Study on Government Managed Gardens in Public Buildings of Kathmandu Valley

Nirajan Bhandari[1*] and Umed Kumar Pun[2]

[1]College of Natural Resource Management, Agriculture and Forestry University, Pakhribas, Dhankuta, Nepal
[2]King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

***CORRESPONDING AUTHOR:**

Nirajan Bhandari
Email: iaasnirajan@gmail.com

ISSN : 2382-5359(Online), 1994-1412(Print)

DOI:
https://doi.org/10.3126/njst.v21i2.62358

Date of Submission: 10/12/2021
Date of Acceptance: 31/01/2023

Copyright: The Author(s) 2022. This is an open access article under the CC BY license.

ABSTRACT

An area embellished with ornamental plants near the city area and office can give a pleasurable, picturesque and naturalistic effect which creates a refreshing and conducive working environment for both staff and service seekers. A study was carried out to elucidate the existing situation of the government managed gardens in public buildings located in the Kathmandu valley. The gardens were selected purposively and the study was made based on the number of plant species, composition of plants, styles of gardening, maintenance of garden and appreciation of the garden. The maintenance and the appreciation of gardens were evaluated by the Likert scale (1-4). The abundance of tree was higher followed by herbaceous perennial, herbaceous annual, shrub, cacti and succulent. The garden of Narayanhiti Palace Museum was found to be dominant in tree, shrub and herbaceous perennial while the Garden of Singha Durbar and Supreme Court was found to be dominant in herbaceous annual. The frequency of *Thuja orientalis* (tree), *Bougainvillea spp* (shrub), *Cuphea hyssopifolia* (herbaceous perennial), *Calendula officinalis* (herbaceous annual) and *Petunia hybrida* (herbaceous annual) were higher. This study shows that formal gardens (66.66%) dominated informal gardens (33.34%). It was found that the maintenance and the overall appreciation of gardens were fair to good. The gardens need improvements in various aspects to make them artistic and beautiful.

Keywords: Gardens, Maintenance, Plant species, Styles of gardening

1. INTRODUCTION

A garden is a planned space, usually outdoors, set aside for the cultivation, display and enjoyment of plants and other forms of nature (Parmar & Hathi 2021). The garden can incorporate both man made and natural components and materials. The history of ornamental gardening date back quite a long time and the earliest evidence was seen in 1500 BCE in Egyptian tomb painting with lotus ponds surrounded by rows of acacias and palms (Singer *et al.* 1954). Later on, different styles and designs of gardens have developed in the different parts of the world for human pleasure and ambience. Now, gardening is not limited to the activity of growing and maintaining the plant species but even more, it is a metaphor for investment, patience, planning, designing, decorating, and bringing out beauty in an independent order (New World Encyclopedia 2017). An unending array of forms, lines, colors, textures and sometimes fragrances can be assembled in the garden for the naturalistic, pleasing and picturesque effect. Gardening provides a satisfying emotional outlet and pleasurable adjunct for the individual who loves the natural environment. Gardening connects people to the natural world and led to a lifelong love of the plant world in a fun and purposeful way (New World Encyclopedia 2021).

The concept of ornamental gardening in the context of Nepal has not developed properly to date. There is no special effort undertaken by government and public offices to maintain the garden and beautification of office premises in spite of having sufficient space and resources. Some private and public organizations and a few people who have sufficient space and are passionate about growing and marinating the plants have developed gardens near their offices and residence. Existing gardens in government offices are encroached by unplanned construction works for building and parking areas (Bhattarai 2019). Kathmandu is a densely populated and urbanized city of Nepal due to centralized services and facilities. The flow of service seekers in government offices of Kathmandu valley is more as compared to other cities in the country. So, maintaining greenery and gardens in the city areas and public offices can create a conducive and refreshing working environment for both the staff and service seekers.

The Government of Nepal, Ministry of Forestry has been celebrating the forest decade program (2014-2024 AD) promoting plantation with the slogan "one home, one tree; one village, one forest and one city many gardens" (DOF 2014). Besides forest related activities, the program also emphasized the development of the garden in public places, biodiversity conservation and raising awareness for protecting rare, endangered and endemic plant species in private and public land including government offices with proper scientific information (MFSC 2015). The present land use policy also emphasized on maintaining greenery in public open spaces, public offices and private settlements to develop a natural environment for the beautiful, hygienic and quality life of people (MOLRM 2015).

