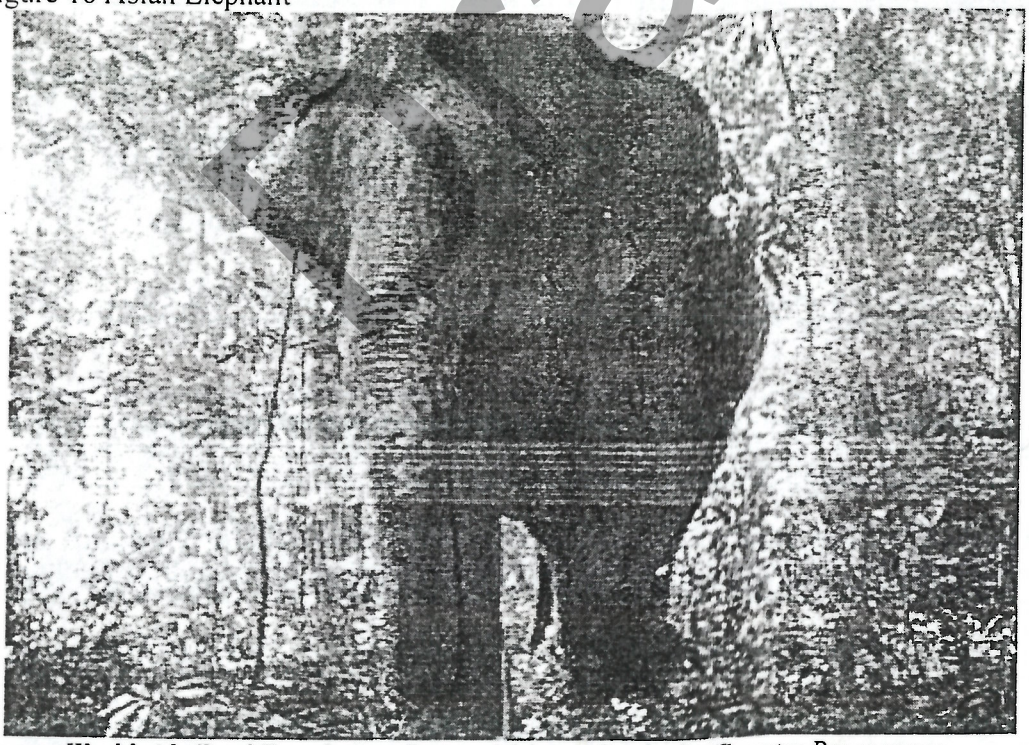
Figure 14 Indichine Leopard

Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

Figure 15 Blackbear

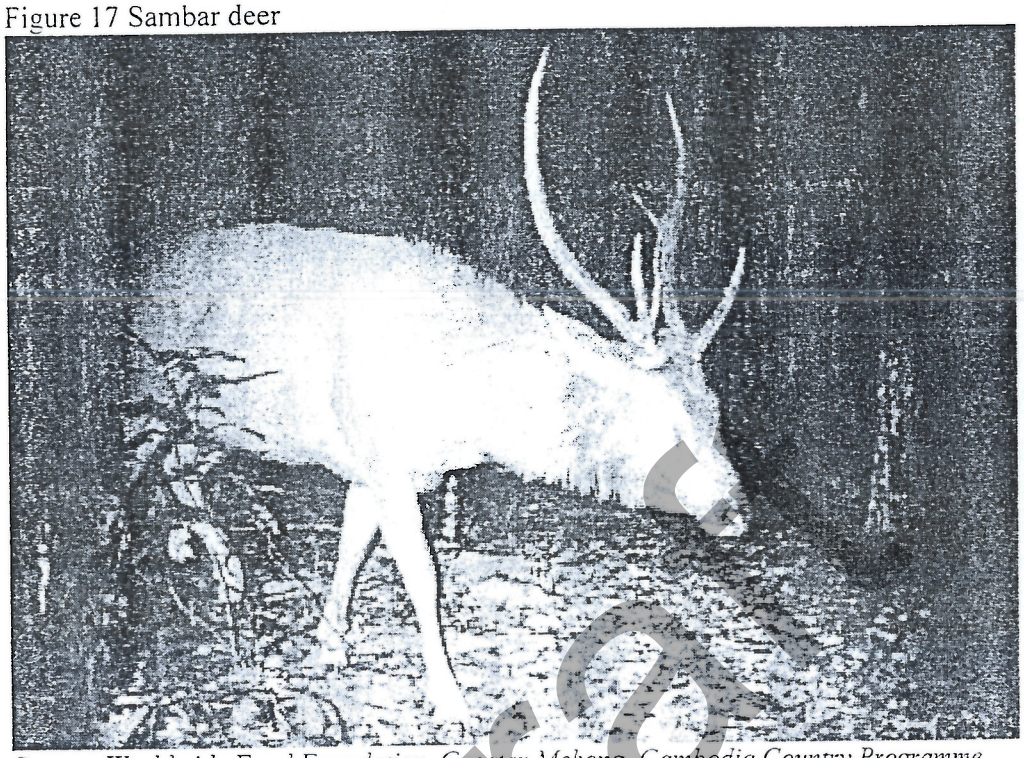
Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 16 Asian Elephant



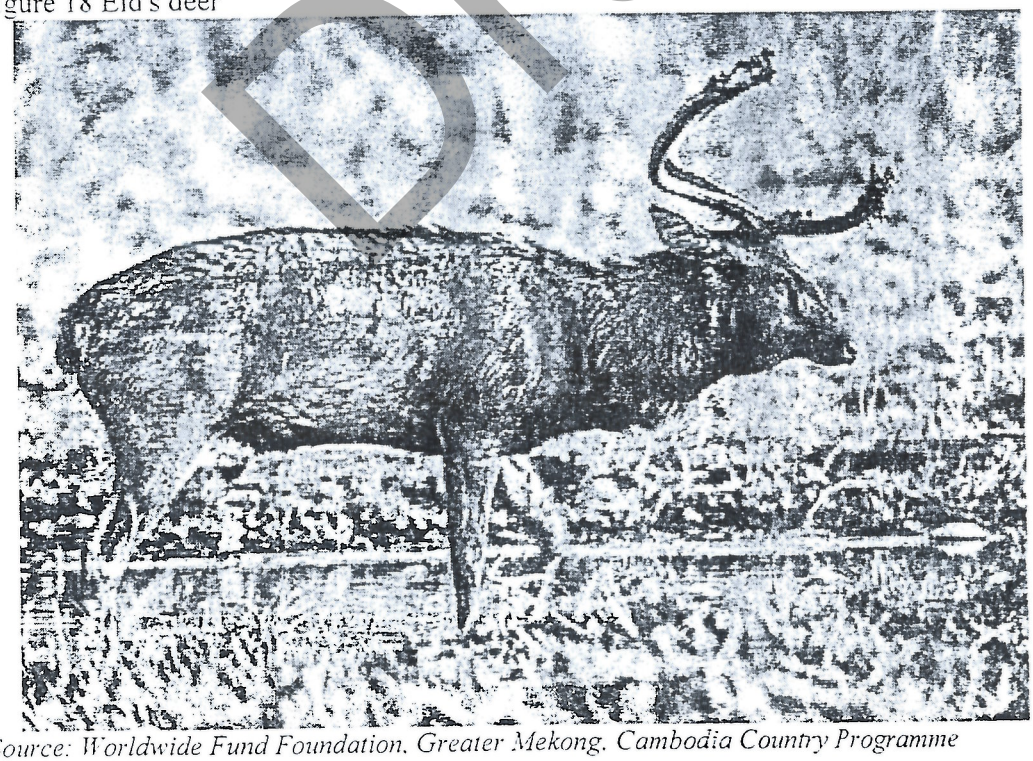
Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 17 Sambar deer



