

ASSESSMENT AND CONSERVATION OF RIPARIAN VEGETATION AND ASSOCIATED BIODIVERSITY OF MEENACHIL RIVER INVOLVING SCHOOL STUDENTS

(Report of the Project supported by Korea Green Foundation)

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1. INTRODUCTION

The 78 km long Meenachil river flows through the Taluks of Meenachil, Vaikom and Kottayam in Kottayam district, Kerala, India (9°42'25"N 76°41'39"E). It has a catchment area of 1272 km². The river is formed by several streams originating from the Western Ghats in Idukki district, flowing from Erattupetta, Palai, Ettumanoor and Kottayam before emptying itself into the Vembanad Lake. The general elevation of the river ranges from 77 m to 1156 m in the high lands and less than 2m in the lowlands and 8 to 68 m in the highlands. The river has a total annual yield of 2349 MCM and an annual utilizable yield of 1110 MCM. Water from this river is being used by thousands of farmers for agriculture purpose. Several places of cultural, religious and tourism importance are in the river stretch. More than 150 drinking water projects, 2 major and 15 minor irrigation projects are active in the river.

Meenachil River is under threat due to the following reasons:

- Water quality has been deteriorated over the years due to pollution and is indicated by changes in acidity, colour, iron and manganese and high presence of coli forms.
- The major source of pollution is municipal sewage, toilet outlets, and agricultural residues, including chemical pesticides, fertilizers and plastics.

The river is dyeing due to the encroachment (both at river and catchment areas); increasing construction at the river banks; pollution of river water and destruction of the river and riparian biodiversity. Sand mining is another major problem faced by this river bed. The total quantity of floodplain mining in the Meenachil river basin amounts to 0.032 x 10⁶ ty⁻¹. Mining in the hillocks also leads to the destruction of the river.

Earlier this river had rich biodiversity of fishes and riparian vegetation. But now, the level of water flow has decreased and the riparian vegetation has been heavily destroyed. Due to the water pollution and low level of water flow, the fish diversity has been depleted.

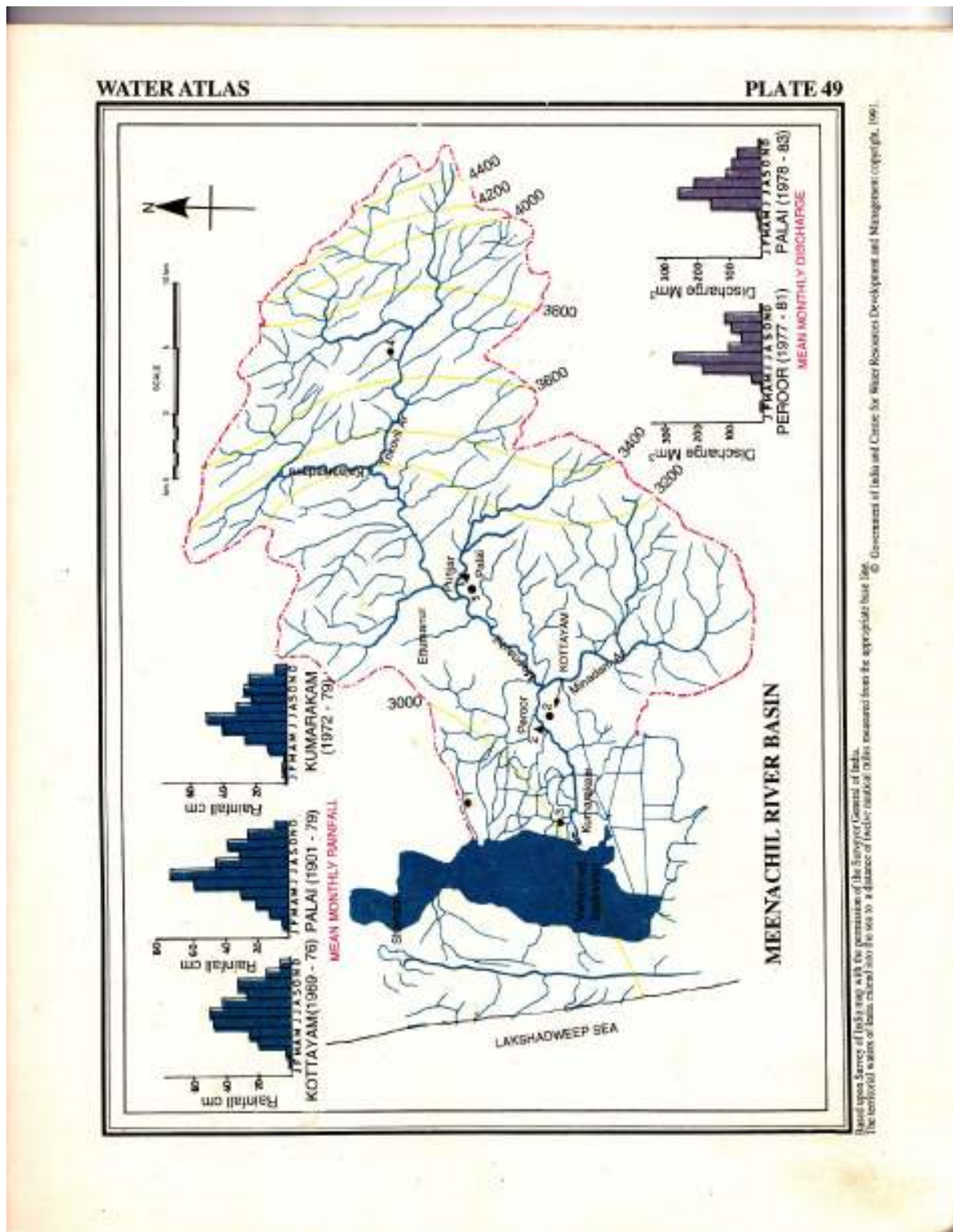
The river basin holds agricultural lands and rubber plantation areas and the usage of fertilizers and insecticides have lowered the natural productivity of the land. During rainy season these chemicals are drowned off into the river. The deterioration of water quality due to the pollution of water and sediment accumulation of heavy metal particles and nutrients or organic materials threatens the survivability of the existing flora and fauna.

Riparian biodiversity comprises of different lives on Earth, including organisms, species and populations. Human beings depend on the river and its biodiversity for food, water, transportation and many other purposes. As it is a basic life supporting system, it is imperative to conserve the rivers for humanity's economic and social development. Prolonged destructive anthropogenic activities are leading to the destruction of the river and its related biodiversity.

Knowledge base of river and the related biodiversity and associated traditional knowledge are being eroded eventually leading to the loss of traditional knowledge. Traditional knowledge comprises extensive knowledge of the practical uses of local natural resources such as medicines, foodstuffs and other personal care products. Therefore, this knowledge should be shared with the local people and our younger generation.

In response, the Convention on Biological Diversity recognized the importance of biodiversity protection and the knowledge related to it. It called for initiatives that promote biodiversity protection and studies related to the same, worldwide. In an effort to identify various species, taxonomic science continues to identify and classify various organisms. Although it named about 1.78 million species, several rare organisms are yet to be identified. In the International Year of Biodiversity (2010), several initiatives have been started to take direct action to reduce the constant loss of biological diversity. The provisions of the Indian Biodiversity Protection Act 2002 require the legal

documentation of local species along with the associated traditional knowledge and practice.



In addition, the reliance of Indian education system on written and theoretical methods of learning has caused a gap in the transmission of traditional knowledge to younger generation, alienating them from their environment. Moreover, traditional knowledge is orally transacted to the next generations, which often go unrecorded. This has left a lack of interest in children to learn traditional knowledge and practices on natural resources from their older generations. A well organized and documented database of the traditional knowledge is imperative for the best utilization, protection and preservation of these resources. Thus, for the biodiversity conservation enhancement, it is necessary to integrate a thrust on biodiversity education in the formal mainstream education system that promotes learning about the biodiversity surrounding their community.

