

The status of Delacour's langur (*Trachypithecus delacouri*) in the planned extension area of Van Long Nature Reserve

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Summary

Vietnam has five primate species on the list of “The world's 25 most endangered primates 2012–2014. One of them, the Delacour's langur (*Trachypithecus delacouri*), occurs only in a limited area of northern Vietnam and is critically endangered. The size of its population is estimated to be 200 individuals grouped in 10 subpopulations. The biggest viable subpopulation occurs in Van Long Nature Reserve. However, the details of the number of groups and individuals in the adjacent area outside the reserve and in the planned extension area, in Dong Tam Commune, are unknown. The aim of our study was to estimate the subpopulation status in the adjacent area of the nature reserve, and to determine the number of groups, individuals and recognition of possible threats. For this purpose we combined the Local Ecological Knowledge (LEK), specifically interviews and species presence/absence records, which were carried out simultaneously August to November 2012. According to local people, this area holds six groups of Delacour's langur with the average and maximum number of 34 and 51 individuals, respectively. If confirmed, this would be one of the biggest known subpopulations of this species outside Van Long Nature Reserve. We observed three groups of Delacour's langurs in two sightings. Moreover, we heard langur vocalization and observed langur faeces. This subpopulation is facing threats from hunting, decreased forest cover, growing settlements and limestone quarrying. However, the forest in Dong Tam Commune is an important strategic area for Delacour's langur conservation, and therefore needs to be included as an extension of Van Long Nature Reserve.

Tình trạng của loài Voọc Mông Trắng (*Trachypithecus delacouri*) ở khu vực dự kiến mở rộng của khu bảo tồn thiên nhiên Vân Long

Tóm tắt

Việt Nam có 5 loài linh trưởng trong danh sách “25 loài linh trưởng nguy cấp nhất thế giới năm 2012-2014”. Một trong số đó là loài Voọc Mông Trắng (*Trachypithecus delacouri*). Loài linh trưởng đang nguy cấp này có vùng phân bố hẹp ở phía bắc Việt Nam. Hiện còn khoảng 200 cá thể sống trong 10 tiểu quần thể khác nhau. Quần thể lớn nhất và có khả năng tồn tại lâu dài nhất thuộc khu BTTN Vân Long. Tuy nhiên, số lượng bầy đàn và cá thể ở khu vực giáp ranh với khu bảo tồn, xã Đông Tâm hiện vẫn chưa có thông tin. Mục tiêu của nghiên cứu này là ước lượng số lượng bầy đàn, cá thể ở vùng tiếp giáp với khu

bảo tồn, cũng như xác định các mối đe dọa đến loài. Từ tháng 8 đến tháng 12, năm 2012. Chúng tôi đã thực hiện phương pháp phỏng vấn người dân địa phương để xác định sự có mặt của loài. Theo người dân địa phương, khu vực Đồng Tâm hiện có khoảng 6 đàn Voọc Mông Trắng với khoảng 34-51 cá thể. Nếu thông tin này được khẳng định thì quần thể voọc này có số lượng lớn nhất trong những khu vực bên ngoài Vân Long. Kết quả thực địa cho thấy, có 3 đàn đã được quan sát trong khu vực này. Chúng tôi còn nghe tiếng kêu của loài Voọc này và nhìn thấy phân của chúng. Tiểu quần thể này đang bị tác động bởi việc săn bắn, suy giảm diện tích rừng, các khu định cư tăng lên và khai thác đá vôi. Diện tích rừng ở xã Đồng Tâm là quan trọng cho công tác bảo tồn loài Voọc Mông Trắng, do đó khu vực này cần được đưa vào trong vùng mở rộng của khu BTTN Vân Long.

