Received Date: April 2023 Revised: June 2023 Accepted: July 2023

Floristic Diversity of Vascular Plants in Community Managed Forest of Sankhu village, Lalitpur District, Nepal

[*]Ratna Silwal Gautam, Sudha Joshi Shrestha, Ila Shrestha

[*]Corresponding email: ratna.silwal@pmc.tu.edu.np

Doi : https://doi.org/10.3126/pragya.v12i01.61638

Abstract

The plant diversity of an area reveals its biodiversity, usage patterns, and conservation status which play a significant role in shaping the country's conservation plans and strategies. The present study aims to describe the vascular plants diversity of Lakuribhanjyang community forest in Lalitpur, Central Nepal. This community forest comprises an area of 43.5 hectares and the altitude ranged 1763m to 1833m asl. The study recorded 111 plant species from 102 genera and 64 families in the Lakuribhanjyang community forest. Among the documented species, trees (49 species) were dominantly followed by herbs (33 species), shrubs (18 species), and climbers (11 species). A total of 90 dicots, 7 monocots, 4 gymnosperms, and 10 pteridophytes were documented. Plants from the Moraceae family (6 spp.) dominated the research area, followed by plants from Asteraceae, Fabaceae, Poaceae and Rosaceae each with 5 species each. Ageratina adenophora, Ageratum conyzoides, Alternanthera philoxeroides, Bidens pilosa, Senna tora and Lantana camara were the invasive plant species that were found in the study area. Similarly, Choerospondias axillaris, Dioscorea deltoidea, Lithocarpus fenestratus, Senegalia catechu, Valeriana jatamansi and Zanthoxylum armatum were the endangered and threatened vascular plants listed in Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) that was found in this region.

Introduction

In terms of size, Nepal is well renowned for its high plant biodiversity. It accounts for only 0.03% of the world's land area, yet over 3.2% of the world's known flora is found here (MoFSC 2014). A total of 6,073 angiosperms, 26 gymnosperms and 534 pteridophytes species have been recorded in Nepal (MoFSC 2014), with 284 flowering plant species endemic to the nation. A recent study recorded about 5,606 species of flowering plants from Nepal (Shrestha *et al.*, 2022). Nepal's forest covers 44.74 percent of the country's total land area, with forest accounting for 40.36 percent and Other Wooded Land (OWL) accounting for the remaining 4.38 percent (DFRS 2018). The Forest Act of 2019 categorizes Nepal's national forests into six types: government-managed, protected, community, leasehold, religious, and collaborative forests (Poudel, 2019). The Nepalese Community Forestry Program (CFP) is part of a four-decade-old global movement toward forest devolution, which gives legal opportunity for local people to manage and utilize forest resources (MoLJ, 1993). This devolution has been acknowledged as a major achievement in natural resource management, preventing deforestation, rejuvenating degraded forests, and safeguarding forests while supporting local livelihoods (Agrawal &

Ostrom, 2008; Niraula et al., 2013). A floristic study of a region is a systematic botanical survey that uses vegetation plots to provide information on trends in plant diversity (Stohlgren *et al*., 1997). Floristic diversity research indicates total resources, their usage, and conservation status, which may be used to establish conservation strategies and policies (Bhatta & Chaudhary, 2009).

Studying the floristic diversity of a local or regional area is essential because it aids in a number of tasks, including the identification of new plant species for herbaria, the updating of nomenclature, the documentation of changes in ecological conditions, the addition of specimens from herbarium collections, and the identification of the types and distribution of flora resources that need to be managed (Chalise et al., 2018). Understanding a region's floral diversity may help with planning and policy-making since it can serve as a representation of the region's total resources, traditional uses, and conservation status (Chaudhary et al., 2002). Several previous studies on the floristic diversity of central Nepal have been done (Baral and Katzensteiner, 2009; Singh, 2014; Gaire, 2015; Chalise et al., 2020). A floristic study of vascular plants concentrating on the Lalitpur district's community managed forest is still absent. As a result, the current study was conducted to investigate vascular plant variety in one of Lalitpur district's community forests in Central Nepal.

Materials and Methods

Study area

The study was carried out in Lakuribhanjyang community forest of Sankhu village in southern part of Lalitpur district, Nepal (Figure 1). The altitude of Lakuribhanjyang community forest varies from 1763m to 1833m with southern west aspect having the slope of 30°-55°. Major vegetation of this forest are *Alnus nepalensis*, *Betula alnoides*, *Pinus wallichiana*, *Pinus roxburghii*, *Schima wallichii*, *Castanopsis indica*, *Quercus lamellose*, *Juglans regia*, *Eurya acuminate*, *Rhododendron arboreum* etc. The climatic data of the period 2013-2022 obtained from Godawari Weather Station showed that the area receives a large amount of rain in the period between June to September. July receives as high as 456.69 mm of average daily accumulated rainfall. The months from April to October are quite hot with the mean daily maximum temperature in June reaching as high as 27.15^{o}C. Other months are relatively cooler with the mean daily minimum temperature of the month of January falling as low as 2.29^{o}C. The data of the period 2013-2022 showed that the daily mean relative humidity of the months of July to November i.e., monsoon is higher than the other months (source: www.dhm.gov.np). Lakuribhanjyang community forest has altitudinal variation from 1763m to 1833m with southern west aspect having the slope of 30°-55°. Major vegetation of this forest are *Alnus nepalensis*, *Betula alnoides*, *Pinus wallichiana*, *Pinus roxburghii*, *Schima wallichii*, *Castanopsis indica*, *Quercus lamellose*, *Juglans regia*, *Eurya acuminate*, *Rhododendron arboreum* etc.

