

ARTICLE

Soil Characteristics and Vegetation at Kalarikunnu, Chelannur, Kozhikode, Kerala, South India

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Abstract

The Kalarikunnu Hill of Chelannur is a gracefully ascending laterite hillock with an expansive table-top area of unsurpassing beauty at its apex. The hill also blesses the local people with a continuously flowing spring of natural water, which rarely dries up even in scorching heat of summer. This serene hill ecosystem is at present facing degradation mostly by way of new constructions along its slopes. This poses threat to the pristine ecological balance of the hillocks and valleys nearby. The present investigation includes a preliminary survey in and around the Kalarukunnu with the help of Local Government to understand the hill areas and land use methods. The study addresses soil characteristics and diversity of flora through regular field visits during different seasons in the area. Soil samples were collected from various regions like foothill, mid area and top hill areas during different seasons. Soil properties like soil moisture content, percentage of organic carbon, soil pH, percentage of available phosphorus, etc. were analysed using standard methods. The upper plateau was enriched with shrubby and small to medium trees, while the mid hill and foot hills showed many medium houses, some under construction. The floral diversity was astounding with different species of shrubs, herbs, trees and creepers growing in all the areas of the hill. The small groves of *Ixoracoccinea*, *Ziziphusoenoplia*, etc. give refuge to a large number of small animals and birds in addition to providing nectar to butterflies and other insects during the flowering season. Many species are rare and are facing threatening due to the over exploitation. Cashew nut plantation and thick patches of Bamboos were seen along the hill sides. The study substantiated the urgent need to document and conserve the rich bio diversity and natural source of water through proper conservation strategies, and also to protect the natural topography of the land by effective stabilization methods.

Key Words: Soil Characters, Floral Diversity, Exploitation, Kalarikunnu

Introduction

In Kerala, midland hills are beautiful natural gifts, giving a curvaceous shape to the entire landscape, with plenty of vegetation and a rich array of animals. The laterite hills are the most imposing but extremely threatened topographical floristic and faunistic feature of northern Kerala (State Environmental Report of Kerala, 2007). The midland lateral hills in the northern part of the state are slowly vanishing as the soil is enormously being scrapped off to meet the demand of land developers. People are often unaware of the importance of the midland hills that are being demolished due to the growing commercialization of land, expanding urbanization and booming construction industry (The Hindu, 2004).

The uncontrolled deterioration of the laterite hills causes irreparable damage to the ecosystem, bio diversity and nature's water conservation strategies. For implementing any conservation programme, scientific study is a prerequisite. So far no detailed studies have been undertaken for the loss of ecological balance due to human intervention in hill areas at northern Kerala. Only a few and brief studies are available on the socio-economic aspects of the hillocks. Biodiversity of hillocks has been studied along with sociological and ecological importance. Padmanabhan (2002) gives a comprehensive description of the historical, geological and ecological aspects of the hillocks. Jaffer (1998) made a study of species diversity of Madayipara. The studies available on wetlands (Nalini Naik, 2000) and that of sacred groves (Jayarajan, 2004) documented the relation of these habitats with hillocks. The study of biodiversity of Kalliassery (Sreedharan, 2001) gives an idea of the mid-land habitat on Kerala. The hill ecosystem of Kalarikunnu, Chelannur is facing

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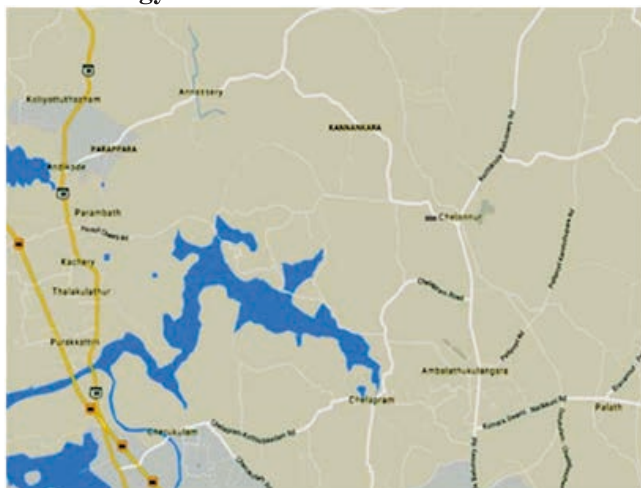
degradation. So far no relevant studies were carried out to explore the soil characteristics and floral diversity at Kalarikunnu. The present investigation will try to fill the lacuna.

