



**QUEEN'S
UNIVERSITY
BELFAST**

Delacour's langur (*Trachypithecus delacouri*) reintroduction program: A preliminary report on the trial release into the Trang An UNESCO World Heritage Site, Ninh Binh Province, Vietnam

Rabett, R., O'Donnell, S., Nguyen, T. M. H., & Nadler, T. (2020). Delacour's langur (*Trachypithecus delacouri*) reintroduction program: A preliminary report on the trial release into the Trang An UNESCO World Heritage Site, Ninh Binh Province, Vietnam. *Vietnamese Journal of Primatology*, 3(2), 39-48. <http://www.primate-sg.org/vpj32/>

Published in:
Vietnamese Journal of Primatology

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights
Copyright 2020 the Authors. This work is made available online in accordance with the publisher's policies. Please refer to any applicable terms of use of the publisher.

General rights
Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Delacour's langur (*Trachypithecus delacouri*) reintroduction program: A preliminary report on the trial release into the Trang An UNESCO World Heritage Site, Ninh Binh Province, Vietnam

Tilo Nadler¹, Ryan Rabett², Shawn O'Donnell² and Nguyen Thi Mai Huong³

¹ Cuc Phuong Commune, Nho Quan District, Ninh Binh Province, Vietnam. Corresponding author: <t.nadler@hust.edu.vn>

² School of Natural and Built Environment, Queen's University Belfast, Elmwood Avenue, Belfast, BT7 1NN, Northern Ireland, UK. <r.rabett@qub.ac.uk; S.O'Donnell@qub.ac.uk>

³ Vietnam Academy of Social Sciences, Institute of Archaeology, 61 Phan Chu Trinh, Hoan Kiem, Hanoi, Vietnam. <ngynmaihuong@yahoo.com>

Key words: Delacour's langur, *Trachypithecus delacouri*, reintroduction

Summary

At the present time, the Van Long Nature Reserve Ninh Binh Province is home to the only viable sub-population of the 'Critically Endangered' Delacour's langur (*Trachypithecus delacouri*). The reserve contains about 200 individuals. The next largest sub-population of about 80 individuals exists in neighboring Ha Nam Province, in a currently unprotected area. Such small and isolated populations have heightened vulnerability to internal and external threats to their survival. The establishment of further sub-populations in suitable, secure and sustainable locations, therefore, is a crucial step towards helping to safeguard the survival of this species. Until the late 1990's a small population is known to have existed in the Trang An limestone massif, Ninh Binh Province. In 2014 Trang An was inscribed as UNESCO World Heritage Site. With strict protection of the area now in place and the existing and excellent habitat that the massif offers for Delacour's langurs, the establishment of a new sub-population here was recommended soon after its inscription and is included in the "Urgent Action Plan for the Conservation of Primates in Vietnam until 2020, Vision 2030". The Endangered Primate Rescue Center (EPRC), located in Cuc Phuong National Park, started breeding programs for several species of highly endangered primates in 1993, with the goal of releasing captive born individuals to support depleted wild populations or to establish new populations where the species has been extirpated. In 2017 a collaborative venture between local, national and international stakeholders was initiated to set in motion a reintroduction program for Delacour's langurs in Trang An. In August 2020, a group of three captive-born Delacour's langurs was transferred to an island in the World Heritage Site as a first step towards a possible re-establishment of a sub-population in this area.

Chương trình chuyển giao loài vọc mông trắng (*Trachypithecus delacouri*): Chương trình thử nghiệm tại Di sản Thế giới UNESCO Tràng An, tỉnh Ninh Bình, miền Bắc Việt Nam - báo cáo sơ bộ.

Tóm tắt

Khu bảo tồn thiên nhiên đất ngập nước Vân Long, tỉnh Ninh Bình là nơi sinh sống của quần thể lớn nhất loài vọc mông trắng 'Cực kỳ nguy cấp' với khoảng 200 cá thể. Một quần thể khác đang tồn tại ở tỉnh Hà Nam, vùng lân cận trong một khu vực hiện chưa phải là khu bảo tồn với khoảng 80 cá thể. Những quần thể nhỏ và biệt lập như vậy luôn có nguy cơ bị ảnh hưởng bởi nhiều tác động tiêu cực có thể xảy ra. Việc thiết lập thêm một vài quần thể khác sẽ đảm bảo sự tồn tại lâu dài cho loài. Đến cuối những năm 1990 ở Tràng An, tỉnh Ninh Bình đã có một quần thể nhỏ loài này sinh sống. Năm 2014, danh lam thắng cảnh này đã được Tổ chức Giáo dục, Khoa học và Văn hóa của Liên hợp quốc (UNESCO) công nhận là Di sản Hỗn hợp Thế giới.

