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Assessment of plant diversity in the community protected forest of Kusnur Village, Hangal, Haveri District, Karnataka, India

Abstract

An assessment was carried out through random quadrates plot in the study area. A total 129 plant species were documented. Frequency and density varied greatly among the taxa, while many species were not evenly abundant in the study areas. The present study revealed that there are many medicinal plants which are used by local peoples, who residing near the forest area. Besides medicine, plant resources were found utilized as other sources as vegetables and also for forage, manure, sheltering and religious purposes which indicates diversity of the study area and needs urgent conservation.

Keywords: biodiversity, invasive species, medicinal plants, plant diversity

Volume 2 Issue 3 - 2018

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Received: April 10, 2018 | **Published:** June 08, 2018

Introduction

India is one of the 12 centres of mega-diversity in the world and encompass of 17,500 flowering plant species. It exhibits a wealth of complex and diverse ecosystems with a great deal of variation.[1] It accounts for 8% of the global biodiversity with only 2.4% of the total land area in the world.[2] Plants are one of the major component of biodiversity, thus the knowledge of plant species found in the different areas of the world is a pre-requisite to conserve the ecological biodiversity and an essential resource for human well-being.[3,4] For this reason precise information of the known local plant species from a given area is essential. It is worth to explore any area with wide range of forest types and identify the economically and medicinally important plant species found there. Further the knowledge about the plants in the region is essential with the increasing conspicuous of people about the environment and its impact on living organisms in general.

Material and methods

The study area Kusnur is located at 14. 69 42.41 N 75.23 00.89 E in the outskirts of Western Ghats lies in a maiden with a few outcrops of low hills. The topography of the area in not even, so it create many minor as well as major tanks. The soil pattern changes variably and annual rainfall is fairly good. The survey was carried out in 2009-2010. The sufficient sample plots of 30 x 30m were laid out randomly, covering the entire forest area about 339 acres. The trees were identified and the density and diameter of each tree species per plots were recorded[5–7] and analyzed for carbon sequestration followed by Pearson et al.[8] The collected specimens were identified with the aid of floras.[9–12] The collected specimens were pressed and prepared herbarium followed by dry method of Jain and Rao.[13] The specimens were deposited in the Herbarium of Botany Department, Karnataka Science College, Dharwad.

Results and discussion

Floristic

The survey indicates that, they are about 129 species belonging to 109 genera under 52 families (Table 1). Of the 52 families documented, the family Fabaceae is the dominant family, comprising 9 spp., the dominance of Fabaceae may be due to the nitrogen-fixing bacteria with which these taxa often are associated, allowing these species to improve their soils.[14] This was followed by *Caesalpiniaceae* (8 spp.), *Euphorbiaceae* (7 spp.), *Capparaceae* and *Mimosaceae* (6 spp. each), *Asclepiadaceae*, *Asteraceae*, *Malvaceae*, *Tiliaceae* are represented by 5 species each. The families *Boraginaceae*, *Liliaceae*, *Rubiaceae* are represented by 4 species each. Seven families are represented by 3 species each, they are: *Acanthaceae*, *Apocyanaceae*, *Convolvulaceae*, *Moraceae*, *Poaceae*, *Rutaceae*, *Verbenaceae*. Again seven families are represented by 2 species *Amaranthaceae*, *Combretaceae*, *Dioscoreaceae*, *Meliaceae*, *Sapindaceae*, *Scrophulariaceae* and *Vitaceae*. The family *Aizoaceae*, *Alangiaceae*, *Anacardiaceae*, *Aponogetonaceae*, *Araceae*, *Aristolochiaceae*, *Cactaceae*, *Calestraceae*, *Cucurbitaceae*, *Diospyraceae*, *Flacourtiaceae*, *Hypoxidaceae*, *Lamiaceae*, *Lythraceae*, *Menispermaceae*, *Myrtaceae*, *Oleaceae*, *Polygonaceae*, *Rhamnaceae*, *Sapotaceae*, *Simaroubaceae*, *Solanaceae*, *Sterculiaceae*, *Urticaceae*, *Violaceae* and *Zingiberaceae* are represented by only a single species.