Introduction

With 5 of its species on the world's 25 most endangered primates list, Vietnam has a disproportionate number of imperiled primates (Mittermeier et al., 2012). The Delacour's langur (*Trachypithecus delacouri*) has been on this list since the first edition in 2000 and is considered as "Critically Endangered" (IUCN Red-List of Threatened Species), and protected in Vietnam on the highest level (Government of Vietnam, 2006). The distribution of Delacour's langur is restricted to limestone mountain ranges of northern Vietnam, located between 20°-21°N and 105°-106°E in four provinces: Ninh Binh, Ha Nam, Hoa Binh and Thanh Hoa (Nadler et al., 2003). After renewed discovery of this species in Cuc Phuong National Park in 1987 (Ratajszczak et al., 1990), an intensive program of surveys by Frankfurt Zoological Society started in 1993 to determine total species population size and distribution. Currently, about 200 individuals are known to exist in 10 isolated subpopulations (Nadler, 2010, Nadler, pers. comm.), down from a high of 300 individuals (Nadler, 1996). Population decline is due to several factors, but the most serious threat seems to be poaching (Nadler et al., 2003). Delacour's langurs occurs in five protected areas: Cuc Phuong National Park, Pu Luong Nature Reserve, Hoa Lu Cultural and Historical Site, Hung Son Cultural and Historical Site and Van Long Nature Reserve. It is believed that only Van Long Nature Reserve contains a viable subpopulation with the chance of long-term survival (Nadler, 2004; 2010). After establishment of Van Long Nature Reserve in 2001, as a result of collaboration between Frankfurt Zoological Society and the Management Board of the nature reserve, significant conservation results have been achieved and the subpopulation of Delacour's langur has doubled during the last decade (Nadler, 2010). Presumably, the total subpopulation size of VLNR is now around 100 individuals (Workman, 2010; Ebenau et al., 2011).

Conservation activities require assessing species abundance and distribution, yet the efficacy of survey and census work varies based on field site conditions and species. Due to lack of habituation and the rugged karst habitat, Delacour's langur are extremely difficult to spot and even more difficult to follow. Using Local Ecological Knowledge (LEK) can therefore be useful (Brook & McLachlan, 2008), while also being mindful that for long-term monitoring, abundance and distribution data need to be confirmed and quantified (Jones et al., 2008; Anadon et al., 2009). LEK has recently been employed in determining the status for various Indochinese primates, for example pygmy loris (*Nycticebus pygmaeus*) (Starr et al., 2011), Francois' langur (*Trachypithecus francoisi*) (Dong Thanh Hai, 2011), macaques (Hamada et al., 2010), as well as in previous surveys of Delacour's langur (Nadler, 1996).

The occurrence of Delacour's langur in Dong Tam Commune, Hoa Binh Province was previously reported (Ebenau et al., 2011) as well known in local communities. This area consists of suitable and, in some parts, intact habitat for langurs, and the inclusion of this area into Van Long Nature

Reserve and the upgrade to a national park is being discussed. Therefore, in this study we aimed to estimate the subpopulation status of Delacour's langur in the extension area, linking two methods: interviews (LEK) and species presence/absence records in order to gather comprehensive information on abundance and distribution of Delacour's langurs in Dong Tam Commune, as well as determine the threats for them and their habitat.

Materials and Methods

Study site

Dong Tam commune is located in Lac Thuy District, Hoa Binh Province, between 20°24' - 20°31' N and 105°46' - 105°52' E. The total area covers 4926.6 ha, including 2154.22 ha of unprotected forest, 268.96 ha of farmlands, 719.89 ha of utilitarian area and 1771.73 ha of other land use types. This commune is settled by 5679 people in 18 villages. Eight villages with 2509 people (44% of total commune's population) are located in close proximity to the forest. Sixty-five percent of people are involved in agriculture activities and 35% in industry. The area is characterized by a seasonal climate with distinguishable hotter, wetter summers and colder, drier winters. The elevation ranges between 27 m and 392.5 m asl. The landscape is similar to that observed in Van Long Nature Reserve with mostly evergreen mixed with some deciduous forest on karst limestone mountainous terrain (Fig. 1). There are no studies conducted on vegetation cover and wildlife in the Dong Tam area.



Fig.1. The landscape of Dai Dong in Dong Tam Commune. Photo: Filip Wojciechowski.

Data collection

In order to obtain relatively comprehensive information on the Delacour's langurs status in the Dong Tam area, the research was divided into three parts, carried out simultaneously between 1st August and November 2012: interviews with local people, presence/absence recording, and threat estimation.

