

GEOGRAPHICAL BIODIVERSITY OF ORCHIDS IN DIFFERENT MUNICIPALITIES

OF NORTHERN SAMAR, PHILLIPINES

ABSTRACT

Orchids are one of the largest and most diverse groups among the Philippine flowering plants, harboring over 1200 species, varieties and forms. Thus, this study was conducted to identify the orchid species in nine (9) sampling sites, as well the anthropogenic activities and economic uses. Purposive sampling technique was applied in this study, which is form of sampling technique in which the selection of sample is based on the researcher's own judgment that will fit in the criteria of the study. A total of seventy-four (74) varieties of orchids, belonging to eighteen genera (18) were identified in nine sampling areas which implied that Northern Samar are rich in varieties of orchid species, although anthropogenic activities need to be minimized to protect these orchid species.

Keywords: anthropogenic, exploitation, habitat, orchid, species

I. INTRODUCTION

"The biodiversity of Northern Samar has long been underrepresented in the scientific literature, due to lack of published studies on biodiversity in the region" [18]. "The present study augments this gap and highlights the substantial level of biodiversity. The largest and the most threatened and diverse family of angiosperm plants globally. Orchids are widely used in traditional medicine as remedies for severe diseases" (Pant and Raskoti, 2013).

There are about 141 genera of orchids representing about 1,100 orchid species, 900 of which are described as endemic to the Philippines (Cootes, 2011), with more new species and genera being discovered and recorded yearly (e.g. de Leon et al. 2017; Naive and Martyr 2018; Meneses and Cootes 2019; Naive et al. 2019; Militar and Vicencio, 2019; Tamayo et al. 2020; Tandang et al. 2020). "Around 25 genera and 104 species are of commercial value. Many of the endemic species have contributed significant roles in the orchid hybridization work in various countries. Among them are *Vanda sanderana* or "waling-waling", *V. merrillii*, *V. lamellata*, *V. luzonica*, *Aeredis pulcherimma*, *A. jarchiana*, *Phalaenopsis amabilis*, *P. lueddemanniana*, *P. pulchra*, *Renanthera storei*, *R. philippinensis*, *Dendrobium taurinum* among many others" (Valmayor, 1984).

"Habitat destruction and unsustainable harvesting are the major global threats to orchids" (Fay 2018; Gale et al. 2018). Habitat fragmentation negatively impacts species richness of orchids (Hundera et al. 2013; Parra Sánchez et al. 2016), the need of highly specialized habitat takes orchids more vulnerable to global environmental changes (Fay 2018). "Orchids are also highly traded mainly for horticulture, medicine and food" (Hinsley et al. 2017). "Despite being regulated under the Convention on International Trade in Endangered Species, many of the species are still being collected and traded unofficially that is negatively affecting wild populations around the world" (Fay 2015). The National List of Threatened Philippine Plants of Fernando et al. (2008) "stated that there are 19 species categorized as critically endangered, 35 endangered species, and 3 vulnerable species in the Orchidaceae family".

The present study helps us in understanding of orchid diversity and ecology and will address the breach in our knowledge and distribution of Philippine orchids. The result of this study will be helpful not only in elucidating the level of biodiversity in Northern Samar but also in inferring patterns of plant diversity and biogeography in the Philippines.

Methodology:

“Northern Samar was subdivided into three areas, namely: Balicuatro Area, Central Area and the Pacific Region. The province lies in the northeast portion of the island of Samar, Philippines with longitudes $12^{\circ} 15' - 12^{\circ} 45'$ and latitudes of $124^{\circ} 15' - 125^{\circ} 30'$. It is one of the six provinces comprising Region VIII. The province consists of twenty-four (24) municipalities. Catarman is the capital town” (Galenzoga, Quiñones, 2014).

Plant Survey

Extensive survey of Orchid species was carried out using purposive sampling technique. Municipality's identification was based on geographic location (distribution) and accessibility.

Plant Collection

Actual survey and collection of healthy orchid plants was done by the researcher with the help of some informants and forest guide. Samples healthy orchid plants and properly documented using a field notebook with the following information: date and place of collection, local name, economic importance and anthropogenic activity.

All orchid species encountered were photographed in situ whenever possible, and no voucher specimens were collected to ensure conservation. Most orchid species observed were represented by only one or a few individuals, and many are already being harvested for ornamental purposes. Species identification was carried out using photographic guides (Cootes 2001, 2011; Pelser et al. 2011 onwards), expert consultations (such as the Co's Digital Flora of the Philippines online plant identification platform; Barcelona et al. 2013), and relevant taxonomic literature (Clements and Cootes 2009; Cabactulan et al. 2018).