Introduction

The Delacour's langur (*Trachypithecus delacourii*) is one of three primate species endemic to Vietnam that are also listed as 'Critically Endangered' (IUCN 2019) and was included in the list of "The World's 25 Most Endangered Primates" (Mittermeier et al. 2000; 2012; Schwitzer et al. 2015; 2017). In the Van Long area, Ninh Binh Province, a Delacour's langur population was discovered in the early 1990's, and in 2001 the area was gazetted as Van Long Nature Reserve. Special protection against the effects of habitat destruction and poaching that the Vietnam Primate Conservation Program has been able to afford this species in the Van Long Nature Reserve has had a significant impact on population numbers there. With the help of two pilot projects (in 2011 and 2012) to augment the existing population through the release of captive born individuals, this has led to an increase from c.50 individuals to a secure count of 176-184 individuals (Agmen, 2014; Elser 2013; Elser et al. 2015; Nadler 2012; Nguyen Van Linh et al. 2019). The next largest surviving sub-population, of about 80 individuals, exists in neighbouring Ha Nam Province, in a currently unprotected area (Kim Bang). The impact of deleterious genetic defects is likely to have limited effect as the course and speed of the current decline suggests that extirpation is more likely to have occurred as a consequence of other pressures before the inbreeding coefficient increases sufficiently to become a significant factor (Nadler et al. 2020). Other internal pressures, such as disease-load, will have a bearing, but it is external factors – loss of food staples to plant disease, habitat conversion or destruction, or direct exploitation as a result of poaching – that have had a devastating impact on population numbers in recent decades, and are likely to remain the principal source of risk to future survival. In this context ensuring sustainable, protected conditions for existing groups and establishing new sub-populations represent essential steps towards securing the continued existence of this species (Nadler 2015a; Nadler et al. 2020). In this report we document recent efforts that have been made towards reintroducing Delacour's langur into part of its former range; specifically, into a secure area of forested limestone tower karst in a protected area of Ninh Binh Province: the Trang An Landscape Complex World Heritage Site.

Previous surveys and anecdotal evidence indicates that a small sub-population of Delacour's langurs existed in Trang An until the late 1990's (Fig. 1). When Trang An was inscribed on the World Heritage List under Criteria (v) (vii) (viii) (World Heritage Committee 2014), this created an area of 6,226 ha (the property's 'core zone') that is managed and protected under stringent government and international regulations. By 2018, Trang An had developed into a national tourism highlight, attracting more than 2.9 million visitors, the majority of whom view the property from traditional sampans (Hayashi et al. 2019). With this area protected and with the suitable habitat it affords Delacour's langurs, the establishment of a new sub-population was recommended by Nadler (2015b). In 2017 collaboration between local, national and international stakeholders set in motion a trial reintroduction program in Trang An modelled on the successful program in the Van Long Nature Reserve. These efforts further represent a direct response to the Vietnamese Government's "Urgent Action Plan for the Conservation of Primates in Vietnam until 2020, Vision 2030" (Prime Minister of Government 2017); and accord closely to UN Sustainable Development Goals 12.8, 15.4, 15.5, 15c, 17.17, and Aichi Biodiversity Strategic Goal C (Target 12).



Fig.1. The impressive scenic landscape of Trang An World Heritage Site housed decades ago a population of Delacour's langurs. Photo: Trang An World Heritage Site.

Methods

Source of animals for a reintroduction program

In 1993, the Vietnam Primate Conservation Program started as a project of the Frankfurt Zoological Society. One part of the project was the establishment of the Endangered Primate Rescue Center (EPRC) in Cuc Phuong National Park. The aim of the center was then and remains: to house endangered primates confiscated from the illegal wildlife trade in order to support the rangers of the forest protection agencies throughout the country with the possibility of housing confiscated animals. This possibility improved the rangers' motivation to confiscate animals from the illegal wildlife trade and relieved the rangers of protracted animal care.

For several highly endangered primate species, confiscated animals were used as founders for breeding programs at the EPRC, with the aim of releasing captive born animals to support depleted wild sub-populations or to establish new ones in areas where the species extirpation had occurred. The Delacour's langur, as a Vietnamese endemic species, has been a focus of the EPRC's breeding program and has been running successfully, with more than 30 births in captivity at the Center. In addition to the EPRC's 50 cages (total area of >3000m²) the Center also has access to two adjacent semi-wild areas, 2 and 5 ha in area, which contain primary forest and can be used as a training ground for the langurs before release into the wild.

