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ORCHID SANCTUARY RAJA RANI (MORANG DISTRICT), EAST NEPAL: AN EFFORT TOWARD HABITAT CONSERVATION

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ABSTRACT. Raja Rani occupies a small area in eastern Nepal. The area is a wetland, surrounded by sal (*Shorea robusta*) forest, situated in Bogatini Village of Letang VDC, Morang District of Koshi Zone. Of the three ponds, Raja Pokhari, Rani Pokhari, and Rajkumari Pokhari, Rani Pokhari has 1 mi^2 of dense forest growing up from the water, and its orchid-rich habitat is a center of attraction. The presenters recorded 45 species of orchids in what appears to be a natural orchid sanctuary, with most of the species in good numbers. The study is an effort to contribute to habitat conservation. During a field trip, local people were enlisted to help conserve this orchid-rich habitat, and as a result, they are now conscious of the need to conserve this habitat, which can be considered the first orchid sanctuary of Nepal.

Key words: orchid sanctuary, Raja Rani, habitat conservation

INTRODUCTION

Nepal is rich in orchid flora with ca. 386 orchid species in 102 genera (Bajracharya & Shakya 2002). The nation's first published floristic work (Don 1825) was based on the plant collection of F. Buchanan-Hamilton and N. Wallich and describes 51 species of orchids, many of them new to science. Hara et al. (1978) listed 313 species of orchids in 89 genera, and their work provides the foundation for the study of flora of Nepal. Another significant publication (Banerji & Pradhan 1984), in which 247 species of orchids are described and illustrated based mainly on herbarium specimens deposited at the Department of Plant Resources, Godavari (KATH). This valuable work added 30 new records of species to the orchid flora of Nepal. Orchids, however, did not receive the attention due in preparation of a checklist of Nepalese plants (Koba et al. 1994, Press et al. 2000) as well as in subsequent publications.

In the last decade, efforts have been made to study conservation as well as taxonomy at orchid hotspots in Nepal. As a result, some species new to science and many new records of orchids have been added to the orchid flora of Nepal. Concern has been growing in Nepal regarding the depletion of orchids from their natural habitats because of habitat destruction and excessive collection; yet efforts to conserve the orchids of Nepal need to be extended. The study of orchid flora and orchid conservation go hand in hand.

Within Protected Areas (nine national parks, three wildlife reserves, one hunting reserve, and three conservation areas), orchids are well conserved in Nepal. These areas, however, total 26,970 km^2 or only 18.32% of the country (HMGN/MFSC 2002). Other areas do not provide adequate management for protection of habitat and thus are vulnerable. Conservation of orchids outside the protected areas is a difficult task in Nepal. This study focuses on orchid flora, with the aim of conserving a small orchid-rich area in eastern Nepal.

METHODS AND MATERIALS

The study site is Raja Rani located in Bogatini Village of Letang Village Development Committee (VDC), Morang District of Koshi Zone. Adjoining areas also were studied to explore additional orchid-rich habitat. Raja Rani (Morang District) was selected because of its richness in orchid population. In this small area (4 mi^2), 45 orchid species were recorded, with most of the species in good numbers. The following methods were used in the study: (1) An extensive field survey was conducted periodically throughout the year at Raja Rani and adjoining areas. (2) Threatened and endangered orchid species were assessed with the help of data on distribution patterns and orchid species abundance obtained in the field survey. (3) Local people were initiated to the concept of conservation by providing education and by forming a local conservation group.

RESULTS

An extensive field survey was carried out in Raja Rani (Morang District) and adjoining areas. Raja Rani, a wetland in Bogatini Village (Letang VDC, Morang District of Koshi Zone in East Nepal) lies 12 km northwest of Mahendra Highway. Botanically this area was not explored.

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Located at 500 m elevation in tropical forest east of Bogatini Village, the area is bounded by Chisang River. The study site is reached by climbing 200 m uphill from the riverbank. Topographically the site has the shape of a wide bowl, with flat land surrounded by small hills. The flat land has three ponds (Raja Pokhari, Rani Pokhari, and Rajkumari Pokhari), and the surrounding hills are covered by forest dominated by sal (*Shorea robusta*). Rajkumari Pokhari is small without any vegetation, and Raja Pokhari has scanty forest; but Rani Pokhari, more or less oval in shape, covers ca. 1 mi^2 and is thickly covered with forest. Known for its scenic beauty and richness of orchid flora, Rani Pokhari also attracts many species of birds that visit the site for shelter and water. The forest is dominated by the single deciduous tree species belonging to the family Rubiaceae. The distinguishing feature of this tree is that its lower part lies 1–2 m below water level supported by a system of thick, highly interlocked roots. The tree trunk above the water level extends upward 2–3 m and is highly branched. Almost all the branches are thickly covered with orchids. Rani Pokhari is a candidate for a natural orchid sanctuary. The trees at the periphery of Raja Pokhari and Rani Pokhari are also rich in mostly epiphytic orchids, as few terrestrial orchids are found in this area. In other parts of the country, orchids are becoming rare in their natural habitats because of heavy collection, but in Raja Rani, species such as *Aerides multiflora, Dendrobium fimbriatum, D. moschatum,* and *D. nobile* are frequent, and *Vanda teres* is common (TABLE 1).

