Shoe-shaped Gastrochilus

Habitat assessment and conservation

Greenhood
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SAN DIEGO COUNTY ORCHID SOCIETY 1947

Project Report

Habitat assessment and conservation of critically endangered Shoe-shaped Gastrochilus in Nepal

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Acknowledgement

My sincere thanks to the San Diego County Orchid Society for supporting us with the funding to undertake this work on the ground.

I am thankful to the authorities of the Community Forests in Kavreplanchowk who supported us with a local resource person who joined us in the field. My sincere thanks go to the authorities of the Division Forest Office and local management in Kavreplanchowk district who participated in an awareness program designed to inform local community forest user groups and key authorities on the conservation awareness of protecting orchids and other plant species in the area. I am humbled by the support received from the leadership of the local school, who welcomed us to organise an awareness session with over 50 students.

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1. Introduction

Orchids are one of the most charismatic and largest families of flowering plants, with ca 30,000 species recorded globally. They are subject to heavy trade for multiple uses, including ornamental, food, and medicinal values (Hinsley et al., 2018), although the trade is regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Moreover, they are also at risk of habitat fragmentation, destruction, and external stresses (Cribb et al. 2005; Štípková et al. 2021), given that they are extremely sensitive to these activities. Additionally, there is very little awareness of the conservation importance of orchids, especially in areas where the livelihood of people hugely relies on the orchid trade. The commercial-scale harvest and trade, coupled with habitat destruction, lack of awareness, and climatic stressors, are increasing pressures on wild orchids globally.

This also applies to Nepal, which hosts over 500 species of orchids (Pant and Raskoti 2013; Subedi et al. 2013; Vaidya 2019), distributed from the plain of Terai to the snowy mountains. Many species in the family have long been harvested traditionally, for local uses and international trade, including as ornamental plants; for the medicinal properties of some species used in traditional Ayurvedic and Chinese pharmacopeia; and for their cultural significance. This includes many species of orchids that are highly protected and extensively used for medicinal reasons (e.g., *Dactylorhiza hatagirea*) and for ornamental uses (e.g., *Gastrochilus calceolaris*, also called Shoe-Shaped Gastrochilus).

Gastrochilus calceolaris is listed as Critically Endangered in the global IUCN Red List, and reported under the CITES Appendix II. The global status shows that its population is decreasing due to intense fragmentation and destruction of its habitat (Agoo et al., 2004). It is endemic to Nepal and so far only recorded in Kaski district (Rokaya et al., 2015) and Dolakha district (Karki and Ghimire, 2019) along 1000-2700 masl.

In this project, we documented the existing habitat and identified threats to the survival of *Gastrochilus calceolaris* in Kavreplanchowk. We also conducted two awareness programs, one targeting local school students and another with local management, Community Forest Chairs, and user groups of the Community Forests. To our knowledge, there is no research done focusing on orchids in general or specific to any species, including *Gastrochilus calceolaris* in the Kavreplanchowk.

The project site is a stronghold of protected species, in particular orchids, critically endangered Pangolins, and Taxus. These areas are easily accessible to local communities for fodder and fuelwood, and there is ongoing habitat destruction due to infrastructural developments. Additionally, Taxus, one of the host trees for this species, harvest and trade are one of the most important economic activities of the local community, and there is massive poaching and illegal harvest.

In the lack of research, awareness, and documentation, the population of this critically endangered orchid, as well as other orchids in Kavreplanchowk, is facing serious threats, which also resembles other areas and species.

2. Aim of the project

The project aimed to conserve the critically endangered *Gastrochilus calceolaris* orchid by outlining a favorable environment for its survival and educating stakeholders about its conservation importance.

This involved three specific objectives:

1. To build a database on the habitat status of *Gastrochilus calceolaris* orchids in the Kavreplanchowk district.
2. To outline a favorable environment for the survival of critically endangered *Gastrochilous* orchids in Nepal.
3. To educate the local communities and management of Kavreplanchowk district about the criticality of orchids and encourage their participation in their conservation.

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3. Method

This study included applied ecological research involving a field survey for habitat assessment, social research, and outreach to enhance conservation planning of *Gastrochilus calceolaris*. All the data was collected during March-November 2024. We consulted the local community forest authority, the division forest office, and local community forest user group members from the project site throughout the work.

3.1 Study area

The project area is the Panauti Municipality within the Kavreplanchowk district of Central Nepal (Fig 1). We focused on the Patne Bhangyang community forest (482 ha) for our ecological and social survey, as we found a previously unreported healthy habitat of *Gastrochilous calceolaris* in that forest. Along with the Patne Bhangyang community, we also did a rapid scoping of adjoining community forests (Chorande Muldada CF, Khhare Ban CF, Janajagriti CF). None of these areas falls under any protected area in Nepal.