Selection of a release site

When comprehensive surveys were undertaken during the 1990's, a total of 19 isolated sub-populations of the Delacour's langur were discovered (Nadler 1996). All of these sub-populations have decreased in an extremely short period particularly as a result of illegal hunting, with at least ten groups extirpated in the first decade of the 21st century (Nadler 2015a; 2015b). In addition to the provision of an appropriate area of habitat, the unconditional requirement for a primate reintroduction program is the elimination of poaching. The natural and legal provisions in Trang An met these requirements (Nadler 2015b).

Releasing primates in order to establish a new sub-population is a protracted process that

requires long-term financial and staffing commitments, detailed planning and preparation, and dedicated and sustained monitoring. A first step towards a final decision on reintroduction in Trang An has been the transfer of a small group of Delacour's langurs to an uninhabited forested island (20°25'N/105°90'E) 1.5 ha in area within the property's core zone (Fig. 2). The positive benefits to this transfer are as follows:



Fig.2. The "Ngoc Island" in Trang An World Heritage Site was selected as a semi-wild area for a group of Delacour's langurs. Photo: Trang An World Heritage Site.

- ❑ The visitor numbers to the Trang An UNESCO World Heritage Site are such that it is not only a tourist destination for Ninh Binh Province, but for the whole country. The opportunity to observe langurs in their natural environment in the wild contributes to raising public awareness of conservation issues and the status of this species in particular. This project and the need to protect the flora and fauna of Vietnam are also presented in an accompanying poster exhibition and documentary at the Trang An Visitor Center (Fig. 3). With more than 60 park staff trained in conservation practice ahead of the release, there is also a growing knowledge-base that can help provide informed guidance for visitors.
- ❑ The presence of one of the world's rarest primates is an additional significant attraction for this World Heritage Site, marking an economic boost as well as a boost to its conservation and biodiversity credentials.
- ❑ Observing a group of Delacour's langurs in their natural habitat under favorable conditions provides a good opportunity to study the species and collect biological information as a background for further reintroduction.
- ❑ The keeping of Delacour's langurs on an island in Trang An with easy but controlled access, allows the management of this group at any time – e.g. through a possible exchange of animals or for any necessary treatments.
- ❑ The transfer of the three individuals opens up space within the facilities of the EPRC, especially in the semi-wild areas, for animals currently kept in cages. This creates an opportunity for more animals to experience living under natural conditions.
- ❑ The transfer will reduce costs and workload at the EPRC by reducing the amount of food and care. Commensurately, it provides security and management staff within Trang An not only with first-hand experience but also information regarding logistical costs and revenue projections that can be incorporated into strategic planning.



TRĂNG AN

QUẦN THỂ DANH THẮNG TRĂNG AN LANDSCAPE COMPLEX

Di sản Văn hóa và Thiên nhiên Thế giới
 Năm 2014, Ủy ban Di sản Thế giới - Tổ chức Giáo dục, Khoa học, Văn hóa Liên Hợp Quốc - UNESCO đã ghi nhận Quần thể danh thắng Tràng An vào Di sản thế giới có tổng diện tích 12,54 ha.

Quần thể danh thắng Tràng An ngự tại một cảnh quan nơi đã và hiện đang ẩn chứa nhiều, không chỉ có những báu vật tự nhiên mà còn là nơi lưu giữ và bảo vệ nghiêm ngặt các giá trị di sản sinh học. Hơn nữa, các kết quả nghiên cứu khảo cổ học, địa chất (làng, khu vực này là nơi sinh sống của người tiền sử cách đây hơn 30.000 năm, tạo nên một quá trình lịch sử văn hóa lâu đời.

World Cultural and Natural Heritage
 In 2014, the World Heritage Committee of the United Nations - UNESCO - inscribed Trang An Landscape Complex on the list of the World Heritage. With its buffer zone covers a total area of about 12.54 ha.

Trang An exhibits an outstanding humid tropical limestone tower karst landscape which is not only considered to be of global geological significance but also of major ecological importance as it provides a home for an astonishing and unique diversity of fauna and flora. Furthermore, archaeological discoveries have shown that people have lived for more than 30,000 years in the area, reflecting a long cultural history.

IP PHOTO BY NGUYỄN THỊ HỒNG
 A BUREAU D'APPUI AU DÉVELOPPEMENT DURABLE LIÉ À LA PRIMAATIQUE (GÉNÉRALISTE) / PALEONTOLOGIE, QUÉBEC / UNIVERSITÉ TÉLÉQUÉBEC, INC.



TRĂNG AN

ĐIỂM ĐẾN DU LỊCH ĐẶC SẮC A TOURISM HIGHLIGHT

Hàng năm, Quần thể danh thắng Tràng An đón hàng triệu du khách Việt Nam và quốc tế từ thành phố, thường ngoạn phong cảnh sơn kỳ, thủy tú nơi đây.