In the vicinity of the study site dwells a Magar tribe made up of 31 households. Using data from our study, we have been able to organize the tribal members along with the local community forest groups to protect all plant species of the area.

Threats to Orchid Diversity

The greatest threat to the conservation of orchids in Nepal is habitat loss resulting from forest destruction, degradation, and fragmentation. Another serious concern is the global demand for selected orchids for ornamental and medicinal purposes.

Habitat Loss

The greatest threat to orchids—habitat loss—is caused by forest destruction, degradation, and fragmentation. In the Terai planes, the forest area decreased at an annual rate of 1.3% from 1978–1979 to 1990–1991. In the hilly areas, the forest decreased at an annual rate of 2.3% from 1978–1979 to 1994. In the entire country from 1978–1979 to 1994, forest area decreased at the annual rate of 1.7%. Forest and shrubs together decreased at an annual rate of 0.5% (FRISP 1999).

Selective Logging and Canopy Disturbances

Selective logging of valuable timber species by His Majesty's Government (HMG) of Nepal as well as by local communities has contributed significantly to the extinction of epiphytic orchids. The timber species that provide orchid habitats include *Shorea robusta* in the tropical zone, *Schima wallichi* and *Castanopsis indica* in the subtropical zone, and *Quercus* species and *Rhododendron arboreum* in the temperate zone.

Road Construction

Total length of roads in Nepal increased from 624 km in 1956 to 11,714 km in 1997 (Ghimire 1998). Road construction in the terai and midhills passes through forest areas and has contributed to habitat modification, landslides, and soil erosion. Many mature trees have been logged, contributing to orchid destruction.

Illegal Collection and Trade

Illegal collection of orchids from the wild and commercial trade in orchids are serious concerns that have contributed to the extinction of orchids from natural habitats. The illegal export of orchids to neighboring countries and abroad has not been controlled despite government efforts.

Threat to Orchid Diversity in Raja Rani

There is no major threat to the orchids of Raja Rani at present. Selective logging and degradation and fragmentation of the forest combine as the major threat to the depletion of the orchid population from natural habitats. In Raja Rani, however, local forest community groups strictly control such activities. Illegal collections of orchids also are strictly controlled in this area.

DISCUSSION: CONSERVATION

In-situ conservation of orchids is a global problem. Today many orchid species are considered to be at risk of extinction, directly or indirectly because of human activities. Habitat destruction, modification, fragmentation, and overcollection are the main causes for the rapid depletion of orchids from natural habitats.

In Nepal orchids also are being depleted at an alarming rate from their natural habitats as the result of habitat alteration and over collection. Removal of orchids from wild populations for trade is a major cause in the decline of many

TABLE 1. Status of orchids in Raja Rani, Morang District, East Nepal, 2004.