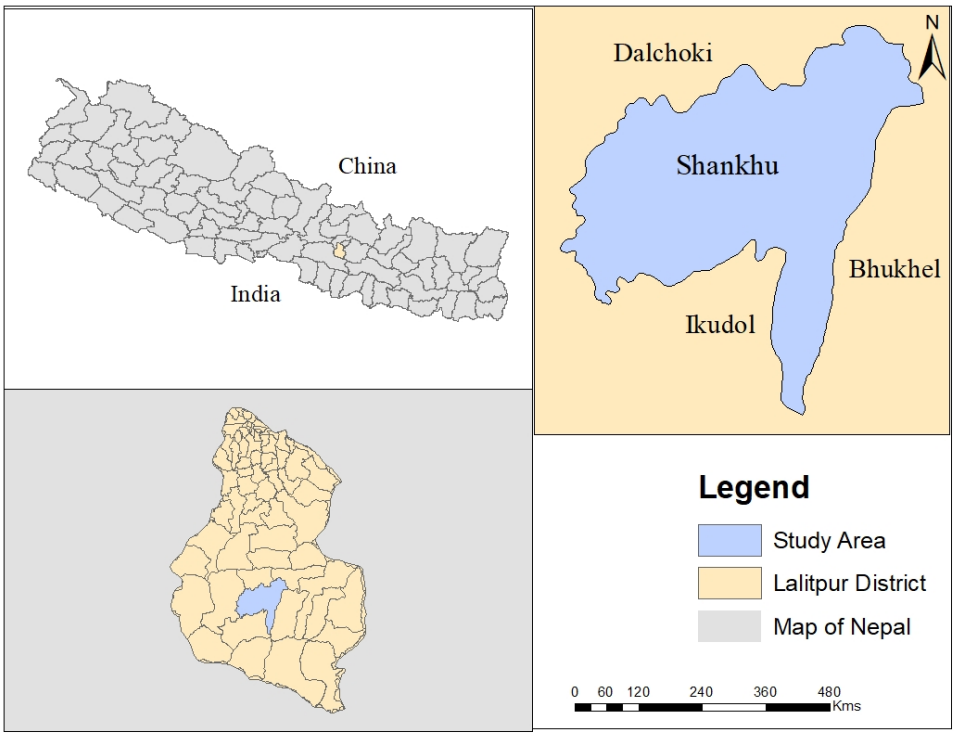

Figure 1 Map of the Study Area

Data Collection

The data collection was conducted from February to March, 2020. Plants species were documented from the 14 concentric circular sampling plots having 8.92-meter radius which were randomly laid down. The voucher specimens were collected from the community forest and the herbarium specimens were prepared (Rajbhandari & Rajbhandary, 2015). All vouchers were brought to the Patan Multiple Campus laboratory for identification using extensive field data obtained during the field visits. Identification of voucher specimens were carried out by following standard literatures (GoN, 1969; GoN, 1986), expert consultation and plant database of National Herbarium and Plant Laboratories (KATH) (http://plantdatabase.kath.gov.np) and the Nomenclature based on World Flora Online, www.worldfloraonline.org (WFO, 2023). The herbarium specimens were deposited in Department of Botany, Patan Multiple Campus, Lalitpur.

Results and Discussion

A total of 111 vascular plant species belonging to 64 families and 102 genera were recorded in Lakuribhanjyang community forest of Sankhu village (Figure 1, Appendix 1). Among the total listed plant species, 97 species were angiosperms (90 species dicots and 7 species monocots), four species were gymnosperms and 10 species were

pteridophytes (Figure 2). Among 111 recorded plant species, 49 plants were trees, 33 were herbs, 18 were shrubs and 11 species were climbers (Figure 3). In total, 111 vascular plant species from 64 families were reported from the study area (Figure 4, Table 1).