Du khách sẽ được băng bèo trên những con thuyền nhỏ xuyên qua các hang động, thưởng lang hoa muông trong cảnh sắc núi sông hùng vĩ, tan hưởng bầu không khí thanh như lụa, thướt khiết, tinh trong.

Nơi đây có cảnh quan thiên nhiên an toàn để bảo tồn di sản sinh học và duy trì môi trường sống cho các sinh vật hệ núi đá vôi.

Tràng An là nơi có tiềm năng lớn về du lịch sinh thái ở Việt Nam.

Hundreds of thousands of Vietnamese and foreign tourists enjoy the fascination of Trang An's unique landscape every year.

The tour with small boats passes through caves and corners of the underground water system, conveying hereby an impressive experience about the majestic karst rock system.

The area provides a secure environment for the conservation of biodiversity and limestone habitats.

Trang An exemplifies the potential of an ecotourism destination in Vietnam.

IP PHOTO BY NGUYỄN THỊ HỒNG
 A BUREAU D'APPUI AU DÉVELOPPEMENT DURABLE LIÉ À LA PRIMAATIQUE (GÉNÉRALISTE) / PALEONTOLOGIE, QUÉBEC / UNIVERSITÉ TÉLÉQUÉBEC, INC.



LA MỘT TRONG NHỮNG LOÀI LINH TRƯỞNG này hiện nay chỉ còn lại được số lượng danh sách "Cực kỳ Nguy cấp" trong Các loài bị đe dọa của Tổ chức Bảo tồn Thiên nhiên Quốc tế (IUCN).
 The Delacour's langur is one of the world's most endangered and is listed as "Critically Endangered" by the IUCN's Red List of Threatened Species.

Voice monitoring chỉ sinh sống ở Việt Nam. Tổng số của loài này còn trong tự nhiên khoảng gần 300 cá thể.
 Delacour's langur exists only in Vietnam, with a total of less than 300 individuals.

Chuyên gia nuôi dưỡng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.
 The aim of the langur reintroduction initiative in Trang An is to release a small number of captive bred individuals into a specific area of Trang An.

Voice monitoring sống theo bầy đàn. Một đàn thường có một con đực làm đàn đầu và các con cái và các con con của chúng.
 Delacour's langurs live in family groups. A group can comprise one male, several females, and their offspring.

Voice monitoring có màu vàng cam đặc trưng, các mắt màu trắng và đôi lông mày màu đỏ-trắng ở một không khí là màu đen trắng.
 Rabbits are brown in bright yellow fur and change during one year to the unique black and white coloration.

Voice monitoring có màu trắng sáng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.
 Delacour's langur live in family groups. A group can comprise one male, several females, and their offspring.

Voice monitoring có màu trắng sáng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.
 Delacour's langur live in family groups. A group can comprise one male, several females, and their offspring.

SỰ TRỞ VỀ CỦA LOÀI BIỂU TRƯỞNG THE RETURN OF A FLAGSHIP ANIMAL

Đến giữa những năm 1990, Quần thể danh thắng Tràng An đã là nơi sinh sống của loài linh trưởng quý hiếm nhất thế giới - loài vượn muông trắng (Delacour's langur), nhưng về nạn săn bắn trái phép đã xóa sổ quần thể di sản này.

Voice monitoring chỉ có thể được tìm thấy duy nhất ở Việt Nam. Tổng số của loài này còn trong tự nhiên khoảng gần 300 cá thể.

Voice monitoring sống theo bầy đàn. Một đàn thường có một con đực làm đàn đầu và các con cái và các con con của chúng.

Voice monitoring có màu trắng sáng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.

Đến giữa những năm 1990, Quần thể danh thắng Tràng An đã là nơi sinh sống của loài linh trưởng quý hiếm nhất thế giới - loài vượn muông trắng (Delacour's langur), nhưng về nạn săn bắn trái phép đã xóa sổ quần thể di sản này.

Voice monitoring chỉ có thể được tìm thấy duy nhất ở Việt Nam. Tổng số của loài này còn trong tự nhiên khoảng gần 300 cá thể.

Voice monitoring sống theo bầy đàn. Một đàn thường có một con đực làm đàn đầu và các con cái và các con con của chúng.

Voice monitoring có màu trắng sáng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.

Đến giữa những năm 1990, Quần thể danh thắng Tràng An đã là nơi sinh sống của loài linh trưởng quý hiếm nhất thế giới - loài vượn muông trắng (Delacour's langur), nhưng về nạn săn bắn trái phép đã xóa sổ quần thể di sản này.

Voice monitoring chỉ có thể được tìm thấy duy nhất ở Việt Nam. Tổng số của loài này còn trong tự nhiên khoảng gần 300 cá thể.

