



Short Review Paper

Anthropogenic impact on biodiversity of native medicinal plants in Kappothagiri Hills, India

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Available online at: www.isca.in, www.isca.me

Received 14th December 2018, revised 9th May 2019, accepted 25th June 2019

Abstract

In the world most of the countries are characterized by their own bio-geographical conditions. India has rich in Flora and Founa. The nature and humans are interring connected or rather interdependent and should exist in harmony and balance. Any type of change in this inter dependence can imbalance the surrounding either, that is natural or manmade. The biodiversity gains importance in various aspects like commercial utility, m social and ecological services and also aesthetically more valuable. As a result of anthropogenic activities, diversity of medicinal plants of Kappattagiri hills is under serious threat. The knowledge about medicinal plants and their specific uses plays a vital role to improve the restoration efforts of various sectors like local tribes, private organizations, state and federal agencies, local owners sacking to restore habitat of wild life and medicinal plants. The chief objective of this study provides anthropogenic impact on Biodiversity of Koppthagiri hills regions. Especially this region is exploited for wind power generation, gold mining, fire hazards, deforestation, and forest encroached by Tribal and Local people and other Human activities. There is a vital need to benefit of humankind before it vanishes. A great many koppthagiri native medicinal plants are used directly as medicine. The medicinal plants contribute to common peoples in terms of lives, health support, culturally and economically important. The human attitudes towards conservation of biodiversity specially medicinal plants and their sustainable uses gains importance by worshipping nature. This work gives awareness of native medicinal plants cultural and ecological importance and also will help the government to initiate the conservation efforts.

Keywords: Canopy, Flora-Fauna, deccan plateau, anthropogenic, biodiversity.

Introduction

The state of Karnataka is highly rich biodiversity part of India. Biodiversity is richness of species in a geographical area. Region of Karnataka State is situated at an average height about 400-600m above the sea level. Kappattagudda forest is an area in Gadag district is about 21923 hectare surveys by satellite image. This area having rich natural medicinal plants and having a canopy cover of less than 0.5 this is the only area in north Karnataka comprising a continuous stretch of hill rocks of 64KM length and 8.14KM width from Binkadakatti to Shingatalur^{1,2}.

Due to biotic and climatic intervention and fire hazards there is a threat of degradation of rich natural forest and thereby may cause threat to the medicinal plants and wild life of the area. Hence there is a need of evolving permanent precautions and solutions to protect and conserve this precious and irreplaceable unique wealth of nature to us.

Koppthagiri hills situated in the Deccan plateau region in Gadag District (Figures-1a and b). This region is Rich in Flora and Fauna, especially medicinal plants, Gold and Iron ore, granite,

carbon, sulphur, and winds are generally more in strength. Koppthagiri forest area's natural environment can easily be affected or harmed which needs the special protection. The unique feature of this forest is known as ecologically sensitive area. Thus the area to be an ecologically and economically important.

The study was initiated many of the researchers³⁻¹⁰ with the objective of anthropogenic impact on medicinal plants by scouting and interacting with local people and herbal medicinal practioners. The flora of Chaudhari and Sarkar¹¹ has been consulted for identification of the plants collecting information about the area of Flora and Fauna from the forest Department. Observing the human harmful impact in the forest area and identifying the threaded plants and animal sps & getting the photographs of impacts. Assess the status of the medicinal plants of the area.

Observation

Frequent field trips were conducted at different seasons. And many available medicinal plants of medicinal importance were collected and Existing Flora and Fauna information is also

collected from Hetwood¹². The interviews were conducted in a place where the informants and forest officers were most cooperative and comfortable at the end of each interview area under threat due to human activities identified and recorded.