Moraceae was the most dominant family having six species. Asteraceae, Fabaceae, Poaceae, Rosaceae and Fagaceae comprised five species for each. Ericaceae, Menispermaceae, Pinaceae and Pteridaceae comprise three species each. Amaranthaceae, Anacardiaceae, Berberidaceae, Cannabaceae, Caryophyllaceae, Dioscreaceae, Melastomataceae, Pentaphyllaceae, Polygonaceae, Primulaceae, Solanaceae, Urticaceae, Verbenaceae and Betulaceae comprised two species each. Similarly, Acanthaceae, Actinidiaceae, Apiaceae, Aquifoliaceae, Araliaceae, Asparagaceae, Athyriaceae, Blechnaceae, Boraginaceae, Convolvulaceae, Cucurbitaceae, Dennstaedtiaceae, Glecheniaceae, Hypoxidaceae, Juglandaceae, Lauraceae, Lycopodiaceae, Lygodiaceae, Lythraceae, Malvaceae, Meliaceae, Myricaceae, Myrtaceae, Oleaceae, Orabanthaceae, Oxalidaceae, Phyllanthaceae, Rhamnaceae, Rubiaceae, Rutaceae, Santalaceae, Sapindaceae, Saxifragaceae, Scrophulariaceae, Smilacaceae, Theaceae, Valierianaceae, Violaceae , Zingiberaceae and Cupressaceae comprised a single species each. *Choerospondias axillaris*, *Zanthoxylum armatum*, *Valeriana jatamansi*, *Senegalia catechu, Lithocarpus fenestratus and Dioscorea deltoidea* are six plant species of the study area listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) list (www.floraofnepal.org/country information/listed plants/cites listed/) (Table 2). There were six invasive alien plant species recorded in Lakuribhanjyang community forest (Table 3). These were *Ageratina adenophora*, *Ageratum conyzoides, Alternanthera philoxeroides, Bidens pilosa, Lantana camara* and *Senna tora*.