Determination of the Anthropogenic Activities

Data and information about the anthropogenic activities in the study area was determined through the use of an interview guide distributed to the respondents living in the area.

Determination of the Economic Uses of Orchids

Data and information about the economic uses of orchids in the study area was gathered through the use of a researcher- made interview guide. In every study site (10) individuals, commonly a farmer and permanent residents living in the area served as the respondents of this study.

Results and Discussion

Distribution of Orchid Species in Selected Municipalities of Northern Samar

Table 1 show the initial list of identified species of orchids in selected municipalities of Northern Samar. The list showed seventy-four (74) species of orchids in nine (9) sampling sites. These were represented by eighteen (18) genera, namely, Acamphe, Arachnis, Aranda, Bulbophyllum, Cattleya, Cymbidium, Dendrobium, Epidendrum, Guarianthe, Leptotes, Oeceoclades, Oncidium, Papilionanthe, Phalaenopsis, Rhynchostylis, Vanda, Vappodes and *X. mokara*.

Table 1. Orchid pecies in Selected Municipalities of Northern Samar

Sl. No	Species Name (Common Name)	Biri	Catarman	Laoang	Lavesarez	Palapag	Rosario	San Isidro	San Roque	Silvino Lobos
1	<i>Acampe pachyglossa</i>	/	x	x	x	x	x	x	x	/
2	<i>Arachnis flos-aeris</i> (spider orchid)	/	x	x	x	/	x	x	x	/
3	<i>Aranda broga</i>	x	x	x	x	/	x	x	x	/
4	<i>Bulbophyllum longifolium</i>	/	x	/	x	x	/	/	/	x
5	<i>Cattleya mendelii</i> (Columbian orchid)	x	x	x	/	x	x	x	x	/
6	<i>Cattleya labiata</i> (Crimson or Ruby-lipped cattleya)	x	/	/	x	/	x	/	/	x
7	<i>Cattleya pumila</i> (Dwarf sophronitis)	x	x	x	/	x	/	x	x	x
8	<i>Cattleya violacea var superba</i>	x	/	x	x	x	x	x	x	/
9	<i>Cymbidium aloifolium</i> (Aloe-leafed cymbidium)	/	x	/	/	/	x	/	/	x
10	<i>Cymbidium finlaysonianum</i>	/	x	x	x	x	x	x	x	x
11	<i>Dendrobium affine</i> (White butterfly orchid)	x	/	x	/	x	/	x	/	x
12	<i>Dendrobium 'airy peach'</i>	x	x	/	x	x	x	x	x	x
13	<i>Dendrobium anosmum</i> (Purple rain orchid)	/	/	/	/	/	/	/	/	/
14	<i>Dendrobium austrocaledonium</i> (Tea three orchid)	x	x	x	/	x	x	x	x	x
15	<i>Dendrobium bigibbum</i> (Cooktown orchid)	x	/	/	/	/	/	/	/	x
16	<i>Dendrobium bigibbum var. phalaenopsis</i> (Cooktown orchid)	/	x	x	/	x	/	x	x	x
17	<i>Dendrobium burana</i> 'Diamond'	x	/	/	/	x	/	x	x	/
18	<i>Dendrobium burana</i> 'green jade'	x	x	/	x	x	x	x	/	x

19	Dendrobium burana 'charming white'	x	x	/	x	/	x	x	x	x
20	Dendrobium crumenatum (Dove orchid)	/	/	/	x	x	/	/	/	/
21	Dendrobium dearie (Deares dendrobium)	x	x	x	/	x	x	x	x	x
22	Dendrobium delicatum	/	/	x	x	/	/	x	x	/
23	Dendrobium 'Emma White	x	x	x	/	x	x	x	x	x
24	Dendrobium fractiflexum	/	x	x	x	x	x	x	x	x
25	Dendrobium lasianthera	x	/	x	/	/	/	x	x	x
26	Dendrobium nobile (Noble dendrobium)	/	/	/	/	/	x	/	/	/
27	Dendrobium kingianum (Charming white orchid)	x	/	x	/	x	x	x	/	/
28	Dendrobium phalaenopsis (Mauve butterfly)	/	/	x	x	/	/	/	x	/
29	Dendrobium phalaenopsis 'hybrid'	x	/	x	x	x	x	x	x	x
30	Dendrobium phalaenopsis var. hololeucum	x	/	x	x	x	x	/	x	x
31	Dendrobium petticoat	x	/	/	/	/	/	x	x	x
32	Dendrobium sonia (Pink dendrobium)	/	/	x	/	/	/	/	/	x
33	Dendrobium 'pink veined or stripe'	x	/	x	x	x	/	x	x	x
34	Dendrobium 'sugar pink' (Pink lorco)	x	/	x	/	/	x	x	x	x
35	Dendrobium pangasinanense (Pangasinan orchid)	x	x	x		x	/	x	x	x
36	Dendrobium schulleri			/	/	x	x	x	x	/
37	Dendrobium taurinum (Bull orchid)	/	/		/	/	/	/	/	/
38	Dendrobium uraiwan (Uranaiwan orchid)	x	x	/	x	/	x	x	/	x
39	Dendrobium victoriae-reginae (Queen Victoria dendrobium)	/	x		/	x	x	x	/	x
40	Epidendrum ciliare	x	x	x	x	x	/	/	x	x