Voice monitoring sống theo bầy đàn. Một đàn thường có một con đực làm đàn đầu và các con cái và các con con của chúng.

Voice monitoring có màu trắng sáng trong các khu vực rừng núi để sinh sống và thực hiện công tác bảo tồn loài.

IP PHOTO BY NGUYỄN THỊ HỒNG
 A BUREAU D'APPUI AU DÉVELOPPEMENT DURABLE LIÉ À LA PRIMAATIQUE (GÉNÉRALISTE) / PALEONTOLOGIE, QUÉBEC / UNIVERSITÉ TÉLÉQUÉBEC, INC.



CHÉ CỎ VIỆT NAM
 Voice Cáo Bả
Rachyophloeus pallicoloratus

CHÉ CỎ VIỆT NAM
 Voice Mũi Đũa
Trachypithecus auratus

CHÉ CỎ VIỆT NAM
 Voice Mông Trông
Delacour's langur

Vượn chà và chà xam
 Grey-shanked douglang
Pygathrix cinerea

Vượn đen tuyền pha đỏ
 Eastern black gibbon
Nomascus nasutus

KẾ HOẠCH HÀNH ĐỘNG CHO LINH TRƯỞNG AN ACTION PLAN FOR PRIMATES

Việt Nam là quốc gia có số lượng các loài linh trưởng cao nhất trong lục địa Đông Nam Á với 25 loài linh trưởng phân bố. Trang An là địa điểm liệt trong danh sách "25 loài Linh trưởng Nguy cấp nhất thế giới".

Chính phủ Việt Nam đã khẳng định trách nhiệm bảo tồn các loài linh trưởng thông qua Kế hoạch hành động bảo tồn thiên cấp các loài linh trưởng ở Việt Nam đến năm 2025, tầm nhìn đến năm 2030 phê duyệt trong năm 2017.

Tất cả các loài linh trưởng ở Việt Nam đều được pháp luật bảo vệ. Các hành vi săn bắn, bẫy bả, buôn bán và nuôi giữ các loài linh trưởng đều bị nghiêm cấm.

25 primate species occur in Vietnam, the highest number in Southeast Asian countries on the continental mainland.

The Government of Vietnam recognizes its responsibility for the survival of these primates and passed in 2017 the "Urgent Conservation Action Plan for Primates in Vietnam to 2025, Vision to 2030" to save the species from extinction.

All primates in Vietnam are protected by law. Hunting, trading and keeping is strictly prohibited.

IP PHOTO BY NGUYỄN THỊ HỒNG
 A BUREAU D'APPUI AU DÉVELOPPEMENT DURABLE LIÉ À LA PRIMAATIQUE (GÉNÉRALISTE) / PALEONTOLOGIE, QUÉBEC / UNIVERSITÉ TÉLÉQUÉBEC, INC.

Fig.3. A poster exhibition inform visitors about the value of Trang An World Heritage Site and the conservation activities for the Delacour's langur.

Vegetation survey

In order to ensure that sufficient food resources exist on the island release site for the Delacour's langur (a leaf-eating species of primates) vegetation surveys were carried out on-site in September 2017 and again in December 2018 (O'Donnell & Nguyen Thi Mai Huong 2017; Rabett et al. 2019). These surveys established that one of the most abundant families of plant on the island is Moraceae (predominantly *Ficus*) (Table 1). This alone accounts for more than 30 per cent of the around 70 preferred species of plant in the diet of wild Delacour's langurs (Nadler & Brockman 2014; Workman 2010). The remainder of the open limestone scrub on the island comprises shrubs and woody climbers in the plant families Annonaceae, Rutaceae, Leguminosae, Cornaceae, Vitaceae and Rubiaceae. Additional observations in the limestone vegetation of adjacent mainland areas included several other plant species that are recorded by Workman (2010) to be important food resources for Delacour's langurs in the Van Long Nature Reserve: *Broussonetia papyrifera* (Moraceae), *Alangium kurzii* (Cornaceae), *Lantana camara* (Verbenaceae) and *Mallotus philippensis* (Euphorbiaceae). The presence of these plants is further indication that suitable habitat elements utilized by this species of langur exist within the Trang An landscape. As such, the immediate and local surveys undertaken in the lead-up to the trial release give good reason to expect that there will be appropriate plant resources to support the initial group and encouraging evidence for potential future phases in the reintroduction program.

Table 1. Plant species and families obtained from field observations on the Trang An island release site in September 2017 and December 2018 (O'Donnell & Nguyen Thi Mai Huong, 2017).