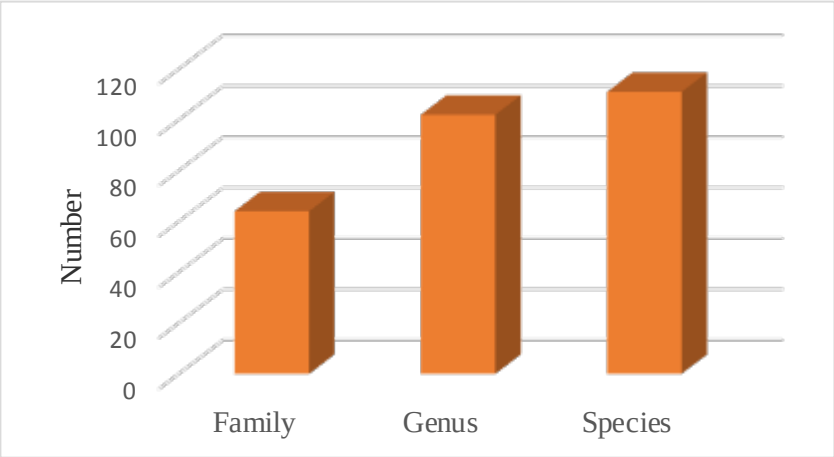

Figure 1. Distribution of family, genus and species

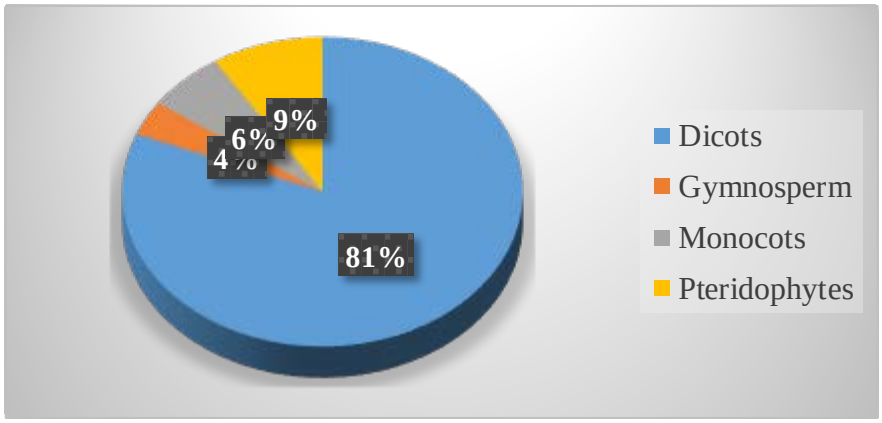

Figure 2. Different divisions of plant species

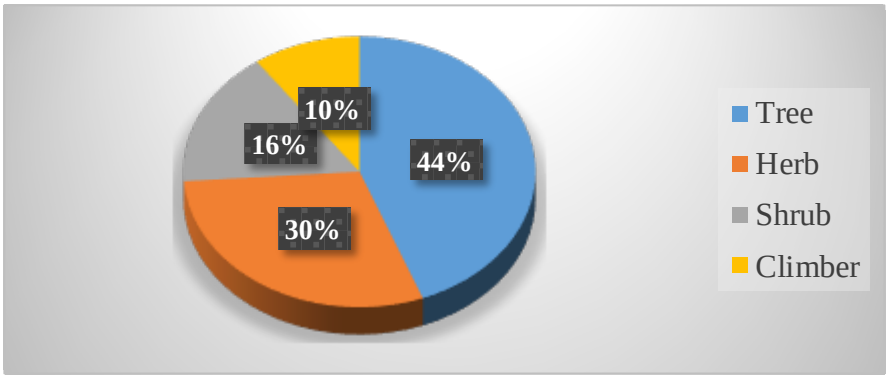

Figure 3. Different growth form of plant species

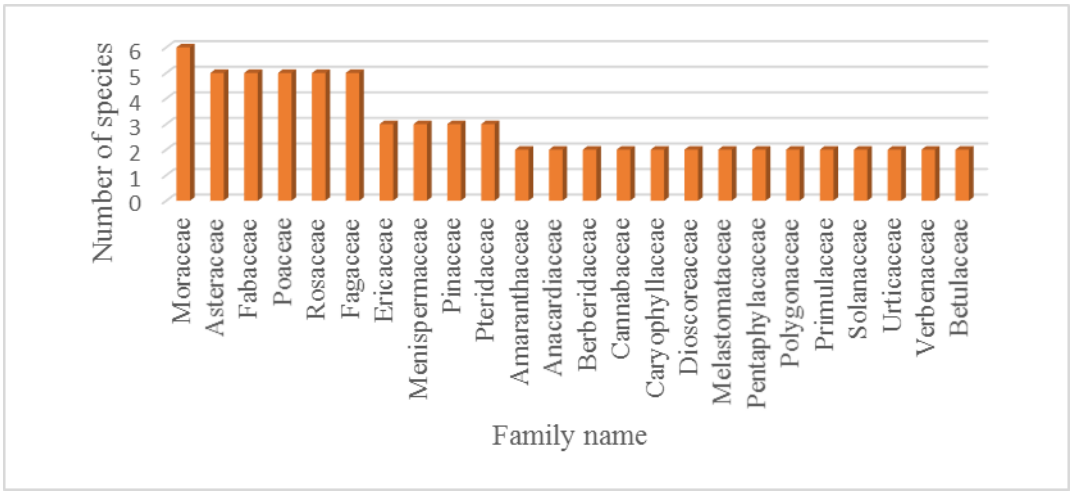

Figure 4. Families having more than one species

Table 1. List of families with number of species

Families	Number of species for each family respectively
Moraceae	6
Asteraceae, Fabaceae, Poaceae, Rosaceae and Fagaceae	5
Ericaceae, Menispermaceae, Pinaceae and Pteridaceae	3
Amaranthaceae, Anacardiaceae, Berberidaceae, Cannabaceae, Caryophyllaceae, Dioscreaceae, Melastomataceae, Pentaphyllaceae, Polygonaceae, Primulaceae, Solanaceae, Urticaceae, Verbenaceae and Betulaceae	2
Acanthaceae, Actinidiaceae, Apiaceae, Aquifoliaceae, Araliaceae, Asparagaceae, Athyriaceae, Blechnaceae, Boraginaceae, Convolvulaceae, Cucurbitaceae, Dennstaedtiaceae, Glecheniaceae, Hypoxidaceae, Juglandaceae, Lauraceae, Lycopodiaceae, Lygodiaceae, Lythraceae, Malvaceae, Meliaceae, Myricaceae, Myrtaceae, Oleaceae, Orabanthaceae, Oxalidaceae, Phyllanthaceae, Rhamnaceae, Rubiaceae, Rutaceae, Santalaceae, Sapindaceae, Saxifragaceae, Scrophulariaceae, Smilacaceae, Theaceae, Valierianaceae, Violaceae, Zingiberaceae, Cupressaceae	1

Table 2. List of CITES listed plants in the study area

S.no.	Scientific name	Local name
1	*Choerospondias axillaris* (Roxb.) B.L.Burtt & A.W.Hill	Lapsi
2	*Dioscorea deltoidea* Wall.	Bhyakur
3	*Lithocarpus* fenestratus (Roxb.) Rehder.	Arkhaulo
4	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Khayer
5	*Valeriana jatamansi* Jones	Sughandhawal
6	*Zanthoxylum armatum* DC.	Timur

Table 3. List of Invasive Alien Plant Species in the Study Area

S.no.	Scientific name	Local name
1	Ageratina adenophora R.M.King & H.Rob	Banmara
2	Ageratum conyzoides Hieron.	Gandhe
3	Alternanthera philoxeroides (Mart.) Griseb.	
4	Bidens pilosa L.	Kuro
5	Lantana camara L.	Ganauni kada
6	Senna tora (L.) Roxb.	Tapre

The study reported that the Lakuribhanjyang community forest in southern Lalitpur has the largest number of dicots, followed by monocots, pteridophytes, and gymnosperms. The dominance of dicot plant species in the study area similar to the result observed by Pandey and Ghimire (2020) in the community managed forest of Kanchanpur district,

Western Nepal. The total number of vascular plants species in this study was 111 which was higher than the 40 vascular plants species recorded in the Gaukhureshwor community forest of Kavrepalanchok district (Baral and Katzensteiner, 2009). Chalise *et al*., (2020) documented 136 species of vascular palnts including 121 angiosperms, four gymnosperms and 11 species of pteridophytes in Daman and its adjoining areas. According to the findings of the study, trees were the main life form of vascular plants, followed by herbs, shrubs, and climbers. Acharya and Acharya (2009) discovered comparable findings. The study of Silwal, (2019) documented 40 species of trees, 16 species of shrubs, 10 species of climbers and 34 species of herbs belonging to 92 genera and 48 families in Hasantar community forest of Nagarjun Municipalitpur of Kathmandu district. The present study documented 111 vascular plant species belonging to 64 families. Among these 64 families, Moraceae was found to be dominant with six plant species. Silwal (2019) identified Moraceae as the largest family, with five plant species in Hasantar community forest, Central Nepal. In the studies of Ahikari et al., 2019 and Bhattarai & Acharya, 2015 Fabaceae was found most dominant family.

