

PROPOSAL

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REINTRODUCING THE NORTHERN WHITE-CHEEKED GIBBON (*NOMASCUS LEUCOGENYS*) INTO VIETNAM'S TRANG AN UNESCO WORLD HERITAGE COMPLEX

Reintroducing the Northern white-cheeked gibbon (*Nomascus leucogenys*) into Vietnam's Trang An UNESCO World Heritage Complex

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1. PROJECT ABSTRACT

The Northern white-cheeked gibbon (Nomascus leucogenys), now classified as a critically endangered species, once filled the lush forests of Vietnam with its melodious call. Unfortunately, the enchanting song of this species has been heavily silenced mainly due to habitat loss and poaching. In Vietnam and Laos, the species is now confined to isolated patches of forest while in China, the battle for their conservation has already been lost, with the species reported to be extinct a mere 2 decades ago. To address the urgent need to safeguard the species in the wild, our organization is in the process of establishing a reintroduction program into the Trang An UNESCO World Heritage Complex in Vietnam. This site is within the species natural range and holds the highest level of protection in Vietnam, providing unique opportunities for successful reintroduction, as demonstrated by our organization's previous achievements in translocating captive Delacour's langur in Trang An. The project also encompasses a targeted breeding program, education and outreach initiatives, stakeholder involvement and scientific research and monitoring. Our long-term vision is to establish a new viable population of Northern white-cheeked gibbons in Trang An by initially soft-releasing a breeding pair and subsequently expanding reintroduction activities in the area if successful. The first phase of the project, the pre-release phase, is essential as it lays the foundation for subsequent activities and ensures additional support. It involves candidate assessment for release, including reproductive, behavioral, genetic, and health checks, as well as site evaluation through habitat assessment. Stakeholder involvement is also a crucial component of this phase. The second phase of the project entails the actual soft-release of the gibbons into the designated area and subsequent follow up of the project. Successfully completing this project will represent a significant milestone in the conservation efforts of the Northern white-cheeked gibbon.

2. INTRODUCTION

The Northern white-cheeked gibbon (*Nomascus leucogenys*) is a captivating primate species known for its beauty, acrobatics, and melodic vocalizations. Beyond its captivating qualities, this primate species plays a vital ecological role as one of the largest frugivores, facilitating seed dispersal in its habitat. Unfortunately, the species finds itself listed as critically endangered in the IUCN Red List of Threatened Species. Over recent decades, the species has experienced a dramatic decline in its populations, primarily attributed to opportunistic poaching for local consumption, the pet trade, and traditional medicine. Moreover, the extensive land use changes characterized by rapid economic development have resulted in widespread deforestation, further intensifying the species' decline (Rawson et al. 2011). To secure the future of this remarkable species, urgent conservation measures are imperative. Among these measures, the establishment of a reintroduction program in a highly protected area such as Trang An UNESCO landscape Complex in Vietnam holds significant importance, enabling the rehabilitation and eventual repopulation of the Northern white-cheeked gibbon in suitable habitats.

Presently, the Northern white-cheeked gibbon population in Vietnam is scattered and predominantly found in protected areas of the country (Figure 2-6/Annex). With approximately 300 groups remaining, Vietnam bears a crucial responsibility in ensuring the preservation of this species. Existing protected areas such as Pu Mat National Park and Xuan Lien Nature Reserve serve as critical strongholds, harboring a significant portion of the remaining population (Rawson et al. 2011, Luu Tuong Bach & Rawson 2011; Le Thanh An 2013; Nadler & Brockman 2014). The neighboring Lao People's Democratic Republic (Lao PDR) hosts

larger populations, but intensive deforestation and poaching threaten their future (Duckworth 2008, Ministry of Agriculture and Forest 2011). Regrettably, the species has been declared extinct in China (Peng-Fei Fan et al. 2013; Peng-Fei Fan 2016). Thus, the critical status of the Northern white-cheeked gibbon highlights the need for concerted conservation efforts.

In Vietnam, despite being designated as a priority species protected under several decrees (Decree 160/2013/ND-CP; Decree 06/2019/ND-CP) and being listed in the Red Data Book of Vietnam (Dang Ngoc Thanh et al. 2007), it continues to face threats due to poaching and habitat loss (Le Thanh An 2013). The 'Urgent Conservation Action Plan for Primates in Vietnam to 2025, Vision to 2030' recognizes the species as a conservation priority (Ministry of Agriculture and Rural Development 2017). However, current conservation initiatives primarily focus on protecting existing populations rather than establishing new ones. The establishment of additional secure habitats and a comprehensive, long-term reintroduction program are crucial to effectively conserve this primate species in its natural habitat.

Thus, a reintroduction program for the Northern white-cheeked gibbon is essential, and in selecting a suitable site for reintroduction, we have identified Trang An UNESCO landscape complex as an adequate location (Figure 1/Annex). The chosen site falls within the species' indigenous range (Figure 2-6/Annex) and enjoys the highest legal protection status in Vietnam, providing favorable conditions for successful reintroduction efforts. In addition, our organization has previously achieved successful reintroduction efforts with the Delacour's langur in Trang An in 2020, highlighting the collaborative spirit and unwavering support provided by the Management Board of the Trang An UNESCO landscape complex (Nadler et al. 2020). Their continuous assistance includes daily protection and monitoring by trained guards, further solidifying their commitment to reintroduction projects.

Reintroducing the Northern white-cheeked gibbon in Trang An not only ensures the implementation of high animal welfare standards but also supports a breeding program that allows them to adapt successfully to their natural habitat. This approach alleviates the strain on rescue centers, enabling them to accommodate other species in need, as these facilities often lack adequate husbandry conditions and fail to meet optimal welfare standards. Moreover, these facilities rarely implement targeted breeding and reintroduction programs for confiscated or captive-born primates, rendering them devoid of conservation value. Additionally, the project provides educational and outreach opportunities, creating awareness and garnering support for broader conservation initiatives. Trang An's UNESCO World Heritage status enhances its role as an educational platform, reaching out to over a million visitors annually. This comprehensive approach promotes effective management for the protection of endangered wildlife, fosters environmental understanding, and facilitates nature conservation.

Finally, the establishment of a new population of the Northern white-cheeked gibbon in a highly protected area such as Trang An UNESCO landscape complex is of paramount importance for ensuring the species long-term survival in Vietnam. This reintroduction program will not only mark a significant milestone but also serves as a catalyst for advancing species conservation efforts. By reintroducing the Northern white-cheeked gibbon, we take a crucial step towards preserving Vietnam's natural heritage and protecting the diverse array of life that thrives within its ecosystems. Ultimately, this initiative plays a vital role in safeguarding the overall biodiversity of our planet, reinforcing the interconnectedness between wildlife, ecosystems, and the well-being of our shared environment.