My River My Life (a project to study Meenachil River and its biodiversity) initiated by Tropical Institute of Ecological Sciences, Kottayam and sponsored by Korea Green Foundation, is a step to address this challenge. The role of learning centres to nurture and document diversity is a new idea. It aims at promoting conservation, sustainable use of natural resources and to put forward a method to document associated traditional knowledge. Moreover, it is an endeavour to narrow the gap in the dissemination of local traditional knowledge to upcoming generation to sustainably use, conserve and share equitable benefits from biological resources and its associated knowledge.

The biodiversity register programme called for the active involvement of students and teachers from schools and local people to collect and record data on biological resources and associated traditional knowledge on the river and its biodiversity. This programme offered full support to the selected schools from Kottayam district. Twenty schools from the banks of Meenachil River, Kottayam district were selected for the study. 3 students and 2 teachers were selected as team leaders from each school. As the students and teachers were involved in data collection, they were introduced to diverse flora and fauna in unique ecosystems and were exposed to the diversity of cultural practices of local people.

1.1. Aims and Objectives

Assessment and Conservation of Riparian Vegetation and associated Biodiversity of Meenachil River Involving School Students

- To assess the status of riparian biodiversity of Meenachil river through students from schools in the riverbed.
- To document the biodiversity of the river in the past and present, including related traditional knowledge(TK), and to make a River Biodiversity Register
- To make a school level action plan for improving riparian diversity and river conservation
- To train our students to take up scientific projects
- To develop abilities for understanding the problems of our state, especially related to biodiversity conservation

2. METHODOLOGY

For the project, “*Assessment and Conservation of Riparian Vegetation and Associated Biodiversity of Meenachil River involving School Students*” (My River My Life), 20 schools of Kottayam district from the banks of Meenachil River was selected to study the biodiversity of the river. The participants included students from classes 6th to 11th. The study mainly focused on plants, creepers and trees; fishes; dragonflies and traditional knowledge associated to the river. The teachers and students were trained to conduct the survey at an installation workshop conducted at TIES. The workshop included different sessions led by experts from the field of fishes, plants and dragonflies. Also, the workshop included a session on survey techniques. They were well equipped on participatory research methodology, identification, collection and recording of diverse species. For 3 months students conducted survey in the river banks. Each school was allocated with a fixed length of the river to conduct the study.

A river walk and cleaning campaign was conducted at each school. Each school conducted the activities in different ways that portrayed the importance of conservation of river and created awareness among the public. River walk involved a rally through the banks of the river. Speakers (retired teachers, poets, river conservation officials, fishermen, and politicians) were invited to talk to the students during the river walk. Their talk created awareness among the student about the past and present condition of

the river and the problems faced by the river. The students were enlightened with the traditional knowledge and it also created awareness among the students and public about their responsibility to conserve the river. In the cleaning campaign, schools with the cooperation of the public, cleaned the river banks and planted bamboo saplings. Students and neighbourhood people were allotted with duties for proper maintenance and watering of the saplings.

A consolidation workshop was conducted at TIES campus to present the summary report of the work done by the schools. All schools participated and presented the report on the activities done. All the schools were awarded with momentos and all the participating students and teachers were awarded with separate certificates. Also, 3 selected schools, who took the programme to another level by conducting activities above the expectations of the project plan, were awarded with special momentos.

2.1. Location of Study

40 Km. Long middle stretch of Meenachil River, in Kottayam district, Kerala covering 20 Panchayats, 2 Municipalities and 30 Villages

2.2. List of Participating Schools, Teacher Guides and Students

Sl.No.	School	Name of the Teacher Guide	Name of students Leaders
1	C.M.S.H.S. Olassa	Mary Joseph Asha C. Oommen	Jithin T.J. Sandra Sabu Mayamol T.M.
2	St. Marys H.S.S. Kidangoor	Shyni Philip Jolly V.K.	Jinson P A Naveen Raju Tibin john
3	Govt. H.S.S. Kudamaloor	Krishnakumari P.K. Suma N.D.	Nithyamol N.K. Rahul Krishnan S Devanarayanan N S
4	Muslim Girls H S S Erattupetta	Muhammed Laisal V M M.F. Abdul Khader	Suhana M Ciyad Fiza Mariyam Ameena Asharaf
5	Al-manar Senior Seondary School	Charles T. George	Muhammed Rafi V A
6	Govt. U.P.S. Arumanoor	Sulochana K.K. Ansamma Joseph Shiby John	Anakha Prasanth Blessy Sabu Adithya Ajith
7	Excelsior English School, Illickal Kottayam	Beena Harilal	Sarah Maria Alex Anjali Joshi

			Safreena Nazeer
8	NSS HSS Kidangoor	Parvathi S. Krishna Rajasree S L	Aneena George Surya Archana P.
9	St. Sebastians U.P.S. Peroor	Tomy Joseph Jacob Chandy	Abin Biju Jobit C Abraham Alitta Tomy
10	Chavara Public School, Pala	Jojo Thomas Geetha Prakash	Karthik Rajagopal Irene Anne Prakash Parthiv Krishna
11	Holy Cross School, Aymanam	Emily M.K. Soumya K.C.	Athira Shibu Adithya C V Muzammil K. Siyad
12	P.E.M.H.S. Thiruvanchoor	Nisha Susan Mathew Roy P George	Elvin Jacob Korah Tom V Paul Anandhu Pradeep
13	DVVHSS Kumaranalloor	Resmi K.S.	Harsha Devan K N Bibin B Abhimanue P S
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2.3. Areas of Research Study

Tax Studied Include:

1. Plants, creepers and trees
2. Fishes
3. Dragonflies

3. RESULTS

3.1. FLOWERING PLANTS, TREES AND CREEPERS

The survey conducted by the students on the banks of Meenachil River identified 93 types of flowering plants, trees and creepers. The study recorded the local name, scientific name, its main uses, its availability and the traditional knowledge associated to each. The list of plants, trees and creepers identified with their local name, common name, scientific name, local condition and uses are given in **Table 3.1.1** **Table 3.1.2** shows the traditional knowledge related to each of them.