The checklist of CITES listed flora of Nepal is the updated checklist of CITES flora listed after CoP 17 which include a total of 171 plant species. The present study documented six CITES listed plants in the study area. These were *Choerospondias axillaris, Zanthoxylum armatum, Valeriana jatamansi, Senegalia catechu, Lithocarpus fenestratus and Dioscorea deltoidea*. Choerospondias axillaris, locally called Lapsi is recorded as non-endemic threatened plant. *Zanthoxylum armatum*, also known as Timur locally, is a medicinal herb endangered by over-collection for export or trade. *Valeriana jatamansi*, locally called Sugandhawala is a threatened species and banned for export. *Senegalia catechu* locally called Khayer is threatened species and banned for felling and transport or export. *Lithocarpus fenestratus*, locally called Arkhaulo is non endemic threatened plant species. *Dioscorea deltoidea* locally known as Bhyakur is not yet threatened with extinction, but could become endangered if its trade is not controlled (www.dpr.gov.np).

Invasive alien species are naturalized species that spread so quickly and widely that they have a significantly harmful impact on biodiversity (Wang et al., 2006). Invasive alien or non-native plant species are one of the major threats to global and local biodiversity (IUCN Council, 2000). They are regarded as one of the primary causes of biodiversity loss, affecting ecological services and economic conditions through a variety of mechanisms (Rai and Singh, 2020). The most challenging invasive plant species in forest and shrublands include *Ageratina adenophora*, *Lantana camara*, *Chromolaena odorata* and *Mikania micrantha* (Shrestha *et al*., 2017). *Ageratina adenophora*, and *Lantana camara* were recorded as most important invasive alien plant species in the study area.

Conclusion

The current study has recorded the vascular plant variety of Lakuribhanjyag Community Forest in Lalitpur district, which aids in the exploration of vascular plant diversity of middle mountain region of Central Nepal. The present research reported 111 vascular plant species from the area, with Moraceae as the dominating family. There were

comparatively more tree species in the area than herb, shrub, and climber species. The floristic study is required to identify the Lalitpur district's general flora and patterns of species composition. Such research is also necessary to fully comprehend the richness of unique and other endangered plant species in the Middle Mountain area of Central Nepal.

Appendix 1: List of plants documented in Lakuribhanjyang community forest of Sankhu village, Lalitpur district Nepal

Scientific Name	Nepali name	Family	Habit	Division
***Acer oblongum* Wall. ex DC.**	Phirphire	Sapindaceae	Tree	Dicots
***Achyranthes bidentata*(Blume)**	Datiwan	Amaranthaceae	Herb	Dicots
***Ageratina adenophora* R.M.King & H.Rob**	Banmara	Asteraceae	Herb	Dicots
***Ageratum conyzoides* Hieron.**	Gandhejhar	Asteraceae	Herb	Dicots
***Aleuritopteris argentea* (S.G. Gmel.)**	Rani sinka	Pteridaceae	Herb	Pteridophytes
***Alnus nepalensis* D.Don**	Utish	Betulaceae	Tree	Dicots
***Alternanthera philoxeroides* (Mart.) Griseb.**		Amaranthaceae	Herb	Dicots
***Artemisia vulgaris* L.**	Titepati	Asteraceae	Shrub	Dicots
***Arudinaria falcate* Nees.**	Nigalo	Poaceae	Herb	Monocots
***Astilbe rivularis* Buch.-Ham. ex D. Don**	Thulowokhati	Saxifragaceae	Shrub	Dicots
***Bambusa nepalensis* Stapleton**	Bans	Poaceae	Herb	Monocots
***Bauhinia purpurea* L.**	Tanki	Fabaceae	Tree	Dicots
***Bauhinia variegata* L.**	Koiralo	Fabaceae	Tree	Dicots
***Berberis aristata* DC.**	Chutro	Berberidaceae	Shrub	Dicots
Betula alnoides Buch.-Ham. Ex. D. Don	Saur	Betulaceae	Tree	Dicots
***Bidens pilosa* L.**	Kuro	Asteraceae	Herb	Dicots
***Brassaiopsis hainla* (Buch.- Ham) Seem**	Chuletro	Araliaceae	Tree	Dicots
***Buddleja asiatica* L.**	Bhimsenpati	Scrophulariaceae	Tree	Dicots
***Cannabis sativus* L.**	Gganja	Cannabaceae	Shrub	Dicots
***Castanopsis indica* (Roxb. ex Lindl.) A.DC.**	Dhalekatush	Fagaceae	Tree	Dicots
***Castanopsis tribuloides* (Sm.) A.DC.**	Musure katush	Fagaceae	Tree	Dicots
***Cedrus deodara* (Roxb. ex D.Don) G.Don**	Debdar	Pinaceae	Tree	Gymnosperm
***Celerya japonica* Thunb.**	Baklepate	Pentaphylacaceae	Tree	Dicots
***Celtis australis* L.**	Khari	Cannabaceae	Tree	Dicots
***Centella asiatica* L.**	Ghodtapre	Apiaceae	Herb	Dicots
***Choerospondias axillaris* (Roxb.) B.L.Burtt & A.W.Hill**	Lapsi	Anacardiaceae	Tree	Dicots
***Cissampelos pareir*a L.**	Batulipate	Menispermaceae	Climber	Dicots
***Curcuma aromatica* L.**	Kalohaledo	Zingiberaceae	Herb	Monocots
***Cuscuta reflexa* Roxb.**	Akashbeli	Convolvulaceae	Climber	Dicots
***Cynodon dactylon* (L.) Pers.**	Dubo	Poaceae	Herb	Monocots