Source: Worldwide Fund Foundation, Greater Mekong. Cambodia Country Programme

Figure 18 Eld's deer



Source: Worldwide Fund Foundation, Greater Mekong. Cambodia Country Programme

Figure 19 Tiger

Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 20 Otters

Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

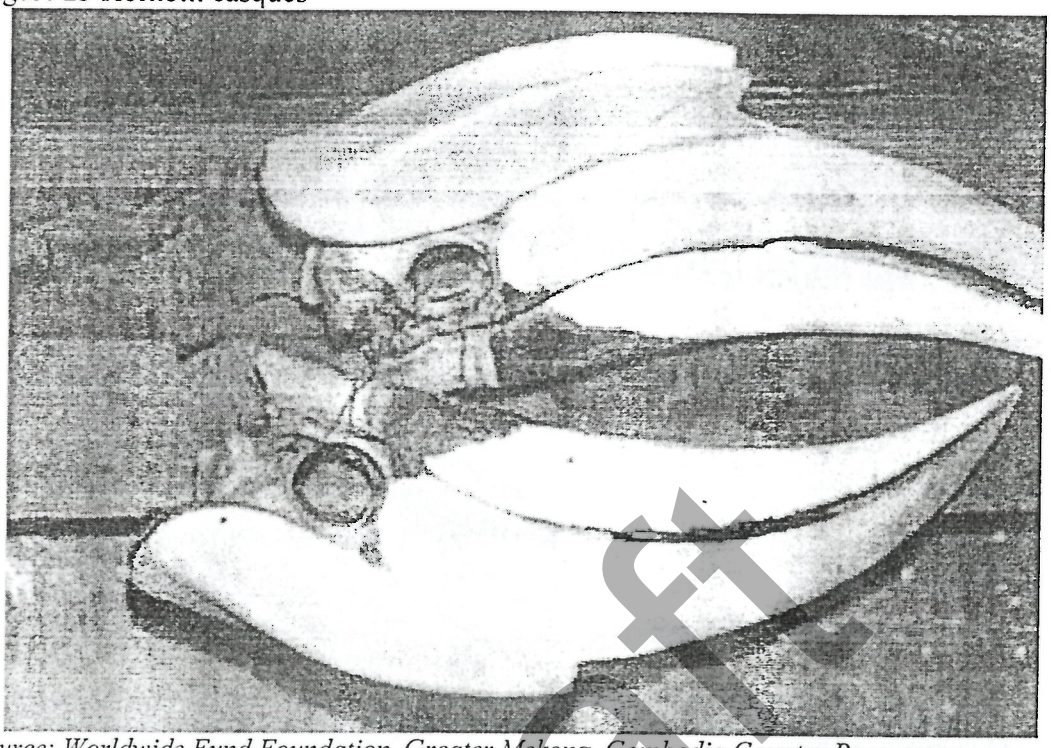
Figure 21 Wildlife hunting

Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

Figure 22 Smoked Slow-loris for traditional medicine

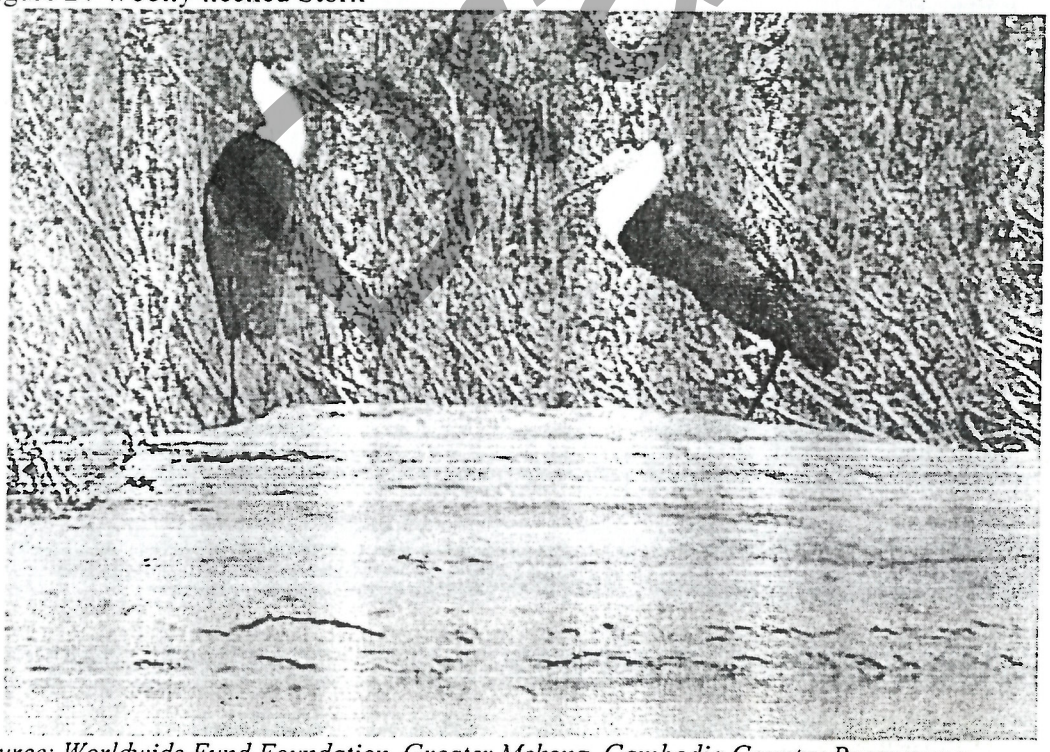
Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

Figure 23 Hornbill casques



Source: Worldwide Fund Foundation, Greater Mekong. Cambodia Country Programme

Figure 24 Woolly-necked Stork



Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 25 White-shouldered Ibis

Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

Figure 26 Grey headed Fisheagle

Source: Worldwide Fund Foundation. Greater Mekong. Cambodia Country Programme

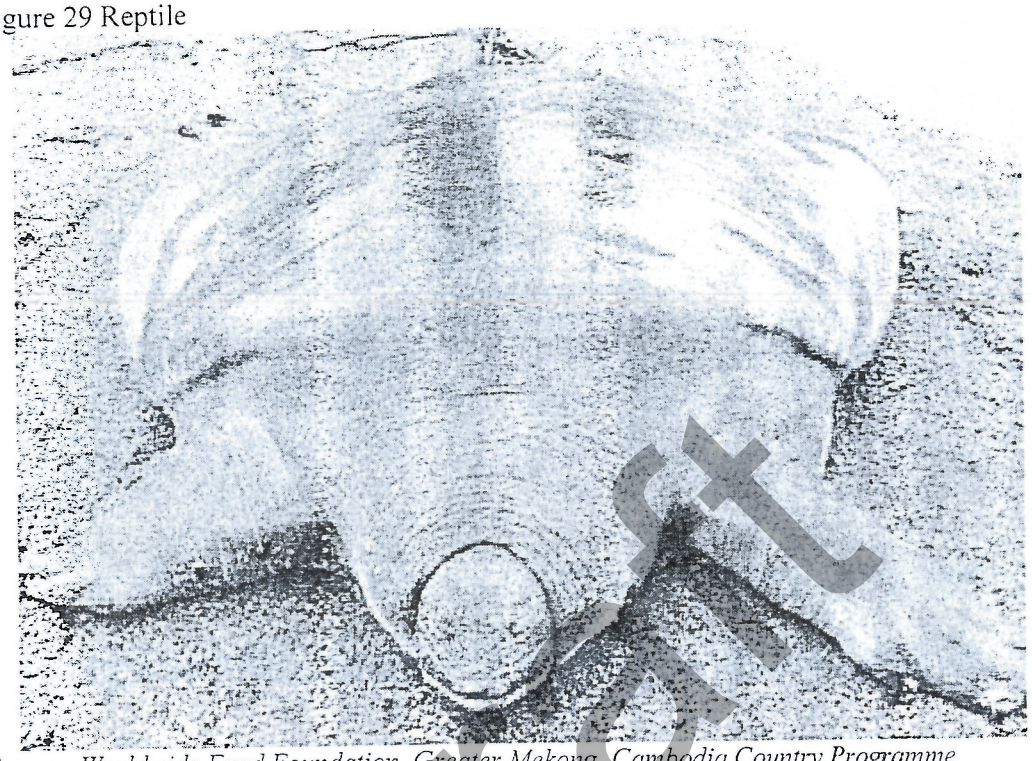
Figure 27 Red-headed Vulture

Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 28 Great Thick knee

Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Figure 29 Reptile



Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

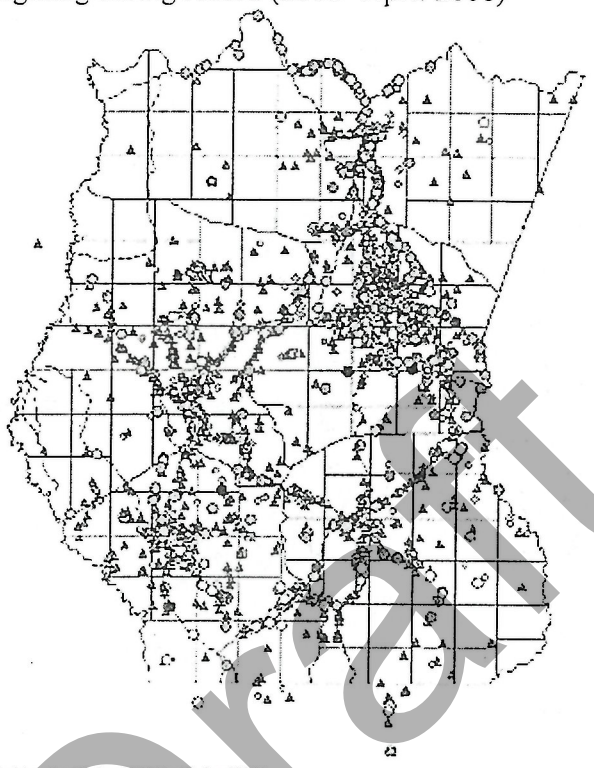
Figure 30 Catchments of the Srepok, Phnom Prich Wildlife Sanctuary

Source: Worldwide Fund Foundation, Greater Mekong, Cambodia Country Programme

Additional note on wildlife observations in the catchments (Mondulkiri Protected Forest, Srepok Wilderness Area)

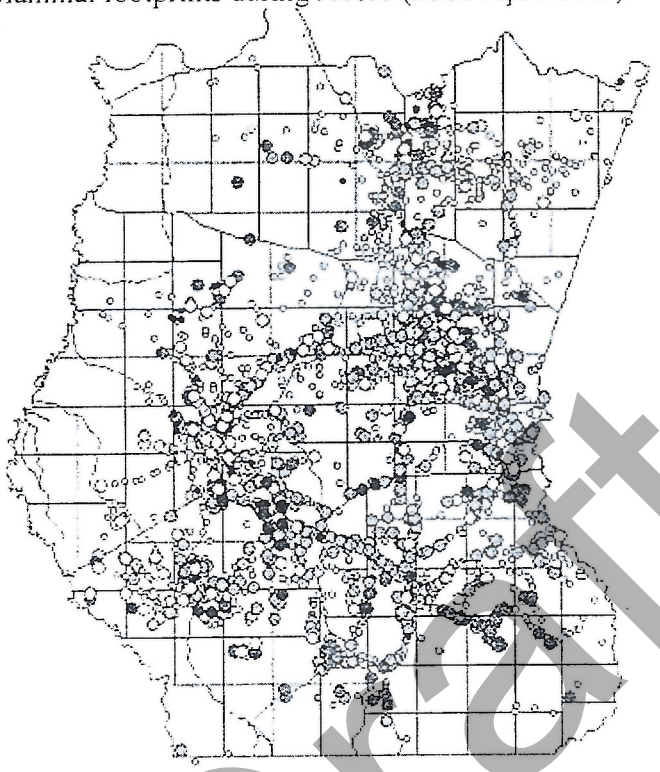
Source: WWW Greater Mekong Cambodia Country Programme

Figure 31 Mammal sighting during record (2006- April 2008)