Flora

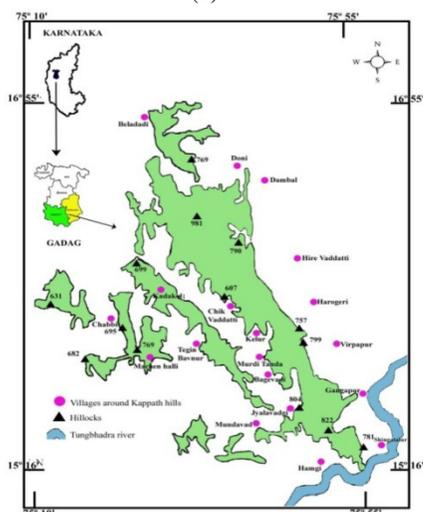
The Kappathgiri Forest comprises fairly shrubs and grass patches. A general survey revealed that huge number of medicinal plants of which 340 most common medicinal plants are identified¹³⁻¹⁵ for the use. *Somyda febrifuge*, *Hardwickia bipinnata*, *Dalbergia paniculata* and *Adatoda vasica*, etc., the major species in that order in terms of distribution. Many of economically important species like *Cassia siamiamia*, *Emblica officinallis*, *Grandinia gummifera*, *Randia dometorum* etc., occur in large number. Sandal “the pride of Karnataka” occurs naturally in Kappattgudda region. The list identified meditational plants; are used by local tribes are given in the Table-1.

Table-1: Medicinal Plants of Kappathgiri Hills and their uses.

Botanical name	Family	Disease prevention	Parts of the plants used
<i>Hibiscus ahelmoshus</i>	Malvaceae	Cancer	Seed
<i>Argomone maxicana</i>	Papavereaceae	Blood disease, chronic cough	Root
<i>Plectranthus amboinicus</i>	Lebiateae	Asthma	Leaf
<i>Vitex niguundo</i>	Verbenaceae	Skin disease	Leaf
<i>Oxalis corniculata</i>	Oxaliadaceae	Mouth freshener	Leaf
<i>Abrus precatorius</i>	Leguminaceae	Skin disease	Leaf
<i>Oscimum basicum</i>	Lamiaceae	Heat reducing	Seed
<i>Santalum album</i>	Santalaceae	Cancer and diabetes	Root and leaf
<i>Tinospra cordifolia</i>	Menispermaceae	Fever, debates	Leaf, stem
<i>Catheranthus roseus</i>	Lauraceae	Cancer	Leaf, root
<i>Aloe barbedonsis</i>	Liliaceae	Piles leaf	
<i>Piper nigrum</i>	Piperaceae	Cold and cough	Seed
<i>Ixora coccinico</i>	Rubiaceae	Kidney stones	Root
<i>Lawsonia inermis</i>	Lythraceae	Skin disease, conditioner	Leaf
<i>Hemidesmus indicus</i>	Crucifera	Blood purification, allergy	Leaf
<i>Aristolochia, indica</i>	Aristolochaceae	Diabetes	Root and leaf
<i>Curculigo orchioides</i>	Amaryllidaceae	Asthma	Root
<i>Phyllanthus niruri</i>	Euphorpiaceae	Jaundice, liver disorder	Leaves
<i>Gymnia sylvertris</i>	Asclepiadaceae	Diabetes	Leaf
<i>Raulfia tetraphylla</i>	Apocynaceae	Blood pressure	Root
<i>Adathoda vesica</i>	Acantheceae	Cold, cough and asthma	Leaf
<i>Bacopa monnieri</i>	Derohulariaceae	Pituitary gland	Leaf
<i>Centella asiatica</i>	Umbelliferae	Cancer	Leaf
<i>Artocarpus hirsute</i>	Urticaceae	Skin disease	Leaf, bark
<i>Withani somnifera</i>	Solanaceae	Nervous system	Root
<i>Tribules terrestris</i>	Zygophyllaceae	Urinary disorders	Fruits
<i>Boerhavia diffusa</i>	Nyctaginaceae	High blood pressure, liver disorder, jaundice, diuretic.	Leaves and roots
<i>Callotropis gigantea</i>	Asclepiadaceae	Cough and cold, dropsy, inflammation	Flower powder, leaves.



(a)



(b)

Figure-1a, b: Study Area Kappathgiri Forest, Karnataka state.

