Tumring REDD+ Project

A Rapid Field Survey of Mammals in Tumring REDD+ Site

Submitted to: REDD+ Project Unit

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Executive Summary

The Tumring REDD+ Project (TRP) is a multi-partner initiative designed to promote climate change mitigation and adaptation, restore biodiversity and create alternative livelihoods under the United Nation scheme of Reducing Emissions from Deforestation and forest Degradation (REDD+). The 67,791 ha TRP lies on the southwestern edge of the recently declared Prey Long Wildlife Sanctuary in central Cambodia. The site is crucially important to Prey Lang Wildlife Sanctuary because it consists of dense forests, semi-dense, and dry forests. According to the previous studies, there are Pileated Gibbon, Pangolin, Gaur, Sambar, and Sun Bear, etc.

In response to the threats to the TRP, the FA of the MAFF, in consultation with the Korean government, decided to try to protect the southwestern edge of the Prey Long landscape. The protection of the TRP will be achieved by both increasing the level of protection of the Project Area, but by also providing project activities to the communities that are designed to mitigate these drivers of deforestation. One project activity is the employment of additional rangers and community member force. The current community member force suffers from inadequate equipment and training. Two very important project activities are assisting local communities with promoting effective land use planning and granting secure land tenure.

The general objective of the survey is to identify key endangered large and small mammal species and provide strategic immediately and regularly monitoring recommendations for the species conservation and development for sustainable uses. The specific objectives of the survey are:

- Identification of key (large and small) mammal species occurred in the survey sites;
- Propose key species for regular monitoring and approaches of monitoring.

There are 64 species of large and small mammals found presented in the study areas. Eight (08) species of them are Endangered (EN), 12 Vulnerable (VU), 35 local concern (LC), 1 Data deficient (DD), 1 Critical Endangered (CR), 3 Near Threatened (NT), and 4 other are non-classified or not evaluated.. They are needed immediate protection from responsible agencies before they are too late to preserve. The supports from the REDD+ project have been dragging the situation before it already gotten worst; the survey team very much acknowledges for that. However, habitat loss and heavy hunting pressures on the surveyed species are utmost concerns for species protection and their future survivals.

Recommendations

The survey team found the following recommendations are utmost importance:

1. **Priority protection efforts** should be started from the highest abundance of wildlife such as in the Water Cycle Research site, and followed by the less priority sites as discussed on the point 3.4 of the report.
2. **Contractual Works with local stakeholders**: Local FA should work with agricultural land owners and Pagodas to monitor key wildlife species. Contracts should be developed to be signed between local FA office and responsible land owners and nearby Pagodas as detailed on the Discussion section above.
3. **The first ever protection measure is to protect habitats of the species** of the large and small mammals from further forest encroachment in all the surveyed CF sites. The protection activity is to closely work with CF Committees of the REDD+ areas through often involvement on training, patrolling, and awareness-raising on species conservation. The awareness-raising could be done by poster and signboards. Local pagodas should be the best means of awareness-raising as well, while monks cite on Buddhism.
4. **All species of large and small mammals classified as Rare Occur to the survey sites**, e.g.

Pileated Gibbon (*Hylobates piletus*), should be the key species to be strictly protected because they are on the brink of extinction. Hunting for commercial purposes is heavier pressure than that for local-village consumption. Therefore, strengthening on cracking down illegal trade in wildlife should be immediately implemented.

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Abbreviation and Acronyms

CF	Community Forestry
CT	Camera Trap
DWB	Department of Wildlife and Biodiversity
FA	Forestry Administration
GHG	Green House Gas
MAFF	Ministry of Agriculture, Forestry and Fisheries
NGO	Non-governmental organization
REDD+	Reduced Emission from Deforestation and forest Degradation
TRP	Tumring REDD+ Project

I. Background and Objectives

The Tumring piloting REDD+ project area is located mostly in Sandan and Santuk districts, Kampong Thom province. The project has been implemented by the Forestry Administration (FA), Ministry of Agriculture, Forestry and Fisheries (MAFF). The Tumring REDD+ Project (TRP) is a multi-partner initiative designed to promote climate change mitigation and adaptation, restore biodiversity and create alternative livelihoods under the United Nation scheme of Reducing Emissions from Deforestation and forest Degradation (REDD+). The 67,791 ha TRP lies on the southwestern edge of the recently declared Prey Long Wildlife Sanctuary in central Cambodia. The Prey Long Wildlife Sanctuary contains the largest remaining area of lowland evergreen forest in Cambodia and forms part of the Indo-Burma Hotspot, one of the world 34 biodiversity hotspots. The site is crucially important to Prey Lang Wildlife Sanctuary because it consists of dense forests, semi-dense, and dry forests. According to the previous studies, there are Pileated Gibbon, Pangolin, Gaur, Sambar, and Sun Bear, etc.

In response to the threats to the TRP, the FA of the MAFF, in consultation with the Korean government, decided to try to protect the southwestern edge of the Prey Long landscape. The protection of the TRP will be achieved by both increasing the level of protection of the Project Area, but by also providing project activities to the communities that are designed to mitigate these drivers of deforestation. One project activity is the employment of additional rangers and community member force. The current ranger/community member force suffers from inadequate equipment and training. The Project will provide invaluable support to this program. Two very important project activities are assisting local communities with promoting effective land use planning and granting secure land tenure. Additional, project activities will promote new income generating activities and improved agricultural methods. These will help create greater financial security in the communities, and therefore less need to perform unsustainable resource extraction from the Project Area. Project start date: 01 January 2015 for Green House Gas (GHG) accounting period: 01 January 2015 – 31 December 2045 and Project lifetime: 01 January 2015 – 31 December 2045. The survey was based on the Terms of Reference (ToR) as shown in the Annex 1.

Objectives

The general objective of the survey is to identify key endangered large and small mammal species and provide strategic immediately and regularly monitoring recommendations for the species conservation and development for sustainable uses. The specific objectives of the survey are:

- Identification of key (large and small) mammal species occurred in the survey sites;
- Propose key species for regular monitoring and approaches of monitoring.

II. Methodology

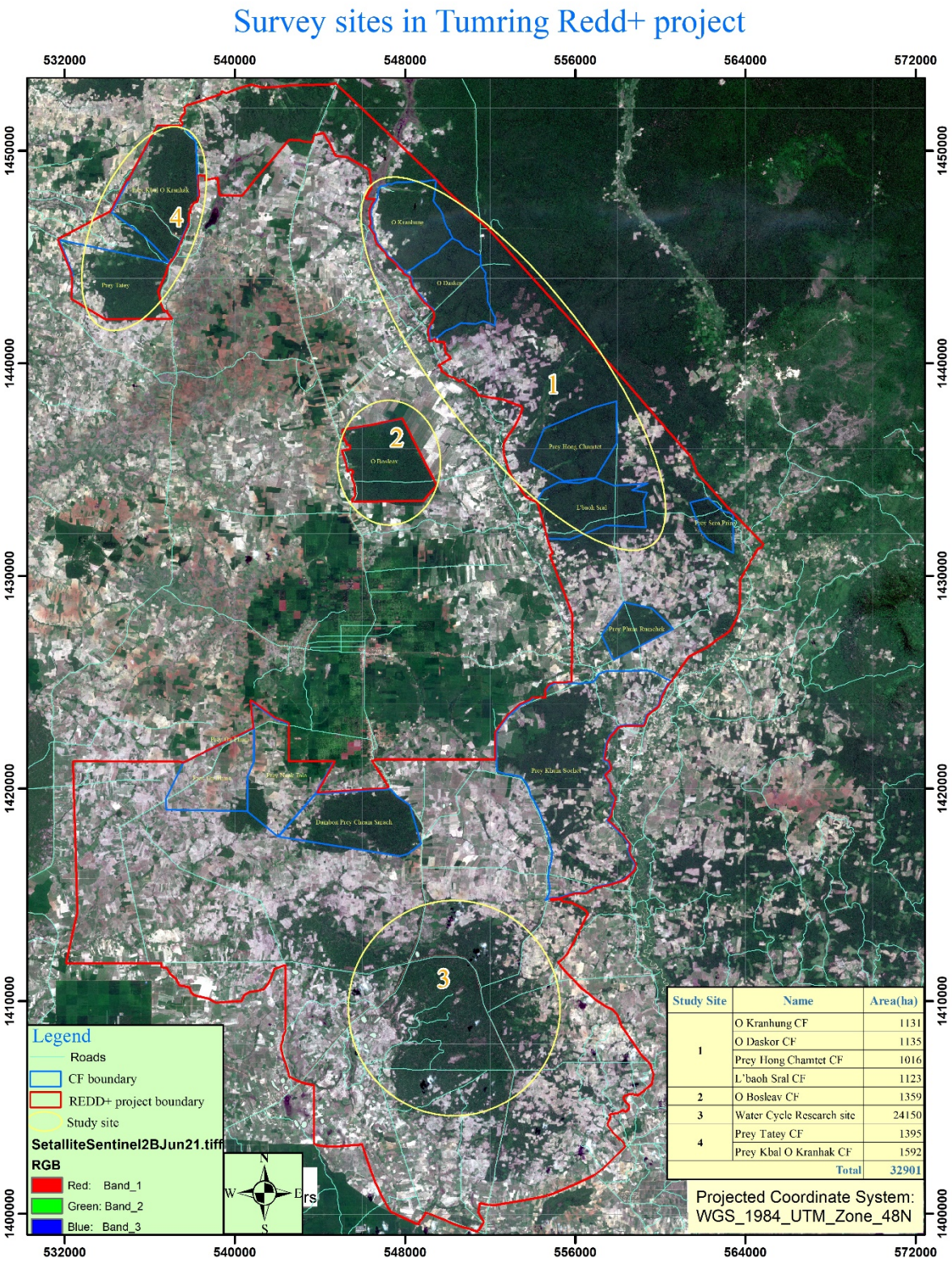
The surveys conducted by expert staff of Department of Wildlife and Biodiversity (DWB), Forestry Administration (FA). There were three teams of the expert staff for the surveys: camera trap, foot-survey, and Mist net and trapping experts. The camera trap team was focusing on large mammal species occurred in the survey sites. The foot-survey was focusing on signs and nocturnal mammal species. The foot-survey team, also, carried out interviewing activities with key informants, group discussions, and interviewees. The Mist net and trapping expert team was focusing on identification of small mammal species like bat, mongoose, civet, and mouse species of the forests if they are trapped.