- Small Asian Mongoose Sighting for 01 Jan 2006 to 01 Apr 2008
- Gibbon. spp Sighting for 01 Jan 2006 to 01 Apr 2008
- Otter spp. Sighting for 01 Jan 2006 to 01 Apr 2008
- Wild water buffalo Sighting for 01 Jan 2006 to 01 Apr 2008
- Wild Pig Sighting for 01 Jan 2006 to 01 Apr 2008
- Sun Bear Sighting for 01 Jan 2006 to 01 Apr 2008
- Stump-tailed macaque Sighting for 01 Jan 2006 to 01 Apr 2008
- Silvered Langur Sighting for 01 Jan 2006 to 01 Apr 2008
- Siamese hare Sighting for 01 Jan 2006 to 01 Apr 2008
- Sambar Sighting for 01 Jan 2006 to 01 Apr 2008
- Red Muntjac Sighting for 01 Jan 2006 to 01 Apr 2008
- Pig-tailed Macaque Sighting for 01 Jan 2006 to 01 Apr 2008
- Long-tailed Macaque Sighting for 01 Jan 2006 to 01 Apr 2008
- Leopard Sighting for 01 Jan 2006 to 01 Apr 2008
- Large-toothed Ferret Badger Sighting for 01 Jan 2006 to 01 Apr 2008
- Gaur Sighting for 01 Jan 2006 to 01 Apr 2008
- Fishing Cat Sighting for 01 Jan 2006 to 01 Apr 2008
- Eld's Deer Sighting for 01 Jan 2006 to 01 Apr 2008
- Douc Langur Sighting for 01 Jan 2006 to 01 Apr 2008
- Dhole Sighting for 01 Jan 2006 to 01 Apr 2008
- Civet spp. Sighting for 01 Jan 2006 to 01 Apr 2008
- Banteng Sighting for 01 Jan 2006 to 01 Apr 2008
- Asiatic Jackal Sighting for 01 Jan 2006 to 01 Apr 2008
- Asian Elephant Sighting for 01 Jan 2006 to 01 Apr 2008
- swap_posts
- swap_road
- swa_block_management

Figure 32Mammal footprints during record (2006-April 2008)



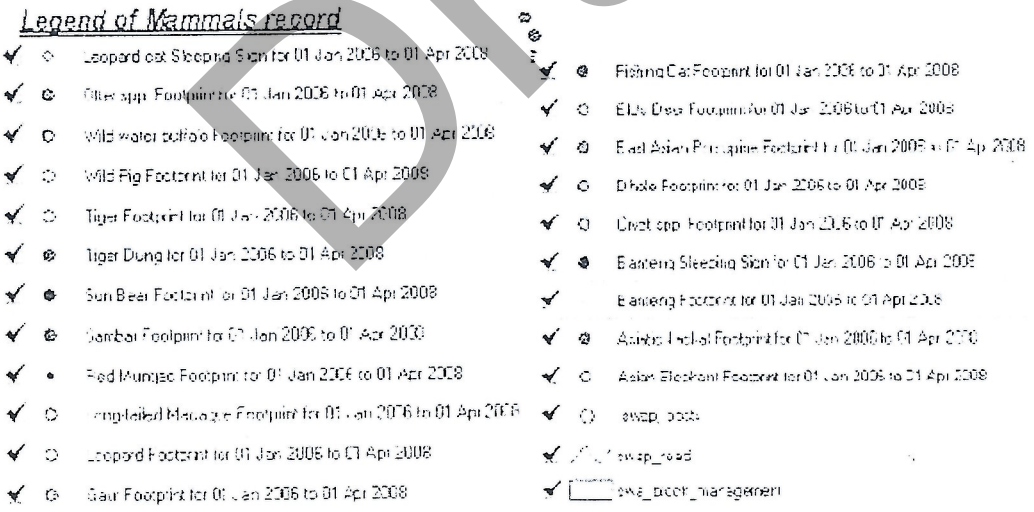
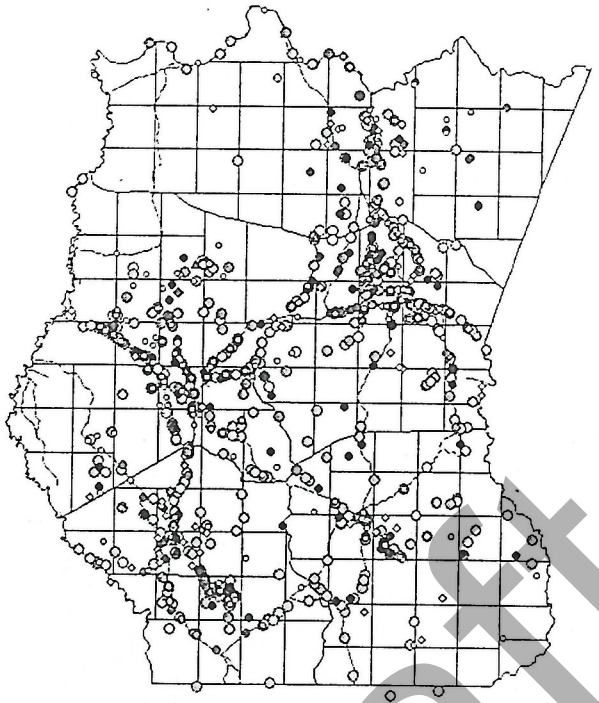


Figure 33 Bird sighting record (2006-April 2008)



- Woolly-necked Stork Sighting for 01 Jan 2006 to 01 Apr 2008
- White-winged Duck Sighting for 01 Jan 2006 to 01 Apr 2008
- White-shouldered Ibis Sighting for 01 Jan 2006 to 01 Apr 2008
- White-rumped Vulture Sighting for 01 Jan 2006 to 01 Apr 2008
- White-rumped Vulture Nest for 01 Jan 2006 to 01 Apr 2008
- White-rumped Vulture Footprint for 01 Jan 2006 to 01 Apr 2008
- Slender-billed Vulture Sighting for 01 Jan 2006 to 01 Apr 2008
- Silver Pheasant Sighting for 01 Jan 2006 to 01 Apr 2008
- Sarus Crane Sighting for 01 Jan 2006 to 01 Apr 2008
- Red-headed Vulture egg for 01 Jan 2006 to 01 Apr 2008
- Red-headed Vulture Sighting for 01 Jan 2006 to 01 Apr 2008
- Red-headed Vulture Nest for 01 Jan 2006 to 01 Apr 2008
- Red-Wattled Lapwing Sighting for 01 Jan 2006 to 01 Apr 2008
- Red Junglefowl Sighting for 01 Jan 2006 to 01 Apr 2008
- Owl Sighting for 01 Jan 2006 to 01 Apr 2008
- Oriental Pied Hornbill Sighting for 01 Jan 2006 to 01 Apr 2008
- Mongoose Sighting for 01 Jan 2006 to 01 Apr 2008
- Little Cormorant Sighting for 01 Jan 2006 to 01 Apr 2008
- Lesser Whistling Duck Sighting for 01 Jan 2006 to 01 Apr 2008
- Lesser Fish Eagle Sighting for 01 Jan 2006 to 01 Apr 2008
- Lesser Adjutant Sighting for 01 Jan 2006 to 01 Apr 2008
- Kite Sighting for 01 Jan 2006 to 01 Apr 2008
- Green Peafowl Sighting for 01 Jan 2006 to 01 Apr 2008
- Greater Adjutant Sighting for 01 Jan 2006 to 01 Apr 2008
- Great Slaty Woodpecker Sighting for 01 Jan 2006 to 01 Apr 2008
- Great Hornbill Sighting for 01 Jan 2006 to 01 Apr 2008
- Giant Ibis Sighting for 01 Jan 2006 to 01 Apr 2008
- Eagle spp. Sighting for 01 Jan 2006 to 01 Apr 2008
- Darter Sighting for 01 Jan 2006 to 01 Apr 2008
- Crested Serpent Eagle Sighting for 01 Jan 2006 to 01 Apr 2008
- Chinese francolin Sighting for 01 Jan 2006 to 01 Apr 2008
- Black-necked Stork Sighting for 01 Jan 2006 to 01 Apr 2008
- Bengal Florican Sighting for 01 Jan 2006 to 01 Apr 2008
- swap_posts
- swap_road
- swa_block_management

Additional note on wildlife observations in the catchments in Phnom Prich Wildlife Sanctuary, Mondulkiri province