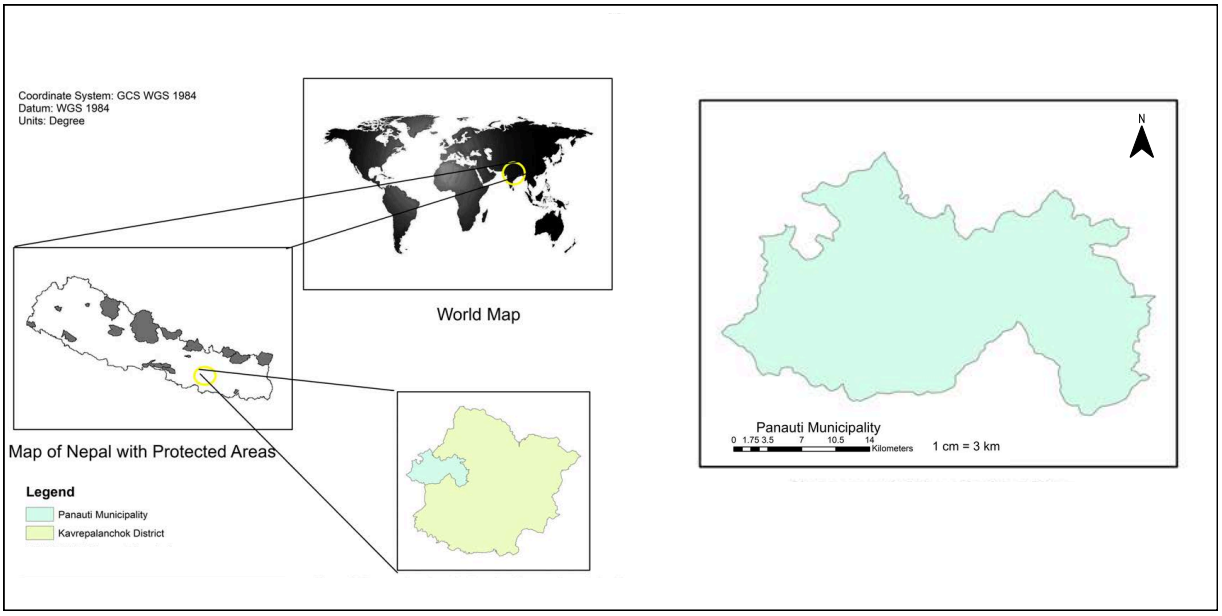

Fig 1: Map of study area showing Panauti Municipality, Kavreplanchowk district

3.2 Preliminary survey

We conducted a preliminary survey in the Panauti Municipality to identify and consult the key informants of the local community forest user groups and local management. We also piloted our survey tools and refined them, identified exact sampling locations, potential communities to focus on, and the names of schools for awareness programs. We also compiled the local community forest operational plan for the Patne Bhangyang community forest. Greenhood has an existing collaboration with local authorities on the project site from our ongoing and prior projects focused on plant conservation. This existing relation helped us to reach out to the key informants and follow their referral for other informants, following a purposive sampling technique, followed by a snowball method.

3.3 Habitat and threats assessment

This involved transect surveys to collect information on different aspects of the habitat, such as altitude, canopy, aspect, slope, the abundance of *Gastrochilus calceolaris*, and vegetation composition. Along with the target species, we also compiled information on the host trees (species, condition of trees, and associated epiphytes in the host tree). We made three temporary quadrats (20 m*20 m), each, in the Patne Bhangyang community forest.

Likewise, the threat assessment and habitat suitability assessment involved the information obtained from field observations of threats to the species in each of the quadrants in the community forest. We quantified the key threats posed by the *Gastrochilus calceolaris* based on Rapid Vulnerability Assessment (RVA) (method adopted from Cunningham, 1996, and Shrestha, 2012). We also collected information on the distance from the key disturbance sources (road, human settlement, open grazing site, open recreation site), and their disturbance intensity (slight, moderate, extreme).

We collected information on the type of threats and their intensity based on semi-structured questionnaires with 20 respondents, including local plant harvesters, community forest authorities, and user group members. We identified different types of threats and categorized them into three types based on their disturbance intensity (low, moderate, and intense). Low disturbance meant plots are far away from roads or residential areas, and there is no obvious trace of disturbance in recent years; moderate disturbance indicated that the plots are far away from roads or residential areas, and there are a few traces of logging, cutting branches and picking seeds); and intense disturbance showed plots are close to roads or residential areas (<2 km), and there are obvious traces of disturbance such as logging, cutting branches, picking seeds and other parts. We also identified and ranked the top ten threats during the stakeholders' consultation. The interaction program (which focused on plant conservation as a whole) also acted as a means to validate information obtained from the field survey.