3. OBJECTIVES

The main objective of the project is to initiate the reintroduction of the critically endangered Northern white-cheeked gibbon in the Trang An UNESCO World Heritage Complex, with the long-term vision of establishing a new viable and eventually self-sustaining population within a secure habitat

The specific objectives of the project are to 1) assess candidate gibbons' suitability and health 2) evaluate the habitat in Trang An, 3) involve stakeholders in planning and implementation, 4) release a breeding pair into the designated area, 5) monitor the program's progress and the gibbons' adaptation, 6) ensure their protection and welfare, 7) establish a targeted breeding program, 8) facilitate successful reproduction, 9) raise public awareness, 10) promote conservation measures, 11) utilize Trang An as an educational platform, 12) conduct scientific research 13) monitor the reintroduced population's and 14) assess the program's effectiveness.

4. ORGANIZATION AND IMPLEMENTATION EXPERTISE

Three Monkeys Wildlife Conservancy (www.three-monkeys.org) is an international NGO that was registered in Belgium in 2020 and obtained an operational permit to carry out projects in Vietnam during the same year. Our organization is guided by a vision of a world where wild animals thrive and their habitats are protected. Accordingly, our mission is dedicated to the protection of wild animals, their habitats, and their well-being.

The NGO was established by Govinda Lienart, who holds a PhD in tropical biology from James Cook University, and was co-founded by Tilo Nadler. Govinda has been residing in Vietnam since 2016 and has been actively involved in the conservation efforts of the Endangered Primate Rescue Center (EPRC) for several years. Tilo, the founder and former director of the EPRC, has played a pioneering and instrumental role in ex-situ and in-situ primate conservation in Vietnam over the past three decades. Additionally, our organization comprises experienced Vietnamese staff, including Hien Nguyen, who, like Tilo, has dedicated decades to primate conservation. Hien possesses extensive knowledge not only in conservation but also in Vietnamese regulations and in establishing collaboration with governmental authorities to ensure compliance with the law.

Currently, our NGO's primary focus is the conservation of primate fauna. We are actively establishing various comprehensive conservation projects, including population assessment, environmental education, community-based patrolling, and reintroduction activities. Of particular significance to the current project, in 2020, our NGO achieved a notable milestone by successfully relocating the Delacour's langur from captive conditions into the Trang An UNESCO landscape complex (Nadler et al. 2020). This achievement underscores our dedication to proactive conservation efforts and the preservation of wildlife.

5. PROJECT IMPLEMENTATION STRATEGY

The proposed project has been developed in alignment with the IUCN Best Practice Guidelines for the Rehabilitation and Translocation of Gibbons (Campbell et al. 2015). It comprises two primary phases that aim to reintroduce the Northern white-cheeked gibbon into the Trang An UNESCO World Heritage Complex. These phases are the Pre-Release Phase and the Release and Post-release Monitoring Phase. During the Pre-Release Phase, crucial activities are carried out to establish the necessary groundwork for a successful reintroduction. These activities

include the selection of candidates for release and an assessment of the habitat. The second phase, known as the Release and Post-release Monitoring Phase, involves the release of chosen gibbons into a designated area within the Trang An Complex. Subsequently, continuous monitoring and follow-up activities are conducted to ensure the progress and effectiveness of the reintroduction project.

5.1. PHASE 1: PRE-RELEASE PHASE

5.1.1. Selection of candidates for release

Thorough assessments will be conducted to identify suitable individuals for release, considering genetics, health and psychological status, behavior, and social and reproductive compatibility.

5.1.1.1. Sourcing of the candidates

The present project aims at finding a fit and compatible breeding pair with the highest chance of producing viable offspring and contributing to a self-sustaining population. In the initial stage of sourcing the breeding pair for this reintroduction program, our primary focus will be on assessing individuals from rescue centers, zoos and safari-parks within Vietnam. These facilities altogether house approximately 20-30 captive Northern white-cheeked gibbons, with individuals being held captive at the Endangered Primate Rescue Centre (Cuc Phuong National Park), Endangered Primate Species Centre (Cat Tien National Park), Pu Mat National Park Rescue Center, Hoang Lien Son Rescue Center, Hanoi Wildlife Rescue Center, Melinh Biological Station, Hanoi Zoo, Saigon Zoo and safari parks Phu Quoc, Hoi An, Nghe An.

Our organization has conducted a preliminary visit to several of these facilities, engaging with directors and leaders to explore potential partnerships and conducting initial observations of the captive animals. Several facilities have shown strong interest in collaborating with our project if suitable candidates are identified among their captive gibbons. However, it is crucial to conduct a thorough and comprehensive screening of all captive individuals to assess their suitability for reintroduction. It is possible that none of the candidates may meet the necessary criteria, requiring us to consider alternative strategies, such as importing animals from zoo collections internationally.

The Northern white-cheeked gibbon is well-represented in zoos worldwide, and the European Endangered Species Program (EEP) already regulates captive breeding of the species. Importing captive individuals for the reintroduction program would not only support conservation efforts within zoos but also contribute to the preservation of Vietnam's biodiversity. The species is effectively managed in zoo collections globally through coordination by esteemed organizations such as the European Association of Zoos and Aquaria (EAZA), Zoo and Aquarium Association of Australasia (ZAA), and the American Association of Zoos and Aquariums (AZA), which maintain detailed studbooks and incorporate them into managed programs.

5.1.1.2. Genetic screening

Genetic screening constitutes a crucial component in the implementation of reintroduction programs, particularly for species like the Northern white-cheeked gibbon that exhibit visual

similarities with its counterpart, the Southern white-cheeked gibbon (*Nomascus siki*). Accurate species identification is paramount in these programs, and to ensure the precision of such identification, collaborative efforts will be undertaken with esteemed wildlife geneticists, namely Dr. Minh Le from the Faculty of Environmental Sciences at Vietnam National University and Dr. Christian Roos from the German Primate Center. Their expertise in the field of wildlife genetics will be instrumental in conducting comprehensive genetic analyses. In instances where animals are imported from foreign sources lacking definitive genetic information within the studbook, genetic screening will be imperative to determine their species identity.

5.1.1.3. Health screening

Individuals potentially candidate for release will undergo a comprehensive health screening to ensure its optimal health and readiness for reintroduction. This screening involves a thorough physical examination to assess various aspects of the gibbon's condition. It includes conducting a dental examination, checking the trachea, eyes, nails, bones, coat condition, deformities, dehydration, diarrhea, respiratory difficulties, and overall general condition. Additionally, a fecal parasite screening will be performed to examine a fecal sample and identify the presence of parasites through thorough microscopic examination. This screening helps assess the gibbon's gastrointestinal health and ensures appropriate treatment if necessary. As part of the health screening, tuberculosis testing will be conducted to assess the gibbon's TB status. Diagnostic methods such as skin tests or blood tests will be employed to detect the presence of *Mycobacterium tuberculosis*, the bacteria responsible for tuberculosis. Furthermore, the gibbon will undergo screening for hepatitis B, A, and C viruses. Tests will be conducted to determine the gibbon's hepatitis B profile, including assessing the presence of hepatitis B virus (HBV) and evaluating immune response or viral load. Screening for hepatitis A virus (HAV) and hepatitis C virus (HCV) will also be performed to assess the gibbon's viral status. In addition, the health screening will include screening for herpes simplex viruses (HSV-1 and HSV-2) to identify any potential infections and determine the gibbon's viral status.