Interviews with local people

We used a structured questionnaire, which can simplify comparisons between respondents and allows quantification (Huntington, 2000). During 10 randomly days we interviewed 100 people from 8 villages with the focus close to the forested area (Dai Dong, Suoi Tep, Dong Moi, Dong Tien, Dong De, Dong Noi, Dong Hai, Doc Yeng). Respondents had been chosen randomly, with the aim to avoid any bias in terms of livelihood, gender or age. However, to strengthen reliability of answers, children and teenagers were not interviewed.

Species presence/absence records

Based on interview answers, we chose areas where we expected occurrence of Delacour's langurs. Some areas where langurs might occur are visible from the village. To better observe langurs, however, we surveyed the habitat over 9 days to find the best observation spots in the hilly habitat. We established 13 observation points (Fig. 2) and spent 52 survey days totaling approximately 350 hours and



Fig.2. The observation points in Dong Tam Commune.

covering an area of 23 km². An observation day lasted from 5.30-6.30 am until 17.00-18.00 pm, depending on the weather conditions and visibility. Surveys were undertaken regardless of weather conditions. We used 10X42 Nikula binoculars. We determined presence/absence from direct observations of animals as well as from indirect observations, mostly feces and vocalization (Ross & Reeve, 2011). We recorded the GPS coordinates of direct and indirect observations using a Garmin G60™ device.

Threats

We interviewed local people and local authorities about hunting and habitat changes in the area and we recorded observations of either throughout the survey.

Data analysis

Questionnaire answers were recorded in Excel and all location data were put in Google Earth. The weighed-average for group size was calculated in each place. When we had a range of numbers, we used the lowest number to avoid overestimation. Additionally, highly unreliable

answers were excluded, and ultimately, 98 questionnaires were analysed. Based on locations and the average groups' size of the langurs, as well as known barriers, the home range of the groups was roughly delineated in Google Earth.

Results

Results of interviews

We interviewed farmers (83% of people questioned), guards of Van Long Nature Reserve (4%), construction workers (3%), miners of the local quarry (3%) and others like policemen, students etc. (7%). Local knowledge about Delacour's langur is high in this area, as 94% of the respondents could recognize the species and correctly described its features. More than the half of the interviewed people (59%) had stated that they can recognize different age classes of individuals, mostly infants. However, only 12 infants had been seen in the area this year. 66% of respondents had seen langurs, 42 had made a direct observation, 13 had both seen and heard them and 11 had only heard the animals. Observation frequency of langurs differed among local people from 1 to more than 10, but the latter was hearing rather than sighting the individuals. In total, langurs had been seen 144 times in 16 places and had been heard 87 times in 13 places within the study

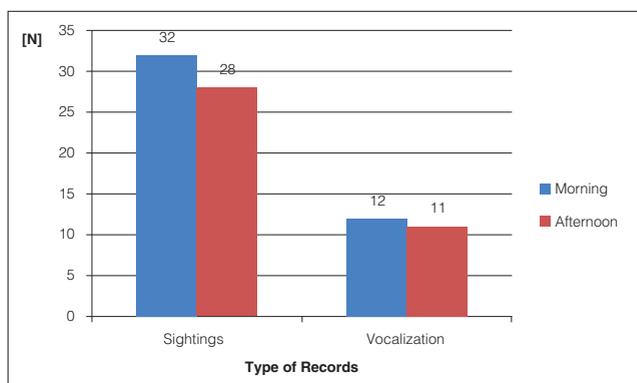


Fig.3. Comparison of sightings and hearings of Delacour's langur (*Trachypithecus delacouri*) noticed by local people during mornings and afternoons (n=83).