Gardening brings peace and tranquility due to the diversity of beautiful and colorful plants and flowers. Gardens provide space for exercise, opportunities for restoration from stress, and social contacts (Dunnett & Quasim 2000). Being around plants and a natural environment, everyone can feel calmer and more relaxed. However, due to rapid urbanization, densification and encroachment, public open spaces have been slowly disappearing in the city areas with negative consequences on public life and activity (Bajracharya *et al.* 1997; Shrestha 2001). The green spaces and plant habitats within the cities have become degraded, modified and fragmented which has changed the urban plant species composition (Kuhn & Klotz 2006). The increasing urban pressure and human activities have reduced species conservation (Knapp *et al.* 2008). This Study aims to explore the present situation of government managed gardens of Kathmandu

valley highlighting the diversity of plant species, styles of gardening and maintenance and appreciation of the gardens.

2. MATERIALS AND METHODS

2.1 Study Site

The present study was carried out in February-April, 2017 to elucidate the composition of plant species, styles of gardening, maintenance and appreciation of government managed gardens of Kathmandu valley. Kathmandu valley is located in the northeast of Nepal, at an average altitude of 1300 meters above sea level (27˚32'13"-27˚49'10" N latitude and 85˚11'31" - 85˚31'38" E longitude) surrounded by four mountain ranges viz., Shivapuri hills, Phulchowki, Nagarjun and Chandragiri. The study sites were located in the Kathmandu and Lalitpur districts of Kathmandu valley. The geophysical conditions within the study sites are relatively similar to a warm temperate monsoon climate. The annual average temperature and humidity is 19 ºC and 76.39% respectively with more than 75% annual precipitation occurs in monsoon season (June-September) (Adhikari 2020).

2.2 Sampling and Field Survey

A set of standard semi structured questionnaires was prepared and the survey was carried out. For this, eight gardens from the Kathmandu district and one garden from the Lalitpur district were selected purposively. The gardens were selected based on the flow of the visitors and service seekers. Among the different gardens maintained inside the Singha Durbar, Rose garden, CITES garden, Physic garden, garden of National Planning Commission and garden of main gate of Singha Durbar were considered for the study.

Table 1: List of gardens selected for the study

S.N.	Name of gardens
Kathmandu district	
1	Garden of Singha Durbar
2	Garden of Nepal Academy
3	Garden of NARC, Singha Durbar Plaza
4	Garden of Civil Service Hospital, Baneshwor
5	Garden of Tribhuvan International Airport
6	Garden of Supreme Court
7	Garden of National Assembly Hall
8	Garden of Narayanhiti palace
Lalitpur district	
9	Garden of NARC Agronomy research division, Khumaltar

The data regarding the composition of plant species and styles of gardening were collected based on observation, interview and specimen study. A rating scale (Likert scale) from 1 to 4 has been assigned to identify the maintenance and appreciation of the gardens. For the maintenance of garden, a rating was given based on the following criteria; irrigation, fertilization, intercultural operations, training and pruning and sanitation. Similarly, for the appreciation of garden, the rating was given based on the major two criteria; arrangement and composition of plant species and presence/absence of components of garden [open green space/lawn, flower beds and borders, topiary, rockery, conservatory or greenhouse or fern house or fernery, drive roads, walks and paths, garden adornments (water area/pool/fountain, Sculptures and statues, sitting benches, arches/pergolas/trellis and light)]. Due to the lack of a specified garden maintenance unit, an interview was taken from two staff of each garden. One of them was maintenance staff who regularly worked in the garden and another one was office staff who was directly or indirectly involved in garden management activities.

Table 2: Likert scale for the measurement of maintenance and appreciation of some government managed gardens in public buildings of Kathmandu valley

Maintenance of gardens/Appreciation of gardens	Rating scale
Excellent	5
Good	4
Fair	3
Poor	2

2.3 Data Analysis

The collected data were tabulated, analyzed, and presented in both qualitative and quantitative information. The quantitative analysis was carried out by using MS Excel 2016 and the presented result's was supported by secondary information.