Of these, many are medicinally important plants and other economic uses are beedi (Diospyros malabarica Kostel), plate (Butea monosperma (Lam.) Taub.) and broom making (*Dodonea angustifolia* L.f.) plants were also found in the area. The community managed forest area is over dominated by *Eucalyptus globulus* Labill. (Myrtaceae), *Gliricidia sepium* (Jacq.) Kunth ex Walp (*Fabaceae*) and *Azadirachta indica* A. Juss (*Meliaceae*). The survey clearly indicates that, there is a severe threat to the forest mainly from these two alien species *i.e. Eucalyptus globulus* Labill. and *Gliricidia sepium* (Jacq.) Kunth ex Wal. Seed dribbling programme was conducted every year since 1987. It was not been success, because these two invasive alien species (*Eucalyptus globulus* Labill. and *Gliricidia sepium* (Jacq.) Kunth ex Wal.) are over dominated and they emits oil through the leaves. It affects the germination and growth of the other species especially native species and this is known as allelopathic interaction.

Carbon sequestration observation during quadrate studies

The sufficient number of quadrats of 30x30meters size was laid

randomly, covering the entire forest area. The obtained result is given below:

Number of Poles (Plants) per quadrate = 86

Girth of single Pole = 20cm

Height of single Pole = 5meter or ca. 15feet

Then the number of *Eucalyptus* standing (poles) in one acre = 12470/acre

12470 x 339 acre of community managed forest area = 42, 27,330 poles (Plants) with 20 cm girth and 5 meter height are available in Kusnur forest.

The outcome of the result indicate the approximate amount of carbon sequestration is 84,34,660kg {the process of capture and long-term storage of atmospheric carbon dioxide (CO2)}in Kusnur village alone.

Table 1 List of plant species in the study area

Botanical name	Family	Local name	Habit	Fl-Fr	Uses
Abrus precatorius L.	*Fabaceae*	Gulgangi	C	May-July	M
Abutilon indicum Sweet	*Malvaceae*	Turubigida	H	Sep-Oct	M
Acacia chundra (Rott.) Willd.	*Mimosaceae*	Teradgida	T	Feb-Apr	WO
Acacia concinna (Willd.) DC.	*Mimosaceae*	Segiballi	T	Dec-Feb	WO
Acacia nilotica L.	*Mimosaceae*	Pickjali	T	Feb-Mar	WO
Alangium salvifolium Wang	*Alangiaceae*	Ankolemara	T	Jan-Mar	WO
Alternanthera sessilis R. Br.	*Amaranthaceae*	Honogoni	H	Sep-Nov	M
Alysicarpus tetragonolobus Edgew.	*Fabaceae*	Alubu	H	Sep-Nov	M
Amaranthus spinosus L.	*Amaranthaceae*	Mullarive	H	Jan-Aug	LV
Ampelocissus indica (L.) Planchon	*Vitaceae*	--	C	Dec-Jan	NK
Andrographis paniculata (Burm. f.) Wall. ex Nees.	*Acanthaceae*	Nelabevu	H	Aug-Sep	M
Aponogeton natans (L.) Engl. & Krause.	*Aponogetonaceae*	Neerukasa	H	Nov-Dec	NK
Argyreia cymosa Sweet	*Convolvulaceae*	--	C	Aug-Sep	NK
Arisaema leschenaultii Blume	*Araceae*	--	H	Aug-Sep	NK
Aristida setacea Retz.	*Poaceae*	--	H	Jul-Aug	FO
Aristolochia indica L.	*Aristolochiaceae*	Ishweriberu	C	Nov-Dec	M
Asparagus racemosus Willd.	*Liliaceae*	Halavumakkalatai	H	Aug-Sep	M
Azadirachta indica A. Juss	*Meliaceae*	Bavu	T	Apr-May	M, WO
Balanites aegyptiaca (L.) Del.	*Simaroubaceae*	Ingalgida	T	Feb-Mar	M
Bauhinia racemosa Lam.	*Caesalpiniaceae*	Arimara	T	Jan-Feb	M
Blepharis repens (Vahl.) Roth	*Acanthaceae*	Hachuga	H	Nov-Dec	M
Butea monosperma (Lam.) Taub.	*Fabaceae*	Muthlamara	T	Apr-May	DYP
Cadaba fruticosa (L.)Druce	*Capparaceae*	Isbugaddi	S	Jan-Feb	M
Caesalpinia bonduc (L.) Roxb.	*Caesalpiniaceae*	Gajuga	S	Dec-Jan	M
Canthium coromandelicum (N. Burm.) Alst.	*Rubiaceae*	Karekai	T	Mar-Apr	EF
Capparis divaricata Lam.	*Capparaceae*	Ravudigida	S	Jan-Feb	EF
Capparis grandis L.f.	*Capparaceae*	--	S	Jan-Feb	NK
Capparis sepiaria L.	*Capparaceae*	Hippi	S	Jan-Feb	NK
Capparis zeylanica L.	*Capparaceae*	Tottilaballi	S	Dec-Jan	NK
Carissa carandas L.	*Apocyanaceae*	Kavali	S	Apr-May	EF
Cassia auriculata L.	*Caesalpiniaceae*	Honnriki	S	Sep-Oct	M
Cassia sericea Sw.	*Caesalpiniaceae*	--	H	Sep-Oct	NK
Cassia siamea Lam.	*Caesalpiniaceae*	--	T	Mar-Apr	NK

