Biological Diversity of Kerala: A survey of Kalliasseri *panchayat,* Kannur district

T.P. Sreedharan

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1. Introduction

Biodiversity

Effective utilisation of biodiversity determines prosperity. This is so because of the limitless potential for application of biodiversity for human welfare. Biodiversity is the most significant of the resources available to man (Pushpangadan, 1999).

Biodiversity encompasses the limitless array of organisms from microbes to large life forms. We owe our achievements for the past 500 years to biodiversity. Tropical regions where light and water are available in plenty are the abodes of biodiversity. India and Latin America are important examples. Sixty-five thousand species of flowering plants have been recorded from Latin American countries. Fifteen thousand species of flowering plants have been

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recorded from India (Agarwal, 1999). Among the biodiversity-rich nations, India is unique being the only country with the largest sub-specific diversity. Sixteen thousand and five hundred varieties of rice are cultivated in India. Six hundred varieties of rice are cultivated in Kerala alone. There are 300 varieties of lemongrass and 1000 varieties of mango in India. There exist numerous examples to prove India's richness of biodiversity. In the case of microbes also India is rich. Several new species of fungi, algae and bacteria are being reported from India almost by the day.

Our forests are fast degrading due to anthropogenic factors. Among the twenty-five biodiversity hotspots recorded all over the world, two are in India. These are the Western Ghats and Sub-Himalayas (Indo-Burma). The biodiversity of Western Ghats has been well known for millennia. It is considered to be the centre of origin of important commercial spices like pepper, cardamom and ginger (Nair, 1997). India's forests and their biodiversity were the significant source of income for the colonialists since 1750. Forests resources had been severely exploited. Teak and Rosewood were extracted in large scale for shipbuilding. Biodiversity of the colonies and western technology made the western countries the leading economic powers of the world. The present-day developed countries do not possess such diverse life forms.

Developing countries are also the storehouse of information on various unique applications of biodiversity. Tribesfolk of such countries have utilized 30 percent of the biodiversity of their environments for various purposes. It is a pity that indigenous information on biodiversity has not been properly documented.

The past two decades have seen tremendous progress in the field of biotechnology. Biotechnological processes make use of their life forms or derivatives to make or modify products or processes for specific uses. Under General Agreement on Trade and Tariff (GATT) principles such as Intellectual Property Rights (IPR), micro-organisms, plants and animals may be patented to make them exclusive private property. Developed countries have always used Third World germplasm freely or modified them. Such modified materials have been used for commercial applications. Huge profits thus earned have not been shared with Third World countries that are the legal owners of the resources. There are many examples of our indigenous knowledge or resources being patented in other countries. Neem, Turmeric, Jamun, Carela, Brinjal, Jute and Basmati rice were patented in the United States. If we were to take counter-measures to prevent such eventualities, we will have first to understand fully our bio-resources. We will also have to document the unique properties and applications of each species and obtain patency for such applications. A shining example of such possibility is that of *Arogyapacha* (*Trychopus zeylanichus)*, which has been patented by Tropical Botanical Garden and Research Institute (TBGRI).

Biodiversity - definition

Biodiversity represents the variety and abundance of life expressed at the genetic, population, species and ecosystem levels, both cultivated and natural, terrestrial and marine. Biodiversity provides the goods and services essential for the survival of human beings and other species

on the earth. Thus biodiversity may be roughly defined as the total number of species in a particular area. Conservation of biodiversity is therefore important to ensure sustainable human development. A bacterium, the domestic cow, rice, the resplendent tiger are all part of biodiversity. Biodiversity knows no limits, and *no distinction between wild and domesticated, microbial and terrestrial. In short biodiversity is the diversity among all-living forms in this universe'.*

The term encompasses all species of plants, animals and the ecosystems of which they are part – many of which have developed over several millennia of evolutionary history. Several indices are used to calculate biodiversity. Summative measures, which count the number of species in an area, have proved to be a poor measure of the structure of a community. Weightier indices, attempt however, to describe the structure of a community as well as its richness by reflecting the functional importance of species within that community.

It is estimated that there are about 1.4 to 1.7 million species in the world. This is almost certainly an underestimate as it is based largely on those species that live on the land. Many biologists estimate that there may be between 5 and 100 million species, most of which remain yet to be described. Ecosystems that are particularly rich in biodiversity, supporting thousands of species, include tropical rain forests, tropical dry deciduous forests and mangrove swamps. Such areas are seen in Third World countries including India. About 75 percent of biodiversity exists in these realms.

Thousands of species worldwide are under threat from overuse, loss of habitat and environmental pollution. Because species in ecosystems are interdependent, the loss of one species may lead to the disappearance of many others. Domestic animals and crop species are also under threat. Local breeds and crops are fast disappearing as they get replaced by the small number of animal varieties and seeds developed for modern intensive farming.

The value of maintaining biodiversity is being increasingly realised by scientists all over the world and steps are being taken to conserve species and ecosystems. Global biodiversity monitoring is providing information on the number and distribution of species, enabling governments to protect areas with high levels of biodiversity and containing rare and threatened species.

Biodiversity - Quantification

Counting the number of species found in a community gives little indication of the structure of that community. For eg., an ecosystem containing 20 species may be dominated by three extremely common species and 17 very rare species. It has been argued that measures of biodiversity should try to reflect this balance found in the eco-systems concerned. Some measures of biodiversity also try to reflect the importance of particular species in ecosystems. For eg., Starfish is thought to be the key species in coastal ecosystems because it provides food for several organisms and prey on many others.

Biodiversity – World Scenario

The world's biodiversity is made up of millions of microbial, plant and animal species. Within each species, there are a variety of populations that have naturally evolved specific characteristics over millennia. Each species have become specially adapted to a particular environment; some of them flourish in regions of the earth in which other species including humans would immediately perish. Genetic variations within species are immeasurably large; it is the greatest among micro-organisms, which have had far longer existence on the earth than others, to diverge.

The human race depends upon microbial plant and animal species for food and for raw materials for a wide range of products, from medicines to building materials. The world's forests and vegetative cover maintain the fertility of land and the quality of water resources and influence climate. Clearly, no species can survive in isolation; all species depend on one another - directly or indirectly - for that survival. Interdependent communities of species and their physical environment form ecosystems, which may be an area as small as a single field or thousands of square kilometres as in the case of tropical rain forests.

Biodiversity represents the very foundation of human existence. Yet by heedless actions mankind is eroding this biological capital at an alarming rate. Even today, despite the wanton destruction inflicted by him on the environment and its natural bounty, man takes Nature's resilience for granted. But the more we come to understand Nature, the clearer it becomes that there is a limit to the disruption that environment can endure.

Besides profound ethical and aesthetic implications, loss of biodiversity has serious economic and social costs. Genes, species, ecosystems and human knowledge, represent a living library of options available for adapting to local and global change. Biodiversity is part of our daily lives and livelihood and constitutes the resources upon which families, communities, nations and future generations depend.

Global biodiversity is usually divided into three fundamental categories: genetic diversity, species diversity and eco-system diversity.

Genetic diversity

The genetic material of micro-organisms, plants and animals contains information that determines the characteristics of all species and individuals that make up the diversity of the living world. The number of possible combinations of genes and of the molecules making up genes is immense - much larger than the number of individuals making up a species.

Genetic diversity refers to the differences in genetic make-up between distinct species and to genetic variations within a single species. Individuals belonging to a particular species share, by definition, certain characteristics, but genetic variation determines the particular characteristics of individuals within the species. The genetic make-up of an individual species is not static. It changes as a result of both internal and external factors.

Species diversity

As was mentioned earlier, 1.7 million species have been described worldwide till now and estimates of the total number of species on Earth range from 5 to 100 million
Species diversity is measured in relation to a given area - from a small field to the entire planet. It is assessed in terms of the number of species or the range of different types of species an area contains. A region harbouring many different plant and animal species has a greater diversity of species than a region in which a few types of species predominate. An island with two species of bird and one species of lizard has, for instance, greater diversity than an island with three species of bird and no lizard.

Ecosystem diversity

The enormous range of terrestrial and aquatic environments on Earth has been classified into a number of ecosystems. The major habitat types include tropical rain forests, grasslands, wetlands, coral reefs and mangroves. Species contained within a given ecosystem also vary over time. Regions containing a great variety of ecosystems are rich in biodiversity.

Biodiversity – Indian scenario

India is rich ecologically, biologically and culturally; in biodiversity it is one of the richest in the world being one among the twelve major countries abounding in biodiversity. So far 1,26,188 species have been noted from India. Table 1.5(a) provides a summary idea of its biological diversity.

Among different taxa Arthropods exhibit the maximum diversity in terms of species richness; they constitute 40 percent of all recorded species from India. Then come fungi accounting for 18.23 percent and angiosperms coming to 13.5 percent.

India has a great wealth of biological diversity in its forests, wetlands and maritime areas. Table 1.1(b) shows the species richness of India in comparison with that of the world as a whole.

India is rich in almost all categories of biodiversity and contributes almost 6 percent to the total species richness of the world. And hundreds of species remain in the ecosystems in India, which are yet to be identified.

Genetic Diversity In India

The different forms in a species constitute its genetic diversity. The life forms seen in India are extremely diverse. In the same species of plants, diversification occurs in their qualities. The compounds contained in them also show immense differences. These characteristics helped India to be considered one among the *Vavilovian* centres of crop diversification. India is the home of about 167 crop plants. Our country is also the ‘land of origin’ of a few domestic animals at primary and the secondary levels. In addition to the richness of biological diversity there is cultural diversity and diverse systems of traditional knowledge.

Table 1.1 (a) Biodiversity in India

No	Category	No of species	%
1	Bacteria	850	0. 67
2	Algae	2500	2. 00
3	Fungi	23000	18.23
4	Lichens	1600	1.30
5	Bryophytes	2700	2.14
6	Pteridophytes	1022	0. 80
7	Gymnosperms	64	0.5
8	Angiosperms	17000	13.50
9	Protozoans	2577	2.04
10	Molluscans	5042	4.00
11	Crustaceans	2970	2.35
12	Insects	50717	40.00
13	Invertebrates including hemichordates	11252	9.00
14	Protochordates	116	0.10
15	Pisces	2546	2.02
16	Amphibians	204	0.16
17	Reptiles	428	0.34
18	Aves	1228	1.00
19	Mammals	372	0.30
	Total	*1,26,288*	*100.00*

Source: *Jaivavaividhyam* (Malayalam), 1996, TBGRI.

Table 1.1(b) Comparison between number of species in India and the World

Group	No. of species in India (SI)	No. of species (SW) in the World	SI/SW(%)
Mammals	372	4629	7.6
Birds	1228	9702	12.6
Reptiles	428	6550	6.2
Amphibians	204	4522	4.4
Fishes	2546	21730	11.7
Flowering plants	17000	2,50,000	6.0

Source: *Jaivavaividhyam* (Malayalam), 1996, TBGRI.

Multi-faceted bio-uses are prevalent among the traditional communities and tribal groups of the country. High rates of population growth, indiscreet human interventions and greed have done much havoc to the country's biodiversity, as has been the case in other tropical regions too. As a result, the natural ecosystems, which had existed in many countries, have become degraded or destroyed irrecoverably, thus seriously affecting the genetic diversity of the world.

About 7000 endemic species are found in India; they do not occur anywhere else in the world. Of these, the Himalayas and the Khasi Hills in Meghalaya account for about 3000 species, and the Deccan Peninsula for about 2000 species. The area of maximum diversity in India is the north-eastern region, which happens to be also the most threatened. The second major area of genetic diversity is the lower region of the Western Ghats around the Nilgiris.
Around 600 species of vascular plants are facing the threat of extinction; the fate of the animal world is not much different either. About 150 species of animals are on the verge of extinction, which include 81 mammals, 47 birds, 15 other animals including 3 species of amphibians and butterflies and moths and beetles of different kinds.

Biodiversity hot spots in India

Certain tropical forest areas rich in diverse endemic species, on the verge of destruction are called 'Hot Spots'. The conservation of these areas is indispensable for the survival of mankind.

About 18 'Hot Spots' (of tropical forests) are identified around the world. Among them two are in India - one in the Western Ghats and the other in the eastern Himalayan region. These two 'Hot Spots' together have about 5330 endemic species including flowering plants, mammals, reptiles, amphibians and butterflies.

In India, forest area is fast depleting and wildlife is fast disappearing. Much of the wild life once widely distributed is now confined to certain pockets. Many innovative schemes and projects have been launched to salvage the Indian wild life from extinction. The Project Tiger was started in 1973. As tiger stands at the apex of the biological pyramid, ensuring its survival implies conservation of the entire biota. The Crocodile Project (1975) and the Project Elephant (1991) followed. Now, efforts are being made to establish elephant corridors, linking the various forest areas so as to ensure continuity of forest habitats.

The Man and Biosphere Programme was formulated in 1986. Eco-development programmes are currently designed to involve people living in and around the protected areas, in conservation efforts with a view to improving their living conditions and thereby reducing their dependence on forest resources.

India has a large number of scientific institutions and university departments carrying out research on various aspects of biodiversity. Several scientists and technicians are engaged in inventory research and monitoring. The general state of knowledge about the distribution and richness of the country's biological resources is therefore fairly good.

Table 1.2 'Threatened' Category of Animals in India

1994 IUCN Red List Threat Category

Group	Endangered	Vulnerable	Rare	Indeterminate	Insufficiently Known
Mammals	13	20	2	5	13
Birds	6	20	25	13	5
Reptiles	6	6	4	5	2
Amphibians	-	-	-	3	-
Fishes	-	-	2	-	-
Invertebrates	1	3	12	2	4
TOTAL	*26*	*49*	*45*	*28*	*24*

Source: *Jaivavaividhyam* (Malayalam), 1996, TBGRI.

Biodiversity: Kerala scenario

The biodiversity of the Western Ghats is the main component of the biodiversity of Kerala. The entire State is blessed with year-round greenery. Evergreen forests are its main biological treasure house. Favourable climate and soil conditions and other affable physical factors are responsible for the biological richness. In Kerala humidity is very high at an average of 70 percent.

Structurally, Kerala has different geo-physical areas such as forests, marshes, mangroves, ponds, seashores and deltas.

Indiscriminate utilisation of the land surface (for cultivation, grazing or other purposes) has adversely affected vegetation and its composition as well as its regeneration capacity. Intensively cultivated areas have lost all natural vegetation except a few weeds. In areas subjected to shifting cultivation, natural fauna and flora face local extinction. Environmental damage triggered by deforestation, dam building, road construction etc. has eroded valuable biological resources including wild varieties of even domesticated crop plants, trees and animals.

The Western Ghats which form the mountain ranges of south-western India have been considered a 'Hot spot' due to their wide range of endemic forms of biodiversity of genera, species and races, which include nearly 2000 species of higher plants, 84 species of fishes, 87 species of amphibians, 89 species of reptiles, 15 species of birds and 12 species of mammals – all endemic to the Western Ghats. The number of endemic species existing amongst the lower animals (with the exception of butterflies), lower plants and micro-organisms remains unknown.

According to the Forest Policy two-thirds of the area under forest cover in the hills and the

mountainous regions is to be maintained in tact in order to prevent erosion and land degradation and to ensure the stability of the fragile eco-system. Against this two-thirds dictum, the actual area under forest/tree cover comes to less than one-fourth. The gaps in the desirable forest / tree cover are numerous; in the prevailing socio-political set up, it would be well-nigh next to impossible to plan for annexing any area for adding on to the existing forest.

Of the 0.75 million km^2 of total forest area of the country, 0.22 million km^2 (30 percent) constitute tropical moist deciduous forests and 0.064 million km^2 (8.5 percent) accounts for tropical wet-semi evergreen forests. A major part of the forests in the Western Ghats constitutes moist forest, i.e.; tropical wet / semi evergreen tropical moist deciduous. Of the total 9400 km^2 of natural forests in Kerala, nearly 7500 km^2 fall under this category, the plantation accounting for nearly 1500 km^2.

Forest resources of Kerala:

The forests of Kerala accounts for 1.26 percent of the total forest area of India and 24 percent of the land area of the State. They are distributed in three distinct altitudinal zones: low, intermediate and high. The low zone is an undulating narrow belt extending up to about 300m MSL and comprising most of the bamboo and tropical moist deciduous forests. The intermediate zone reaches up to 1500m and consists of steep hills and sharp falls. This is the zone of tropical semi-evergreen and tropical wet-evergreen forests. This zone culminates in the upland plateau, which is the high altitude zone comprising sub-climax Savannah of high ranges. Most of the non-refractory areas of these grasslands have been planted with Eucalyptus, Wattles and tropical pines.

The Kerala forests have bewildering diversity of floristic composition. More than one thousand arborescent species make Kerala's forests rich and varied. There are also herbaceous cardamom, bamboo, the giant grass-, *calamus rotang*-, the longest of the phanerogams-, *piper nigrum*- the black gold-, and sweet scented vetiveria.

In terms of animal diversity also Kerala holds a leading position. Elephant, tiger, wild boars, tahrs, spotted deer, leopard are among the numerous different wild animals seen. Some endemic forms constituting endangered species, also exist. Lion-tailed monkeys, Nilgiri langur, Malabar civet and Giant squirrels are a few examples.

Table 1.3 Forest Types of Kerala

No	Category	Area in km^2
1	Tropical wet evergreen and semi evergreen forests	3470
2	Tropical moist deciduous forests	4100
3	Tropical dry deciduous forests	100
4	Montane subtropical and temperate forests (sholas)	70
5	Grass lands	130
6	Forest plantations	1530

Source: *Jaivavaividhyam* (Malayalam), 1996, TBGRI.

About 51 percent (4835 Km^2) of the forestland has been set apart as "protected" forests. Another 2,035 Km^2 (22 percent) of natural forests including grasslands form wild life sanctuaries and national parks. The protected forests and the natural forests in the sanctuaries and national parks are the upper catchments and the sources of rivers. They are on steep slopes and form a fragile and rare ecosystem. No forestry operations aimed at generation of revenue are being carried out in these areas.

The areas of gentle slopes, foot hills etc., are classified under 'production' forests. It is in such areas that normal forestry operations are carried out. Some parts of 'production' areas with gentle slopes and deep soils; have been converted into commercial plantations of teak, Eucalyptus, match-wood, fuel wood etc., for meeting specific industrial requirements. Nearly, 1531 Km^2 of such forests have been converted into plantations, till now.

Degradation of forests

Owing to various pressures and continuous onslaught, the area of forests dwindled during the 19th and the 20th centuries. Some forest areas in the districts of Kannur and Kozhikode were clear-felled for raising rubber, coffee and tea-plantations. Some virgin forests were clear-felled for hydro-electric and irrigation projects. A few of these projects brought new people to the construction sites who, in course of time, spread out into adjoining forest areas causing irreparable damage to them. The Grow More Food Campaign of the early years of independence resulted in several inroads into the virgin forests and created in pockets of occupation within the forests. In consequence, the total forest cover of Kerala, which had been 28 percent of the land area during the first quarter of the 20th century, has declined to 24 percent.

Mangroves of Kerala

The mangrove patches of Kerala are highly localised. They are confined, to the upper reaches of lagoons or backwaters and creeks, as seen in Veli, Kollam, Kumarakom, Kannamali, Chettuva, Nadakkavu, Edakkad, Valapattanam, Pappinisseri, Muzhappilangad, Koduvalli, Kunjimangalam, Chittari, Payangadi, Kotti, Kavvay, Thalassery, Ezhimala, Vypin, Mahe, Badagara, Kallai, Tirur, Edappalli, Panangad, and Aroor. Kerala Mangroves are distributed in eight coastal districts of which Kannur has the largest area followed by Kozhikode, Ernakulam, Alappuzha, and Kottayam. The total area comes to about 17 Km^2 (1671 ha). The district-wise distribution is shown in Appendix II Table I. Out of this 2 Km^2 are government and public land and the rest private land. Only an area of 1.50 Km^2 area has typical undamaged mangroves. The total area under mangroves in Kerala in the remote past had been reportedly about 700 Km^2 (Chand Basha, 1992).

The vegetation cover of the coastal region of Kerala (590 km) has played a dominant role in shaping various faunal compositions. This niche attracted numerous types of marine birds and nursed a variety of brackish water fishes. The entry of tidal waters regularly from the sea and the existence of 30 estuaries and back waters of varying sizes with fresh water flowing regularly into them from the 41 rivers that originate in

the Western Ghats, create a peculiar ecological environment favourable to the development of a unique mangrove vegetation on the fringes of the backwaters; estuaries and creeks. The important species met with are *Acanthus ilicifolius, Acrostichum aureum, Aegiceras corniculatum, Avicennia marina, A. officinalis, Bruguiera gymnorhiza, B. parviflora, Ceriops tagal, Derris trifoliate, Excoecaria agallacha, E. indica, Kandelia candel, Lumnitzera racemosa, Rhizophora apiculata, R. mucronata* and *Sonneratia caseolaris.* Many species of mangrove associates also occur, the more important among them being *Barringtonia racemosa, Calophyllum ixnophyllum, Cerbera odollam, Haitian littoralis, Hibiscus tiliaceus, Pandanus fascicularis, Premna serratifolia, Samadera indica,* and *Thespesia populne*.

This unique flora with their specialised ecological characteristic cerate a suitable habitat for a set of peculiar fauna - both the flora and the fauna - living in their own highly specialised ecosystem. Man in his rage for supremacy over nature, failed to understand the intimate 'ecological niche' of mangroves. In order to meet his fancies, man started replacing the natural vegetation with his pet ideas in the name of agricultural and industrial development, a process that has led to a total annihilation of vast extents of mangrove vegetation in the Kerala coasts.

There are clear indications to show that very rich mangrove vegetation had existed along the coastal tracts of Kerala. According to one estimate, Kerala once supported about 700 Km^2 of mangroves along its coast (Ramachandran, et al, 1986). What we see now are only relies of this glorious past. As one travels along the coastal belt from Thiruvananthapuram to Kasargod, one realises that the lands reclaimed from the inland waters have still not lost their inherent tendency of regeneration into mangrove vegetation. The tufts of mangroves lying scattered along the coast inside coconut gardens or paddy fields and struggling to survive, tell the tale of the potential of these areas to support the growth and spread of mangroves. The major factors that led to the destruction of mangroves include the following:

(1) Development of Agriculture and Horticulture: - High demographic pressure along the coastal tract made it necessary to bring in as much land as possible under agriculture and horticulture. Additional land was procured by clearing mangrove forests. Construction of bunds and regulators in many parts of the State (Thottapally, Thaneermukkom, Andhakaranazhy, Enammavu, Kuttankottavalavu) for preventing the entry of saline water from the sea into the back waters in order to facilitate cultivation, has also changed the ecological conditions required for the healthy growth of mangroves.

(2) Development of Industries: -The establishment of industries such as tiles and textiles and plywood and other softwood as well as the opening of extensive timber-stacking yards along river-banks and backwaters (eg., Valapatanam and Kuppam) the development of ports and the construction of Cochin Shipyard, have led to the destruction of rich mangrove vegetation. The existence of the Keeryard Island in Valapatanam River and the small islands near Neendakara

supporting pure mangroves, speak of the rich mangrove forests of the localities, which had once existed.

(3) Development of transport and communication facilities: -The development of road and rail transport (by opening National and State Highways and district and village roads as well as railway lines passing through mangrove-rich areas) was achieved through wanton destruction of mangrove vegetations. These roads and railway lines act as barriers to the inflow and outflow of brackish water in the area thereby altering the ecological condition suitable to grow and flourish.

(4) Other activities: -Digging ponds of brackish water for fish and prawn culture in the pure mangrove areas an enterprise practiced by private land-owners in Kasargod, Kannur and Kollam districts has destroyed a few mangrove lands. Research in brackish-water-fish culture without causing destruction to existing mangroves is carried out in the 1.01 Km^2 of mangrove area at Puthuvypeen, the largest single piece of mangrove land in the whole of Kerala.

Creation of grounds for retting husk for coir fibre used in hand-operated coir-spinning and weaving machines and removal of impediments to easy movement of country boats through backwaters also have led to the destruction of mangroves. The cutting of roots and stems and even uprooting of mangrove vegetation for making corks, floats for local fish-nets, and fuel-wood are the other, though minor causes of mangrove destruction.

The biodiversity richness of Kerala lies also in its wealth of vascular plants; see Table 1.4

Vascular plants of Kerala

Table 1.4 Diversity of Vascular Plants in Kerala

No	Plants	No.s
1	Ornamental plants	1000
2	Medicinal plants	900
3	Wild food plants	450
4	Gum, latex, colouring materials producing plants	175
5	Economically useful plants	165
6	Aromatic plants	150
7	Bamboo	14

Source: *Jaivavaividhyam* (Malayalam), 1996, TBGRI.

2. Objectives and Method

There exists widespread illiteracy among people on matters related to eco-systems and biodiversity.

In India, various schemes for conservation are already in operation. An area of about 2300 km^2 is identified as protected areas for *in situ* conservation – which include 12 Wildlife Sanctuaries and 2 National Parks. Facilities exist also for *ex situ* conservation of rare and endangered species in the botanical parks, zoological gardens and captive breeding centres such as safari parks, snake parks and deer parks.

Traditional forest management efforts began in India in 1860. Conservation of biodiversity and its sustainable utilization are the challenges before the resource managers and the stakeholders. A harmonious relationship between the two groups is taking shape in the country.

The government of Kerala has constituted a State Biodiversity Committee to look into matters relating to bio-diversity conservation and utilization. A National legislation on biodiversity is also on the anvil.

A significant attempt in documenting biodiversity was made in Ernakulam District under the People's Planning Campaign in 1999. The project envisaged the preparation of Biodiversity Register in 86 *Grama Panchayats* of Ernakulam district. The committee included experts from Agriculture, Botany, Zoology, Geology, Taxonomy and Social Sciences. At District, Block and Panchayat levels, resource persons were appointed. About 8600 volunteers were involved in this project. The strategy was to identify at the ward level, with the help of elected representatives, knowledgeable elderly persons and to collect information from them on plants, animals and indigenous knowledge about them.

The pioneer in participatory studies on bio-diversity is Pattuvam panchayat (Taliparambu block, Kannur district). The study was conducted in 1995; it could not, however, be followed up.

Kannur district in the Malabar region of Kerala is rich in flora and fauna (Logan, 1887). Recent times have witnessed, however, rapid decline of its forest area and wild life. Farmlands and wastelands have also been disappearing. It is highly essential to document the remaining biodiversity of the area for conservation for the benefit of generations to come.

The present study on the Kalliasseri panchayat of Kannur district is aimed at the preparation of a Biodiversity Inventory of the area.

Objectives

Panchayat Resource Mapping with people's participation was done at Kalliasseri during the 1991-93 period. This was done to find out the present status of land and water resources

and also to assess the impact of developmental activities of the past on these resources. The purpose was to formulate developmental activities on the basis of data made available through resource mapping. The data collected by volunteers and scientists have been used for the preparation of seven thematic maps – on type of landscape, type of soil, water availability, soil strata, patterns of land utilisation, man made developments and environment assessment. It is widely accepted that an integrated watershed development activity with people's participation alone would be sustainable. The main requirements for undertaking such a developmental activity are:

(1) A systematic approach to find out the complex inter- relation between man on one the side and the land and water ecosystems on the other side; and
(2) A programme aimed at revitalisation of soil, water, flora, fauna and biodiversity.

The aim of the present project was to identify the floristic and faunistic diversity of Kalliasseri Panchayat so that it will help to formulate developmental strategies without endangering the environment in the long run.

An important component of the programme was documentation of the knowledge of the local communities as to the changes that have taken place in the landscape and the biological resources and prepare a Community Biodiversity Register. In the process, opinions of the local population on how they would like to intervene in the process of landscape transformation and biodiversity destruction were also gathered. These proposals could be of use as inputs to the decentralised process of management of natural resources at the Grama Panchayat level.

A number of major electrical and industrial projects are scheduled to come up in Kalliasseri Panchayat in the near future. To study the ecological impacts of these projects, it is essential that the present ecological status should be established.
The following have been the main objectives of the study:

1. Preparation of an inventory on the flora and fauna of Kalliasseri Panchayat, with particular emphasis on medicinal plants, WRCP and economically important plants;
2. Preparation of the changes undergone in the landscape elements during the 50 years preceding the study, of indigenous knowledge and practices and of ongoing changes in biodiversity, the causative factors and reaction to such changes from the part of the local community.

Method

1) The Panchayat with an area of 15.7 Sq. km was selected for biodiversity studies. The study sites include human impacted ecosystems.
2) The project was done on a participatory manner. There has been constant interaction with Grama Panchayat governing committee members and panchayat and ward level development committees.
3) Thirty members including four women were selected from various wards of the

panchayat and were given training at IRTC, Palakkad for a period of 3 days. These volunteers assist the research assistants in carrying out field studies.