3. RESULTS AND DISCUSSION

3.1 Number of Different Species of Plants

This study shows that there was a variation in plant species (trees, shrubs, herbaceous annuals, herbaceous perennials, cacti and succulents) among the different gardens (Table 3). The highest number of trees, shrubs and herbaceous perennials were recorded in the garden of Narayanhiti Palace Museum while the garden of Singha Durbar and Supreme Court was found to be dominant in herbaceous annuals. Among the plant species, trees dominated the other species. The cacti and succulent species were found in very small numbers having nil at Nepal Academy, Civil Service Hospital and Narayanhiti Palace. The ratio of the average number of trees, shrubs, herbaceous perennials, herbaceous annuals, cacti and succulents were 3.39:1.72:2.67:1.89:0.11:0.22 respectively. However, the abundance of herbaceous species was higher as compared to other plant species (trees, shrubs and cacti and succulents) which is due to the extensive use of herbaceous annuals and herbaceous perennials in the landscape. The present finding was consistent with Li *et al.* (2006) and Zheng & Liu (2006) who reported a greater abundance of herbaceous species as compared to trees and shrubs in most of the urban parks of Beijing, China. Majority of species (except herbaceous annuals and a few herbaceous perennials) in the garden of Narayanhiti Palace Museum was maintained since the period when it was the residence of the king of Nepal. The species richness in the garden of Narayanhiti Palace Museum might be due to the interest of the royal family in different species of ornamental plants.

The variation in the composition of plant species and vegetation in the urban green space was subjected to adopted management practices depending upon the available resources (time and money), ownership, objectives and current understandings of best management practices (Kendal *et al.* 2012a). In addition to this, human activities have also changed the diversity and species composition of urban plant communities (Smart *et al.* 2005).

Table 3: Number of different species of plants in some government managed gardens in public buildings of Kathmandu valley

Name of gardens	Tree	Shrub	Herbaceous perennial	Herbaceous annual	Cacti	Succulent
Garden of Singha Durbar	12	4	10	6	0	1
Garden of Nepal Academy	7	4	3	4	0	0
Garden of NARC, Singha Durbar Plaza	3	1	4	5	1	0
Garden of NARC Agronomy research division, Khumaltar	6	4	5	2	0	1
Garden of Civil Service Hospital, Baneshwor	5	1	4	1	0	0

Garden of Tribhuvan International Airport	4	3	6	2	0	1
Garden of Supreme Court	4	4	2	6	0	0
Garden of National Assembly Hall	5	3	1	3	1	1
Garden of Narayanhiti palace	15	7	13	5	0	0
Average	6.78	3.44	5.34	3.78	0.22	0.44