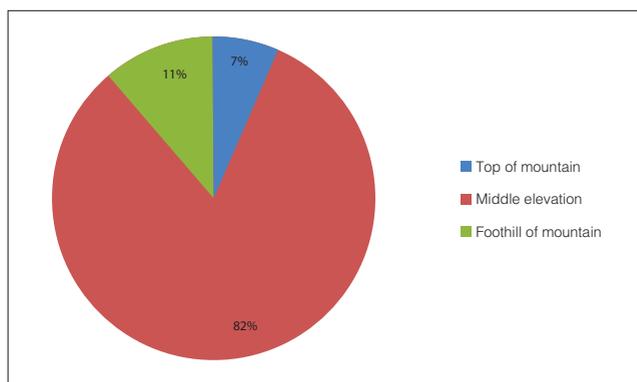


Fig.4. Comparison of number of sightings of Delacour's langur (*Trachypithecus delacouri*) on different elevation by local people (n=62).

area (Table 1). Combining all information together, including location, group sizes and natural barriers, the number of groups in the area is 6 and the group size ranged from 2 to 12 (Table 1, Fig. 5). The total subpopulation average is 34 individuals; however the maximal number can reach 51. According to local people, there is no best time to spot langurs, as respondents had seen and heard them almost evenly in the morning and afternoon (Fig. 3). Most of the people had stated that they had seen or heard them between 6 and 9 am and between 3 and 5 pm. Additionally, local people said they usually saw langurs when the weather changed, i.e. rainy morning and sunny afternoon. Villagers saw langurs more often on the middle of the mountain slope, and much less on the top and foothills (Fig. 4). Only seven respondents had seen langurs entering or exiting a cave.



Fig.5. The presumable distributions of groups of Delacour's langur (*Trachypithecus delacouri*) in Dong Tam Commune. The blue colour - places where langurs had been seen and heard, the yellow colour – places where they had been only heard, the pink colour – places where they had been seen by research team, the green colour – spots with feces recorded.

Table. 1. Records of occurrence of Delacour's langur (*Trachypithecus delacouri*) at Dong Tam Commune, based on local people statements.

No.	Name of the place	Number of records		Group size in the spots		Overall group size	
		Sightings	Hearings	Max.	Min.	Max.	Min.
1	Trai Hui	21	4	10	5	10	6
2	Dong Moi	26	4	10	7		
3	Khi Cave	10	16	7	2		
4	x	4	-	10	-		
5	Gieng Valley	2	5	10	-		
6	Dai Dong	5	>10	3	-		
7	Quang Valley	10	>10	8	6	8	6
8	Quan Le 1*	4	-	15	8	18	9
9	Quan Le 2*	6	-	10	-		
10	Quan Le 3*	19	-	18	12		
11	Quan Le 4*	1	1	5	-		
12	Quan Le 5*	7	>10	3	2		
13	Mountain 2	5	3	2	-	2	2
14	Mountain 4000	-	2	-	-	7	5
15	Nha Vit Valley	14	>10	7	6		
16	Chen Valley	3	>10	2	1		
17	Ngo Valley	7	2	6	6	6	6
Total number		144	87	126	55	51	34

Species presence/absence records

We only observed langurs on two occasions. Additionally we found indirect evidence of langurs on three accounts. We heard callings on one occasion and two times faeces were found. One adult male was seen mid afternoon probably with two other individuals out of view in dense vegetation. There was another sighting of three individuals; adult male and female, and an unidentified individual early in the morning. Finally, we found old faeces in a sleeping cave, and again old faeces on a rock.

Threats to Delacour's langur

Strong anthropogenic pressure exists on the langur subpopulation in the area of Dong Tam Commune. However, human impact is not evenly distributed between all places where langurs had been observed. The main threats which affect the langurs are hunting, destruction of the forest cover (livestock grazing, fuel wood collection, logging), growing settlements in the area with increasing infrastructure and limestone quarrying.

Hunting

The direct threat for the species in the area is hunting. Twice we encountered hunters, one we saw with a gun, and another one carried bird traps. Apart from direct sightings we found possible hunter campsites in the area. Local people reported a high presence of hunters in the area, mostly for bird trapping and snake collection but also occasionally with guns. Local authorities of Dong Tam Commune reported no cases of receiving or encountering killed or illegally caught Delacour's langurs in recent years.