4) A one-day workshop was conducted on indigenous knowledge in which farmers, masons, blacksmiths, carpenters and weavers participated.
5) Meetings of the traditional health practitioners were held to elicit information regarding uses of medicinal plants and other species.
6) The study sites are investigated as a landscape composed of different individual elements like coconut plantations and paddy fields. The maps prepared for landscape elements, cultivations etc by the Resource Mapping Programme was made use of.
7) Landscape ecological approach was adopted for survey; vegetation studies were conducted in all landscape elements (LSE). For vegetation studies, Multiple Stage sampling method was adopted with quadrates of different sizes for different plant classes. The study area comprises of areas with different degrees of disturbances. In all these areas separate transects were laid and sampling done along this transects. Emphasis was given for medicinal plants and wild relatives of cultivated plants (WRCP).
8) For information regarding agriculture, Padasekhara Samithy members were interviewed.
9) The following taxa were selected for animal sampling.
   (a)Smaller mammals (b) Birds (c) Reptiles (d) Amphibians (e) Fishes
   (f) Butterflies (g) Crabs
10) Apart from quadrate study, animals were sampled opportunistically in their preferred habitats. Among plants survey of Angiosperms, Gymnosperms and Ferns was done.
11) Ward development committee members helped in interviewing fishermen, experts in folk arts etc.
12) Local people were interviewed to document their knowledge of occurrence and uses of various plants and animal species. Emphasis was given to the status of once highly utilised plant species and also to the causes for their destruction (as expressed by the old generation).
13) Elder people were interviewed to document the change that has undergone in the landscape elements during the past 50 years consequent to the changes in the pattern of land holdings and also due to the developmental activities.
14) Study of sacred groves in the Panchayat was done and an inventory of the plants and animals occurring there was made.
15) School children were involved in collecting information regarding food habits, games and health practices of yester years.
16) This information was compiled to obtain a picture of the ongoing changes in biodiversity, the forces responsible for such changes and also the reaction of the local communities to these changes.
17) The floristic and faunistic surveys and documentation of indigenous knowledge and other aspects of the project were carried out in a participatory manner.

3. Studies on Biodiversity in India: An overview

India

Florae

A large number of studies on the status of biodiversity in India exist. The report of the Ministry of Environment (1994) estimates the number of plant species in the country to be about 45,000 representing about 7 percent of the world's flora. Among the cultivated plants are 51 species of cereals and millets, 104 species of fruits, 27 species of spices and condiments, 55 species of vegetables and pulses, 24 species of fibre crops, 12 species of oil seeds and various wild strains of tea, coffee, tobacco and sugarcane. The report gives also a detailed account of India's faunal wealth, comprising about 81,000 species representing 6.4 percent of the total fauna of the world.

Fauna

The faunal wealth includes nearly 57,000 insects, 2546 fishes, 204 amphibians, 428 reptiles, 1228 birds and 372 mammals. According to this report, India has 26 breeds of cattle, 44 breeds of sheep, 20 breeds of goats, breeds of camels, 6 breeds of horses, 2 breeds of donkeys and breeds of poultry (see also Khoshoo, 1995). Nayar (1996) has stated that eco-system wise, India has 42 vegetation types, 16 forest types, 10 bio-geographic zones and 25 hotspots of endemic centres. He has identified three of the hotspots in Kerala. Daniel (1994) carried out an elaborate survey on Tropical Wild Life with special reference to the Indian subcontinent. Holloway (1974) studied the bio-geography of Indian butterflies. A general survey of the rare and threatened flowering plants of south India was carried out by Henry, et al. (1979).

Separate studies exist on bio-diversity in India in respect of fishes, reptiles, birds, and mammals as well as on medicinal plants, fungi and mangroves.

The study on Indian reptiles by Daniel (1983), on snakes of India by Murthy (1986, 1994, 1995), on herpatofauna of South India by Groombridge (1990), on lizards of India by Tokader and Sharma (1992) and on lizards, snakes and cheloniah by Mukherjee (1994) and Naseer (1996) are well-known. About birds the unquestioned authority in India is Salim Ali (1969), who identified 1200 species of which 900 are residents and 300 water migrants. Jayson (1994) carried out detailed studies on synecological and behavioural characteristics of certain species of forest birds. Vijayan's surveys (1986) were on birds of Indian wetlands. Vijayan and Balakrishnan (1977) in their work on 'Impact of Hydro-electric projects on Wildlife studies the factors affecting bird populations especially of the Great Indian Hornbill.

'The book on Indian mammals' by Prater gives a general idea about the animal population of India. The report by the Zoological Survey of India (1991) on 'Animal Resources in India – protozoa to mammalia' gives a general view of the animal population in India and their individual estimates.

Das (1995) made a study on the turtles of India.

An extensive study on Diversity and Conservation of Carnivore Mammals in India was made by John Singh (1986). Studies on other faunal forms include the elaborate enquiry into two species of earthworms including their habitat and feeding behaviour patterns by Julka and Chandra (1986). The study by Rensch (1995) on the land snails of Mysore and the Nilgiri plateau also deserve mention.

Some special studies have gone into the indigenous medicinal systems and medicinal plants of India. The report entitled 'A Manual of Entho-botany prepared by Jain (1995) lists among the traditional medicinal systems of India, Ayurveda, Siddha, and Unani. Kothari's India's Biodiversity: a status reprot' gives elaborate descriptions of the medicinal plants used in the traditional systems of medicine since ancient times.

Arora and Nayar (1983) did elaborate studies on the medicinal plants of India. Umashankar (1996) analysed the regenerative capacity medicinal plants in the country. Chopra et al (1956) documented the medicinal plants of India. They later (1958) carried out a study on the indigenous drugs of the country.

Studies on sacred groves on India were conducted by Gadgil and Vaartak (1975) and Pascal (1988). The extent of sacred groves, their locations, religious practices associated with them and their ecological and other cultural values were analysed.

CSE Report of 1985 has brought out interesting information on the rice genes discovered in India in relation to Oryza nivara for prevention of the spreading of the grassy stunt virus.

The microbial diversity has been the topic of enquiry of Bhat and Deshbandhu (1994) and Jagtap (1993). Bhat and Deshabandhu identified about 850 species of bacteria and 125,000 species of fungi.

Studies on the biodiversity of Indian wetlands have identified 318 species of birds, 150 species of amphibians and a large number of fish species. The India government published a detailed directory of the wetlands in India; a similar publication was made by WWFI in 1993. Ram's studies on the wetlands of India with particular reference to Chilka lake of Orissa are also famous (Ram, 1994). Frame, et al, (1953) brought out a report on 'Biodiversity Conservation: Forests, Wetlands and Deserts', which give a general view of ecosystems.

'The Mangroves and Us – a synthesis of insights' written by Vennuccil (1989) states that mangroves and their products had a significant place in the overseas trade between Mediterranean countries and India. The present mangrove ecosystems are only vestiges (Blasco, 1925).

Forests in India have remained a subject of study by government agencies and individual researchers. The Government of India published in 1993 the State of Forest Report in which the area under forests and the details of forest bio-diversity were categorized. The Forest Research Institute had published in two volumes One Hundred Years of Forestry in the year 1961.

Tribespeople and their agricultural practices were the topic of study by Perriera (1992). He found that agricultural practices varied with water and soil conditions. The study conducted by MOFE in 1994 contains information about eight breeds of buffalos in India, which represent the entire range of genetic diversity in the world.

Kerala

Studies on the general aspects of biodiversity of Kerala as well as on specific species and special aspects exist in large numbers. On the general aspects, the major studies include the following:

Biodiversity Wealth and Its Conservation by Manoharan, et al (1986)
Floristic Diversity of the Western Ghats and Its Conservation Measures by Nair and Daniel (1986)
Economic Botany of Kerala by Nair (1984)
Studies on Southern Western Ghats by Satish Chandran Nair (1991)
Animal Resources of Kerala – prospects of resource utilization and employment opportunities by Balakrishnan and Xavier (1995)
Ecological values of Biodiversity by Lal (1992)

Hora who had earlier studies about the advances in fish geography in India, prepared in 1992 a comprehensive list of fishes of the Nilgiri and Wayanad hills. The study by Lawrence (1992) was on the fishes of the high hills of the Western Ghats. The study by Nair on the endemic fishes of the Western Ghats is also worth mentioning (Nair, 1991). The Kerala segment of the Nilgiri biosphere reserve and the stream fishes in that region formed the topic enquiry by Easa and Chand Basha (1995).

An exercise in identification of lizards and snakes in the Chimmony Wild life Sanctuary (WLS) was made by Naseer (1996). He identified 15 species of lizards and 25 species of snakes in the sanctuary. Specific studies on the reptilian fauna of Parambikulam was carried out by Radhakrishnan in 1996.

In 1876, Hume published his work entitled ‘A first list of the birds of Travancore Hills. Ali and Whistler in their publication the ‘Birds of Kerala’ (1935-1937) documented extensively the birds of Kerala. The Malayalam version of the publication has appeared recently.

Elamon Suresh, 1994 has documented the Butterflies of Periyar Reserve while Goankar Harish, 1996 has studied in general the Butterflies of the Western Ghats.

Kurup, (1991) recorded 11 species of shore birds from paddy fields of north Kerala in his book on ‘Ecology of birds of Malabar Coast and Lakshadweep’. Nair, et al, (1993) conducted a survey on the distribution of mammals and birds in Chinnar WLS. ‘NEST’ has published several reports on the bird population in the various parts of Kerala such as ‘Birds of Peechi-Vazhani WLS: A Survey Report’ in 1991,’ ‘Birds of Kole Wetlands: A Survey Report’ in 1993 and ‘Birds of Vembanad Lake: A Survey Report’ in 1993. Neelakantan, 1993 conducted studies on the birds of Kerala and identified 476 species.

Mammals

Studies regarding the distribution, threats and status of mammals in Kerala were conducted by Balakrishnan, (1986), Balakrishnan and Easa, (1986) and Daniel, (1994). They have identified around 39 species of large and medium sized mammals from Kerala. Davidar, (1998) conducted elaborate studies on the population of Nilgiri Tahr at Eravikulam National Park regarding their feeding habits, habitat, and domesticability. Easa (1995) carried out a general survey on the mammalian biodiversity of Eravikulam NP and has identified 16 species from the area. Nair (1991) identified 48 genera of mammals, 275 genera of birds and 60 genera of reptiles from the Western Ghats. Jayakumar, (1996) carried out survey on the sea turtles along Kerala coast and identified five species visiting the coasts with two species having their nesting grounds there. Zacharias and Bharadwaj (1996) has identified 8 endemic species of amphibia from Periyar Tiger Reserve.

Wildlife

Kerala Forest Department and Kerala Forest Research Institute have jointly brought out a publication on 'Wildlife Census – Kerala, 1993' which gives estimates of the wildlife population of the State.

Medicinal Plants

The first comprehensive printed book on the natural plant resources of the Indian subcontinent is the 'Hortus Indicus Malabaricus' by Van Rheede tot Draakenstein. It furnished an extensive directory of the plants and trees of the Malabar Coast.

Nambiar, (1985) has conducted a vast study on the medicinal plants of Kerala in which he has found that out of the 3200 species of vascular flora in Kerala, 900 are known to possess immense medicinal properties. Out of these 540 species have been identified from forest ecosystems. Nambiar, et al, (1989) documented the medicinal plants in Kerala forests. Manilal, 1981 did research work on the 'Ethnobotany of Rices of Malabar'. Ethnomedical and Ethnobotanical Investigations among some Scheduled Caste Communities of Travancore were conducted by Pushpangadhan, (1986). He has also carried out investigations regarding 'Arogyapacha (*Trichopus zeylanicus*) the 'ginseng' of Kani Tribes of Agasthyar Hills for Evergreen Health and Vitality' and 'Amrithapala (*Janakia arayalpathra*) – A New drug from Kani Tribe of Kerala'. Ramachandran and Nair (1981) carried out 'Ethnobotanical studies in Cannanore District of Kerala'.

Fungal Diversity

Hosagoudar V.B. and Goos R.D. (1990) have inventoried the Meliolaceous Fungi of the State of Kerala.

Wetlands

Envis (1987) published a report on the 'Wetlands: Status and Management: An Overview'

in which they have given the extent of Wetland Ecosystem in the State and the characteristics of individual wetlands.

Gopalan (1991) has carried out an elaborate work on 'Backwaters: Our Valuable Resources' with special reference to Kerala.

Mangroves

Thankaimoni (1987) in 'Mangrove Palynology' has conducted in-depth research on 'Spores and Pollen Grains of Mangroves reported from Quarternary deposits of Kerala'. Ramachandran and Mohanan, (1990) has conducted vast surveys on the extent of mangrove ecosystem in Kerala in their book entitled 'The Mangrove Ecosystem of Kerala'. 'Studies on Flora of Quilon District, Kerala' by Mohanan (1984) give details of the mangrove ecosystem in Quilon. Azis and Nair (1987) in 'The Estuarine Scenario of Kerala with Special Reference to Status of Aquaculture Development' highlighted the present condition of the estuaries in Kerala. He has estimated the estuarine ecosystem at 2400 sq.km, which is rich in nutrients and high in productivity.

Studies on 'Sacred Groves of Kerala with particular reference to Conservation of Rare, Endemic, Endangered and Threatened Plants of the Western Ghats, Kerala' were carried out by Ramachandran, et al, in 1991.

Mohanan and Nair (1981) has also studied the Sacred Groves of Kerala. They have identified a new leguminous climber called *Kunstleria keralensis.* Unnikrishnan (1995) has published a book in Malayalam on sacred groves entitled 'Keralathile Vishudha Vanangal'.

Forests

Many researchers have carried out Forest studies in Kerala since Kerala has rich forest wealth. Karunakaran (1985) has published a Malayalam book titled 'Keralathile Vanangal Noottandukaliloode'. 'The Fauna and Flora of Malabar' was studied by Rhodes Morgan as early as 1887. Ward and Conner (1827) had published 'Memoir of the survey of the Travancore and Cochin States'. Bourdillon, 1893 has published reports on 'Forests of Travancore'. Krishna Iyer (1947) published the 'Travancore Forests Manual – Part II'. 'British Indian Forestry' was published by Kunhikrishnan in 1987.

Nair, (1985) conducted general studies on the forest resources of the State. He also carried out specific studies on the shola forests of Kerala. He has stated that the major cause for deforestation in the State is clear felling for eucalyptus plantation. Tewari (1995) has stated that forest fires are the cause for loss of the regenerative power of 75 percent of natural forests. Das, (1995) has studied the Evergreen forests of Southern Western Ghats.
Chandrasekharan (1962) carried out general studies on the forest types of Kerala State. Menon, (1986) has estimated the extent of forest area in India.

Nair, et al, (1995) published Kerala Forests and Forestry Handbook that gives a general picture of the forest extent in Kerala and the different forest types.

Studies regarding the forest vegetation of Kerala has been conducted by several researchers like Chandrasekharan, (1962), Champion and Seth, (1968), Nayar and Daniel, (1986), and Gadgil and Mehre Homji, (1986). Nayar, (1995) and Uniyal and Easa, (1990) also conducted studies on the forest vegetation of Kerala. Uniyal (1987) carried out a detailed study on the general flora and fauna of the forest ecosystem of Parambikulam Wildlife Sanctuary.

Mohandas, (1986) has carried out a general study on the population growth and its adverse effect on growth of forests in the Wayanad Plateau.

Silent Valley

Radhakrishnan and Gopi (1995) has conducted an extensive study of Silent Valley National Park covering around 315 animals. Das, (1986) identified 6 species of bats from the area. Pillai (1986) identified 19 species of amphibians. The detailed study regarding the fishes of the Silent Valley was carried out by Devi Rema and Indira (1986). Mathew George and Rahamathullah conducted studies on the Butterflies of Silent Valley National Park. Murthy (1986) carried out elaborate studies on the Reptiles of Silent Valley.

Cultivated Plants: Their Uses and Conservation

Nayar (1996) carried out research on 'Conservation of Rice Germplasm and its Utilization in breeding: Recent Advances in Rice Improvement'. A general study has been carried out by him in 1997 on 'Biodiversity Challenges in Kerala and Science of Conservation Biology'. Some basic concepts and the economic and political importance of genetic resources of cultivated crops have been described by Daniel Querol in his book – 'Genetic Resources – Our Forgotten Treasure'.

Navdanya (1993) carried out a study on the domesticated biodiversity of India. He has identified almost 150 different varieties of rice in the Western Ghats alone, each often from a different ecosystem or ecozone.

Folk Knowledge

The book *Krishimalayalam* by Sujith Kumar deals with the indigenous knowledge of farmers with regard to various agricultural practices.

4. Socio-Economic Profile of Study Area

The settlement map of 1928 gives a picture of the traditional agrarian system that existed in Kalliasseri. Land ownership was confined to a very narrow section of the society. The *Janmam* right to land was the monopoly of large Nair families and *Devaswoms*. The 374 Nair *pattadars* owned 43.46 percent of the cultivated area in the village. 59.2 percent of the total land was owned by 6.3 percent of *pattadars* (Thomas Isaac, Gangadharan, et al, 1995). The community-wise distribution of landholdings in Kalliasseri (1928) is shown in Table II of Appendix.

The *Jenmis* leased the land to cultivators under various tenures. The majority of the tenants suffered from insecurity of tenancy, rack-renting and arbitrary levies by *Jenmies*. The *Jenmies* were mostly of the upper castes. Nairs, a community that constituted only around 15 percent of the total population, directly controlled 43.46 percent of the land in the village. The Thiyyas and other backward classes, which consisted of 60 percent of the population, owned only 6.5 percent of the landed area. The proportion of agriculture labourers in the general population was only around 5 percent. The traditional caste-hierarchical community was maintained by a series of patron-client relationships, shared rituals and festivals.

By the end of the 1920s, the prices of pepper and coconut soared. The spread of commercial crops and the rise in prices during First World War led to the enrichment of a narrow stratum of tenants.

The national upsurge in the early 1930s, organising peasants in the latter half of 1930s and the peasant struggles waged after the Second World War contributed to the enlightenment of the peasants. During the 1950s mass movements for agrarian reforms began. The series of mass actions starting from the 1930s resulted in the Land Reforms Act, which changed the agrarian relations not only in Kalliasseri but also in the whole of Kerala. The agitation for land reforms continued and it resulted in the Land Reforms Act of 1971. It conferred fixity of tenure on tenants, fixed fair rents, and conferred right of purchase for the cultivating tenants and greater security to the ‘kudikidappukars’.

The land reforms conferred ownership on tenants on payment of a nominal compensation to landlords. Ownership right to hutment land was also conferred. As a result only a small number of Kalliasseri peasants are landless. The number of households that own more than 5 acres has declined to 13; they control only a meagre 6 percent of the total land area of the *panchayat*. According to 1951 census, out of 3340 cultivators in Kalliasseri only 152 had owned land. Th agricultural labourers were 1040 in number. Rentiers who constituted 4 percent of the households controlled more than 80 percent of the land. At present there is neither a rentier class nor landless tenants. Even agricultural labourers have their hutments (Isaac, T. Gangadharan, et al, 1995). The details of the distribution of holdings by land size are given in Table III of Appendix.

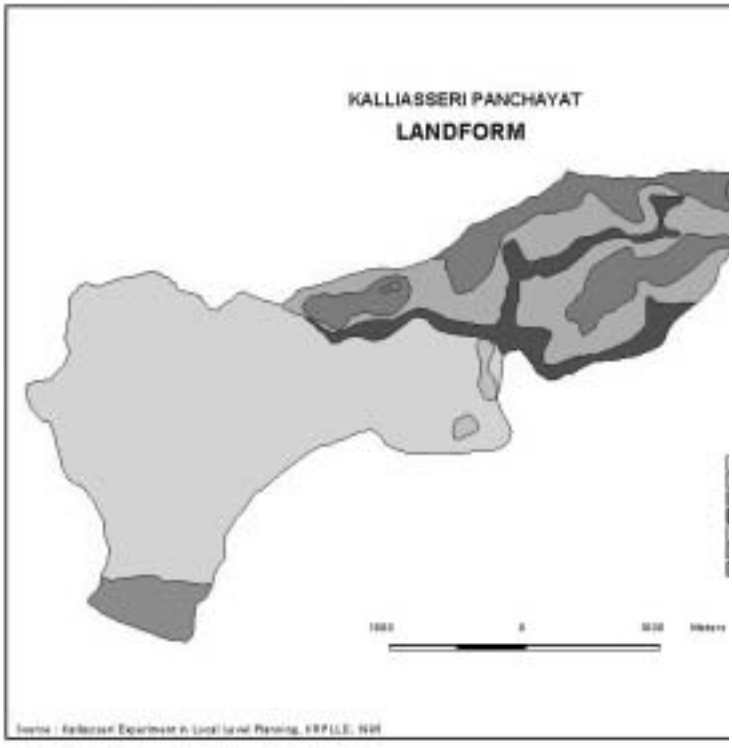
With the removal of landlordship, the cultivator, who had to surrender the major part of the produce, retains the entire produce with him. Land reforms have led to improvement of the economic status of the cultivators. The traditional pattern of distribution of land ownership based on caste has undergone a sea of change. The domination of upper castes over land has come to an end.

Remittances made by emigrants to the Gulf region have raised the economic status of several households. Owing to the growth of small-scale industry around Kalliasseri, employment opportunities have expanded substantially and reduced the work force dependent upon agriculture.

Study area

Kalliasseri Panchayat, one among the 81 panchayats of Kannur district, has an area of 15.7 Sq.km. The panchayat with its infrastructural facilities, is shown in Map I. Kalliasseri is a typical coastal village of the northern agro-climatic zone of Kerala within which the district of Kannur falls. A major portion of the panchayat lies in the coastal plain, but it also contains a hilly terrain, and a valley in its northeastern part, features akin to the midland region of Kerala. As is the case with most of the panchayats in Kerala, Kalliasseri is more of an administrative unit than a geographical or ecological entity. The micro watersheds in the panchayat extend to the neighbouring villages. A small portion of the panchayat in the southwestern corner adjoining the Valapatnam River is tidal marshy land. Thus, *prima facie*, the Panchayat contains a variety of land terrains, underlining the importance of considering locational specificity of natural resources in development planning (Kalliasseri Experiment, 1995).

Map 1 Landforms in Kalliasseri *Panchayat*



Demographic charactersitics

According to the 1991 census, the total population of Kalliasseri panchayat was 25,003 (12,015 males and 12,988 females). The population of the area has been rising at a rate more rapid than the average for the state. Between 1971 and 1981, the population increased by 25 percent. The growth rate slightly decelerated during the eighties to 22 percent. A census conducted in June 2000, in connection with the preparation of voters' list has shown that the number of houses in the panchayat is 5698 and the population 34,687, the average household size being 6.12.

Table 4.1 Population in Kalliasseri, 1971, 1981 and 1991

Year	House hold	Male	Female	Total	Average size of house hold	Growth in population
1971	2479	7945	8452	16397	6.61	-
1981	3160	8872	10625	20497	6.48	25.00
1991	3988	12015	12988	25003	6.27	22.96

Source: Kalliasseri Experiment in Local Level Planning (1995), KRPLLD

The average size of household has come down from 6.6 in 1971 to 6.1 in 2000. The relationship of the average household size to the size of land holding follows the normal positive relationship. Age distribution shows that nearly 9 percent of the population consists of children below the age of six years. And 20 percent is in the school going age of 6-15 years. The old, above 60 years constitute about 7 percent. 8 people in the age group of 16-59 years come to 64 percent. The details of the distribution of households and population by major caste groups are shown in Table IV of Appendix.

The role of caste and religion in the social life of the village has considerably declined during the last one century. A significant proportion of the population does not practise of any religion. Going by birth, 83 percent of the households are Hindus and 16.3 percent Muslims. The percentage of Christians is negligible. Ezhavas are numerically the largest caste group, accounting for 43 percent of the households. The forward castes are a minority with only a share of 15 percent of the households. The proportion of scheduled caste population is also relatively small, lower than the state average.

Income from agriculture does not constitute the dominant source of income for any of the land size groups. On an average it contributes to only 11 percent of the household income.

Map 2 Environmental Resources of Kalliasseri *Panchayat*

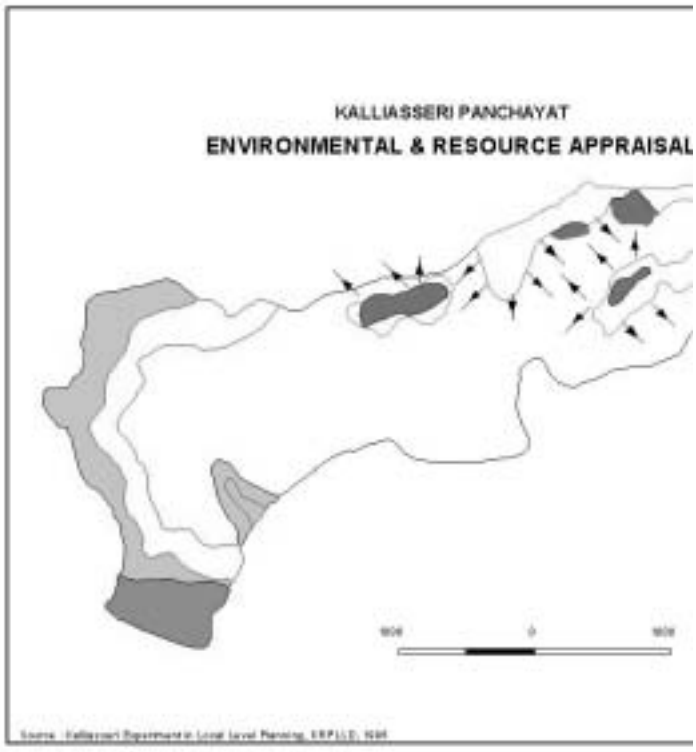


Table 4.2 Productivity of Major Crops

Crop	Productivity Kalliasseri	State Average
Rice	1666 kg/ha	1958 kg/ha
Coconut	3095 nuts/ha	5377 nuts/ha
Pepper	250 kg/ha	282 kg/ha
Cashew	5 kg/tree	
Pulses	300 kg/ha	706 kg/ha

Source: Kalliasseri Experiment in Local Level Planning (1995), KRPLLD

The vast majority of wage labourers engaged in non-agricultural activities are employed either in small-scale units or in co-operatives. Even though traditional and small-scale industries dominate, the self-employed workers constitute only 13 percent of the work force. Nearly 83 percent of the work force is employed in traditional industries as wage earners. Of the industrial workers, while around 600 persons are employed in factories, nearly 1500 work in the non-factory sector. Manufacturing is the dominant sector employing 35.5 percent of the work force. The salaried employees are concentrated in service sector jobs. Trade is the major source of self-employment.

Land Resources

The land resources of Kalliasseri panchayat may be divided into five main categories based on landforms: top surface, side slope, bottom surface or valley/plain, coastal plain and marshy land. Land productivity varies according to landform. The extent of control of sediment, soil and water movement also varies with the category of the land resource.

The top surface covering around 12 percent of the total area is composed of laterite soil. This area usually stands at 20-40m above mean sea level. It is characterised by moderate to high runoff. In areas having higher soil cover, infiltration is more than in other laterite outcrops; these areas are suitable for various types of crops like coconut, arecanut, and jackfruit, other fruit trees.

The side slopes are seen below the top surface. Sediment and water from the top surface comes down along these slopes. The slope of the area varies from 10 – 25 metres. Areas having higher slope have higher rate of soil erosion. Here the soil is mostly laterite gravelly loam with about 27 percent clay content. Soil is moderate to well-drained and deep. It is well vegetated with garden crops and forms the most intensively used land area with settlements and trees in them.

Valley floors are sinking zones of water and sediments coming down the side slopes. Here the soil is extremely rich due to continuous recharging of nutrients and therefore highly productive. Sand deposits in these areas are high and the soil has a sandy clay texture. Valley floors are located usually below 40m and above 20m. Variable soil composition and differential gradient results in non-uniform drainage and water-logging. As a result of fresh silt deposit and high water availability, these areas have been found to be most suitable for rice cultivation, even up to three crops a year. As sand and silt content is high, pulses and vegetables are also grown in some plots.

The bottom-most surface receives sediment and water from all the other overlying areas. It lies at about 3-4 m above MSL. The major soil type is coastal alluvium most suitable for rice cultivation. In some parts of this coastal land, coconut and a variety of other crops are grown. In some parts sacred groves are also seen. Increase in the proportion of sand in the soil results in excessive drainage and loss of organic matter, rendering the soil poor infertility.

The tidal marshy land covers only about 4 percent of the total area. Intrusion of saline water into the non-saline water of this area results in tidal marshes, which are zones of intense biological activity. These are natural sites of mangrove vegetation. During high tide these areas are inundated and receive regular tide deposits. Soil is clayey. This area is the most suited for pisciculture.