Botanical name	Family	Local name	Habit	Fl-Fr	Uses
Cassia tora L.	*Caesalpiniaceae*	Taratagida	H	Sep-Nov	NK
Catunaregam spinosa (Thunb.) Tirveng.	*Rubiaceae*	Kakki	S	Aug-Sep	EF
Cayratia trifolia (L.) Domin	*Vitaceae*	--	C	Aug-Sep	EF
Celastrus paniculatus Willd.	*Calestraceae*	--	S	Sep-Oct	FO
Chlorophytum laxum R. Br.	*Liliaceae*	--	H	Jul-Aug	M
Chloroxylon swietenia DC.	*Rutaceae*	Masavala	T	Jan-Mar	FO, CH
Clerodendron serratum (L.) Moon	*Verbenaceae*	--	S	Aug-Sep	LF
Cocculus hirsutus (L.)Diels	*Menispermaceae*	Dagdiballi	C	Dec-Jan	M
Coldenia procumbens L.	*Boraginaceae*	--	H	Nov-Dec	M
Corchorus olitorius L.	*Tiliaceae*	--	H	Nov-Dec	RM
Cryptolepis buchanani R. Br. & Roem. & Schult.	*Asclepiadaceae*	Karibunta	C	Aug-Sep	M
Curculigo orchioides Gaerth	*Hypoxidaceae*	--	H	Aug-Oct	M
Curcuma sp.	*Zingiberaceae*	--	H	Aug	M
Cynodon dactylon (L.) Pers	*Poaceae*	Kariki	H	Sep-Dec	FO
Dalbargia lanceolaria L.f.	*Fabaceae*	--	T	Mar-Apr	FO
Desmodium triflorum (L.) DC.	*Fabaceae*	--	H	Sep-Oct	NK
Dioscorea oppositifolia L.	*Dioscoreaceae*	--	C	Jul-Aug	M
Dioscorea sp.	*Dioscoreaceae*	--	C	Jul-Aug	M
Diospyros malabarica Kostel	*Diospyraceae*	Tumrigidi	T	Mar-Apr	FO
Dodonea angustifolia L.f.	*Sapindaceae*	Bandariki	S	Nov-Jan	M
Echinops echinatus DC.	*Asteraceae*	Bramhdandi	H	Sep-Oct	NK
Ehretia laevis Roxb.	*Boraginaceae*	Addkisuppu	T	Jan-Mar	WO
Ehretia microphylla Lour.	*Boraginaceae*	--	S	Jan-Feb	M
Emilia sonchifolia (L.) DC.	*Asteraceae*	--	H	Jul-Aug	M
Eucalyptus globulus Labill**.**	*Myrtaceae*	Nelageri	T	Mar-Apr	CH
Eupatorium capillifolium (Lam.) Small	*Asteraceae*	Mungulli	H	Sep-Dec	FO
Euphorbia antiquorum L.	*Euphorbiaceae*	Gutkalli	S	Jul-Aug	NK
Euphorbia nivulia Buchanan-Hamilton	*Euphorbiaceae*	--	S	Jul-Aug	NK
Euphorbia thymifolia L.	*Euphorbiaceae*	Cominust grass	H	Sep-Oct	NK
Evolvulus alsinoides L.	*Convolvulaceae*	Shankapuspi	H	Sep-Oct	M
Evolvulus nummalarius L.	*Convolvulaceae*	--	H	Oct-Nov	M
Feronia elephantum Corr.	*Rutaceae*	Belavala	T	Mar-Apr	M
Ficus bengalensis L.	*Moraceae*	Aralimara	T	Jan-Mar	M
Ficus racemosa L.	*Moraceae*	Hattimara	T	Jan-Mar	EF
Flacourtia indica (N. Burm.) Merrill	*Flacourtiaceae*	--	T	Mar-Apr	FO
Gardenia gummifera L f.	*Apocynaceae*	Kaduberu	T	Aug-Sep	EF, M
Glinus lotoides L.	*Aizoaceae*	Gobbaradasasi	H	Aug-Sep	NK
Gliricidia sepium (Jacq.) Kunth ex Walp	*Fabaceae*	--	T	Mar-Apr	FO
Gloriosa superba L.	*Liliaceae*	Kardiguddigida	C	Jul-Sep	M
Grewia tenax (Forsk.) Fiori.	*Tiliaceae*	Sirikisoppu	T	Mar-Apr	M, EF
Grewia tiliifolia Vahl	*Tiliaceae*	--	T	Mar-Apr	EF
Grewia nervosa (Lour.) Panigrahi	*Tiliaceae*	--	T	Mar-Apr	EF

