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RESEARCH ARTICLE

SYSTEMATIC STUDIES ON THE RIPARIAN FLORA OF SOKANASINI RIVER, CHITTUR TALUK, PALAKKAD DISTRICT, KERALA

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ABSTRACT

The taxonomic survey was carried out during June 2015 to March 2016 in Sokanasiniriver, Chittur Taluk, Palakkad district, Kerala. In the present study a total of 91 plant species belonging to 72 genera and 30 families were documented. The Fabaceae family was the largest contribution in 11 species followed by Asteraceae in 9 species and Malvaceae, Acanthaceae and Poaceae are each in 8 species and life forms of herbs are the dominantly present in the study area.

INTRODUCTION

The word Riparian is originated from the Latin word 'Ripa' means along the river margin. Plant communities seen along the margin are commonly referred to as the Riparian flora. From the beginning to the end of a river the riparian zone is highly influenced by the quantum and flow of water in the river channel. It is also known as gallery forest and stream side forests (Brinson, 1990). A riparian zone is the interface between land and water bodies, including streams, rivers, lakes and estuarine marine shores. Riparian zones can therefore be considered as a transitional belt between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes and biota (National Research Council, 2002). The structure and function of the riparian zone are highly influenced by climate through temperature, precipitation, evaporation and runoff. Floods play a significant role in determining regeneration from seed as well as long term seedling survival. Soil moisture and depth to the water table also influence the composition of the riparian plant communities (Naiman *et al.*, 2005). Riparian vegetation intercepts and detains agriculture run off from adjacent upland areas and waste water pollution and maintains water quality. They significantly reduces nutrient run off and helps in nutrient cycling. Riparian plants stabilizing river banks by their root system. Apart from this riparian vegetation functions as cover for wildlife and corridors for species migration, dispersal, breeding ground for birds and small mammals. Riparian floras are maintained by the interaction of constant erosion and deposition of soil.

The dominance of the tree species especially of evergreen species and presence of different life forms like herbs, shrubs, climbers, epiphytes and trees in a particular ratio shows clear structure similarity to the wet evergreen forest. The presence of weeds and some deciduous elements indicate the disturbance. These species are mainly found in the edges where the adjacent plantations merge with the vegetations. The knowledge on rivers is intensively studied in addition to the distribution of plant diversity, richness of species is also used for effective management. Knowledge of plant species and communities can reveal crucial facts necessary to the management of river ecosystems and for effective management and conservation, concomitantly taxonomy study should be taken up. Hence, the previous studies were made in different regions of Kerala *viz.*, Vazhachal region of Chalakkudy river basin (Bachan, 2002), Valappatanam river (Sreedharan, 2006) and Pamba river basin (Joby, 2013). The present study area the river Sokanasini was taken up for identification, documentation and prioritization of species, since the river Sokanasini and the connected aquatic systems are rich repositories of various plant species.

MATERIALS AND METHODS

Study area: The river Chitturpuzha originates from Anamalais and flows through Thathamangalam and Chittur areas of Palakkad District. It joins the main river Bharathapuzha near Parli and also known as Kannadipuzha or Amaravathipuzha. Three main streams combine to form this river are Valayar, Aliyar Uppar. The altitude and latitude of the study area ranges between 10° 26' to 11° 15' North and 75° 50' to 76° 55' East (Fig. 1). The study area Chittur River is known as Sokanasini river, this name was given by Thunjathu Ramanujan Ezhuthachan. The river is lifetime water source for the peoples of

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Figure 1. Show the study area Sokanasiniriver, Chittur taluk, Palakkad district, Kerala

Map showing the study area Sokanasini river, Chittur, Palakkad district.