Sl. No.	Malayalam Name (Common Name)	Common Name	Scientific Name	Main Use	Local Condition
1	Aal	Banyan tree	<i>Ficus sp.</i>	Homestead plant and wild plant	Abundant
2	Aatha	Custard Apple	<i>Anona squamosa</i>	Food	Rare
3	Aavanakku	Castor	<i>Ricinus communis</i>	Medicine	Rare
4	Adakka	Areca Nut Palm	<i>Areca catechu</i>	Chewing	Abundant
5	Adalodakam	Malabar Nut	<i>Justicia adhatoda</i>	Cure cough	Common
6	Anachunda	Turkey Berry	<i>Solanum torvum</i>	Food	Rare
7	Anjili	Wild Jack	<i>Artocarpus hirsutus</i>	Furniture, Fruit, Smoked to avoid mosquitos	Common
8	Arali	Nerium	<i>Nerium oleander</i>	Medicine	Rare
9	Aryaveppu	Neem	<i>Azadirachta indica Juss</i>	Medicinal properties; Used to make soap, paste and oil; kill germs	Rare
10	Ashokam	Ashoka tree	<i>Saraca asoca</i>	Medicine	Common
11	Avanakku	Castor oil plant	<i>Ricinus Communis</i>	Anti inflammatory	Rare
12	Chamba	Rose apple	<i>Syzygium jambos</i>	Food	Common
13	Chandanam	Sandal	<i>Santalum album Lin</i>		Rare
14	Cheera	Amranthus	<i>Amaranthus sp.</i>	Food	Common
15	Chembarathy	Hibiscus	<i>Hibiscus roosasinensis</i>	Homestead plant	Abundant
16	Chembu	Colocasia	<i>Colocasia esculenta</i>	Food	Common
17	Chena	Elephant foot yam	<i>Amorphophallus paeoniifolius</i>	Food	Common
18	Cheroola	Mountain Knot Grass	<i>Aerva lanata</i>	Kidney Disease treatment	Common
19	Chethi	Ixora	<i>Ixora coccinea</i>	Offerings, Decoration, Medicine	Common
20	Chithirapala	Asthma plant	<i>Euphorbia hirta linn</i>	Medicine	Common
21	Cocco	Cocoa tree	<i>Theobroma cacao</i>	To make chocolate	Abundant
22	Communist Pacha	Siam Weed	<i>Eupatorium perfoliatum</i>	Cures wound	Common
23	Eentha pana	Queen Sago	<i>Cycas cinalis L.</i>	Fruit	Rare
24	Eetti	East Indian Rose	<i>Dalbergia latifolia Roxb.</i>		Rare
25	Erukku	Madar	<i>Calotropis gigantea</i>	Rhumatic pain, Medicine	Abundant
26	Inji	Ginger	<i>Zingiber officinale</i>	Food	Abundant
27	Jathi	Nut mug tree	<i>myristica fragrans</i>	Spice	Abundant
28	Kadaladi	Prickly chaff flower plant	<i>Achyra thea aspera</i>	Skin disease, Medicine	Common
29	Kantharimulaku	<i>Capsicum frutescens</i>	Homestead and wild plant	Abundant	Common
30	Kappa	Tapioca	<i>Manihot esculenta</i>	Food	Common
31	Kappalam	Papaya	<i>Carica papaya</i>	Food	Abundant
32	Karinochhi	Vitex Negundo	<i>Vitex negundo</i>	Medicine	Rare
33	Kariveppila	Curry Leaves	<i>Murraya koenigii</i>	Ingredient in curries	Abundant

34	Kashuvandi	Cashewnut	<i>Anacardium oxydental lin</i>	Food	Common
35	Kattarvazha	Aloe vera	<i>Flacourtia Jangomas</i>	Medicine	Common
36	Kayyonni	Trailing eclipta	<i>Eclipta prostrata</i>	Medicine – Skin disease, nausea; To make oil;	Rare
37	Keezharnelli	Hazarmani	<i>Dioscorea Pentaphylla</i>	Medicine (Jaundice)	Rare
38	Koval	Ivy gourd	<i>Coccinia grandis</i>	Food, Medicine	Common
39	Koonam pala	Tabernaemontana	<i>Tabernae montana dichotoma</i>	Cures whitlow	Common
40	Krishna Tulsi	Basil	<i>Ocimum sanctum</i>	religious and medicinal purposes, and for its essential oil	Common
41	Kudakan	Indian pennywort	<i>Centella asiatica</i>	Vitamin deficiency	Rare
42	Kudangal	Indian pennywort	<i>Centella asiatica</i>	To treat varicose veins and chronic venous insufficiency and in ointments to treat psoriasis and help heal minor wounds	Rare
43	Kumbalam	Ash gourd	<i>Benincasa hispida</i>	Food	Rare
44	Kurumulaku	Pepper	<i>Piper nigrum</i>	Food, Spice	Abundant
45	Kurunthotty	Indian hemp	<i>Sida rhombifolia</i>	Anti inflammatory	Common
46	Maavu	Mango	<i>Mangifera indica</i>	Food, Fruit	Abundant
47	Mahagoni	Mahogany	<i>Swietenia mahogani</i>		Common
48	Mandaaram	White Orchid Tree	<i>Bauhinia tomentosa</i>	Offerings, Decoration	Common
49	Manja Kayyunni	Wedelia calendulacea	<i>Wedelia calendulacea</i>	Medicinal properties	Common
50	Maruth	Marudah	<i>Terminalea sp.</i>	medicine	Abundant
51	Mathan	Pumpkin	<i>Cucurbita maxima</i>	Food	Common
52	Menthonni	Glory lily	<i>Gloriosa superba</i>	Rhumatic pain	Rare
53	Thottavadi	Sensitive plant	<i>Mimosa pudica</i>	allergy, asthma, menstrual problems, hemorrhoids, premature ejaculation, hypertension, cholesterol, snake bite	Common
54	Moovila	Salaparni	<i>Pseudarthria viscida</i>	Medicinal properties	Rare
55	Mukkutti	Better stud	<i>Biophytum sensitivum</i>	Prevents sneezing; Cure wounds	Rare
56	Mula	Bamboo	<i>Bambuseae</i>	To make decorative items	Common
57	Murian Pacha	Goat weed	<i>Ageratum conyzoides</i>	Germicide	Rare
58	Muthanga	Nut grass	<i>Cyperus rotends</i>	Medicine	Rare
59	Nantyarvattam	East Indian Rosebay	<i>Tabernaemontana coronaria</i>	Red eye, Medicine	Common
60	Nelli	Indian Gooseberry	<i>Phyllanthus emblica</i>	Medicine, food (Good for hair growth and weight loss)	Rare
61	Njottanjodiyam	Sunberry	<i>Physalis minima Linn.</i>	Medicinal properties	Rare
62	Orucheviyam		<i>Emilia sonchifolia</i>	Medicine	Rare
63	Pacha cheera	Amaranathus	<i>Amaranthus sp.</i>	Food	Abundant
64	Pachamulaku	Green chilli	<i>Capsicum annum</i>	Food	Abundant

65	Pachila	Patchouli	<i>Pogostemon patchouli</i>		Rare
66	Pana	Date palm	<i>Pheonix dactylifera</i>		Rare
67	Panal	Ban Nimbu	<i>Glycosmis pentaphylla</i>	Germicide	Rare
68	Pani koorka	Indian Rock Foil	<i>Plectranthus amboinicus</i>	Medicine (Cough, Sore throat)	Common
69	Paval	Bitter gourd	<i>Momordica charantia</i>	Used to cure diabetes, Food	Common
70	Pera	Guava	<i>Psidium</i>	Food	Common
71	Peraal	Banyan tree	<i>Ficus benghalensis</i>	Medicine	Common
72	Peringalam	Clerodendrum	<i>Clerodendrum viscosum</i>	Germicide	Common
73	Plavu	Jack Fruit	<i>Artocarpus heterophyllus</i>	Food	Common
74	Pudina	Mint	<i>Mentha arvensis</i>	Food, Medicine	Common
75	Rajamalli	Peacock Flower	<i>Caesalpinia pulcherrima</i>	Scent	Rare
76	Rambuttaan	Rambutan	<i>Nephelium lappaceum</i>	Fruit	Rare
77	Ramathulasi	Sweet basil	<i>Ocimum basilicum</i>	Medicine	Common
78	Robusta	Banana	<i>Musa sp.</i>	Food	Rare
79	Rubber	Rubber	<i>Herea brasiliensis</i>	Firewood	Abundant
80	Shankhu Pushpam	Butterfly pea	<i>Clitoria ternatea</i>	Medicine	Common
81	Thakkali	Tomato	<i>Solanum lycopersicum</i>	Food	Common
82	Thazhuthama	Spreading Hog weed	<i>Boerhavia diffusa Linn</i>	Medicine	Abundant
83	Thekk	Teak	<i>Tectona grandis</i>	Homestead and wild plant	Common
84	Thengu	Coconut tree	<i>Cocus nucifera</i>	Prepare oil, make products, prepare food	Abundant
85	Thottavadi	Tickle-me plant/Touch me not	<i>Mimosa pudica</i>	Medicine	Common
86	Thumba	Thumbe	<i>Leucas aspera</i>	coughs, colds, toothaches, and abdominal pains	Abundant
87	Tulsi	Basil	<i>Osimum sanctum</i>	Medicine for fever, cough; Used in temples	Common
88	Undu Mulaku	Chilli	<i>Capsicum annum</i>	Spice	Abundant
89	Ummam	Datura	<i>Datura metel</i>	Medicine	Rare
90	Vathamkolli	Black Vasa	<i>Justica gendarussa</i>	Medicine for Rhumatics	Rare
91	Vatta	Gum plant	<i>Macaranga peltata</i>	Wildplant	Abundant
92	Vazha	Plantain	<i>Musa sp.</i>	Food	Common
93	Vazhuthana	Brinjal	<i>Solanum melongena</i>	Food	Common