5.1.1.4. Behavioural and reproductive screening

Gibbons chosen for reintroduction will undergo an extensive behavioral screening process to assess their suitability for release into the wild and their potential for forming lasting breeding pairs. The screening process serves the purpose of ensuring that the selected gibbons exhibit the essential behaviors required for survival and successful reproduction in their natural habitat.

The screening process evaluates specific behavioral traits outlined by Cheyne et al. (2008a). These include proficient brachiation, with minimal time spent on the ground (not exceeding 5% of total activity time). The gibbons should show a preference for the upper levels of their enclosure, spending a significant portion (at least 40%) of their time at the top and avoiding sleeping on the ground. Positive pair association, characterized by physical proximity and non-aggressive contact, should account for a substantial portion (at least 7%) of their total activity time. Grooming activities should make up a minimum of 3% of their total activity time. Regular singing and/or duetting behaviors are desirable indicators of their communication abilities. Lastly, their activity budgets, including feeding, resting, and traveling, should closely resemble those observed in their wild counterparts.

However, assessing these behavioral traits in captive environments presents challenges. Some facilities have inadequate cage sizes or lack enrichment features, limiting the expression of

natural behaviors and hindering proper assessment. Social interaction opportunities may be limited as some gibbons are caged alone, with duetting as one of the few potential forms of interaction. As a result, the screening process may encounter different scenarios. In the best-case scenario, a healthy reproductive pair or compatible male and female are housed together in the same facility, facilitating the reintroduction process. If suitable pairs are not readily available, efforts will be made to assess the suitability of individuals kept in separate cages within the same facility. Additionally, we plan to construct a large field cage that can be deployed on the field site to serve as part of the soft release follow-up and facilitate initial rehabilitation and compatibility testing between potential pairs (refer to the cage section for further details). This approach offers flexibility and increases the chances of success. Ideally, suitable healthy pairs with favorable behavioral traits will be identified either within Vietnam or in international zoos, streamlining the reintroduction process.

In conclusion, the behavioral screening process is a crucial step in evaluating the fitness of gibbons for reintroduction. Despite the limitations of captive environments, dedicated efforts will be made to assess their behavioral traits and establish compatible pairs, maximizing the success of the reintroduction program.

5.1.2. Selection of Release site

As detailed below, Trang An UNESCO landscape complex emerges as a highly suitable release site as it falls within the species' natural historical distribution, it offers protection from threats, and it provides suitable natural habitat.

5.1.2.1. Reintroduction within its natural historical distribution

The historical range of the Northern white-cheeked gibbon includes northwestern Vietnam and northern Lao PDR, but also in China, where the species is considered either extinct or functionally extinct (Van Ngoc Tinh et al. 2010a, Le Thanh An 2013, Fan et al., 2014). While the understanding and track record of primate assemblages in Vietnam has been limited due to prevailing conditions of war for decades and poverty, efforts have been made since the war's conclusion to enhance our understanding of the faunal assemblages in Vietnam. Scientific investigations employing various methods, such as direct observations, analysis of historical records, examination of museum specimens, and genetic research, have contributed to our understanding of the species' distribution (Table 1/Annex).

In Vietnam, the Northern white-cheeked gibbon is found in the northern region, extending southwards from the Black River, including its confluence with the Red River, with its southern boundary believed to reach at least as far as the Rao Nay River near Vu Quang National Park (Van Ngoc Tinh et al. 2010a, 2010b). Throughout its historical range, the species is thought to have been locally eradicated in most of the northwest and north-central parts of the country (Geissmann et al., 2000; Rawson et al. 2011, Le Thanh An 2013) and is now confined to remote border areas, where their survival is aided by the remote often inaccessible mountainous terrain (Figure 1-6/Annex).

The complete eradication of the species also occurred in Ninh Binh, the province where the current project plans to reintroduce the species. For example, in Cuc Phuong National Park (Ninh Binh), interviews with local residents revealed that gibbons were present there only a generation ago (T. Nadler, pers. comm., and Geissmann, interviews conducted in 1993). Similarly, in the Trang An UNESCO landscape complex (Ninh Binh), chosen as the release

site for the ongoing conservation reintroduction project within the species' historical range, the species has also completely disappeared. Interviews with locals and hunters confirmed the presence of gibbons in the 1950s during surveys conducted in the early 1990s. It is highly probable that the species became extinct around the 1960s, approximately 50 to 60 years ago (Nadler, unpublished data). While Trang An Scenic Landscape Complex was designated as a UNESCO World Heritage Site only in June 2014, its stringent protection measures came too late to prevent the total extinction of all the local primate fauna in the area. Fortunately, active reintroduction efforts are underway to restore locally extinct primate species, including the recently translocated Delacour's langur, and hopefully, soon the Northern white-cheeked gibbon as well.

5.1.2.2. Reintroduction within a protected area

Trang An UNESCO landscape complex, encompassing a core area of 6,211 hectares and a buffer zone of 5,849 hectares (Figure 1/Annex), has been granted the utmost legal protection status in Vietnam, along with the allocation of adequate funds and personnel to ensure effective law enforcement. The ownership of this property lies with the Socialist Republic of Vietnam, while its control is under the jurisdiction of the Ninh Binh Provincial People's Committee. The majority of Trang An is encompassed within three officially designated protected areas. To ensure the safeguarding and sustainable management of the property, six key national laws and a series of Government decrees have been enacted. These laws and decrees cover various aspects, including the protection of cultural heritage and archaeological resources, conservation of biodiversity, environmental preservation, regulation of eco-tourism and other commercial activities, as well as the administration and management of the area.

Taking charge of the property's management is the Trang An Landscape Complex Management Board. This independent agency possesses extensive decision-making powers, responsibilities, and resources. It maintains close functional ties with Government ministries, research institutes, as well as commercial and community stakeholders. The management board operates in accordance with a comprehensive management plan that has been officially approved by the Government and carries legal binding force. This plan has been developed through broad public consultation and enjoys widespread support. It follows the highest international standards and addresses all significant factors impacting the property. Furthermore, it is effectively implemented by a team of professional and well-equipped staff members.

5.1.2.3. Assessment of the habitat

The Northern white-cheeked gibbon is predominantly found in mountainous terrains, including limestone complexes, but can also be found in the lowland areas between these mountains. The species is commonly associated with montane broadleaf forests and can occasionally be observed in medium and high mixed coniferous and broadleaf forests as well (Rawson et al. 2011) (Figure 5-6/Annex). In the Trang An UNESCO World Heritage Complex, where plans for their reintroduction are underway, the habitat consists of a combination of broadleaf forests and limestone elevations which provides excellent habitat suitability for the species. The tree species composition in this area is similar to other limestone massifs that previously served as suitable habitats for the gibbon species.