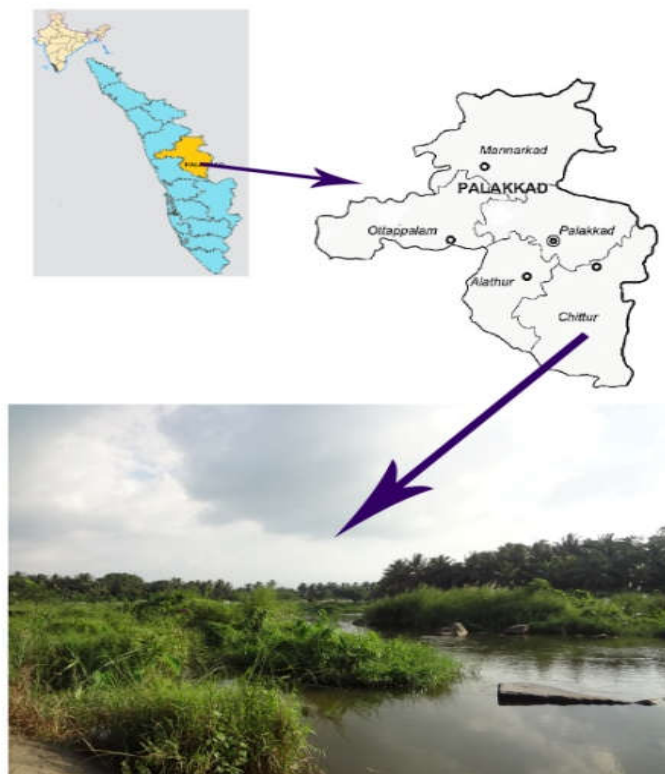


Table 1. Details of enumerated plants, their botanical names, habits, families and uses

S. No.	Botanical Name	Family	Habit	Uses
1.	<i>Nymphaea stellata</i> Burm.	Nymphaeaceae	Herb	Diabetes, liver disorders and inflammations.
2.	<i>Cleome monophylla</i> L.	Capparaceae	Herb	Intestinal diseases.
3.	<i>Cleome viscosa</i> L.	Capparaceae	Herb	Infections, fever, rheumatism and headache.
4.	<i>Bergia ammannioides</i> Roxb.	Elatinaceae	Herb	Pathogenic inhibition
5.	<i>Hibiscus micranthus</i> L.	Malvaceae	Herb	Wounds, cut, stomach pain, diabetes, fever, cold and poisonous bites.
6.	<i>Hibiscus surattensis</i> L.	Malvaceae	Shrub	Wounds, eye diseases, laxative, gonorrhea and other inflammations.
7.	<i>Hibiscus vitifolius</i> L.	Malvaceae	Shrub	Jaundice, inflammation and diabetes.
8.	<i>Pavoniazeylanica</i> (L.) Cav.	Malvaceae	Shrub	Skin conditioning and soothing.
9.	<i>Sida acuta</i> Burm.	Malvaceae	Herb	Wounds, antipyretic, headache and fever.
10.	<i>Sida cordifolia</i> L.	Malvaceae	Herb	Bronchitis and nasal congestion.
11.	<i>Sida glutinosa</i> Commerson ex cav.	Malvaceae	Herb	Diabetes.
12.	<i>Urena lobata</i> L.	Malvaceae	Herb	Gonorrhea
13.	<i>Corchorus olerarius</i> L.	Tiliaceae	Herb	Gestational diabetes.
14.	<i>Corchorus tridens</i> L.	Tiliaceae	Herb	Cold, cough and gastro intestinal disorders.
15.	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Herb	Cardiovascular problems.
16.	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Shrub	Diabetes and anaemia.
17.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Climber	Inflammation.
18.	<i>Alysicarpus monilifer</i> (L.) DC.	Fabaceae	Herb	Skin diseases.
19.	<i>Clitorea ternatea</i> L.	Fabaceae	Climber	Thyroid disorders and headaches.
20.	<i>Crotalaria mysorensis</i> Roth.	Fabaceae	Herb	Urinary problems.
21.	<i>Crotalaria pallida</i> Aiton.	Fabaceae	Herb	Eczema, fever and urinary problems.
22.	<i>Crotalaria verrucosa</i> L.	Fabaceae	Herb	Cough.
23.	<i>Goniogyna hirta</i> (Willd) Ali.	Fabaceae	Herb	-
24.	<i>Indigofera linnaei</i> Ali.	Fabaceae	Herb	Arthritis.
25.	<i>Phyllodium pulchellum</i> (L.) Desv.	Fabaceae	Shrub	Malaria and diarrhea.
26.	<i>Tephrosia maxima</i> (L.) Pers.	Fabaceae	Shrub	Bronchitis, asthma and diarrhea.
27.	<i>Teramnus labialis</i> L. f.) Sprengel	Fabaceae	Climber	Tuberculosis, nervous affections and rheumatism.
28.	<i>Vigna trilobata</i> (L.) Verdc.	Fabaceae	Climber	Fever and worm infestation.
29.	<i>Neptunia oleracea</i> Lour.	Mimosidaeae	Herb	Necrosis and earache.
30.	<i>Ludwigia octavalvis</i> (Jacq.) Raven.	Onagraceae	Shrub	Dysentery and nervous diseases.
31.	<i>Ludwigia perennis</i> L.	Onagraceae	Herb	Fever
32.	<i>Citrullus colocynthis</i> Schrader.	Cucurbitaceae	Climber	Jaundice and asthma.
33.	<i>Coccinia indica</i> Wight & Arn.	Cucurbitaceae	Climber	Leprosy
34.	<i>Mollugo nudicaulis</i> Lam.	Aizoaceae	Herb	Cough and cold.
35.	<i>Mollugo pentaphylla</i> L.	Aizoaceae	Herb	Cancer

