

HERPETODIVERSITY OF XUAN SON NATIONAL PARK (PHU THO PROVINCE): NEW FINDINGS

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Xuan Son National Park in the Phu Tho Province in northern Vietnam is notable for its high plant and animal diversity. Apparently, the richness of the Park flora and fauna is accounted for its fortunate location at the south-eastern extremity of the Hoang Lien mountain ridge, where the slate rocks meet the limestone karst massifs. This contact creates not only the very diverse picturesque landscapes of the Park but also a variety of habitats that refuge a rich herpetofauna. The additional interest to the fauna of Xuan Son NP is also caused by its closeness to the junction of the two major watercourses of northern Vietnam, Red River and Black River, which are considered as important zoogeographic boundaries in Indochina (Orlov, Ananjeva, 2007; Bain, Hurley, 2011). A number of rare and endangered amphibians and reptiles inhabit Xuan Son NP, including several recently discovered species, for example, the newt *Tylototriton vietnamensis* Böhme, Schöttler, Nguyen & Köhler, 2005 (Nguyen et al., 2009), the frogs *Odorrana orba* (Stuart & Bain, 2005) and *Leptotalax firthi* Rowley, Hoang, Dau, Le & Cao, 2012, the skink *Sphenomorphus cryptotis* Darevsky, Orlov & Ho, 2004 and the pit viper *Trimeresurus honsonensis* (Grismer, Ngo & Grismer, 2008), all recorded by Nguyen et al. (2013). Our field survey in 2014 allowed us to extend the list of amphibians and reptiles which are encountered in the Park. Some new interesting findings may further evidence the remarkable biodiversity of Xuan Son NP.

I. STUDY SITE AND METHODS

The field survey was taken out from 27 June to 7 July 2014 in several forested and rural areas of the Park: in the vicinity of the village Du (Tan Son District, Xuan Son Commune, approximate coordinates 21°07'28" N, 104°57'28" E, elevation 440 m a.s.l.), in the primary forest on the slate hills between the villages Du and Lap (21°08'12" N, 104°57'04" E, elevation 430 m a.s.l.), in the primary forest on the limestone karst hills in the vicinity of the villages Du (21°06'42" N, 104°57'25" E, elevations 420–900 m a.s.l.) and Lap (21°08'24" N, 104°56'26" E, elevation 240 m a.s.l.).

During the survey the temperature varied from 25.5°C (at night) to 30–31°C (at day), the rains were regular in afternoons and nights.

The inventory of amphibian and reptile fauna as well as anuran larvae was conducted during the day and night surveys. Additionally, series of 10 pit-fall traps were installed in the dipterocarp forest on slate hills and in the limestone massif near the village Du. All collected specimens were photographed in life and then preserved in ethanol (for adult specimens) or formalin (for larvae) after the sampling for genetic analysis.

II. RESULTS

During our survey we registered 47 species, including 21 amphibians and 26 reptiles (Table 1), some of which were not previously recorded in the Park.

Table 1

The list of amphibians and reptiles recorded in Xuan Son National Park during the field survey in June - July 2014

№	Species	Habitat			
		DFS	FLK	RS	RAA
class AMPHIBIA					
order Anura					
fam. Bufonidae					
1	<i>Duttaphrynus melanostictus</i> (Schneider, 1799)	+			+
fam. Megophryidae					
2	<i>Leptolalax</i> cf. <i>bourreti</i> Dubois, 1983		+		
3	<i>Ophryophryne pachyproctus</i> Kou, 1985		+	+	
4	<i>Xenophrys major</i> (Boulenger, 1908)	+	+	+	
fam. Dicroglossidae					
5	<i>Fejervarya limnocharis</i> (Gravenhorst, 1829)	+	+		+
6	<i>Hoplobatrachus rugulosus</i> (Wiegmann, 1834)				+
7	<i>Limnonectes bannaensis</i> Ye, Fei, Xie & Jiang, 2007			+	
fam. Ranidae					
8	<i>Amolops ricketti</i> (Boulenger, 1899)		+	+	
9	<i>Hylarana guentheri</i> (Boulenger, 1882)	+			
10	<i>Odorrana</i> cf. <i>orba</i> (Stuart & Bain, 2005)			+	
11	<i>Rana johnsi</i> Smith, 1921	+			
fam. Rhacophoridae					
12	<i>Chiromantis vittatus</i> (Boulenger, 1887)			+	
13	<i>Kurixalus odontotarsus</i> (Ye & Fei, 1993)	+	+		+
14	<i>Polypedates megacephalus</i> Hallowell, 1861	+	+	+	+
15	<i>Rhacophorus dennysi</i> Blanford, 1881		+		
16	<i>Rhacophorus kio</i> Ohler & Delorme, 2006	+			
17	<i>Rhacophorus orlovi</i> Ziegler & Köhler, 2001		+	+	
18	<i>Theloderma asperum</i> (Boulenger, 1886)	+	+		
fam. Microhylidae					
19	<i>Microhyla butleri</i> Boulenger, 1900		+	+	+
20	<i>Microhyla fissipes</i> (Boulenger, 1884)	+	+		+
21	<i>Microhyla heymonsi</i> Vogt, 1911	+			+
class REPTILIA					
order Squamata – Sauria					
fam. Agamidae					
22	<i>Acanthosaura lepidogaster</i> (Cuvier, 1829)	+	+		
23	<i>Draco maculatus</i> (Gray, 1845)				+
24	<i>Pseudocalotes microlepis</i> (Boulenger, 1887)		+		
fam. Lacertidae					
25	<i>Takydromus sexlineatus</i> Daudin, 1802				+
fam. Scincidae					
26	<i>Eutropis longicaudata</i> (Hallowell, 1856)				+