Table 3.1.1: Observed Flowering Plants, Trees and Creepers

Sl.No.	Malayalam Name (Common Name)	Traditional knowledge (if any)
	Aal	It will grow as a giant tree with several branches.
	Aatha	Its seeds are used to sow Its fruit is very delicious and can be eaten. It has more fleshy part in its fruit.
	Adakka	It prevents stomach related diseases.
	Adalodakam	It is a medicinal plant. Eating its juice along with egg is a good remedy for asthma.
	Anachunda	
	Anjili	Has high commercial value. Its wood is used for making furniture. Its fruit is eatable. Its seeds are fried and used to eat. It is tasty.
	Arali	Seen in arid regions; it enhances blood circulation in heart and helps to remove blocks in lungs.
	Aryaveppu	A good medicine for cough, eczema, and skin diseases. It is an ingredient of several medicines and is used for steam bath. It purifies blood.
	Ashokam	There is a proverb, " <i>Ashokam nikkunnidattu shokam undakilla,</i> " meaning there won't be any unhappiness where Ashokam stands. Thoran (a traditional Kerala cuisine) made of Ashokam flowers gives relief from bleeding. It also helps to have a regular menstruation in women. Its decoction is good for diseases related to women; an ingredient in herbal hair oils; good for skin diseases; good for phlegm, biliousness and vomiting. It stays green always. It is used as a medicine for biliousness, injury, dysentery, poison etc. Its skin is used for herbal syrup which is good for sore throat. Good for eczema and erysipelas
	Avanakku	Its root herbal syrup with butter is good for constipation. Drinking coconut water mixed with its leaf (10gms) is good for jaundice. Good for arthritis, biliousness, inflammation, diarrhoea, stomach ache, intestinal worms, and urinary infections. It is also used for industrial purposes
	Chamba	Its fruit is eatable. It is a commonly seen tree here. It is used to prepare pickle and <i>thoran</i> , a traditional curry of Kerala.
	Chandanam	The wood is famous for its fragrance. Also, oil is being extracted from the wood for use and the oil has a good fragrance.
	Cheera	Its stem and leaves are used for cooking.
	Chembarathy	Its flower juice is a good medicine for fire burns. Applying juice prepared from tender hibiscus leaves and flowers on head removes dirt from hair and gives relief from dandruff and lice. It will also enhance hair growth, blackens hair and prevent greying of hair. Its flowers are also used to make <i>thoran</i> (a traditional Kerala cuisine) and cool drinks. It is an ingredient in ayurvedic hair oils and shampoos; good for hair growth. It is mixed with custard oil and given to cows soon after the delivery. Its flowers are sometimes used to make curries.
	Chembu	Once the matured tubers are harvested, the culm, which is called <i>thada</i> in Malayalam, is kept until it sprouts. Then, it is divided into smaller parts and planted in smaller furrows. Cow dung powder and dried leaves are also inserted in the furrows before it is covered with soil. Within 4 weeks, it will grow leaves. It is

		good to apply chemical fertilizer after the plant grows a little. No need of pesticides. When the leaves begin to ripe (probably in the 10th month), it should be harvested. At this point, seeds are collected. Colocasia is used to make traditional cuisines such as <i>thoran</i> , <i>sambar</i> , and <i>puzhuku</i> . It is not a good food option for people who have gastric troubles. Its leaf is nutritious. Its leaves and stems are used to make <i>thoran</i> , a traditional cuisine. Certain colocasia species has medicinal properties. It is able to cure intestinal diseases such as ulcers.
	Chena	The harvested tubers are covered with cow dung and kept near fire hearth until it begins to grow buds/shoots. Then the tuber is divided into small parts and cultivate separately in holes with less depth but enough width. These holes are filled with cow dung powder, fertilizers and dried leaves before it is covered with soil. Within 1 or 2 months, the shoot grows bigger and spread out. The tuber can be harvested in the 3rd or 4th month of farming date. It is believed that <i>chena</i> is tastier in Karkidakam, last month of Malayalam calendar. There is a proverb that, " <i>Kattengilum karkidakathil chena thinnanam</i> ," which means one must eat yam in <i>Karkidakam</i> , if you don't have one you should steal and eat. Various dishes are prepared from yam. It has medicinal use for several stomach diseases. The harvested tubers are covered with cow dung and dried, before they are used for planting.
	Cheroola	It is good for diseases like asthma, cough, kidney stone
	Chethi	Taking shower in boiled water of ixnora branches and roots gives relief from crysipelas. It is used in worship rituals, decoration, and to prepare herbal hair oils. It is used to make herbal hair oils. It also gives relief from body pain and wounds. Using its leaves and flowers juice as eye drops is good for eye. Good for skin diseases. Can be used as a shampoo to control dandruff. It is of two types: medicinal ixora and flowering ixora. All parts of this plant are used for herbal medicines. It is very commonly found in our region.
	Cocco	Its seeds have less life span.
	Communist Pacha	It got its name "communist pacha" because it was mainly seen in a communist country earlier. Its extract is applied on wounds; it helps heal the wound quickly.
	Eentha pana	Helps to attain a healthy body.
	Eetti	Used for making furniture and instruments (guitars, recorders), pens etc.
	Erukku	Good for arthritis and skin diseases; its resin can be dripped on skin to take out thorns struck in skin. It is good for snake poison. It is a main ingredient in <i>Kaashoraditailam</i> , <i>Naagaraditailam</i> etc. Its resin is good for disease caused by worms. Children use its tender as "appoppanthadi", It is a bushy plant; good for skin diseases, eczema, intestinal worms etc. It is good for skin disease. Firstly, its skin needs to be grinded properly and cover it with grinded mustard. Then, it has to be covered with soil and heat it. After some time, when it becomes cold, mix the extract in mustard oil and apply on skin. Application of its latex on decayed tooth hole will give relief from tooth ache. It is good for skin diseases such as eczema and erycipelas. It is also good for