Due to the challenging accessibility of the area, with some parts accessible only through steep rock formations or by boat, human impact on the habitat, particularly through logging, has remained remarkably low in recent decades. However, during the 1950s and 1960s, intensive

hunting led to the eradication of the northern white-cheeked gibbons in the region. As conservation efforts now focus on their reintroduction, a comprehensive assessment of the habitat is planned to evaluate its suitability and ensure the presence of essential gibbon food trees.

To carry out the assessment, a collaboration has been established with botanists from the National University of Hanoi. The evaluation will encompass multiple factors, such as forest diversity, structure, composition, canopy connectivity, and density. The availability of water suitable sleeping sites and especially the presence of suitable food sources for the gibbons will be identified. Interestingly, the Northern white-cheeked gibbon exhibits a feeding behavior where their consumption of leaves is high, almost comparable to their consumption of fruits, distinguishing them from other gibbon species (Hu & Yang 1989).

5.1.2.4. Construction and location of the holding facility

For the accommodation and acclimatization of a pair of gibbons intended for release into the wild, a holding facility is to be constructed at the planned release point. The construction should offer the possibility to control, feed and, if necessary, recapture the animals. The construction will consist of two separate cages, but with the possibility of a connection and a corridor to allow safe feeding by keepers during the acclimatization phase. Access to this facility is only possible by boat, which eliminates any danger to the keepers from the released gibbons (Figure 7/Annex).

The gibbons' holding facility is set to be strategically situated within a brief boat ride from the ranger station, guaranteeing convenient proximity. This beneficial location nearby the ranger station has already been validated by the successful reintroduction of the Delacour's langur in the area, enabling the implementation of improved protection measures and simplifying the daily monitoring and follow-up of the reintroduced animals. Additionally, the soft release facility for the Delacour's langur on Ngoc Island and the gibbons' holding facility will be positioned a short distance apart, which will create a hotspot destination for daily visitors passing by via boat (Figure 8/ Annex).

5.1.2.5. Engagement of stakeholder, including local authorities and communities

A reintroduction project or the establishment of a new population is only possible with support and close cooperation with the local authorities. Acceptance by the local population is also necessary. A reintroduction project is supported by the Ministry for Agriculture and Rural Development, the provincial Forest Protection Department and the Management Board of the World Heritage Site. The Three Monkeys Wildlife Conservancy, together with the Management Board of the World Heritage Site, will publicize the project in the surrounding communities and explain the importance of the area and the species. The World Heritage Site is a major employer for the surrounding communes and an important source of income.

5.2 PHASE 2: RELEASE AND POST MONITORING PHASE

5.2.1. Soft release

A gibbon release is only justifiable as a soft release. After an acclimatisation period and appropriate training, the animals should be released from the holding facility. Further supplementary feeding of the animals is most likely required and should take place in the

holding facility designed for this purpose. Guards from the World Heritage Site will be trained by experienced keepers to care for the animals until the gibbons become self-sufficient and independent of supplementary feeding.

5.2.2. Post-release Monitoring

After the gibbons are released from the holding facility, a comprehensive monitoring program will be implemented. To facilitate tracking, the animals will be equipped with radio collars in collaboration with the German company e-obs. The duration of the monitoring efforts will depend on the technical specifications of the radio collars but is expected to last at least one year. The rugged rock formations in the area pose challenges for accessing and tracking the gibbons, but drone mounted with tracking technology will be evaluated. Furthermore, the successful application of a thermal drone (MAVIC3t) by our organization in monitoring other primate species like the Delacour's langur has yielded promising results, demonstrating its exceptional ability to locate individuals and conduct detailed behavioral assessments in the field. Leveraging these technologies presents an excellent opportunity to closely observe and track the reintroduced gibbons.

5.2.3. Possible continuation of the reintroduction process

If the first pair is successfully reintroduced and a home range is established, it is possible to prepare another pair for reintroduction at another location within the World Heritage Site. The area offers with almost 6000 ha sufficient habitat for a viable population.

5.2.4. Educational potential and conservation messages

The World Heritage Site attracts approximately 1.5 million visitors annually, both nationally and internationally, and an increase in numbers is anticipated. One of its key features is its limited accessibility, primarily by rowing boat, with only a few designated points of interest accessible by other means, and even then, only locally. While direct interaction with the reintroduced gibbons is not feasible, tourists occasionally have the opportunity to observe them from a boat and be captivated by their impressive vocalizations. This highlights the immense potential of gibbon reintroduction to effectively convey a conservation message.

In collaboration with the management board of the World Heritage Site, Three Monkeys Wildlife Conservancy aims to enhance the experience for visitors by training the rowboat guides to provide valuable information on conservation. Additionally, we plan to establish a poster gallery and produce informative materials. The Delacour's langur reintroduction project is currently underway, and the reintroduction of gibbons would serve as an equally captivating attraction for the area, if not more so.

6. PROJECT TIMELINE

Three Monkeys Wildlife Conservancy has already started preparing for the project, in particular by contacting authorities and stakeholders and making a preliminary inventory of the individuals of the species kept in Vietnam. The continuation of Phase 1 is dependent on an available budget, which is currently not available. A period of about 6-12 months is foreseen for Phase 1. Phase 2 should cover a period of monitoring, i.e. about one year, until the project can be continued with a further release.

7. BUDGET

The total budget, amounting to \$82,000 USD, provides a rough estimation and will be further elaborated during further stages of the planning phase.

7.1. PHASE 1: PRE-RELEASE PHASE

Inventory of gibbons individuals in Vietnamese holding facilities (travel)	3500 USD
Genetic checks	2500 USD
Health checks (including travel)	4000 USD
Habitat assessment	3000 USD
Construction holding facility at the World Heritage Site	9000 USD
Meetings with stakeholders, workshops	4000 USD
	26,000 USD

7.2. PHASE 2: RELEASE AND POST MONITORING PHASE

Animal transportation	3000 USD
Animal keeping (caretaker one year / food)	12000 USD
Technical equipment for monitoring	20000 USD
Monitoring one year	12000 USD
Training for World Heritage Site staff	4000 USD
Education material	5000 USD
	56,000 USD

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ANNEX

Reintroducing the Northern white-cheeked gibbon (*Nomascus leucogenys*)
into Vietnam's Trang An UNESCO World Heritage Complex

Table 1. Summary of the geographic location points and the corresponding sources of information used to create the annex maps depicting the occurrence of the Northern white-cheeked gibbon (*Nomascus leucogenys*).