3.2 Composition and Frequency of Plants Species

The highest number of tree species (30 types) were documented followed by herbaceous perennials (26 types), shrubs (17 types) and herbaceous annuals (11 types). The composition of cacti and succulents were recorded lowest (2 types) (Fig. 1). Among trees, *Thuja orientalis* was the most common species found in 7 gardens. *Cycas revoulata* and *Araucaria columnaris* are other common tree species found in 5 gardens. *Bougainvillea spp* was the most common shrub found in 7 gardens. *Rosa species* and *Jasminum humile* were other common shrubs next to *Bougainvillea spp* which were found in 4 gardens each. The most common herbaceous perennial was *Cuphea hyssopifolia* (found in 4 gardens) followed by *Canna indica, Aspidistra elatior, Cynodon dactylon* and *Alternanthera ficoidea. Petunia hybrida* and *Calendula officinalis* were the most common herbaceous annuals found in 6 gardens. Cacti and succulents were found in a few gardens only and the common cacti and succulents were *Euphorbia trigona* (found in 2 gardens) and *Agave americana* (found in 3 gardens) respectively (Table 4). The present result was supported by Bhandari *et al.* (2021) who reported the variation of plant composition among the commercial nurseries and home gardens of Jhapa and Ilam districts. *Thuja spp* is the most popular plants among garden users (Bartłomiejski & Kowalewski 2019; Kumar & Narain 2013) due to evergreen in nature, availability of a large number of compact to dwarf cultivars (Missouri Botanical Garden 2021) and can be shaped in different forms easily (Szekely & Dagmar 2011). Most of the landscapes and gardens consist of *Bougainvillea spp* due to their attractive multicolored bracts and can be used in the garden as a shrub, climber, potted plant or as a specimen plant (Salam *et al.* 2017). Besides the beauty of flowers, *Cuphea hyssopifolia* is popularly used in gardens as a potted plant, for low borders, and as ground cover in small beds (Francis 2004). Calendula was one of the preferred winter annuals by consumers as a cut flower and loose flower in terms of flowering, flower quality and yield (Sindhu *et al.* 2020). Similarly, the extensive use of *Petunia hybrida* was due to a variety of flower colors and flowering habits (can bloom nonstop from spring to frost) and ease to culture. *Petunia hybrida* has been a popular plant among gardeners for many years as a bedding, edging, ground cover and border plant (Missouri Botanical Garden 2021). The lowest diversity of cacti and succulents could be due to the availability of limited species in the commercial nurseries and less preference over other ornamental plants. Bhandari *et al.* (2021) also reported the abundance of cacti and succulents was lower in the home gardens and nurseries of the Jhapa district.

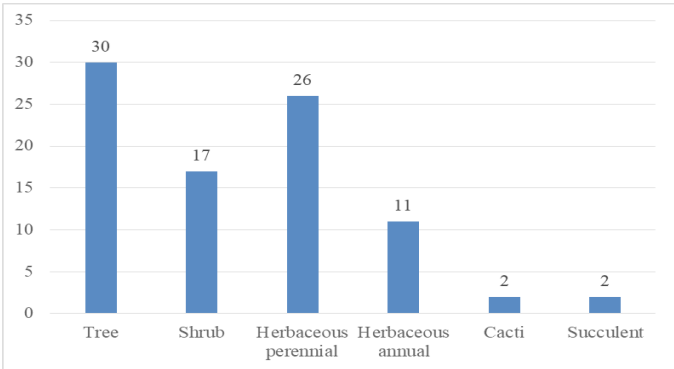

Fig. 1. Composition of plants species found in some government managed gardens in public buildings of Kathmandu valley

Table 4: Frequency of individual plant species found in some government managed gardens in public buildings of Kathmandu valley

S/N	Trees	Frequency	Shrubs	Frequency	Herbaceous perennials	Frequency
1	*Grevillea robusta*	*1*	*Camellia japonica*	*1*	*Dendrobium densiflorum*	2
2	*Callistemon lanceolatus*	*1*	*Jasminum humile*	4	*Canna indica*	3
3	*Nyctanthes arbor-tristis*	*2*	*Mahonia nepalensis*	*1*	*Salvia splendens*	1
4	*Hyophorbe lagenicaulis*	*1*	*Brunfelsia uniflora*	*1*	*Aspidistra elatior*	3
5	*Caryota urens*	*1*	*Rosa spp*	*4*	*Cynodon dactylon*	3
6	*Rhapis excelsa*	*1*	*Rosa chinensis*	*1*	*Tradescantia pallida*	1
7	*Ficus benjamina*	*3*	*Azelia hybrida*	*1*	*Lycoris radiata*	1
8	*Murraya paniculata*	*1*	*Duranta plumieri*	*3*	*Asparagus densi-florus*	2
9	*Pinus roxburghii*	*1*	*Duranta erecta*	*2*	*Alternanthera ficoidea*	3
10	*Podocarpus neriifolius*	*1*	*Bougainvillea spp*	*7*	*Monstera deliciosa*	2
11	*Thuja orientalis*	*7*	*Hydrangea macrophylla*	*2*	*Pelargonium spp*	1
12	*Prunus cerasoides*	*3*	*Poinsettia pulcherrima*	*2*	*Bryophyllum pinnatum*	1
13	*Schefflera actinophylla*	*1*	*Michelia fuscata*	*1*	*Nephrolepis cordifolia*	2
14	*Bahuinia purpurea*	*1*	*Nerium oleander*	*1*	*Cuphea hyssopifolia*	4
15	*Cycas revoulata*	*5*	*Vitex negundo*	*1*	*Strelitzira alba*	2
16	*Livistona chinensis*	*4*	*Trachelospermum jasminoides*	*1*	*Chlorophytum comosum*	*2*
17	*Araucaria columnaris*	*5*	Osmanthus fragrance	*1*	*Verbena urticifolia*	2
18	*Araucaria cookii*	*1*			*Zantedeschia aethiopica*	1
19	*Talauma hodgsonii*	*1*			*Cymbopogon citratus*	1
20	*Platanus orientalis*	*2*			*Philodendron Xanadu*	1
21	*Biscofia javanica*	*1*			*Hedychium spp*	1
22	*Dracaena spp*	2			*Hemerocallis spp*	1