Fauna

Wild animals found in K.P. Hills are about approximately 62 different sps., some of them are very common they are Panther (Leopard) are seen occasionally, wild boar, wild cats, Jackals, Black bucks. Sloth bear, highly populated spotted deer, common langur, common fox, Jackal mice, squirrel Birds, Black drongo, Blue Pigeon. Crow pheasant, Common Hawk, Grey babbler, Indian ribbon, koel, etc., Reptile Cobrn, Viper, chameleon, Pythan etc., Insects, crabs Beetles, scorpion etc.. The Biodiversity is under serious threat by anthropogenic activities given in the Tables-2 to 5.

Table-2: Kappatagiri Hills Forest area covered by Anthropogenic Activities.

K.P. Hill Zone	Area
Mundavad Tank Irrigation	23.96 hector
Wind Mill Project	12.00 hector
Water supply	0.023 hector
Wind Project	325.00 hector
Electricity line	6.75 hector
Total	367.25 hector

Table-3: Showing Kappattagiri Hills Forest area threatened due to fire hazards (latest details as on date).

Year	No. of Incidents	Area Affected	Cause of fire
2011-12	11	267.0 hector	Man made purposely
2012-13	5	120.00 hector	Man made purposely
2013-14	7	160.00 hector	Man made purposely
2014-15	6	95.00 hector	Man made purposely
2015-16	8	48.00 hector	Man made purposely
2016-17	20	166.80 hector	Man made purposely

The fire incidents burn the plants and animals. Fire weather causes by man or nature results in huge loss of forest cover biodiversity.

In Figures-2 and 3(a),(b),(c) one can note that every year in a strange thanks giving ritual during summer, the shrubs and grasslands on the Kappattagiri hills are torched by villagers living around the area.

The department of forest is concerned that precious flora and fauna are getting burnt on the hill tracts during these rituals. It has been merely dousing the forest fires that begin after such events but has not been able to stop the ecologically harmful practice.

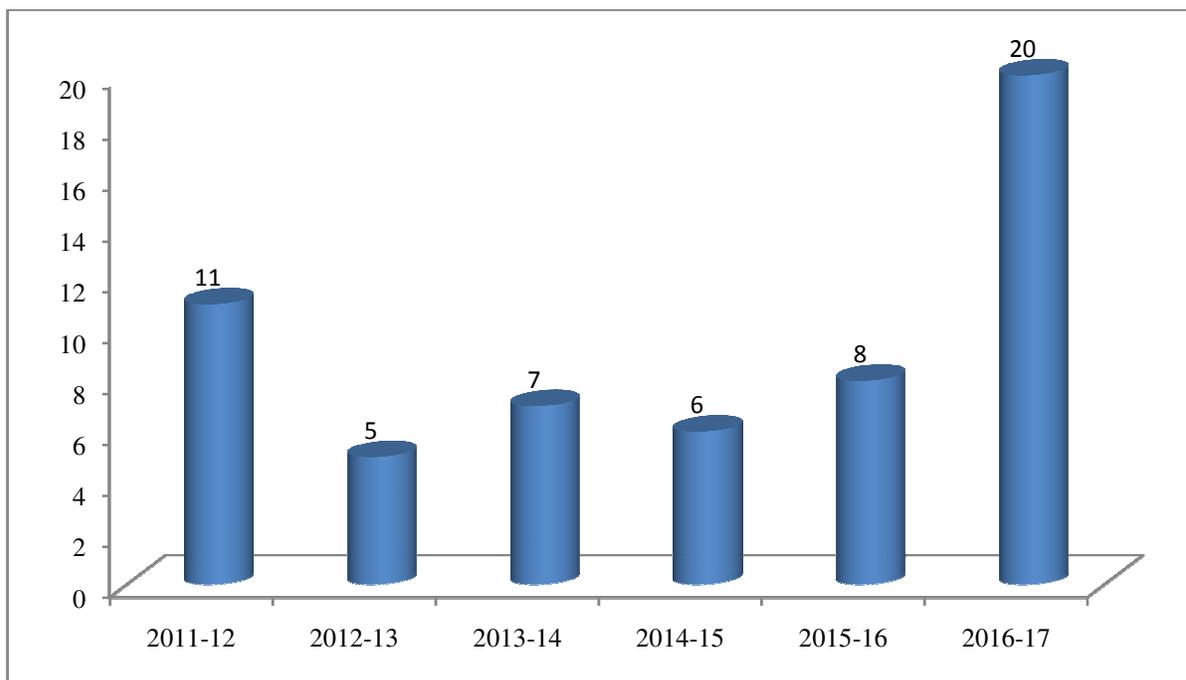


Figure-2: Year wise fire incidents.