N	Name	Latitude	Longitude	Info	reference
1	Muong Lay	21.967119	103.080865	Museum specimen	Geissmann 2000
2	Muong Troi	21.133837	103.053109	Museum specimen	Geissmann 2000
5	Thach Tuong commune	20.307189	105.482541	Interview	Geissmann 2000
6	Nui Tuong limestone area	20.366667	105.333455	Locally extinct / Interview	Geissmann 2000
7	Cam Quy commune	20.28784	105.442662	Locally extinct / Interview	Geissmann 2000
8	Ban Phang	21.281667	104.070307	Locally extinct / Interview	Geissmann 2000
9	Ban Dan	21.327842	103.351638	Locally extinct / Interview	Geissmann 2000
10	Na Ot commune	21.05	103.983333	Locally extinct / Interview	Geissmann 2000
11	Phieng Pan commune	21.066637	104.066768	Locally extinct / Interview	Geissmann 2000
12	Ban Puon hamlet	21.190149	104.028338	Locally extinct / Interview	Geissmann 2000
13	Ban Tam	20.831623	104.697117	Locally extinct / Interview	Geissmann 2000
14	Tu Buon	20.831623	104.697117	Locally extinct / Interview	Geissmann 2000
15	Pieng Luong hamlet	20.820688	104.718203	Locally extinct / Interview	Geissmann 2000
16	Chieng Set hamlet	21.390498	103.829554	Locally extinct / Interview	Geissmann 2000
17	Cuc Phuong National Park	20.316745	105.608829	Locally extinct / Interview	Geissmann 2000
18	Muong Nhe Nature Reserve	22.292077	102.40	Field Observations	Rawson 2011
19	Sop Cop Nature Reserve	21.54361	103.618093	Field Observations	Rawson 2011
20	Xuan Nha Nature Reserve	20.721282	104.7871	Field Observations	Rawson 2011
21	Long Luong Commune	20.78457	104.856683	Field Observations	Rawson 2011
22	Xuan Lien Nature Reserve	20.02	105.15	Field Observations	Rawson 2011
23	Pu Hoat Proposed Nature Reserve	19.758123	104.83998	Field Observations	Rawson 2011
24	Ben En National Park	19.619063	105.541062	Field Observations	Rawson 2011
25	Pu Huong Nature Reserve	19.330021	104.92948	Field Observations	Rawson 2011
26	Pu Mat National Park	19.056678	104.758281	Field Observations	Rawson 2011
27	Huong Son Forest	18.511231	105.266827	Field Observations	Rawson 2011
28	Vu Quang National Park	18.285576	105.479217	Field Observations	Rawson 2011
29	Ke Go Nature Reserve	17.96663	106.146439	Field Observations	Rawson 2011
30	Hang Kia-Pa Co Nature Reserve	20.741395	104.878138	Locally extinct	Rawson 2011
31	Ngoc Son–Ngo Luong Nature Reserve	20.439237	105.349201	Locally extinct	Rawson 2011
32	Pu Luong Nature Reserve	20.466435	105.2122	Locally extinct	Rawson 2011
33	Khe Net Proposed Nature Reserve	17.983753	105.923028	Locally extinct	Rawson 2011
34	Bai Thuong	19.894273	105.378345	Interview / Skin collected	Rawson 2011
35	Trang An Landscape Complex UNESCO	20.22838	105.89091	Reintroduction Site	-
36	Trang An	20.268708	105.889701	Locally extinct / Interview	Nadler unpublished (1990)
37	Dong Tam	20.462131	105.817666	Locally extinct / Skin collected	Nadler unpublished (1980)

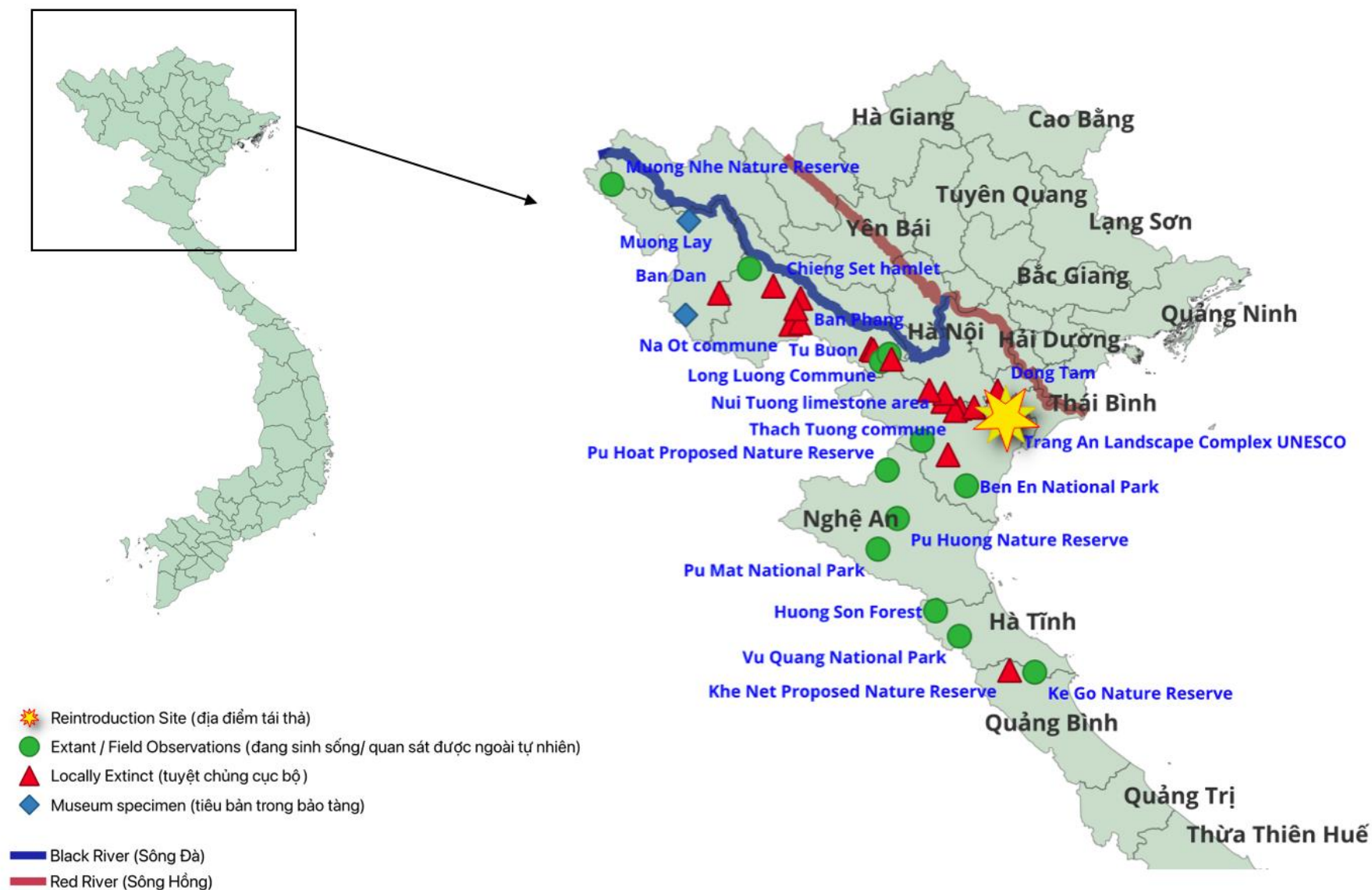


Figure 2. Map displaying the known occurrence locations of the Northern White-Cheeked Gibbon (*Nomascus leucogenys*), including extinct populations based on skin collection, interviews, or museum records, as well as extant populations observed in the field, along with the designated reintroduction site (source see Table 1)