23	*Ficus elastica*	1	*Hedera helix*	1
24	*Cinnamomum camphora*	3	*Himalayacalamus falconeri*	2
25	*Cinnamomum tamala*	1	*Musa spp*	1
26	*Elaeocarpus ganitrus*	1	*Antigonon leptopus*	1
27	*Psidium guajava*	3		
28	*Morus alba*	1		
29	*Prunus persica*	2		
30	*Malus pumila*	1		

S/N	Herbaceous annuals	Frequency	Cacti	Frequency	Succulents	Frequency
1	*Viola tricolor*	2	*Euphorbia tirucalli*	*1*	*Sansevieria spp*	*1*
2	*Petunia hybrida*	6	*Euphorbia trigona*	*2*	*Agave americana*	*3*
3	*Tagetes erecta*	1				
	Calendula officinalis	6				
4	*Antirrhinum majus/ subbaeticum*	3				
5	*Eschscholzia californica*	2				
6	*Chrysanthemum spp*	1				
7	*Dorotheanthus bellidiformis*	1				
8	*Datura stramonium*	3				
9	*Dianthus chinensis*	2				
10	*Gerbera jamesonii*	1				
11	*Senecio cruentus*	2				

3.3 Styles of Gardening

Variation was observed in the styles of gardening among the studied gardens. The domination of the formal style (66.66%) of gardening over the informal style (33.34%) was observed in this study (Table 5). Garden of Singha Durbar has been differentiated into different thematic and landscape gardens which are designed and maintained to reflect formal styles. The domination of formal style over the informal style of gardening might be due to the availability of geometric land and easier to design and establish. In public offices, it is desirable and preferable to maintain the garden components more formal (like planting trees and shrubs in straight lines, trimming hedges, making geometric shape topiary, straight roads etc.) for the aesthetically appealing visual appearance from any parts of the garden. There were systematic and individual differences in visual and behavioral preferences that exist in terms of formal vs. informal style of gardening (Van den Berg & van Winsum-Westra 2010). However, informal styles of gardens are more restorative, natural and visually

appealing than formal styles (Twedt *et al.* 2016). Naturalistic gardening aims for sustainability and the inclusion of native plant species rather than exotics and adopted a more ecological approach (Gaston *et al.* 2007). A study showed that people with pro-environmental attitudes preferred naturalistic local native and woodland gardens and less often owned more manicured shrub and ''gardenesque'' garden (Zagorski *et al.* 2004). However, individual differences in the preferences for garden styles are guided by fundamental psychological needs rather than other factors (Koole & Van den Berg 2005; Van den Berg & van Winsum-Westra 2010).