***Cynoglossum zeylanicum* Thumb.Ex.Lehm**	Bhedekuro	Boraginaceae	Herb	Dicots
***Datura stramonium* L. test**	Dhaturo	Solanaceae	Shrub	Dicots
***Debregeasia saeneb* (Forssk.) Hepper & J.R.I.Wood**	Tusare	Urticaceae	Tree	Dicots
***Dicranopteris linearis* (Burm. f.) Underw.**	Hadeuneu	*Gleicheniaceae*	Herb	Pteridophytes
***Dioscorea bulbifera* L.**	Bantarul	Dioscoreaceae	Climber	Dicots
***Dioscorea deltoidea* Wall.**	Bhyakur	Dioscoreaceae	Climber	Dicots
***Diplazium esculentum* (Retz.) Sw.**	Neuro	Athyriaceae	Herb	Pteridophytes
***Drymaria cordata* Willd. ex Schult.**	Abijalo	Caryophyllaceae	Herb	Dicots
***Duchesnea indica* (Andrews) Teschem.**	Bhuikaphal	Rosaceae	Herb	Dicots
***Duranta erecta* L.**	Nilkada	Verbenaceae	Shrub	Dicots
***Eriobotrya dubia* Decn**	Jurekaphal	Rosaceae	Tree	Dicots
***Eurya acuminata* DC.**	Jhingaine	Pentaphylacaceae	Tree	Dicots
***Ficus auriculata* Lour.**	Timilo	Moraceae	Tree	Dicots
***Ficus benghalensis* L.**	Bar	Moraceae	Tree	Dicots
Ficus benghalensis L.	Bar	Moraceae	Tree	Dicots
***Ficus neriifolia* Sm.**	Dudhilo	Moraceae	Tree	Dicots
***Ficus religiosa* L.**	Pipal	Moraceae	Tree	Dicots
***Fraxinus floribunda* Wall.**	Lakuri	Oleaceae	Tree	Dicots
***Gaultheria fragrantissima* Wall.**	Dhasingare	Ericaceae	Shrub	Dicots
***Grewia tiliaerolia* Vahl**	Shyalphusre	Malvaceae	Tree	Dicots
***Ilex excelsa* (Wall.) Voigt**	Punwale	Aquifoliaceae	Tree	Dicots
***Imperata cylindrica* (L.) P.Beauv.**	Siru	Poaceae	Herb	Monocots
***Justicia adhatoda* L.**	Asuro	Acanthaceae	Shrub	Dicots
***Juglans regia* L.**	Okhar	Juglandaceae	Tree	Dicots
***Lantana camara* L.**	Banphada	Verbenaceae	Shrub	Dicots
***Lithocarpus fenestratus* (Roxb.) Rehder.**	Arkhaulo	Fagaceae	Tree	Dicots
***Litsea monopetala* (Roxb.) Pers.**	Kutmiro	Lauraceae	Tree	Dicots
***Lycopodium clavatum* L.**	Nagbeli	Lycopodiaceae	Climber	Pteridophytes
***Lygodium japonicum* (Thunb.) Sw.**	Janailahara	Lygodiaceae	Climber	Pteridophytes
***Lyonia ovalifolia* (Wall.) Drude**	Angeri	Ericaceae	Tree	Dicots
***Maesa chisia* D.Don**	Bilaune	Primulaceae	Tree	Dicots
***Mahonia nepalensis* DC. ex Dippel**	Jamanomandro	Berberidaceae	Shrub	Dicots
***Melastoma malabathricum* L.**	Kalochulesi	Melastomataceae	Shrub	Dicots
***Melia azedarach* L**	Bakaino	Meliaceae	Tree	Dicots
***Molineria capitulata* (Lour.) Herb.**	Shyaldhoti	Hypoxidaceae	Herb	Monocots
***Morus indica* L.**	Kimbu	Moraceae	Tree	Dicots
***Myrica esculenta* Buch.-Ham. ex D.Don**	Kaphal	Myricaceae	Tree	Dicots