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Botanical name	Family	Local name	Habit	Fl-Fr	Uses
Gymnema sylvestre R. Br.	*Asclepiadaceae*	Madavi	C	Sep-Nov	M
Hardwickia binata Roxb.	*Caesalpiniaceae*	Anjanamara	T	Feb-Mar	FO, WO
Heliotropium ovalifolium Forssk.	*Boraginaceae*	--	H	Sep-Nov	M
Hemidesmus indicus (L.) R. Br.	*Asclepiadaceae*	Sogadheberu	C	Sep-Nov	M
Holoptelea integrifolia Roxb.	*Urticaceae*	Tapsi	T	Feb-Mar	FO
Holostemma annulare (Roxb.) K. Schum.	*Asclepiadaceae*	Jeventhi	C	Sep-Oct	M
Hybanthus enneaspermus L.	*Violaceae*	Purushrathna	H	Sep-Oct	M
Hyptis suaveolens Poit.	*Lamiaceae*	--	H	Oct-Nov	FO
Indoneesiella echioides (L.) Sreem	*Acanthaceae*	Ativishagida	H	Sep-Oct	M
Iphigenia pallida Baker	*Liliaceae*	--	H	Aug-Sep	M
Ixora pavetta Andr.	*Rubiaceae*	--	S	Dec-Jan	FO
Jasminum roxburghianum Wall. ex C. B. Clarke	*Oleaceae*	Kadumallige	S	Dec-Jan	M, CH
Jatropha curcas L.	*Euphorbiaceae*	Maroudla	S	Apr-May	M
Jatropha glandulifera Roxb.	*Euphorbiaceae*	--	H	Nov-Dec	NK
Lagerstromia parviflora Roxb.	*Lythraceae*	Chennangimara	T	Feb-Mar	FO
Lantana camara L	*Verbenaceae*	Buduranga	S	Jul-Aug	FO
Leucaena leucocephala (Lam.) de Wit	*Mimosaceae*	Babul tree	T	Apr-May	FO
Madhuca longifolia (L.) Macbr.	*Sapotaceae*	Hippimara	T	Apr-May	EF
Maerua oblongifolia (Forssk) A. Rich.	*Capparaceae*	--	S	Feb-Mar	FO
Melochia corchorifolia L.	*Sterculiaceae*	--	H	Nov-Dec	M
Mimosa pudica L.	*Mimosaceae*	Mullumutuga	H	Nov-Dec	M
Morinda pubescens J. E. Sm.	*Rubiaceae*	Maligimara	T	Apr-Mar	DYP
Nerium indicum Mill.	*Rutaceae*	Naibelavala	T	Sep-Nov	O
Opuntia dillienii Haw.	*Cactaceae*	Dabgalli	S	Oct-Nov	EF
Parthenium hysterophorus L.	*Asteraceae*	Cangress grass	H	Aug-Sep	NK
Pavonia odorata Willd.	*Malvaceae*	--	H	Sep-Oct	NK
Phoenix sylvestris (L.) Roxb.	*Poaceae*	Echalmara	T	Jan-Mar	EF
Phyllanthus sp.	*Euphorbiaceae*	--	H	Aug-Sep	M
Physalis minima L.	*Solanaceae*	Marugannu	H	Sep-Oct	M
Polygonum plebeium var indica. J. Hooker	*Polygonaceae*	--	H	Sep-Oct	M
Pongamia pinnata (L)Pierre	*Fabaceae*	Hulagail	T	Apr-May	CH
Prosopis juliflora (Sw.) DC.	*Mimosaceae*	Sarkari Jaligida	S	Dec-Mar	WO
Quirivelia frutescens (L.) R. Br.	*Apocyanaceae*	--	S	Dec-Jan	M
Rhynchosia minima (L.) DC.	*Fabaceae*	--	C	Nov-Dec	M
Sapindus emarginatus Vahl	*Sapindaceae*	Antuvala	T	Jan-Mar	WO
Scoparia dulcis L.	*Scrophulariaceae*	--	H	Sep-Oct	M
Securinega leucopyrus (Willd.) Muell. - Arg.	*Euphorbiaceae*	Biligulikaigida	S	Nov-Dec	M
Semecarpus anacardium L.	*Anacardiaceae*	Garumara	T	Jan-Mar	EF
Sida acuta Burm f.	*Malvaceae*	--	H	Aug-Sep	M
Sida cordata Borss.	*Malvaceae*	--	H	Aug-Sep	M
Sida rhombifolia L.	*Malvaceae*	--	H	Aug-Sep	M
Soymida febrifuga (Roxb.) Juss	*Meliaceae*	--	T	Apr-May	WO
Stachytarpheta indica Vahl	*Verbenaceae*	Keriutni	H	Sep-Oct	M