.....Continue

36.	<i>Oldenlandia umbellata</i> L.	Rubiaceae	Herb	Bronchial asthma
37.	<i>Spermacoe hispida</i> L.	Rubiaceae	Herb	Toothache and dysentery.
38.	<i>Acmella paniculata</i> (Well. ex DC.) Jansen	Asteraceae	Herb	Toothache
39.	<i>Blumea mollis</i> (D. Don) Merr.	Asteraceae	Herb	Rheumatism and diarrhea.
40.	<i>Blumea obliqua</i> (L.) Druce.	Asteraceae	Herb	Hypertension, cough and cold.
41.	<i>Chromolaena odorata</i> (L.) R.	Asteraceae	Shrub	Healing wounds
42.	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Herb	Hair loss
43.	<i>Parthenium hysterophorus</i> L.	Asteraceae	Herb	Cancer
44.	<i>Spilanthes calva</i> DC.	Asteraceae	Herb	Tooth ache
45.	<i>Tridax procumbens</i> L.	Asteraceae	Herb	Cure wounds.
46.	<i>Wedelia chinensis</i> (Obeck) Merr.	Asteraceae	Herb	Jaundice
47.	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Shrub	Indigestion
48.	<i>Evolvulus nimmularis</i> L.	Convolvulaceae	Herb	Blood purification.
49.	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Shrub	Carcinogenic treatment
50.	<i>Ipomoea hederifolia</i> L.	Convolvulaceae	Climber	Liver diseases
51.	<i>Ipomoea pes-caprae</i> (L.) R.	Convolvulaceae	Climber	Diuretic and purgative.
52.	<i>Solanum nigrum</i> L.	Solanaceae	Herb	Mouth and stomach ulcer.
53.	<i>Lindernia crustacea</i> (L.)	Scrophulariaceae	Herb	Haemorrhage and jaundice.
54.	<i>Lindernia pusilla</i> (Willd) Bold.	Scrophulariaceae	Herb	Dysentery and intestinal problems.
55.	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Herb	Diabetes, hypertension, sickle cell disease and burns.
56.	<i>Asystasia gangetica</i> (L.) T.	Acanthaceae	Shrub	Respiratory problems.
57.	<i>Blepharismolluginifolia</i> Pers.	Acanthaceae	Herb	Swellings.
58.	<i>Dipteracanthuspatulus</i> (Jacq.) Nees	Acanthaceae	Herb	Skin diseases.
59.	<i>Hygrophilaauriculata</i> (Schum.) Heine	Acanthaceae	Shrub	Diuretic, diarrhea and rheumatism.
60.	<i>Justiciatranquebariensis</i> L.	Acanthaceae	Herb	Leprosy and skin diseases.
61.	<i>Peristrophebicalyculata</i> (Retz.) Nees	Acanthaceae	Herb	Tuberculosis.
62.	<i>Ruelliatuberosa</i> L.	Acanthaceae	Herb	Bladder stones
63.	<i>Gmelinaarborea</i> Roxb.	Verbenaceae	Tree	Gonorrhea, cough, ulcer and head ache.