(a)



(b)



(c)

Figure-3(a),(b),(c): Fire hazards at Kappattagiri hills.

Table-4: Endangered species of Kappattagiri Hills.

Botanical Name	Local Name
Aegle mormelos	Belpatri, Bel
Gardenia gummifera	Bhicky gida
Santallum Album	Chandan, Gandha

Encroachment of Kappattagiri forest area

The main cause of encroachment identified as the socio-economic cause i.e., limited land and unemployment. Kappattagiri forest area encroached by local and tribal people as shown in Figure-4. According to recent survey was conducted by forest and revenue department, approximately more than two thousand hectare forest land of Kappattagiri Hills forcibly encroached by tribal and local people of nearby villages.

Table-5: Showing Total Area of the Gadag district forest – 6300.37 acre.

Year	Enchrached area
Before 1978	758.39 acre
After 1978	1481.21acre
Total	2240.21 acre

The Table-5 represents definitely the number of enchroachers forcibly occupied the most of Kappattagiri hills forest area for their cultivation purpose. This is a dangerous activity, should not be continued, this activity has a bad impact on whole biodiversity of Kappattagiri hills.



Figure-4: Encroachment of Kappattagiri forest area.

Discussions

Kappattagiri hills situated in the Deccan Plateau region in Gadag district, Karnataka State. Apart from its beauty Kappattagiri hill area is highly resourceful area starts from Binkadakatti to Singatalur. Spreaded over from south to north for about 60-65kms and width is about 2 KM to 10 KM located at 2700ft. MSL. Kappattagiri hill is full of resources with Rich in Flora and Fauna especially natural rare medicinal plants and winds are generally more in strength the unique feature of this forest is known as ecologically sensitive area. In the year 1882 the Bombay Govt Research team identified more than 18 ores wealth some of them are very important gold, manganese, copper, iron hidden under its layers.

Recently in the year 2006 Karnataka Govt. Forest Department survey the plants and animals found in the Kappattagiri hills more than 340 rare medicinal plants being used by many producers of Ayurvedic medicine and local doctors. Kappattagiri hill is like the Himalayas of North in this region.

Kappattagiri hills forest comprises of herbs, shrubs, trees, Grasses and climbers etc. Approximately more than 340 medicinal plant species are identified some important once are *Tinospora cardifolia*, *Andrographis paniculata*, *Withania Somnifera*, *Aloe barbedonsis*, *Adhothoda vasica*, *Gymnia Sylvestris*, *Rauvolfia serpentina*, *Santalum album*, *Oscimum basilicum*, *Phyllanthus fraternus*, *Vitex nigunda*, *Abrus precatorius* etc.

Some common animals found in the forest. *Acinoyx jubatus*, *Antilope cervicapra*, *Conis lupus*, *Reindeer*, *Porcupine*, *Hylochoerus meinertzhageni*, *Felis silvestris*, *Pavo cristatus*, *Psittaciformes*, *Columba livia*, *Corvus corax*, *Passerine*, *Acridotheres tristis*, *luscinia megarhynchol*, *Sciuromorpha*, lizards, calotes, snakes, earth worm, butterfly, honey bee, insects and micro organisms. Honey used by around forty thousand people of Shirahatti, Mundaragi and Gadag taluk of 36 villages surrounding area of Kappattagiri hills.

According to the census 2006 realising all the British govt. had declared it earlier this hill had a grand look of greenery supporting for showers and eco balance. But it is changed. The whole natural resources will be ransacked causing pollution leading to eco imbalance and loss of natural habitat for both men and animals.