***Myrtus cumini* L.**	Jamuno	Myrtaceae	Tree	Dicots
***Nephrolepis cordifolia* (L.) C. Presl**	Paniamala	Orabantaceae	Herb	Pteridophytes
***Osbeckia stellata* Buch.-Ham. ex D.Don**	Ratochulesi	Melastomataceae	Shrub	Dicots
***Osyris lanceolata* Hochst. & Steud.**	Nundiki	Santalaceae	Shrub	Dicots
***Oxalis corniculata* L.**	Chari amilo	Oxalidaceae	Herb	Dicots
***Persicaria hydropiper* (L.) Delarbre**	Pirre	Polygonaceae	Herb	Dicots
***Phyllanthus emblica* L.**	Amala	Phyllanthaceae	Tree	Dicots
***Pinus roxburghii* Sarg.**	Khotesallo	Pinaceae	Tree	Gymnosperm
***Pinus wallichiana* A.B.Jacks.**	Gobresallo	Pinaceae	Tree	Gymnosperm
***Polygonatum odoratum* (Mill.) Druce**	Hadjorni	Asparagaceae	Shrub	Dicots
***Prunus cerasoides* D.Don**	Paiyun	Rosaceae	Tree	Dicots
***Pteridium aquilinum* (L.) Kuhn**		*Dennstaedtiaceae*	Herb	Pteridophytes
***Pteris biaurita* L.**		Pteridaceae	Herb	Pteridophytes
***Pteris vittata* L.**		Pteridaceae	Herb	Pteridophytes
***Pyrus pashia* Buch.-Ham.ex D.Don**	Mayal	Rosaceae	Tree	Dicots
***Quercus lanata* Sm.**	Baajh	Fagaceae	Tree	Dicots
***Quercus lamellosa* Sm.**	Phalat	Fagaceae	Tree	Dicots
***Rapanea capitellata* (Wall.) Mez**	Setikath	Primulaceae	Tree	Dicots
***Rhododendron arboreum* Sm.**	Laligurash	Ericaceae	Tree	Dicots
***Rubia manjith* Roxb. ex Flem.**	Majitho	Rubiaceae	Climber	Dicots
***Rubus ellipticus* Sm.**	Aiselo	Rosaceae	Shrub	Dicots
***Rumex nepalensis* Spreng.**	Halhale	Polygonaceae	Herb	Dicots
***Saurauia napaulensis* DC.**	Gogan	Actinidiaceae	Tree	Dicots
***Schima wallichii* (DC.) Korth.**	Chilaune	Theaceae	Tree	Dicots
***Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.**	Khayer	Fabaceae	Tree	Dicots
***Senna tora* (L.) Roxb.**		Fabaceae	Shrub	Dicots
***Smilax aspera* L**	Kukurdaino	Smilacaceae	Climber	Dicots
***Solanum nigrum* L.**	Kaligedi	Solanaceae	Herb	Dicots
***Solena heterophylla* Lour.**	Golkakri	Cucurbitaceae	Climber	Dicots
***Sonchus oleraceus* L.**	Titejhar	Asteraceae	Herb	Dicots
***Stellaria media* (L.) Vill.**		Caryophyllaceae	Herb	Dicots
***Stephania grandiflora* Forman**	Gundarigano	Menispermaceae	Climber	Dicots
Thuja sp.	Dhupi	Cupressaceae	Tree	Gymnosperm
***Thysanolaena latifolia* Honda**	Amriso	Poaceae	Herb	Monocots
***Tinospora sinensis* (Lour.) Merr.**	Gurjo	Menispermaceae	Climber	Dicots
***Toxicodendron wallichii* (Hook.f.) Kuntze**	Bhalayo	Anacardiaceae	Tree	Dicots
***Trifolium repens* L.**	Pyauli	Fabaceae	Herb	Dicots

***Urtica dioica* L.**	Sisnu	Urticaceae	Shrub	Dicots
***Valeriana jatamansi* Jones**	Sughandawala	Valerianaceae	Herb	Dicots
***Viola pilosa* Blume**	Ghatteghas	Violaceae	Herb	Dicots
***Woodwardia unigemmata* (Makino) Nakai**	Dateuneu	Blechnaceae	Herb	Pteridophytes
***Woordfordia fruticosa* Kurz**	Dahairo	Lythraceae	Shrub	Dicots
***Zanthoxylum armatum* DC.**	Timur	Rutaceae	Tree	Dicots
***Ziziphus incurva* Roxb.**	Hadebayer	Rhamnaceae	Tree	Dicots

References

Acharya R, & Acharya K.P. 2009. Ethnobotanical study of medicinal plants used by Tharu community of Parroha VDC, Rupandehi district, Nepal. *Scientific World*, **7**(7): 80-84. https://doi.org/10.3126/sw.v7i7.3832.

Adhikari M, Thapa R, Kunwar R.M., Devkota H.P., & Poudel P. 2019. Ethnomedicinal Uses of Plant Resources in the Machhapuchchhre Rural Municipality of Kaski District, Nepal. Medicines **6**: 69. https://di.org/10.3390/medicines6020069.

Agrawal A., & Ostrom E. (2008). Decentralization and community-based forestry: Learning from experi-ence. In Webb L. & Shivakoti G.P. (Eds.), Decentralization, forests and rural communities: Policy out-comes in South and Southeast Asia (pp 44–67). New Delhi: SAGE Publications.

Baral, S., & Katzensteiner, K. (2009). Diversity of vascular plant communities along a disturbance gradient in a central mid-hill community forest of Nepal. *Banko Janakari*, *19*(1), 3–10. https://doi.org/10.3126/banko.v19i1.2176

Bhatta, K.P., & Chaudhary, R.P. (2009). Species diversity and distribution pattern of grassland and cultivated land species in upper Manang, Nepal Trans-Himalayas. Scientific World, 7(7), 76-79.