Coconut is the major crop accounting for cultivation about 54 percent of the area. Coconut cultivation is more in the coastal plains. Pepper and arecanut are the important slope crops. Cashew is grown in the terrace areas. Rice cultivation is seen only in about 21 percent of the area. Pulses and vegetables are grown in nearly 10 percent the area utilised for rice

Map 3 Relief Map of Kalliasseri *Panchayat*

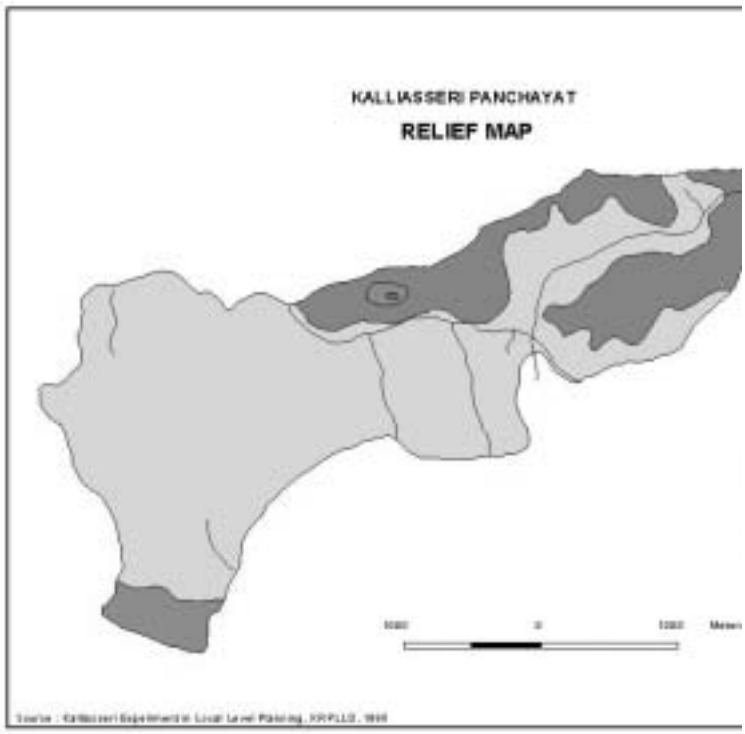


Table 4.3 Classification of Land Resource in the area

Sl.No	Type of land	Area ('00 km^2)	% of total
1.	Mesa/Laterite plateau	17819	11.59
2.	Slopes	27011	17.57
3.	Valley floor	16821	10.94
4.	Coastal plain	85351	55.50
5.	Tidal marsh	6771	4.40
	Total	***153773***	***100.0***

Source: Kalliasseri Experiment in Local Level Planning (1995), KRPLLD

cultivation, as a third crop, mostly in the coastal plains. The remaining areas have 'mixed crops' and 'mixed trees'. The land use pattern of Kalliasseri Panchayat is shown in Table V of Appendix.

Water resources

Kalliasseri panchayat receives good rainfall of about 320 cm, mostly from the southwest monsoon. Heavy downpour during the monsoon is concentrated within a span of 6-7 days.

High variations in the intensity of rainfall have led in recent years to a decline in the net sown area of rice by about 30 percent. The conversion of paddy lands for coconut cultivation had begun from the late fifties and gained momentum from the early' seventies. The major factors that were responsible for this change in the cropping pattern are discussed below.

In fact, coastal plain is more suitable for coconut than for rice. Therefore what is surprising is that the coastal plain remained under rain-fed rice crops till the 'seventies. 'Vadakkan' variety of rice that had been usually cultivated in the coastal plain gave only six-fold yield and was not therefore highly profitable. The main reason for rice cultivation to be in vogues seems to have been the tenurial conditions in the village. A significant proportion of the paddy land had been largely owned by 'Devaswoms', which leased out their land only on 'Varam' tenancy, a system that did not permit the tenant to plant any perennial crop on the leased in land. Even the private 'jenmis' permitted Kuzhikkanam tenancy, which permitted planting of trees and permanent improvement to land only on the sand ridges in the coastal plain. The paddy fields in the coastal plain also played an important role in the bovine economy of the village. After the single crop was harvested the paddy fields remained as virtual common property for grazing animals. The security of tenure granted by the tenancy legislation at the end of the 1950s gave the first fillip for conversion of paddy lands. The process accelerated with the passing of Land Reforms Act of 1971. The relatively rapid increase in coconut prices also proved to be a major incentive for conversion. The net return from coconut was, on the average, more than double that from rice for a unit area. Yet another reason was the spread of education and the resultant withdrawal of labour in agriculture, particularly of the younger generation in the farming community. The proportion of the agricultural labour class became very low in the area and the farmers themselves had to carryout the various operations in cultivation. Even the younger generation that remained in the agricultural sector shied away from arduous labour in rice cultivation to less labour-intensive crops such as coconut.

The spread of coconut cultivation is unlikely to have caused serious ecological problems of its own in the coastal plain. As we have noted, ecologically this region is more suited for coconut, but the cropping pattern shift in the valley is a matter of serious concern. Already about one-eighth of the valley is under coconut. Violations of the Land Utilization Order restricting the conversion of valley are evident in many places. If the expansion of coconut cultivation in the valley land is not checked it would seriously disrupt the valley ecology and rice cultivation in the near future.

Traditionally, a part of the marshland also used to be under rice cultivation. Marshland rice cultivation disappeared nearly a decade ago. The main reason had been the increase in salinity of the Valapattanam river water during the non-monsoon months due to decline of discharge in the river.

An unexpected side effect of the spread of coconut plantations in the coastal plain has been the aggravation of the salinity problem. Salinity in the Valapattanam River increases drastically during the non-monsoon period. The intrusion of saline water into the panchayat through the Kandanchira thodu became a major problem for rice cultivation in the neighbouring areas. In order to restrain salt-water intrusion during summer, a regulator popularly known

as Irinavu dam was built in 1957. It was expected that the dam would benefit a large area of rice cultivation. For various administrative reasons the dam was not commissioned and it has remained merely as a transportation link across Irinavu *thodu*. The problem of saline water intrusion has been aggravated by the pumping out of ground water for irrigating coconut. Unlike the rain-fed rice crop, coconut requires irrigation during the summer months, a need that is being met mainly through well- irrigation.

A disturbing trend in the changes in cultivation practices has been the decline in homestead farms. Typical homestead farms in the hill slope or hill terrace used to have large numbers of trees like coconut, arecanut, jack, mango, and cashew nut vegetables, tapioca, banana, and other crops such as pepper. The trend has been towards cultivation of coconut mono crop. As the number of houses increases by partition of ancestral homesteads, the axe first falls on jack, mango and tamarind trees. Being an ideal tree for timber for door and window frames and furniture, there is great demand for the Jack wood. Indigenous varieties of mangoes are also on the way out. The mango tree also serves as timber for a variety of purposes. Poor people use it as wood for rafters and reapers and even for door and windows frames in house construction. As per the Hindu custom, the cremation of the dead is done with firewood from mango trees. When there is crunch for domestic fuel wood, mango trees, cashew trees and young wild trees that grow on the margin of the homesteads are cut. The number of trees in homesteads has come down drastically. Vegetable cultivation has sharply declined. At present only about 7 percent of the paddy fields are used for cultivation of pulses and vegetables during the post-harvest months.

Decline in rice cultivation has also contributed to depletion of cattle stock in the village. After the harvest of the single crop, by tradition, the coastal paddy lands were virtually a common property resource where cattle grazed. Cow dung was the important traditional biofertiliser. As rice cultivation in the coastal plain declined, the traditional grazing system also rapidly declined; it totally disappeared by the early 'seventies. The declining organic content of the sandy soil is today a visible problem in the reclaimed paddy fields.

Kalliasseri and Chandroth Kannan

The ballad about Chandroth Kannan of Kalliasseri gives an idea about the large extent of paddy fields that had existed in the ancient past.

" Aringoda kovvalum kovvachalum
Anjooru pothippadu chenna kandam
Mangattuvayalile punja kandam
Mangattupalam muthalulla
Kandamchirappalam Athirayittu"

The Ballad depicts the heroism of Chandroth Kannan in helping Chirakkal Kovilakam to release the cow and calf abducted by soldiers of Arakkal Raja. The Chirakkal Raja in appreciation, gifts out a large area of paddy fields to Chandroth Kannan whereby he becomes rich and known. This creates eye sore to Erambala Tharavadu. Making advantage of the matrimonial relationship of the latter with Chirakkal Raja, Chandroth Kannan is killed by the Raja. Woven around the story is a graphic depiction of Kalliasseri of yester years.

Decline in livestock

The livestock economy of Kalliasseri panchayat has undergone dramatic change during the past three decades. Traditionally the livestock consisted of cattle, which was the main source of draught power and milk. Cattle were an important component of the homestead farms. The total bovine population in the panchayat declined by around 30 percent between 1966 and 1992. The decline is applicable to all categories of livestock. Even poultry population declined by around 15 percent. The composition of livestock also underwent a change along with changes in the cultivation and transport practices; the bullock population has virtually disappeared. Similarly, there has been a sharp decline in the number of buffaloes and goats. At present more than half the cattle stock population is of hybrid varieties; Kalliasseri has shared the remarkable success of modernisation of animal husbandry in Kerala. In poultry also there has been a decline in the 'desi' (indigenous) breeds. In 1966, 98 percent of the poultry in the Kalliasseri were of 'desi' breeds. The details of the distribution of livestock ward-wise are shown in Appendix Table VI.

Livestock populations are being homogenised and their diversity is being irrecoverably lost. The carefully evolved pure breeds of cattle are on their way to extinction. Today crossbreeds are systematically substituting them.

With animals disappearing as an essential component of primary systems, and their contribution of organic fertility being substituted by chemical fertilizers, soil flora and fauna have also become extinct. The local-specific nitrogen fixing bacteria, fungi that facilitate nutrient intake through mycorrhizal association, predators of pests, pollinators and seed dispersers, and other species that co-evolved over centuries to provide environmental services to traditional agrosystems, have become extinct or have had their genetic base dramatically narrowed. Deprived of the flora with which they co-evolved, soil microbes also disappear. This is a serious fall out of the White Revolution. Cowdung, ash and leaf manure were the only fertilizers available to crops, about 50 years ago. The introduction of chemical fertilizers and the aggressive propaganda by the Agriculture Department to popularise them have deteriorated the productivity of the soil. It is not the use of chemical fertilizers, but its misuse and lack of supplementation by biofertilizers that has caused the ruin.

5. Plant diversity

'The Treasure of Malabar' or *Hortus Malabaricus* published in twelve volumes from 1678 to 1693 contains valuable information on local medicinal, aromatic, timber, food and ornamental plants of Malabar. It describes and illustrates 793 plants (693 species) of the 17th century Malabar covering the coastal areas ranging from the littoral to the low land and from hills to mountains and covering approximately 12,000 km (Manilal, 1980). There are about 675 Angiosperms of which 550 species belong to Dicots and 107 species to Monocots, 2 to Gymnosperms, 13 to Pteridophytes and 1 to Bryophyte. Of these, 23 species are on the list of endangered species. The study by C. R. Suresh (1986) shows that about 660 species are present in the original localities as mentioned by Hendrik Van Rheede, the author of *Hortus Malabaricus.*

Table 5.1 Red-Listed Plants Documented more than 300 Years ago

Sl. No.	Botanical Name	Vernacular Name	Status
1.	*Acorus calamus*	Vayambu	VU (R)
2.	*Adenia hondala*	Modekka	VU (R)
3.	*Aegle marmelos*	Koovalam	VU (R)
4.	*Amorphophallus paeonifolius*	Chena	VU (R)
5.	*Ampelocissus indica*	Chembra valli	EN (R)
6.	*Andrographis paniculata*		LR-LC(R)
7.	*Artemisia nilagirica*		LR-LC(G)
8.	*Cycas circinalis*	Eendu	CR (R)
9.	*Drosera indica*	Pullazhaku, Sisirapatram	LR-NT(R)
10.	*Embelia ribes*	Poovalli	LR-NT(R)
11.	*Gloriosa superba*	Mendoni	LR-NT(R)
12.	*Holostemma ada-kodien*		VU (R)
13.	*Kaempferia galanga*	Kachooram	CR (R)
14.	*Michelia champaca*	Pon chempakam	VU (R)
15.	*Myristica malabarica*		EN (G)
16.	*Oroxylum indicum*	Payyana	VU (R)
17.	*Piper longum L*	Thippali	LR-NT
18.	*Piper nigrum L*	Molaku kodi	VU (G)
19.	*Rauwolfia serpentina*	Sarpagandhi	EN
20.	*Saraca asoca*	Ashokam	EN
21.	*Symplocos cochincinensis*	Pachotti	LR-NT(R)
22.	*Tinospora sinensis*	Pee amridu	VU (R)
23.	*Vateria indica*	Painavu	LR-NT (G)

CR	– Critically Endangered	NT	– Near Threatened
EN (R)	– Endangered – Regional	LR	– Low Risk
EN (G)	– Endangered – Global	LC	– Least Concern

This is the rich heritage of our villages. But, human population that grew by leaps and bounds during the past three centuries had its disastrous effect on plant diversity. Man's interaction with land and water has undergone radical changes. The relationship has transformed from a harmonious one to that of blatant exploitation. In spite of such tremendous onslaught on nature, because of the plentiful sun and rain with which the West Coast is gifted, the diversity that exists in these human-habited ecosystems is still enormous.

Kalliasseri panchayat is such a human-habited area. Plant diversity in this panchayat is considerable. It includes medicinal plants, trees, cereals, climbers and creepers, tuber crops, vegetables, fruit crops & mangroves. Some of the rare and threatened plants are noticed here. The folk knowledge about the plants of the panchayat is very rich; all the knowledge is centred, however, on the old people of the panchayat. One of the saddest things is that the youngsters of the area are not aware of any folk knowledge.

Trees

Kalliasseri panchayat has rich tree-species diversity. This includes some of the rare and threatened plants such as *Santalum album* (Chandanam), *Thespesia populnea Cav* (Poovarasu), *Sapindus emarginatus Vahl* (Soppinkayamaram), *Saraca indica L* (Ashokam), *Spondias mangifera L* (Ambazham), and *Holigarna arnottiana Hk.f* (Cheru maram). The number of the tree species is getting depleted because trees are cut for a variety of purposes such as fuel and construction material. In the case of *Mangifera indica*, now local varieties are rare and the cultivation of graft varieties is on the increase. Local varieties of *Mangifera indica* like *Kovakka mavu*, *Panchara mavu*, *Puliyan*, *Kadukkachi*, *Bappakay*, *Elamavu*, *Kannapuram mavu*, *Mysore mavu*, *Olar mavu*, *Nambiar mavu*, and *Kuttiattoor* are present in some areas of the panchayat. The people of the area use the fruits of these local varieties as common property. But the graft variety fruits are considered private property. Cultivation of coconut and cashew nut trees has reduced the area for cultivation of other trees. The density of houses in the panchayat has increased tremendously. The trees are being cut down for creating area for construction of houses and as raw material for the construction.

Trees are cut in general for construction works and use as fuel wood. About one-half of the energy sources for cooking and one-fourth of the energy source for water heating is firewood. A higher level of usage of biomass energy sources may reduce dependence on the degree of firewood consumption. There are eleven wood-based industries in the panchayat. These industries have been the major cause for the depletion of softwood from the area. There is acute scarcity for timber of all kinds.

The details of the trees identified including their botanical name, family, vernacular name, useful parts and their uses and present status are shown in Appendix Table VII.

Shrubs

Shrubs are bushy plants that do not grow tall. These plants branch from the very bottom of their stem, which is mostly woody, but in some cases fleshy too. Sixty-nine species of shrubs have been identified from Kalliasseri, the details of which are shown in Appendix Table VIII.

Medicinal plants

Many medicinal plants were in use in the past as home remedies. But now home remedies are nearly non-existent. Several medicinal plants are used by ayurvedic practitioners to prepare medicines that are commercially important. This survey has revealed that only very few persons in the panchayat are involved in medicinal plant collection. There used to be in the not-too-distant past, many persons engaged in this kind of work as professional plant collectors. Now, most herbal raw materials for ayurvedic preparations come form outside the panchayat. Local collection is minimal. People are not interested in making use of the local knowledge of home remedies; there is difficulty in preparing the medicines too.

Modern medicine came to Kalliasseri in the early years of the 20th century. But even thereafter, it was the traditional system, which was widely sought after. The climatic conditions favoured the growth of numerous plants and trees of great medicinal value and learned Ayurvedic practitioners of the area (*Vaidyas*) used them in their medicinal preparations. Many who practiced medicine were not officially recognized professionals, but who inherited knowledge of illnesses, medicines and treatment from their ancestors. Thus, in each village there used to be experts in the treatment of Orthopaedic cases; some were well versed in treatment of hepatitis and so on.

Today people widely use Allopathy, Homeopathy and Ayurveda. The present generation in the locality has only negligible knowledge about medicinal plants. Medicinal plants like *Naravelia zeylanica* (Vathacody), *Calophyllum inophyllum* (Punna), *Cissus quadrangularis* (Changalamparanda), *Cardiospermum halicacabun* (Uzhinja), *Kaempferia galanga* (Kacholam), and *Acorus calamus* (Vayamb) have become very rare in the area. Since some medicinal plants are easily available but others are not, several medicinal preparations of Ayurveda, which are compound drugs, are difficult to be made. The scarcity could be overcome if medicinal plants are cultivated in homesteads.

In the panchayat, 162 species of medicinal plants were identified. Discussion with elderly *Vaidyans* and other traditional health practitioners in the locality revealed a fund of knowledge regarding the use of plants commonly seen in Kalliasseri.

The details of the medicinal plants including their botanical name, family, vernacular name, uses and preparation of medicine are given in Appendix Table IX.

Ornamental plants

From the Kalliasseri panchayat area, 103 species of ornamental plants have been identified; their attractive parts have also been identified, the details of which are given in Appendix Table X.

Flora

Dalits of 397 species of flora and their families, identified from the Kalliasseri panchayat. are given in Appendix Table XI.

Vegetables

Twenty-nine species of vegetables have been identified in the area. The pulses and the cucurbitaceae members are cultivated widely. Tuber crops are also cultivated. In case of commercial cultivation, use of fertilizers and insecticides is on the increase.

The seed-keeping technology of the people is appreciable. Their traditional technology to preserve seeds is highly efficient. They mix the seeds with cow-dung, make cakes of cow-dung and paste them on the walls of the kitchen. These seeds are not destroyed by insects because of the smoke and high temperature of the kitchen. This practice has virtually disappeared. Now people buy seeds from agricultural offices and other agencies. Hence, cultivation has become of hybrid varieties.

There was a rich tradition of cultivation of vegetables, especially Cucumis sativus (Vellari) in the coastal plains during summer. Kolath vayal was famous for vellari cultivation. Large tracts of fields used to be taken on lease from landlords for vegetable cultivation. The manure used was cow-dung and ash. No pesticide was sprayed. Small water-holes would be dug and both men and women would be engaged in irrigating the base of the plants by using earthen pots called pani. When the fruits began to mature, the youth and children used to keep vigil day and night, against theft. It was during nights that local amature teams performed drama in open fields. When the fruits were plucked and the fields became empty, plays will be enacted. These crude dramas performed by the unititiated youth were called Vellari Nadakam.

Fruits available in plenty were sold either in the fields themselves or taken to the nearby market at Chirakkal.

People stored some fruits such as Cucumis sativus (Vellari), and Cucurbita moschata (Mathan) wrapped in the sheath of the areca leaves (pala) and hung in the ceiling. Fruits kept thus lasted undamaged for six to eight months. But now storage is possible only for 2-3 months, because of low quality fruits grown under heavy doses of chemical fertilizers and pesticides.

Some of the vegetables have high medicinal value. Benincasa hispida and Momordica charantia are valuable in diabetic treatments. Moringa oleifera and Amaranthus are useful against night blindness. Carica papaya is highly helpful to reduce worm infestation.

Table 5.2 Vegetables

Sl. No.	Botanical name	Family	Vernacular name	Useful part
1.	*Amaranthus gangeticus L.*	Amaranthaceae	Cheera	Leaf
2	*Amaranthus spinosus L.*	Amaranthaceae	Mullan cheera	Leaf
3	*Amaranthus viridis L.*	Amaranthaceae	Cheru cheera	Leaf
4	*Amorphophallus companulatus Bl.*	Araceae	Chena	Corm
5	*Averrhoa bilimbi L.*	Oxalidaceae	Bilbi	Fruit
6	*Benincasa cerifera Savi.*	Cucurbitaceae	Kumbalanga/ Elavan	Fruit
7	*Cajanus cajan*	Fabaceae	Thuvara	Fruit& seeds
8	*Canavalia ensiformis (L)DC.*	Fabaceae	Avara/Mathivalu	Tender fruit
9	*Capsicum anum L.*	Solanaceae	Mulak	Fruit
10	*Capsicum fruitescens L.*	Solanaceae	Mulak	Fruit
11	*Carica papaya L.*	Caricaceae	Papaya / Kapalanga	Tender fruit
12	*Citrus medica L.var.acida.*	Rutaceae	Cherunaragam	Fruit
13	*Coccinia indica W&A.*	Cucurbitaceae	Kovayka	Tender fruit
14	*Colocasia antiquorum Schott.*	Araceae	Chempu	Corm
15	*Cucumis melo L.*	Cucurbitaceae	Kakkiri	Fruit
16	*Cucumis sativus L.*	Cucurbitaceae	Vellari	Fruit
17	*Cucurbita moschata L.*	Cucurbitaceae	Mathan	Fruit
18	*Dioscorea alata L.*	Dioscoreaceae	Kachil	Tuber
19	*Dolichos biflorus L.*	Fabaceae	Muthira	Seeds
20	*Dolichos lablab L.*	Fabaceae	Avara/Kotapayar	Tender fruits & seeds
21	*Hibiscus esculentus L.*	Malvaceae	Venda	Fruit
22	*Lagenaria vulgaris Ser.*	Cucurbitaceae	Churacka	Tender fruit
23	*Luffa acutangula Roxb.*	Cucurbitaceae	Peechinga	Tender fruit
24	*Lycopersicon esculentum Mill.*	Solanaceae	Thackali	Fruit

25	*Momordica charantia L.*	Cucurbitaceae	Kaypakka/Paval	Tender fruit
26	*Moringa oleifera Lam.*	Moringaceae	Muringa	Leaf/Flower/ Fruit
27	*Murraya koenigii Spreng.*	Rutaceae	Kariveppu	Leaf
28	*Pisum sativum L.*	Fabaceae	Payar	Fruit& dry seeds
29	*Raphanus sativus L.*	Cruciferae	Mullangi	Tuberous stem
30	*Solanum melongena L.*	Solanaceae	Vazhuthina	Tender fruit
31	*Trichosanthus anguina L.*	Cucurbitaceae	Padavalam	Fruit

Fruit crops

Kalliasseri panchayat has 20 species of fruit crops (Table 5.3). Some of them are not local but collected by the people from other parts and cultivated here. Examples of such imported crops are *Carissa carandas*, *Terminalia catappa* (*Badam*), *Averrhoea bilimbi*, and *Annona squamosa*. *Artocarpus integrifolia* (*Plavu*) has two major varieties, *Pazham* and *Varicka*. Several varieties of *Musa paradisiaca* are present here: *Mysore poovan*, *Nenthran*, *Kadali*, *Rakthapoovan*, *Koombilla poovan*, *Neypoovan*, *Adacka poovan*, *Mannan*, *Sodhari* and *Robusta*. Now hybrid and tissue culture varieties are also cultivated.

Most of the home gardens have more than one mango tree. Nine local varieties of *Mangier indica* are present in the panchayat.

1. *Puliyan*: This type is sour in taste when not ripe. There are different types of *Puliyan*. One is *Kadukkachi*. According to K. P. Balan Master of Ward VII there are four varieties of *Kadukkachi.*
   (a) Small seed, thick epicarp and fleshy mesocarp.
   (b) Big seed, plenty of sweet juice.
   (c) Flesh scanty, but sweet juice.
   (d) Plenty of fibrous mesocarp.

All these varieties are most suited to prepare pickles. When unripe they are sour; but when ripe are extremely sweet. In Ward VII, this variety of mango trees is common.

2. *Bappakkay*: The epicarp is not sour even in unripe fruits. When ripe, sweet.
3. *Elamavu:* Big fruits, seed small, sweet when ripe.
4. *Kannapuram mavu (Chuvappan*): Big fruits, fleshy, very sweet. When ripe fruit is red in colour.
5. *Chakkaramavu*: Fruit of average size; near the base, the colout of the fruit is red. When unripe moderately sweet; when ripe; extremely sweet.
6. *Gomavu*: Small seed; fruits very sweet when ripe.
7. *Mysore mavu*: Fruit as big as coconut; seed small; plenty of flesh; very sweet.
8. *Olor mavu*: Fruit small, sweet and fleshy.
9. *Nambiar mavu*: Big size; fibrous in one variety and fleshy in another. In one variety fruits come in large branches.

Psidium guajava (*Pera*): two varieties are found in the panchayat: one with white flesh and the other with red flesh.
Spondias pinnata (*Ambazham*), *Syzygium cumini* (*Njaval*), *Phyllanthus emblica* (*Nelli*) are also in the Panchayat, but only rarely.

In the case of mangifera indica, newly cultivated seedlings are grafted with specoal varieties and thus hybrid varieties are produced. Tissue culture - seedlings of *Musa paradisiaca* are also to cultivate hybrid varieties. This is one of the major causes for decline of local varieties. *Artocarpus integrifolia* (*Plavu*), *Mangier indica* (*Mavu*), *Artocarpus hirsuita* (*Ayaniplavu*) etc are cut down for use as timber for furniture-making and house construction and they are fast disappearing too.

Table 5.3 Fruit Crops

Sl. No.	Botanical name	Family	Vernacular name	Availability
1	*Achras sapota L.*	Sapotaceae	Sapota	Occasional
2	*Ananas cosmosus Merr.*	Bromeliaceae	Kaithachakka	Common
3	*Annona squamosa L.*	Anonaceae	Aathachacka	Occasional
4	*Artocarpus heterophyllus Lam.*	Moraceae	Pilavu	Common
5	*Artocarpus hirsuta Lam.*	Moraceae	Ayaniplavu	Occasional
6	*Averrhoa bilimbi L.*	Oxalidaceae	Bilimbi	Occasional
7	*Carica papaya L.*	Caricaceae	Kappalam/ Pappaya	Common
8	*Chrysophyllum cainito L.*	Sapotaceae	Rosapple/ Starapple	Rare
9	*Citrus medica L.var.acida.*	Rutaceae	Cherunarakam	Occasional
10	*Citrullus vulgaris Schrad.*	Cucurbitaceae	Vathacka	Occasional
11	*Jambosa vulgaris DC.*	Myrtaceae	Chamba	Occasional
12	*Mangier indica L..*	Anacardiaceae	Mavu	Common
13	*Musa paradisiaca L.*	Musaceae	Vazha	Common
14	*Passiflora edulis Sims.*	Passifloraceae	Passion fruit	Occassional
15	*Phyllanthus emblica L.*	Euphorbiaceae	Nelli	Rare
16	*Prunus avium L..*	Rosaceae	Cheri	Rare
17	*Psidium guajava L.*	Myrtaceae	Pera	Common
18	*Spondias pinnata Kurz.*	Anacardiaceae	Ambazham	Rare
19	*Syzygium cumini (L)Skeels.*	Myrtaceae	Njaval	Rare
20	*Terminalia catappa L.*	Combretaceae	Badam	Occasional

Cereals

The major cereal cultivated in the panchayat is rice (*B.N.Oryza sativa L*). In about 7 percent of the area rice cultivation is alternated with cultivation of vegetables and pulses. Rice is cultivated only once in a year in most of the paddy lands.

Different varieties of rice seeds are used for cultivation of the first and the second crops. Earlier biocontrol methods for controlling pests had been in use. Bio-control methods have been ineffective since farmers now use high-yielding hybrid varieties. In consequence, the use of chemical fertilizers, and chemical pesticides and insecticides has become the practice. More than 30 varieties of rice used to be cultivated in the area in the earlier times. But now only very few local varieties are used for rice cultivation; hybrid and high yielding varieties are largely in use. The spread of intensive agriculture based on much fewer varieties than in the past, has had an adverse impact on genetic diversity of crops and livestock. Decline in indigenous breeds and varieties and their replacement by a few selected varieties is a relatively recent phenomenon in developing countries. The change has gathered great momentum in recent decades. For example, in India where 50,000 local varieties of rice had existed till recently, only a small number exist now. In Kalliasseri also 90 percent of the traditional rice varieties are lost. The seed bank of the Kalliasseri Biodiversity Project has only seeds of 11 local varieties.

Kalliasseri biodiversity project 'seed bank' contains seeds of 11 local varieties. Their vernacular variety names are given below:

1) Kunjinellu	*2) Chitteni*	*3) Varocky*
4) Navarapuncha	*5) Punchavith*	*6) Arickaray*
7) Thavalakkannan	*8) Mundakan*	*9) Vadackan*
10) Oarkkayama	*11) Jeeraka sala*	

It is, however, hybrid varieties of rice such as IR-8, IR-36, *Massori, Aathira, Aayirampara, Jyothi, Thriveni,* and *Neeraja* that dominate now in the area.

A wild variety of rice called *varinellu,* consumed by the poor, sometimes appear in the peripheries of uncultivated fields and on the periphery of the fields.

The local names of rice varieties available in the panchayat are given below.

Arickaray: Second crop, cultivated on marshy land; Duration 110-120 days; yield up to 15 times the seed grains narrow and long with brown colour; grows to a height of 1.6-1.8 metres.

Aryan: - Cultivated in low land areas, plant height 1.25 to 1.5 metres, growth period is 170 to 180 days, grows in waterlogged areas.

Oarkkazhama: Cultivation as first crop in salt-water-locked areas. Growth period 170-180 days; grains are gold coloured; high yield (20 times) and high disease resistant; during the time of grain-ripening plants, are commonly lodged.

Oarthidiyan: Cultivated in salt-water-locked areas. 110-120 days of growth; ripened grains drop down from the plant.

Vadakkan (Veluppu): Cultivated as First crop; 120-135 days of growth; grains are long and whitish; 20-25 times yield; 1.3 – 2.5 metres in height.