Source: WWW Greater Mekong Cambodia Country Programme

Figure 34 mammal footprints

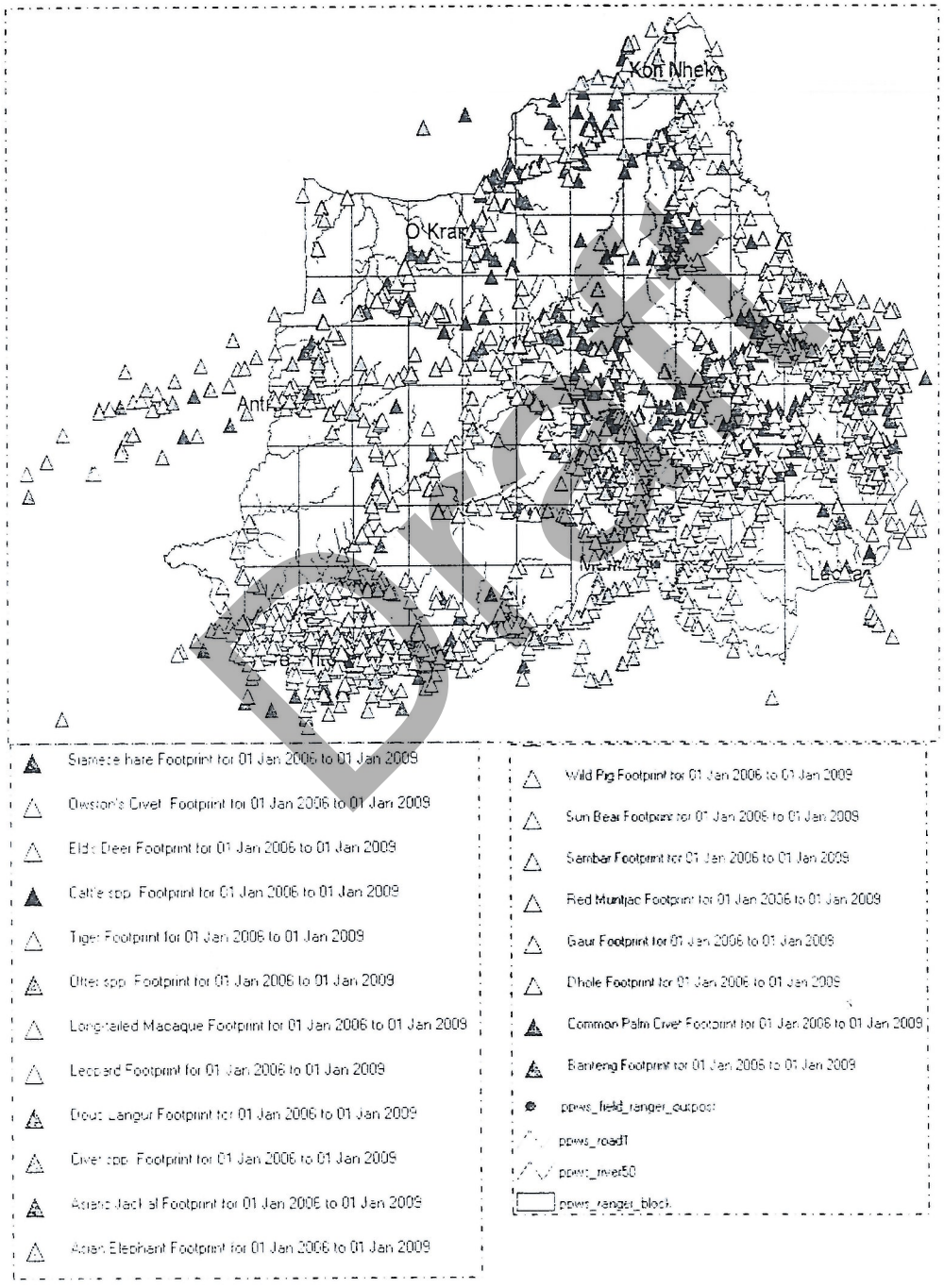


Figure 35 Map of mammal sights

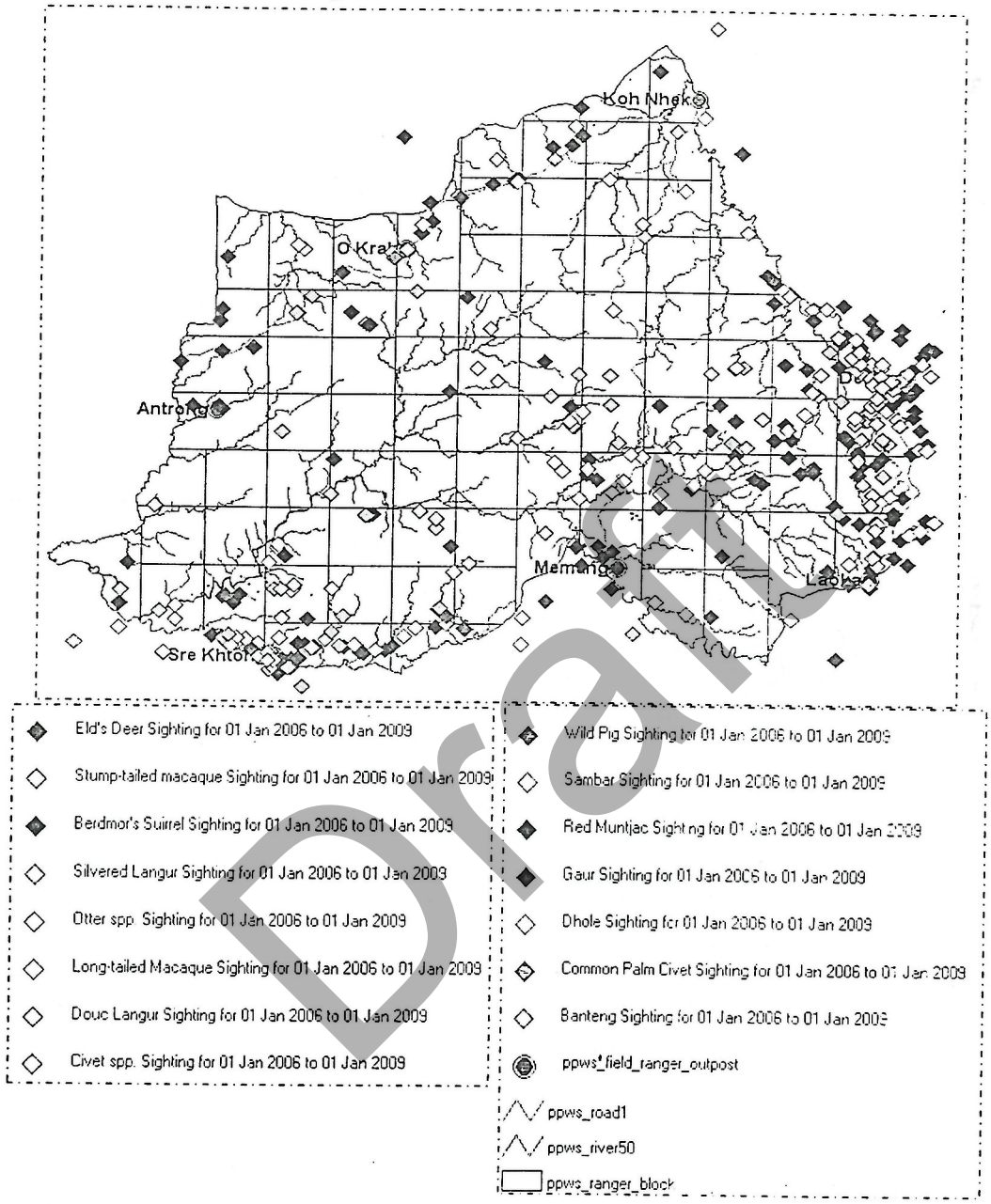


Figure 36 Map of bird sighting

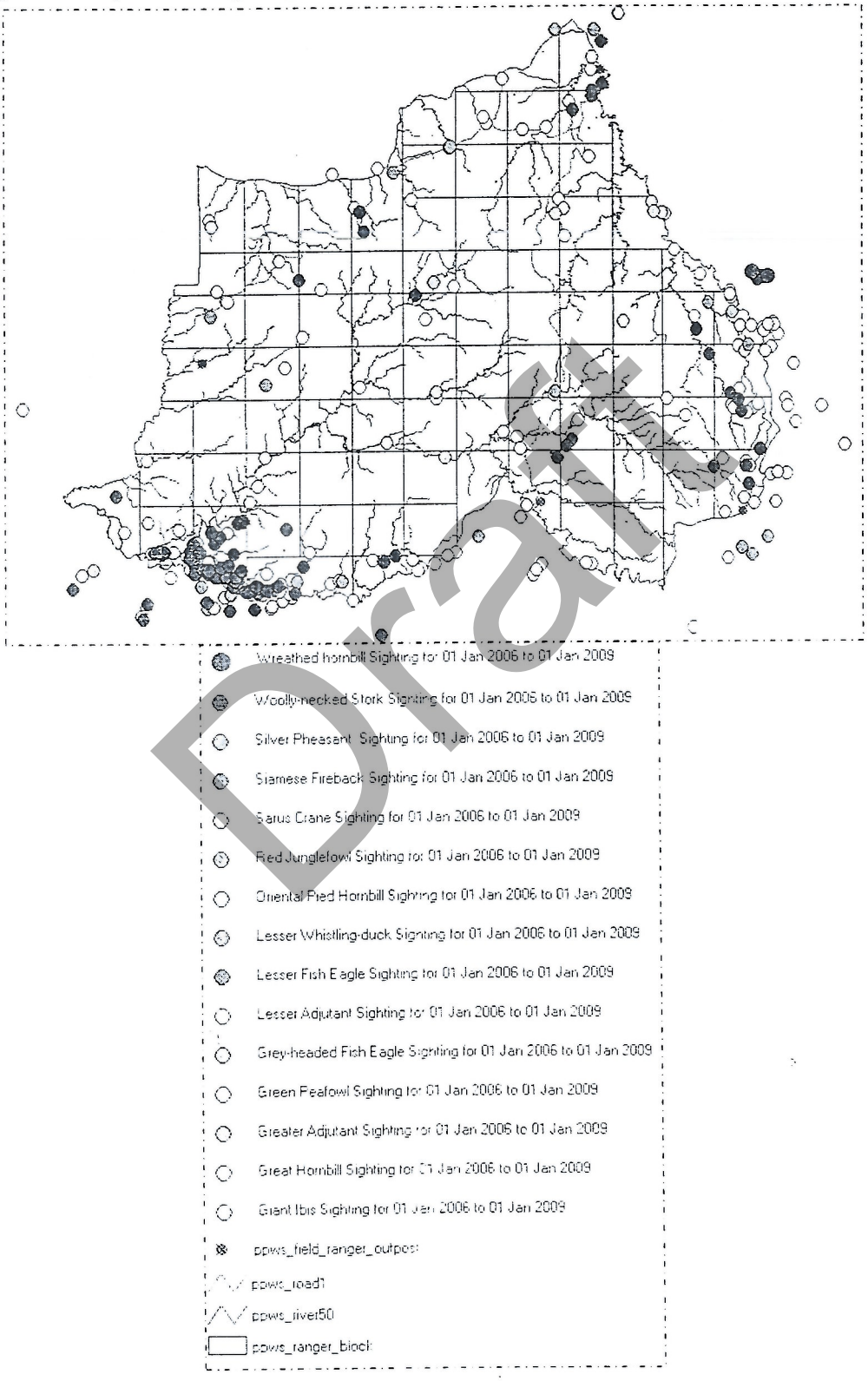