2.1 Sites Selection

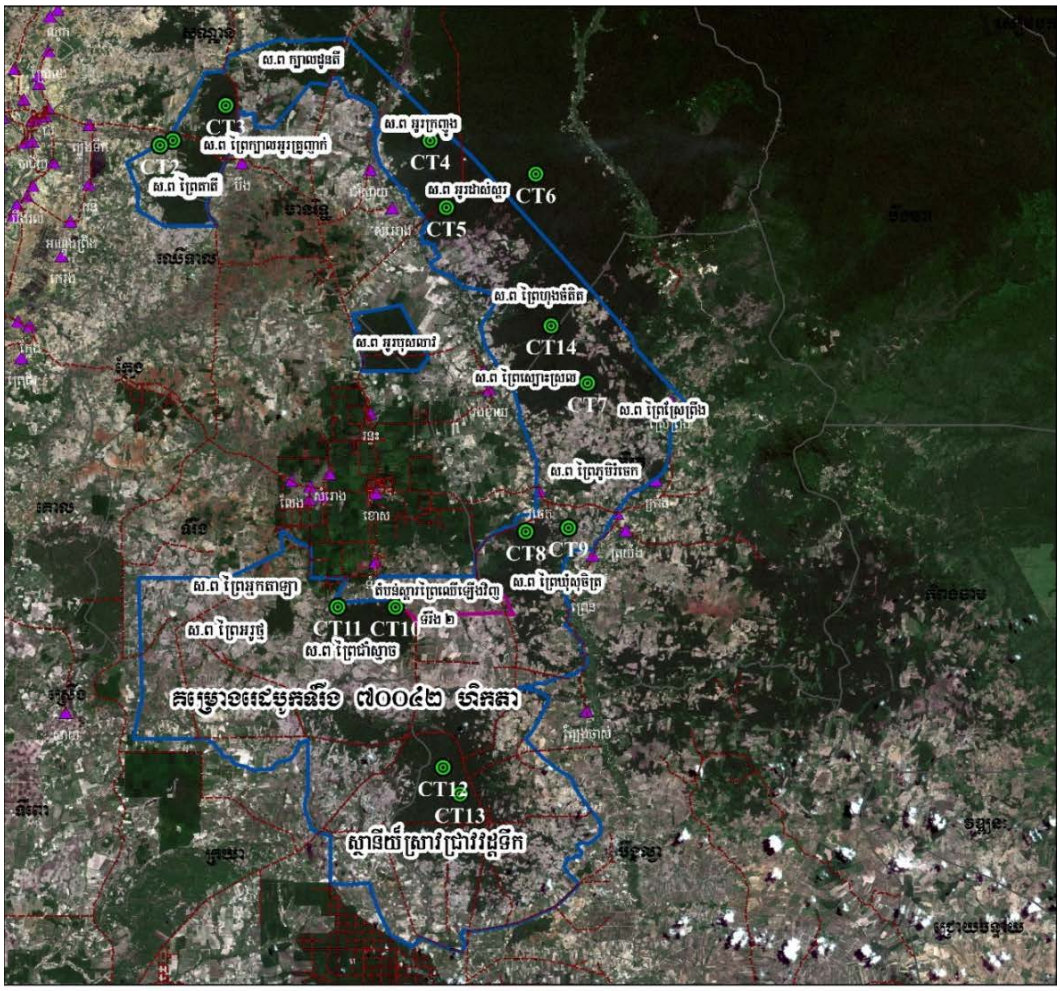
The survey sites were indicated by the REDD+ project unit prior to the actual ground survey activities, which consists of four (04) core-sites (in yellow color circles). There are fourteen (14) Community Forestry (CF) sites in the indicative survey areas: zone 1, zone 2, zone 3 (Water Cycle Research site), and zone 4 (Map 1). The Tumring REDD+ project area is one of the biggest areas located overlapping on the government Biodiversity Conservation Corridor Project. The forests of the site, which comprise of dense and semi-dense forests suitable for different wildlife habitats, are in better conditions compared to other CF sites of the country. After all technical consultations with relevant stakeholders such as the REDD+ project unit, local FA, and CF Members, the camera trap team decided to set camera traps in 9 locations of the CF sites and Water Cycle Research site (Table 1). The locations of the camera traps are expected to shoot photos of Gaur, Bear, and Sambar. It is worth noticed that there are 14 camera traps set in the 9 locations (Map 2).

Table 1: Locations of the 14 set camera traps

No.	Name of CF site	Area, ha
1	Prey Tatey	1395.44
2	Prey Kbal O Kranhak	1592.71
3	O KraNhuong	1131
4	O Das Skor	1135
5	Prey Hong Chamtet	1016
6	Prey Lboah Sral	1123
7	Prey Khum Sochetr	4571.72
8	Prey Choam Smach	1445.65
9	Water Cycle Research Site	-



Map 1: Survey sites for small and large mammal species



Area	ID	X	Y	Date
C.F Kbal Oukrornhak	CT1	534408	1447128	12/05/2021
C.F Preytatey	CT2	533656	1446844	12/05/2021
C.F Kbal Oukrornhak	CT3	537547	1449195	12/05/2021
C.F Oukranhuong	CT4	549599	1447107	12/05/2021
C.F Oudasko	CT5	550561	1443163	12/06/2021
C.F Oudasko (PreyLand)	CT6	555831	1445140	12/06/2021
C.F PreyLbossral	CT7	558890	1432793	12/06/2021
C.F Khumsochet	CT8	555238	1424017	12/07/2021
C.F Khumsochet	CT9	557760	1424246	12/07/2021
C.F Choasmach	CT10	547549	1419563	12/07/2021
C.F Choasmach	CT11	544151	1419578	12/07/2021
PreyAngten	CT12	550363	1410092	12/08/2021
PreyAngten	CT13	551366	1408528	12/08/2021
C.F PreyHongChamtet	CT14	556734	1436183	12/08/2021

Map 2: Locations of camera traps: CT1, CT2,…, and CT14

2.2 Survey Methods

The surveys were held with four means of data collection: Semi-structure Questionnaires, camera trap, foot-survey, and Mist net and live-trapping.

The semi-structure questionnaires were prepared and rehearsal with the team members prior to the

actual surveys. The semi-questionnaires (Annex 2) were developed to cover key interview informants, Group Discussion, and general interviewees. The KII were focusing on officials and members of the Community Forestry sites within the REDD+ project areas while Group Discussions were orientated for villagers.

The camera trap team was focusing on large mammal species occurred in the survey sites (Annex 3). There were 7 days, during 3 – 9 December 2021, of setting the camera traps into the agreed locations. The retrieve of the camera traps was during 12 – 16 January 2022, in order for camera traps to take photos for about 38 days. It is worth noticed that the locations of each camera trap is important. The camera traps, therefore, were set in the most predictable sites of getting photos of animals like animal trails, saltlick areas, water bodies (swamp, ponds, and stream beds), grasslands, and animal escaping sites.

The foot-survey was focusing on signs and nocturnal mammal species. In addition to interviews and technical expertise on camera traps and Mist net and live-trapping, all teams of large and small mammal surveys conducted the foot-surveys. The foot-surveys were conducted as transect wildlife surveys within the target sites.

Using the Mist net and live-trapping (Annex 4), the expert team was focusing on identification of small mammal species like bat, mongoose, civet, and mouse species of the forests. While the Mist net and trapping was for catching small mammal species in overnight period of time. With baits used, the nets and traps (by Mist net and live-trapping teams) were laid out from around 21:00 of the night and collected back at about 8:00 in the morning of the next day. Trapped animals were identified by taking measures of key characteristics such as length of arms and body, sex, and taking photos. The animals, then, were immediately released into their original habitats after identification completed.

2.3 Survey Schedules

Schedule of Camera trap setting and retrieve: There were 7 days, during 3 – 9 December 2021, of setting the camera traps into the agreed locations. The retrieve of the camera traps was during 12 – 16 January 2022. It is worth noticed that the locations of each camera trap is important. The camera traps, therefore, were set in the most predictable sites of getting photos of animals like animal trails, saltlick areas, water bodies (swamp, ponds, and stream beds), grasslands, and animal escaping sites.

Schedule of Mist net and live-trapping: The surveys were carried out during 10 days (20 - 29) in December 2021 and another planned 10 days in June 2022. The two times set for the surveys are intentionally time allocation for finding of the mammal species in different seasons.