3.*4 Data analysis and final results*

The data was segregated, entered in MS Excel, and analyzed. The result from the field survey and focus group discussion is used to build a database on the habitat status and outline a favorable environment for the survival of Gastrochilus orchids in the area. The threats were also documented and ranked in MS Excel.

3.5 Conservation awareness

Awareness program targeted to the local forest user groups and management was another key activity of this study. Along with an awareness program targeting forest officials, local forest user group members, and local government representatives (involving n=30 participants), we also conducted an awareness session for school-level students (of grade 10) in a local secondary school. The awareness program for local forest user group members and local management also involved influential people such as teachers/ward chairperson/ chairperson of local village groups, and community people residing close to the wild habitat of *Gastrochilus calceolaris*. The awareness program focused on awaring participants on the importance of Gastrochilus calceolaris and its critically endangered status, as a result, ongoing rampant habitat destruction through fodder collection, cutting/felling of old host trees, open-grazing, and ways the local community and local management can save these protected species.

Fig 2: During focus group discussion where participants identified mapped potential sites, key threats, and ranked the threats

Fig 3: R.Bashyal and a key informant spotting orchids in project site.

4. Results and discussion

4.1 Status of Gastrochilus calceolaris in the project site

We observed at least 13 healthy clumps of *Gastrochilus calceolaris* within Patne Bhangyang (Fig. 4), each clump ranging from 7-25 individual plants. We observed the flowering and fruiting of this species several times from late February to August. It is an epiphytic orchid, and we found it preferring tree trunks and branches with shade, moisture, and rough bark, primarily in mature trees.

We found its habitat in mixed forests, including several associated species of protected plants and animals. Key dominant species recorded alongside *G. calceoloris* were: *Taxus mairei*, *Taxus wallichiana*, *Coelogyne* spp., *Gastrochilus* spp., *Pleione humilis*, *Ainsliaea latifolia*, *Asparagus racemosus*, *Berberis asiatica*, *Daphne papyracea*, *Castanopsis indica*, etc.