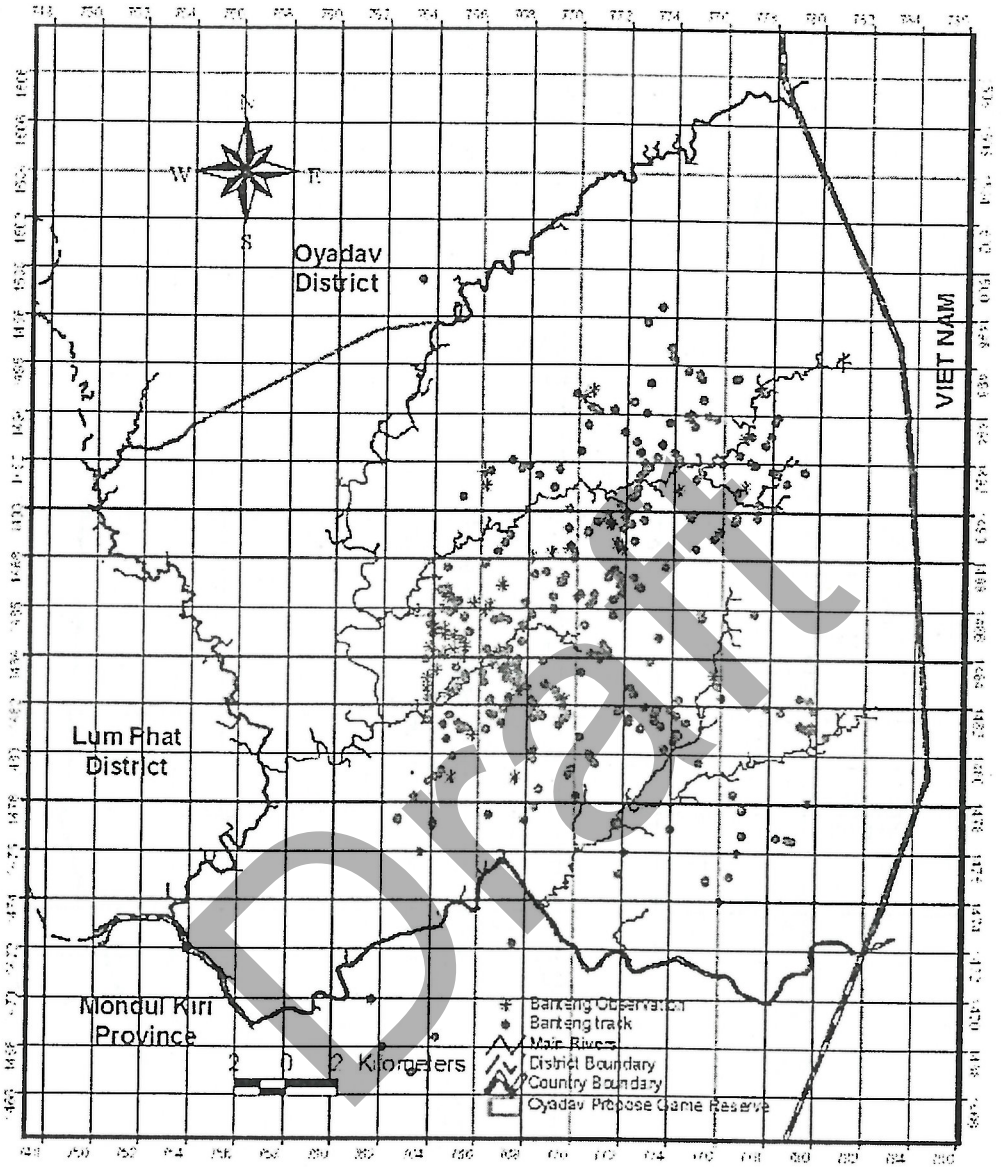
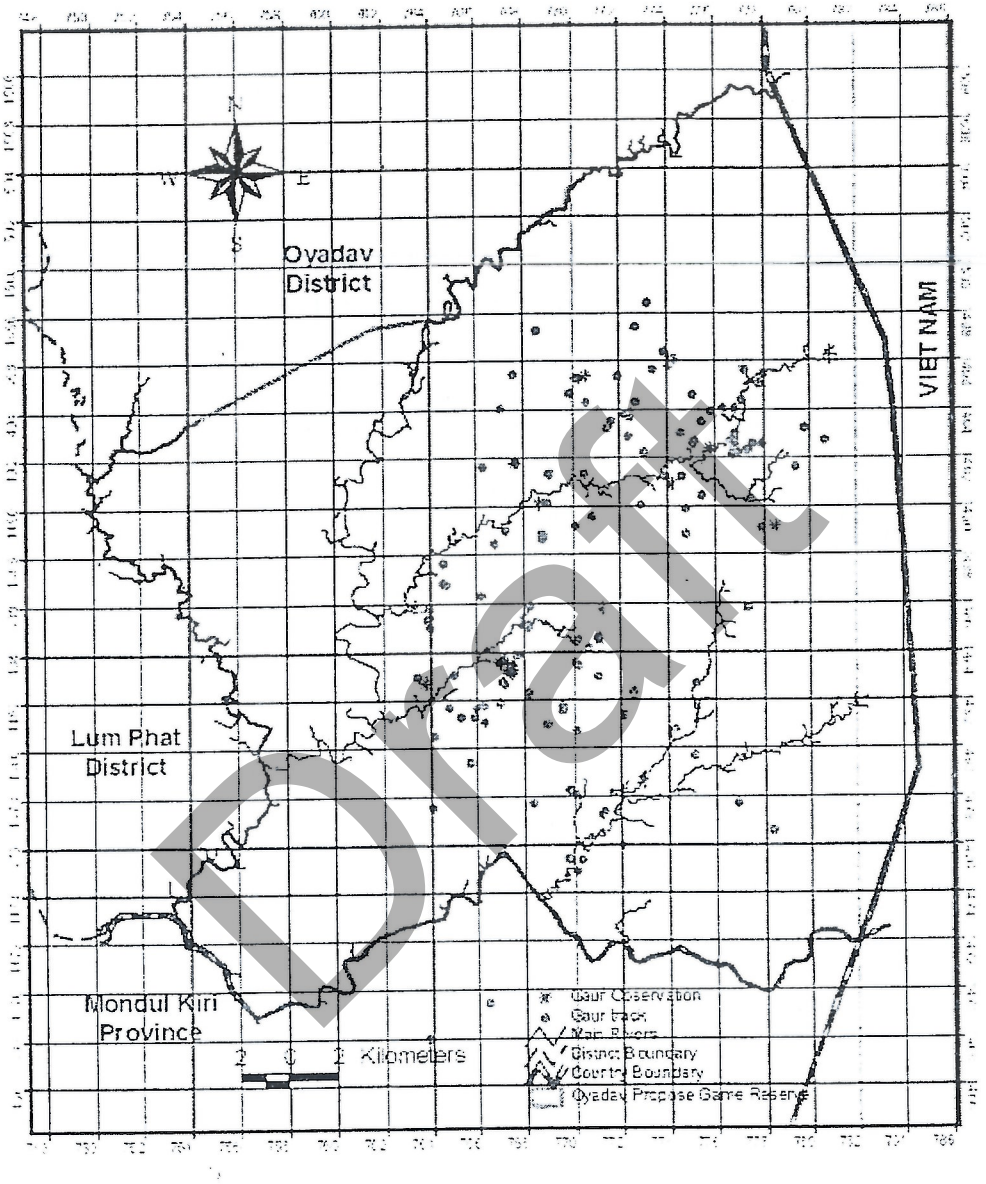


Figure 37 Banteng's data in the catchments, Oyadav, Ratanakiri province



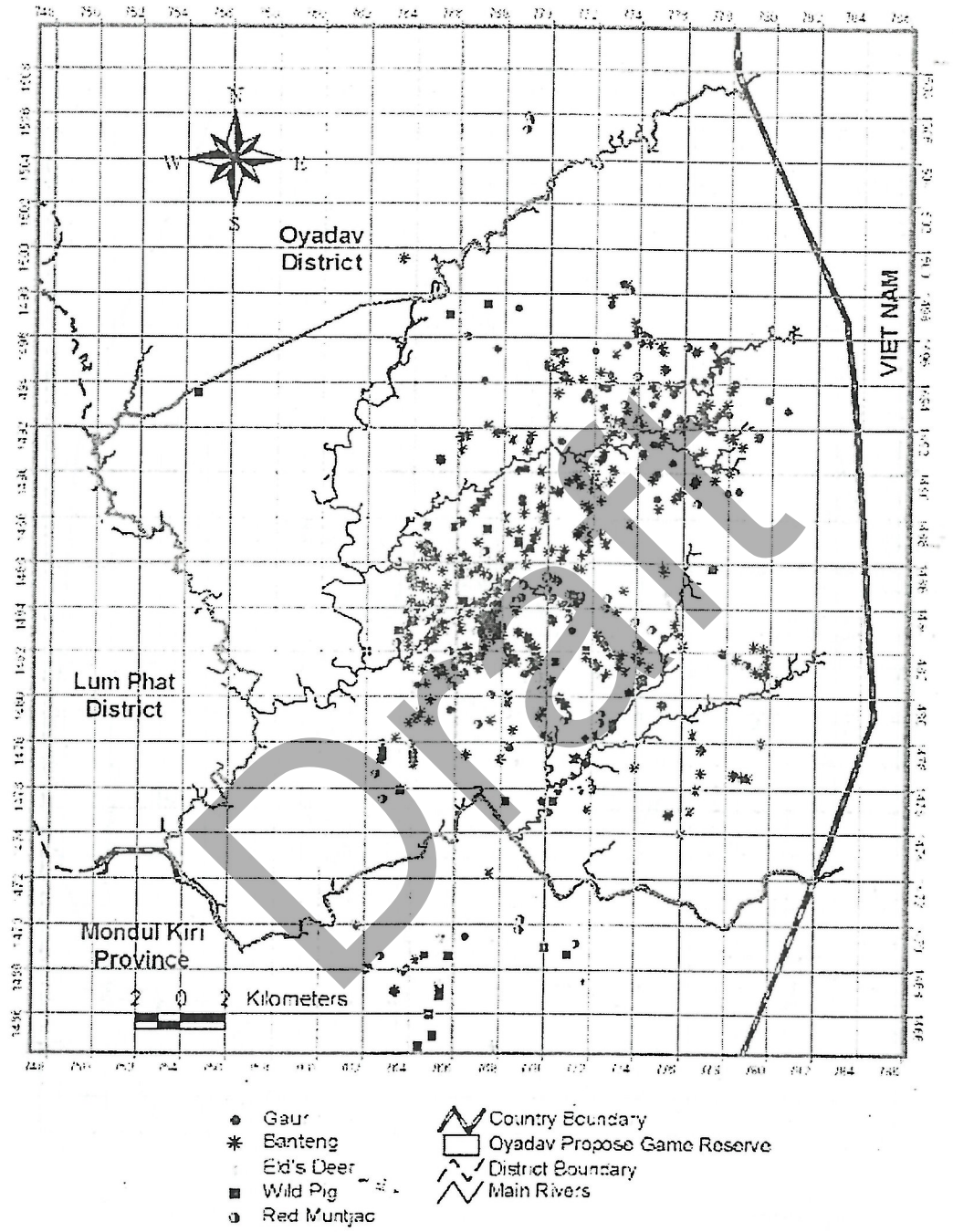
Source: Wildlife Protection Office, 2006