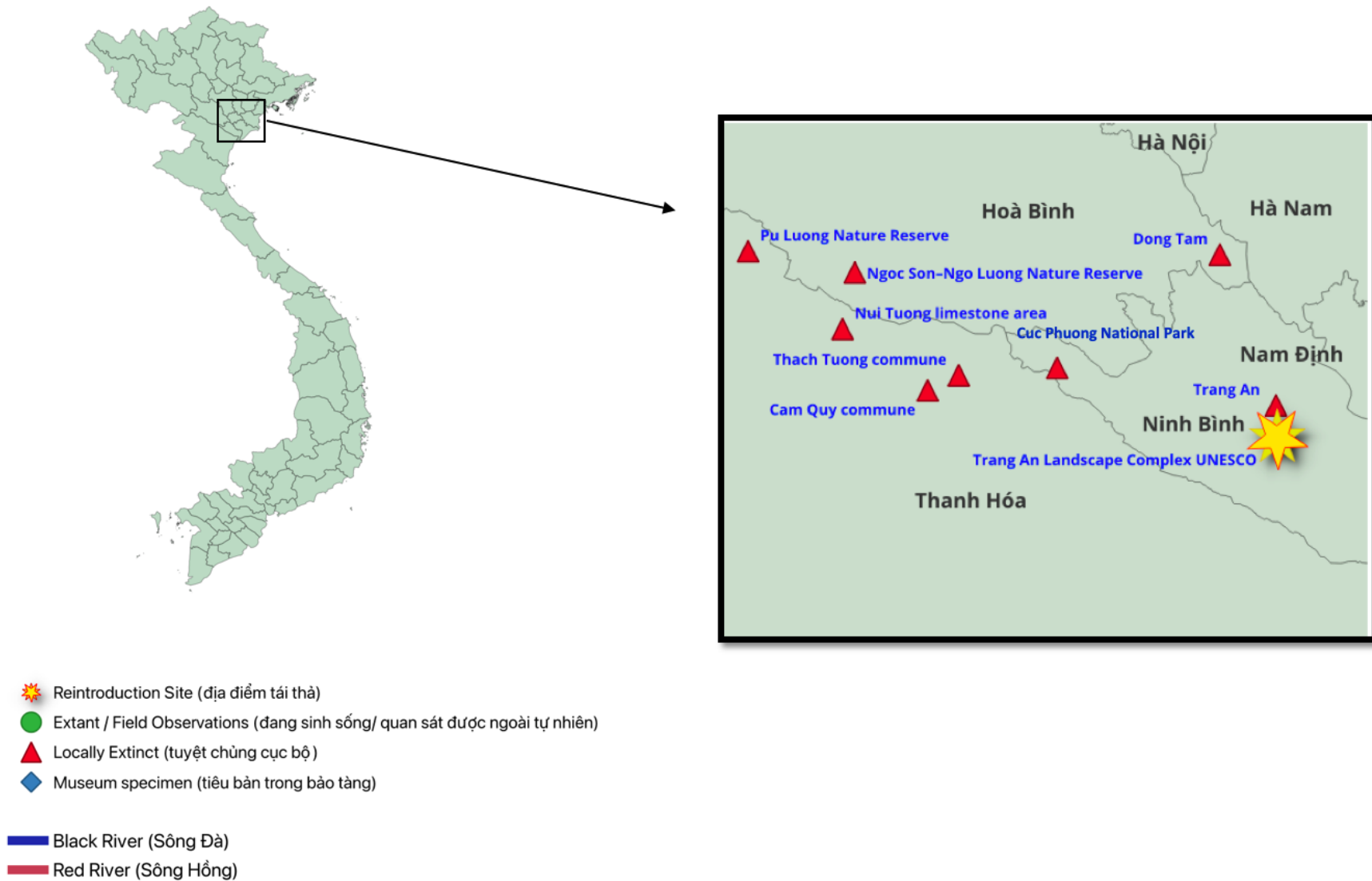


Figure 3. Map depicting the former presence of the Northern white-cheeked gibbon (*Nomascus leucogenys*) nearby the planned reintroduction site (source Table 1)



Figure 4. The distribution range of the Northern White-Cheeked Gibbon (*Nomascus leucogenys*) extends southwards from the Black River, including its confluence with the Red River. It is believed that the southern boundary of its range reaches at least as far as the Rao Nay River near Vu Quang National Park (Source: Table 1).