Study Area

Kozhikode District is endowed with lush green country sides, serene beaches, historic sites, wildlife sanctuaries, rivers, and hills. Chelannur village is located in Kozhikode Tehsil of Kozhikode district in Kerala, India. Kalarikunnu is located at the midst of Chelannur Grama Panchayath, with SreeNarayana Guru College, Chelannur at its foot hill area. The main attraction of the hill is its natural surrounding with beautiful vegetation and natural springs originating from hill sides (Fig. 1).

Fig. 1: Map of Chelannur

Methodology



First-hand information on Kalarikunnu, Chelannur was collected from Panchayath and Village authorities. Preliminary survey was conducted in and around the Kalarikunnu to understand the hill areas and land use methods. Field visits were organized to collect plant specimens during different seasons, and the collected plants were identified with the help of standard flora and field keys.

Soil samples were collected from various regions like foothill, mid area and top hill soils during different seasons. The analysis of soil parameters were carried out following the methods described in APHA, 1995. Soil properties like soil moisture content, percentage of organic carbon, soil pH, percentage of available phosphorus, etc were analysed. For determining the soil pH, a mixture of 10 g of working soil sample in 50 ml of distilled water was stirred using a clean glass rod and kept undisturbed for sedimentation of the heavier soil particles (Jackson, 1967). The pH was measured by using a portable digital pH meter. To analyse the soil moisture content, 10 g of soil from each working

sample was taken out and kept on a clean Petri plate. The weight of the soil and Petri plate were recorded. This was then kept in a hot air oven at 80°C for 48 hrs. The dry weight of the sample was measured using an electronic or digital balance, and the percentage moisture content of the sample was calculated.

The percentage of organic carbon in the soil sample was determined by taking 10g oven dried working soil sample in a 500 ml conical flask and adding 10 ml 1N potassium dichromate ($K_2Cr_2O_7$) solution and 20ml conc. Sulphuric acid (H_2SO_4) to it, followed by gentle stirring. The flask was then left undisturbed for 30 minutes for chemical reaction to proceed unhindered. After the reaction was over, the contents were diluted with distilled water, followed by addition of 10 ml phosphoric acid and 1ml Diphenyl amine as indicator. The sample was then titrated against 0.4 N Ferrous Ammonium Sulphate, this led to the change of colour to brilliant green at the end point. The blank was also read with the same quantity of the chemicals without soil. Available phosphate was estimated by keeping 3g soil dissolved in 200ml of 0.002N H_2SO_4 in a conical flask for half an hour for dissolution of the soil. The sample was then filtered. To 10 ml of sample was taken out and to this 5ml of Ammonium Molybdate solution was added, followed by 2-3 drops of stannous chloride solution. A blue color appeared and this was read within 5 minutes in 690nm on a Spectrophotometer using distilled water as blank.

Results and Discussion

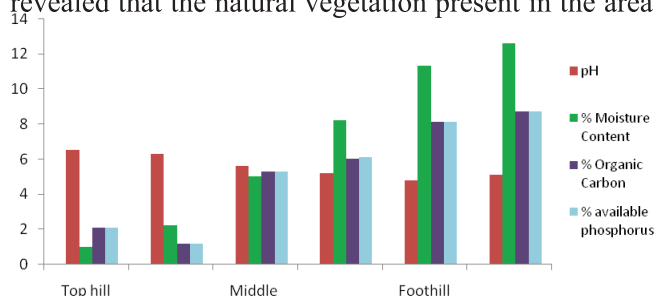
The present study revealed that the soils in the Kalarikunnu is a natural gift and it is the chief source and means of agricultural production. The fertility of the soil totally changes the economic activities of the people, especially increasing the yields of cultivated crops (Majoribank, 1908). The deposits of alluvium (Bristow, 1929), terisand blown sands increase the agricultural products of the area.

The results from the present investigation relating to average soil pH and percentage of soil moisture content are depicted in Fig. 2. It shows that the upper soil layer of the top hill was almost neutral (pH 6.5) while the acidity increases with increase in soil depth. The same pattern was observed in all the study sites. Maximum percentage of soil moisture content was noticed in the foothill area, while the top hill soils exhibited almost dry nature. The water holding capacity of the surface soil particles in the top hill soils was comparatively low, and maximum moisture content was seen in the foot hill region. The percentage organic carbon content in the top hill area was very less compared to other layers of soils. The soil phosphorus content was very low. Laterite can occur at every altitude from sea level to about 2500 m, and can be formed from any type of rock.

Removal of top soil (alkaline upper horizon) creates an acidic environment which further accelerates the laterisation process (Jayarajan 2004). The percentage of organic carbon and available phosphorus are also due to the same property of acidity in the study area.