27	<i>Lipinia vittigera</i> (Boulenger, 1894)	+			
28	<i>Plestiodon tamdaoensis</i> (Bourret, 1937)		+	+	
29	<i>Sphenomorphus cryptotis</i> Darevsky, Orlov & Ho, 2004		+	+	
30	<i>Sphenomorphus</i> cf. <i>indicus</i> (Gray, 1853)		+		
31	<i>Tropidophorus hainanus</i> Smith, 1923		+		
order Squamata – Serpentes					
fam. Pareasidae					
32	<i>Pareas monticola</i> (Cantor, 1839)	+	+		
fam. Colubridae					
33	<i>Boiga guanxiensis</i> Wen, 1998			+	
34	<i>Calamaria</i> cf. <i>pavimentata</i> Duméril, Bibron & Duméril, 1854	+			
35	<i>Calamaria</i> sp.	+			
36	<i>Cyclophiops multicinctus</i> (Roux, 1907)		+		
37	<i>Lycodon ruhstrati</i> (Fischer, 1886)	+			
38	<i>Oligodon chinensis</i> (Günther, 1888)	+			+
39	<i>Oligodon lacroixi</i> Angel & Bourret, 1933	+			
fam. Natricidae					
40	<i>Amphiesma craspedogaster</i> (Boulenger, 1899)			+	
41	<i>Amphiesma</i> cf. <i>modestum</i> (Günther, 1875)		+	+	
42	<i>Sinonatrix percarinata</i> (Boulenger, 1899)				+
43	<i>Xenochrophis flavipunctatus</i> (Hallowell, 1861)			+	+
fam. Elapidae					
44	<i>Bungarus multicinctus</i> Blyth, 1860				+
45	<i>Sinomicrurus maccllellandi</i> (Reinhardt, 1844)	+			
fam. Viperidae					
46	<i>Protobothrops mucrosquamata</i> (Cantor, 1839)		+		
47	<i>Trimeresurus stejnegeri</i> Schmidt, 1925	+	+	+	

Habitat designations:

DFS (dipterocarp forest on slate hills) – lowland primary polydominant forest with the abundance of *Dipterocarpus* sp., with closed canopy and thick underbrush, on the slate hills at elevations up to 450 m a.s.l.

FLK (forest on limestone karst) – lowland and submontane primary polydominant forest with the predominance of Elaeocarpaceae, Lauraceae, Moraceae, Sabiaceae, Anacardiaceae, etc., on limestone karst massifs, with thick underbrush and abundance of limestone rocks, at elevations from 240 to 900 m a.s.l.

RS (rivers and streams) – Riverbeds, banks and overhanging vegetation of the rivers and forest streams in slate hills and limestone rocks at elevations from 240 to 420 m a.s.l.

RAA (rural and agricultural areas) – villages, roads, fields and gardens, clearings and small artificial ponds in the environs of the villages Du and Lap, elevations from 240 to 420 m a.s.l.

Taking into account the data of the previous herpetological investigations (Nguyen et al., 2013), the fauna of the Xuan Son NP numbers at least 63 species of amphibians and reptiles (31 and 32, respectively).