III. Results and Discussion

Wildlife of the REDD+ areas concluded that there were 91 species (Wildlife Works Carbon, 2020). They are 64 bird species, 25 mammal species, one species of reptile, and one species of fish. The paper further identifies that 11 species of them were under IUCN Red List such as Great-Hornbill, Pileated Gibbon, and Pangolin.

The results of the surveys are divided as results of interviews, net-and trapping, foot survey, and camera trap detailing below. The surveys, also, found threats to the species of the areas as discussed below.

3.1 Interviews

In general, the populations of the all large and small mammal species of the surveyed sites have been decreased since the last ten years due to destruction of habitats and illegal hunting. For the current time of the survey periods, local consumption of the wild meat had been increased due to weak law enforcement and increase of local people due to new born and in-migrants through marriages.

Members of CF Committees had, also, been reluctant because of lacks of financial supports, e.g. NGO supports, internal trust and breakaway of CF members. Mlup Baitong (one of the local NGOs) used to support for establishment and development of the CF sites within the REDD+ areas like Prey Hong Chamtet and L'baoh Sral, but the support was ended sometime in 2017. A former CF member mentioned that she and her family pulled out their support because that the CF Committee did not properly implement rules of by-law of the CF.

Specific to the survey areas, the key critical endangered species of large and small mammals suggested to take immediate protection are: East Asian Porcupine (*Hystrix brachyura*), Sambar (*Cervus unicolor*), Red Muntjac (*Muntiacus muntjak*), Lesser Oriental Chevrotain (*Tragulus javanicus*), Pileated Gibbon (*Hylobates piletus*), Northern Slow Loris (*Nycticebus bengalensis*), Pygmy Loris (*Nycticebus pugmaeus*).

Figure 1: Interview activity with Head of Chorm Smach CF (left) and Interview activity with Head of O Boss Leav CF (right)

3.2 Mist net and Live-Trapping

Mist net and live-traps were used to catch small mammals. The Mist nets are intentionally for those flying small mammals, e.g. bat spp., while the traps were used for small-ground mammals like forest rat spp. The Mist nets and live-traps were laid out at around 19:00 and retrieved at around 21:00 during which checks were carried out at 30 minutes intervals. Roasted cassava, banana, peanut, and bone-waste from local people kitchen were used as baits for the traps. As the results, two species of small mammals caught on the Mist net and traps: bat spp., and forest rats (Table 5).

Figure 2: Berdmore's squirrel (*Menetes berdmorei*) (Left) Horse shoe bat (*Rhinolophus acuminatus*)

3.3 Foot-surveys

Transect walks were the main mean of Foot-surveys. As shown in the Table 2, transects were laid out in each site of the zones 1, 2, and 4 (Map 3). Because of the very thick forests, old paths or log skidding roads were used as transect walks for foot-surveys. Walking through the undisturbed forests was made after hearing vocalization of loud call of mammals like gibbons and Variable Squirrel (*Callosciurus finlaysonii*). Table 2 indicates numbers of transects used for wildlife surves.

Table 2: Numbers of transects during Foot-surveys

Zone	CF site	Number of Transects
1	Prey Hong Chamtet and L'baoh Sral CF	2 (two transects in each CF site)
2	O Bosleav CF	4
3	Water Cycle Research site	2
4	Prey Kbal O Kranhak and Prey Tatey CF	2 (two transects in each CF site)

Total length of line transects laid out is 50.624 km. These transects are:

For Zone 1:

- 6.866 km was laid out in Hong Chamtet CF: first line is 4.138 km and the second line is 2.728 km;
- 6.680 km was laid out in Lboah Sral CF: first line is 3.519 km and the second line is 3.161 km.

For Zone 2:

- There were 4 transects with 6.248 km was laid out in Bosleav CF.

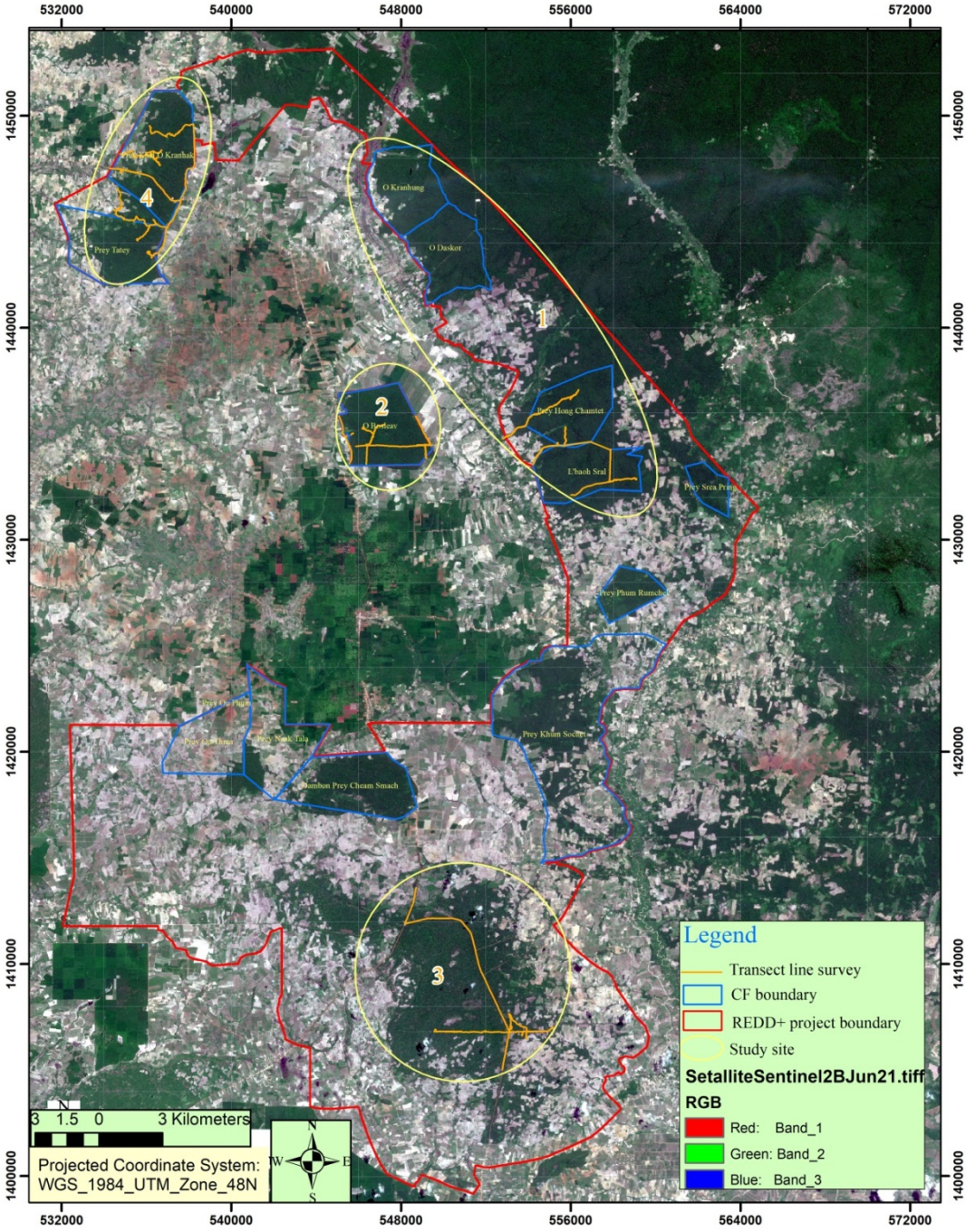
For Zone 3:

- There were 2 transects: the first transect is 6.497 km and the second line transect is 7.150 km were laid out in Water Cycle Research site.