Orchid species	Habit*	Local population status**
Acampe papillosa (Lindl.) Lindl.	E	++
Acampe rigida (Buch.-Ham ex Sm.) P.F. Hunt	E	+
Aerides multiflora Roxb.	E	++++
Aerides odorata Lour	E	+++
Bulbophyllum careyanum (Hk.) Spreng	E	+++++
Bulbophyllum reptans (Lindl.) Lindl. ex Wall.	E	+++++
Bulbophyllum affine Lindl. (Lindl.) Garay	E	+++
Cleisostoma filiforme (Lindl.) Garay	E	++++
Coelogyne flavida Hook.f. ex Lindl.	E	++
Coelogyne nitida Lindl.	E	++++
Coelogyne ovalis Lindl.	E	++
Cymbidium aloifolium (L.) Sw.	E	+++++
Dendrobium anceps Sw.	E	+
Dendrobium aphyllum (Roxb.) C.E.C. Fisch	E	++++
Dendrobium densiflorum Lindl.	E	++
Dendrobium fimbriatum Hook.	E	++++
Dendrobium farmeri Pexton	E	+
Dendrobium formosum Roxb. ex Lindl.	E	+
Dendrobium heterocarpum Wall. Ex Lindl.	E	+++
Dendrobium moschatum (Buch.-Ham.) Sw.	E	+++++
Dendrobium nobile Lindl.	E	++++
Ephemerantha macraei (Lindl.) P.F. Hunt & Summerh.	E	++++
Eria amica Reichb.f.	E	+++++
Eria apertiflora Summerh.	E	++++
Eria bipunctata Lindl.	E	+++
Eria concolor Rechb. f.	E	++
Eria discolor Lindl	E	++
Eria lasiopetala (Willd.) Ormerod	E	+++++
Eria spicata (Buch.-Ham ex D. Don) Hand.-Mazz.	E	+++++
Gastrochilus calceolaris (Sm.) D. Don	E	++
Habenaria dentate (Sw.) Schltr.	T	++
Liparis nervosa (Thunb.) Lindl.	T	+
Lusia trichorhiza (Hook.) Bl.	E	+++
Malaxis latifolia Summerh.	T	+
Oberonia iridifolia Lindl.	E	+
Otochilus albus Lindl.	E	+++
Phalinopsis mannii Reichb. f.	E	+
Pholidota articulata Lindl.	E	+++
Pholidota imbricate Hook.	E	++
Pholidota pallida Lindl.	E	++
Rhynchostylis retusa (L.) Bl.	E	++++
Thunia alba (Lindl.) Rechb. f.	E	++
Vanda cristata Lindl.	E	+++
Vanda teres Lindl.	E	+++++
Zeuxine strateumatica (Lindl.) Schltr.	T	+++++

* Epiphytic (E) and Terrestrial (T).

** + = very rare (up to 10 individuals); ++ = rare (11–20 individuals); +++ = occasional (21–40 individuals); ++++ = frequent (41–80 individuals); +++++ = common (above 80 individuals).

showy Nepalese orchids. In Nepal there are two types of orchid collectors: those who fulfill foreign demands and those who fulfill local demands. A survey (Shakya et al. 1994) found that plant quarantines in 1988–1989 and 1991–1993 gave permission for the export of 7923 orchid plants. These plants were exported for the most part to Japan. Local orchid sellers around Kathmandu Valley collect many orchid plants from wild populations. In all, these collectors remove ca. 96,000 pseudobulbs per year from Kathmandu Valley.

Orchid collection has been banned under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to which Nepal has been a signatory party since 1973. Implementation of CITES regulations, however, is poor; and harvesting from the wild

continues for commercial trade. His Majesty's Government of Nepal (HMG) has not taken serious steps to assure orchid conservation in Nepal. In the Environment Protection Act of 1996 and the Environment Protection Act Regulation of 1997 under Article 8 is a provision regulating the collection of sungava (orchid) seeds. This law requires an Initial Environmental Examination Report to be made prior to any collection. Plant collecting that causes depletion of orchid species from their natural habitats must not be encouraged; rather such activities need to be stopped completely (Chaudhary 2000).

Throughout Nepal, conservation of orchids growing in the wild outside protected areas is the most challenging task. Despite this ongoing challenge, present work in eastern Nepal provides an example of successful conservation of orchid-rich habitats. A major part of this work is the in-situ conservation of orchid-rich habitats. Raja Rani (Morang District), an orchid-rich habitat selected as the site of the present study, is well suited for in-situ conservation. Toward this goal, the authors involved the local people of Bogatini Village in conserving orchids and other plant species of this area. Local residents were found to be very interested in conserving all the plant species of the area. During the first field visit to the site, the authors organized a meeting to educate the local people about conservation and especially about orchids. Participating in the meeting were the chairman and vice-chairman of Bogatini VDC, educated local residents, members of non-governmental organizations (NGOs), along with many village people. During this meeting people were informed about the plant diversity of the area, the general characteristics of orchids with an emphasis on orchid conservation, and the number of orchid species present in the area with the emphasis on why this area is important for orchid survival.

The local people asked many questions about the importance of orchids and their conservation. Through interaction with the people on this issue, the authors finally were able to convince them of the value of orchids to the environment and the need for their conservation. The local people, including the VDC chairman, decided to develop the area for ecotourism. In the second field visit, the authors found that the area has been strictly conserved at the local people's initiation. They have restricted entry to the orchid sanctuary to ticketholders for those visiting the orchid sanctuary for a picnic; and also, no one is allowed to collect and remove any plant. Thus, this area can be considered as Nepal's first orchid sanctuary completely managed by the local people. This achievement, in having local people successfully conserving the orchids of Nepal, is a major outcome of the current study. Declaration of this area as an official orchid sanctuary by the Government of Nepal has yet to be issued, but efforts toward this goal are ongoing.

The density of the forest and the deep water levels during our fieldwork limited detailed study of the orchid flora of Rani Pokhari. The total number of orchid species is projected to increase when penetration into the central region of the site is possible.

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