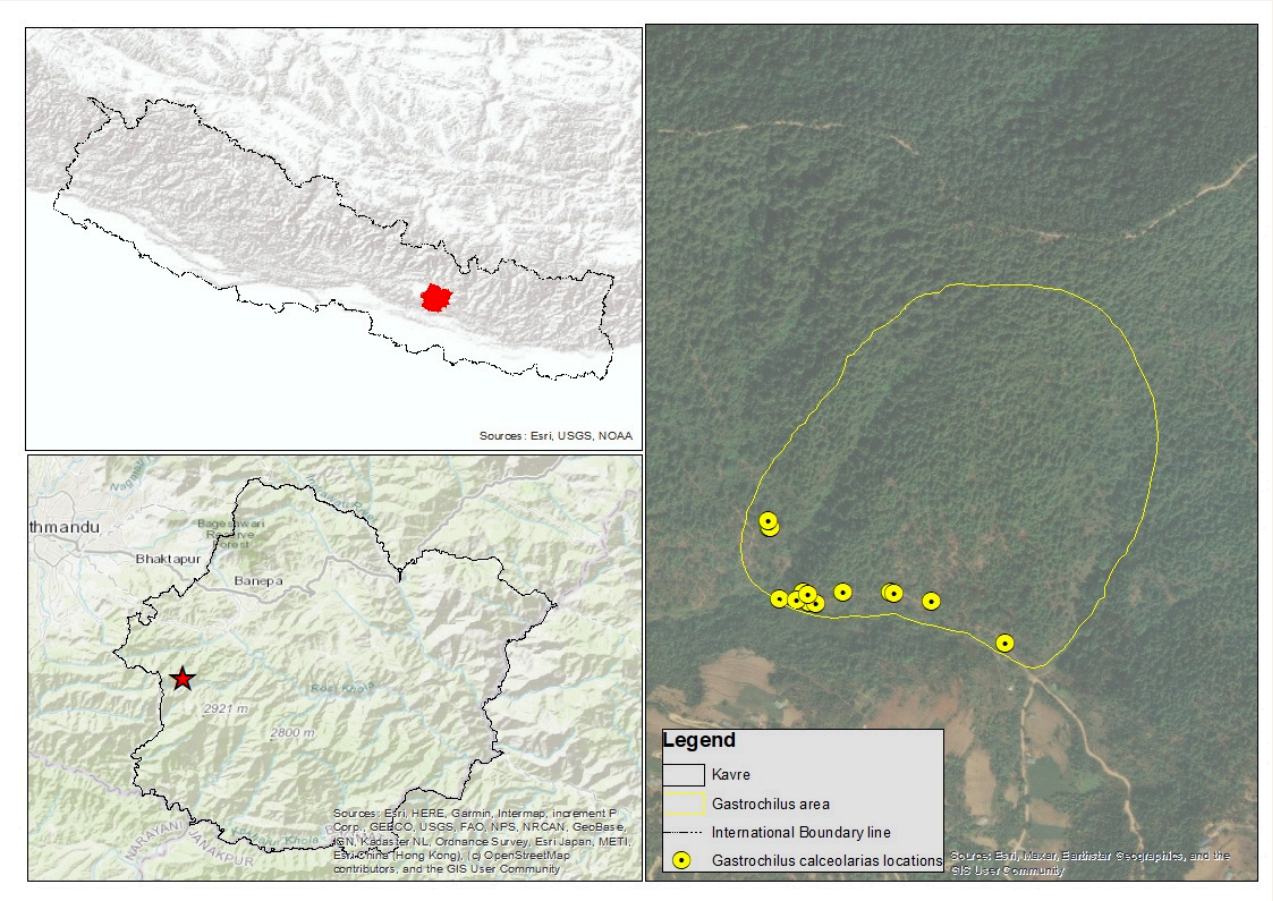

Fig 4: Showing *Gastrochilus calceolaris* reported in the project site

4.2 Gastrochilus calceolaris

I submitted a herbarium to the National Herbarium and Plant Laboratories (Photo).

Measurement: Lateral sepal (8mm x 4.5 mm), dorsal sepal (9mm x 5mm), lip (8mm x 3.5mm), leaf (130mm x 16mm), petiole (18-30mm length of petiole x 2mm width of bract)

Fig 5: *Gastrochilus calceolaris* collected from the project site

Fig 6: Herbarium *ofGastrochilus calceolaris* collected from the project site submitted to the national herbarium

Fig 7: *Gastrochilus calceolaris* in its habitat in Patne Bhangyang community forest

Fig 8: Some glimpse of field survey with local resource person and Greenhood Nepal team

4.2 Documenting threats and outlining a favourable environment

Although a majority of the individuals we spotted seemed healthy and undisturbed, there were several signs of potential threats observed and also identified through interviews. The interview with the stakeholders and field observation identified these key threats: extensive forest fire, disturbance due to roads and trails, poaching for ornamental uses, felling of trees during harvesting host and associated trees, and lack of conservation awareness. Our observation also found other threats like the presence of mining sites and landslides close to the habitat (Table 1).

Table 1: Key threats to the Gastrochilus calceolaris in the project site (Red boxes suggest the threat)

Key threats	Field observation	Interviews	Group discussion
Sharing habitat with other highly poached wildlife leading to its unintended felling and collection			
Easy access to visitors of hiking trail and local community, making it vulnerable for ornamental use			
Landslides and disasters impacting the habitat			
Felling of host trees (old trees, cut due to road expansion, poaching, logging, firewood)			
Habitat destruction due to unmanaged forest fires; less capacity of locals to address threat			
Invasive species, bushes that impede regeneration of host trees and impact orchids			
Lack of conservation awareness and its critically endangered status			
Less conservation priority from government and community authorities			

4.2 Encouraging locals to conserve orchids and their habitat

This objective focused on awareness and interaction programs aimed at encouraging local stakeholders to aware the conservation importance of protecting orchids and build orchid conservation activities in the management and operational plans. The database on Gastrochilus calceolaris is the first-hand data for the critically endangered orchid in the study site. It could be a record of a new population, and we have submitted the herbarium to the National Herbarium and Plant Laboratories (Fig xx) after discussing it with the authorities. This will help to raise awareness and draw the attention of all relevant stakeholders. We are working on a manuscript to share key insights of this study. The data adds to the national and global conservation assessments, in preparation for an action plan for Gastrochilus calceolaris and other orchids for long-term conservation. Moreover, awareness programs designed for local communities have been useful to help authorities become aware of the significance of orchids, which will prevent them from harming orchids when they collect firewood, fodder, and livestock grazing in specialized areas.

Fig 9: Photo collage showing interaction programs, first photo local management, second photo during interaction at the school

Additionally, this study was also crucial considering that the current federal government system in Nepal mandates local authorities to protect the natural resources; however, there is limited capacity to address the ongoing threats. The limited capacity, in particular, related to addressing threats to plants is linked to a lack of awareness. In the project site, no one we interviewed knew that this was an orchid, a critically endangered species, and it is a protected species. The sensitization programs helped local authorities to understand the conservation importance of this species, but also outlined a need for the immediate next step on how local governments should respond to address the threats.

5. Way forward

Gastrochilus calceolaris, despite being critically endangered, remains one of the least studied orchids in Nepal, with only eight records (including one from this study) of its specimens reported from the national plant database. Although its critical status is well known among the scientific community, it is little known to local communities who reside alongside its habitat. Additionally, this species shares its habitat with other heavily poached species (at least in my project site). This situation suggests that the conservation practitioners and scientific community should collaborate with local management to design collaborative conservation interventions.

Fig 10: Project site showing remains of forest fire