Table 5: Styles of gardening in some government managed gardens in public buildings of Kathmandu valley

S.N.	Name of gardens	Styles of gardening
1	Gardens of Singha Durbar	Formal style
2	Garden of Nepal Academy	Formal style
3	Garden of NARC, Singha Durbar Plaza	Informal style
4	Garden of NARC Agronomy research division, Khumaltar	Formal style
5	Garden of Civil Service Hospital, New Baneshwor	Formal style
6	Garden of Tribhuvan International Airport	Formal style
7	Garden of Supreme Court	Formal style
8	Garden of National Assembly Hall	Informal style
9	Garden of Narayanhiti palace	Informal style

3.4 Maintenance of the Garden

The maintenance of the garden was found to be good to fair in most of the gardens (Table 6). None of the gardens were excellent in ranking. Good maintenance was observed in 40% of the gardens and 60% of gardens were found to be fairly managed (Fig. 2). As previously discussed, the maintenance of the garden depends on the adopted management practices that directly influence the composition, structure and distribution of plant communities across the urban landscape. The fair maintenance of the gardens was due to a lack of management systems and practices which are markedly influenced by ownership, available resources (time, money, labor and technologies) and knowledge of management practices (Kendal *et al.* 2012; Threlfall *et al.* 2016). The management decision may be "top-down" or "bottom-up". The top-down decisions are imposed by planning guidelines, conservation obligations or owners associations and the bottom-up made by individual park management contractors, local friends groups or individual home and garden owners (Kendal *et al.* 2012). In our study, both top-down and bottom-up management approaches have been lacking in most of the gardens.

3.5 Appreciation of the Garden

The appreciation of gardens was ranked poor to good (Table 6). On ranking, 22.22% of gardens were good and 77.78% of gardens were fair. None of the gardens were observed as excellent in ranking (Fig. 2). The overall good appreciation of the garden of Tribhuvan International Airport was due to the proper planning and execution of the garden management plan by the functional garden maintenance unit. The garden of Tribhuvan International Airport was found to possess most of the important garden components like lawn, fountain, topiary, flower beds etc. The appreciation of the garden of Narayanhiti Palace Museum was observed as good though the maintenance of the garden was fair which is due to the presence of garden components (lawn, bridge, hedge, light etc.) that were maintained since the time when it was the residence of the king. Being the gateway

of Nepal, the flow of people (service seekers and visitors) in the Tribhuvan International Airport is higher which might draw the attention of concerned stakeholders to beautify and maintain the garden. Besides this garden, it was found that none of the public gardens have a specific functional garden maintenance unit. Similarly, none of the staff were recruited for this specific purpose and there was a lack of supervision of staff who are partially involved in the garden activities which might be other reasons for fair appreciation of the gardens. Similarly, lack of knowledge and information among the head of offices and other staff about gardening and its positive impact on human life is another drawback that led to poor maintenance of the garden.

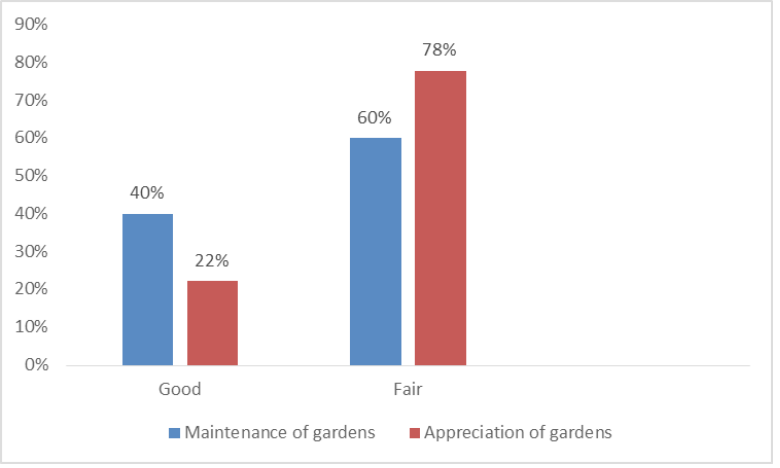

Figure 2: Comparison of maintenance and appreciation of gardens in some government managed gardens in public buildings of Kathmandu valley

Table 6: Maintenance and appreciation of some government managed gardens in public buildings of Kathmandu valley

S.N.	Name of gardens	Maintenance of gardens	Appreciation of gardens
1	Gardens of Singha Durbar	Good	Fair
2	Garden of Nepal Academy	Fair	Fair
3	Garden of NARC, Singha Durbar Plaza	Good	Fair
4	Garden of NARC Agronomy research division, Khumaltar	Fair	Fair
5	Garden of Civil Service Hospital, New Baneshwor	Good	Fair
6	Garden of Tribhuvan International Airport	Good	Good
7	Garden of Supreme Court	Fair	Fair
8	Garden of National Assembly Hall	Fair	Fair
9	Garden of Narayanhiti palace	Fair	Good