		snake poisoning. It is a natural bio pesticide.
	Inji	Sprouted seeds are sowed in small pits; cow dung and chemical fertilizers are also applied for its growth. It will grow within 4-5 weeks. From mature plants, its tubers are separated when it dries after ripening. Its tuber can be used when it is unripe or dry. It is an essential flavour in curries and has medicinal value. Eating ginger with salt is good for gastric problems. It is good for stomach and chest diseases. It is dried and used as another spice. It is good to mix with coffee. It is a rhizome. It is also used in food items and medicines as a flavour.
	Jathi	It is a dioecious plant. Fruits are available throughout the year. It is a spice which is used as a flavour in both food items and medicines. Its seed is good for stomach ache; its aril (mace of the nutmeg) is used as a spice. The seeds from ripen fruits are separated and is kept in separate pots. Essential fertilizers and water is provided for its growth. After 4-5 years, only the female plant starts flowering. Cow dung is good for its growth. Its skin is used to prepare chutney, pickle etc. Its seed is a medicine, and its outer fleshy covering is used to make pickles.
	Kadaladi	Applying the extract of its fruit and seed is good for snake bites.
	Kantharimulaku	Seeds from ripen fruits are dried and sowed in soil. Water is sprayed for its quick sprouting; it is also taken care from ants and birds eating it. Once it sprouts (after 3-4 days), its seedlings are sowed in a suitable environment by providing water and fertilizers. It is used in food items and in ayurvedic medicines. It is used in food to get pungent taste. It helps to reduce cholesterol.
	Kappa	Application of grinded tapioca leaves is good for burns from fire. A panacea for many diseases.
	Kappalam	Seeds from ripen fruits are dried and sowed in soil. It will sprout within few days. Ash is a good fertilizer for its growth. It does not need any extra care for its growth. Its fruit is eatable and is also used in cooking (<i>Avial, Sambar, Pickle, and Thoran</i>). Eating this fruit is a good treatment for intestinal worms. Fully ripe fruit can be used for herbal facial. Its leaves and stems are used to make flute toys.
	Karinochhi	Drinking 5 mg Karinochhi yellow curd curry is a good remedy for malaria. It can be planted as hedges; Good for arthritis, measles etc. Gargling with its kashaayam is good for oral cancer and throat pain.
	Kariveppila	It is used as an ingredient in many herbal medicines. New plants are grown from both roots and seeds. It grows from the roots of mature plants. Its leaves are used for medicines and food items. A common plant in this part of the region. The seedling that grows around mature plant is taken out and planted in suitable soil (all kinds of soils are not suitable for its growth). It is used in curries as it gives a special flavor. It is also an ingredient in ayurvedic hair oils. This hair oil is good for hair growth and black color. It is believed that if its seedlings are stolen and sowed, it will grow quickly.
	Kashuvandi	Taking bath in water boiled with its skin is good for arthritis and tinea pedis. It is not good for gastric patients.

Kattarvazha	Its oil is good for dandruff; its fleshy stalk is used as an ingredient in ayurvedic treatment for cancer. Helps improve skin beauty, helps control temperature. Applying grinded aloe vera on head will increase hair growth. Good for children's skin diseases; according to ayurveda, it is considered as a medicine for most of the women diseases. It is a bushy plant; it is good for cough, arthritis etc. it enhances the blood vessels in uterus. Its herbal oil is applied on hair to control lice. Ingredient in cancer medicine, good to make herbal oil for hair growth and color. Uses as medicine for wounds and dandruff, to cure whitlow. It gives relief from phlegm, bilious and arthritis diseases.
Kayyonni	A famous medicine. It's good for skin, hair and tooth. Its herbal oil is applied on hair to control lice
Keezhanelli	It is seen common in arid areas. Good medicine for jaundice, urinary infection, kidney stone, diabetes, stomach pain, menstrual cramps, liver disease, phlegm and bilious diseases. It helps in blood purification. It is commonly seen in house orchards; its leaves are similar to tamarind leaves. It is good for diseases like cough, diarrhoea etc. Good for hair growth and hence used as an ingredient in herbal hair oils. Good for stomach pain, indigestion, bleeding etc. Drinking yogurt with its extract is good for dysentery. Applying grinded kizhikanelli roots and branches could give relief from several disease that affect reproductive organs. In addition, herbal hair oil made of kizhukanelli enhances hair growth and reduces baldness.
Koval	A medicinal plant; has two types of guards: bitterly ivy guard and non bitterly guard. It is a climber that climbs up with its tendrils. It has comparatively less diseases and pests; thus, it is commonly grown in this part of the region. Stems from mature plants are planted, which will sprout within 1 week. When its vine starts growing, stems should be given to support these vines. Essential fertilizers should be given while it grows. When its fruit grows, it is used to cook. It is believed that according to mythology, its first name was <i>Govak</i> . It is all season harvesting vegetable.
Koonam pala	Applying its latex on agnails twice or thrice a day will give relief. Its latex is applied to take out thorns from skin.
Krishna Tulsi	All its parts have medicinal values. Applying Tulsi leaves on head before sleeping will give relief from lice. Taking shower everyday in boiled water of tulsi leaves and Indian borage (<i>panikoorkka</i>) will prevent fever. It is good for cough. It does not have attractive flowers. It is also used in herbal medicines. It is a very commonly found plant.
Kudakan	Is a good memory enhancer. It has anti bacterial, anti viral and anti parasitic properties. Also, it has anti-inflammatory properties that can cure Rheumatism and Arthritis.
Kudangal	It helps in curing wounds and is good for stomach. It is good medicine for biliousness, mental retardness and piles. Roots come out from its stem and thus new plants are grown. It is boiled and is kept on throat for throat pain, cold and cough. It is usually seen in wet and cold places; a tea spoon of leaf juice with butter is good for children's mental ability and immunity power. Use to make pickle and used as a thirst quenching herbal

		product. When boil appears on skin, pancake made of its leaves are given to eat. Saliva is put on its leaves and stucked on boils. Grinded leaves are applied on cheek for tooth ache.
	Kumbalam	It is a climber that climbs up with its tendrils. It can be used to cook. It is good for diseases such as arthritis and biliousness. It helps to reduce stomach problems, epilepsy and lung diseases. It also increases physical strength. It is one of the main items cooked during Bali (solemn offerings to the departed souls). Medicinal Use: its extract is good for piles treatment. Good for diabetes; Seeds of ripen fruits should be dried and grinded; then drink hot water mixed with this powder for intestinal worms.
	Kurumulaku	A spice; mixture of pepper powder and thulsi is good for cough. For toothache, pepper powder and salt can be used as toothpowder. Mixture of pepper and dried ginger mixed in coffee is good for fever. It is known as black gold. There is a saying that "Kandal kurudan, kaashinu midukkan" which means that even though it is very small, it is very expensive. It is a cash crop and is used as spice in food items. It is not commonly cultivated in fields as in earlier days.
	Kurunthotty	It is used to prepare herbal hair oils. Its root extract mixed with ginger juice is good for fever. It is an ingredient in most of the ayurvedic medicines. Water boiled with its root extract is good for arthritis. Its herbal oil is applied on hair to control headache. It is a bushy plant; decoction is made out of its leaves to cure severe headaches. Decoction of <i>Karinochi</i> , <i>Kurunthotti</i> , <i>Indrayavam</i> and <i>garlic</i> is good for arthritis.
	Maavu	There various types of mangoes. Both raw and ripped mangoes are eaten. Mangoes are also dried and kept for several purposes. Its leaves were used to brush teeth. Its wood is used to make home utensils and for cremation. Its seed are dried to make flour. It commonly blooms from January to May. It is a very common tree in Kerala. Mango is known as the "King of fruits."
	Mahagoni	It was introduced in Indian in the beginning of 1870. Its timber has high monetary value.
	Mandaaram	Used in worship rituals.
	Manja Kayyunni	A creeping herb with medicinal properties
	Maruth	Its leaves are used for various medicinal purposes
	Mathan	Seeds of matured pumpkin are washed and dried under sunlight. Then, they are planted in small soil basins. Soil moisture need to be maintained for the plant growth. Application of cow dung will support plant growth, and a small amount of pesticide can be applied too. Pumpkin is eaten raw and cooked as curry. It is said that eating pumpkin helps to remove tobacco stain from lungs. It fastens digestion. It is good for phlegm, arthritis and gastric problems.
	Menthonni	It cures skin diseases; antibacterial properties; eases abdominal pain; treatment for piles and chronic ulcer. The tubers are used against snake bite; cure cancer; cure kidney problems and leprosy.
	Thottavadi	It can used to cure swelling, wounds, piles, insect bites and premature ejaculation.
	Moovila	It is used to treat asthma and nervous dysfunction.
	Mukkutti	It has small flowers. Good to cure wounds. It is used for