Species	Family	%
<i>Desmos</i> aff. <i>chinensis</i>	Annonaceae	30
<i>Boehmeria</i> sp.	Urticaceae	20
<i>Ficus</i> spp.	Moraceae	15-20
<i>Alangium</i> aff. <i>chinensis</i>	Cornaceae	15
<i>Zanthoxylum</i> aff. <i>nitidum</i>	Rutuaceae	10
<i>Dasymaschalon rostratum</i>	Annonaceae	3-5
<i>Dracaena</i> aff. <i>cochinchinensis</i>	Asparagaceae	3-5
<i>Mallotus</i> spp.	Euphorbiaceae	3-5
<i>Bauhinia</i> sp.	Leguminosae	3-5

Preparation for the transfer of the Delacour's langurs from the Endangered Primate Rescue Center to Trang An World Heritage Site

A group of three Delacour langurs (a male and two females) born in captivity was selected for the transfer:

Male	Date of birth: 13.05.2013
Female	Date of birth: 10.10.2015
Female	Date of birth: 24.02.2018

In April 2020, the animals were moved from a cage at the EPRC to the 5 ha semi-wild area at the Center to help them familiarize them with the natural substrate. Whilst here they were also trained daily by a whistle to return to a cage that was set within the area and take a small bite of sweet potato. At the end of June, during a detailed health check following the IUCN Guidelines (Baker 2002), and ahead of the transfer to Trang An planned for August 2020, it was determined that the older female was pregnant with a fetus about seven weeks along. In order to avoid stress for the animal it was decided to postpone the island transfer. However, during a further routine health check in July it was found that the female had unfortunately lost the fetus for no evident cause. It was therefore decided that an August transfer could be carried out as originally planned.

On the island itself an area was selected to set up a cage where the animals would stay briefly after transfer and to which they would be called back subsequently for management or treatment. This portable cage (3m x 4m x 2.5m) was designed, built and transported to the island in mid-August (Fig. 4, 5). Three guards under the employment of the Trang An Management Board received a week of training at the EPRC that prepared them to deal with feeding the animals during the short period of time they would remain in the cage, and how to call the animals back after they have been released.



Fig.4. Transport of the cage parts to the island in Trang An World Heritage Site. Photo: Tilo Nadler.



Fig.5. Erecting the cage on the island. Photo: Tilo Nadler.

Transfer of the langurs and release

For the island transfer, which took place on 27th August, the animals were caught and transported in individual boxes to Trang An, about 30 km away from the EPRC. After boat transport from the property's Main Wharf and Visitor Centre the animals were moved to the release cage (Fig. 6, 7). They were then allowed to acclimatize to the new surroundings over a period of 14 days before being released to range freely over the island on 9th September. In the days that followed the langurs were observed exploring the island and searching for food (Fig. 8). Every day at 9 am the animals are called back to the cage with a whistle, following the routine established in the EPRC. While to date this has not always been successful, overall the procedure has worked well. Occasionally, the animals will also return to stay in the open cage for a period during the day. Copulation of the langurs has already been observed and it is hoped that a first langur will be born on the island within the trial period.



Fig.6. Transportation of the animals to the island in Trang An World Heritage Site. Photo: Tilo Nadler.



Fig.7. Delacour's langur group after the move to the cage on the island. Photo: Tilo Nadler.

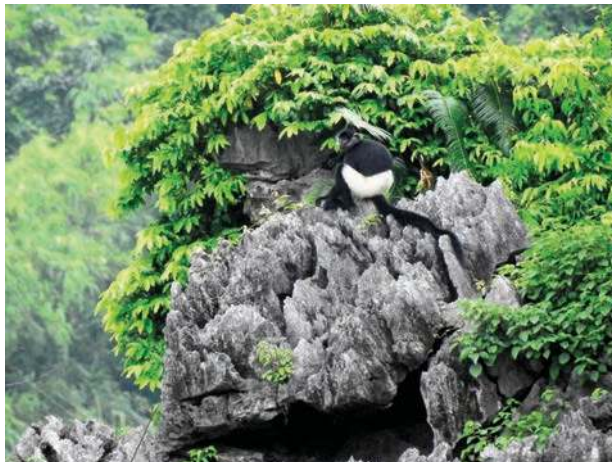


Fig.8. A Delacour's langur ranging across the island in Trang An. Photo: Tilo Nadler.

Monitoring of the langurs on the island

The langurs are closely monitored from a guard station on the mainland shore immediately adjacent to the island. The waters around the island are patrolled and it is currently the guards' responsibility to track the habits of the langur group, recorded as sightings in different squares of a spatial grid that takes in the whole island. This preliminary data will help establish preferred areas and food trees, as well as the group and the daily movements. The anticipated period for the initial release and associated monitoring is around 12 months. During which time a decision for further action will be made.