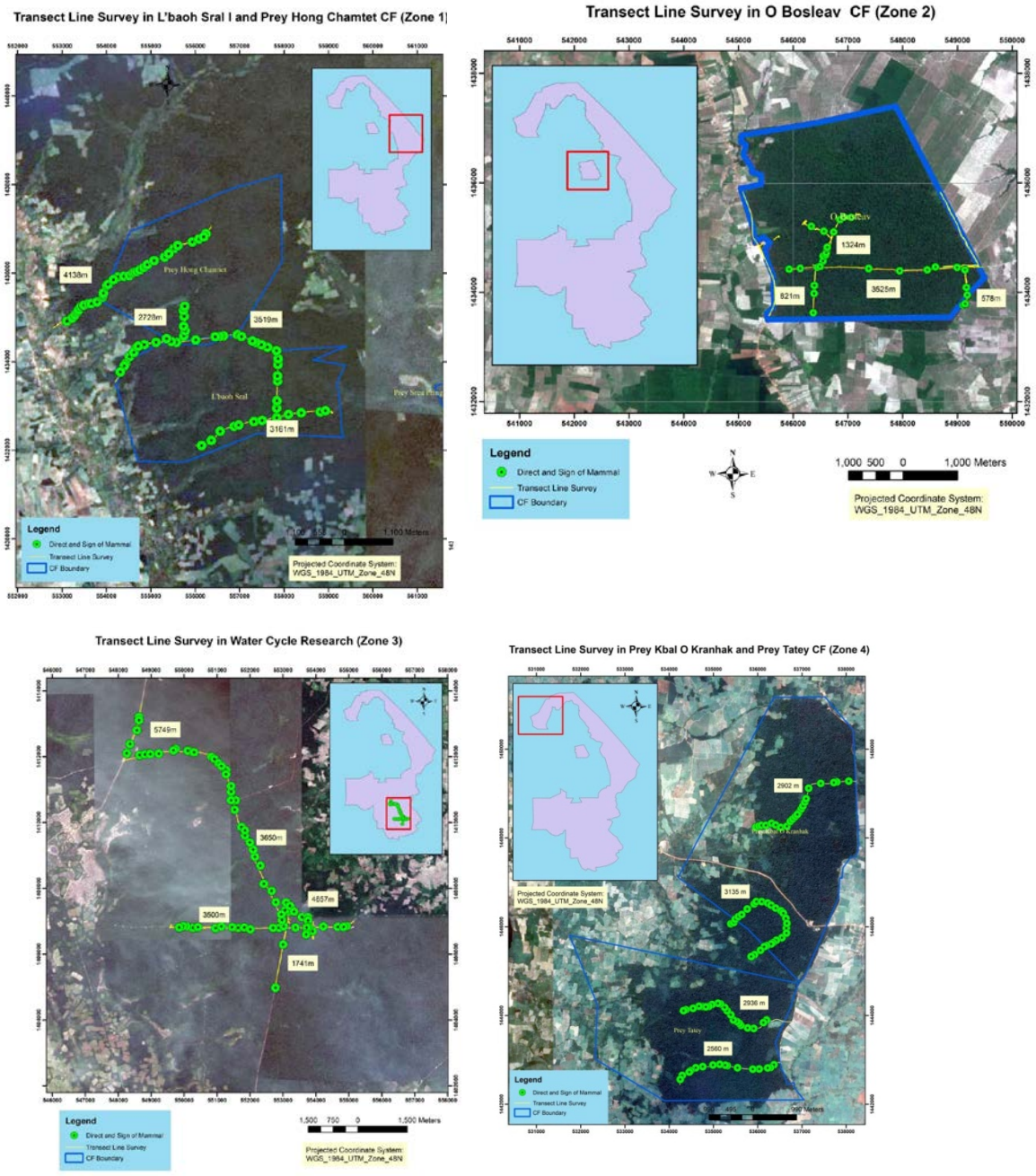
For Zone 4:

- In Prey Kbal O Kranhak CF: two transects with 6.037 km were laid out;
- In Prey Tatey CF: two transects with 5.496 km were laid out.

Transect Line Survey _Large and Small Mammal



Detail transect lines are shown on map below.



Map 3: Numbers of transects laid out during the surveys

Presence of the large and small mammals found, either direct or indirect sighting, are shown in Table 3 and figures 3, 4, and 5 below.

Table 3: Foot-surveys results

No.	Khmer Name	English Name	UTM		Marks
			X	Y	
1	ប្រើស	Sambar	534271	14471198	Foot print
2	ប្រើស	Sambar	533547	1446838	Foot print
3	សំពោធក្រអូប	Common palm civet	533623	1446821	Foot print
4	ពស់ថ្លាន់តូច	Python	533421	1446977	Skin
5	សំពោធក្រអូប	Common palm civet	537546	1449204	Dung
6	ឈ្លូស	Muntjak	550499	1443468	Foot print
7	ប្រើស	Sambar	557829	1424112	Foot print
8	ក្តាន់ព្រ៉ែង	Lesser Oriental Chevrotain	551858	1409474	Death body
9	ជ្រូកព្រៃ	Wild pig	557828	1424231	Foot print
10	ខ្ទីង	Gaur	551393	1408547	Foot print

Figure 3: Sambar footprint in cashew plantation (Left) and Python skin (Right)

Figure 4: Dung of Common Palm Civet (Left) and Wild pig footprint (Right)

Figure 5: Lesser Oriental Chivrotain (Left) and Gaur footprint (Right)

3.4 Camera Traps

Mounting the camera traps: Camera traps are used for taking photos of animals that are shy or difficult to directly be seen by the surveyors even though their footprint, dung, and other scratches on trees. In addition, with determined timeframe and by counting and analyzing the taken photos, the abundance of animal species could be identified. There are two types of the camera traps set: Bushnell (Hybrid), that could run two functions of Video and fixed photo simultaneously, and Bushnell (normal) that could run only one function, either video or fixed photo.

They were set to run for 24 hours per day hung on straight trees at 50 – 73 cm above the local ground level (J. Eymann, J. Degreef, Ch. Häuser, J.C. Monje, Y. Samyn and D. Vanden Spiegel, 2010). They were about 2 – 6 km distance from each other depending on habitat types and animal abundance. The camera traps were set during dry season. The camera traps are set in parallel to north-south direction in order to catch better photos. In front of the camera traps, also, needed to be clear of vegetation for about 8 – 20 m in order to avoid any movement of objects rather than animals. If there are too many movements, the camera trap would spend all its memory (memory card) for useless photos/videos. Table 4 below detailing locations of the camera traps set with UTM.

Table 4: The set camera traps with detail forest types and UTM

Setting Date	Retrieving Date	Camera trap No.	UTM		CF Name	Forest Habitat
			Latitude	Longitude		
05/12/2021	12/01/2022	CT 1	534408	1447128	Prey Kbal O Kranhak	Regrowth forest
05/12/2021	12/01/2022	CT 2	533656	1446844	Prey Tatey	Regrowth forest
05/12/2021	13/01/2022	CT 3	537547	1449195	Prey Kbal O Kranhak	Dense forest
05/12/2021	13/01/2022	CT 4	549599	1447107	O KraNhuong	Dense forest
06/12/2021	13/01/2022	CT 5	550561	1443163	O Das Skor	Dense forest
06/12/2021	13/01/2022	CT 6	552847	1444654	Prey Lang	Dense forest
06/12/2021	13/01/2022	CT 7	558890	1432793	Prey Lboah Sral	Dense forest-stream bank
07/12/2021	13/01/2022	CT 8	557794	1424267	Prey Khum Sochetr	Bamboo forest along stream
07/12/2021	13/01/2022	CT 9	557760	1424246	Prey Khum Sochetr	Bamboo forest along stream
07/12/2021	13/01/2022	CT 10	547549	1419563	Prey Choam Smach	Dense forest-stream bank
07/12/2021	13/01/2022	CT 11	544151	1419578	Prey Choam Smach	Dense forest-Bamboo
08/12/2021	13/01/2022	CT 12	550363	1410092	Water Cycle Research Site	Deciduous forest
08/12/2021	13/01/2022	CT 13	551366	1408528	Water Cycle Research Site	Dense forest
09/12/2021	13/01/2022	CT 14	556734	1436183	Prey Hong Chamtet	Semi Dense forest
Note: CT is referred to Camera Trap with each serial number						

For the total of 38 days, the camera traps were retrieved during 12 – 16 January 2022. The results of the camera traps are shown as following.

Numbers of Species and Animals

There are 10 families and 19 species with 78 animals trapped on the camera shown in the table below.

No.	Khmer Name	English Name	Scientific Name	IUCN	PRAKAS No. 020 (MAFF, 2007)
Family: Cervidae					
1	ប្រើសស្វាយ	Sambar	*Cervus unicolor*	VU	Common
2	ឈ្វស	Red Muntjak	*Muntiacus muntjak*	LC	Common
3	ផ្នងតូច	Lesser Oriental Chevrotain/ Javan Chevrotain	*Tragulus javanicus*	DD	Common
Family: Felidae					
4	ខ្លាត្រី	Fishing Cat	*Prionailurus viverrinus*	VU	Common

5	ឆ្មាដាវ	Leopard Cat	*Prionailurus bengalensis*	LC	Common
Family: Viverridae					
6	សំពោចវល្ល៍	Small indian civet	*Vivericula indica*	LC	Common
7	សំពោចក្រអូប	Common Palm Civet	*Paradoxurus hermaphroditus*	LC	Common
8	ខ្ទឹន	Large Indian Civet	*viverra zibetha*	LC	Common
9	សំពោចពណ៌លាត	Masked Palm Civet	*Paguma larvata*	LC	Common
Family: Mustelidae					
10	សំពោចកលឿង	Yellow-throated Marten	*Martes flavigula*	LC	Common
Family: Herpestidae					
11	ស្កាតូច	Small Asian Mongoose	*Herpestes javanicus*	LC	Common
Family: Suidae					
12	ជ្រូកព្រៃ	Wild Boar	*Sus Scrofa*	LC	Common
Family: Cercopithecidae					
13	ស្វាក្តាម	Long-tailed Macaque	*Macaca fascicularis*	VU	Common
14	ស្វាត្រោស	Norththern Pig-tail Macaque	*Macaca leonina*	VU	Common
Family: Sciuridae					
15	កំប្រុកពណ៌	Variable Squirrel	*Callosciurus finlaysonii*	LC	Common
16	កង្កែន	Berdmore's Squirrel	*Menetes berdmorei*	LC	Common
17	កំប្រុកស្វាបតូច	Small Flying Squirrel	*Hylopetes spp.*	LC	-
Family: Tupaiidae					
18	កន្ធឹក	Norththern Treeshrew	*Tupaia belangeri*	LC	Common