Fig.2: The Soil Parameters Studied in Tophill, Middlehill and Foothill areas of Kalarikkunnu, Chelannur, Kozhikode

The present extensive study on the flora of Kalarikkunnu revealed that the natural vegetation present in the area



includes herbs, shrubs and trees. A laterite hill plateau can be considered as an amphibious ecosystem. The alternation of very wet and dry conditions creates an unusual ecological situation that supports a unique biota. To survive in such an ecosystem, a species must be able either to tolerate a wide range of conditions, or to grow and reproduce in a short time. Table 1 presents the angiospermic flora observed in the study area.

Table 1 : Plant Species Present in the Study Area of Kalarikkunnu, Chelannur

SlNo	Binomial	Family	Local name
1	Cyperusexalatus	Poaceae	Muthanga
2	Kyllinganemoralis	Poaceae	Vallimuthanga
3	Bambusabambos	Poaceae	Mula
4	Desmodiumbipinnata	Fabaceae	
5	Abruspreicatorius	Fabaceae	Kunni
6	Abutilon indicum	Malvaceae	Vattooram/Ooram
7	Acacia caesia (A. intsia)	Mimosaceae	Veluthaincha
8	Acalyphaindica	Euphorbiaceae	Kuppameni
9	Achyranthesaspera	Amaranthaceae	Katalaadi
10	Achyranthesbidentatae	Amaranthaceae	Perumkatalaadi
11	Aervalanata	Amaranthaceae	Cheroola
12	Allamandacathartica	Apocynaceae	Kolambi
13	Alloteropsiscimicina	Poaceae	
14	Alstoniascholaris	Apocynaceae	Ezhilampala
15	Alternantherabettzickiana	Amaranthaceae	Kaattuponnamkanni
16	Alternantherasessilis	Amaranthaceae	Ponnamkanni
17	Amaranthusspinosus	Amaranthaceae	Mullencheera
18	Ampelocissuslatifolia	Vitaceae	Kaattumunthiri
19	Anacardiumoccidentale	Anacardiaceae	Kasumaavu
20	Anamirtacocculus	Menispermaceae	Polla/Vatolam
21	Biophytumreinwardtii	Oxalidaceae	Mukkutti
22	Biophytumsensitivum	Oxalidaceae	Mukkutti
23	Andrographispaniculata	Acanthaceae	Nilaveppu
24	Buteamonosperma	Fabaceae	Chamatha/Plashu
25	Canavaliagladiata	Fabaceae	Vaalpayar
26	Canthiumcoromandelicum	Rubiaceae	Kataramullu
27	Catunaregamspinosa	Rubiaceae	Malankaara
28	Cayratiatrifolia	Vitaceae	Kandalmunthiri
29	Chromolaenaodorata	Asteraceae	Communist Pacha
30	Chrysopogonaciculatus	Poaceae	Snehappullu