4. CONCLUSION

The variation in the number, composition and frequency of plant species was found among the gardens selected for the study. Formal gardens dominated the informal gardens and the maintenance and appreciation of gardens were found fair to good. The lack of human resources for the development and maintenance of the office garden needs to be addressed. With the continuous sprawling of Kathmandu valley and drastically increasing population, there has been a continuous reduction of the public open spaces. It's a challenging issue to maintain the aesthetic, recreational and environmental value of Kathmandu valley in the present context. People get stressed and unhealthy due to the increase in environmental pollution and slowly decrease in the refreshing environment. So, it is urgent to plan, develop and maintain greenery in the public open spaces and public offices of Kathmandu valley and replicate it across the country. In addition to this, government and concerned agencies should focus to conserve the beauty and diversity of existing gardens and parks located in the Kathmandu valley.

ACKNOWLEDGEMENT

We would like to acknowledge all the concerned garden authorities and staffs who gave us access and time during garden visit.

REFERENCES

Adhikari, N., J. Gao, T. Yao, Y. Yang and D. Dai, 2020. The main controls of the precipitation stable isotopes at Kathmandu, Nepal. Tellus B: Chemical and Physical Meteorology. 72(1), 1-17.

Bajracharya, D., K. K. Shrestha, and R. P. Chaudhary, 1997. Garden Flowers: an illustrated guide to indoor and outdoor garden plants in Nepal. The King Mahendra Trust for Nature Conservation (KMTNC), Jawalakhel, Lalitpur.

Bartłomiejski, R. and M. Kowalewski, 2019. Polish urban allotment gardens as 'slow city'enclaves. Sustainability. 11(3228), 1-12.

Bhandari, N., B. Khanal, P. Lamichhane, P. Bhattarai, and U. K. Pun, 2021. Inventory of plant species in commercial plant nurseries and home gardens of Ilam and Jhapa districts of Nepal. In Poudel et. al.,(Eds.), Post COVID Horticulture for Food and Nutritional Security. Proceeding of 12th National Horticulture Seminar 2021 (pp. 99-106).

Bhattarai, K. R., 2019. Enumeration of the flowering plants of Singha Durbar Premises, Kathmandu, Nepal. Journal of Plant Resources. 17(1), 69-81.

DOF, 2014. Forest Decade Program Implementation Plan. Babarmahal, Kathmandu: Department of Forest.

Dunnett, N., and M. Qasim, 2000. Perceived benefits to human well-being of urban gardens. HortTechnology. 10(1), 40-45.

Francis, J. K., 2004. Cuphea hyssopifolia Kunth false heather. Wildland Shrubs of the United States and Its Territories. Thamnic Descriptions. Volume, 266.

Gaston, K. J., R. A. Fuller, A. Loram, C. MacDonald, S. Power and N. Dempsey, 2007. Urban domestic gardens (XI): variation in urban wildlife gardening in the United Kingdom. Biodiversity and conservation. 16(11), 3227-3238.

Kendal, D., N. S. Williams and K. J. Williams, 2012. Drivers of diversity and tree cover in gardens, parks and streetscapes in an Australian city. Urban forestry & urban greening. 11(3), 257-265.

Knapp, S., I. Kühn, V. Mosbrugger, and S. Klotz, 2008. Do protected areas in urban and rural landscapes differ in species diversity? Biodiversity and Conservation. 17(7), 1595-1612.

Kühn, I., and S. Klotz, 2006. Urbanization and homogenization–comparing the floras of urban and rural areas in Germany. Biological conservation. 127(3), 292-300.

Koole, S. L., and A. E. Van den Berg, 2005. Lost in the wilderness: terror management, action orientation, and nature evaluation. Journal of personality and social psychology. 88(6), 1014-1028.