Figure 38 Map of Gaur's data in the catchments, Oyadav, Ratanakiri province



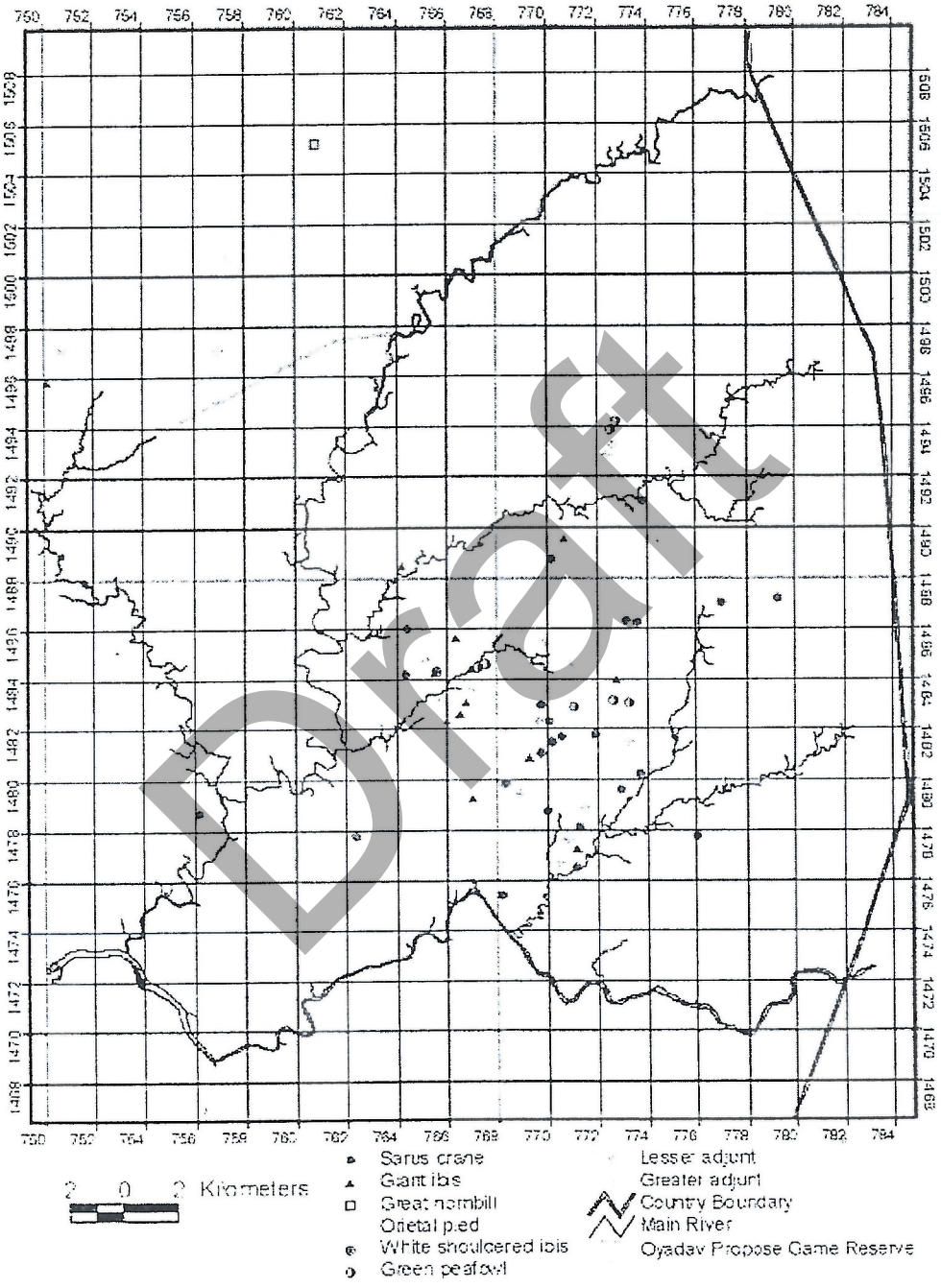
Source: Wildlife Protection Officer, 2006

Figure 39 Map of key mammals in the catchments, Oyadav, Ratanakiri province



Source: Wildlife Protection Officer (WPO), 2006

Figure 40 Map of key birds in the catchments, Oyadav, Ratanakiri province



Source: Wildlife Protection Office (WPO), 2006

Convention

The IUCN (1996) categories of global threat:

CR- Critically Endangered: The species faces an extremely high risk of extinction in the wild in the immediate future.

EN- Endangered: The species is facing a very high risk of extinction in the wild in the near future.

VU-Vulnerable: The species is facing a high risk of extinction in the wild in the medium term future.

DD- Data Deficient: A species for which there is inadequate information to make a direct, or in direct, assessment of its risk of global extinction in the wild. This category does not imply that the species is certainly Globally Threatened, and further data could show that the species is presently secure globally.

LR/nt-Low Risk/near-threatened: The species is close to qualifying for Globally Threatened-Vulnerable. Near threatened (nt) is one of the three sub-categories of the Low Risk (LR) category. Lower Risk is defined as "a taxa, which, when evaluated, does not satisfy the criteria for any categories Critically Endangered, Endangered or Vulnerable". Near threatened is defined as "taxa which do not qualify for Conservation Dependent (the highest sub-categories of Lower Risk), but which are close to qualifying for Vulnerable".

Least Concern: A species which does not qualify for Near-threatened – this applies to all species not in one of the above mentioned categories, but this is only mentioned for those species that were formerly considered Near-threatened.

The CITES Appendix

These categories reflect the level of threat posed by international trade. Unlike global and national threat categories, CITES categories have a regulatory effect in trade between countries that are parties to the Convention on International trade in Endangered Species of Wild Fauna and Flora. Cambodia is ones of these countries, having signed an agreement to be part of this convention.

I = Appendix I:
Species threatened with extinction that are or may be affected by trade. Trade in specimens between parties is only authorized in exceptional circumstances (such as import and export of scientific purposes).

II = Appendix II:
Species, which although not necessarily now threatened with extinction may become so unless trade in specimens is subject to strict regulation in order to avoid over-utilization.

Species may also be listed in Appendix II because their similarity to more threatened species, as an aid to enforcement. Commercial trade in wild specimens listed on Appendix II is permitted between members of the convention, but is controlled and monitored through licensing system.

III = Appendix III:
Species for which trade in wild specimens is permitted, but for which in certain CITES signatory countries requires appropriate regulation and documentation. Note on place names: Throughout this report country names follow The Times Atlas of the World (1999). Local place names largely follow the spelling on the 1:50,000 maps of Cambodia, prepared by the USAMSFE 1964.

Table 4 List of mammal species in the northeast and eastern Cambodia

No.	Local names	English and (scientific names)	Status
1	Dam-Rey	Asian elephant (*Elephas maximus*)	EN (IUCN)
2	Khlar Thom	Tiger (*Panthera tigris*)	EN (IUCN)
3	Khlar Popork	Clouded leopard (*Neofelis nebulosa*)	VU (IUCN)
4	Khlar Khmumthom	Asiatic black bear (*Ursus thibetanus*)	VU (IUCN)
5	Khlar Khmumtouch	Sun bear (*Ursus malayanus*)	DD (IUCN)
6	Khlar Leongmeas	Asian golden cat (*Catopuma temminckii*)	N-t (IUCN)
7	Khlar Phnhi Thmor Keov	Marbled cat (*Pardofelis marmorata*)	DD (IUCN)
8	Khlar Lkhen	Leopard (*Panthera pardus*)	I (CITES)
9	Kra Bei Prey	Wild Water Buffalo (*Bubalus arnee*)	EN (IUCN)
10	Romeang	Eld's Deer (*Cervus eldii*)	VU (IUCN)
11	Ton Sorng	Banteng (*Bosjavanicus*)	EN (IUCN)
12	Sva Kravat	Douc Langur (*Pygathrix nemaeus*)	EN (IUCN)
13	Touch Markoth	Pileated Gibbon (*Hylobates piletus*)	VU (IUCN)
14	Touch Thpeal Leourng	Yellow-cheeked Gibbon (*Hylobates gabriellae*)	VU (IUCN)
15	Phe Kbal Sompeth	Eurasian Otter (*Lutra lutra*)	VU (IUCN)
16	Chhlus Yeak	Large-antlered Muntjac (*Megamuntiacus vuquangensis*)	I (CITES)
17	Khting	Gaur (*Bos gaurus*)	VU (IUCN)
18	Khlar Trei	Fishing Cat (*Prionailurus viverrinus*)	N-t (IUCN)
19	Chhmar Prey	Jungle Cat (*Felis chaus*)	II (CITES)
20	Chhmar Daov	Leopard cat (*Prionailurus bengalensis*)	II (CITES)
21	Preurs	Sambar (*Cervus unicolor*)	
22	Sva Angkuth	Stump-tailad Macaque (*Macaca arctoides*)	VU (IUCN)
23	Sva Pream	Silvered Langur (*Semnopithecus cristatus*)	NT (IUCN)
24	Pongrul	Sunda Pangolin (*Manis javanica*)	N-t (IUCN)
25	Phe Touch	Oriental Smal-clawed Otter (*Aonyx cinerea*)	NT (IUCN)
26	Phe Khlurn Lolorng	Smooth Otter (*Lutrogale perspicillata*)	II (CITES)
27	Kamping Dong	Owston's Civet (*Hemigalus owstoni*)	VU (IUCN)
28	Kamprok Slapphnom	Particoloured Flying Squirrel (*Hylopetes alboniger*)	EN (IUCN)
29	Kamprok Thom	Black Giant Squirrel (*Ratufa bicolor*)	II (CITES)
30	Chhmarbar Kantuy Krahom	Giant Flying Squirrel (*Petaurista petaurista*)	
31	Chhmarbar Kantuy Khmao	Indian Giant FlyingSquirrel (*Petaurista philippensis*)	
32	Ronhy Praphes	Slow Loris (*Nycticebus cqucang*)	DD (IUCN)
33	Sva Trosh	Pig-tailed Macaque (*Macaca nemestrina*)	VU (IUCN)
34	Sva Kdam	Long-tailed Macaque (*Macaca fascicularis*)	N-t (IUCN)
35	Chker Prey	Dhole (*Cuon alpinus*)	VU (IUCN)
36	Phsort Tonle	Irrawaddy Dolphin (*Orcaella drevirostris*)	DD (IUCN)
37	Prama	East-Asian Porcupine (*Hystrix brachyura*)	VU (IUCN)
38	Chruk Prey	Wildpig (*Sus scrofa*)	
39	Chlush	Red Muntjac (*Muntiacus muntjak*)	
40	Chker Chochork	Asiatic Jackal (*Canis aureus*)	III (CITES)
41	Tonsaykul	Burmese Hare (*Lepus peguensis*)	
42	Sampoch Thom	Large spotted Civet (*Viverra megaspila*)	III (CITES)
43	Sampoch Kra-orb	Common Palm Civet (*Paradoxurus hermaphroditus*)	III (CITES)
44	Skar Thom	Crab-eating Mongoose (*Herpestes urva*)	III (CITES)