64	<i>Vanda charles goodfellow x tessellate alba</i> (Yellow orchid)	x	/	x	x	x	x	x	x	x
65	<i>Vanda coerulescens</i> (Orange color)	/	/	x	/	/	x	/	x	/
66	<i>Vanda coerulescens</i> (Pink color color)	/	x	x	x	x	x	/	/	x
67	<i>Vanda denisoniana</i> (Lady Denison Londesborough's Vanda)	x	/	/	x	x	x	x	/	x
68	<i>Vanda josephine</i> Brero (Vanda JBV hybrid)	x	/	x	x	x	/	x	/	/
69	<i>Vanda 'miss joaquim'</i> (Cylindrical vanda)	x	/	x	x	x	x	x	x	X
70	<i>Vanda scadens</i>	x	x	x	x	/	x	x	x	x
71	<i>Vanda usha</i>	/	/	/	/	/	/	/	/	/
72	<i>Vappodes phalaenopsis</i> (Cooktown orchid)	x	/	x	x	/	x	x	x	X
73	<i>X - mokara</i> (Mokara orchid)	x	x	/	/	x	/	/	x	X
74	TOTAL	30	34	26	35	27	25	27	24	25

Legend: /=present x=absent

As shown in the table 1, there are nine municipalities which serve as the sampling sites, namely, Biri, Catarman, Laoang, Lavesarez, Palapag, San Isidro, San Roque, Silvino Lobos, and Rosario. Of the nine municipalities, Lavesarez (35), Catarman (34) and Biri (30) to have the most number of orchids. Whereas, San Roque (25), Rosario (25) and Silvino Lobos (24) has the least number of orchids.

Result implies that the nine sampling sites are rich in varieties of orchid species. Among the nine (9) municipalities, Lavezares and Catarman are the most orchid inhabited places.

Anthropogenic Activities

As human population is expanding, increased pressure is being placed on natural area, including areas with numerous threatened orchid species. Based on observation and actual interview held in nine (9) sampling areas, three anthropogenic activities are identified by the researcher that are commonly affecting the distribution of orchid species in Northern Samar. Local collections have been observed in nine (9) sampling areas for ornamental purposes. Upon interviewing the local residents, some locals confirmed that they trade with outside plant hobbyist and collectors.

In the process of land clearing, numerous individual plants and animals are killed or die soon after. However, climate change, especially global warming that brings about frequent extreme events could negatively impact orchid's adaptation and aggravate the species extinction. Therefore, many species are subject to decline and threatening by potential challenges of climate change. Habitat degradation and climate changes are exacerbated by the poaching and harvesting of orchid species, which remain a global threat to orchid population.

In this matter, the researcher suggests to implement an immediate restriction in collecting orchid species to maximize its number in their natural habitat. Official of each municipality should take action in protecting the species from being poached legally and exposed in other threats.

Economic Uses

Economic importance of orchid species was identified through actual interview conducted by researcher in all sampling areas Local residents identified and acknowledging that the seventy-one (71) species are economically important terms of horticulture and florist. They confirmed that they trade to outside hobbyist and collectors as they are interested in these plant species as plant stock. It implies that, orchid species in the sampling area were known only for its ornamental uses and locals are unaware of other potential economic importance of orchids especially in medicine and food uses.

Conclusion

The seventy-four (74) species of orchids implied that the area has a vast diversity of orchid species, and anthropogenic activities need to be minimized to protect these orchid species.

Summary

There were seventy-four (74) orchid species that were found in nine (9) municipalities of Northern Samar. These represented nineteen (19) genera. Based on the interview conducted in the sampling areas, anthropogenic activities in area affecting the distribution of orchids were identified as illegal poaching, land clearing and climate change or calamities.

Recommendation

Restriction for collection of orchids should be implemented to local residents by municipal officials to conserve and enhance the number of these species.

Disclaimer (Artificial intelligence)

I hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscripts.