Kayama (Thrissur): Plant height about 0.7-1 metre; grows in low-water and high water areas.

Thavakkayama: Cultivated as first crop; de-husked rice whitish; 150-170 days of growth; cultivated in waterlogged areas.

Kuthiru: High yield; 110-120 days of growth, horned, big, white-coloured grains; does not lodge; inflorescence looks like sorghum.

Kurukkazhama: Cultivated as first crop, 120-130 days of growth, white grains; 25 times yield; plants grow up to an average height of 1.7 metres.

Kunjinellu: Cultivated as first crop; 120 days of growth; rice fragrant and delicious; paddy does not have horn. White and red coloured grains exist.
Oaka kunjinellu: a horned variety of kunjinellu.

Koyivalan: Cultivated as first crop; 180 days of growth; white grains; plant grows to 1.7 to 1.8 metres in height; low yield (10-15 times); resistant to flood; known also as *Parambavattan*.

Chitteni: Cultivated as second crop; 140-150 days of growth; grows to a height of 1.3 to 1.7 metres in height.

Chennellu: 160 days of growth, whitish grains; plant about 1.7 metres in height; 12-15 times yield; high pest-resistant; has some medicinal value.

Thynar:160 days of growth; plant grows to 1.3 to 1.7 metres in height; 18-23 times yield.

Kuroorayi: Leaf sheath is bluish. Reddish rice. Not resistant to flood; known also as Varocky.

Punchanellu: Cultivated as second crop, Tasty; plant grows to a height of about 1.3-1.7 metres; irrigation necessary. 100-110 days of growth. Small grains.

Jeerakasala: Fragrant, lengthy small and white grains; 150-180 days of growth; 1.7-1.8 metres of height for the plant; suitable for preparation of ghee rice, and biriyani. Low yield.

Mundakan: 230 days of growth; flood-resistant; leaves are pruned during the rainy season.

Navara: 60 days of growth; cultivated at all crop seasons; yield low – only 4 to 6 times the seed; white, broad grains.

Navarapuncha: 90 days of growth. cultivated during all crop seasons; plant grows to about 0.7 to 1 metre height; Used as medicine in Ayurveda. Up to 15 times yield; white, narrow grain.

Poothada: Cultivated as first crop; rain-dependent cultivation.

Palliyaran: Horned grain; cultivated in salt-water areas; low yield;

Karinchan: Cultivated as first crop; black grains; 160-180 days of growth, 15-20 times yield.

Vadakkan puncha: Grains have white and brown colour combination; up to 10 times yield.

Malachan: 150-160 days of growth; black grains; upper portion of the leaf sheath have a chain like (mala) design; highly disease resistant.

Varinellu: It occurs as a weed in paddy fields; horned type grain; ripened grains drop off; grain suited for preparing beaten rice (*aval*); rice consumed by the poor people of the area.

Conclusion: Nowadays only a few of these local varieties are cultivated in the area. Others are also endemic to this area. The local varieties present here are the following;

1. *Oarkkayama*	2. *Arikkaray*	3. *Kayama (Veluppu)*	4. *Kuthiru*
5. *Kurukkarama*	6. *Kunjinellu*	7. *Chitteni*	8. *Chennellu*
9. *Navarapuncha*	10. *Mundakan*	11. *Vadakkan*	12. *Varocky*

Tuber crops

The widely cultivated tuber crops of the area are the *Manihot utilissima* (Tapioca), *Amorphophallus companulatus, Dioscorea alata,* and *Ipomaea batatas*. Of Dioscorea two local varieties are cultivated (one having red tuber and the other having white tuber). Of Colocasia, two local varieties are present-'Eaya chempu' and 'Thalu'. *Dioscorea esculenta Bark* is now rare to the area. Previously the people of the area widely used this as food. But now it is rarely available in the wild. Of Tapioca many local varieties are available.

The cultivation of tuber crops is highly reduced because of the cultivation of perennial crops and also because tuber crop cultivation is less profitable. The details of the tubers are given in Table XII of Appendix.

Aromatic plants of Kalliasseri *panchayat*

Table 5.4 Aromatic Plants

Sl.no	Botanical name	Family	Vernacular name
1.	*Cymbopogon citratus (DC) Stapf.*	Poaceae	Inchippullu
2.	*Eucalyptus citriodera Hook.*	Myrtaceae	Eucalyptus
3.	*Veteveria zizanoides (L) Nash.*	Poaceae	Ramacham

Plants for fumigation and chewing

The cultivation of the plants whose barks or nuts for fumigation and chewing has steeply declined. Betel leaf consumption and therefore cultivation of betel vines have come down. Now-a-days people use chewing items, which come in packets. Plants like Leucas, Osimum, and Vitex had in been in use in this area for fumigation purposes for keeping away mosquitoes; now people use mosquito coils and mats for that purpose. The number of these plants has also fallen.

The details of the plants identified along with their botanical and vernacular names and the preparation methods are given in Appendix Table XIII.

Climbers and creepers

The panchayat is rich in climbers and creepers of various species. Most of these plants have high medicinal value; *Asparagus racemosus* (Sathavari), *Hydrocotyle asiatica* (Kudangal), and *Merremia umbellata*, *Naravelia zeylanica* (Vathakody) etc are a few examples. *Asparagus racemosus* and *Naravelia zeylanica* have become very rare now in the panchayat. The list of the climbers and creepers of Kalliasseri panchayat is given in the Appendix Table XIV (This list does not include creepers and climbers included in the list of tuber crops). People consider these plants weeds and therefore destroy them for preparing ground for cultivation.

Mangroves

Marsh lands cover about 68 hectares (4.4 percent) of the total panchayat area. They are located mainly in the southwestern part of the panchayat adjoining Valapattanam River. There is also a small area of marshy land in the northeastern part of the panchayat beside the Irinave *thodu*. The entire marshy area is under private ownership of about 60 families.

A part of the marshland was under *kaipadu* cultivation (of rice) until a decade ago. The main reason for the disappearance of *kaipadu* cultivation here is due to the increase in salinity of the Valapattanam River water during the non-monsoon months. And the reason

for this, is town, is the decline of discharge in the river (CDS Report, 1995). These marshy areas are the sites of mangrove vegetation.

According to UNESCO, 'Mangrove ecosystem consists of the inter-tidal flora and fauna in the tropics and sub-tropics and is dominated by evergreen sclerophyllous broad-leaved trees with stilt roots or pneumatophorous and viviparous seedlings' (1973). According to FAO, 'Mangroves are the characteristic littoral plant formations of tropical and sub-tropical sheltered coastlines'. They have been variously described as 'coastal woodlands', 'tidal forest' and 'mangrove forest'. Their root systems are immersed regularly in saline water. Mangroves are plant communities comprising predominantly of salt tolerant species of herbs, shrubs, vines, trees and associated fauna which colonise the protected sedimentary shores especially tidal lagoons, embankments, creeks and estuaries (Water Resources of Northern Kerala, SEEK, 1999).

Mangrove biodiversity

Mangroves play an important role in brackish water environment. They are essential for survival of many fishes and shrimp species. Wetland vegetation harbours several air-breathing snails such as Pila, Lymnaea species, Indoplanorbis species, and Bellamya species. Over 2500 species of fishes have been identified and recorded by Zoological Survey of India. More than 100 species of birds are recorded from wetlands.

The flora of mangroves falls under two categories – true mangroves and mangrove associates. True mangroves are called 'eumangroves'. They have high degree of salinity tolerance and habitat specificity (they grow only in inter-tidal environment). Mangrove associates are, on the other hand, land plants, which can tolerate salinity only to a lower degree.
Sonneratia and Lumnitzera racemosa are relatively new in the area. Except for Acanthus ilicifolius, Aegeceras corniculatum, Lumnitzera and Brugiera, all other are trees. Some are quite widespread; they include *Acanthus*, *Avicennia* (used for fodder, fuel wood and manure), Excoecaria (the roots of which are used for cork) and Rhizophora (used as fodder for goats). Less abundant Lumnitzera, Sonneratia, Barringtonia; Avicennia officianalis dominate leaving a single layer of undergrowth of Excoecaria and Aegiceras.

The details of the true and the associated mangrove species of Kalliasseri Panchayat are given in Table XV and XV (a) of Appendix.

Mangrove fauna

Birds, fishes, mammals (like Indian Jackal), Otter, bats and crabs play an important role in the food chain of the mangrove ecosystem. The mangrove litter is broken up into minute particles by crabs. These are then decomposed by a miscellany of bacterial population. The nutrients released there from become available for plankton. Crabs dig deep burrows in the mud and thereby help soil aeration.

Fishes: Indian Longfin Eel (Anguilla bengalensis) called Aaral is a freshwater fish but breeds

in estuary. Giant freshwater prawn (Macrobrachium sp.) called Attu Konju breeds in estuary and migrates upstream. Letes Calcariter (Narimeen) found in brackish waters of the estuary. Estuarine fishes include Liza parsia, Liza tade, Etroplus maculatus, Etroplus suratensis and Sillago sihama.

Prawns: The prawn species found in mangroves include Pinnaeus monodon, Pinnaeus indicus, Metapenaeus dobsoni, Metapenaeus coffinis, Metapenaeus merghensis and Metapenaeus monoceros.

Bi-valves: The bi-valves that are usually seen in the mudflats of mangroves are Meretrix meretrix, Meretrix casta, Perna indica, Perna viridis, Cassastrea maderassensis, Cassastrea malabarica, Cassastrea cuclulata, Plough shell (Bullia sp.), Horn shell (Telescopium sp.), Balanus.

Protection of Mangrove Ecosystem

Considering the ecological and economic importance of mangrove areas, measures to conserve and protect this ecosystem have to be implemented urgently. More areas have to be brought under mangrove vegetation.

For efficient utilisation of mangrove resource, they should be conserved on a sustainable basis. Poor management decisions and practices have severe social, economic and ecological impacts. The failure of national governments to adequately regulate the shrimp industry, and the headlong rush of multilateral lending agencies to fund aquaculture development without meeting their own stated ecological and social criteria, have contributed to the deterioration.

The global community has begun realising in recent years the need for protecting mangroves and other wetland resources. Preservation of mangrove areas has been implemented in at least eighteen countries. However, in most of these countries, the individual areas brought under preservation do not exceed 10 Km^2. A major global initiative in this direction has begun in right earnest, known as Ramsar Initiative.

Commercial crops

The major commercial crops of the panchayat are coconut, arecanut, pepper, and cashewnut. Productivity of coconut and pepper in these areas is lower than the State average.

Table 5.5 Commercial Crops

Crop	Productivity of Kalliasseri	Productivity of State
Coconut	3095 nuts/ha	5377 nuts/ha
Pepper	250 kg/ha	282 kg/ha
Cashew nut	5 kg/tree	

Local varieties of coconuts cultivated here are *Mattool thy, Anthoor thy, Nadan, Chenthengu*, and *Kuttiyadi*. Hybrid varieties are also cultivated.

Local varieties of pepper are *Valankotta, Uthiran, Poonjaran,* and *Karimunda*. *Valankotta* and *Uthiran* are suitable to be cultivated even using shade trees as support. Hybrid varieties such as Panniyoor – 1 are also cultivated. The area under pepper cultivation has been declining progressively.

Table 5.6 Local Varieties of Commercial Plants

Sl.	Botanical name	Family	Vernacular name	Useful parts
1.	*Anacardium occidentale L.*	Anacardiaceae	Kashumavu	Nut
2.	*Areca catechu L.*	Arecaceae	Kamungu	Nut
3.	*Cocos nucifera L.*	Arecaceae	Thengu	Kernel
4.	*Piper nigrum L.*	Piperaceae	Kurumolaku	Fruit

Endangered plants

The endangered plants of the panchayat include the following:

Memecylon lawsonii	-Wild	-Rare
Leucas aspera	-Wild	-Common
Bacopa monnieri	-Wild	-Common
Hedyotis sps	-Wild	-Common
Aegle marmelos	-Cultivated	-Rare
Andrographis paniculata	-Wild	-Rare
Cycas circinalis	-Wild	-Rare
Gloriosa superba	-Wild	-Common
Kaempferia galanga	-Cultivated	-Rare

Rare plants

The following plants are identified as rare species in Kalliasseri Panchayat

1) *Naravelia zeylanica*
2) *Calophyllum inophyllum*
3) *Sida rhombifolia*
4) *Cissus quadrangularis*
5) *Cardiospermum halicacabum*
6) *Brugiera gymnorhiza*
7) *Terminalia coreacea*

8) *Barringtonia acutangula*
9) *Memecylon lawsonii **
10) *Melothria madaras patana*
11) *Nyctanthus arbor-tristis L.*
12) *Solanum nigrum*
13) *Aeginetia indica (Endemic)*
14) *Hydrophylla sps*
15) *Ocimum anisatum*
16) *Kaempferia galanga **
17) *Asparagus racemosus*
18) *Acorus calamus **
19) *Hydrolea zeylanica*
20) *Vateria indica*

(They are considered a rare variety in the IUCN category also)*

Besides this, most of the medicinal plants identified in this panchayat are of rare occurrence. Most of them are cultivated by the traditional ayurvedic physicians and by one or two schools. The Kalliasseri South UP School has planted at least 80 species of medicinal plants.

Home gardens

Among the most diverse of agricultural systems known are the home gardens in the humid tropics, the result of long historical development of technology designed to meet the needs of local communities (Gadgil). The typical home garden is an assemblage of trees, shrubs, climbers, herbs and creeping plants that are used for fruit, vegetables, spices, ornamentals, medicine, fodder, fuel, etc.

To assess the quantum of diversity that exists in home gardens the following study was conducted. Homesteads were selected at random in each of the 3 ecological zones - the laterite mesa, the slopes and the coastal plain. From each ecological zone plots below 15 cents, between 15 and 25 cents and above 25 cents were selected. These plots were subjected to a preliminary survey on plant diversity. Only trees, shrubs and herbs – both cultivated and wild – were considered.

The study has revealed that in spite of severe anthropogenic pressures, there still exists considerable biological diversity in the home gardens of the Panchayat. Extreme variations are observed between rainy and summer seasons. In this respect, not much difference is observed among the three ecozones – Coastal Plain, Mesa lands and the Slopes. But within a single plot itself, large diversity is seen around boundaries, particularly in large plots. However, the number of fruit trees like Jack and Mango have fallen. The presence of wild trees also is significantly much lower than earlier. [Appendix Tables XVI (a) – XVI (c) and Tables XVII (a) – Table XVII (c)].

Biodiversity of sacred grove (*Kaavus)*

A Sacred grove is a patch of forest, which contains a shrine and a deity kept inviolate by human action, for fear of wrath of the forest deity. It formed an integral part of the traditional community life in the State till a few decades ago and served as successful models of forest conservation. But inroads by organized religious interests and half-baked government policies are now posing a serious threat to the survival of sacred groves.

'*Kaav*' is a Dravidian term which means sacred grove. Sacred groves have existed, however, in many parts of the world, India, Ghana, Nigeria, Syria and Turkey. In India, they are known in various names: *Deorans* in Maharashtra, *Orans* in Rajasthan, *Sidhravanam* in Karnataka and *Kavu* in Malayalam and Tamil. The deity is *Naaga Devata* – snake god. These forest patches used to be conserved in the name of religion, but now they make for good business. Most of them are in the hands of wily tantriks, who permit the owners to change the use pattern of these forest patches; even to destroy them, without any compunction.

According to land records, there were more than 10,000 sacred groves in Kerala; recent studies indicate, however, that not more than 900 remain. Increasing scarcity of land due to growing population and development needs has played havoc with the forests of this state. Kerala with less than 2 percent of the country's land mass, harbours more than 3 percent of the country's population. The pressure is being reflected on the destruction of sacred groves and their conversion to other land uses. Sacred groves were an essential part of the undivided Hindu households of Kerala in the past. But with the disappearance of the joint family system and consequent partitions of family property household holdings have become fragmented. In the process sacred groves also were divided, reducing their size and number.

According to traditional belief, the groves are the abode of the serpent god and therefore sacrosanct; therefore they have to be left undisturbed. In fact, removing leaf litter from the groves or harvesting of trees in them is taboo. But the lure of lucre is too powerful to disregard.

Apart from their religious associations, sacred groves play an important ecological role also. They perform a complex array of interactions that influence the flora and fauna of the region in addition to influencing the local microclimate. Sacred groves are distinct and unique in their biodiversity. Some of them are mere relics of erstwhile gregarious vegetation. Compared to soil of nearby areas, the soil of sacred groves is highly porous, a condition which ensures optimum aeration of the soil and helps nutrient assimilation. The thick litter cover and channels created by the micro fauna or organisms inhabiting the soil layers, increase the capacity of the soil to retain water, and facilitate healthy development of plant roots, gaseous exchange and conduction of heat through plants and soil systems. Groves also serve as natural conservers of various endemic ecosystems and huge variety of medicinal plants, as well as rare endemic and endangered plants. Several important and semi-evergreen trees are found in these sacred groves. They house a large variety of insects, birds, reptiles and several small and large animals; in sum, they are treasure houses of biodiversity and represent a *mini ecosystem* with diverse biotic and abiotic components.

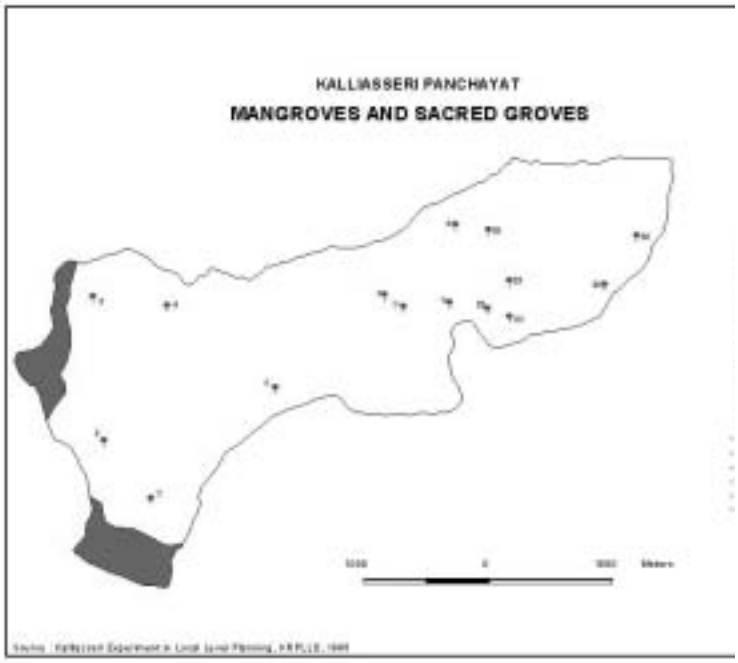
There are a large number of sacred groves in Northern Kerala, which are famous for their elaborate ritualistic ceremonies and festivals. In some districts heavy concentration of groves is observed. Kasargod with 71, Kannur with 60, Alappuzha with 49, Kollam with 44, Thiruvananthapuram with 43, Pathanamthitta with 33, and Kozhikode with 23. (Unnikrishnan, 995).

There exist several cultural practices that have contributed to conservation and enhancement of biodiversity. But establishing the connection between practices and conservation separately for each practice is difficult. The declared purpose of a practice may not be conservation, but the effect would be. Thus, in South Asia conservation of sacred ponds have helped conservation of the indigenous fish fauna. People protect ponds out of devotion to some deities, not to conserve fish diversity (Gadgil).

Among the large number of sacred groves in Kalliasseri panchayat two are worth special mention. The presence of these groves is not mentioned in the Development Report of the Panchayat or in any other document. These two areas are found to be rich in biodiversity. About 67 plant species have been identified from these groves, most of the species being those not found anywhere else in the panchayat. The more famous of them, Erampala is on the verge of destruction.

Some conspicuous features of these two groves are mentioned below.

Map 4 Mangroves and Sacred Groves of Kalliasseri *Panchayat*



(1) Erampala Tharavattu kavu

It has an area of 30 cents and is privately owned by the Erampala family. There are many religious beliefs associated with this grove. To avoid the fury of the snake god (*Sarppapappam*), gold coins and ornaments are kept buried in urns in the four corners of the grove. At present no idol is found there. Nobody is allowed to trespass on the sacred grove and if by any chance someone enters, then purificatory rituals (called *Suddhikalasam)* are be carried out. The only class of people allowed to enter the *kaavu* are the *Kosavans* who perform the purificatory functions. They collect dry twigs and branches of trees from inside the *kaavu*, which they use for performing the rituals. Use of footwear is not allowed in and around the premises of the shrine. Women, during their monthly periods and days immediately following childbirth are not allowed entry in this area.

(2) Cheriyath Naagakkavu

It has an area of about 50 cents and has thick vegetation growth. The deity here is called *Cheriyath Nagam*. The *pooja* and other rituals are carried out on the *Dhanu-Ayilyam* days. Here also the class of people *Kosavans* alone are allowed to enter the *kaavu.* They enter the *kaavu* only for certain specific purpose like clearing the pathway to the shrine or collecting the dry twigs and branches for use in the burning rituals in the temple shrine. Entry into the premises of the shrine is restricted to the members of the *Tharavadu*. The expenditure for carrying out the rites and rituals is met by the *Tharavadu* members.

The names of the other sacred groves in the panchayat are given below. Most of them are of small areas and have much fewer vegetation. Many of them are highly degraded too.

	Name of the sacred grove	***Plot Survey no.***
1.	Irinavu Kottam kaavu	S.no. 111
2.	Illippuram kaavu	S.no.122
3.	Irinavu vadakke kaavu	S.no.9
4.	Kalliasseri – Kannapuram	S.no.18
5.	Payyattom kaavu	S.no.52
6.	Kooroth Illam Ayyappan kaavu	S.no. 237
7.	Kakkoth kaavu	S.no.251
8.	Anchampeedika Asarikottam Kavu	S.no.254
9.	Parakkoth kaavu	S.no.302
10.	Ozhakrom Padinjare kaavu	S.no.314
11.	Manakkulangara Cheriyakaavu	S.no.314
12.	Cheriyath Nagam kaavu	S.no.317
13.	Erambala Nagam kaavu	S.no.321
14.	Eranjikeel Nagam kaavu	S.no.393
15.	Kakkam Kovil Nagam kaavu	S.no.418

The details of the 62 plant species identified from the sacred groves of Kalliasseri Panchayat are given in Appendix Table XVIII.

Hill top flora

Kalapram *Motta* has the highest altitude in this Panchayat, followed by Mangad. The important plants seen in these are the following:

1) *Hugonia mystax*
2) *Cuginta reflex*
3) *Ochna heyneana*
4) *Cassia kleinii*
5) *Gloriosa superba*
6) *Eusteralis quadrifolia*
7) *Polycarpae corymbosa*
8) *Paspalum scroliculatum*
9) *Apocopis mangalorense* etc

The abundant species of this region is Hugonis mystax, Polycarpaea corymbosa, paspalum scorbiculatum.

Fern flora

Ferns found in this Panchayat are the following:

1) *Adiantum*
2) *Azolla*
3) *Selaginella spp*
4) *Pteris spp*
5) *Pteris quadricurita*
6) *Drynaria spp*
7) *Ceratopteris*
8) *Acrostichum aureum*

Exotic species / elements
Some of the common examples of the tropical Asiatic elements in this Panchayat are species of Knoxia, Myristica, Hedyotis, Saraca, and Uvaria.

Examples for the tropical Africans and Madagascrean elements found in this area are *Catharanthus sp, Geissaspis cristata, Kalamchoe pinnata, Pseudarthria viscida* and *Ricinus communis*.

American elements are represented by cultivated sp of *Anacardium, Anona, Capsicum,* and *Manihot*. Examples for the very common migrants are *Acanthospermum hispidium, Ageratum conizoides, Cassia occidentalis, Cassia tora, Catharanthus roseus, Croton bomplandianus, Eichhornia crassipes, Gliricidia sepia, Lantana camera, Mimosa pudica, Passiflora foetida, Pepeoromia pellucida, Scoparia dulcis, Cynedrella nodiflora, Tridax procumbens, Turnera ulmifolia* etc.

These exotic species have not spread to such a large extent as to have any deleterious effect on the cultivated crops and the people of the area. Probably, it is the frequent weeding and digging practices that keep the exotic varieties under control.

Fauna

The different types of habitats in Kalliasseri Panchayat possess rich fauna. The microfauna of this area is not included in the study.

The animals surveyed included butterflies, fishes, amphibians, reptiles, birds and mammals.

Insects

This class includes a vast variety of organisms like the ants, cockroaches, bugs, flies including houseflies, butterflies, moths, beetles, wasps and honey bees. A few aquatic forms also exist.

Butterflies

There are about 1500 species of butterflies in India. They vary greatly in colour, habits and size. (Gay, 1992).

Butterflies are the indicators of ecological health of an area. A butterfly seen in an area also indicates its larval food plant in that area. The detailed study of complex organic linkages of butterflies and plants in a given area can provide enough information for conservation of the life supporting system of that area. Butterflies help in the cross pollination of plants.

Use of pesticides is the major limiting factor for growth of the butterfly population. Besides, the clearing of wild plants and their replacement by exotic varieties have also led to the decline of the butterfly population in the Panchayat.

Fifty-seven species of butterflies were identified from the study area, the details of which are given in Appendix Table XIX. The largest butterfly in India, the Southern bird wing (*Troides helena*) and the second largest the Blue mormon (*Papilio polymnestor*) are seen in Kalliasseri Panchayat.

Common Lasscar (*Neptis hardonia*) and Spot Sword-tail (*Pathya nomius*) are the rare butterflies recorded from Kalliasseri.

For systematic arrangement, the Wynter Blyth Classification (1957) has been followed in preparing the list given in Appendix Table XIX.

Fishes

India is endowed with rich inland water resources that include rivers, rivulets, reservoirs,

ponds, fresh and brackish water lakes, estuaries and backwaters. It has a coastline of 6,100 km and the annual yield of marine fishes is 39.7 lakh tonnes. (Kerala Fisheries - Facts and Figures, 1990, Govt. of Kerala, 1991). The fisheries sector of the country contributes more than 3 percent of its annual export earnings and provides employment opportunities to more than 1.7 million persons. It also helps to meet a major portion of the protein requirements of the people.

The inland fisheries have great economic potential in Kerala. Its inland water resources remain under-exploited. The total area of inland water resources in the State is 3,60,535 hectares (Table 6.1).

Table 6.1 Inland Water Resources of Kerala

Type of inland waterbody	Area (in hectares)	Percent
Rivers	85,000	23.58
Tanks and Ponds	3,300	0.92
Reservoirs	29,635	8.22
Brackish water lakes, backwaters and estuaries	2,42,600	67.29
Total	3,60,535	100.00

Source: Govt. of Kerala, Department of Fisheries - Facts and Figures, 1990

Kerala occupies 4.65 percent percent of the total inland water resources in India, but during the past decade the share of the state in inland fish production of the country was only 2.45 percent.

During the period 1981 – 90, the inland fish production in the country registered an increase from 9.9 lakh tonnes to 14.83 lakh tonnes at an annual growth rate of 5.12 percent whereas in Kerala the corresponding rate of increase was only 2.49 percent; from 0.26 lakh tonnes to 0.33 lakh tonnes. Between 1991 and 1999 production increased from 36342 metric tonnes to 65855 metric tonnes.

A wide variety of inland fishes like Cat fishes (*Vaala, Muzhu, Kaari), Mullet (Kanambu*), *Murrel* (*Bral*). Milk fish (*Poomeen*), Perches (*Narimeen, Chempally*), Pearl spot (*Karimeen*), Chromid (*Pallathy*), Sole (*Mantha*l), Jew fish (*Kora*) and Barbus (*Poovali*) are the commercially exploited fishes of the inland waters of Kerala. The major varieties of culture fishes raised are Catla (*Catla catla*), Rohu (*Labeo rohita*) and Mrigala (*Cirrhinus mrigala*) and Tilapia (*Tilapia moggambica*).

In addition to the above said fin fishes, shell fishes and arthropods such as Macrobrachium (*Attu Konju*) and prawns (*Chemmeen*) are exploited on a large scale and their output contributes significantly to the economy of the State.

Kannur District has six rivers – Perumba, Ramapuram, Kuppam, Valapattanam, Anjarakkandy, Eranjoli and Mahe, all emptying into the Arabian Sea. The total length of the rivers is 392 km and the area of the waterbodies is 3223 sq.km. There are about 2000 tanks and ponds. Total area of these water bodies is 112 hectares. About 70 percent of the ponds are below 10 cents in area and only 5 percent are above 50 cents, 75 percent of the tanks and ponds are privately owned (District Plan, Kannur, 2000). The only reservoir in Kannur District is the Pazhassi Reservoir with an area of 648 hectares. The inland fish production of Kannur District for the year 1998 – 99 is 1895 metric tonnes.

Kalliasseri panchayat is part of Valapattanam and Kuppam river basins. Like other panchayats of Kerala, this panchayat is also well endowed with rainfall. The annual average precipitation is around 320 cm (Table 6.2).

Table 6.2 Monthly Rainfall Data (in mm) at Taliparambu for the period of 1961-1991

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1961	---	---	11.4	210	411	900	495	266	113	7.9	6.7	2421	
1971	---	---	7.2	64	389	1219	1104	660	321	162	---	28	3954
1981	---	---	23	114	1426	770	768	422	213	88	9.7	3833	
1991	---	---	---	---	118	890	1296	746	62	173	122	---	3407

Source: Kalliasseri Experiment in Local Level Planning (1995), KRPLLD

Hydrological regime

In the case of surface water, three hydrological regimes are observed: (1) drainage system of the laterite area (2) drainage system in the coastal plain and (3) Valapattan river system.