Table 5 List of bird species in the northeast and eastern Cambodia

No.	Local names	English and (scientific names)	Status
51	Kreal	Sarus Crane (*Grus antigone*)	
52	Kngor Yeak	Giant Ibis (*Pseudibis gigantea*)	
53	Kngor Khmao	White-shouldered Ibis (*Pseudibis davisoni*)	
54	Tradak Thom	Greater Adjutant (*Leptoptilus dubius*)	
55	Tradak Toch	Lesser Adjutant (*Leptoptilus javanicus*)	
56	Roneal Sar	Milky Stork (*Mycteria cinerea*)	
57	Angkat Khmao	Black-necked Stork (*Ephippiorhynchus asiaticus*)	
58	Karsar	Wolly-necked Stork (*Ciconia episcopus*)	
59	Kngaok Baitong	Green Peafowl (*Pavo muticus*)	VU (IUCN)
60	Tmat Pheh	White-rumped Vulture (*Gyps bengalensis*)	
61	Tmat Tnaot	Long-billed Vutlture (*Gyps indicus*)	
62	Tmat Phleung	Red-headed Vulture (*Sarcogyps calvus*)	
63	Tea Prey Slapsar	White-winged Duck (*Cairina scutulata*)	
64	Popoul Toek	Masked Finfoot (*Heliopais personata*)	
65	Tradevech Tonle	River Lapwing (*Vanellus duvaucelii*)	
66	Totear	Chinese Francolin (*Francolinus pintadeanus*)	
67	Krourch Troungsar	Japanese Quail (*Coturnix japonica*)	
68	Krourch Troungkhmao	Rain Quail (*Coturnix coromandelica*)	
69	Krourch Troungkheov	Blue-breasted Quail (*Coturnix chinensis*)	
70	Moin Prey	Red Junglefowl (*Gallus gallus*)	
71	Moin Toprak	Silver Pheasant (*Lophura nycthemera*)	
72	Sdech Kolid	Siamese Fireback (*Lophura diardi*)	NT (IUCN)
73	Moin Tobaitong Propheh	Germain's Peacock Pheasant (*Polyplectron germaini*)	VU (IUCN)
74	Praveok	Lesser Whistling-duck (*Dendrocygna javanica*)	
75	Krourch Eurt	Barred Buttonquail (*Turnix suscitator*)	
76	Trases Thom Pousar	White-bellied Woodpecker (*Dryocopus javensis*)	
77	Trases Toch Seleurng	Lesser Yellownape (*Picus chlorolophus*)	
78	Trases Thom Seleurng	Greater Yellownape (*Picus flavinucha*)	
79	Trases Damrey	Great-Slaty Woodpecker (*Mulleripicus pulverulentus*)	
80	Keng Kang Toch	Oriental Pied Hornbill (*Anthracoceros albirostris*)	II (CITES)
81	Keng Kang Thom	Great Hornbill (*Buceros biconis*)	NT (IUCN)
82	Poveang	Wreathed Hornbill (*Aceros undulatus*)	II (CITES)
83	Barko	Common Hoopoe (*Upupa epops*)	
84	Teav Keov	Indian Roller (*Coracias benhalensis*)	
85	Chachat Krem	Commom Kingfisher (*Alcedo atthis*)	
86	Kevkork	Stork-billed Kingfisher (*Halcyon capensis*)	
87	Chachat Sarkhmao	Pied Kingfisher (*Ceryle rudis*)	
88	Tradev Toch	Green Bee-eater (*Merops orientalis*)	
89	Tavao	Asian Koel (*Eudynamys scolopacea*)	
90	Tokakor	Green-billed Malkoha (*Phaenicophaeus tristis*)	
91	L'ort Thom	Greater Coucal (*Centropus sinensis*)	
92	L'ort Sbov	Lesser Coucal (*Centropus bengalensis*)	
93	Seksoam	Alexandrine Parakeet (*Psittacula eupatria*)	II (CITES)
94	Sek Art	Blossom headed Parakeet (*Psittacula roseata*)	II (CITES)
95	Klaeng Slak	Barn Owl (*Tyto alba*)	II (CITES)
96	Popleakchang	Large-tailed Nightjar (*Caprimulgus macrurus*)	

No.	Local names	English and (scientific names)	Status
97	Popleaktoch	Indian Nightjar (*Caprimulgus asiaticus*)	
98	Lolorkbay	Spotted Dove (*Streptopelia chinensis*)	
99	Popul Kbalprapheh	Pink-necked Green Pigeon (*Treron vernans*)	
100	Moin Toek	White-breasted Waterhen (*Amaurornis phoenicurus*)	
101	Khlom	Watercock (*Gallicrex cinerea*)	
102	Torm	Purple Swamphen (*Porphyrio porphyrio*)	
103	Prahit Khmao	Bronze-winged Jacana (*Metopidius indicus*)	
104	Trodevech Toul	Red-wattled Lapwing (*Vanellus indicus*)	
105	Ro-art Khmum	Oriental Honey-buzzard (*Pernis ptilorhyncus*)	II (CITES)
106	Steang Lolork	Black-shouldered Kite (*Elanus caeruleus*)	II (CITES)
107	Kleang Chableurng Kramao	Brahminy Kite (*Haliastur indus*)	
108	Orkbal Prapheh	Grey-headed Fish Eagle (*Ichthyophaga ichthyaetus*)	NT (IUCN)
109	Orktoch	Lesser Fish Eagle (*Ichthyophaga humilis*)	NT (IUCN)
110	Tmat Khmao	Cinereous Vulture (*Aegypius monachus*)	NT (IUCN)
111	Ork Pushprey	Crested Serpent Eagle (*Spilornis cheela*)	II (CITES)
112	Ro-art Tonsay	Eastern Marsh Harrier (*Circus spilonotus*)	II (CITES)
113	Steang Slapchek	Shikra (*Accipiter badius*)	II (CITES)
114	Steang Tochslapsrouch	Collared Falconet (*Microhierax caerulescens*)	II (CITES)
115	Smohn	Darter (*Anhinga melanogaster*)	NT (IUCN)
116	Khaek Toektoch	Little Cormorant (*Phalacrocorax niger*)	
117	Kokroung Toch	Little Egret (*Egretta garzetta*)	
118	Krasar Prapheh	Grey Heron (*Ardea cinerea*)	
119	Krasar Thnung	Purple Heron (*Ardea purpurea*)	
120	Kokroung Thom	Great Egret (*Casmerodius albus*)	III (CITES)
121	Kokroung	Intermediate Egret (*Mesophoyx intermedia*)	III (CITES)
122	Korko	Cattle Egret (*Bubulcus ibis*)	III (CITES)
123	Korkbal Thnaotchas	Chinese Pond Heron (*Ardeola bacchus*)	
124	Krasar Svay	Little Heron (*Butorides striatus*)	
125	Khvek	Black-crowned Night Heron (*Nycticorax nycticorax*)	
126	Kork Matestom	Cinnamon Bittern (*Ixobrychus cinnamomeus*)	
127	Chorng Chortkhev	Red-billed Blue Magpie (*Urocissa erythrorhyncha*)	
128	Trameak Khlar	Racket-tailed Treepie (*Crypsirina temia*)	
129	Khaek	Large-billed Crow (*Corvus macrorhynchos*)	
130	Chek Tum	Black-naped Oriole (*Oriolus chinensis*)	
131	Chek Tumkbal Khmao	Black-hooded Oriole (*Oriolus xanthornus*)	
132	Kanhcheaksla	White-browed Fantail (*Rhipidura aureola*)	
133	Kanhcheaksla Khmao	Pied Fantail (*Rhipidura javanica*)	
134	Antep Prapheh	Ashy Drongo (*Dicrurus leucophaeus*)	
135	Antep Khaek	Crow-billed Drongo (*Dicrurus annectans*)	
136	Kantrop Kantrai	Greater Racket-tailed Drogon (*Dicrurus paradiseus*)	
137	Popech Bontulkbalkhmao	Black-naped Monarch (*Hypothymis azurea*)	
138	Lvear Chek	Oriental Magpie Robin (*Copsychus saularis*)	
139	Lvear Chekprey	White-rumped Shama (*Copsychus malabaricus*)	
140	Kanhchreach Smasar	White-shouldered Starling (*Sturnus sinensis*)	
141	Kraling Kralorng	Black-collared Starling (*Sturnus nigricollis*)	
142	Sarekakeov Kor	Common Myna (*Acridotheres tristis*)	