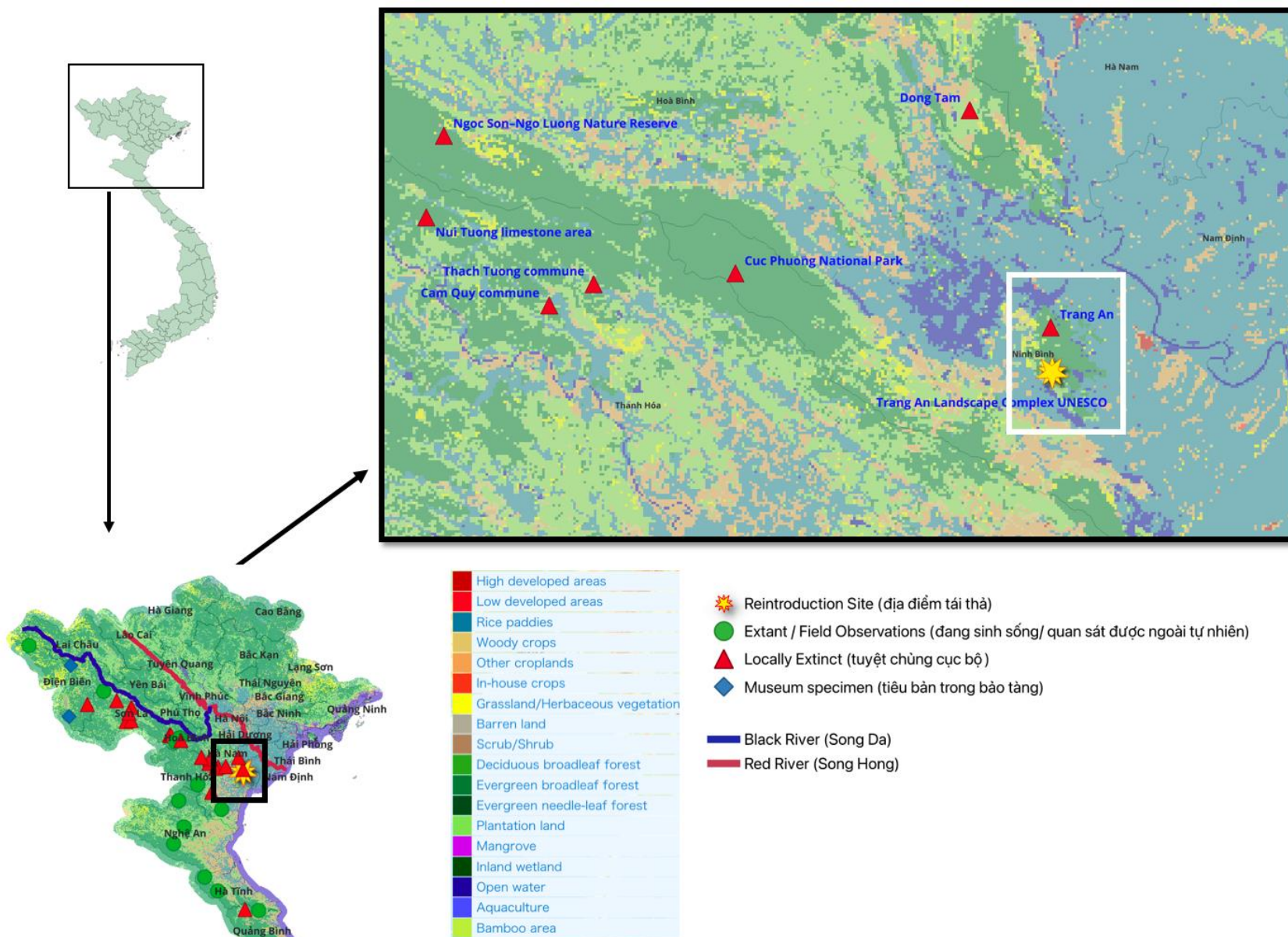


Figure 5. Land Use and Land Cover (HRLULC) dating from 1990, depicting the Northern white-cheeked gibbon's preference for broadleaf forests throughout its distribution range, including within the planned reintroduction site in the Trang An UNESCO landscape complex (source see Table 1)

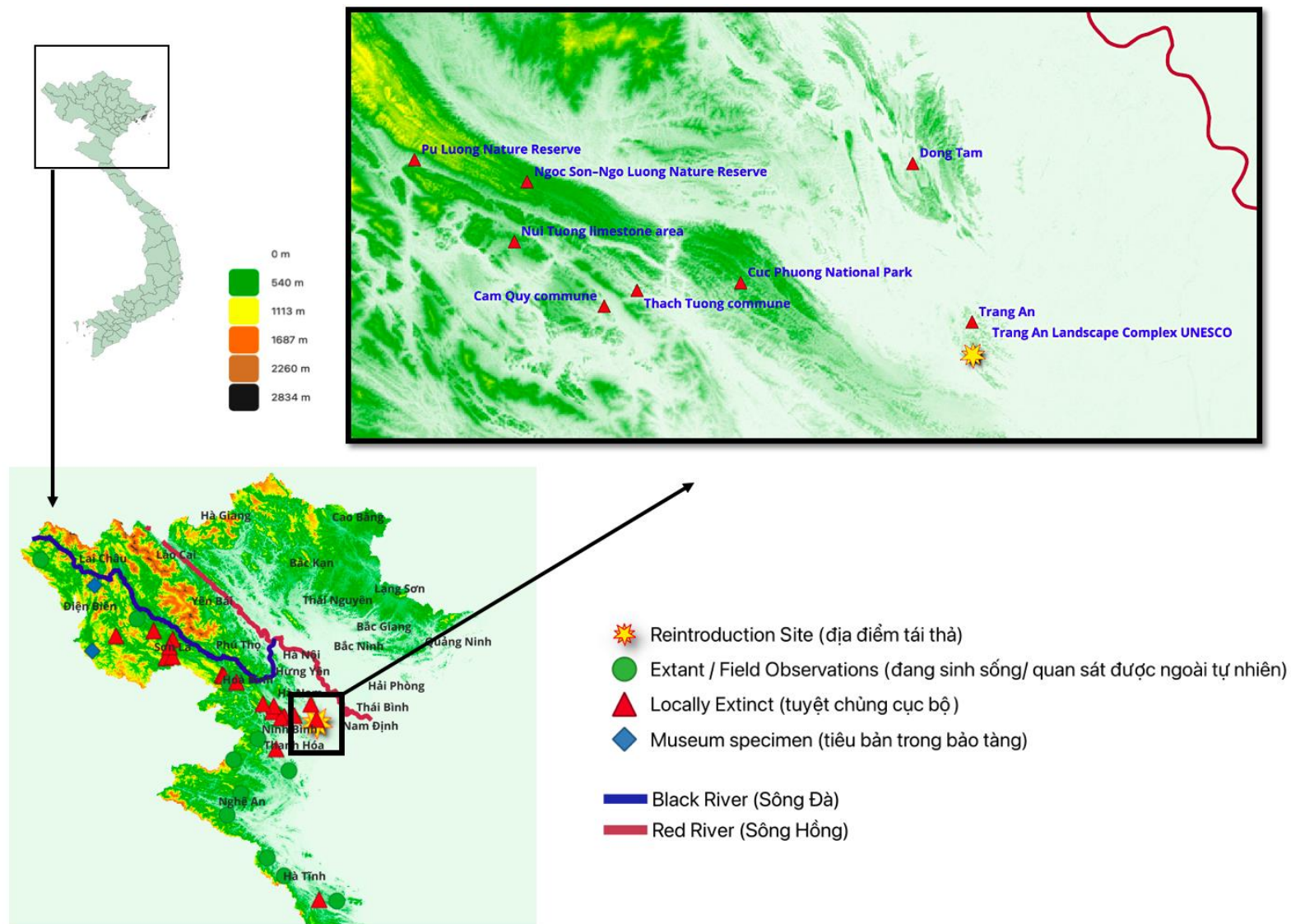


Figure 6. The elevation map showcases how the Northern white-cheeked gibbon (*Nomascus leucogenys*) is associated with mountainous areas. This includes their presence in lowland montane forests found in the lower regions of these mountains. Furthermore, the gibbon's preference for mountainous terrain extends to karst mountains, as demonstrated by the Trang An Landscape Complex.