Two tributaries, Kandanchira *Thodu* traversing the middle of the valley and *Vayalkara thodu* along the southern border of the panchayat join together to form *Parakkadavuthodu*, the main stream in the panchayat. The two rivulets are seasonal because they originate at very low altitudes and have small catchment areas. Immediately after monsoon, they flood the banks and carry all the water to the *Irinavu thodu*. Even in the case of the rivulet that originates from the pond in the valley head (Vayalkara thodu originates from *Kunhi kulam* of nearby Andur village), water is available only for limited irrigation purposes during the lean period. Two very small drains, the *Karikadu thodu* and *Chirakutti thodu* also join the *Parakkadav thodu* as it turns northwards and joins the tidal *Irinavu thodu* at Odipram.

The drainage system in the coastal plain is intricate because the plain is drained in all directions. While the area lying to the east of the railway line drains through *Parakkadav thodu*, the western half is drained in all directions. Owing to low gradient, shallowness and sandy soil, most of the channels have deteriorated. In some cases, drainage channels have been encroached upon for construction purposes resulting in waterlogging and other associated problems. Free flow of rain is almost restricted.

The Valapattanam river system has a significant impact on the water regime of the panchayat. The western part of the panchayat is encircled by a tidal waterbody *(Irinavu thodu*), which is connected to the Valapattanam river system. Along this western border, a zone of saline water intrusion exists. Salinity of this area is controlled by the flow through the Valapattanam river system. The hydrology of this part is thus linked with a larger system.

The Valapattanam River - having a catchment area of 1867 sq.km and originating from the Wayanad plateau - discharges 4092 million cubic metres of water per year into the sea. During monsoon salinity in the rivers of this panchayat falls to extremely low levels. While the impact of the Pazhassi irrigation project on salinity levels in Valapattanam river is yet to be studied, it is reported that 20 percent of the coastal plain is salinity infested. The Irinavu salt-water barrier was installed to check saline water intrusion. However, it has not been operating efficiently as its diversion channels remain interlinked and more than one panchayat is involved in its operation.

Apart from rivers, another important surface water resource is ponds and tanks. In fact, these have multiple uses like minor irrigation, fish farming, and domestic water use. Thirty-seven ponds are recorded in the panchayat. The largest pond has an area of 896 sq.mt. There are 4 ponds with more than 500 sq.mt each in area and another 13 ponds of more than 100 sq.mt each. The names of 30 ponds in the Panchayat are as given below:

1. Kattampally Chira
2. Parakkadav Kulam
3. Keecheri Thava Kulam
4. Arayala Kshethra Kulam
5. Maryangalam Kulam
6. Ozhakrome Kulam
7. Madayilchal Kulam
8. Manakulangara Kavu Kulam I
9. Sree Kurumba Kavu Kulam
10. Illipuram Kulam
11. Payyattom Kulam I & II
12. Odipram Kulam
13. Chirakutti Kavu Kulam I & II
14. Kappoth Kavu Kulam
15. Mundayat Kulam
16. Kandanchira Kulam
17. Kandanthally Kshethra Kulam
18. Parakkoth Kshethra Kulam
19. Puthiyandeel Kulam
20. Edathile Kulam
21. Unden Kulam
22. Chandroth Kulam
23. Manakulangara Kavu Kulam II
24. Kizhakkan Vayal Kulam
25. Sree Krishna Matom Kulam
26. Erumbala Kulam
27. Kakkam Kovil Kulam
28. Mangat Kulam
29. Erinhikeel Kulam I & II
30. Kalliasseri Alinkeezh Kulam
31. Irinave Thava

About 12 species of Freshwater fishes and 47 species of Brackishwater fishes have been identified from the various water-bodies of Kalliasseri Panchayat. The details of the fishes are given in Appendix Tables XX and XXI.

Etroplus maculatus (*Chuttachi*) is common in paddy fields. It used to be given to women in curry after childbirth. During heavy rains in June, the rivers and the low-lying fields get flooded when plenty of Labeo sps. Silurus appear with the first rains and disappears into rivers and fields.

Unscientific fishing methods, water pollution, fish diseases, and man made barriers in rivers are affecting the fish population, which is progressively on the decline. Channa sp, Arius sp, Etroplus maculatus, Pondy fish are cases in point. Grey and red mullet, Red snapper, Parava, Thalayan, Pomfret, Ayakoora are also facing danger.

Fishing methods

Cast Net (*Veesu Vala*): In Kalliassery, it is most commonly used in ponds and rivers. The net when cast into water, spreads out like an umbrella and sinks to the bottom. A rope tied to the base is held in the hand. As the perimeter fitted with sinkers touches the bottom, the string at the base is pulled to raise the net above water and trap the fish caught in the net.

Dip Net: It is a piece of net-webbing attached to a frame, used to scoop moving fish from shallow waters.

Trap Net: The commonest form of trap net is the basket locally called *Kuthood*. It is a conical basket open at both ends made of bamboo strips kept in shape by coir rope. The trap is placed in water and examined at short intervals to collect the trapped fish.

Pedal: is another trap net which helps to trap fishes in areas where they aggregate. In a trap net fishes are led to an enclosure through a guarded entrance. Trap nets are usually placed in shallow waters close to the land.

Hooks and lines: This is an ancient type of gear, which is still popular, and is very prevalent. Hook is a metallic piece. The spear end carries inclined barbs 1 – 3 in number. Live bait is attached to the hook.

Bunding: There are narrow canals leading to paddy fields. During ebb, water flows through the canals and enter the fields. After intrusion of water into fields, the canal is blocked either by net or splinters of bamboo. And then water is drained into the canals during flow. Water is drained but fishes remain in fields. These are picked up by hand.

Bund: A small earthern platform is made across the small rivers that crisscross the fields during rains. Fishes swimming along the river will jump over and get trapped in the raised platform where it can be picked up.

In Irinave and Madakkara rivers during December – January when the temperature used to be low in the past, and fishes remain on the water surface in a frozen state. People used to come with baskets and scoop the fishes.

Gill Net: This is called ‘Ozhukkuvala’. It is a rectangular net with floats along one border and weight on the other; when the net is set across the direction of the current, it remains suspended vertically like a wall and slowly drifts with the current. When a fish strikes the net, their gills are caught in the meshes of the net.

Thappal: In this method, women are usually involved. In shallow waters, prawns are caught with hands and kept in small baskets called 'Kuriya'. The Kuriya will be held in position by teeth.

Pedal: It is a trap to catch fishes in shallow waters. It is made of ribs of coconut palm leaf. The ribs are matted together by thin coir and then rolled to form a cylindrical structure with one end broad and the other narrow. The narrow end is immersed in water to trap fishes.

Chemballi Trap: It is a box made of bamboo. Its base is rectangular and has a height of about 1-2 feet. These are bottom traps. The funnel like compartment inside the box is an efficient trap for fishes.

Koodu: It is made of sticks. It is held in place on fixed poles just below the water surface. It can help in catching pelagic fishes.

Stake Nets (*Kuttivala*): Each net has a funnel shape. The wider end has larger meshes. The mesh size gets reduced towards the tapering end. The wide end of the net is tied to a wooden frame. It is attached to the main pole called *Thazhmaram* (*Sakshal*). The supporting pole used as stay is called *Kuthu*. The pole to which the net is to be tied is called *Charu*. The main pole (*sakshal*) is erected 4m apart. The net is tied to the *charu* using coir rope, before the tidal ebb. The net is left for 2 hours till the ebb is almost complete. The narrow blind end of the net will be filled with fishes.

Crabs

Both the poor and the rich use crabs as a food delicacy. The following species of crabs have been identified in the Panchayat. An exhaustive study is yet to be.

A. Marine Crabs
   1. *Scylla serrata*
   2. *Mutata sp.*
   3. *Ocypode sp.* (Shore crab)

B. Intertidal Crabs
   1. *Metapograpsus messoi*
   2. *Calappa philarguns*
   3. *Uca annulips*

C. Mangrove Crabs
   1. *Sesarma quadratum*
   2. *S. edversi*
   3. *Sarmaerum punctatum*

Amphibians

Practically little attempt has been done to study these ubiquitous animals. During rainy season, the atmosphere resounds with the croaking of frogs. They help reduction of pest population of cultivated lands. No serious attempt has gone into identifying and documenting

the various types of amphibian population that inhabit Kerala villages. Widespread use of pesticides and large scale catching of frogs either for export or for local consumption are threatening the very survival of these ecologically important animals.

The amphibian fauna of Kalliasseri belongs to the following families.

Order : Anura
Family : Ranidae, Rhacophoridae, Microhylidae, Bufonidae
Order : Apoda
Family : Caeciliidae

1. *Rana tigrina:* Bullfrog is the largest Indian frog. This species is distributed widely in the Panchayat and is found in wells and ponds throughout the year. The colour is normally olive brown on the back marked with characteristic, irregularly shaped blue blackish spots disposed commonly in longitudinal series in two or three cross bands. A dark band extends forward from the eye to the snout through the nostril.

2. *Rana limnocharis*: It is smaller than R.tigrina, greenish or olive with large black spots on the back and limbs. A characteristic stripe down the centre of the back is observed. They are found near tanks and streams. When disturbed, they leap into water, but rapidly swim ashore back. During the dry season, they collect under stones in damp places during daytime and come out at dusk.

3. *Rana hexadactyla*: This is the common Green frog found abundantly and on the banks of tanks and ponds and streams especially during and after the monsoons. The adult usually sits among weeds in water. The upper side is bright grass green. Green or pale yellow strips are seen along the middle of the back.

4. *Rana cyanophlyctis*: It is a small frog whose upper side is brownish or olive brown spotted with black or dark olive markings. A distinct dark band is found along each flank and on the front and back of thighs. It is the commonest frog found throughout the year. It is almost entirely aquatic and is seen on banks of water bodies. It skips over the surface when alarmed.

5. *Rana malabarica*: This is a moderate sized frog about 2 – 3 inches in length, with bright crimson colour on the back and blackish brown at the sides. On the back a few spots are observed in certain frogs of this species.

6. *Rana leptodactyla Boulenger*: This is a small sized frog with thin and attenuated limbs. The skin on the upper side bears short longitudinal, glandular folds. The upper side is brown or olive brown, mottled with dark brown markings. There is a distinct sub – triangular dark spot between the eyes. The limbs bear dark cross-levels. This is essentially a species of the forests but also found in densely wooded areas of garden land.

7. *Rana beddomi:* This moderate-sized frog is found in forested regions. Its upper side is brown with distinct dark-brown spots. Distinct dark cross bands are seen between the eyes.

8. *Philatus leucorhinus*: This small-sized frog has smooth skin is on the upper side and its under side is granular on the belly and on the lower surface of the thighs. A fold of skin extends from the eye to the shoulder. It is yellowish brown or olive brown in colour with a dark band, which runs across the sides. Sometimes there is a large hexagonal or triangular pale spot on the snout and a dark band between the eyes. On the under side the throat is usually spotted with brown.

9. *Rhacophorus maculatus*: It is a moderate sized frog with partially webbed fingers and completely webbed toes. There are discs at the tips of fingers and toes. The upper side of the body is brownish, yellowish or whitish with or without brown spots. It is usually found adhering to vertical walls.

10. *Rhacophorus malabaricus*: It is larger than R.maculatus. The fingers and toes are entirely webbed. The tips of fingers and toes are dilated into large discs. It is - bright grass green in colour, spotted all over the body with dark spots. It is also called the flying frog. As the colour is grass green it camouflages well with green leaves.

11. *Rhacophorous pleurosticus*: it is usually green in colour with dark spots. The thighs are purplish brown, marked with yellow spots. The fingers are webbed only at the base. The toes are fully webbed. The discs at the tips of fingers and toes are well developed.

12. *Microphylla ornata*: This frog is reddish or greyish olive or gretish brown on the back, with a large dark marking extending from between the eyes backwards. The fingers and toes are slender with their tips dilated into very small discs. It is nocturnal and during the day, it is usually found hidden under leaves and stones.

13. *Bufo melanosticus*: It is the commonest toad found in Kerala. Large and stoutly built, with head bearing a few raised bony ridges, this animal has its upper parts in brown or yellowish brown, some times with spots. The warts and the ridges on the head are usually black. It makes a chirping sound and is found in large numbers in damp places.

14. *Uraeotyphlus*: The body of the animal is cylindrical with about 170 closely set circular folds. The head is short and triangular with a blunt and rounded snout. There is an inconspicuous tentacle situated below and slightly on advance of the nostril. The dorsal surface is salty grey.

The amphibian population in Kalliasseri panchayat is found to be rich; but they are under threat. The croaking noise that used to reverberate throughout the night in many parts of the panchayat is becoming a thing of the past with the disappearance of the paddy fields.

Water-filled paddy fields are the natural habitats of frogs. The conversion of paddy fields to coconut gardens and house sites has put great stress on the amphibian population. Ponds that used to be common in many parts of the panchayat have been partly or fully filled up.

Increasing use of pesticides for protecting crops has also been causing depletion of amphibian population. Frogs are an important segment in the food chain starting with plants. Large-scale destruction of frogs leads to proliferation of insect pests. And to control them increasing doses of pesticides in higher concentrations are applied. And the vicious circle continues.

Plants → Insects → Frogs → Snakes → Birds

The practice of catching frogs for food is not widespread in this area. The internal market for frog leg is still low. There is also resistance from local people against collecting frogs for export.

Reptiles

The reptile records from Kalliasseri Panchayat show the presence of a large variety of snakes, lizards, terrapins and mud turtles.

Snakes

It is estimated that there are about 2,500 species of snakes in the world and that they predominate in the warm climate and lush regions of the tropics. About 233 species of snakes are found in India of which only about 52 species are poisonous. (Whittaker, 1992).

Of the fifteen species of snakes listed in Kalliasseri panchayat, four are poisonous. They are Common Indian Krait, Indian Cobra, Russels Viper and Rock Pit Viper. The details are given in Appendix Table XXII.

The venom of Common Indian Krait is more toxic than that of the Cobra and acts both as a neurotoxin and haemotoxin (Bangaro tropic). Krait venom is considered to be 15 times more virulent than Cobra's venon; the Krait is one of the deadliest among the poisonous snakes of the world.

The venom of Indian Cobra acts mainly as a neurotoxin. Neurotoxin paralyses the respiratory centre and causes death.

The venom of Russel's viper is haemotoxic. It acts as a depressor of the vasomotor centre and a destroyer of the blood vascular system.

Snakes especially Cobra have evoked feelings of awe, veneration, curiosity and wonder in the minds of people from very early times. The cobra has remained the symbol of Indian culture through the ages. As a part of worship of the cobra, it is naturally protected in the sacred groves in North Malabar.

Now-a-days people have a tendency to kill snakes irrespective of whether they are poisonous or non-poisonous. This is due to the fear and lack of scientific knowledge. People forget the role of snakes in controlling rodents especially rats. Rats do more material damage to food and health than snakes. Indiscriminate killing, loss of homestead vegetation, and rapid urbanisation have resulted in the loss of the primary microhabitats of many species. Now many varieties of snakes are on the verge of extinction.

Lizards

Six species of lizards have been recorded from the study area. Lizards include two species of Geckos, two species of Agamids, one species of Skink and one species of Monitor Lizard. In general, lizards seldom attract the attention of people. No study on the status of lizards in the Panchayat exists.

Table 6.3 Lizards recorded from Kalliasseri *Panchayat*

Sl.No	Scientific name	Common name	Vernacular name
		Geckos	
1.	*Hemidactylus brooki*	Brook's Gecko	Palli
2.	*Hemidactylus forenatus*	Southern House Gecko	Palli
		Agamids	
3.	*Calotes versicolor*	Common Garden Lizard/ Blood Sucker	Ohnthu
4.	*Draco dussumieri*	Draco/ Flying lizard	
		Skink	
5.	*Mabuya carinata*	Common / Brahminy Skink	Arana
		Monitor lizard	
6.	*Varanus bengalensis*	Common Indian Monitor	Udumbu

Turtles and Tortoises

One species of terrapin (Fresh-water tortoises) and one species of freshwater Mud turtle have been recorded from the study area. Terrapin includes Indian Pond Terrapin and Mud Turtle includes Indian Mud Turtle or Flapshell. The local people eat the flesh of these two species. Both turtles and tortoises are highly threatened groups in the panchayat. Loss of habitat and over-exploitation has caused the damage.

Mugger or Marsh Crocoile (*Crocodiles palustris* Lesson)

The older people of the Panchayat point out that mugger had been surviving in the large ponds in Kalliasseri area. Habitat destruction through conversion and reclamation has led to disappearance of this species from the study area. For the past few years no reports of its occurrence have been recorded.

Table 6.4 Terrapin and Mud Turtle recorded from Kalliasseri *Panchayat*

Scientific name	Common name	Vernacular name
Melanochelys trijuga coronata	Indian Pond Terrapin	*Karayama*
Lissemys punctata	Indian mud flap shell turtle	*Vellama*

Most of the reptiles are useful to man and do silent service in biological control. But they have excited little interest in man. If it were not for the harmful snakes, reptiles as a group would have been largely ignored (Daniel, 1984). The greatest threat to this useful group of animals is the demand for their skin for commercial purposes.

Birds

Kerala with about 400 species of birds is considered to be rich in avifauna. The pioneering works of Ali (1969) and Neelakandan (1986) documented the avifauna of the state. These were followed by further observations from different areas (Neelakantan, Sasikumar and Vengopalan, 1993). These intensive surveys and observations added to the fund of knowledge on the distribution of birds in the region.

From Kalliasseri panchayat, 150 species of birds were recorded, out of which 55 are wetland birds confined to tidal marsh, and 32 were migrants. The details of the bird species identified are given in Appendix Table XXIII.

Little egrets, large egrets, tiny sand plovers and little ringed plovers are seen in large numbers in the tidal marsh in the panchayat. Egrets and herons are the common wetland bird species. The white-bellied Sea Eagle (Haliacetus leucogaster) is an endangered species, which is seen at the tidal marsh. The favourite food items of this bird are fish and snakes. The proposed Kannur Power Project will occupy most of the marshy area endangering the existence of its avifauna. The large scale filling of paddy lands and other wetlands also poses a major threat to the bird life of the panchayat. Shooting and similar destructive practices that cause harm to birds are not popular in the area. But there is total unconcern among the population for the survival of these winged beauties. This does not auger well for bird conservation against possible future outrages.

Smaller mammals

Eighteen species of smaller mammals representing most of the major species found in Peninsular India, were recorded from Kalliasseri panchayat, the details of which are given in Appendix Table XXIV.

Sighting of the animals

Sighting of the mammals is poor in the months of South-West monsoon; most of the species were located during the summer months.

Jungle Cat: Jungle cat is seen usually in the tidal marsh in the mornings and evenings. They are found to prey on poultry.

Civets: Small Indian Civets and Common Palm Civets were recorded from Kalliasseri panchayat. But the small Indian Civet was only rarely seen. It is used to seen frequently in the past. The mammal used to be kept in homes for collection of the secretion from its scent glands for use both as perfume and medicine. The secretion is used in the preparation of *Dhanvandarum Gulika.*

The scent gland situated in the peri - anal area, can be seen externally as a fairly large pouch with hairy swollen lips. The secretion contains free ammonia, resin, fat and a volatile oil to which its odoriferous properties are due. The method of collection practised by the *vaidyas (*physicians) of Kalliasseri is to scrape the secretion from the pouch with a wooden spoon. The meat of this animal is eaten by some communities in the locality. In the past, most *vaidyas* (physicians) of Kalliasseri Panchayat had reared this animal for collecting the secretion.

Owing to over-exploitation, the number of Small Indian Civets has declined drastically.

The Common Palm Civet is common in this Panchayat. People kill this animal for eating its meat.

Small Indian Civets and Common Palm Civets are good eaters and great destroyers of vermins. Civets which live in or near human dwellings do a real service by helping reduction of the swarms of rats which infest crops and stocks of edibles and apparel in residential houses and trading stores.

Common Mongoose: It is a common animal in this panchayat. It is seen in open lands and cultivated areas. Common Mongoose destroys rats and mice and thus render service to humans. At the same time they do a certain amount of damage to poultry. Some people eat the flesh of this animal.

Jackal: Jackals are common in tidal marsh of this Panchayat. They do good work in the clearance of carcasses. At the same time they are poultry thieves also.

Common Otter: This mammal is seen in the mangrove forests in the tidal marsh. Bones and scales of fish strewn over the web-footed tracks of the animal round the den is evidence of the presence of this animal in the area. The analysis of the faecal matters of Common Otters indicates that they eat fish, crab and other crustaceans, frogs, rodents, and waterfowl, and also leaves and other vegetable matter.

Grey Musk Shrew (Musk rat): This is the large shrew that enters houses at dusk. The pointed snout and depressed ears distinguish these shrews from rats with which they are often confused.

Bats: Four species of bats have been recorded from the area. They are Indian flying fox, Short nosed fruit bat, Fulvous fruit bat and Painted bat. All of them are frugivorous and feed only on the juice of fruits.

Indian flying fox is the largest of Indian bats. The members of all the four species leave at dusk, flying heavily with slow wing beats in search of fruit-bearing trees. They have very good sense of smell, as well as good memory of fruit trees in their area and fly fairly long distances in search of food.

Rodents: Among rodents, the Common house rat is the most common in this Panchayat. The squirrel, which is commonly found in this area, is the Three-Striped Palm Squirrel. Indian porcupine is rare in this area. They are found mostly in hilly terrain.

Bandicoot rats are also common which are creatures of large size. Their burrowing habits cause great damage to the ground. Like other rats they are omnivorous and feed on household refuse and grains and occasionally attack poultry. The Indian Field Mouse and House Mouse are also commonly seen here. Rats and mice cause extensive damage to agriculture. Grains of all sorts are their chief and favourite food.

Hare: Black-naped hare is rare in the panchayat and is seen only in the hilly terrain. Hare-meet is consumed by some local inhabitants. High population density in the panchayat and the concomitant loss of habitat has badly affected the survival of mammalian species in the area.

7. Cultural and Traditions

Folk knowledge

Traditional societies have acquired through years of evolution, vast bodies of knowledge about the sustainable use of nature's resources for the benefit of humanity. Passed orally from generation to generation, this knowledge got continually modified with new discoveries and insights and changing environmental conditions. Its learning, application and transmission were often governed by strict ethical codes designed and enforced primarily to prevent its misuse and corruption (Khadpekar, 1995).

Kalliasseri Panchayat has also its stock of indigenous knowledge. But the area has remained exposed to the glare of modern civilization from the early decades of the twentieth century. The attitude of modern science to indigenous knowledge of traditional societies has been generally negative. Moreover, as the sole motive of colonial powers was commercial exploitation of natural resources, the concept of sustainable use was not in their agenda. This has led to erosion of indigenous knowledge in Kalliasseri also.

Traditional household articles

The people of the Panchayat have been using to a large extent traditional household articles. Plastic, fibre and rubber materials have begun fast replacing these articles. The following is a discussion on the local names of the articles available and the raw materials used for their manufacture.

Kutta (Basket): This is used to keep various articles and also for carrying head loads. Raw materials used for their production are '*chooral' (Calamus rotanz L, Calamus brandisii Becc, Calamus pseuotenuis Becc* and *Ochlandra travancorica Benth)* and stems of the Eata plant. Since these plants do not occur in the Panchayat, people brought them from other areas.

Paya (mat): Mats are used for sitting on and lying down to sleep.
Raw materials are *Kaitha or Thazha*, (*Pandanus tectorius soland)*. Leaves of the plants are used. The plant grows on the banks of Irinavu *thodu*, Kandanchira *thodu* and Vayalkara *thodu. Potta* usually occurring in marshy lands (*kaipadu*) is also used.

Thavi (ladle): It is used for serving food materials.
Raw materials: Coconut shells are used to make the spoon and *Areca catechu L.* Stems or bamboo stems are used as the handle of the ladle. The length of the handle will be 2.5 times greater than the diameter of the coconut shell. The fibres of the shell are not removed.

Chirava: Chirava is used to scratch out coconut kernel from the shell.
Raw materials: The wood portion is made of the wood *Alstonia scholaris L R.Br* 'Ezhilampala' and the scratching portion is made of iron.

Marathavi (ladle made of wood): Uses are the same as those of *thavi.*
Raw materials-Wood of Artocarpus heterophyllus Lamk (Plavu) or the wood of *Myristica fragrans Houtt* (Jathi) or the stem of *Bambusa arundinacea Willd* (Mula). Both the ladle and the handle from a single piece made of the same wood.

Mulam Kutti: It is a piece of bamboo stem open at one end and closed at the other, which is used as a container for holding various kinds of condiments. Coir mattings are woven around the outer surface of the bamboo stem to serve as hooks for hanging the *kutti* on the wells of the kitchen.
Bamboo stems with large diameter were in use as milk and toddy containers.

Thondu: This is the hollow complete coconut shell from which the soft mesocarp is completely removed. One hole alone will be there for the shell. When the shell is dry, it is used to store things like mustard. The heat and smoke in the kitchen will make *thondu* a good container.

Mara chacku (Grinder): This is used to crush out oil from the *kopra* (dried coconut) and other oil seeds.
Raw material for making it is the timber of *Schleichera trijuga Willd* (*Poovam*) or the wood of *Tamarindus indicus L* (*Puli*).

Masala mari: The utensil used to keep spices for use in food preparation.
This is made out of the timber of *Artocarpus heterophyllus Lamk* (*Plavu*), teak, etc.

Uppumari: This is the utensil used for keeping salt.
Wood of *Mangier indica L* (*Mavu*) is used for making this utensil.

Ural: It is used to powder cereals and dried food materials, and dehusk rice.
Raw material: Wood of *Pterocarpus marsupium Roxb* (*Venga*), *Aegle marmelos Corr* (*Koovalam*), *Schleichera trijuga Willd* (*Poovam)* and. *Caraea arborea* (*Pezhu*).

Sear: It is a wooden vessel used for measuring cereals, pulses, pepper etc. Smaller vessels like Nazhi and Kongazhi are also in use.
Raw material: Root of Artocarpus (*Anjili*)

Nilam Thalli: This is a flat wooden structure with a long handle.
Raw material: This is made of *Strichnos* (*Kanjiram*). Usually before the harvest of rice or pepper the courtyard is racked, levelled and consolidated by using *Nilam thalli*.

Munth: This is used to churn curd to produce butter.
Raw material This is usually made of *Artocarpus* (*plavu*) or *Tectora grandis (Theck*).

Ulacka: It is the rod used to pound grains in the ural.
Raw material- Wood of *Dalbergia latifolia Roxb* (*Eatty*) and Grewia iliaefolia Vahl (*Chatachil*)

Adachooty: It is used as a lid to cover utensils or drain water from pots.
Raw material- Wood of *Mangifer indica L* (*mavu)* -

Kuria: Small baskets used to keep flowers, grains etc.
Raw materials- Tender leaves of coconut.

Paduthirikka: Mat made of coconut leaves used for sitting.

Marappalaka: It is used for sitting
Raw material: Wood of *Alstonia scholaris L.R.Br* (*Ezhilampala*). Wood of *Artocarpus* is also used.

Grandhappalaka: Book-rest to keep the books open while reading.

Kurikkotta: It is used to keep *Bhasma* (ash of cow-dung cake). This ash is put on the forehead as a religious custom. The string to hang it is also made of wood.

Chambili: It is a box to keep betel leaves and arecanut
Raw material- Stem of Ochlandra *travancorica Benth* (*Eata/Eara*)

Thazhu (Lock): Thazhu is used to lock the room.
Raw material: Wood of *Artocarpus heterophyllu Lamk* (Plavu) and *Grewia tiliaefolia Vahl* (*Chatachil*)

Uri: Uri is an article used to keep pots and pats containing food. Uri is tied to rafters bars in roofs. It is prepared from palm leaves or coir.

*Oalakkuda (*Palm leaf umbrella): In earlier times, people used *Oalakuda* as (palm leaf umbrella) made of palm leaves and bamboo stems. There are different types of *Oalakuda*. Those carried by children and adults have long stem. Those used by field-workers have extra wide top and very short stem. There is the *Thoppi koda* that has no stem, but it has cap-like structure to fit a human head.

Palathoppy (Cap): It is used as caps for protection of head from heat and rain.
Raw material- Sheathing leaf base of *Areca catechu L (Kamungu*)

Palathotty (Bucket): This is used as bucket
Raw material- Sheathing leaf base of the arecanut plants and the ribs of the leaflets of the coconut leaf. The latter is used to stitch the sheathing leaf base into a bucket.

Koramba: It is a rain cover used by women in fields made of bamboo reed and sheath is palm leaves.

Dehusking of rice

Unhusked rice is put first on the ground and a group of women pound on it to dehusk it

with *Ulacka* (wooden rod); the half de-husked grain is poured in the *Ural* (an article made up of wood, middle portion has a pit to receive grain).