64.	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	Herb	Wounds, burning sensation and Joint pain.
65.	<i>Stachytarphetajamaicensis</i> (L.) Vahl.	Verbenaceae	Herb	Asthma, blood purification and ulcer.
66.	<i>Vitexnegundo</i> L.	Verbenaceae	Tree	Rheumatism and skin disease
67.	<i>Hyptissuaveolens</i> (L.) Poit.	Lamiaceae	Shrub	Wound healings.
68.	<i>Leucasaspera</i> (Willd.) Link.	Lamiaceae	Herb	Fever, cough, cold and nasal conjunction.
69.	<i>Leucasbiflora</i> (Vahl) R.	Lamiaceae	Herb	Eye disorders.
70.	<i>Ocimumcanum</i> Sims	Lamiaceae	Herb	Cough and cold.
71.	<i>Boerhaaviadiiffusa</i> L.	Nyctaginaceae	Herb	Abdominal pain, anaemia, liver and kidney disorders.
72.	<i>Aervalanata</i> (L.) Juss.	Amaranthaceae	Herb	Snake bites.
73.	<i>Alternantheratenella</i> Forssk.	Amaranthaceae	Herb	Skin inflammation and fever.
74.	<i>Nothosearvabrachiata</i> (L.) Wight.	Amaranthaceae	Herb	Diuretic.
75.	<i>Psilotrichumnudum</i> (Wallich) Moq.	Amaranthaceae	Herb	Wound healings.
76.	<i>Persicariachinensis</i> (L.) Gross.	Polygonaceae	Shrub	Skin diseases.
77.	<i>Periscariaglabra</i> (Willd.) M.	Polygonaceae	Shrub	Inflammation.
78.	<i>Phyllanthusmaderaspatensis</i> L.	Euphorbiaceae	Herb	Tooth ache and purgative activity
79.	<i>Euphorbia serpens</i> Kunth.	Euphorbiaceae	Herb	Stomach ache and intestinal worms.
80.	<i>Amischopacelus axillaries</i> (L.) R.	Commelinaceae	Herb	-
81.	<i>Commelinabenghalensis</i> L.	Commelinaceae	Herb	Fever and leprosy.
82.	<i>Commelinasubulata</i> Roth.	Commelinaceae	Herb	Skin Inflammation.
83.	<i>Cyperusrotundus</i> L.	Cyperaceae	Herb	Dysentery
84.	<i>Bothriochloapertusa</i> (L.) A.	Poaceae	Herb	-
85.	<i>Echinochloacolona</i> (L.) Link.	Poaceae	Herb	-
86.	<i>Eragrostistenella</i> (L.) P. Beauv.	Poaceae	Herb	-
87.	<i>Eragrostisuniloides</i> (Retz.) Nees	Poaceae	Herb	-
88.	<i>Heteropogoncontortus</i> (L.) P. Beauv. ex Roemer &Schult.,	Poaceae	Herb	-
89.	<i>Panicumnotatum</i> Retz.	Poaceae	Herb	-
90.	<i>Paspalidiumgemmatem</i> (Frosskal) Stapf	Poaceae	Herb	Diuretic, laxative, bladder disorders and liver disorders.
91.	<i>Saccharumspontaneum</i> L.	Poaceae	Herb	Obesity, piles and tuberculosis.