		medicinal purposes by old medical practitioners.
	Mula	Plant parts are used to make artisan products and musical instruments. Soup made of bamboo rice is a medicine.
	Murian Pacha	It is an insecticide and nematicide. It has limited uses due to its toxicity.
	Muthanga	Tender plant is grown from its tubers. It grows in low land areas or in marshy fields. It belongs to grass family. Ingredient in herbal hair oils. Taking bath in water (in which its leaf has kept for long) is good for cheerfulness. Intaking 5 gram dried powder of its tuber wither with milk, sugar or honey is good for indigestion. Its tuber has abundant water content. Good for stomach diseases. It is also good for dysentery and intestinal worm. Medicine for fever, intestinal worms, thirst, fever, kidney stone, and diarrhea.
	Nantyarvattam	Using clear water in which its flower was kept is good to wash face, for eye diseases. Apply the viscous milky juice that comes out while plucking the bud of white East Indian Rosebay on eyes; it gives relief from Conjunctivitis.
	Nelli	Its seeds are good for asthma. Its juice is good for diabetes. Earlier this plant was not very common. It does not produce many fruits. Its fruit contains vitamins and it is a medicine. It contains Vitamin C; it is lost while boiling.
	Pacha cheera	Since spinach contains Vitamin A. It enhances new cell growth, protects skin and eyes. It also boosts immune, digestive and excretory system in human body. It gives relief from diseases related to biliousness, phlegm, urinary infection, kidney diseases etc. Including spinach cuisines in daily life also helps to have good sleep.
	Pachamulaku	Seeds from ripen fruits are dried and sowed in soil. Water is sprayed for its quick sprouting; it is also taken care from ants and birds eating it. Once it sprouts (after 3-4 days), its seedlings are sowed in a suitable environment by providing water and fertilizers. It is used both in food and medicines.
	Panal	Extract of its leaf is good for swelling and pain due to diseases like chikungunia. Bathing children in water that has crushed leaves in it is good to prevent black on them. Good for smallpox and headache.
	Pani koorka	Drinking boiled water with Pani koorka leaves will give relief from fever. Drinking its juice mixed with honey is good for fever and intestinal parasites. Its extract is used as ingredient in oils for fever and cold. Its leaf in boiled water is good to foment for cough, common cold and fever. Good to control lizards and snakes. It also gives relief from urinary infection and stomach ache. It is also a natural bio pesticide.
	Paval	Its juice is good for diabetes. Its ripen seeds are taken and its seedlings are separated from it. This seedling is washed using ash and then dried under sunlight. Then, it is preserved in a cloth under smoke. One day before sowing, it is kept in water and then in a wet clothe. Later, its sprout will come out of the seedling and then it (3-4 sprouts) is sowed in the soil. After 2, 3 weeks its vines are supported using stems of other plant. Its fruit is used to cook pickle, curries etc. It is also used in decorations. It is a climber that climbs up with its tendrils. Its

		leaves are also used as medicines. Moreover, its leaves are very nutritional. This vegetable can be dried and saved for future use. It has medicinal value.
	Pera	It is a nutritional plant. Its leaves have medicinal properties. It contains abundant Vitamin B. Its seeds are used to sow. Drinking boiled water with its new leaves is good for diabetes and is used for drinking purposes.
	Peraal	It will grow as a giant tree with several branches.
	Peringalam	Clerodendrum leaves are used as bath scrubbers while having eczema. Mixture of its tender leaves and calcium carbonate is good for wounds. But the medicament should not be allowed to wet during the application. It is also used as medicine for erysipelas.
	Plavu	Its fruit is eaten as raw, cooked and fried. Its seeds are used to prepare curries. Its ripe fruit are used to make traditional snacks called Kuple and also jam. Its leaves are given as food to goats. If jackfruit is fried with jagger, then it can keep for a long time. Jackfruit's seed (with its skin) is used in curries; it is good for cancer. Chakkappada (transparent lining of seed) - can be fried like chips. Koonjil (the white part above the fruit) - to make pickle. Tender jackfruit is used to prepare curries.
	Rajamalli	Orange and yellow flowers, beautiful scent, attractive, big flowers
	Rambuttaan	Its fruit is delicious. It is a homestead plant which is seen more than earlier. It produces lots of fruits. Its ripen fruit can be eaten. Earlier, it was not commonly cultivated.
	Ramathulasi	Drinking tulsi flower juice and honey will give relief from common cold. Its leaves are mosquito repellent.
	Robusta	Sprouts usually grow from the culm of matured plantain plant bearing fruits. After the fruit is harvested, those small plants are separated without harming its roots and planted in furrows. The furrow is filled with dried leaves and cow dung before it is covered with soil. The upper part of the seedling should not be covered with soil. The plantain plant will produce fruit by six months, which should be harvested once it is matured.
	Rubber	Rubber is used to make bags, tyre, rubber band etc.
	Shanku Pushpam	Its root extract mixed with butter can be taken in the morning before breakfast. It is good for wisdom, strength and mental ability. Good first aid for cobra's poison. Its roots are good for wounds and cough. It also gives relief from ear pain. It is also used as biofertilizers and bioinsecticides. It is used for enhancing intelligence, memory, physical strength and as a remedy for fever. Drinking its root with milk is good for constipation. Equivalent to 10 air conditioners. It has antiviral and antibacterial qualities.
	Thakkali	It is used as an ingredient in curries and also to prepare sow. It does not need any extra care for its growth. It is commonly seen now than earlier. Its fruit is an eatable item.
	Thazhuthama	Good for swelling, bruise and pain. Its root extract mixed with oil is good for dizziness. Its leaf curry is good for eyes. It is usually seen as a weed growing on abundant lands; it is used as a medicine for rabies, urinary infection, skin diseases,

		constipation and cough. It helps in curing wounds; good for stomach.
	Thekk	It is known as " <i>the Kings of trees</i> ."Its timber has high economic value, since it can be used to make furnitures and building houses.
	Thengu	It is one of the commonest trees in Kerala. It has high commercial value and some people make their livelihood out of it. Its fruit is used in both food items and medicines. Its leaves are used to make traditional roofing; wood for furniture and pillars; other parts as firewood; its flower is used in herbal medicines for skin nutrition and bone strength. Hot coconut oil mixed with honey is good to improve mental ability of children below 5 years. Its water is also used to make food items. Planting arrow root in the same furrow of coconut samplings will prevent attack from ants. Coconut is used in curries and its leaves are used to make broom. Coconut flowers are used for auspicious ceremonies such as marriages and house warming.
	Thottavadi	It is also a remedy for thirst, shortness of breath, phlegm and blood purification. Grinded leaves are applied on wounds. It is used to prepare medical decoction. Applying grinded leaves on head will give relief from head ache. Keeping grinded root mixture in mouth for a while will give relief from mouth ulcers and throat pain. Eating it with goat milk is a good remedy for diseases related to respiratory and phlegm diseases. Good for stomach diseases and is an ingredient for herbal hair oils, which is good for headache. Its root extract is good for sprain and bruise. Its extract is usually applied to heal the wound. In Sanskrit, it is called as "Sparsamsakopa." It is a good medicine for diabetes. It prevents thirst, cough etc. Medicine for sprain, biliousness, intestinal parasite and diabetes.
	Thumba	Prepare boiled coconut oil or ghee using either with thumb leaves, thumb tender leaves or betel leaf, which is good for agnail. In case of cold, its clear extract can be used as nosedrops. It is also good for stomach diseases. Its juice is good for stomach diseases; applying its juice mixed with tamarind is good for scorpion poison. It grows commonly on abundant lands as weeds. It is good for fever like diseases. It has antiseptic properties. Good for Intestinal parasite, cold and cough.
	Tulsi	It is used against the poison of scorpion, spider, and snake. Daily consumption of 15 ml Kattu Tulsi juice is a remedy for malaria. An ingredient in ayurvedic hair oils and good for cough. Bluish-green leaves have more medicinal value. Its leaf juice is good to apply on conjunctivitis. Good to apply on head scalp for lice removal; its oil is good to apply on whitlow; good for headache and cold. Medicine for <i>vasoori</i> and chicken pox. Mixture of tulsi leaves and turmeric is used as medicine for poisoning. Putting tulsi leaves on head before going to bed will reduce lice on head. Medicine for jaundice. Its leaves are grinded and applied on wounds. It has natural antiseptic properties. It is used a remedy for fever, intestinal worms, and phlegm. It is good for heart disease and lung diseases.
	Ummam	Good for arthritis and stomach ache. It is good against rabies poison. Spasmodic contraction of muscles in lungs. Good for