Activities affecting the forest cover

The human impact on vegetation is high in Dong Tam Commune. Livestock grazing is widespread in one part of the area which can have an effect on the forest cover. The grazing by goats is prevalent. Almost always during observations in these areas, we saw one or more groups of goats, usually with one person following them. Four times we encountered collectors of different plants. The most commonly collected plants are Song đá (*Calamus rudentum*), Mây Nếp (*Calamus tetradactylus*), Bình Vôi (*Stephania glabra* (Roxb.) Miers), Bời Lờ Nhót (*Litsea glutinosa* (Lour.) C.B. Rob.) and Huyết Giác (*Dracaena cambodiana* Pierre ex Gagnep) partly for medical purposes. Logging was observed in two main areas, one close to a point of langur observation.

Growing settlements

The human population growth in the Dong Tam Commune is almost 1% per year (local authorities, pers. comm.). Additionally there is a resettlement program planned to relocate 120 families from a threatened terrain of the Da River in Mai Chau District in 2013 (Fig. 6). The disturbance from construction was very high, caused by using heavy equipment vehicles and high numbers of workers.

Limestone quarrying

Limestone quarrying for construction and the opening of trails for tracks destroy larger areas. The extraction work creates a high disturbance (Fig. 7). An intensifying of the quarrying is planned. The quarrying area is close to the home range of a langur group.



Fig.6. The construction of a new estate in front of Quan Le Mountain for the translocation of 120 families. Photo: Filip Wojciechowski.



Fig.7. The effect of limestone quarrying. Photo: Filip Wojciechowski.

Discussion

Limitations of methodology

Delacour's langurs are difficult to study in the wild because of the extremely rough and inaccessible karst (Workman, 2010; Ebenau et al., 2011). Point transect sampling are recommended from other studies in similar habitats (Haus et al., 2009; 2010). With the limited time and staff capacity we could not afford transect sampling. This method would be also of low efficiency through the very difficult terrain, low visibility and subpopulation density. Interviews with local people are a cost-effective method for assessing poorly populations (Hines et al., 2005; Meijaard et al., 2011). However the reliability of our data could be affected by recall ability, causing either underestimation or overestimation of individuals within the groups, mixing up the period of sightings or places where they noted the presence of Delacour's langurs.

Distribution and group size

Inferred subpopulation size of Delacour's langur in Dong Tam Commune is 34 individuals in 6 groups, constituting a considerable part of the world's population of this species. This is a significantly larger number than the 14 individuals mentioned in previous studies in Dong Tam Commune (Ebenau et al., 2011). We recorded infants in 4 groups, so these are probably viable groups and will increase in size. The number of individuals in groups of the study area is consistent with Delacour's langur in a normal population density, claimed as 9 (Nadler et al., 2003). The daily movements of Delacour's langur was estimated as 666.3 m per day in VLNR (Nguyen Vinh Thanh & Le Vu Koi, 2006) and this distance is similar to other groups of colobines, which move on average between 500 to 600 meters per day, (Struhsaker & Leland, 1987). Based on these facts and our sightings it can be assumed that the the langurs have relatively large home ranges in this area.

One langur with radio collar was seen in the area. It was one of the three released individuals in VLNR in 2011. It potentially shows the suitability of this forest for new reintroduced langurs.

Threats to the Delacour's langur

It is not clear whether langur poaching still exists in the area and how the population is affected. The forest cover is highly affected by human activities, especially by goat grazing. Goats can damage vegetation as well as compete for food with langurs (Nadler et al., 2003). The scale of logging and collection of forest products seems to be less destructive to the habitat. The langurs in the area of Quan Le Village are highly affected by growing settlements and limestone quarrying.

Patrols by rangers and community guards in the area are insufficient and rare.

Conclusions

The subpopulation of Delacour's langur in Dong Tam Commune holds 6 groups comprising of 34 to 51 individuals. This is roughly 20% of the entire population of the species. The involvement of this area as an extension of Van Long Nature Reserve would be a considerable support for the conservation for one of the world's rarest primates.

Current conservation activities should focus on:

- education activities for local people about the importance of the area and the conservation of the Delacour's langur,
- the establishment of a monitoring program of this subpopulation by local people,

- strengthening the efforts of rangers and guards, increasing patrol activities and intensifying the law enforcement.

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