Thathamangalam and Chittur. The river irrigates 32,400 ha in the ayacuts of Moolathara, Thembaradaku, Kunnankattupathy, and Narnee. The average rainfall in the river basin is 1828 mm. July experience highest rainfall (525 mm) and almost 29% rainfall in the basin. January receives the lowest rainfall. April is the hottest month of the river basin. The drainage pattern is dendritic.

Data collection: The taxonomic survey of the Sokanasini river basin has been conducted during June 2015 to March 2016 and frequent field trips were made and collected in all groups of plants. The collected plants were identified with the help of Flora of the Presidency of Madras (Gamble and Fischer, 1915-1936), The Flora of Tamilnadu Carnatic (Matthew, 1983), Flora of Palghat District (Vajravelu, 1990), The Flora of Kerala (Daniel *et al.*, 2005) and Flowering Plants of Kerala (Nayar *et al.*, 2006). Further literature surveys to document the plants and

its medicinal uses are analyzed with research articles. Identification was confirmed at the Botanical survey of India, Southern circle, Coimbatore, Tamil Nadu. The herbarium specimens were deposited at the Herbarium of Kongunadu Arts and Science College, Coimbatore-29 (KASCH).

RESULTS AND DISCUSSION

The present study results in the collection of 91 plant species belonging to 72 genera and 30 families were recorded (Table 1). In Dicotyledons are the dominant groups represented by 79 species (86.81%) belonging to 62 genera (86.11%) of 26 families (89.65%) followed by Monocotyledons are small contribution in 12 species (13.18%) belonging 10 genera (13.88%) of 3 families (10.34%).Habit wise analysis indicates, 57 (63%) species are herbs, followed by 26 (28%) species are shrubs, 7 (8%) species are climbers and 1 (1%) tree (Fig. 2).

Table 2. Ten Dominant Families

S. No	Family	No. of Genera	No. of Species
1.	Fabaceae	9	11
2.	Asteraceae	8	9
3.	Malvaceae	4	8
4.	Acanthaceae	8	8
5.	Poaceae	7	8
6.	Convolvulaceae	2	4
7.	Verbenaceae	4	4
8.	Lamiaceae	3	4
9.	Amaranthaceae	4	4
10.	Commelinaceae	2	3

The Fabaceae family was the largest contribution in (9 genera and 11 species), followed by Asteraceae in (8 genera and 9 species) and Malvaceae (4 genera), Acanthaceae (8 genera) and Poaceae (7 genera) are each in (8 species) (Table 2).

The *Sida*, *Hibiscus*, *Crotalaria* are the dominant genera with 3 species each followed by *Cleome* and *Leucas* are respectively each in 2 species. Hence, photographs of the common plants were taken during field visits have been presented as color plates (Plate. 1-3).

The documented plant species are commonly used for tribal and local peoples in various parts of India and Worldwide. Majority of the plant species are used in our ancient system of medicine such as Siddha, Ayurveda, Unani and Homeopathy. We analyze the mostly cited plant species in previous literatures in intestinal disorders (8 species), followed by cough, cold, fever and inflammation (7 species), skin diseases, diabetes and wound healing (6 species) and other diseases are cited in one to three species. Invasive exotic species are dominant population with in all seasons some of the plants like *Chromolaena odorata*, *Parthenium hysterophorus*, *Hyptis suaveolens* and *Alternanthera tenella* cause considerable threat to the native flora.