Agricultural Implements

Njengol (Kalappa): This is the wooden implement with a cutting blade fixed at the end to furrow the soil and turn it up.
Raw material: Wood of *Artocarpus heterophyllu Lamk* (*Plavu*) and *Anacardium occidentale L* (*Kashumavu*)

Nukam (Yoke): It is a wooden crosspiece fastened over the racks of two oxen and attached to the plough.
Raw materials: Wood of *Avicennia officonalis L* (*Uppatty)* and taproot of *Ficus* (*Aal*)

Kattakkol: It is a wooden implement used to powder lumps of soil in the field.
Raw material: Wood of *Avicennia officinalis L* (*Uppatty*) and *Strichnos nux-vomica* (*Kanjiram*)

Vithkootty: It is a wooden implement used to spread unhusked rice, pepper etc for drying.
Raw material: The flat part is made up of stem of *Artocarpus Heterophyllus Lamk Plavu*) and the handles are made up of stem of *Areca catechu L* (*Kamungu*). Handles of agricultural implements are made up by using the stem portion of *Areca catechu L* (*Kamungu*) and the tender stem of *Grewia tiliaefolia Vahl* (*Chatachil*). The bark of *Helicterus isora L* (Naru) and the inner petiole bark of the coconut leaves are used as coir for tying the rake and the handle.

Wetland cultivation

Small mounts, each 30-40 cm in height are made in the soil with hoe. When the water on the mounts evaporates salt crystals appear on the surface of these mounts. During the first rains, these crystals are washed away. Rice seeds are prepared in the following way. Seeds are tied in gunny bags and dipped in water. The water source may be either a pond or a large vessel filled with water. After a full day the seeds are taken out of water and tied in a gunny bag and a weight is kept over it. Usually the weight used is laterite bricks. In 24 hours the seeds sprout and then they are sown on the mounts. When the seedlings are about one foot tall, they are spread along with the mud of the mount in the field uniformly with a hoe. The seeds usually used in Kaippadu lands are *Arickaray, Aryan, Oarkkazhama, Oarthidiyan,* and *Kuthiru*. These varieties are tolerant to salinity and flooding. They are tall varieties.

For cultivation in the Kaippadu lands, no fertilizers and pesticides are used. The average yield is about 900 sear per hectare when rains are favourable. About ten years ago, about 100 acres of Kaippadu land was under cultivation. But with the advent of prawn farming, shrubs began to grow and birds (vermins) inhabited the area making farming unprofitable.

Shrimp Cultivation: The traditional system of aquaculture is practiced in a few areas. Here the water from the adjoining river is let into the field during high tides. This is usually done in November. And then it is blocked by using a sluice gate. This is called *Chemmeenkandi*. The harvest is spread over a period of time from January to April. Two harvests are carried out in a month. Each harvest is called an *Ach*. The harvest includes *Tiger prawn (Kara chemmeen), Vella Chemmeen (Naran chemmeen)* and *Thelli Chemmeen* (small size). Fishes lke *Yetta, Paral*, and *Malan* are also included in the harvest.

In Kalliasseri *Panchayat* there is no prawn farm where intensive cultivation is done.

Preparation of Kalam: *Kalam* is usually the courtyard in front or on the side of the house of the cultivator. When it is time for harvesting, the courtyard is hoed by using different types of iron implements – *Kaikottu (Vaykottu)*, and *Kungottu*. The digging is done by the latter and the former is used to level the ground. Water is sprinkled over the soil to give a binding effect. Then using wooden implement called *Nilamthalli* (of various sizes) the soil is rammed to get a smooth surface. This beating process is repeated three or four times, interspersed with application of cow dung water. When the yard is dry, cow dung paste is well applied for plastering the surface. Once the process is over, the courtyard is ready to receive the harvested grain in bundles called *Katta*. The yard is used for thresing and for drying the grain. As the *Kalam* is prepared soon after the rains, it serves better than cement plastered floor.

Ploughing: After the first crop, comes the hectic time for ploughing. After the ploughing period is over, it is resting time for the bulls. They remain in the cattle-shed well fed during the rainy days and come out for grazing on the weeds that grow luxuriantly in the garden and common grazing lands.

For the second crop, when the time comes to prepare the field bulls are brought into the field on an auspicious day. The yoke is placed on *Anakaranam*. Ploughing work is done from 6 am to 12 noon. On the 10th day of the Malayalam *Thulam* paddy is boiled and kept in *Muram*. The ceremonial lamp is lit and beaten rice, fried grain etc are offered on plantain leaves to Lord Ganapathi. This ritual is called *Pathamudayam*. The grain will be kept out of the *Kalam* before this ceremony. This ritual is the licence for using the courtyard for drying rice drying the boiled rice, etc.

Puthari: It is a ceremony connected with harvesting. When the corn becomes ripe, a few of ears of corn are collected from the standing crop. The food item is boiled rice and curries. It is the rice of the last crop that is used to prepare the food. When pudding is made a few (at least 7 grains), dehusked grains of the recently cropped rice are also added. This is called *Kunhiputhari* (small celebration of New Rice).

When harvesting is begun in a large area and rice from the new harvested becomes available, another ceremonial feast is arranged - *Valiya puthari* (Large celebration of New Rice). Servants and agricultural labourers are invited to the feast. All members of the ancestral family are also invited. The menu should positively include leafy vegetables, pumpkin and

long beans. At the time of the harvest these vegetables will be kept ready in their gardens. In dry land cultivation, along with rice, vegetables like pumpkin, beans, ladies finger, chillies are cultivated, to match the harvest of both.

Akrana Puthari: Rice powder, jaggery, honey, pieces of banana and coconut are mixed, with at least one grain of the newly harvested rice. This mixture is placed on the leaf of the vegetable *thaal* (*Nymphoefolia*) and served to the participants.

Sowing: Sowing of rice seeds is usually initiated on the first of *Medam* (regarded as an auspicious day). One-fourth sear of seeds in a *kuriya* (basket made of screw pine), tender coconut, hoe, choottu (torch of dry coconut leaves tied together into a bundle) are taken to the field. The southern-western corner of the field (*Kannimoola*) is selected for the ceremonial sowing function. The field is prepared by using hoe on which water of tender coconut is sprinkled. The *choottu* (torch) is lighted and put out by brushing it on the ground whereby the ash is spread. After a short prayer, the seeds are sown. This ritual is called *Kaivithidal* (preliminary sowing).

The actual sowing of the seeds in all the fields takes some more days. When the weather is congenial it is completed before Medam 10th (May 10 – 24th). In wetlands, the transplantation method is mostly used. Seedlings are grown on beds and transplanted after about 20 days. When transplantation is over in a field owned by a person, the tender frond of coconut is planted in the field as a mark of completion of the transplanting work.

Kunhinellu variety is threshed by trampling. Unlike other varieties, *Jeerakasala* seeds are prepared along with the ear of the corn. The corns are dried in the sun. And all the corns are tied up in a bundle and hung form the roof. This special kind of seed storage is called *Ayyar kettal*. In other varieties, the seeds are stored usually in Pothi (A ball-like structure constructed from hay). Keeping seed rice and rice for consumption in *Pothi* keeps them away from rat menace.

Other methods of storage are: -(1) *Pathayam* – (wooden box of size 15 feet ´ 3 feet (2) *Nilapathayam:* (Similar to *pathayam* except that the bottom of the box is the floor itself). (3) *Ara* – Wooden structure, the sides of which are the wall of the room itself).

Pathamudayam: This is a ritual of rice-boiling. Early on the morning of Thualm 10th (Sept/ Oct), the boiled rice is placed in *Muram* (a carrier made of bamboo for winnowing rice) along with an iron knife at sunrise. Ripe plantain, *agarbathi (*incense candle), beaten rice and *Nilavilakku* (ceremonial lamp) are placed along with the boiled rice. Servants and dependents used to bring beaten rice to the landlord's house by way of ritual obeisance.

Nira: This is a ritual followed by farmers to invoke God for prosperity. A few (usually 7, 9 or 11) sheaths of ripening paddy corns are harvested. After bath, the bundles are brought home along with Strychnine leaves. The bundling is done by *Pandham* of coconut trees. The bundles are placed on plantain leaves in the courtyard. Beaten rice *(Avil*), fried grain (*Malar*), tender coconut, a lit *Nilavilakku* (a ceremonial lamp with coconut oil as fuel) are

placed alongside. Each corn is placed on the broad leaf of Clerodendron and along with it are placed leaves of nine other plants.

All these are folded in the leaf of Clerodendron and tied with *Pandham* (inner petiole bark of coconut leaves). The members of the family who assemble around shout *Nira Nira Poli Poli* (let there be prosperity and let the granary become full) and move to various places of the house to tie corn bundles to columns, beams, *pathayam* (big wooden box to store paddy, etc) *Ural* (the wooden mortar used for dehusking) and cowshed.

Thottathil Kunhi Kannan of Ward I is an old farmer. He used to cultivate native varieties like Vadakkan and Kazhama. Seeds were locally produced. There was no external agency to supply them. According to him, the main reason for the fall of agriculture is the use of chemicals. He has sold away a major portion of his land and the rest has been partitioned among his children. No cultivation is carried out in the land now.

He also used to tap toddy. Only old and tall coconuts were tapped for toddy. To scratch the juvenile spadix, 'Nhallu' obtained from Ramanthali (nearby Panchayat) is used. Toddy was collected in 'Onda' made from bamboo stem. Kunhi Kannan used to fish by using Kuthood and net. He used to get lot of fishes during floods. Now there is no fish in rivers and he no more goes for fishing.

He remembers that about 30 years ago, there were extensive paddy fields. There were only 3 or 4 houses in the area. The fire works in Keecheri Palott Kavu, about 6 kms away were visible from here. But the Irinave Road constructed in 1957 led to hordes of settlements obliterating paddy fields.

According to C.P.Kannan, an agricultural labourer, it is the construction of Irinave Dam – Kacheri Thara Road which made the difference. Pulses used to be grown in large scale. Vegetables like cucumber, pumpkin, water melon and ash gourd were cultivated on a commercial scale. They were sold in markets ate Puthiyatheru and Cherukunnu. Tubers like sweet potato and tapioca were also cultivated. But now all these have vansished.

By fishing with Kuthood, Ilakku vala and Kara vala it was easy to catch Karimeen, Kachayi, Kayyan, Chempalli and Thirutha. During rainy season Kaychil, Etta and Muzu were caught from fields. Now it is the use of nets with very low mesh width that has caused considerable reduction in fishes.

Kowapravan Kunhiraman (77 years) remembers that the whole Kolathvayal from Keecheri to Kottappalam was under paddy cultivation and there were hardly ten houses in the whole area, some 50 years back. After the first crop, cattle from Punnacheri, Thavam and other places were brought to Kolathvayal, where they would be tethered for two days. Their cow dung and urine would enrich the soil. For this service the owners would pay money or paddy to the hardman. The fields would be ready for cultivating pulses like Bengal gram, horse gram, big gram etc. 90% of paddy area was brought under pulses cultivation. Even in dry lands horse gram used to be cultivated.

Sri.Kunhi Kannan had produced 500 sears of bengal gram a year. For 100 sears, the price was thirty rupees and the same measure of horse gram would fetch fifteen rupees. Traders used to come to the house for buying the produce. Horse gram was fed to draught animals. The husk of bengal gram was also fed to them. Dried cow dung, ash and sledge from Kappakadavu were the staple manures. Sledge was collected; salt water poured over it and it was dried and powdered. These would then be carried in baskets during night to the fields.

Even those who had paddy cultivation for 1000 sears hardly got paddy for year long consumption. The Varom and Pattom levied by landlords were very high and in these circumstances, it was the pulses and vegetable cultivation that sustained the farmers. The fields for pulses cultivation with deposits of cow dung and urine are ploughed by using bullocks. The lumps of soil are pulversised by using wooden hammer (Kattakkoi). Seeds are sown and another round of ploughing is done. The leaves of pulses were used for making stews. Harvesting was done at dawn since the dry pods would break when handled in the sun. Bengal gram and horse gram were uprooted whole, dried in sun and thrushing was done by beating with long poles. Now only 2 to 3 % of the cultivable area is under pulses cultivation.

Traditional food

A large number of tribal communities living in forests and adjoining areas rely on plants not only for food and shelter but also for other essential amenities and they are able to sustain their life in the absence of conventional agriculture (Vartak and Gadgil, 1979). Kosambi (1962) opined that this is due to the availability of uncultivated food. This is not practicable in a society that has been exposed to modern civilization for long. But it is interesting to note that even in a village like Kalliasseri, uncultivated plants played an important role in the daily life of the common man till half a century ago. Uncultivated plants are, to a limited extent part of the menu even now.

The tenurial system was so extortionate in the early decades of the 20th century that farmers had little food grain left after payment of levies to the landlord. Hence, in many cases, the marginal farmer had to subsist on the leftover grain retrieved from hay. The poor depended also on a variety of plants to sustain their life. The food items were different and the combination of various articles for food was also diverse. With the enactment of land reforms and with the emergence of new employment opportunities, the purchasing power of the common man went up and the traditional food items and food habits during the earlier periods are on the way out.

The food habits inhabitants of Kalliasseri, - in general that of the old Chirakkal Taluk as a whole-were quite different from those of today. The Green Revolution and the spread of modern values and attitudes have altered the dietary habits. The principal indigenous food items that were prevalent in the Panchayat a few decades ago are discussed here. The traditional food items were of low cost and highly nutritive.

1. *Kanji:* Rice was well-boiled in water and used in semi-liquid form. Buttermilk, curry leaf, ginger, etc were added to the gruel. Usually stews made of leafy vegetables or jackfruit accompanied the gruel. Mango pickle used to be one important side dish item.

2. *Pazhamkanji:* This is kanji prepared on the previous night. Usually, *pazhamkanji* was served as breakfast. Gruel water freezes in winter when *pazhamkanji* is used in solid form.

3. *Thavidukanji:* The water drained from gruel was kept in earthen pots for two or three days and then boiled with rice and bran of rice. This is a nutritious food item; which had an agreeable sour taste.

4. *Thavidu:* This is bran of rice collected at the time of paddy dehusking rice. Water is sprinkled on bran and kneaded with or without jaggery. Consumption of barn was the prerogative womenfolk; men were denied this item of food on the pretext that it would prevent development of masculine characters like facial hair growth. This item of food is a good preventive measure against jaundice.

5. *Pukkan:* The boiled rice juice is kept for a full day. Into it is added rice powder and then boiled. This is an easily digestible food item.

6. *Ottada*: Rice is ground into paste. Coconut and jaggery are added. It is then pastened on the inner side of plantain leaf, folded, and placed on a cloth tied over the mouth of an earthen pot containing boiling water. The paste is boiled in steam into a delicacy.

7. *Kuzhakkatta:* Rice is soaked in water and ground into a semi-solid paste. After adding coconut scrapings to the paste, it is made into balls and boiled in water for half an hour. The water in which the rice-balls are boiled is also consumed after coconut scrapings are mixed with it.

8. *Non – vegetarian items:* In the small rivers, fishes were abundant - Etroplus, Catfishes, Mullets, Perches and crabs. Bivalves were also collected to prepare dishes. Meat of turtles was a delicacy in many families. In wetland Kaipadu, prawns were abundant. Chicken meat and mutton were eaten; but consumption of beef was not popular in those days. Now, fish diseases are widespread. The Irinave dam provides a barrier to fishes to migrate to inland waters. Green-coloured river-crabs used to be caught at night in torchlight. Crabs were pinned down by using sharp spikes. Crabs were also caught by bait or using *Koruvala*.

9. *Dishes from Mango:* (a) Pickles of different types were made from mango. Tender mangoes were preserved in salt water and green chillies large earthen pots called *Kuttuam*.

(b) The endocarp of mangoes were collected and dried in sun. Its endosperm used to be taken out and powdered. This powder is mixed with rice powder. This is then boiled in water. It is a nutritious drink. (c*) Manga kach:* From ripe fruits the fleshy part was taken, made into a juice, spread over palm-leaf or bamboo mats and dried in the sun. The solid sheet was a delicious item of food. (d) Preparation from seeds: - Seeds are kept for germination. After germination, the seed coat is removed and the

cotyledons are dried under sunlight. Thereafter they are powdered. Various food items used to be prepared from this powder. The powder is boiled in water with jaggery, small amount of ginger powder, coriandrum and coconut milk. This is tasty *Payasam*. Powdered mango cotyledons are mixed with water, coconut scrapings and jaggery to form a paste; it is spread on plantain leaf, folded and baked in earthen vessel. This is called *Manga Ada*.

10. *Dishes from Jackfruit*: (a) Jackfruit used to be a dominant food item especially among lower strata of the society. The seeds are used as food during the monsoon season. It is roasted in earthen vessels and after peeling the outer coat is consumed straight or mixed with coconut and jaggery. Seeds may also be munched after baking in choolah directly. Jackfruits used to be plenty during the rainy season. And the seeds were stored for off season by coating them with mud paste, drying them and then storing them in earthen vessels.

(b) Unripe fruits are used to make different dishes. Not only seeds, but also the seed pod and other parts of fruits are used to prepare various types of dishes. Tender fruits are cut into pieces, dried and stored. The ripe fruits are very delicious. For storage, it is mixed with jaggery and baked into a paste like form. Ghee, cashew nuts etc are added for taste and flavour. This dish called *Chakka Varatty,* can be stored for long periods of more than a year.

11. *Tapioca:* Though cultivation of tapioca was limited to a small area, poor people used to purchase tapioca from market as a cheap source of carbohydrate, particularly during lean period. Various kinds of preparations were made from tapioca. Tapioca was stored for future use in two ways – (a) Small pieces of tapioca are semi boiled and dried in sunlight. It can be stored for months in gunny bags (*Vattu kappa*).

(b) Tapioca is cut into larger pieces and dried in sun without boiling. This is called *Vellu kappa*. It is powdered and used for peparing *puttu* (steamed powder).

12. *Arrowroot Ada:* Arrowroot powder is mixed with a large quantity of water and is kept for settling. The precipitate is mixed again and the final product is collected and dried. This powder is used for preparation of Ada.

Rice is ground into paste and spread on taro leaf. Coconut and jaggery are placed over it and the leaf is folded. It is baked in steam. The dish is eaten along with the taro leaf. Leaves of plantain or jack tree are also used to make this item delicacy.

13. *Choondappana Choru:* Choondappana is Caryoya urens (family Palmaceae). The innermost part of the trunk of the tree is cut into small bits, ground and mixed with water. The precipitate is collected and dried. It is used to prepare porridge and bread.

14. *Nannari Coffee:* Root of *Nannari* (Hemidesmus indicus) is cut into small pieces and roasted with coffee seeds and powdered. It is used to prepare coffee. Not sugar, but jaggery was used. Milk was not usually an ingredient of the preparation of coffee. Sometimes ghee would be added to coffee. Tea was not very common. Coriander, cumin etc were boiled with milk and consumed.

15. *Vegetables:* Vegetables like Bitter gourd, Snake gourd, Brinjal, Ladies finger, Long beans, pumpkins, ash gourd, etc were cultivated in fields and homesteads. Selling of vegetables in shops was a rare phenomenon. Taro, elephant yam, long yam etc were the main tubers. Banana was a major crop; all varieties were cultivated. Not only plantains, the core of the pseudostem (*Kambu*) and *Koombu* (inflorescence) were in common use. Country green, leaves of Colocasia, Nymphoefolia, Pumpkin, Beans, Muringa, Ash gourd, Cassia tora etc were commonly used for preparations of leafy vegetables. Tender leaves of Nettle (*Kodu Thoova*) were used as fry. The itching sensation that Nettle makes was avoided by applying coconut oil on it and then washing in hot water. The stem of elephant yam and Taro were used to prepare curries. Jackfruit, both tender and mature, were in high demand.

Folk knowledge on house construction

For construction of a house, the plot is equally divided into 4 parts and the house site is fixed in the north – east segment of the plot. The house should face towards the east. The well and hearth are constructed only on the north – east part of the house. The south – east corner, called 'Agni moola', is not considered auspicious for placing the hearth. Cattle-sheds are constructed at the *Kanni moola* (South – west) or Agni moola, but not exactly at a corner of the house. The beams in a room should be of even number.

There are certain rituals connected with the beginning of house construction. *Kutti Adikkal* is fixing the corners of the to - be - constructed house. *Pooja* is performed at that time. A small piece of gold is placed below the foundation or at the base of the main door frame. At the house-warming ceremony, offerings are made to Lord Ganapathi and the chief carpenter boils the milk. Lighting the fire for boiling milk is done by the mason. Boiled milk is first given to the carpenter and the mason and then to others. As the milk boils bubbles appear; if the first bubble appears at the centre of the milk surface, it is considered a good omen. If it is on the southern side it is bad for the owner and if elsewhere it portends mixed fortunes.

Wood is an important raw material for conventional house construction. There are separate species of plants used for different purposes such as rafters, reapers and beams and door and window frames. The household implements and articles are also made from plants.

To increase durability of wood of *Mangifera indica L* (Mavu)- *Curcuma longa L* rhizome is ground with salt and painted on to the wood pieces.

Frame for doors and windows- Wood of *Artocarpus heterophyllus Lam* (Plavu*), Myristica fragrans* (Jathi) and *Xylia xylocarpa Jaub* (Irul) are used.

Kazhukol (Rafter): Wood of *Terminalia sps* (Maruth) and *Hopea parviflora Bedd* (Uruppu) are used.

Beam: Wood of *Hopea parviflora Bedd* (Uruppu*), Artocarpus heterophyllus Lam* (Plavu), *Pterocarpus marsupium Roxb* (Venga) and *Xylia xylocarpa Jaub* (Irul) are used.

Door (Shutters): Wood of *Artocarpus hirsuta Lam* (Anjili) are used to construct doors. Metal hinges were not used for doors and windows. Instead, the top and bottom frames of doors and windows have sockets into which the ends of shutters of doors are inserted. This type of hinge was called *Aranga Kutti*. Similarly instead of bolts, a wooden structure called *Thazhu Kutti* was made to keep the two door planks well shut. There was also another wooden structure called *Saksha* (bolt) for keeping the doors well shut.

Masonry: Laterite bricks were cut manually from quarries. These bricks were laid for walls using stone powder for mortar. Stone powder and sand are mixed in 1:2 ratio and jaggery and tender leaves of Mangifera are pounded with this mixture. This process enhances the strength and bounding power of the mortar. The mortar used to be carried not in iron plates as the practise is today, but in small buckets made of light-wood or sheathing leaf base of Areca. This basket was called *Maru*. The measurements were all in *Kols* and *Virals*.

The wall thickness is 8 *virals* and basement 9 *virals*. The *Ulthara kallu* is 10 virals thick. In some houses, at the level of ceiling, decorative *Kapotham* is made in laterite brick.

Since the laterite bricks are neatly cut and shaped, the use of mortar for brick laying was the minimum. There is no need for plastering. If plastering is done, the mortar is of stone powder and sand or of lime and sand.

For flooring, stone powder and sand mixture is spread on the floor and well rammed. Over the surface, granite powder mortar is applied. After that a coat of cashew nut oil is applied by using a wooden frame. The surface is then polished by using leaves of *Coccinia indica* (*Kova)* or *Erythrina indica* (*Muricku*). If charcoal from burning coconut shell or carbon from dry cells are mixed and applied on the floor, it will appear pitch black, far better than the appearance of cement flooring.

Masons were respectfully called *Maniyanis*.
The middle and low-income groups used mud bricks instead of laterite bricks. *Uruttu Katta* (Round bricks) was also used. For making *Uruttu Katta*, Clay and loamy soil are ground and kept for 3 or 4 days and then ball shaped lumps are made from them. These were used to construct walls. At one stretch, a wall of two feet height will be constructed; only after this part gets dry, the next higher stretch will be built.

To purify and cool the well water

Wood pieces of *Phyllanthus emblica L* (*Nelli*) are kept at the base of the open well for cooling and purifying the water. Also this wood has medicinal value. This round piece of wood is called *Nellippalaka*.

Folk knowledge on temple construction

The wood of *Hopea parviflora Bedd* (*Uruppu*), *Myristica fragrans* (*Jathi*) and *Terminalia torentosa (Kari Maruthu)* are used for constructing temples. An old concept is that the

wood of Myristica fragrans is suitable only for construction of temples and houses of Brahmins and that this wood is not suitable for construction of the houses of lower castes. This may be a ploy for ensuring availability of the best type of wood for the upper castes.

The above-mentioned woods were available in plenty in olden times. But now-a-days they have become rare in the area. In their place, several other types of timber are in use for house construction.

Hygiene & health care

Teeth brushing- Ripened leaves of *Mangifera indica L* (Mavu) are used for brushing teeth.

Coconut fibre is also used.
Tender stem of *Azadirachta indica L* (*Neem*) is crushed and used for cleaning teeth. Crushed stem of *Jatropa curcas L* (*Katalavanacku*) was also in use as toothbrush.

Tooth powder: Burned paddy-husk was used as tooth powder for cleaning teeth. It was crushed and mixed with common salt and pepper powder before use.

Bathing brush: Coconut fibre was used as bathing brush. Leaves of *Musa paradisiacia L* (Vazha), the crushed stem of *Acacia incia Willd* (incha) and the fibre of the dried fruit of *Luffa acutangula Roxb* (Peechil) were also in use.

Tongue used to be cleaned with the ribs of coconut leaves, split longitudinally.
During bathing, leaves and vines of pepper or leaves of Hibiscus used to be crushed and applied on the head as shampoo.

Cow-dung was widely used for plastering the mud floors. Plastering had to be done several times a year. When the floor or the courtyard becomes filthy, cow-dung water used to be sprinkled to cleanse and purify.

Kalam Pattu: Punga prasnam is a divination ceremony conducted on the 7th month of pregnancy. The ceremony is conducted by the families of the husband and the wife jointly to ensure that all is well with the pregnancy. If the *prasnam vekkal* - divination – suggests spirit afflictions, *Kalam Pattu* was performed to appease the spirits. Exercising the Kenthrom, the Gandharvan spirit ws inevitable. Dereliction in performance of these rites would invite social stigma. Kenthrom is performed by the Vannan caste. Neighbours and relatives are invited for these rituals.

Figures of three deities are drawn on the courtyard. This *Deivakkolam* (Deivam = God; Kolam = shape or figure) is made of rice flour, soot turmeric. Dried and powdered leaves are also used. The deities made out of these powders are *Bhairavan, Bhagavan and Bhagavati*. A five-wick bronze lamp is kept burning in front of these drawings. A one-wick ceremonial lamp each is kept in the four corners of the yard. In a plantain leaf are placed the offerings – beaten rice, puffed rice, betel leaf, arecanut, *Niranazhi* (a traditional

measuring container filled with rice) and *Nirapara* (a container much larger than *Nazhi (*filled with rice). *Nirapara* and *Niranazhi* signify prosperity and auspeciousness).

After the feast of invitees, *Kalampattu* commences. A pregnant woman half clad in new robes is brought to the *Kolam*, made to circumambulate the lamp and seated at the central place. Santhana Gopalam, a specific portion of *Ramayanam*, *Seelavathi Charitham* and *Nalacharitham* are sung in chorus melodiously and in good rhythm. This goes on through out the night. But midway through the singing, the pregnant woman gets possessed of the deity, begins to move her body rhythmically and begins to show abnormal behaviour, yelling, gesticulating and grabbing *Gurusi* and drinking it. *Gurusi* is a red-coloured mixture of turmeric, rice flour and quick lime in water representing sacrificial blood. Much to the embarassment of the audience, the chief ritualist enters into a dialogue with the spirit pregnant woman is possessed. Questions about the identity of the spirit, its willingness to leave the woman's body and so on are put to the possessed woman. The questioning and the attendant mortifications culminate in the falling down of the woman in swoon. Singing stops. Water is sprinkled on the unconscious woman's face and she is brought back to consciousness. She is removed to inside the house. Ritualists and their assistants are sent away gifted with new clothes and money befitting the status of the household which performed the ritual.

Fertilizer for vegetables

The head and other wastes of sharks are put in baskets made of coconut leaves and dipped into a pond for about five days. Then the water in the pond is taken and sprayed over field of vegetable cultivation to serve as pesticide and fertilizer for growth of plants.
Fish wastes are mixed with ash and applied to crops as fertiliser.
Fish waste alone is also used in the field.

Cow-dung is the major fertilizer used. Sometimes ash obtained from traditional choolas is mixed with cow dung before use as fertiliser.

Some agriculturists prepare an interesting fertilizer by mixing cow dung, ash, saltwater and mud collected from the marshy Irinavu area.

Art and decorative items

Theyyam is a performative art of Kannur District. The *Kavus* or sacred groves are the places where this art is performed by communities like *Vannan*, *Malayan* and *Valluvan*. The main source of livelihood for these communities was the performance of Theyyam. The festival season starts in February and ends in May.

Each *Kavu* has a main deity and several smaller deities. Each deity is identified by its unique dress and ornamentation. The head shield (*Muti*) of the *Theyyams* is made of *Murikku* and *Bamboo*. The spathe of areca leaf and coconut leaves are used as hair. The spathe of areca leaf is made into a mask for the deity *Gulikan*. For most Theyyams, tender coconut leaves are essential dress materials. The leaves are also used to adorn the head shields. Flowers of various kinds like *Hibiscus*, and *Ixora* and leaves of Tulsi are also used for garlands.