During rainy season near Tungabhadra dam huge water is collecting approximately it is more than 3 times water covered Kappattagiri hills. As a result ground water level in surrounding area increases. Due to water logged condition more than 30 tanks in Kappattagiri hills namely Hagalu Batti tank, Manjina tank, Alad tank, Katti Kirabana tak, Gold tank etc and also many streams are filled with water during rainy season. As a result ground water level increasing during summer more than three thousand borewells every year becomes live. It helps to former for agriculture and also for drinking water.

Every year farmers of nearby villages before sowing their field they are worshipping god mallayya at Kappattagiri Hills by preparing food and they stay about 2-3 days they have tradition of getting seeds from swamiji and mixing those seeds with their seeds in the house using such holy seeds to their fields as a tradition. Kappattagiri hill is a spiritual holy place. There are so many holy places, they are Gangibhavi, Mangana Matha, Nandiveri Matha. During shravana masa people celebrating jatra festival. Some hills are named as Jolada rashi hills, Navani rashi hills, Hesarina rashi hills.

The Kappattagiri hills are wealth place for poor people. Many types of fruits and medicinal plants growing important once are *Syzygium jambos*, *Phyllanthus emblica*, *Carrissa carandas*, *Zizphus*, *jujuba* etc and huge medicinal plants. Poor people collecting these fruits & medicinal plants they sell in Gadag and Betageri and also nearby villages getting money to lead their life therefore the Kappattagiri hill is providing food for them. Kappattagiri hills also provide fodder to many wild and domestic animals and birds.

Karnataka Govt. in the year 2010 Kappattagiri hills 39-70 hectare area land handover to Beruka Company for wind mill project, in the name of projects and road work the huge area of Kappattagiri hills lost. Part by part area acquired by Company and Karnataka Govt. part by part Kappattagiri hills area distributed to backward people for agriculture and other purposes nearby reserve forest. The land also acquired by Baldota mining company and many farmers also trying to acquire forest land.

The Kappattagiri hill comprises various medicinal plants used by local people. The nature and humans are inter connected or rather interdependent and should exist in harmony and balance any type of change in the inter dependence can imbalance the surrounding, either that is natural or manmade.

As a result of Anthropogenic activities, Biodiversity of Kappattagiri hills is under serious threat Ethno botanical knowledge plays important role to improve the restoration efforts of private organization, tribal and local peoples state and factorial agencies, land owners seeking to restore habitat of medicinal plants and wild life. The chief objective of this study provides anthropogenic impact on biodiversity of Kappattagiri hills regions specially on medicinal plants.

Observations were carried at with the aid of canon camera DSLREOS 1200 D WT Lens with 18-55 lens. Anthropogenic impacts seen were recorded seasonally and frequently impacts identified are mentioned in this report the check list of medicinal plants, animals and threatened areas was prepared using standardized scientific names of medicinal plants, animals following text and field guides. A total number of 271 medicinal plants and more than 100 species of animals and impact areas have been recorded from the study area.

Especially this region is exploited for wind power generation, gold mining, fire hazards, deforestation and forest encroached by tribal and local people. The huge medicinal plants are in endangered state due to hectic mining activity, and insufficient rain and ground water level receded to the depths. Hence proper measures to be taken for storage of rain water. Now a day's multinational companies starts their projects in this area one of the company already established their wind plants in Kappattagiri hills and one more company should be got an idea to start mining. Suppose govt will be given permission to mining definitely this will be dangerous in many ways because one of the deadly toxic chemicals like sodium cyanide mixed with soil. The soil become unfertile and water also polluted because of mixing poisonous chemicals. The govt should not give the permission for mining in this area. Firstly the responsibility of the govt is relocate the factories, industries and wind plants. Govt. should stop to give the permission to industries, stop the illegal agricultural activities in Kappattagiri hills and Govt. responsibility is to opened the Ayurveda Research and Training Centre to supporting to medicinal plants.

The biodiversity of Kappattagiri hills is under serious threats as a result of human activities the main dangers are resource consumption, Fire hazards and deforestation. Every year the shrubs and grass lands on the Kappattagiri hills are touched by villagers living around the area. The fire may injure or kill part of plant or the entire plants and animals. The precious flora and fauna are getting burnt on the hill tracts during summer. The concerned forest department must take action to stop such ecologically harmful practice which is much dangerous to Kappattagiri hills.