		hair growth and helps to control hair loss. Good for asthma and arthritis.
	Vathamkolli	Good for migrane and sneezing.
	Vatta	Its leaves are used to serve food. Its gum is used to paste paper.
	Vazha	It is a fibrous fruit; can be used in cooking. Different food items that can be made are: <i>Pulissery, Halwa, Cake, Neyyappam, and Thamukku</i> . Its seedlings below the plant are used to grow new plants. These seedlings have to be given fertilizers for three times. It is a medicinal plant. Its fruit is delicious. Different varieties of plantain trees such as <i>Ettanvazha, Njalipoovan, Palayamkodan, Charappoovan, Kadali, and Chundillakkannan</i> are seen here. Allowing red ants to grow in the banana plantations will prevent worms that harm banana stem. Application of cow dung is good for banana plant and it increases yield. Keeping tobacco under the young leaves of banana will prevent <i>Vellakoombu</i> disease. To increase the weight of banana bunch, pour mixture of water and rice soup in 1:1 ratio on banana once it starts to bear fruit. It is a medicinal plant. Banana is known as nature's tonic. During festival, people eat in Banana leaves. Food packed in banana leaves is very delicious.
	Vazhuthana	Its fruit can be used to cook. Seeds from matured brinjal are used for cultivation. With 4 or 5 months, the plant starts to flower and fruits will be formed once these flowers are withered. The matured fruits are harvested and used as vegetable.

Table 3.1.2: Traditional Knowledge related to the observed flowering plants, trees and creepers

3.2 Fishes

The survey conducted by the students on the banks of Meenachil River identified 44 species of fishes. The study recorded the local name, scientific name, its main uses, its local condition and the traditional knowledge associated with each. The list of fishes identified with their local name, common name, scientific name, local condition and uses are given in **Table 3.2.1**.

Sl. No.	Malayalam Name (Common Name)	Common Name	Scientific Name	Main Use	Local Condition
1	Aacharya paral	Exclamation barb	<i>Puntius exclamation</i>	Decoration	Less than Before
2	Aaron	Malabar Spinyeel	<i>Macrogathus guentheri</i>	Decoration	common
3	Arakan	Tire-track spinyeel	<i>Mastacembelus armatus</i>	Decoration	Less than before
4	Catla	Katla	<i>Catla catla</i>	Food	Rare
5	Chemballi	Red Snapper	<i>Lutjanus argentimaculatus</i>	Food	Common
6	Cherumathi Paral			Food	Common
7	Cherumeen	Cobra snakehead/Great snakehead	<i>Channa marulius</i>	Food	Common
8	Cheru varal			Food	Less than before
9	Chillaan	<i>Mystus vittatus</i>		Food	Common
10	Ilam Manja			Decoration	Abundant
11	Kaari	Stinging catfish	<i>Heteropneustes fossilis</i>	Food	Abundant
12	Kallada/Antikalli	Climbing perch	<i>Anabus tesudineus</i>	Food	Abundant
13	Kallada mutti		<i>Anabus Testudineus</i>	Food and Decoration	Abundant
14	Kallelmutti		<i>Anabus Testudineus</i>	Food	Abundant
15	Kanambu/Thirutha kanambu	Mullet	<i>Mugil cephalus</i>	Food	Rare
16	Karimeen	Green chromide/Pearl spot	<i>Etroplus suratensis</i>	Food	Common
17	Katla	Catla	<i>Catla Catla</i>	Food	Common
18	Kodiyam Paral	Mascara barb	<i>Puntius assimilis</i>	Food	Abundant
19	Kola	Freshwater garfish	<i>Xenentodon cancila</i>	Food	Rare
20	Kooral			Food	Common
21	Kullan Kallotti	Mullya garra	<i>Garra mullya</i>	Decoration	Rare
22	Kuruva Paral	Peninsular olive barb	<i>Puntius sarana</i>	Food	Common
23	Kuruva	Oliver barb	<i>Systemus sarana</i>	Food	Less than before
24	Mananjil/malanjil	Indian mottled	<i>Anguilla bengalensis</i>	Food	Rare

		eel			
25	Manalaaron	Malabar Loach	<i>Lepidocephalichthys thermalis</i>	Food	Common
26	Manathukanni	Tiger panchax	<i>Aplocheilus lineatus</i>	Decoration	Less than before
27	Manjakoore	Yellow catfish	<i>Horabagrus brachysoma</i>	Food	Common
28	Mushi	Walking catfish	<i>Clarias batrachus</i>	Decoration	Common
29	Pallathi	Orange chromide	<i>Etroplus maculatus</i>	Food	Abundant
30	Panna Karimeen	Malabar leaf fish/common catopra	<i>Pristolepis marginata</i>	Decoration	Rare
31	Paral	Giant danio	<i>Danio malabaricus</i>	Food & Decoration	Common
32	Parapparaal	Scarlet banded barb	<i>Puntius parrah</i>	Food	Abundant
33	Poonjan/Manathukanni, Pochutti	Tiger Panchax	<i>Aplocheilus lineatus</i>	Food	Common
34	Poovali Paral	Black spot barb	<i>Puntius filamentosus</i>	Food	Common
35	Prawn			Food	Lesser in number than before
36	Pullan	Pamba labeo	<i>Labeo dussumieri</i>	Food	Rare
37	Rohu	Reba	<i>Labeo Rohita</i>	Food	Rare
38	Thirutha	Flathead mullet	<i>Mugil cephalus</i>	Food	Rare
39	Tilopia	Tilapia	<i>Oerochromis mossabicus</i>	Food	Rare
40	Gourami	Gourami	<i>Osphronemus goramy</i>	Decoration	Common
41	Valah	Ribbon Fish	<i>Lepturacanthus saval</i>	Food	Common
42	Varaal	Banded snakehead	<i>Channa striatus</i>	Food	Common
43	Vayambu	Silver carplet	<i>Amblypharyngdon melettinus</i>	Food	Rare
44	Vellakkoore	Long whiskered catfish	<i>Mystus gulio</i>	Food	Abundant

Table 3.2.1. Observed Fishes

3.3 Dragonflies

The survey conducted by the students on the banks of Meenachil River identified 27 species of fishes. The study recorded the local name, scientific name, its main uses and its local condition. The list of dragonflies identified is given in **Table 3.3.1.**