IV. References

1. BARCELONA JF, NICKRENT DL, LAFRANKIE JV, CALLADO JRC, PELSER PB. 2013. Co's Digital Flora of the Philippines: plant identification and conservation through cybertaxonomy. *Philippine Journal of Science* 142: 57–67.
2. CABACTULAN DD, COOTES J, DE LEON MD, PIMENTEL RB, AURIGUE FB, BINAYAO III NK. 2018. Nineteen new orchid species from northern Mindanao, Philippines. *Orchideen Journal* 6: 1–21.
3. CLEMENTS M, COOTES J. 2009. The systematics of the Orchidaceae for flora Malesiana II: Miscellaneous Dendrobieae from the Philippines. *Orchideen Journal* 16:19–27
4. COOTES JE. 2011. *Philippine Native Orchid Species*. Quezon City, Philippines: Katha Publishing Co., Inc. 289p.
5. DE LEON MD, NAIVE MA, COOTES J. 2017. A new *Ceratostylis* (Orchidaceae) species from Bukidnon, Philippines. *Phytotaxa* 305(4): 299–300.
6. FAY MF. 2015. Undocumented trade in species of Orchidaceae. Retrieved on 09 Aug 2020 from <https://cites.org/sites/default/files/eng/com/pc/22/Inf/E-PC22-Inf-06.pdf>
7. FAY MF. 2018. Orchid conservation: how can we meet the challenges in the twenty-first century? *Botanical Studies* 59: 16.
8. FERNANDO ES, CO D, LAGUNZAD D, GRUEZO W, BARCELONA J, MADULID D, LAPIS A, TEXON G, MANILA A, ZAMORA P. 2008a. Threatened plants of the Philippines: a preliminary assessment. *Asia Life Sciences Supplement* 3: 1–52.
9. GALE SW, FISCHER GA, CRIBB PJ, FAY MF. 2018. Orchid conservation: bridging the gap between science and practice. *Biological Journal of Linnean Society* 186(4): 425–434.
10. HUNDERA K, AERTS R, DE BEENHOUWER M, VAN OVERTVELD K, HELSEN K, MUYS B, HONNAY O. 2013. Both forest fragmentation and coffee cultivation negatively affect epiphytic orchid diversity in Ethiopian moist evergreen Afromontane forests. *Biological Conservation* 159: 285–291.
11. HINSLEY A, DE BOER HJ, FAY MF, GALE SW, GARDINER LM, GUNASEKARA RS, KUMAR P, MASTERS S, METUSALA D, ROBERTS DL, VELDMANS, WONG S, PHELPS J. 2017. A review of the trade in orchids and its implications for conservation. *Botanical Journal of the Linnean Society* 186(4): 435–455.
12. MENESES ZD, COOTES JE. 2019. *Pseuderiesamarana* (Orchidaceae), a new species and genus record from the Philippines. *Taiwania* 64(4): 353–356.
13. MILITAR, KM., R. BELGA, MCG VICENCIO, 2019. Inventory Assessment of Orchids in Selected Barangays of Palapag, Northern samar, Philippines, *J. Bio Inno*, 8 (3), pp. 375-390.
14. NAIVE MAK, MARTYR JC. 2018. *Trichoglottiscorazoniae* (Orchidaceae: Vandae: Aeridinae), a new species from the Philippines. *Lankesteriana* 18(2): 81–84.
15. NAIVE MAK, COOTES J, ORMEROD P. 2019. *Stichorkisdavidlohmanii* (Orchidaceae; Malaxideae), a new species from the southern Philippines. *Taiwania* 64(1): 65–68.
16. PANT, B. and RASKOTI, B.B. (2013) *Medicinal Orchid of Nepal*. Himalayan Map House Pvt. Ltd., Kathmandu
17. TAMAYO MN, MC ANDREW KP, BUSTAMANTE RAA. 2020. *Dendrochilumignisiflorum* (Coelogyninae, Arethuseae, Orchidaceae), a new species from Luzon Island, Philippines. *Phytotaxa* 455(4):240–244.
18. Saavedra AJ, Pitogo KM. Richness and Distribution of Orchids (Orchidaceae) in the Forests of Mount Busa, Sarangani, Southern Mindanao, Philippines. *Philippine Journal of Science*. 2021 Apr 2;150.

Vandodes phalaenopsis



Aranda broaa



Arachnisflor-aeris



Oncidium varicosum



Phalaenopsis fuller



Dendrobium bigibbum



Dendrobium warawan



Dendrobium anosmum



P. luedemanniana



Vanda usha



Vanda JBV



Vanda courulescens





Figure 1. The photographic representation of selected Orchid species found in the natural habitats of Northern Samar