Conclusion

The trial reintroduction of Delacour's langurs into Trang An marks a positive step in an arc of conservation research that began almost 20 years ago, when the lead author conducted surveys in this area to assess the species' local status. Following recommendations for the establishment of a new sub-population in Trang An (Nadler 2015b), efforts to realise this ambition have brought together a wide variety of stakeholders, including partnership with an academic research project that is reconstructing the impact of palaeoenvironmental changes during Trang An's prehistory. This kind of novel collaboration highlights the potential value of extending dialogue across the traditional boundaries between scientific disciplines to help meet the challenges that face wildlife conservation today

Trang An presents an ideal site for this trial release not only because habitat conditions are well-suited and reserve is protected by stringent legislation, but also because of the existing socio-economic and ecotourism-based context of the property. Trang An has the benefit of a large relationship-network with local communities (Bui Van Manh & Pham Sinh Khanh 2018). As such the philosophy and returns that a project like this embodies will likely be familiar to many local residents. The aim is that these existing conditions, taken in combination with suitability and security, will provide a sound basis for establishing a new population of Delacour's langur here over the coming years; and a socio-economic outcome that will hopefully enable the trial release reported herein to follow a similar growth trajectory to that already witnessed in the Van Long Nature Reserve (Nguyen Van Linh et al. 2019). In building ecotourism as a sustainable local economy in Ninh Binh this initiative will hopefully not only mark an important step towards securing the future of this endemic species but also help to strengthen the heritage value of Trang An and the communities that depend upon it.

Acknowledgements

The trial release of Delacour's langurs into the Trang An World Heritage Site has involved numerous institutions, organizations, Government authorities and funding bodies to whom acknowledgement and gratitude is extended. These include: the Ninh Binh Provincial People's Committee, Ninh Binh Department of Tourism, Ninh Binh Forest Protection Department, Trang An Management Board, Vietnam Primate Conservation Program, Endangered Primate Rescue Center (EPRC), Cuc Phuong National Park, the IUCN Primate Specialist Group, Van Long Nature Reserve Management Board, Four Paws Viet Wildlife Conservation Center, Xuan Truong Construction Enterprise, and members of the SUNDASIA research project (led by Queen's University Belfast, Bournemouth University and the Vietnam Institute of Geoscience and Mineral Resources), the UK Arts and Humanities Research Council / Global Challenges Research Fund (GCRF) (grant to RR: AH/N005902/1), and the UK Innovation and Research-GCRF Global Impact Acceleration Award (grant: GCRF-GIAA18-19/Rabett).

Special thanks go to FOUR PAWS, an animal welfare organization based in Austria, and its subsidiary organization in Vietnam, Four Paws Viet Wildlife Conservation which generously provided financial support for this transfer project, and to Carsten Hertwig, Director of the organization's 'Sustainable Sanctuaries', for his commitment to the protection of wildlife in Vietnam. Many thanks also to Cuc Phuong National Park, host of the Endangered Primate Rescue Center, especially to Caroline Rowley, Director of the EPRC, Do Van Lap, Deputy Director of the National Park and Nguyen Manh Cuong, Head of the Scientific Department; and, in the case of Trang An World Heritage Site,

to Bui Van Manh, Deputy Director of Tourism and Pham Sinh Khanh, Deputy Director of the Trang An Management Board.