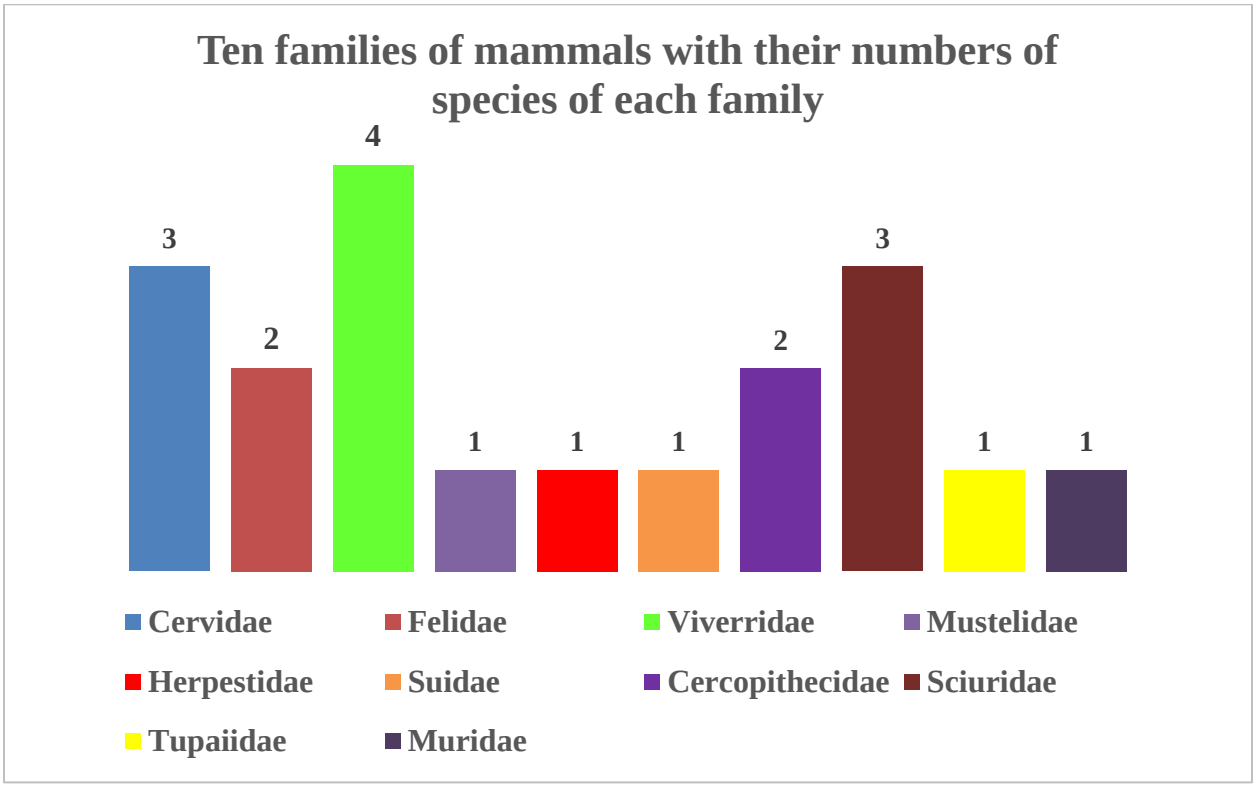
Family: Muridae					
19	កណ្តុរបង្កង់ពោះស	Red spiny maxomys	*Maxomys surifer*	LC	-
Note: Khmer and English names of the species are spelt following the Guide to the Mammals of Cambodia (2008).					

Specific camera traps with photos are shown in the table below.

Cam ID	Easting	Northing	Ele.	CF Name	Forest Habitat	Result of Animal photographed
CT1	534408	1447128		Prey Kbal O Kranhak	Regrowth Forest	A Fishing Cat and a small indian civet (Night time)
CT2	533656	1446844		Prey Tatey	Regrowth Forest	No
CT3	537547	1449195		Prey Kbal O Kranhak	Evergreen Forest	Common Palm Civet (Night time)
CT4	549599	1447107		O KraNhuong	Evergreen Forest	7 Long-tailed Macaque and a northern pig-tailed macaque
CT5	550561	1443163		O Das Skor	Evergreen Forest	A small flying squirrel (Night time)
CT6	552847	1444654		Prey Lang	Evergreen Forest	Wild boar and long-tailed macaque (Day time)
CT7	558890	1432793		Prey Lboah Sral	Evergreen Forest-stream bank	2 Rats, a large Indian civet, a wild boar, a variable squirrel and a berdmore's squirrel
CT8	557794	1424267		Prey Khum Sochetr	Bamboo Forest along stream	2 Sambar (Night time)
CT9	557760	1424246		Prey Khum Sochetr	Bamboo Forest along stream	2 Small Indian civet, 2 Small Asian mongoose, a yellow-throated marten, a variable squirrel and a northern treeshrew
CT10	547549	1419563		Prey Choam Smach	Evergreen Forest-stream bank	4 Long-tailed macaque, a common palm civet and a lesser mousedeer
CT11	544151	1419578		Prey Choam Smach	Evergreen forest-Bamboo	2 Long-tailed Macaques
CT12	550363	1410092		Water Cycle Research Site	Deciduous Forest	21 Wild boar and 7 Red muntjac
CT13	551366	1408528		Water Cycle Research	Evergreen Forest	4 Red muntjac, a large Indian civet, a leopard cat, a small Indian civet, 2 common palm

			Site		civet, a masked palm civet and a rat
CT14	556734	1436183	Prey Hong Chamtet	Semi-Evergreen Forest	No

In accordance to the families, the species richness of the survey site could be told from the graphic below. Among them numbers of species of the Viverridae is the highest followed by Cervidae, Sciuridae, and so on.



In accordance to the specific survey sites, the species richness could be told from the graphic below. Among them Water Cycle Research site (Prey Angten) is the richest site while the other sites are similar abundant of animals.

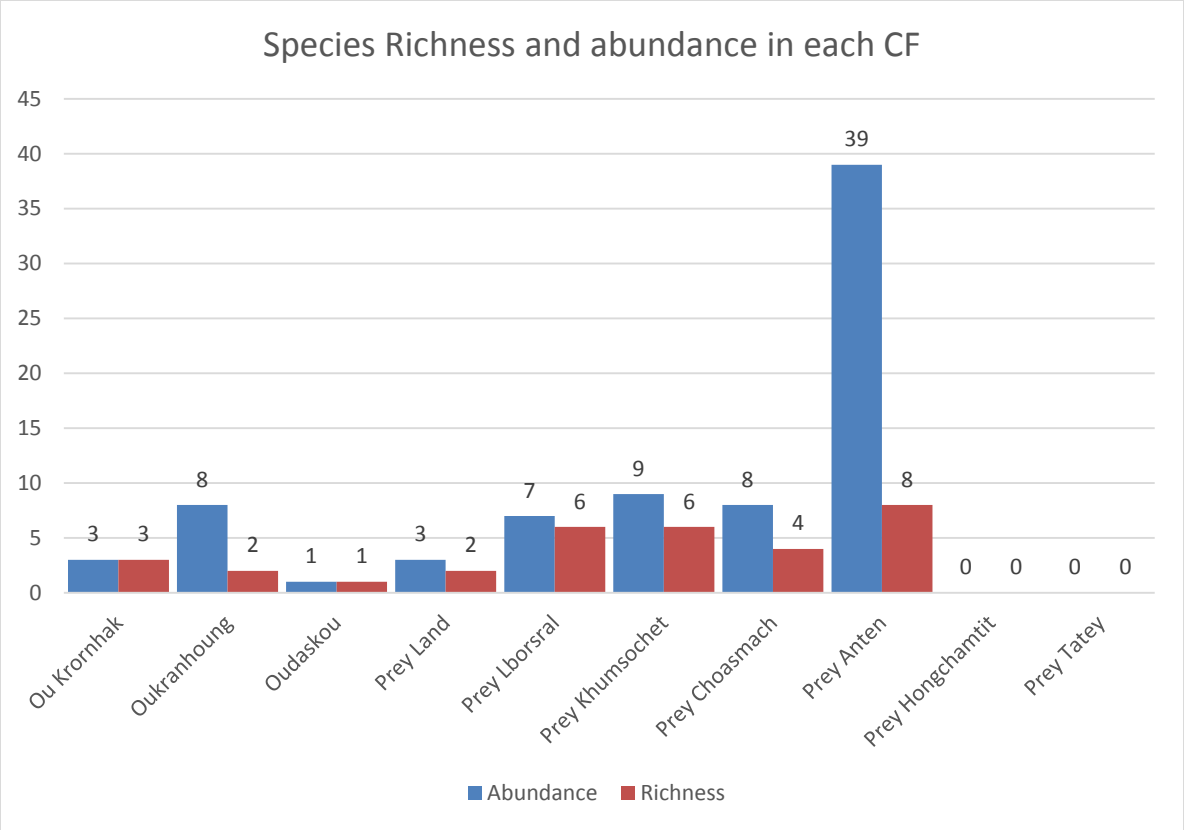


Photo of two Sambars taken from camera trap No. 8 (Prey Khum Sochetr CF)