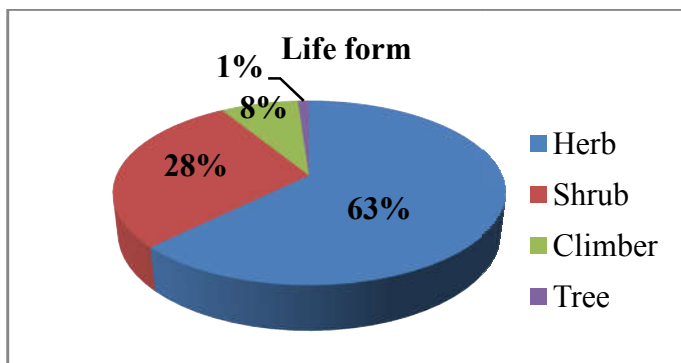
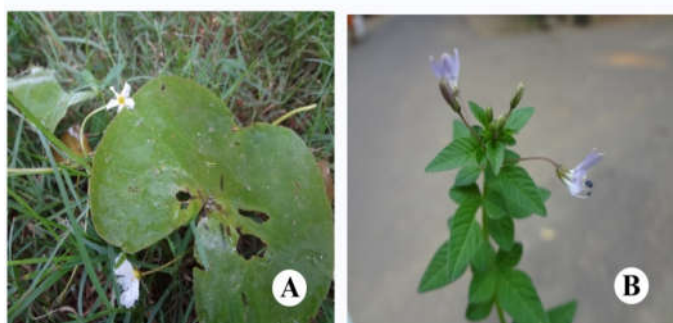


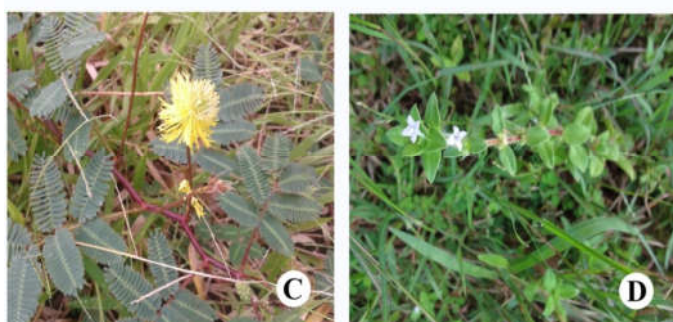
Figure 2. Life form of plants in Sokanasiniriver

PLATE - 1



Nymphaea stellata Burm.

Cleome monophylla L.



Neptunia oleracea Lour.

Spermacoce hispida L.



Eclipta prostrata (L.) L.

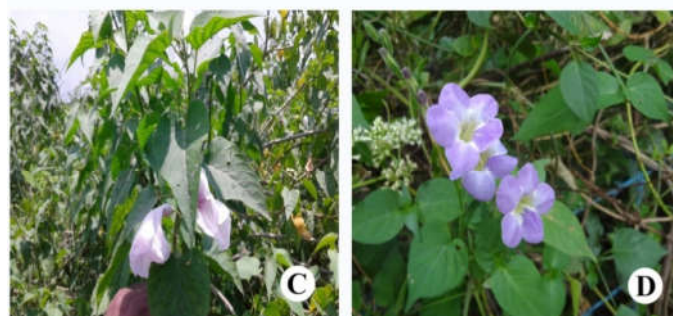
Spilanthes calva DC.

PLATE - 2



Wedelia chinensis (Oebeck) Merr.

Evolvulus nimmularis L.



Ipomoea carnea Jacq.

Asystasia gangetica (L.) T.



Hygrophila auriculata (Schum.) Heine

Phyla nodiflora (L.) Greene

PLATE - 3

*Vitex negundo* L.*Boerhaavia diffusa* L.*Alternanthera tenella* Forssk.*Commelina subulata* Roth.*Cyperus rotundus* L.*Heteropogon contortus* (L.)
P. Beauv. ex Roemer & Schult.

Conclusion

The riparian vegetation in the Sokanasini river basin cover only a limited fraction of their former historical range due to human activities such as river damming, discharge regulation, water diversions, sand mining, agriculture, plantation, urbanization and watershed degradation. Anthropogenic activities such as agriculture and livestock, mining, industry, transportation and communication and urbanization, have caused alteration or degradation of many riparian environments. Hence, to creative community awareness and suitable conservation measures are practical to field and preserve their riparian ecosystems.

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