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Botanical name	Family	Local name	Habit	Fl-Fr	Uses
Streblus asper Lour.	*Moraceae*	Mitligida	T	Mar-Apr	WO
Striga asiatica (L.) O. Ktze.	*Scrophulariaceae*	Bilikasa	H	Sep-Oct	M
Stylosanthes fruticosa (Retz.) Alston	*Fabaceae*	--	H	Oct-Nov	NK
Tamarindus indica L	*Caesalpiniaceae*	Hunusai	T	Mar-Apr	EF
Terminalia alata Heyne ex Roth	*Combretaceae*	Karimatti	T	Feb-Mar	FW
Terminalia arjuna (Roxb. ex DC) W. & A.	*Combretaceae*	Bilimatti	T	Feb-Mar	M
Trichosanthes tricuspidata Lour.	*Cucurbitaceae*	Kagitondiballi	C	Jul-Sep	M
Triumfetta rotundifolia Lam.	*Tiliaceae*	--	H	Sep-Oct	RM
Tylophora indica (Burm. f.) Merr.	*Asclepiadaceae*	Aadusogi	C	Sep-Oct	M
Xanthium indicum Koen.	*Asteraceae*	Artheli	H	Nov-Dec	NK
Ziziphus xylopyrus (Retz.) Willd.	*Rhamnaceae*	Godachi	S	Jan-Mar	EF

C, climbers; H, herbs; T, trees; S, shurbs; FO, fodder; M, medicinal; RM, rope making; O, ornamental; LV, leafy vegetable; NK, not known; WO, wood; CH, bioactive chemicals; EF, edible fruit; DYP, dye yielding plant; FW, firewood

Conclusion

The present study recorded 129 species of plants belonging to 109 genera and 52 families in the study site. Among total families, the family *Fabaceae* is the dominant family. 42, 27,330 poles (Plants) with 20cm girth and 5meter height are available in Kusnur forest. The process of removing carbon from the atmosphere and depositing in the plants it acts as a carbon reservoir in Kusnur village. The approximate amount of carbon sequestration is 84,34,660kg.

The study highlights a severe threat to the forest mainly by alien species. Hence the forest managers should pay attention to the natural composition of forest communities and should not try to replace the native species by invasive ones. Presently, there is a need for increased legal protection, well designed management practices to conserve the local diversity of the study area. Some indigenous species should be planted in the study area which will fulfill the demand of local people.

Acknowledgements

None.

Conflict of interest

Authors declare there is no conflict of interest in publishing the article.

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