The facial painting of a *Theyyam* performer forms a major part of the folk art. Each deity can be made out from its unique facial painting. Vermillion (*chayilyam*), for red, *manola* for crimson, *mashi* for blue, dried and powdered leaves for green and charcoal for black is used for the painting. The mid rib of coconut leaves (*Eerkil*) is dipped in the colours and delicate facial decorations are made using it. A wick soaked in coconut oil or gingelly oil is burnt and an earthen pot is placed to collect the soot. This soot forms the black dye used for facial painting. Green dye is made by mixed white and blue colours. Vermillion and collyrium are soaked in oil before applying on the face so that even while perspiring the colours do not fade, but only glisten. White dye is made of rice flour.

Parboiled rice (*Unakkal ari*) is ground into a paste and mixed with turmeric for painting the body of deities like *Mutthappan*. Red dyes for *Theyyams* are made usually by mixing quick lime with turmeric. The emulsion to be applied on the body of Goddess is made out by boiling together ground rice flour, turmeric and quick lime. Cotton is used to decorate the body in *Theyyams* like *Pulimaran* and *Pulikandan*.

The hair of Theyyam is made of

Bambusa arundinacea L (*Mula*)
Erythrina indica Lam (*Murick*)
Areca catechu L (*Kavung*), sheathing leaf base.
Cocos nucifera L (*Thengu*), leaves.

Pookotta (Flower basket) is made of *Pandanus tectorius Soland* (*Kaitha*).

Udayada (Frocks) is made from tender leaves of the coconut tree.

Dyes are prepared in the following way:
Black from Coconut oil-lamp soot
White from Rice Powder
Blue from Indigofera tinctoria L (*Neela amari*)
Green from Blue colour + White colour
Red *Curcuma longa L* (Manjal), rhizome+ lime
Colour for *Thakidu* (plate)from Rice powder+Curcuma longa L (rhizome)+Lime
Paricha (Armour) from Wood of *Erythrina indica L* (*Murick*)
Kuzhampu from Rice powder mixed with *Curcuma longa L* (*Manjal*) rhizome and lime.

Games and biodiversity

It is interesting to note that in olden days children used to play games with locally available materials. The whole gamut of games including rules and regulations seem to have originated indigenously. Unlike the modern games, which use costly gadgets and sports goods, the articles used in old games were inexpensive and easily procurable. The following are some of the plays and games, which were prevalent in the northern part of the state, including Kalliasseri Panchayat.

1. *Vellayum Chambayum*: Four concentric circles are drawn on the floor. Two perpendicular lines passing through the centre, one transecting the other at the centre are drawn. In this game, 4 children participate. The materials used in the game are bivalve shells.

2. *Itty and Kol*: The play materials are just two sticks – one about 1 to 1.5 feet and the other about 2 to 3 inches in length. It is a group game involving four or six children. The game tests the targeting acumen of children.

3. *Sody*: It is group play. The group is divided into two equal teams. It needs no play materials. It is a physical fitness testing game.

4. *Arippo Thirippo*: Four or five children participate in this game. Usually it is played by girls. The participants sit in a circle. A chime is sung in consonance with the game.

5. *Uppu Kali:* The play material is soil. There are two teams. A small amount of soil with colour different from that of the surrounding area is collected. This soil is hidden in various places by one team and it is the duty of the other team to find them out.

6. *Kotham Kallu*: In this play, any number of children can participate. The only material needed is five pebbles of almost equal size. The play improves the ability of children to hold and handle things. The five stones are spread; one is thrown up; before it comes down it is caught along with the other four stones on the ground. There are a number of steps for this play.

7. *Dappa Kali*: Here the materials are 12 pieces of tile and a ball made of cloths and coir. The small pieces of tile are piled one upon another. Children are divided into two groups. Each member of the team tries to upset the pile by throwing the ball at it and the play proceeds.

8. *Kottel Kuthu*: A circle is drawn. One boy stands outside and others remain within the circle. The boy outside tries to pull out the ones in the circle without entering into the circle. If he wins, the pulled out boy also joins him in taking out others.

9. *Kallanum polisum*: Five or more children are involved in this. One child is designated as the police and all others are thieves. The thieves hide in various places when the policeman closes his eyes. The police boy searches all possible hideouts and based on the number of thieves he could find out, he is given scores.

10. *Nira*: Two persons play this game. Twelve small pebbles or seeds are held by one person where as the other person has 12 grains as material. Three squares are drawn one within the other. The corners of three squares are connected by a line. Each person places one material at a time, on the transecting point. The aim is to have three materials in a line. In that case, he can take away one material that the other man has put on the square.

11. *Ettum Kattam*: A long rectangle on the ground is longitudinally divided into two equal parts. Each division is further subdivided into four equal squares. It can be played by more than two persons. Only a single dice is needed. Usually the dice is a polished piece of tile.

12. *Nooram Kolly*: Here a rib of the coconut leaf about 15 cm-long is taken. Ten more ribs half the size of the first are also made ready. The long rib is placed on the ground. It is the queen. The other 10 ribs should be dropped on the long one. If none of the short ribs touches the long rib, the player loses the game. If, say, two short ribs are in touch with the long one, the player should carefully take the ribs one by one without jerking the other ribs. For each rib thus lifted ten points are awarded, and for the long rib 100 points.

13. *Thalama*: This is played by two teams. The article used is a ball. In the olden days, there was neither rubber nor plastic ball. A small ball will be made of clothe or hay tied and bound by coir or string made from the bark of *Helicterus isora* (Koovalam). A more common article is ball woven from coconut leaves. Ribs removed, the ribbon like leaves are woven into a small ball. This is usually called *Atta*. With the ball, several feats are performed as the opposite team tries to catch the ball.

From the brief description of games given above, it is clear that no sophisticated or costly items were used as play materials. All were collected from the surroundings. The old are fast disappearing yielding place to the new. But school children, especially girls, still play some of these games.

The toys of earlier times were also biodiversity-related. Most of the little toys given to the tots were made from coconut and jack tree leaves. Small baskets helpful while playing in soil were also made from coconut leaves. Car toys were made from jack tree leaves with the fruits of *Jatropha* (*Kadalavanak*) serving as wheels. The sheaths of arecanut trees were used for dragging kids through the ground. The sheath was used also to make hats, fan etc. Paper was also commonly used to make hats, canoe, purse etc as toy items. Children were given small wooden carts with three wheels which they could push around and train themselves in walking. Grown up children used to make small carts with four wheels on which a kid could be seated and drawn around using coir rope.

Children used to play top and string with top made of coconut shell and rib. Thus it may be seen toys were also made from locally available materials. Children's lives was in extreme harmony with nature. Bathing in ponds and tanks for hours together and jumping into and swimming in them was a common sight. Children also helped their household in farming activities and in cattle-rearing and dairying.

Traditional knowledge

Various forms of traditional knowledge are found among the people of Kalliasseri. For collecting information, we interviewed a large number of persons - *Vaidyans*, fishermen, farmers and elderly persons of all categories of Kalliasseri.

Some items of traditional knowledge which local people use for curing diseases are given below.
The persons suffering from the sting of fishes use decoctions prepared from the root of the plant *Hydrophylla spinosa.*

Acorus (*Vayambu*) and *Aristolochia indica* (*Uruthooky*) are crushed into a paste and applied at the site of sting by scorpion or centipede.

Adathoda (small variety) and Tulsi are crushed and the juice is effective against palpitation. Muringa skin crushed and its juice is mixed with equal amount of coconut milk. This mixture is poured into a handful of boiled rice. It is boiled again and the resultant semi-liquid is an efficacious drug against gas trouble.

The youngest fronds of coconut along with ribs are ground into paste and consumed. This is a treatment for *Rekthapitham*.

Narvelia zeylanica (**Nila narakam**) and *Pergularia* (*Keezhar nelli*) are ground together and well mixed with butter. If this is placed on the top of the head, dizziness is cured.

Urine collected from ass, camel, goat, cow and horse are mixed and a concoction is made which is used for treatment of epilepsy. This concoction is called *Panchamoothrasavam.*

The secretion from the scent gland of Small Indian Civet (*Viverricula indica*) is used in the preparation of an ayurvedic tablet called *Dhanuvandaram Gulika*. This tablet is used for the treatment of Colic.

Cattle leech (*Hirudinaria granulosa*) is used for curing skin diseases.

For the treatment of fever, Bed bug (C*imex*) covered with jaggery is eaten.

Antlion, the larva of the Antlion flies (*Myrmeleon formicarius*) the eggs of ants and the leaves of *Mussanda frondosa* (Vellila) are ground in milk and if this product is applied to the head of typhoid patients to restore the consciousness.
Tongue sore can be cured by chewing coconut button.
The fruit of cashew and *Carum capticum* (*Ayamodakam*) are mixed and the juice is given to cholera patients for cure.

Ten grams of tender shoots of cashew plant is ground and consumed along with butter for stopping bleeding.

Frog meat is cooked and eaten for treatment of whooping cough.

The faeces of rat mixed with medicinal herbs is used for restoring smooth passage of urine.
The meat of Indian flying fox (*Pteropus gigantens*) is cooked and eaten for the treatment of Asthma.
Domestic quail meat is cooked and eaten for treatment of Asthma. Quail egg is also used for the treatment of Asthma.
Earthworm is used in the preparation of Bhoonagathailam used for treatment of typhoid.
Snail is an ingredient in the preparation of *Thazhuthena thailam*. This medicine is used for treatment of skin diseases.
The Apple Snail (*Pila globosa*) is cooked and used as a medicine for the treatment of Piles.
The Eel (*Anguilla)* is cooked and used for treatment of piles.
For tongue sore of cows, the fruit of *Punica glanatium* is kept in-between the teeth of the affected cow.

Pest eradication

Chemical pesticides made their entry in this part of the state only about 50 years ago. Farmers had been resorting to a variety of methods to combat pests in the past.

(1) Dry leaves used to be collected from homesteads in baskets made of coconut leaves and spread out in paddy fields and burnt. This practice helped in controlling the menace of soil mites.
(2) A lighted petromax lamp was placed on a tripod stand in the middle of the field at night. Below the lamp in a pot, water mixed with kerosene oil was kept. The lamp attracts insects, which fall into the kerosene solution placed below. Stirring with sticks caused instant death of the insects.
(3) Small branches of Holigrana (*cheru*) used to be kept in various parts of the paddy field to ward off insects.
(4) Asfoetida (*Palkayam*) is dissolved in water and a coir rope is immersed in the solution. The two ends of the rope are held by two persons standing across the paddy field. They walk from one end of the field to the other sweeping the paddy with the rope. The odour of Asfoetida drives away insects.
(5) Elephant dung is burnt at the side of the bunds of paddy fields.
(6) Leaf rollers used to be contained by dewatering paddy fields occasionally.
(7) Rhinoceros beetle attacking the fronds of coconut were taken out from tree-tops by using a sharp long iron spike. Loose sand was sprayed around emerging fronds to kill beetles.
(8) A small tin drum was kept on a long pole in the centre of the field. The beating of the drum from a long distance using a stick to which a long rope is tied drive away birds.
(9) In fields, an effigy made of hay and covered by clothes was hung from posts to scare away wild animals. Sometimes a pot covered with cabalistic signs or carrying mantras inscribed on palmera leaf was hung in a conspicuous position. If a crop of vegetables is raised in a garden visible and accessible from the road, the vegetables will never reach maturity unless a bogey of some sort is set up in their midst (Logan, 1887).
(10) Castor seeds (about 250 gm) well crushed and mixed with boiled rice water used to be placed near the stem base of coconut tree. Rhinoceros beetle and other beetles are attracted to this solution.

8. Summary and Conclusions

Biodiversity has assumed considerable importance over the past 5 years for two reasons (Solbrig and Oordt, 1992). Firstly, new strides in molecular biology have made it possible to move genes from one organism to another, from mammals to yeasts, from bacteria to insects and so on, opening up new possibilities of putting genetic resources to human use. Secondly, the Intellectual Property Rights allow patenting of living organisms and their products (Reid, et al, 1993). However, the level of awareness of the richness of plant and animal diversity around the globe is getting rapidly eroded.

The highly diverse early farming systems generated little production surplus. They could sustain autonomous, small societies for long periods. The more complex agrarian and industrial societies that followed were based on large-scale resource exports from the countryside to cities. This is the scenario in the Panchayat areas also. The population of Kalliasseri has been growing at a rate faster than that of the average for the Kerala State. During the ten years between 1971 and 1981, its population increased by 25 percent. During the 'eighties it is a bit lower at 22 percent.

The study conducted in June 2000, reveals that the population had increased to 34687, an increase of 38 percent during the preceding 10 years. This extra ordinary population increase is wholly due to in-migration from adjacent areas. Land prices being relatively low in the wetlands people from neighbouring cities and industrial areas rush into the panchayat to buy small pieces of wetlands for conversion into dwelling housing sites. Large scale filling up of wetlands is going on causing serious erosion of genetic diversity in the area.

In earlier years, cultivation had extended to most of the arable lands. The entire area of the coastal plain was under rice cultivation. The returns from cultivation were comparatively low; cultivators were denied the fruits of their soil due to the prevalence of an extortionate tenurial system. The needs of the population were also very much limited. With the spread of education and development of the communication system, the wants of the people began to rise. Because of its proximity to the district headquarters – Kannur – and the growth of the near-by industrial belt at Mangad and Andoor, non-agricultural occupations have come to dominate Kalliasseri while at the same agricultural occupations are getting marginalised. Moreover, with the spread of education, job expectations have tended to move away from agriculture. Another important feature of changes in the agrarian structure is the rising dominance of small holders and fragmentation of holdings into tiny plots. In 1928, the size of the average land holding was 1.04 ha as against 0.28 ha in 1996. As non-agricultural activities are the major source of income, landholders make little effort to raise agricultural productivity. For 565 households in the panchayat, the major income is the Gulf remittances. Most of the land owners have neither the time nor the aptitude for cultivation. Only less than 20 percent of the households depend on agriculture for their livelihood. This situation has led to near-total conversion of paddy fields into coconut gardens and disappearance of cultivation of pulses and vegetables. Indigenous varieties of rice, vegetables and other crops have been displaced by hybrid varieties. There are only very small pockets in which local varieties survive.

As most areas of the panchayat are inhibited, large-scale destruction of wild plants has happened. The practice of weeding and hoeing of the home gardens prevents the establishment of the saplings of wild plants. Whatever diversity of wild plants remains is found on the borders of gardens, waste lands and public lands. There used to be large tracts of land on the fringes of home gardens where wild species of trees and shrubs grew luxuriantly. These borders of homesteads served as bio-fences and provided fuel, fodder, green manure and medicinal plants. With the fragmentation of home gardens, bio-fences are replaced by laterite compound walls and waste lands are dwindling fast.

There are 11 small-scale industries in the Panchayat, which depend on wood, especially soft wood. There is rapid decline in the population of soft wood trees in the Panchayat. The indigenous medicare system is also fast disappearing. The traditional healers are an extinct group. Even though the Ayurvedic system is on a comeback trail, it is almost centred on professional and qualified physicians. Only three or four traditional *Vaidyans* practise in the area. The collection of medicinal plants from in and around the Panchayat has also become thing of the past. Almost all the herbs and drugs and other raw materials for preparation of medicine are bought from markets in Taliparamba and Kannur. Large-scale adulteration of raw materials has become quite common. Moreover, this habit of procuring medicinal plants from outside sources cuts at the root of building up a knowledge base in medicinal plants.

Many of the traditional ceremonies and festivals connected with agriculture are also on the wane. In the olden times, the life of villagers was centred on farming (rice cultivation) and allied cultural activities. It was a way of life. Farming is disappearing along with its concomitant culture. Tiled houses are on the way out. For doors and windows, concrete or iron frames are being widely used. The practice of cement flooring in houses is confined to the lower middle class. The cow-dung plastered mud floor is fast disappearing. Surprisingly, there is no thatched building in the Panchayat. Marble slabs are used in a big way for flooring, by the relatively well to do.

The animal population in the Panchayat also has undergone changes. The number of buffalos in the Panchayat in 1992 was only 30. The number has fallen further since then. The cattle population is of the hybrid variety. Goat rearing also shows a depressing picture. The pure indigenous varieties have not been recorded at all. In poultry, local varieties are seen along with hybrid types. But here too, unless there is any programme to conserve the germplasm, the fate of local varieties is doomed. Among wild animals, except for fishes, total lack of concern is observed. Some fishes, which were prevalent in earlier days, have vanished from the rivers. Crocodiles have become extinct. Tortoises are extremely rare. Snakes face extinction from the extreme animosity people show to them. Chemicalisation of agriculture is posing danger to amphibian and insect fauna.

In spite of heavy odds, homesteads, marginal lands, fallow lands, and barren lands are seen to carry a variety of medicinal plants and WRCPs. Even in cultivated areas traditional varieties of rice, coconut, pepper and mango co-exist with new hybrid varieties. The traditional farming, fishing and other livelihood activities of the area are undergoing tremendous change.

Health practices and food habits have also undergone substantial change. The younger generation is oblivious of the biodiversity treasure that lies neglected around them. There is no effective means to transfer the biodiversity knowledge of the older generation to the new one.

The study has brought out the richness in biodiversity of the area and the factors responsible for its loss and unearthed some fast-disappearing remnants of traditional knowledge in various fields. It has also succeeded in exposing the callous of students and the general public towards the richness of this biodiversity in this heavily human impacted ecosystem and the imperative need to conserve them.

Loss of biodiversity stems from changes in attitudes towards nature, growth in human population; depletion of natural resources - global trade – in sum, all socio-economic changes that fail to value the environment and its resources.

Suggested Follow-ups

Man depends on biological resources for food, energy, shelter, clothing, medicine and others. Biodiversity and man have been in inalienable relationship from prehistoric times. The way societies has managed their resources determines how much diversity survives and the way that societies manage biological diversity determines the productivity of important resources and ecological services (Mc Neely, Madhav Gadgil).

The present generation is illiterate with respect to the bio-resources that lie around them. Unless they know the importance of the wealth around them, they cannot be expected to conserve that wealth. Hence concerted effort should go into the building up of taxonomic capability among the youth. Just as the Minimum Level of Learning (MLL) is adopted as a goal in the school curriculum, a Minimum Level of Biodiversity Knowledge (MLBK) must be insisted upon. A child who completes Lower Primary Education must know the names and uses of at least 20 plants around him. An Upper Primary student should know at least 50 plant species. The minimum level prescribed for a High School student is 75. A child who completes High School Education should be able to identify 25 bird species and 10 butterfly species. With necessary training programmes designed for schools, this is not an unattainable goal. What would be required are a few Resource Persons at the Panchayat, a few Reference Books and a Slide Projector. Classes and field trips could be designed and implemented on holidays so as to achieve the target.

Incentives for conserving biodiversity

For *in situ* conservation of land races of different crops, farmers who practise cultivation of indigenous varieties may be identified within a Panchayat. A system of providing incentives to farmers who adopt indigenous methods for seed storage and crop protection and who practise conservation farming systems, would be a step in the right direction. Similarly in the case of livestock breeds, it is necessary to identify households in which there are still

animal germplasm of local breeds. This may be in cattle, poultry, goats, etc. Such farmers are forgoing higher economic returns that they could have earned through crossbreeding. The local bodies may develop through people's participation an adequate compensatory mechanism for indigenous germplasm conservation. The Panchayat may also declare a few ponds of the Panchayat as 'Conservation Sites of Local Varieties of Fish'. Indigenous species could be introduced and maintained in these ponds.

Incentives for cultivation of medicinal plants

There are hundreds of plant species of medicinal value growing in wastelands and home gardens. The importance of conservation of medicinal and aromatic plants is well recognised. Technical assistance for conservation, cultivation, sustainable extraction, value addition and marketing of these plants may be obtained from institutions like Ayurveda College and TBGRI. People should be motivated to cultivate medicinal plants at least on a small scale on the available lands. The Neighbourhood System of People's Planning and the *Kudumbasree* Programme may be strengthened to take up cultivation of medicinal plants as micro enterprises. If land is available, the local body itself should set up its own garden of medicinal plants. The harvest may be sold in the market. Or as Malapattam Panchayat (Irikkur Block, Kannur District) has shown, a training programme may be conducted for interested persons on how to prepare Ayurvedic medicines. Now manufacture of Ayurvedic preparations has become highly commercialised and it is not possible to ensure quality. Value addition to medicinal plant materials can be done at the Panchayat itself. Organizing new co – operative societies or extending the activities of the present ones in the area of production and marketing of ayurvedic drugs will give the required boost to the programme.

Organic farming

Owing to increasing awareness about toxic residue of pesticides in food, the preference for organic products is on the increase. Soil-based microbial diversity is also conserved in organic farming. There are a few farmers in Kalliasseri who cultivate vegetables without using any pesticide. But as there are no facilities for organic certification, no value is added to such products. Hence, in course of time even people engaged in organic farming may tend to switch on to the use of chemical fertilisers and pesticides (at least for vegetables which are marketed and not taken for own consumption) attracted by the prospects of high returns. If Departments of Chemistry of the University or of nearby colleges are empowered to issue *Organic Certification,* it will help the organic farmers.

Database on indigenous knowledge

Databases could be developed in which information on indigenous knowledge and innovations along with the names of innovators, are stored. These would deal with herbal pesticides, veterinary medicines, organic fertilisers, farm implements, soil and water conservation. This database would be used by local communities as by well as local self-governments.

Heritage museum

The Panchayat may set up a Heritage Museum in which a section may be set apart for biodiversity. The People's Biodiversity Register prepared based on the project report, the herbarium, the preserved specimens etc. will form the nucleus of the Biodiversity division of the Museum. Panels for exhibition may also be prepared. There will be a system for inflow of knowledge into and outflow of knowledge from the Indigenous Knowledge Bank at the Division.

Appendix I

Convention on Biological Diversity

With the Convention on Biological Diversity (CBD), which came into force on December 29, 1993, recognising the sovereign right of each individual nation over its biodiversity in the areas of protection, management, conservation and utilisation and the emergence of the new world order on trade and intellectual property rights (IPR) serious attention is being given to inventorying, documentation and conservation of the biological resources (Mohan Pillai, 2000). The Convention on Biological Diversity was approved by more than over 10 countries including India. A very conservative assessment of global diversity is 13-14 million species out of which only 1.75 million species are documented around the world (UNEP, 1995).

The critical factors adversely affecting biodiversity are (1) Over exploitation (2) Habitat loss (3) Poaching and illegal trade (4) Invasion of exotics (5) Fragmentation of forest areas and (6) Industrial and other related developmental activities.

Investigation, information, incentives, integration, insistence, involvement, innovativeness and international support are necessary to save biodiversity from further deterioration.

CBD requires all countries to prepare inventories of their biodiversity resources, to monitor their fate, to organise adequate information systems for such resources and to take steps to conserve them. (United Nations Environment Programme, 1993, 1994). It also recognises the importance of the role of local communities in conservation of these resources.

The Convention defines 'Biodiversity' as the variability among living organisms.
Biodiversity refers to the variety and variability among living organisms and the ecological complexes in which they occur. Thus the term encompasses: species diversity, or diversity among species, genetic diversity, or diversity within species – the variety of genes, and ecosystems. It includes all functional systems that include organisms of a natural community together with their physical environment. (Natural Research Council, 1992).
Conservation of biological diversity in the tropics is largely a matter of conserving entire habitats rather than individual species of flora and fauna (Terbough, 1992, Whitmore 1990). For conservation, a high opportunity cost is paid by developing countries in terms of forgone benefits. There is a tendency in developed countries to view tropical biodiversity as a global resource and the host country as both a beneficiary and a custodian of this resource on behalf of humanity. The implication is that the host country has the responsibility to conserve the biodiversity within its borders regardless of opportunity costs involved.

The main objectives of the Convention are

(1) the conservation of biological diversity
(2) the sustainable use of its components, and
(3) the fair and equitable sharing of the benefits arising out of the utilisation of the genetic resources by appropriate access to genetic resources and by appropriate

transfer of relevant technologies, taking into account all rights over those resources and to technologies and by appropriate funding.

The Convention requires each contracting state party to develop national strategies, plans or programmes for conservation and sustainable use of biodiversity by recognising the sovereign rights of indigenous and local people. The convention imposes a responsibility on the states to ensure that the activities within their jurisdiction and control do not cause environmental damage to the other states. The CBD, through Art 8(j) declares that each contracting party shall ' subject to national legislation respect, preserve and maintain knowledge, innovation and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biological diversities and promote their knowledge, innovation and practices and encourage the equitable sharing of the benefits arising from the utilisation of such knowledge, innovations and practices". The provisions of CBD regarding the transfer of technology are ambiguous in their treatment of IPR. Contemplating the use of licensing agreements, the convention requires the access and transfer to be provided on fair and most favourable terms including on mutually agreed concessional and preferential terms, consistent with the adequate and effective protection of IPR [Art 16(2)]. However, parties have to co-operate to ensure that IPR are supportive of and do not run counter to, its objectives [Art 19(1)]. It is in this context that patent laws, TRIPS and GATT assume relevance for biodiversity conservation.

CBD insists on community rights, TRIPS gives importance to individual investor. Obligations under CBD and TRIPS pull countries in different directions. Sensing this conflict the Second Conference of Parties to CBD, held at Jakarta in November, 1995, requested the CBD Secretariat to undertake a preliminary study which analyses the impact of IPR system on the conservation and sustainable use of biological diversity and the equitable sharing of benefits derived from its use. The Third Conference of Parties to CBD held at Buenos Aires in November 1996, drew attention to the relationship between IPR and the knowledge, practices and innovations of indigenous and local communities relevant to the conservation and sustainable use of biodiversity.

The extension of IPR to biological diversity would have serious implications. The impact on wild plants and animals may not be direct, so long as they remain outside the purview of IPR. But in the case of agricultural diversity the impact would be both direct and indirect. As far as indigenous knowledge is concerned the essentially private nature of IPR does not recognise it at all.

The emerging IPR regime established by TRIPS makes it possible to establish IPR by modifying or even by just recording the traditional knowledge of indigenous people. Thus in the name of IPR, TRIPS facilitates bio-piracy i.e. the appropriation and pirating through the enforcement of IPR of scientists and corporations of the intrinsic worth of diversified species and the community rights of innovations of indigenous people.

CBD recognises the sovereign rights of countries to their biodiversity. However, this does not mean that biodiversity is the property of the state. The state is only the trustee of

people's resources. There should therefore be no interference of the state in the local use of local resources. However, all commercial links between the local communities and the outside world should be regulated by the state. Strengthening of local democracy through Panchayat Raj institutions is essential for the conservation of biodiversity as well as the defence of people's rights and indigenous knowledge in the face of piracy.

TRIPS make inroads into the sovereignty of states especially the developing countries. It will encourage uncompensated free flow of resources and knowledge from the South to the North. Unless efforts to protect and preserve our national sovereignty are taken, we may soon fall under bio-colonialism. Writing in Modern Law Review (1998) Alain Pattage explains the term bio-colonialism as the encompassing process of commodification, which appropriates not only the bodily genetic resources of indigenous peoples but also their traditional cultural artefacts. It discloses an asymmetrical process in which the wealthy but genetically impoverished nations of the North exploit the patrimony of the vulnerable South (Jayakumar).

India is a party to CBD and therefore committed to developing an inventory of its biodiversity resources, monitoring their dynamics, organising a computer-based system of such information and working out an effective strategy of conserving these resources (Gadgil, 1994). The documentation of indigenous knowledge with respect to biodiversity is also a major task (Gadgil, Berkes, Folke, 1993).

Valuable elements of biodiversity are not restricted to forests and protected areas. Wild relatives of rice occur, for example, in wetlands dispersed throughout the country and wild relatives of taros and yams are to be found along road verges. The insectivorous Drosera plants being collected and exported to Japan occur in small rain puddles on sheet rocks all along the Western Ghats (Gadgil, 1994).

Inventorying and monitoring biodiversity is an immense task. There are several million species of sexually reproducing organisms in the world and so also asexual lower organisms.

This taxonomic diversity is organised into communities of interacting organisms that differ from one ecosystem to another. There is also great variation in the relationship that people have with biodiversity and ecosystems. The significance that people attach to ecosystems and species varies among different sections of the society.

The pioneer in the biodiversity study is the Pattuvam Panchayat of Taliparamba Block, Kannur District. A band of enthusiastic young men helped by experts in various fields made an exhaustive study of the coastal Panchayat in 1995. The programme had attracted national interest, but in the absence of any follow up activities, it was relegated to oblivion. This is the national and global scenario in which a micro study has been attempted in a small thickly inhabited Panchayat – Kalliasseri – of Kannur District, Kerala.

Kannur District, which is a part of the Old Malabar District, is rich in flora and fauna. William Logan in his Malabar Manual (1887) has given a graphic description of the luxuriant

vegetation and the teeming wildlife. But times have changed. The forestland has shrunk to a bare 7.6 percent of the total area of the district (2967.97 sq km). The wildlife wing of KFRI had conducted a survey on the fauna of the District in 1994. The Botanical Survey of India had a floristic survey in Kannur District. But most of the surveys and data collection have been done in forestlands. But biodiversity is not restricted to forestlands. Farmlands, homesteads and waste lands in human habited areas by virtue of the geographic and climatic factors are rich in biodiversity, though not on the scale of forests. The diversity of cultivated crops, the variety of seeds and seedlings in use, the type of plants that grow in homesteads, in marginal lands have not been earlier studied in detail. Hence the need for such a study was felt.