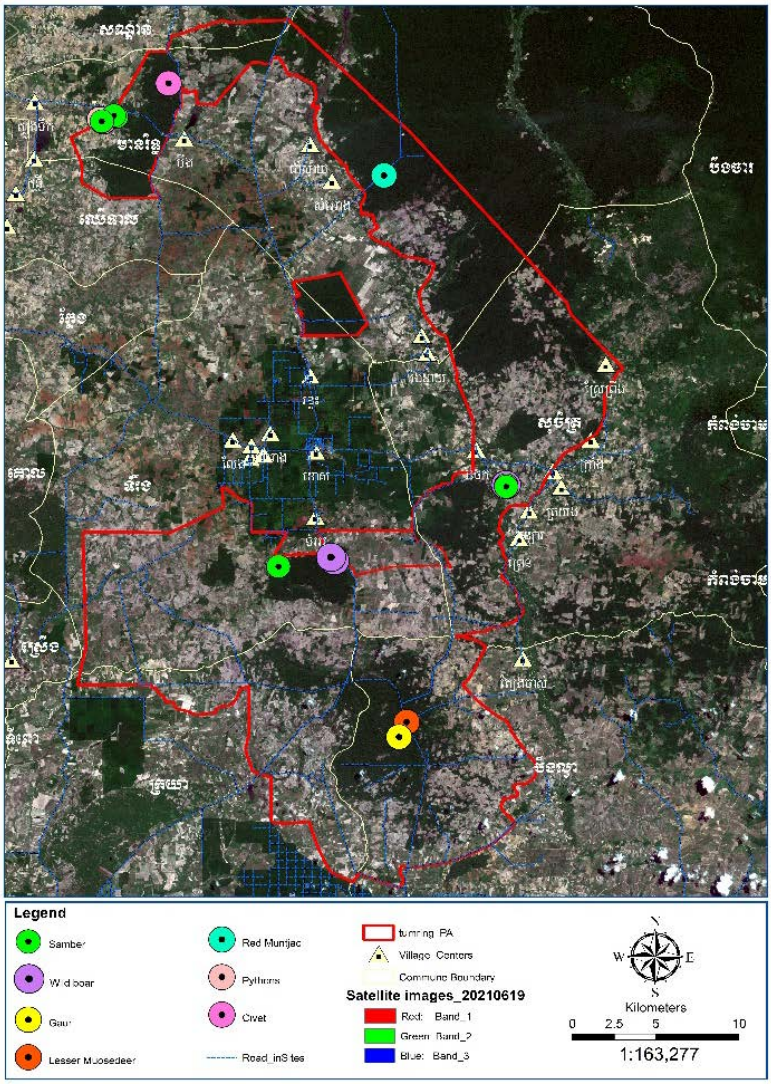
Wild pig (left, CT12) and Fishing Cat (CT1)

Leopard Cat (left, CT13), Common Palm Civet (central, CT13) and Masked Palm Civet (right, CT13)

Yellow-throated Marten (left, CT9), Small Asian Mongoose (central, CT9) and Small Flying Squirrel (CT9)

Large Indian Civet (left, CT7) and Red Muntjak (right, CT 17)

Wildlife distribution in the REDD+ areas are shown on the map below.



There are 64 species of large and small mammals found presented in the study areas. Eight (08) species of them are Endangered (EN), 12 Vulnerable (VU), 35 local concern (LC), 1 Data deficient (DD), 1 Critical Endangered (CR), 3 Near Threatened (NT), and 4 other are non-classified or not evaluated (Table 5).

Table 5: List of large and small mammals found in the survey areas

Species name				Current Status of the species	Means of obtaining data	IUCN	CITES	PRAKAS No. 020 (MAFF, 2007)
N°	Khmer name	English name	Scientific name					
1	ទោចម្កុដ	Pileated Gibbon	*Hylobates pileatus*	3	Foot-survey	EN	I	កម្រ
2	រញីផេះ	Northern Slow Loris	*Nycticebus bengalensis*	3	Interview	EN	I	កម្រ
3	រញីក្មេង	Pygmy Loris	*Nycticebus pygmaeus*	3	Interview	EN	I	កម្រ
4	ស្វាក្តាម	Long-tailed Macaque	*Macaca fascicularis*	2	CT	VU	II	បង្ហូរ
5	ស្វាត្រោស	Norththern Pig-tail Macaque	*Macaca leonina*	2	CT	VU	II	បង្ហូរ
6	ប្រម៉ា	East Asian Porcupine	*Hystrix brachyura*	2	Interview	LC		បង្ហូរ
7	ប្រើសស្វាយ	Sambar	*Cervus unicolor*	2	CT	VU		បង្ហូរ
8	ឈ្លូស	Red Muntjac	*Muntiacus muntjak*	1	CT	LC		បង្ហូរ
9	ផ្នង់តូច(កាចាំង)	Lesser Oriental Chevrotain/ Javan Chevrotain	*Tragulus javanicus*	1	Foot-survey	DD		បង្ហូរ
10	ជ្រូកព្រៃ	Wild pig	*Sus scrofa*	1	Foot-survey	LC		បង្ហូរ
11	កំប្រុកពណ៌	Variable Squirrel	*Callosciurus finlaysonii*	1	Foot-survey and CT	LC		បង្ហូរ
12	សំពោចក្រអូប	Common palm civet	*Paradoxurus hermaphroditus*	2	Foot-survey and CT	LC	III	បង្ហូរ
13	សំពោចវល្លិ៍	Small Indian civet	*Vivericula indica*	2	CT	LC	III	បង្ហូរ
14	សំពោចពណ៌លាត	Masked Palm Civet	*Paguma larvata*	1	CT	LC	III	បង្ហូរ
15	សំពោចអុជខ្នង	Small-toothed Palm Civet	*Arctogalidia trivirgata*	1	Interview	LC		បង្ហូរ

16	សំពោចធំ	Large-spotted Civet	*Viverra megaspila*	3	Interview	EN	III	បង្ហូរ
17	សំពោចកលឿង	Yellow-throated Marten	*Martes flavigula*	3	CT	LC	III	បង្ហូរ
18	ខ្ទីង	Gaur	*Bos gaurus*	3	Interview and website	VU	I	កម្រ
19	សំពោចវល្លិ៍	Small Indian Civet	*Viverricula indica*	2	Interview	LC	III	បង្ហូរ
20	ស្កាតូច	Small Asian Mongoose	*Herpestes javanicus*	1	CT	LC	III	បង្ហូរ
21	ស្កាធំ	Crab-eating Mongoose	*Herpestes urva*	1	Interview	LC	III	បង្ហូរ
22	កេតូច	Oriental Small-clawed Otter	*Aonyx cinerea*	1	Interview	VU	I	
23	ឆ្មាដារ	Leopard Cat	*Prionailurus bengalensis*	3	CT	LC	I-II	បង្ហូរ
24	ឆ្កួក	Large-toothed Ferret Badger	*Melogale personata*	1	Interview	LC		បង្ហូរ
25	ទន្សាយគល់	Burmese Hare	*Lepus peguensis*	1	Interview	LC		បង្ហូរ
26	ស្វាព្រាម	Silvered Langur	*Trachypithecus germaini*	1	Interview	EN	II	បង្ហូរ
27	កំពីងដូង	Owston's Civet	*Hemigalus owstoni/Chrotogale owstoni*	2	Interview	EN		បង្ហូរ
28	កន្ទិកក្បាលឆ្នូត	Northern Smooth-tailed Treeshrew	*Dendrogale murina*	1	Interview	LC	II	បង្ហូរ
29	កន្ទិក	Northern Treeshrew	*Tupaia belangeri*	1	CT	LC	II	បង្ហូរ
30	កណ្តុរភ្នំធំ	Large Bamboo Rat	*Rhizomys sumatrensis*	2	Interview	LC		បង្ហូរ
31	ពង្រ្កួល	Sunda Pangolin	*Manis javanica*	3	Interview	CR	I	កម្រ
32	ខ្លាឃ្មុំតូច	Sun Bear	*Ursus malayanus/ Helarctos malayanus*	3	Interview	VU	I	កម្រ
33	កំប្រុកធំ	Black Giant Squirrel	*Ratufa bicolor*	2	Interview	NT	II	កម្រ
34	កំប្រុកស្វាបតូច	Small Flying Squirrel	*Hylopetes spp*	1	CT			

35	កំប្រុកស្វាបធំ	Giant Flying Squirrel	*Petaurista sp/ Petaurista petaurista*	3	Interview	LC	II	កម្រ
36	ប្រមោញ	Asian Brush-tailed Porcupine	*Atherurus macrourus*	3	Interview	LC		បង្ហូរ
37	កណ្តុរស្រែ	Ricefield Rat	*Rattus argentiventer*	1	Interview	LC		
38	ជ្រើងធំ	Large Flying-fox	*Pteropus vampyrus*	3	Interview	NT	II	បង្ហូរ
39	ឆ្កែព្រៃ	Dhole	*Cuon alphinus/Cuon alpinus*	3	Interview	EN	II	កម្រ
40	កំពីងដូងអុជ	Spotted Linsang	*Prionodon pardicolor*	3	Interview	LC	I	កម្រ
41	ឆ្មាព្រៃ	Jungle Cat	*Felis chaus*	3	Interview	LC	II	កម្រ
42	ខ្លាត្រី	Fishing Cat	*Prionailurus viverrinus*	3	CT	VU	II	កម្រ
43	ឆ្មាដាវ	Leopard Cat	*Prionailurus bengalensis*	3	CT	LC	I-II	បង្ហូរ
44	ខ្លាលឿងមាស	Asian Golden Cat	*Catopuma temminckii*	3	Interview	NT	I	កម្រ
45	ឈ្មុសប្រែង	Binturong	*Arctictis binturong*	3	Interview	VU	III	
46	ខ្លាពពក	Clouded Leopard	*Neofelis nebulosa*	3	Interview	VU	I	ជិតផុតពូជ
47	ទន្សោង	Banteng	*Bos javanicus*	3	Interview	EN		កម្រ
48	ស្វាត្រោស	Nornthern pig-tailed macaque / Pig-tailed Macaque	*Macaca leonine/ Macaca nemestrina*	3	Interview	VU	II	បង្ហូរ
49	ខ្ទឹន	Large Indian Civet	*Viverra zibetha*	2	Interview	LC	III	បង្ហូរ
50	ជ្រូកពោន	Hog Badger	*Arctonyx collaris*	3	Interview	VU		កម្រ
51	ស្វាអង្គត់	Stump-tailed Macaque	*Macaca arctoides*	3	Interview	VU	II	កម្រ
52	កង្កែន	Berdmore's squirrel	*Menetes berdmorei*	1	Foot-survey and trapped	LC		បង្ហូរ
53	កង្កិប	Eastern striped squirrel	*Tamiops rodolphii*	1	Foot-survey	LC		បង្ហូរ