Kumar, S., and S. Narain, 2013. Ex Situ Conservation of Plants: A Case Study in Roxburgh Botanical Garden, Allahabad. Science and Technology. 1(2), 24-31.

Li, W., Z. Ouyang, X. Meng and X. Wang, 2006. Plant species composition in relation to green cover configuration and function of urban parks in Beijing, China. Ecological Research. 21(2), 221-237.

Marahatta, S., B. S. Dangol, and G. B. Gurung, 2009. Temporal and spatial variability of climate change over Nepal, 1976-2005. Practical Action Nepal Office.

MFSC, 2015. Draft Forest Decade (2014-2024) Policy Paper (prepared by Ministry of Forests and Soil Conservation). Hamro Kalpabrikchhya. 26(289), 9-13.

Missouri Botanical Garden, 2021, June 20. Gardens and Gardening. Retrieved 05:16, June 20, 2021 fromhttps://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=a601

Missouri Botanical Garden, 2021, June 20. Gardens and Gardening. Retrieved 05:16, June 20, 2021 fromhttp://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=277409

MOLRM, 2015. The Land Use Policy, 2015. SinghaDurbar, Kathmandu: Government of Nepal, Ministry of Land Reform and Management.

New World Encyclopedia, 2017, May 23. Gardening. Retrieved 05:16, June 20, 2021 from https://www.newworldencyclopedia.org/p/index.php?title=Gardening&oldid=1004854.

New World Encyclopedia, 2021, July 20. Gardening. Retrieved 16:45, January 2, 2022 from https://www.newworldencyclopedia.org/p/index.php?title=Gardening&oldid=1055520.

Parmar, P. M., and S. H. Hathi, 2021. An Outlook on Different Garden Styles. Vigyan Varta. 2(3), 21-25.

Salam, P., V. Bhargav, Y. C. Gupta, and P. K. Nimbolkar, 2017. Evolution in bougainvillea (Bougainvillea commers.)-a review. Journal of Applied and Natural Science. 9(3), 1489-1494.

Shrestha, V., 2001. Sustainable urban housing in Kathmandu, Nepal: Proposals and evaluations. University of California, Los Angeles.

Sindhu, K., B. H. Naik, Y. Kantharaj, S. Y. Chandrashekar, and M. Ganapathi, 2020. Evaluation of winter annuals for auitability as cut and loose flowers under hill zone of Karnataka. Int. J. Curr. Microbiol. App. Sci. 9(10), 2412-2422.

Singer, E., E. J. Holmyard, and A. R. Hall, 1954. A History of Technology. Vol 1. Fall of Ancient Empires. Oxford University Press, London.

Smart, S. M., R. G. H. Bunce, R. Marrs, M. LeDuc, L. G. Firbank, L. C. Maskell, and K. J. Walker, 2005. Large-scale changes in the abundance of common higher plant species across Britain between 1978, 1990 and 1998 as a consequence of human activity: tests of hypothesised changes in trait representation. Biological Conservation. 124(3), 355-371.

Szekely, G., and V. Dagmar, 2011. Thuja trees in the parks of Timişoara. Journal of Horticulture, Forestry and Biotechnology. 15(4), 165-168.

Threlfall, C. G., A. Ossola, A. K. Hahs, N. S. Williams, L. Wilson, and S. J. Livesley, 2016. Variation in vegetation structure and composition across urban green space types. Frontiers in Ecology and Evolution. 4, 1-12.

Twedt, E., R. M. Rainey, and D. R. Proffitt, 2016. Designed natural spaces: informal gardens are perceived to be more restorative than formal gardens. Frontiers in psychology. 7, 1-10.

Van den Berg, A. E., And M. van Winsum-Westra, 2010. Manicured, romantic, or wild? The relation between need for structure and preferences for garden styles. Urban forestry & urban greening. 9(3), 179-186.

Zagorski, T., J. B. Kirkpatrick, and E. Stratford, 2004. Gardens and the bush: gardeners' attitudes, garden types and invasives. Australian Geographical Studies. 42(2):207-220.

Zheng, R., and Y. Liu, 2006. The Research on Plant Diversity of Park Greenbelt of Beijing City. Science Technology and Engineering. 6, 1671-1815.