Chalise, P., Paneru, Y. R., & Ghimire, S. K. (2018). Floristic diversity of vascular plants Gyasumbdo valley, lower Manang, Central Nepal. *Journal of Plant Resources*, **17**(1), 42-57.

Chalise, P., Paneru, Y.R., Dhakal, S., & Tharu, L.R. (2020). Floristic Diversity of Vascular Plants in Daman and Adjoining Areas, Makawanpur District, Central Nepal. *Journal of Plant Resources*, **18**(1): 116-123.

Chaudhary, R. P., Nepal, M., Gupta, V. N. P., & Subedi, B. P. (2002). Traditional Use of Plants by the Indigenous peoples of Makalu-Barun Region, eastern Nepal. In R. P. Chaudhary, Bhim P. Subedi, O. R. Vetaas, & T. H Aase (Eds). Vegetation and Society: their Interaction in the Himalayas. (pp. 83-97). Tribhuvan University, Nepal and University of Bergen Norway *(PDF) An Assessment of Floristic Diversity and Uses of Plant Resources in Madane Protected Forest Gulmi, Western Nepal*.

DFRS. (2018). Forest Cover Maps of Local Levels of Nepal Department of Forest Research and Survey. Kathmandu, Nepal.

Gaire, B. (2015). *Plant diversity of Phulchoki Area, Central Nepal*. M.Sc. Dissertation, Central Department of Botany, Tribhuvan University, Kathmandu Nepal.

GoN. (1969). Flora of Phulchoki and Godawari. HMG Press, Kathmandu.

GoN. (1986). Flora of Kathmandu Valley: ed. Malla, SB, Rajbhandari, SB, Shrestha, TB, Adhikari, PM, Adhikari, SR, Shakya, PR. HMG Press, Singhdarbur Kathmandu.

GoN. (2019). An Introduction to Nepal (Nepal Parichaya). Government of Nepal, Ministry of Communication and Information Technology, Department of Information and Broadcasting, Sanchargram, Tilganga, Kathmandu, Nepal.

IUCN Council. (2000). "Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species." in *Prepared by IUCN SSC Invasive Species Specialist Group (ISSG) Approved by 51st Meeting IUCN Council Gland Switzerland.* **1**, 12–25.

MoLJ. (1993). Forest Act of Nepal. Kathmandu, Nepal.

MoFSC. (2014). Nepal Biodiversity Strategy and Action Plan 2014-2020. Government of Nepal, Ministry of Forests and Soil Conservation, Kathmandu, Nepal.

Niraula R.R., Gilani H., Pokharel B.K., & Qamer F.M. (2013). Measuring impacts of community forestry program through repeat photography and satellite remote sensing in the Dolakha district of Nepal. *Journal of Environmental Management*, 126:20–9. https://doi.org/10.1016/j.jenvman.2013.04.006

Pandey, N., & Ghimire, S.K. (2020). Floristic Diversity in a Community Managed Forest of Kanchanpur District, Western Nepal. *Journal of Plant Resources*, **18**(1): 124-134.

Poudel D.P. (2019). Migration, forest management and traditional institutions: Acceptance of and resistance to community forestry models in Nepal. *Geoforum* 106: 275-286. DOI: 10.1016/j.geoforum.2019.09.003.

Rai, P.K. & Singh, J.S. (2020). Invasive alien plant species: Their impact on environment, ecosystem services and human health. *Ecological Indicators*, 111: 106020. doi: 10.1016/j.ecolind.2019.106020

Rajbhandari, K.R., & Rajbhandary, S. (2015). Herbarium Preparation and Storage Technique. In: M. Siwakoti & S. Rajbhandary (Eds.), Taxonomic tools and flora writing (pp. 70-80). Kathmandu, Nepal: Department of Plant Resources and TU Central Department of Botany.

Shrestha K.K, Bhandari P, & Bhattarai S. (2022). Plants of Nepal (Gymnosperms & Angiosperms). Heritage Publishers & Distributers, Pvt.Ltd., Kathmandu.

Shrestha, B.B., Ranjit, J.D., & Siwakoti, M. (2017). Status of Invasive Alien Plant Species in Nepal. In: Conservation and Utilization of Agricultural Plant Genetic Resources in Nepal (Joshi, B.K., KC, H.B. and Acharya, A.K. eds.), Proceedings of 2nd National Workshop on CUAPGR, Kathmandu, Nepal. Pp: 446-452.

Silwal, R. (2019). Floristic Study of Hasantar Community Forest, Nagarjun, Kathmandu Nepal. *International Journal of Innovative Science and Research Technology*, **4**(6): 147-152.

Singh, S. (2014). *Floristic study and vegetation analysis of Shivapuri National Park Central Nepal*. Ph.D. Thesis, Tribhuvan University, Kathmandu Nepal.

Wang W.Q., *et al*. (2006). Seed population dynamics and germination characteristics of *Eupatorium adenophorum*. *Chinese Journal of Applied Ecology*, **17**: 982-986.