54	កន្ធឹក	Northern Treeshrew	*Tupaia belangeri*	1	Foot-survey	LC		បង្គួរ
55	កណ្តុរបង្កង់ពោះស	Red spiny maxomys	*Maxzumys surifer*	3	Trapped and CT			
56	កណ្តុរផ្ទះ	House Rat	*Ratus ratus*	2	Trapped			
57	កណ្តុរប៉ាស៊ីហ្វិក	Pacific rat	*Ratus exulans*	2	Trapped			
58	ប្រចៀវក្រចកសេះ	Horse shoe bat	*Rhinolophus acuminatus*	2	Mist net	LC		
59	ប្រចៀវត្រចៀកទន្សាយ	Lesser false-vampire	*Megaderma lyra*	2	Mist net	LC		
60	ប្រចៀវត្រចៀកទន្សាយ	Lesser false-vampire	*Megaderma spasma*	2	Mist net	LC		
61	ប្រចៀវច្រមុះជ្រួញ	Cantor's Roundleaf bat	*Hipposideros galeritus*	1	Mist net	LC		
62	ជ្រើងតូចច្រមុះខ្លី	Greater short-nosed fruit bat	*Cynopterus sphinx*	1	Mist net	LC		
63	ជ្រើងតូចច្រមុះខ្លី	Greater short nosed fruit bat	*Cynopterus brachyotis*	2	Mist net	LC		
64	ជ្រើងអត់កន្ទុយ	Northern tailless fruit bat	*Megaerops niphanae*	3	Mist net	LC		

Large and small mammal Species occur to the survey areas:

- 1 represents Common occur
- 2 represents Uncommon occur
- 3 represents rare occur

Greater short-nosed fruit Bat (*Cynopterus brachyotis*)

3.5 Threats to the species of the survey areas

The threats to the species of the survey areas are habitat loss, increasing hunting pressure, and weak law enforcement.

Even though the REDD+ areas consist of CF sites with most of them are officially recognized by MAFF, the habitat loss had been continued to happen. The CF members claimed that their village population has increased because of lots of new married couples when they did not have alternative home settlement rather than clearing new forestlands. These forest encroachments were happened in all the survey sites, to give the few: Prey Kbal O Kranhak, Prey Tatey, Prey Hong Chamtet, L'baoh Sral, O Bosleav CF sites and Water Cycle Research site. O Bosleav CF, moreover, is located in isolated area in the middle of the agricultural lands (zone 2). It was reported that all types of forest clearing were for agricultural purposes and some of those were for selling.

Hunting has been increased since 2019, especially since the pandemic disease, Covid-19, started in early 2020. Hunting was made by local made guns, traps, and net. The local made guns were used for small mammals, traps were used for any size-mammals, and nets were used for macaque (monkey) species such as Long-tailed Macaque (*Macaca fascicularis*).

Having faced with forestland encroachment, the surveys found that there was inactive enforcement of law, e.g. Law on Forestry (2002). The current Head of CF Committee of the survey sites claimed that there was no intervention made by officials of the FA even though repeatedly requested. However, the officials of the survey sites stated that they do not have sufficient staff to cover the large areas of forests.

Lesser Oriental Chevrotain (*Tragulus javanicus*) killed by local people for food (Left) and illegal timber cutting (Right)

Discussions

As claimed by previous study, e.g. Benjamin Hayes et al. (2015), Pileated Gibbon is one of the key important species to the Prey Lang, in general, and in Tumring REDD+ site. The survey found that Pileated Gibbon occurred in two sites, the Water Cycle Research site and Prey Hong Chamtet CF. Therefore, the Pileated Gibbon (*Hylobates piletus*) occurred in Prey Hong Chamtet CF could be flagship small mammal species for the areas. There are three herds of them (around 12 individuals) living in the areas. Temple of Raong Khnay village could be the best institution to take care of the species because this village-temple is the closest to the gibbon site. Discussion with the monks of the village-temple should be held in order to find ways to protect the species and habitats. Align with the REDD+ financial support to the CF Committee of the Prey Hong Chamtet CF, financial support to the village-temple should be provided as necessary.

Three to four Sambars (*Cervus unicolor*) of the Prey Kbal O Kranhak CF were wondering around the nearby cashew plantations, where they are protected by the owner of the plantation. The owner claimed that the species is protected by law. Therefore, somehow written-ownership rights given to private sector could be helpful to protect the species of large and small mammals. The written-ownership rights could be contracted between the local FA and the owners of the plantations either cashew, cassava, or other crops.

Northern tailless fruit bat (*Megaerops niphanae*)

IV. Conclusion and Recommendations

There are 64 species of large and small mammals found presented in the study areas. Eight (08) species of them are Endangered (EN), 12 Vulnerable (VU), 35 local concern (LC), 1 Data deficient (DD), 1 Critical Endangered (CR), 3 Near Threatened (NT), and 4 other are non-classified or not evaluated. If compared among the species themselves in the local areas, the species are nominated as from common occur to rare occur as 1, 2, and 3, respectively. In this regard, 25 of them are critically rare, 15 are Uncommon, and the rest are Common. The status of species of the large and small mammals is critically endangered. They are needed immediate protection from responsible agencies before they are too late to preserve. The supports from the REDD+ project have been dragging the situation before it already gotten worst; the survey team very much acknowledges for that. However, habitat loss and heavy hunting pressures on the surveyed species are utmost concerns for species protection and their future survivals.

Recommendations

The survey team found the following recommendations are utmost importance:

1. **Priority protection efforts** should be started from the highest abundance of wildlife such as in the Water Cycle Research site, and followed by the less priority sites as discussed on the point 3.4 of the report.
2. **Contractual Works with local stakeholders**: Local FA should work with agricultural land owners and Pagodas to monitor key wildlife species. Contracts should be developed to be signed between local FA office and responsible land owners and nearby Pagodas as detailed on the Discussion section above.
3. **The first ever protection measure is to protect habitats of the species** of the large and small mammals from further forest encroachment in all the surveyed CF sites. The protection activity is to closely work with CF Committees of the REDD+ areas through often involvement on training, patrolling, and awareness-raising on species conservation. The awareness-raising could be done by poster and signboards. Local pagodas should be the best means of awareness-raising as well, while monks cite on Buddhism.
4. **All species of large and small mammals classified as Rare Occur** (table 5), e.g. Pileated Gibbon (*Hylobates piletus*), should be the key species to be strictly protected because they are on the brink of extinction. Hunting for commercial purposes is heavier pressure than that for local-village consumption. Therefore, strengthening on cracking down illegal trade in wildlife should be immediately implemented.

References

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J. Eymann, J. Degreef, Ch. Häuser, J.C. Monje, Y. Samyn and D. VandenSpiegel. 2010. Chapter 6, Volume 8, part1. Page No. 110.

Website shows Two Gaurs (male and female) video in Water Cycle Research Site. Visited on 10 January 2022 https://www.facebook.com/vichol.hy/posts/1606270439561534

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Annex 1: Terms of Reference (ToR)
Tumring REDD+ Project mammal, reptile, amphibian and fish survey

About content of the technical report

Each technical report should contain:
Abstract
Introduction
Methodology
Descript about habitat and exact survey site/point (UTM), maps, and/or photos
Results

- Species discovered (i.e. a list, and evident of the species findings, …)
- Propose selected key some species for regular monitoring and what kind of monitoring to be developed.
- Discussion and recommendation to enhance/increase the population of the of the key selected species

Annexes (photo with UTM, list of species found, habitat, transect line, if possible, tools or equipment of the survey, field team photos, and activities photo …).

Schedule
First Trip: 15 December 2021
Second Trip: 15 June 2022

Annex 2: Questionnaires

Introduction of the interviewers to the interviewees should be made at the beginning of the talks. The introduction should include: your name, study purposes, agencies, and talking time during the interview. The interviewers should not interrupt the talk of the interviewees, but try to keep the talks on the subject matter (keep it on track).

It is worth noticing that the interviewers should pay respects to his/her interviewees at all the time.

Photos of animal species (field guides of birds and mammals of Cambodia) have to be with the interviewers for helps in interviews.

Key Informants

The Key Informants (KI) are: Village Heads, Commune Heads, Heads of provincially technical departments (Environment, Agriculture, Forestry Administration Cantonment). Questions to be asked for these KI are:

How long have you been in your current position? .....years

What are the mammal species that you know? .....

.....

.....

What are the mammal species currently exist in the areas?

.....

.....

What their threatening status?

.....

.....