The deforestation can have negative impact on the environment. The loss of habitat for many plants especially medicinal plants, animals and micro organisms live in forests. Deforestation destroys their home and also drives climate change.

Conclusion

At present there is a threat to habitat destruction by anthropogenic activities in the Kappattagiri hills. Direct observations as well as personal interviewed with local people during surveys related that villager are contributing to minimize disturbance. The knowledge is needed for sustainable management and conservation of natural resources by educating the surrounding people of Kappothgiri hills to protect this unique region.

There is a vital need to benefit of human kind before it vanishes. A great many Kappattagiri medicinal plants are used directly as medicine. The contribution of medicinal plants makes to many people's in terms of lives, gives health support, commercially and culturally gains importance. This project gives awareness of native medicinal plants, cultural and ecological importance and also will help the government to initiate the conservation efforts and also gives awareness of Anthropogenic impacts on

Kappattagiri hills provide opportunity for the scientists, research scholars and environmentalists to understand the impacts of human activities on flora especially on rich diversity of medicinal plants and fauna. In this area some of the species become extinct and endangered. The Ethno botanical knowledge is needed to improve restoration efforts to restore medicinal plants and wild life habitat and other natural conditions. Hence there is need to protect and conserve this rich biodiversity of Kappattagiri hills. Regular surveys related to Anthropogenic impacts and awareness of the local people should be conducted for a detailed assessment of the impacts.

Acknowledgements

The author HSK is respectively grateful to the management of K.L.E Society Belagavi and Principal Prof. C. Lingareddy for their support and encouragement. He wishes to express his thanks to University Grants Commission, New Delhi, INDIA for financial support to pursue this work under a Minor research project Scheme. [MRP(S)-0465/1314/KAKA072/UGC-SWRO].

References

1. Kambhar S.V. and Kotresha K. (2014). Diversity of Tree species in Gadag district, Karnataka, India. Natural Science – Academic Paper, 1-12.
2. Government of Karnataka Biodiversity of Karnataka at a Glance (2018). Gadag district forest office, Gadag. http://www.indiaenvironmentportal.org.in/files/Biodiversity%20of%20Karnataka%20at%20a%20Glance_0.pdf
3. Arya Vaidya Sala (2010). Indian medicinal plants, University press. India, ISBN: 9788173717048.
4. Magadi R.G. (2001). Botanical and vernacular names of south Indian plants. *Divya Chandra prakashana*, Bangalore, 282-283.
5. Joshi Shankar Gopal (2008). Medicinal plants, Oxford and IBH publishing Co-PVT. Ltd, New Delhi, ISBN: 8120414144
6. Deniel M. (2008). Medicinal plants (Chemistry & Properties). Oxford and IBH publishing Co-PVT. Ltd, New Delhi, ISBN: 8120416899
7. Singh Amritpal (2008). Medicinal plants of the world. Oxford and IBH publishing Co-PVT. Ltd, New Delhi, ISBN: 8120417038
8. Reddy K. Janardhan (2007). Advances in Medicinal Plants. University Press, India, ISBN:8173715882
9. Sharma Ravindra (2003). Medicinal plants of India: An Encyclopedia. Daya Publishing House, New Delhi, ISBN:8170353041.
10. Neeru Mathur (2010). Medicinal plants of India. RBSA, ISBN: 8176114995

11. Chaudhuri A.B. and Chaudhuri A.B. (2003). Megadiversity Conservation: Flora, Fauna and Medicinal Plants of India's Hot Spots. Daya Books., ISBN: 8170353017.
12. Rost D. (2012). Flowering Plants: A Pictorial Guide to the World's Flora. Firefly Books, New York, ISBN:9781119403555.
13. Sharma V.K. and Shenai S.K. (2013). Economically important Medicinal plants. Campus Books, New Delhi, ISBN: 9788171326235
14. Gangopadhyay Ajay (2007). Plant Biodiversity. Gene Tech Books, ISBN:8189729659
15. Nandini Sarkar (2013). Indigenous medicinal plants and tribals. Random publications, New Delhi, ISBN:9789351111163