Sl. No.	Malayalam Name (Common Name)	Common Name	Scientific Name
1	Changathi thumbi	Ditch Jewel/Orange skimmer/Asian groundling	Brachythemis contaminata
2	Chenkali palthumbi	Blue bush dart	Copera vittata
3	Chenthavidan vyali	Red faced skimmer	Orthetrum chrysis
4	Cheriyathanal thumbi	Clear winged forest glory	Vestalis gracilis
5	Choravalan thumbi	Asiatic bloodtail	Lathrecista asiatica
6	Chuttinilathan	Black tipped ground skimmer	Diplacodes nebulosa
7	Kaarthumbi	Black Stream Glider	Trithemis festiva
8	Kaduva Thumbi		
9	Kanalvaalan Chathuppan	Orange Tailed Marsh Dart	Ceriagrion cerinorubellum
10	Manjakaali Paalthumbi	Yellow bush dart	Copera masginipes
11	Nattukaduva	Common clubtail	Lctinogomphus rapax
12	Nattunilathan	Ground skimmer	Diplacodes trivialis
13	Nattupoothaali	Blue sprite/Blue grass dart	Pseudagrion microcephalum
14	Naattupulchinnan	Pigmy Dartlet	Agriocnemis pygmaea
15	Onathumbi	Wandering Glider	Pantala flavescens
16	Paandan Parunthan	Amber-winged glider	Hydro basileus Croceus
17	Paandan Vayaltheyyan	Scarlet Basker	Urothemis signata
18	Pacha vyali	Green Marsh Hawk	Orthetrum Sabina
19	Pavizha vaalan vyaali	Crimson-tailed Marsh Hawk	Orthetrum pruinatum
20	Peelithumbi	Stream Glory	Neuribasis chinensis
21	Pullivalan	Yellow tailed Ashy skimmer	Potamarcha congener
22	Shalabha thumbi	Common picture wing	Rhyothemis variegata
23	Sindhoora chirakan	Crimson marsh glider	Trithemis aurora
24	Soochivaalan Sandhyathumbi	Brown Dush Hawk	Zyomma petiolatum
25	Swamy thumbi	Pied paddy skimmer	Neurothemis tullia
26	Theekkarimuthan	Scarlet marsh hawk	Aethriamanta brevipennis
27	Vella Pulchinnan	White dartlet	Agriocnemis pieris

Table 3.3.1. Observed Fishes

4. Activities

- **Orientation Programme** – 3 students and 2 teachers from each selected school participated in a training workshop at TIES campus. The programme included different sessions on fishes, dragonflies and different survey techniques. The classes were taken by experts in each field. The schools were provided with survey sheets and field guides for conducting the survey.
- **Field survey by students** – Students selected from each school conducted survey on fishes, dragonflies and plants at the allocated river length of Meenachil River. Also, students interviewed local people on the traditional knowledge related to the river.

- **Cleaning Campaign** – The schools cleaned and collected plastics from the river bank area allotted for them and planted bamboo saplings. The campaign was attended by political leaders and social workers.
- **River Walk** – Students walked through the banks of the river, carrying pluck cards with slogans written and also by reciting them. In between, the rally stopped at different stations and retired teachers and social workers with knowledge about the past and present condition of the river spoke to the students about the deteriorating condition of the river.
- **Consolidation Workshop** – A consolidation workshop was conducted at TIES participating representatives from the schools. Teachers and students shared their experiences of the project and gave suggestions on improving the program and conducting other programs by involving the students.
- **Preparation of final report** – A final report was prepared summarising the data prepared by all the schools.

5. DISCUSSION

The survey conducted by the schools through the length of the Meenachil River identified various species of flowering plants, trees, creepers, butterflies and fishes.

The river has been found at severe threat due to sand mining, pollution, dumping of wastes, landslides, construction of check dams and deforestation. The river banks have lost its biodiversity due to human encroachment, construction of buildings and check dams and deforestation. Earlier, people used the water from the river for drinking, washing, and other purposes. But now, the water cannot be used for any of these purposes due to its poor condition because of dumping of wastes and other polluting activities. During the survey and the river walk, students interacted with aged people and they shared with them the experiences they had with the river during their childhood. The students were disappointed as the deteriorating condition of the river took away those privileges from them.

To change the situation, there is a need to create awareness among the public on the importance of the river, the bad effects the present lifestyle can have on the river and the urging need to conserve the river. More tree planting activities should be conducted on

the banks of the river to control landslides. Also, more restrictions should be imposed in illegal sand mining. Serious and concrete measures should be taken to control waste dumping and other polluting activities. The main awareness should be spread to control pollution. Wastes should not be allowed to be dumped in the river and river banks. Rules and regulations should be installed for the proper management of wastes.

People are not aware about the uses and medicinal properties of the trees and plants. More awareness creation classes among the public on the uses of the trees and plants will encourage them to conserve and protect the trees and plants. Restrictions should be implemented in the cutting of trees and conversion of forest areas into human dwelling areas (Human Encroachment). Additionally, awareness should be created among public regarding the necessity of fishing regulations such as restricted fishing during spring season and the reason it is strictly prohibited.

Only an integrated agricultural approach based on soil microorganisms, butterflies, birds and plants will be sustainable, an understanding that the students developed from the interaction with aged people. None of these living organisms are smaller or greater than one another. For instance, soil organisms assist plants to intake nutrients and produce flowers, fruits and seeds, which are crucial for the consumption of other organisms. The butterflies which consume honey from flowers assist migration of pollen grains, and thus enable reproduction and seed formation. Every plant displays distinct characteristics- colour, smell, size and uses. Similarly, each butterfly is different in its size, colour, and has specific host plant. Therefore, these organisms and their habitats need to be conserved to ensure their effective interaction and collaboration to enhance native biodiversity. In addition, use of chemical fertilizers can harm useful soil microorganisms, which are crucial for plant growth. Therefore, natural and eco-friendly methods should be promoted. Successful control of these pests or insects will increase yield, and will encourage more people to engage in agriculture.

Additionally, awareness among general public regarding the adverse impacts of unsustainable development and significance of biodiversity conservation need to be created. Several plants that are considered wild and weeds have several medicinal properties; many people are ignorant of its medicinal properties, resulting in their destruction and extinction. Free distribution of plant saplings (both homestead and wild)

that are at the verge of extinction and promotion of vegetable, flowering and medicinal gardens at households will help in local biodiversity conservation and in retaining greenery at backyards. By encouraging people to plant host plants of various butterflies will create suitable habitats for reproduction of butterflies thereby increasing their diversity and population. For instance, building one or two butterfly gardens in each Panchayat as models will encourage the general public. In order to protect fish diversity, regulations should be adopted to reduce water pollution, levelling of water bodies for construction purposes, and over exploitation of water sources through activities such as sand mining. Hunting birds for hobbies or fun should be discouraged through educational and awareness programs, which will help in conserving bird diversity.

The programme conducted had a very positive impact on students. It helped them to identify local species of vegetables, flowering plants, medicinal plants, butterflies and fishes around them. The project succeeded in creating awareness among the students about the need for conserving our nature and providing a platform for the students to interact with nature and its organisms. Participating in this project was a different experience from their hectic classroom lessons. Also, the project was a success in drawing the attention of the general public towards the deteriorating condition of the river and the need to take measures to conserve them.

Moreover, the interviews with experts and local people helped the students to know traditional knowledge associated with the river. From students' responses, it is found that their communication skills, self confidence, and care for nature have increased by being a part of this programme. In addition, they became independent in conducting project works.

6. CONCLUSION

About 93 flowering plants, trees and creepers, 27 butterflies and 44 fishes were observed and identified as the existing biodiversity of Meenachil River. The study found that the river is in deteriorating condition due to human activities such as pollution, dumping of wastes, sand mining, construction of check dams *etc.* Most of the river banks are being occupied by human for dwelling, cultivation and other activities and results in soil erosion and water pollution. As the trees and plants on the banks are being cut down the soil is losing its mineral contents. Also, deforestation is causing a major threat for birds,

butterflies and other organisms. It is mainly because of the drastic change in people's lifestyle, and an integrated agricultural approach based on soil microorganisms, butterflies, birds and plants need to be promoted. Awareness regarding the necessity of biodiversity conservation should be created and crucial regulations to preserve local biodiversity should be implemented and practiced.

The study helped students to integrate their observational and practical learning experience in classroom curriculum. This learning broadened and deepened the educational experience for students. Most importantly, the study led the students to the realization that the greater responsibility to protect the nature lies on their shoulder as young, growing population with greater potential.