31	<i>Cinnamomum malabatum</i>	Lauraceae	Vayana
32	<i>Cleome viscosa</i>	Capparaceae	Manjavela
33	<i>Crotalaria pallida</i>	Fabaceae	Manjakkilukki
34	<i>Cardiospermum halicacabum</i>	Sapindaceae	Uzhinja
35	<i>Curculigo orchioides</i>	Hypoxidaceae	Nilappana
36	<i>Cymbopogon flexuosus</i>	Poaceae	Theruvappullu
37	<i>Cynodon dactylon</i>	Poaceae	Karukappullu
38	<i>Desmodium triflorum</i>	Fabaceae	Nilamparanda
39	<i>Eclipta prostrata</i>	Asteraceae	Kayyonni
40	<i>Elephantopus scaber</i>	Asteraceae	Aanachchuvadi
41	<i>Emilia sonchifolia</i>	Asteraceae	Muyalchevian
42	<i>Eriocaulon cuspidatum</i>	Eriocaulaceae	Choothu
43	<i>Evolvulus sinoides</i>	Convolvulaceae	Vishnukranthi
44	<i>Evolvulus nummularius</i>	Convolvulaceae	Vellakranthi
45	<i>Gliricidia sepium</i>	Fabaceae	Seemakkonna
46	<i>Gloriosa superba</i>	Liliaceae	Menthonni
47	<i>Glycosmis pentaphylla</i>	Rutaceae	Kurumpaanal
48	<i>Helicteres isora</i>	Sterculiaceae	Edampiri-valampiri
49	<i>Heliotropium indicum</i>	Boraginaceae	Thekkada
50	<i>Hemidesmus indicus</i>	Periplocaceae	Nannaari
51	<i>Hyptis suaveolens</i>	Lamiaceae	Naarikkadu
52	<i>Ixoracoccinea</i>	Rubiaceae	Cheththi
53	<i>Jasminum zoricum</i>	Oleaceae	Kaattumulla
54	<i>Kylling brevifolia</i>	Cyperaceae	
56	<i>Lantana camara</i>	Verbenaceae	Arippoo/Konginippoo
57	<i>Laportea interrupta</i>	Urticaceae	Kuttikodithoova
58	<i>Leucas aspera</i>	Lamiaceae	Thumba
59	<i>Macaranga peltata</i>	Euphorbiaceae	Uppila
60	<i>Melastoma malabathricum</i>	Melastomataceae	Athirani
61	<i>Melochia corchorifolia</i>	Sterculiaceae	Cheruvuram
62	<i>Memecylon umbellatum</i>	Melastomataceae	Kaasavu
63	<i>Mikania micrantha</i>	Asteraceae	Dhrutharashtrapacha
64	<i>Mimosa pudica</i>	Mimosaceae	Thottavaadi
65	<i>Mimusops elengi</i>	Sapotaceae	Elanji
66	<i>Mukia maderaspatana</i>	Cucurbitaceae	Mukkappeeram
67	<i>Phyllanthus amarus</i>	Euphorbiaceae	Keezharnelli
68	<i>Physalis angulata</i>	Solanaceae	Mottampuli/ Nhottanhodien
69	<i>Pilea microphylla</i>	Urticaceae	
70	<i>Piper nigrum</i>	Piperaceae	Kurumulaku
71	<i>Santalum album</i>	Santalaceae	Chandanam
72	<i>Sapindus trifoliata</i>	Sapindaceae	Soppinkaayamaram
73	<i>Scoparia dulcis</i>	Scrophulariaceae	Kallurukki
74	<i>Sesamum radiatum</i>	Pedaliaceae	Kattellu
75	<i>Sida acuta</i>	Malvaceae	Aanakkurunthotti
76	<i>Sida cordata</i>	Malvaceae	Vallikkurunthotti
77	<i>Sida cordifolia</i>	Malvaceae	ValliKurunthotti
78	<i>Sida rhombifolia</i>	Malvaceae	Kurunthotti
79	<i>Smilax zeylanica</i>	Smilacaceae	Kariyilanchi

80	Solanumtorvum	Solanaceae	Kattuchunda/
81	Spermacoarticularis	Rubiaceae	Kudalchurukki
82	Spermacocelatifolia	Rubiaceae	Pachappalla
83	Strychnosnux-vomica	Loganiaceae	Kanjiram
84	Strychnosvanprukii	Loganiaceae	Vallikkanjiram
85	Tectonagrandis	Verbenaceae	Thekku
86	Tephrosiapupurea	Fabaceae	Kozhinjil
87	Tinosporacordifolia	Menispermaceae	Chittamruthu
88	Trichosanthesnervifolia	Cucurbitaceae	Kaattupadavalam
89	Tridaxprocumbens	Asteraceae	Odiyanpachcha
90	Tylophoraindica var. indica	Asclepiadaceae	Vallippaala
91	Urenalobata	Malvaceae	Malvaceae
92	Utriculariamalabarica	Lentibulariaceae	
93	Uvarianarum	Annonaceae	Narumpaanal
94	Vernoniacinerea	Asteraceae	Poovamkurunthal
95	Zizyphusmauritiana	Rhamnaceae	Elantha
96	Zizyphusoenoplea	Rhamnaceae	Cheruthudali
97	Justicia japonica	Acanthaceae	
98	Leeaindica	Leeaceae	Manipperandi
99	Mangiferaindica	Anacardiaceae	Maavu
100	Pennisetumpolystahyon	Poaceae	Meesappullu
101	Pothosscandens	Araceae	

The floral diversity observed presently at Kalarikkunnu was astounding with different species of shrubs, herbs, trees and creepers growing at the surfaces and in the slopes of the hills. The identified plant species belong mostly to herbs, shrubs and trees. The small groves of *Ixoracoccinea*, *Zizyphusoenoplia*, etc. give refuge to a large number of small animals and birds in addition to providing nectar to butterflies and other insects during the flowering season (Plate-1). Many species are rare and are facing threat due to over exploitation stemming from poverty of local people and degradation of environment largely due to construction of medium sized houses. The interrelationship between exploitation of natural resources through developmental work and poverty is particularly relevant in the present context. Sustainable development is the only alternative to conserve nature and natural resources to enable the forthcoming generations to live here safely and successfully.

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Plate 1



- A: Top hill plateau
- B: A view of the ground vegetation
- C: Rocky region in the top hill area
- D: Vegetation present in the boarder line
- E and F : Mid hill vegetation