No.	Local names	English and (scientific names)	Status
143	Sarekakeov Krabei	White-vented Myna (*Acridotheres grandis*)	
144	Sarekakeov Vorng	Hill Myna (*Gracula religiosa*)	
145	Tracheakam	Barn Swallow (*Hirundo rustica*)	
146	Popech Kbalkhmao	Black-headed Bulbul (*Pycnonotus atriceps*)	
147	Popech Kampoykhmao	Black-crested Bulbul (*Pycnonotus melanicterus*)	
148	Popech Chong Khorngsar	Sooty-headed Bulbul (*Pycnonotus aurigaster*)	
149	Popech Mouthleurng	Stripe-throated Bulbul (*Pycnonotus finlaysoni*)	
150	Chab Krorch	Yellow-vented Bulbul (*Pycnonotus goiavier*)	
151	Popech Khmao	Black Bulbul (*Hypsipetes leucocephalus*)	
152	Chab Dangkovsar	Plain Prinia (*Prinia inornata*)	
153	Chab Dangkovthom	Brown Prinia (*Prinia polychroa*)	
154	Chab Kanlorng Phneksar	Oriental White-eye (*Zosterops palpebrosus*)	
155	Chab Donta Chortkhmao-sar	Black-browed Reed Warbler (*Acrocephalus bistrigiceps*)	
156	Chab Donta	Oriental Reed Warbler (*Acrocephalus orientalis*)	
157	Chab Kandoeng Srok	Common Tailorbird (*Orthotomus sutorius*)	
158	Chab Kandoeng Pery	Dark-necked Tailorbird (*Orthotomus atrogularis*)	
159	Krouch En	Indochinese Bushlark (*Mirafra marionae*)	
160	Chab Kanlorng	Olive-backed Sunbird (*Nectarinia jugularis*)	
161	Chab Phtes	Eurasian Tree Sparrow (*Passer montanus*)	
162	Chab Srok	Plain-backed Sparrow (*Passer flaveolus*)	
163	Khtutdei Prey	Forest Wagtail (*Dendronanthus indicus*)	
164	Khtutdei Sar	White Wagtail (*Motacilla alba*)	
165	Khtutdei Leurng	Yellow Wagtail (*Motacilla flava*)	
166	Khtutdei Propheh	Grey Wagtail (*Motacilla cinerea*)	
167	Krouch Encheurngveng	Richard's Pipit (*Anthus richardi*)	
168	Krouch Ensre	Paddyfield Pipit (*Anthus rufulus*)	
169	Krouch Enchnort Khmao	Olive-backed Pipit (*Anthus hodgsoni*)	
170	Krouch Enkhnorng Chnort	Red-throated Pipit (*Anthus cervinus*)	
171	Chab Changkrorng	Scaly-breasted Munia (*Lonchura punctulata*)	

Table 6 List of reptile species in the northeast and eastern Cambodia

No.	Local names	English and (scientific names)	Status
1	Krapeu Phnom	Siamese Crocodile (*Crocodylus siamensis*)	CR (IUCN)
2	Anderk Kbalthom	Big-headed Turtle (*Platysternon megacephalum*)	EN (IUCN)
3	Anderk Bedmuk	Indochinese Box Turtle (*Cuora galbinifrons*)	CR (IUCN)
4	Anderk Prich	Elongated Tortoise (*Indotestudo elongata*)	EN (IUCN)
5	Anderk Bedmuk Snorkhmao	Asian Box Turtle (*Cuora amboinensis*)	VU (IUCN)
6	Anderk Sakal	Malayan Snail-eating Turtle (*Malayemys subtrijuga*)	VU (IUCN)
7	Anderk Kha-ek	Black Marsh Turtle (*Siebenrockiella crassicollis*)	VU (IUCN)
8	Anderk Krabei	Yellow-headed Temple Turtle (*Hieremys annandalii*)	EN (IUCN)
9	Kanteay Asy	Asian Softshell Turtle (*Amyda cartilaginea*)	VU (IUCN)
10	Kanteay Kbalchep	Asian Giant Softshell Turtle (*Pelochelys cantorii*)	EN (IUCN)
11	Push Thlantoch	Burmese Python (*Python molurus bivittatus*)	N-t (IUCN)
12	An Sorng	Water Monitor (*Varanus salvator*)	II (CITES)
13	Tra Kort	Bengal Monitor (*Varanus bengalensis*)	I (CITES)
14	Push Thlanthom	Reticulated Python (*Python reticulatus*)	II (CITES)
15	Pushprey Kandor	Common Rat Snake (*Ptyas mucosus*)	II (CITES)

No.	Local names	English and (scientific names)	Status
16	Push Vekroneam	King Cobra (*Ophiophagus hannah*)	II (CITES)
17	Push Vekrabei	Monocled Cobra (*Naja kaouthia*)	II (CITES)
18	Push Vekdombok	Indochinese Spitting Cobra (*Naja siamensis*)	II (CITES)
19	Push KrayVeng	Banded Krait (*Bungarus fasciatus*)	
20	Push Kray Khlei	Malayan Krait (*Bungarus candidus*)	
21	Push Prey	Indochinese Ratsnake (*Pytas korros*)	
22	Pushprey Kantuykrahom	Red-tailed Green Ratsnake (Gonyosoma oxycephalum)	
23	Push Chan Lmorm	Bocourt's Water Snake (*Enhydris bocourti*)	
24	Push Kachan	Tay Ninh Water Snake (*Enhydris innominata*)	
25	Push Krayrussey	Bamboo Pit-viper (*Trimeresurus stejnegeri*)	
26	Push Khseko	Striped Keelback (*Amphiesma stolata*)	
27	Push Chheur	Tentacled Snake (*Erpeton tentaculatum*)	
28	PoPleakbal-Orch	Barron's Kukri Snake (*Oligodon barroni*)	
29	Popleak Prapheh	Banded Kukri Snake (*Oligodon fasciolatus*)	
30	Popleakhmao	Cambodian Kukri Snake (*Oligodon mouhoti*)	
31	Popleak Prey	Inornate Kukri Snake (*Oligodon inomatus*)	
32	Push Angkachmeas	Striped Kukri Snake (*Oligodon taeniatus*)	
33	Push Toker	Common Wolf Snake (*Lycodon capucinus*)	
34	Push Khseko Leurng Baitong	Golden Tree Snake (*Chrysopelea ornata*)	
35	Push Khseko Kbalchnortsar	Mountain Bronzeback (*Dendrelaphis subocularis*)	
36	Push Hanukman Baitong	Green Cat Snake (*Boiga cyanea*)	
37	Push Slabkankeb	Chequered Keelback (*Xenochrophis piscator*)	
38	Pushtrei Srakathom	Dog-faced Water Snake (*Cerberus rynchops*)	
39	Toker	Tockay (*Gekko gecko*)	
40	Bongkuy Prey	Scale-bellied Tree lizard (*Acanthosaura lepidogaster*)	
41	Bongkuy Pokmeat	Moustached Lizard (*Calotes mystaceus*)	
42	Kantrorng	Water Dragon (*Physignathus cocincinenus*)	
43	Thlen Kantuyveng	Long-tailed Sun Skink (*Mabuya longicaudata*)	
44	Thlen Kantuykrahom	Common Butterfly Lizard (*Leiolepis belliana*)	

Table 7 Plant species in the deciduous dipterocarp forest

No.	Local names	Scientific name	Life-form	Status
1	Russey Prich	*Arundinaria falcate* Nees.	Bamboo	
2	Russey Thom	*Bambusa sp.*	Bamboo	
3	Cha Huoy	*Zingiber sp.*	Herb	
4	Phrang	*Cycas siamensis*	Herb	
5	Ang Krong	*Ziziphus cambodiana* Pierre.	Shrun	
6	Bay Kdang	*Ixora sp.*	Shrub	
7	Ampok		Small tree	
8	Kandaol	*Careya sphaerica* Roxb.	Small tree	
9	Krong	*Aporusa sp.*	Small tree	
10	Lveak	*Strychnos sp.*	Small tree	
11	Beng	*Afzelia cochinchinensis*	Tree	
12	Cha		Tree	
13	Chambak	*Irvingia oliveri* Pierre	Tree	

No.	Local names	Scientific name	Life-form	Status
14	Chhlik	*Terminalia alata* Hyn.Roth	Tree	
15	Khlong	*Dipterocarpus tuberculatus* Roxb.	Tree	
16	Khsev	*Terminalia pierrei* Gagnep.	Tree	
17	Lngieng	*Cratoxylum prunifolium* Dyer.	Tree	
18	Neang Nuon	*Dalbergia bariensis* Pierre	Tree	
19	Pon	*Spondias sp.*	Tree	
20	Pong Ro	*Schleicheria trijuga*	Tree	
21	Popel	*Hopea recopei*	Tree	
22	Pramdom Leung	*Terminalia mucronata* Craib.	Tree	
23	Pring	*Eugenia sp.*	Tree	
24	Roka	*Bombax ceila* L.	Tree	
25	Rang Anlok	*Barringtonia longipes* Gangep.	Tree	
26	Rang Phnom	*Shorea siamensis* Miq.	Tree	
27	Slaeng	*Strychnos nux-vomica* L.	Tree	
28	Sokram	*xylia xylocarpa* Taub.	Tree	
29	Sralao	*Lagerstroemia sp.*	Tree	
30	Sramor	*Terminalia chebula* Retz.	Tree	
31	Svay Prey	*mangifera aff. duperreanna* Pierre.	Tree	
32	Tbaeng	*Dipterocarpus obtusifolius*	Tree	
33	Thlork	*Parinari annamensis* Hance.	Tree	
34	Thnung	*Pterocarpus pedatus* Pierre.	Tree	
35	Slaeng Poir	*Bauhinia sp.*	Vine	
36	Kuy	*Willoughbeia cochinchinensis* Pierre.	Liana	
37	Kreurl	*Melanorrhea laccifera*	shrub	
38	Tro Yeoung	*Diospyros helferi*	Tree	
39	Korki Daek	*Hopea helfera*	Tree	
40	Korki Msao	*Hopea odorata*	Tree	
41	Phchek	*SHorea obtusa*	Tree	
42	Trach	*Dipterocarpus intricatus*	Tree	
43	Kantout Prey	*Phyllanthus emblica*	Shrub	
44	Cheurng Kor	*Tetracera scadens*	Tree	
45	Chher Sraeng	*Cananga latifolia*	Tree	