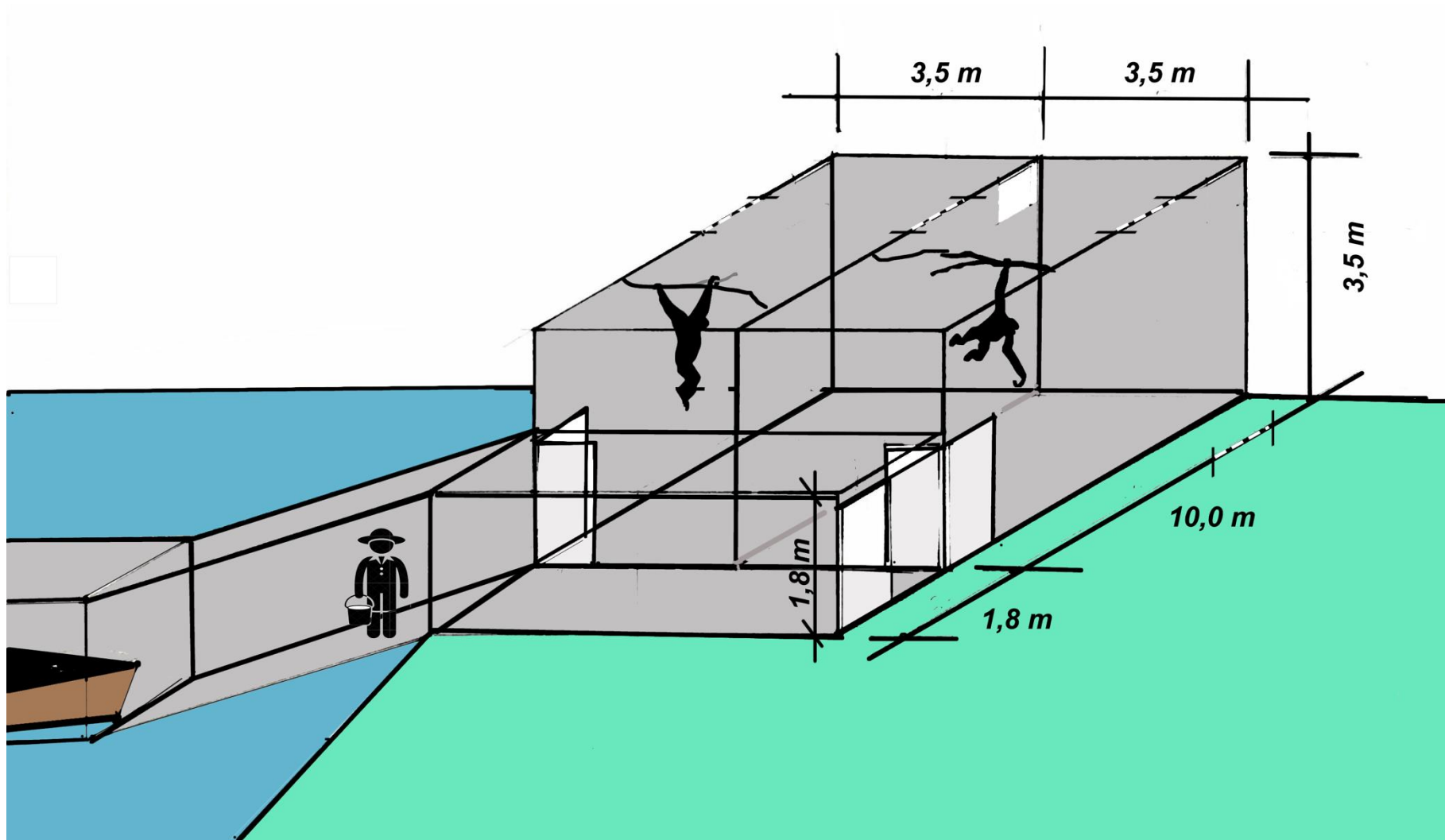


Figure 7. The holding facility will only be accessible by boat through a corridor, ensuring the safety of keepers, veterinarians, and biologists while they feed and closely monitor the gibbons. Moreover, the facility comprises two interconnected cages that can be utilized to assess the compatibility of breeding pairs if the need arises.

-  Reintroduction site gibbon (địa điểm tái thả vượn)
-  Reintroduction site Delacour's langur (địa điểm tái thả voọc mông trắng)
-  Ranger station (trạm kiểm lâm)

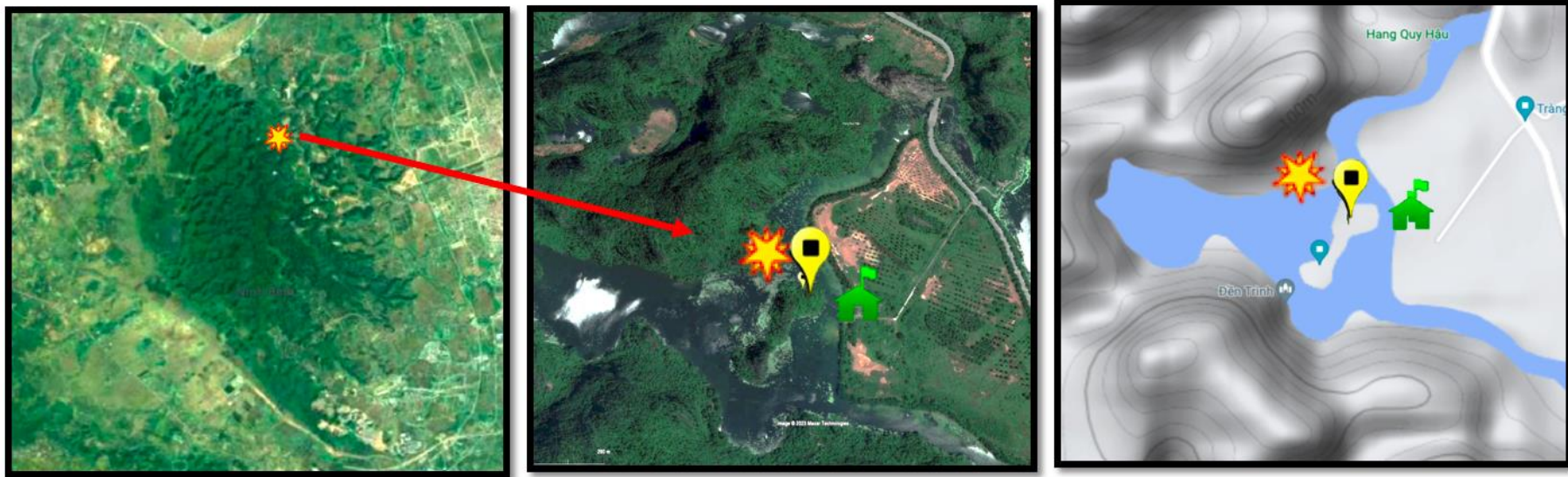


Figure 8. The gibbons' holding facility is planned to be strategically located in close proximity to the ranger station, ensuring convenient monitoring and feeding of the gibbons. This strategic positioning, achieved through a short boat ride, has been proven successful in the reintroduction of the Delacour's langur in the same area