By preliminary estimation, the herpetofauna of Xuan Son NP is composed of the representatives of two main ecological complexes. The first one embraces the widely distributed species which are characterized by high ecological plasticity and are rather common throughout the country, including highly disturbed natural habitats, as well as agricultural and rural areas (Orlov, Ananjeva, 2007; Poyarkov, Vassilieva, 2012). Among them are, for example, the toad *Duttaphrynus melanostictus*, the frogs *Fejervarya limnocharis*, *Hoplobatrachus rugulosus*, *Microhyla butleri*, *M. fissipes*, *M. heymonsi* and *Polypedates megacephalus*, the lizards *Eutropis longicaudata* and *Takydromus sexlineatus*, the snakes *Sinonatrix percarinata*, *Xenochrophis flavipunctatus* and *Oligodon chinensis*.

The forest and aquatic faunistic complexes are more diverse than the ubiquitous one (40 vs 15 species, respectively) and are composed of the rather stenoecic species that are more selective and exigent to their habitat and are quite sensitive to the disturbance of natural ecosystems. In Xuan Son NP among them are, for example, the megophryid frogs (*Leptolalax*, *Ophryopyrne*, etc.) whose life is strictly associated with clear forest streams, as well as some arboreal frogs (*Kurixalus*, *Rhacophorus*) and the hollow-breeding *Theloderma* (Rhacophoridae). Some of our findings on amphibians are new not only for the Xuan Son NP, but also for the province Phu Tho, that allows to widen the distribution areas of certain species, for example, *Leptolalax bourreti*, *Kurixalus odontotarsus*, *Rhacophorus kio*, *R. orlovi*.

Among forest reptiles quite interesting findings were, for example, the relatively rare agamid lizard *Pseudocalotes microlepis*, previously known in Vietnam only from the provinces Bac Kan, Quang Ninh, Da Nang and Lam Dong (Nguyen et al., 2009), and the brightly colored skink *Plestiodon tamdaoensis*, which was also not previously recorded from Phu Tho Province. Another surprising finding was the rare colubrid snake *Oligodon lacroixi* encountered in southern China but known in Vietnam only from its type locality in Sa Pa (Lao Cai Province) (Nguyen et al., 2009; Orlov et al., 2010). Its congeneric *Oligodon chinensis* was also recorded for Phu Tho Province for the first time, although this species was rather numerous in rural habitats. A brightly colored and quite dangerous elapid *Sinomicrurus maccllellandi* was added to the Park faunistic list.

The fauna of the forests on limestone rocks in the Park is especially rich in frog, lizard and snake species, possibly because of the abundance of suitable shelters, high humidity and quite difficult accessibility for humans and cattle. The very rich hydrographic net of the park, which includes rivers, large and small forest streams, waterfalls and seasonal watercourses also favors the variety of ecological niches. Taking into account the great habitat diversity in the Park, we presume that the herpetodiversity of the Xuan Son NR is still greatly underestimated.

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ĐA DẠNG KHU HỆ BÒ SÁT VƯỜN QUỐC GIA XUÂN SƠN (TỈNH PHÚ THỌ): PHÁT HIỆN MỚI

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TÓM TẮT

Chuyến khảo sát thực địa tại Vườn Quốc gia Xuân Sơn vào tháng 6 - 7 năm 2014 được tiến hành nhiều loại môi trường sống (rừng nguyên sinh trên núi đá và núi đá vôi, sông suối và khu vực làng mạc) ở độ cao 240–900 m trên mực nước biển. Có 21 loài lưỡng cư và 26 loài bò sát đã được ghi nhận. Khu hệ bò sát của Vườn Quốc gia được đại diện bởi các loài phân bố rộng rãi có mặt ở khắp nơi trong rừng và các loài sống dưới nước. Các loài ếch *Leptolalax bourreti*, *Kurixalus odontotarsus*, *Rhacophorus kio*, *R. orlovi*; các loài thằn lằn *Pseudocalotes microlepis*, *Plestiodon tamdaoensis* và các loài rắn *Oligodon lacroixi*, *O. chinensis*, *Sinomicrurus maccllellandi* là những phát hiện mới quan trọng cho Vườn Quốc gia. Có lẽ là, sự đa dạng của môi trường tự nhiên trong Vườn Quốc gia đã dẫn tới tính đa dạng cao của khu hệ bò sát ở Xuân Sơn.