References

- Agmen FL** (2014): Conservation strategies for Delacour's langur (*Trachypithecus delacouri*) in Vietnam: Behavioural comparisons and reviewing a release. PhD thesis, Australian National University.
- Baker L** (ed.) (2002): Guidelines for Nonhuman Primate Re-introductions. Re-introduction NEWS 21. Special Primate Issue.
- Bui Van Manh & Pham Sinh Khanh** (2018): Local community engagement in the management of the Trang An Landscape Complex, World Heritage property and its relationship to tourism development. Paper presented at International Workshop on Sustainability and Tourism for Archaeological and Heritage Sites, Siem Reap, Cambodia, 5-8 February 2018.
- Elsner SK** (2013): Reintroduction of the 'Critically Endangered' Delacour's langur (*Trachypithecus delacouri*) in Van Long Nature Reserve. Diploma thesis, University Koblenz-Landau, Germany.
- Elsner SK, Nguyen Hong Chung & Brühl CA** (2015): Reintroduction of the 'Critically Endangered' Delacour's langur (*Trachypithecus delacouri*) into Van Long Nature Reserve, Ninh Binh Province, Vietnam. Vietnamese J. Primatol. 2(3), 1-13.
- Hayashi N, Clark B & Sneddon A** (2019): Report on the joint World Heritage Centre/ICOMOS/IUCN Reactive Monitoring mission to the UNESCO World Heritage property "Trang An Landscape Complex", Viet Nam (C/N 1438bis), 28 September – 3 October 2019 (<https://whc.unesco.org/document/183365>).
- IUCN Red List of Threatened Species.** <https://www.iucnredlist.org/search>
- Mittermeier RA, Konstant WR & Rylands AB** (2000): The World's Top 25 Most Endangered Primates. Neotropical Primates 8(1), 49.
- Mittermeier RA, Schwitzer C, Rylands AB, Taylor LA, Chiozza F, Williamson EA & Wallis J** (eds.) (2012) Primates in Peril: The World's 25 Most Endangered Primates 2012-2014. IUCN/SSC Primate Specialist Group, International Primatological Society, Conservation International and Bristol Conservation and Science Foundation, Bristol.
- Nadler T** (1996): Report on the distribution and status of Delacour's langur (*Trachypithecus delacouri*). Asian Primates 6(1-2), 1-4.
- Nadler T** (2012): Reintroduction of the 'Critically Endangered' Delacour's langur (*Trachypithecus delacouri*) – a preliminary report. Vietnamese J. Primatol. 2(1), 67-72.
- Nadler T.** (2015a): Delacour's Langur *Trachypithecus delacouri* (Osgood, 1932) Vietnam. In: Schwitzer C, Mittermeier RA, Rylands AB, Chiozza F, Williamson EA, Wallis J & Cotton A. (eds.). Primates in Peril: The World's 25 Most Endangered Primates 2014-2016; pp.53-55. IUCN SSC Primate Specialist Group (PSG), International Primatological Society (IPS), Conservation International (CI) and Bristol Zoological Society, Arlington, VA.
- Nadler T** (2015b): The critical status of the Delacour's langur (*Trachypithecus delacouri*) and the call for a National Action Plan. Vietnamese J. Primatol. 2(4), 1-12.
- Nadler T & Brockman D** (2014): Primates of Vietnam. Endangered Primate Rescue Center, Cuc Phuong National Park, Vietnam.
- Nadler T, Quyet LK, Rawson BM & Coudrat CNZ.** (2020): *Trachypithecus delacouri*. The IUCN Red List of Threatened Species 2020: e.T22043A17958988.
- Nguyen Van Linh, Mai Van Quyen & Nadler T** (2019): Rapid population increase of the 'Critically Endangered' Delacour's langur (*Trachypithecus delacouri*) in Van Long Nature Reserve due to strict protection. Vietnamese J. Primatol. 3(1): 3-18.
- O'Donnell S & Mai Huong NT** (2017) Island botanical survey. In the UNESCO State of Conservation Report by the State Party; pp. 78-81. <http://whc.unesco.org/document/165143>
- Prime Minister of Government** (2017): Approving Urgent Conservation Action Plan for Primates in Vietnam to 2020, Vision 2030. Decision 628/QĐ-TTg.
- Rabett R, Coward F, Van TT, Manh BV, Bachtsevanidou Strantzali I, Green E, Hill E, Holmes R, Kahlert T, Kelly C, Ludgate N, Macleod R, McAllister M, Tan NC, Trung ND, Hao NT, Loan NT, Mai Huong NT, O'Donnell S, Pyne-O'Donnell S, Redmond A, Khanh SP, Stimpson C, Quy TTK, Trang TTQ, Utting B, Verhoeven M, Linh VD, Linh VT & Lien VT** (2019): Human adaptation to coastal evolution: late Quaternary evidence from Southeast Asia (SUNDASIA) – A report on the second year of the project. Vietnam Archaeology 13, 23-48.
- Schwitzer C, Mittermeier RA, Rylands AB, Chiozza F, Williamson EA, Wallis J & Cotton A.** (eds.). (2015): Primates in Peril: The World's 25 Most Endangered Primates 2014-2016. IUCN SSC Primate Specialist Group (PSG), International Primatological Society (IPS), Conservation International (CI) and Bristol Zoological Society, Arlington, VA.
- Schwitzer C, Mittermeier RA, Rylands AB, Chiozza F, Williamson EA, Macfie EJ, Wallis J & Cotton A** (eds.). (2017): Primates in Peril: The World's 25 Most Endangered Primates 2016-2018. IUCN SSC Primate Specialist Group (PSG), International Primatological Society (IPS), Conservation International (CI), and Bristol Zoological Society, Arlington, VA.
- Workman C** (2010). Diet of the Delacour's langur (*Trachypithecus delacouri*) in Van Long Nature Reserve, Vietnam. Am. J. Primatol. 72(4), 317-324.
- World Heritage Committee** (2014): Decision: 38COM8B.14. WHC-14/38.COM/1 p.177-180. (<https://whc.unesco.org/archive/2014/whc14-38com-16en.pdf>).