What are the main causes threatening the mammal species?

.....

.....

What types of interventions should be in place, if the mammal species should be saved?

.....

.....

Focus Group Discussion

Focus Group Discussion (FGD) should be held in order to let the participants interact for their ideas regarding presences/absence, status, threats, measures to protect and conserve the mammal species. At the meeting of FGD, some hint questions are:

What are the mammal species exist in the areas?

What is the status of these mammal species?

What are the main threats to these mammal species?

What can we do to protect these existing mammal species?

The facilitators of the FGD should collect all answers from the FGD for records and data of the surveys. Any other observations, such as disagreement among the group members on these questions, during the FGD should be written down as notes. Write down their majority opinions on this subject matter. For instance, some members of the FGD claim that there is Tiger, but majority of them claim no Tiger, etc.

Interviewees

The Interviewees are villagers, ex-hunters and current hunters, wildlife middlemen, wildlife stores, and wildlife restaurant owners. Questions to be asked, but not limited to, are:

How long have you been living in the area (your village)? .....

What are the mammal species existing in the areas? .....
.....
.....
Who normally poach the mammal species? .....
.....
.....
What is the trend of mammal species poached?
Increase? .....
Decrease? .....

What is the trend of mammal species in trade?
Increase? .....
Decrease? .....

Who are the main players in trading of the mammal species?
.....
.....
What should we do to counter the situation of the mammal species? ....
.....

Transect Walks (optional)
At the end of conversation with your interviewees, you may want to walk with him/her for evidence of his/her talks. You may, also, obtain more answers from your interviewees during the Transect Walks.

Annex 3: Camera Trap methodology

Methodology and Equipment

Interviews

The interviews were held with the 14 CF Committees of the REDD+ project site by calls and face-to-face in order to collect primary data. Having obtained the primary data, the team produced map of the project site in order to allocate camera traps for different habitat types of different animal species.

Schedule of Camera trap setting and retrieve

There were 7 days, during 3 – 9 December 2021, of setting the camera traps into the agreed locations. The retrieve of the camera traps is planned for another 7 days during 25 – 31 January 2022, in order for camera traps to take photos for about two months of time. It is worth noticed that the locations of each camera trap is important. The camera traps, therefore, were set in the most predictable sites of getting photos of animals like animal trails, saltlick areas, water bodies (swamp, ponds, and stream beds), grasslands, and animal escaping sites.

There are two types of the camera traps: Bushnell (Hybrid) and Bushnell (normal). The Hybrid camera trap has two functions at the same time: fixed photo and video recording whereas the normal one has only one function according to setting either for fixed photo or video.

Annex 4: Survey Methodology of Large and Small Mammal Species
(Methodology of Mist net and live-Trapping**)**

I. Introduction

Mammal species is identified by animal mothers feed their offspring by their own milk after birth. Skin of almost all mammal species have fur even though water mammal species such as Dolphin and Shark. The mammal species are warm blood animals, and normally consist of four arms. The arms could be either for walking or flying. Some mammal species look like bird, e.g. bat, some like Reptile, e.g. Pangolin, and some others look like fish, e.g. Dolphin.

Each animal is scientifically worldwide named by two wording: family and species names. In responding to the need of the Tumring REDD+ Project, Kampong Thom province, the technical study team on Large and Small mammal species conducted surveys in the target site. The technical team members are knowledgeable in animal track identification, animal habitat types, source of water, species identification, and interviews with local people like forest collectors and ex-hunters, using Field Guides of the Mammal of Cambodia.

II. Team Members

There were eight (08) people of the team, six from the Forestry Administration and two other from local villagers.

III. Objectives of the survey

The objectives of the survey were:

- Identify presence and richness of the species using established transects within the Tumring REDD+ site;
- Review available references and technical report writing;
- Propose endangered Large and Small mammal species list for listing in Prakas.

IV. Methodology

The study for Large and Small mammal species requires patience of the team members using variety of methodologies such as direct sighting and track identification. The methodologies were used include interviews with forest and wildlife experienced people, transects layout, camera traps, live-trapping tools, and Mist nets[1].

Specific detail methodologies are:

4.1 Mist net establishment: The Mist nets are for catching flying animals such as different species of bats. The Mist nets were established at dusk (when the sky is getting dark) in order to catch bats because they are nocturnal species. The bats are classified into two families: Fruit Bats and Insect Bats[2]. The Mist nets were mounted in narrow spaces like an open forest area, along path, old oxcart, cave sites, and edge of water bodies. Because bats are active from dawn to dusk, the Mist nets were mounted and checked at 30 minutes interval of time till 21:30, then they were retrieved. The caught bats were identified and released immediately in order to avoid stress and exhausted time or death of the animals. In some cases, the Mist net would be destroyed if the animal left too long in the net. It is

[1] A Guide to the Mammals of Cambodia by Mr Men soryon, Soun Phalla, Sin Polin and Joe Walston, FA
[2]. A field guide to the mammals of south-east asia By Mr Charles M.Francis

worth noticed that different species of bats have different foraging habits. For instance, Rhinolophus spp., have their foraging habitat early night whereas Cynopteros spp., start their searching for food from the midnight.

4.2 Live-trapping tools: the live-trapping tools are for catching small animal species that forage on the ground like civet, squirrel, rate, and other rodent family. The live trapping tools were placed on the ground areas and at the same time, where the Mist net established, but were retrieved in the next morning (another word, they were left out overnight). These live-trapping tools would be suitable to animals with the size of 100 mm by 300 mm, specifically for the rodent species in order not to kill them whenever they are trapped because of too narrow sizes[3]. For the study targets, the live-trapping tool sizes are 40 cm by 10 cm by 10 cm. Ten (10) of them were placed on one Quadrant with each Quadrant line paralleling to the four geographical directions. Distance from one to another live-trapping tool is 10 m[4] within the Quadrant, and the 50 m to 100 m from one Quadrant to another. There were four Quadrants (Q1, Q2, A3, A4) established at each trapping time. The live-trapping tool is called Sherman Traps made from zinc with the form of trapeze-shape on the section surface. The traps were baited by ripe banana, cassava, mais/roasted corn, or peanut (peanut butter or roasted peanut) in order to produce smell to attract the animals. For long-term study, the traps could be placed permanently until the end of the study period, but checking should be done once a day in order to replace bait and release animal, if trapped. For the study in Tumring REDD+ site, there were four (04) CF sites and the traps were placed for two nights in each site.

4.3 Transect surveys:

In addition to the Camera traps, live-trapping tools, and face-to-face interviews, the transect surveys were carried out in the target CF sites. The transect walks were conducted during, mostly, the morning of the survey days because the animals are active, and the survey team members were also energetic in this time of the day. The survey team members were quietly looking for animals (direct sighting), and marks such as tracks on the ground and signs on the trees and vegetation. The transect walks were laid out along walking sites like paths, oxcart, riverbeds, etc., and at the edge of agricultural areas and forestlands.

4.4 Interviews: In addition to the prepared Semi-Questionnaires, a local guide was selected for the survey team. The local guide was playing roles in introducing the interviewers to the interviewees, directed the target villages, and assisted in transportation. The local guide was also knowledgeable on wildlife of the areas. Field Guide to Mammal of Cambodia was used to assist the interviewees for identification of the Large and Small mammal species.

4.5 Animal identification: The identification was focusing on forms, size, length, weight, and specific parts of body of the animals. With these characteristics, the team checked the Field Guide to Mammal of Cambodia for final names. Specific activities are:

A. Bats

Specific characteristics checked for bats are:

- Weight,
- Length of forearms,

[3]. Collecting and preparing study specimens of vertebrates By E.Raymond Hall

[4] . Ecology of small mammals in tropical forest habitats of southern India Journal of Tropical Ecology 1996 By Anjaly Chandrasekar-rao and Melvin E.sugquist

- Face, ears, eyes, noses, tail, hind arms, nails, and tip of wings,
- Body color, call (sound), and food,
- Time of trapping and habitats.

B. Rodent

Specific characteristics checked of rodent are:

- Weight,
- Lengths of hind leg and ears,
- Length of hind pad,
- Body color, etc.

4.6 Equipment and Tools: Table below are required equipment and tools.

No.	Name	Quantity	Unit	Remark
1	Net	10	Net	For bat catching
2	Live-trapping tool	60	Trap	Ripe banana or mais (roasted corn)
3	Pole	30	Pole	PCV or metal and robe
4	Glow	3	Pair	For protection of hands
5	Head torch	3	Torch	For seeing the animal
6	High beam torch	2	Torch	For walking at night
7	Camera	1	Pcs	High quality
8	GPS	1	Pcs	And batteries
9	Axes	2	Pcs	For grass clearing and poling
10	First Kids	1	Box	Emergency
11	Alcohol	1	Pcs	
12	Field Guide to Mammal of Cambodia	1	Book	Latest publication
13	Binoculars	1	Pcs	For long distance sight

The Table below is for animal recording at every checking hour.

For Bats:

Location			**Forest type**		**UTM**			
Date	Elevation		H1	H2	H3	H4	Totals	Mist net
Time catches								
H is representing Checking hour								

For Rates:

Location			Forest type		UTM			
Date	Elevation		Q1	Q2	Q3	Q4	Totals	Mist net
Time catches								
Q is representing Quadrant								

For Transect Walk:

Location:……..

Forest Type:……..

No.	Name of Animal	Mark (track, sound, etc.)	UTM	Elevation	Remark