Appendix II

Table 1 Districtwise Distribution of Mangrove Vegetation in Kerala

No	District	Mangrove Area (Km^2)
1.	Thiruvananthapuram	0.23
2.	Kollam	0.58
3.	Alappuzha	0.90
4.	Kottayam	0.80
5.	Ernakulam	2.60
6.	Thrissur	0.21
7.	Malappuram	0.12
8.	Kozhikode	2.93
9.	Kannur	7.55
10.	Kasargod	0.79
	Total	**16.71 Km^2**

Source: - Kerala Forests & Forestry Handbook, 1995,
Forestry Information Bureau, Kerala Forest Department

Table 2 Communitywise distribution of landholdings in Kalliasseri-1928

Name of Community	Size of landholding									
	< than 5 acres		5 to 10 acres		10 to 20 acres		> 20 acres		All land holdings	
	No	Total Areas (acres)	No	Total Areas (acres)	No	Total Areas (acres)	No	Total Areas (acres)	No	Total Areas (acres)
Devaswom	57	88.0	1	87.48	10	137.9	12	712.19	90	1025.56
Namboodiri	33	47.28	6	42.70	4	51.20	1	51.23	44	192.41
Nair (Nambiar)	325	450.68	26	180.44	14	196.4	9	729.94	374	1557.46
Ezhava (Thiyya)	107	82.55	2	11.24	-	-	-	-	109	93.79
Muslim	208	232.26	17	114.37	10	163.6	2	65.12	237	575.40
Others	138	112.85	2	12.85	1	13.57		-	141	139.27
Total	868	1013.6	64	449.08	39	562.7	24	1558.48	995	3583.89

Table 3 Distribution of Holdings by Land Size Class in Kalliasseri

Holding Size	Households		Area Holding	
Cents	Number	Percentage	Acres	Percentage
0	140	3.6	0.0	0.0
0.1 – 10	745	18.9	5647.10	3.0
10 – 50	1973	50.1	50291.77	26.6
50 – 100	651	16.6	47607.63	25.1
100 – 200	306	7.8	43103.16	22.6
200 – 500	108	2.7	30978.72	16.4
500 & above	13	0.3	11876.48	6.3
Total	3936	100.0	189504.86	100.0

Source: Kalliasseri Experiment in Local Level Planning , 1995, KRPLLD

Table 4 Distribution of Households and Population by Major Castes in Kalliasseri

Caste	Households		% of Village population	Average holding size (cents)	% of total area
	Number	%			
Brahmin	8	0.2	0.2	139.13	0.6
Nair	493	12.5	11.02	70.02	18.2
OFC	110	2.8	2.4	37.20	2.1
Muslim	633	16.1	22.2	45.46	15.2
Ezhava	1710	43.4	40.7	50.30	45.5
OBC	781	19.8	18.7	38.96	16.0
SC & ST	196	5.0	4.7	22.41	2.3

Source: Kalliasseri Experiment in Local Level Planning, 1995, KRPLLD

Table 5 Land Use Pattern in Kalliasseri (Area in 100 Sq.mt)

Landuse	**Coastal**	**Tidal**	**Valley**	**Hilly**	**Terrace**
P1	18218	170	4978		
P2			6515		
P3			681		
Coconout	62658	291	2045	9562	7879
Mixed Crops	904		787	8212	2231
Mixed Trees	92		924	4399	1278
Wasteland	317		33	700	4032
Cultivable Wasteland	70	451			
Paddy with pulses	2809	48			
Vegetables					
Pisci land		1583			
Marshy land		4228			
Pepper			10	1030	505
Arecanut			75	394	59
Cashew			736	2437	1435
Laterite Quarry			37	138	292
Tapioca					12
Banana				139	96
Total	**85068**	**6771**	**16821**	**27011**	**17819**

Source: Kalliasseri Experiment in Local Level Planning, 1995, KRPLLD

Table 6 Distribution of Livestock by Ward in Kalliasseri

Animal/ Bird	I	II	III	IV	V	VI	VII	VIII	IX	X	1992	1966
Cow	192	176	188	194	243	188	77	160	112	111	1941	1845
Buffalo	14	5	7		4						30	126
Bullock		2	2	2	10		10			2	38	429
Goat	3	7	4		1	11	6	5	3	12	52	301
Total	209	190	201	196	258	199	103	165	115	125	1761	2701
Hen	278	412	319	500	519	243	407	172	154	173	3177	3840
Duck	2		4	14	4		2			5	31	
Others	4		12		2	14		1		1	34	
Total	284	412	335	514	525	257	409	173	154	179	3242	3840

Source: Kalliasseri Experiment in Local Level Planning, 1995, KRPLLD

Table 7 Trees of Kalliasseri *Panchayat*

Sl. No.	Botanical name	Family	Vernacular name its uses	Useful parts & Status	Statis
1	*Acacia auriculiformis*	Mimosaceae	Acacia	Wood-soft wood Fire wood	Abundant
2	*Achras sapota L.*	Sapotaceae	Sappota	Fruit-edible Wood-Firewood	Occasional
3	*Adenanthera pavonia L.*	Mimosaceae	Manchaty	Seeds-preparation of ornamentals Wood-Fire wood	Abundant
4	*Aegiceras corniculatum Blanco.*	Myrsinaceae	Halsi	Wood-Fire wood	Rare
5	*Aegle marmelos Corr.*	Rutaceae	Koovalam	Fruit-edible, medicinal Leaf-medicinal Wood-Fire wood	Rare
6	*Ailanthus malabarica DC.*	Simarubaceae	Matty	Wood-Soft wood	Abundant
7	*Albizzia lebbeck Benth*	Caesalpini aceae	Nenmeni vaka	Wood-Furniture	Occasional

8	*Albizzia procera Benth*	Caesalpini aceae	Vellavaka	Wood-Fire wood	Occasional
9	*Alstonia scholaris R.Br.*	Apocynaceae	Ezhilampala	Wood-Soft wood Bark-Medicinal	Common
10	*Anacardium occidentale L.*	Anacardi aceae	Kasumavu	Wood-Fire wood Fruit&Nuts-Edible	Common
11	*Anona reticulata L.*	Anonaceae	Atha	Wood-Fire wood Fruit-Edible	Occasional
12	*Anona squamosa L.*	Anonaceae	Atha	Wood-Fire wood Fruit-Edible	Occasional
13	*Areca catechu L.*	Arecaceae	Kamungu	Arecanut-Chewing Stem-Agricultural purposes	Occasional
14	*Artocarpus altilis L.*	Moraceae	Seema plavu	Wood-Fire wood & Softwood Fruit-Vegetable	Occasional
15	*Artocarpus heterophyllus Lam.*	Moraceae	Plavu	Wood-House construction, Furniture Fruit-Edible	Abundant
16	*Artocarpus hirsutus Lam.*	Moraceae	Ayaniplavu/ Anjili	Wood-House construction, Furniture Fruit-Edible	Occasional
17	*Avicennia officinalis L.*	Avicenni aceae	Uppootti	Wood-Fire wood	Common in marshy land
18	*Excoecaria agallocha L.*	Euphorbi aceae	Komatty	Wood-Furniture Fire wood	Rare
19	*Azadirachta indica L.*	Meliaceae	Veppu	Wood-Fire wood Leaf-Medicinal Seeds-Oil/Oilcake Used as fertilizer	Rare
20	*Barringtonia racemosa Forst.*	Lecythid aceae	Samudra pushpam/ Samudrakka	Wood-Fire wood Soft wood	Common in marshy area
21	*Bixa orellana L.*	Bixaceae	Kurangu manjal	Wood-Fire wood Fruit & Seeds-Medicinal	Common
22	*Brugiera eriopetala W&A.*	Rhizopho raceae	Kandal	Wood-Fire wood	Common in marshyland

23	*Buchanania lanzan Spring*	Anacar diaceae	Kulirmavu	Wood-Fire wood/House construction	Occasional
24	*Butea frondosa Koen.*	Fabaceae	Plasu	Wood-Soft wood	Rare
25	*Calophyllum inophyllum L.*	Guttiferaceae	Punna	Wood-Fire wood	Rare
26	*Carallia integerrima DC.*	Rhizopho raceae	Venkana	Wood-Fire wood	Occasional
27	*Careya arborea Roxb.*	Lecythi daceae	Pezhu	Wood-Fire wood Bark-Medicinal	Occasional
28	*Caryota urens L.*	Palmaceae	Choonda-pana	Wood-Agricultural purpose	
29	*Cassia fistula L.*	Caesalpini aceae	Kanikonna	Wood-Fire wood Flower-Ornamental Wood bark-Medicinal	Occasional
30	*Cassia siamea Lam.*	Caesalpini aceae	Manjakonna	Wood-Furniture House construction	Occasional
31	*Casuarina equisitifolia L.*	Casuarin aceae	Chavock / Kattadi	Wood-Temporary house construction	Occasional
32	*Chrysophyllum cainito L.*	Sapotaceae	Rosapple	Wood-Fire wood Fruit-Edible	Rare
33	*Cinnamomum zeylanicum Bl.*	Lauraceae	Karappa	Wood-Fire wood Leaves-Source of cinnamomum oil	Rare
34	*Citharexylum subserratum Sw.*	Verbenaceae	Parijatham	Bark-Contiment Wood-Fire wood Flower-Ornamental	Occasional
35	*Commiphora caudata Engl..*	Burseraceae	Idinjil	Bark - Medicinal	
36	*Corypha umbraculifera L.*	Arecaceae	Kudappana	Leaves-Thatching	Occasional
37	*Crataeva religiosa Forst.*	Capparid aceae	Neer mathalam	Wood-Fire wood	

38	*Croton tiglium L.*	Caesalpini aceae	Neervalam	Wood-Soft wood Seeds-Used as poison in fishing	Occasional
39	*Delonix regia Raf.*	Caesalpini aceae	Vaka	Wood-Soft wood	Occasional
40	*Emblica officinalis Gaertn.*	Euphorbi aceae	Nelli	Wood-Firewood/ Medicinal Fruit-Edible/Medicinal	Common
41	*Eriodendron pentandrum Kurz.*	Bomba caceae	Panjimaram	Wood-Soft wood Cotton from the outgrowth of the seeds are used to prepare pillows & beds	Common
42	*Erythrina indica Lam.*	Fabaceae	Muricku	Wood-Soft wood It is a support for pepper	Common
43	*Evodia roxburgiana Benth.*	Rutaceae	Kanaeli	Wood-Soft wood	Rare
44	*Ficus asperima Roxb.*	Moraceae	Therakam	Wood-Fire wood	Common
45	*Ficus bengalensis L.*	Moraceae	Peral	Wood-Fire wood/ Medicinal	Common
46	*Ficus elastica Roxb.*	Moraceae		Wood-Fire wood / Medicinal	Occasional
47	*Ficus gibbosa Bl.*	Moraceae	Ithi	Wood-Soft wood/ Medicinal/ Firewood	Rare
48	*Ficus glomerata Roxb.*	Moraceae	Athi	Wood-Softwood/ Firewood/ Medicinal	Rare
49	*Ficus religiosa L.*	Moraceae	Arayal	Wood-Softwood/ Firewood Root-Medicinal	Occasional
50	*Ficus tomentosa Roxb.*	Moraceae	Kallal	Wood-Softwood/ Firewood	Rare
51	*Garcinia cambogia Desr.*	Guttiferaceae	Kudampuli	Wood-Firewood Fruit-Edible	Occasional
52	*Glochidion zeylanica A.Juss.*	Euphorbi aceae	Neervetty	Wood-Firewood	Rare
53	*Gmelina arborea Roxb.*	Verbenaceae	Kumbil	Wood-Furniture/ Handicraft/ Medicinal	Rare

54	*Grevillea robusta A.Cunn.*	Proteaceae	Silveroak	Wood-Softwood	Occasional
55	*Grewia tiliaefolia Vahl.*	Teliaceae	Chatachil	Wood-Furniture construction	Occasional
56	*Holarrhena antidysenterica Wahl.*	Apocynaceae	Kudagappala	Wood-Softwood/ Matchbox industry	Occasional
57	*Holigarna arnottiana Hk.f.*	Anacardi aceae	Cherumaram	Wood-Firewood	Occasional
58	*Hopea parviflora Bedd.*	Diptero - carpaceae	Uruppu/ Thambagam	Hardwood-used for construction of building and railway sleepers	Occasional
59	*Kandelia rheedii W&A.*	Rhizopho raceae	Kandal	Wood-Firewood	Occasional
60	*Lagerstroemia flos-reginae Retz.*	Lythraceae	Manimaruth	Wood-Building construction/ Furniture/ Ship work .	Occasional
61	*Limonia crenulata Roxb.*	Rutaceae	Kattu narakam	Wood-Firewood	Occasional
62	*Macaranga peltata M.Arg.*	Euphorbi aceae	Vatta	Wood-Firewood/ Packing box	Common
63	*Mallotus philippinensis M.Arg.*	Euphorbi aceae	Karumam	Wood-Firewood	Occasional
64	*Memecylon malabaricum Cogn.*	Melasto maceae		Wood-Firewood Flower-Ornamental	Occasional
65	*Michelia chempaca L.*	Magno liaceae	Ponchen pacam	Wood-Firewood Flower-Ornamental	Occasional
66	*Mimusops elengi L.*	Sapotaceae	Elengi	Wood-Firewood Flower-Aromatic	Occasional
67	*Morinda tinctoria Roxb.*	Rubiaceae	Manjanathi	Wood-Fuel	Occasional
68	*Moringa oleifera Lam.*	Moringaceae	Muringa	Wood-Useless Leaf&fruit-Vegetable/ Medicinal	Common
69	*Murraya koenigii Spr.*	Rutaceae	Kariveppu	Wood-Firewood Leaves-used in curries	Common

70	*Myristica fragrans Houtt.*	Myristi caceae	Jathikka	Wood-Temple construction Fruit&Seeds-Medicinal	Occasional
71	*Ochna heyneana W&A.*	Ochnaceae		Wood-Firewood	Occasional
72	*Olea dioica Roxb.*	Oleaceae	Edala	Wood-Firewood/ Temporary house construction	Occasional
73	*Pithecolobium saman Benth.*	Mimosaceae	Rain tree	Wood-Fire wood	Occasional
74	*Plumeria acutifolia Poir.*	Asclepia daceae	Manjachem bakam	Flower-used in 'Poojas'	Occasional
75	*Polyalthia longifolia Hk.f.*	Anonaceae	Ashoka maram	Wood-Fuel	Occasional
76	*Pongamia glabra Vent.*	Fabaceae	Ung	Wood-Fuel Bark-Medicinal	Occasional
77	*Psidium guajava L.*	Myrtaceae	Pera	Wood-Fuel Fruit-Edible	Common
78	*Pterocarpus marsupium Roxb.*	Fabaceae	Venga	Wood-House construction	Occasional
79	*Rhizophora mucronata Lam.*	Rhizopho raceae	Kandal	Wood-Fuel	Occasional
80	*Sapindus emarginatus Vahl.*	Sapindaceae	Soppinkay maram	Wood-Fuel Fruit-Washing purposes	Rare
81	*Santalum album L.*	Santalaceae	Chandanam	Wood-Medicinal	Rare
82	*Saraca indica L.*	Caesalpini aceae	Ashokam Fuel	Wood-Softwood/	Rare
83	*Sterculia foetida L.*	Sterculi aceae	Thondi	Wood-Fuel	Occasional
84	*Schleichera trijuga Willd.*	Sapindaceae	Puvam	Wood-House construction	Occasional
85	*Spathodea companulata Beauv.*	Bignoniaceae		Wood-Fuel	Rare
86	*Spondias pinnata Kurz.*	Anacardi aceae	Ambazham	Fruit-Edible Wood-Fuel	Occasional
87	*Sterculia foetida L.*	Sterculiaceae	Anathondi	Wood-Fuel	Rare
88	*Strychnos nux-vomica L.*	Loganiaceae	Kanjiram	Wood-Fuel Fruit-Edible	Occasional

89	*Syzygium cumini L.*	Myrtaceae	Njaval	Wood-Fuel Fruit-Edible	Occasional
90	*Syzygium jambolanum DC.*	Myrtaceae	Chamba	Wood-Fuel Fruit-Edible	Common
91	*Swietenia mahagoni L.*	Meliaceae	Mahagoni	Wood-Furniture	Occasional
92	*Tamarindus . indica L*	Caesalpini aceae	Valanpuli	Wood-Fuel Fruit-Edible Leaves-Medicinal	Occasional
93	*Tectona grandis L.*	Verbenaceae	Theck	Wood-Furniture/ House construction	Common
94	*Terminalia arjuna W&A.*	Combreta ceae	Venmaruth	Wood-used in house construction and some type of furnitures	Rare
95	*Terminalia bellerica Roxb.*	Combreta ceae	Thanni	Wood-Softwood/ Packing case/ Fuel Bark&Seed-Medicinal	Rare
96	*Terminalia catappa L.*	Combret aceae	Kadukka	Seedcoat-Medicinal Wood-Construction works/ Fuel	Occasional
97	*Terminalia chebula Retz.*	ombretaceae	Badam	Wood-Construction works	Occasional
98	*Terminalia coriacea W&A.*	Combret aceae	Thanni	Wood-works/Fuel Construction	Occasional
99	*Terminalia paniculata Roth.*	Combret aceae	Maruthu	Wood-Construction works	Occasional
100	*Terminalia tomentosa*	Combret aceae	Karimaruthu	Wood – Construction works	Occasional
101	*Terminalia pallida Brandis.*	Combret aceae		Wood-Fuel	Rare
102	*Thespesia populnea Cav.*	Malvaceae	Poovarasu	Wood-building construction	Common

103	*Trema orientalis Bl.*	Ulmaceae	Vedikarayam	Wood-Fuel	Occasional
104	*Vateria indica L.*	Diptero carpaceae	Vella pine	Wood-Fuel/ House construction	Rare
105	*Vitex altissima L.*	Verben aceae	Mayillellu	Wood-House construction/ Furniture	Rare
106	*Xylia xylocarpa Taub.*	Mimosaceae	Irul	Wood-House construction	Rare

Table 8 Shrubs of Kalliasseri *Panchayat*

Sl. No.	Botanical name	Family	Vernacular name	Useful parts & its uses	Status
1.	*Acanthospermum hispidum DC.*	Asteraceae	Kattunjerinjil		Rare
2.	*Acanthus ilicifolius L.*	Acanthaceae	Vayalchully	Whole plant medicinal	Common in Kappa kadavu
3.	*Adhathoda beddomei Clark.*	Acanthaceae	Cheriya Adalotakam	Whole plant medicinal	Common
4.	*Adhathoda vasica Nees.*	Acanthaceae	Adalotakam	Whole plant medicinal	Common
5.	*Allamanda cathartica L.*	Apocynaceae	Kolambichety	Flower-ornamental	Occasional
6.	*Barleria cristata L.*	Acanthaceae	Parvathichety	Flower-ornamental	Occasional
7.	*Barleria gibsoni Dalz.*	Acanthaceae	Parvathichety	Flower-ornamental	Occasional
8.	*Bougainvillaea spectabilis Willd.*	Nyctaginaceae	Katalasuchety	Inflorescence -ornamental	Occasional
9.	*Calamus rotang L.*	Palmaceae	Chooral	Stem-Construction of household articles	Rare
10.	*Calotropis gigantea R.Br.*	Asclepiadaceae	Erucku	Plant-Medicinal	Occasional
11	*Calotropis procera R.Br.*	Asclepiadaceae	Erucku	Plant-Medicinal	Occasional
12.	*Calycopteris floribunda Lam.*	Combretaceae	Pullanji	Stem-Fuel Plant – Medicinal	Common
13.	*Cassia alata L.*	Caesalpiniaceae	Thakara	Plant-Medicinal	Occasional
14.	*Cassia tora L.*	Caesalpiniaceae	Thakara	Plant-Medicinal	Common
15.	*Cassia occidentalis L.*	Caesalpiniaceae	Thakara	Plant-Medicinal	Common
16.	*Citrus medica Var acida Brand.*	Rutaceae	Cherunarakam	Fruit-Medicinal	Occasional

17.	*Clerodendron fragrans R.Br.*	Verbenaceae	Chendumalli	Flower-Used to construct 'Athapookalam'	Occasional
18.	*Clerodendron inermae Gaertn.*	Verbenaceae	Peringalam	Flower-Used to construct Athapookalam'	Common
19.	*Clerodendron infortunatum L.*	Verbenaceae	Vattapiriyan	Flower-Used to construct 'Athapookalam'	Occasional
20.	*Clerodendron paniculata.*	Verbenaceae	Hanuman kireedam	Flower-Used to construct 'Athapookalam'	Common
21.	*Clerodendron serratum Spr.*	Verbenaceae	Cherutheck	Plant-Medicinal	Common
22.	*Clerodendron siphonanthus R.Br.*	Verbenaceae		Flower-Used to construct 'Athapookalam'	Occasional
23.	*Clerodendron thomsonae Balf.*	Verbenaceae	Thengum hrudhayam	Flower- Used to construct 'Athapookalam'	Occasional
24.	*Coffea arabica L.*	Rubiaceae	Kappi	Seeds-powdered seeds used to prepare drinks	Occasional
25.	*Corchorus capsularis L .*	Tiliaceae	Chanam	Bark of the stem-used as coir	Common
26.	*Croton sparsiflorus Mor.*	Euphorbi aceae		Flower-ornamental	Rare
27.	*Flacourtia sp.* tiaceae	Flacour	Mullicka		Common
28.	*Glycosmis pentaphylla Corr.*	Rutaceae	Panal	Whole plant. Medicinal	Common
29.	*Gossypium arboreum*	Malvaceae	Paruthi	Cotton from the outgrowths of the seeds are used in textile industry	Occasional
30.	*Gossypium herbaceum.*	Malvaceae	Paruthi	Cotton from the outgrowths of the seeds are used in textile industry	Occasional

31.	*Grewia microcos L.*	Tiliaceae	Kottaika	Stem-Fuel	Common
32.	*Hibiscus rosa-sinensis L.*	Malvaceae	Chemparuthi	Flower-Ornamental	Common
33.	*Hugonia mystax L.*	Malpighiaceae	Meesha	Stem-Fuel	Common
34.	*Indigofera prostrata Willd.*	Fabaceae			Occasional
35.	*Indigofera tinctoria L.*	Fabaceae	Neelayamary	Plant-Medicinal Leaf-Dye	Occasional
36.	*Ixora coccinea L.*	Rubiaceae	Chethy/ Checky	Flower-Ornamental Plant-Medicinal	Occasional
37.	*Jussieua suffruticoasa L.*	Onagraceae	Kattuthumpa	Whole plant - Medicinal	Common in Palathun kundu
38.	*Kirganelia reticulata Baill.*	Euphorbiaceae	Mazhikkay	Leaf - diuretic	Common in Keechery
39.	*Lantana camara L.*	Verbenaceae	Arippoo/ Kongini	Flower-Ornamental Bark-Disinfectant	Common
40.	*Lawsonia inermis L.*	Lythraceae	Mylanchi	Leaf-Nail dye	Occasional
41.	*Limonia crenulata Roxb.*	Rutaceae	Kattunarakam	Wood-Fuel Root-Medicinal	Common
42.	*Melastoma malabaricum L.*	Melasto-maceae	Athirani	Flower-Ornamental	Common
43.	*Melochia corchorifolia L.*	Sterculiaceae	Nayichana	Leaves - Fertilizer	Common
44.	*Memecylon malabaricum Cogn.*	Melasto-maceae	Malanthetti	Stem-Fuel	Common
45.	*Morus alba L.*	Moraceae	Mulberry	Leaves-Food for silkworms Fruit-Edible	Rare
46.	*Mussaenda frondosa L.*	Rubiaceae	Mussaenda/ Vellila	Inflorescence-Ornamental Plant-Medicinal	Occasional

47.	*Nerium indicum Mill.*	Apocynaceae	Arali	Plant-Medicinal Flower-Ornamental	Occasional
48.	*Ochna heyneana W&A.*	Ochnaceae		Wood-Fuel	Common
49.	*Pavetta indica L.*	Rubiaceae	Pavetta	Flower-Ornamental	Rare
50.	*Pedilanthus tithymaloides poit.*	Euphorbiaceae		Flower-Ornamental	Rare
51.	*Polygonum hydropiper L.*	Polygonaceae	Kalarchy	Stem & Root-Medicinal	Common
52.	*Premna latifolia Roxb.*	Verbenaceae	Kattappa	Stem-Fuel Flower-Ornamental	Common
53.	*Quisqualis indica L.*	Combretaceae	Kulamaringi / Rangoon valli	Flower-Ornamental	Occasional
54.	*Rauwolfia serpentina Benth&Kurz.*	Apocynaceae	Amalpori / Sarpagandhi	Plant-Medicinal	Occasional
55.	*Ricinus communis L.*	Euphorbiaceae	Aananack	Plant-Medicinal	Occasional
56.	*Ruta graveolens L.*	Rutaceae	Aarootha	Plant-Medicinal	Rare
57.	*Sauropus pubescens Hk.f.*	Euphorbiaceae	Pressure cheera	Leaf used to prepare curry, Medicinal	Common
58.	*Sida acuta Burn.*	Malvaceae	Manja kurunthotty	Plant-Medicinal	Common
59.	*Sida cordifolia L.*	Malvaceae kurunthotty	Aana Medicinal	Plant-	Common
60.	*Sida retusa.*	Malvaceae	Kurunthotty	Plant-Medicinal	Common
61.	*Sida spinosa L.*	Malvaceae	Kattu venthiyam		Rare
62.	*Sida vernonifolia Lam.*	Malvaceae	Valli kurunthotty	Stem	Rare
63.	*Spilanthus calva W.*	Asteraceae	Palluvethan - appoo/ Acravu	Flower used as pain killer in tooth ache	Common in Irinavu

64.	*Stachytarpheta indica Vahl.*	Verbenaceae		Flower used to construct 'Athapookalam'	Common
65.	*Thunbergia erecta T.*	Acanthaceae	Krishnaneela	Flower-Ornamental	Common
66.	*Triumfetta rhomboidea Jacq.*	Tiliaceae	Uthiram	Stem-Fuel	Common
67.	*Waltheria indica L.*	Sterculiaceae			Common
68.	*Zizyphus Oenoplia Mill.*	Rhamnaceae	Kotta	Stem-Fuel	Common
69.	*Zizyphus*	Rhamnaceae	Kotta	Stem-Fuel	Common

Table 9 Medicinal Plants of Kalliasseri *Panchayat*

Botanical name	Family	Vernacular name	Uses of medicine	Preparation
Abrus precatorius L.	Fabaceae	Kunni	For swelling Bald head Wounds in the mouth	Grind the leaf and apply the pulp on the swollen part Grind the seeds and apply on the head Gargle with decoction of leaf and keep it five minutes in mouth
Acalypha indica L.	Euphor biaceae	Kuppameni	Bronchitis / asthma Skin disease	Leaf dried in sunlight, powered and use Boil the leaf with coconut oil and apply on the skin.
Acanthus ilicifolius L.	Acanthaceae	Snake bite		Leaves and tender shoots are used.
Achras sapota L.	Sapotaceae	Seema iluppa	Preventive against biliciousnes and febrile attacks	Eat the fruit
Achyranthes aspera L.	Amaranthaceae	Kadaladi	Swelling Stomach pain	Drink the decoction of the whole plant. Ash of the whole plant mixed with water and drink the essence.
Acorus calamus L.	Araceae	Vayamb	Epilepsy Stomach pain	Powder of the rhizome mixed with honey or milk and drink. Grind the rhizome and drink

Adhatoda beddomei Clark.	Acanthaceae	Cheriya adalodakam	Cough/ bronchitis Ulcer	Drink 25ml of the leaf juice mixed with same amount of honey. Prepare whole plant decoction and use.
Adhatoda vasica Nees.	Acanthaceae	Valiya adalotakam	Same as that of *A. beddomei*	Same as that of *A.beddomei*.
Aegle marmelos Corr.	Rutaceae	Koovalam	Dysentery/ Diarrhoea Diabetes Stomach pain	Dry the fruit pulp and mix with honey and drink. Eat the leaves of the plant Dry the seeds, powder it and mix with honey and drink.
Aerva lanata Juss.	Amaranth-aceae	Cherula	Urinary bladder stone	Keep flowers for an hour in boiled water and drink
Ailanthus malabarica DC.	Simarubaceae	Perumaram	Dysentery	Drink the juice prepared from fresh bark
Alangium salvifolium Wang.	Alangiaceae	Ankolam	Rabies	Drink the decoction of the root.
Albizzia lebbeck Benth.	Mimosaceae	Nenmeni vaka	Night blindness	Apply leaf juice in the eye and drink the leaf powder with ghee.
Aloe vera L.	Liliaceae	Kattarvazha	Stomach pain at the time of menstruation Ingrowing toe nail	Drink the leaf juice Grind the leaf and Curcuma longa (manjal) rhizome and apply on the nail.
Alstonia scholaris R.Br.	Apocynaceae	Ezhilampala	Fever, malaria, diarrhoea	Drink the decoction of the bark

			Headache	Crush the flower and put it in boiled water and inhale the vapour.
Amaranthus caudatus L.	Amaranth-aceae	Cheera	To purify blood/piles	Eat the cooked leaves
Amaranthus spinosus L.	Amaranth-aceae	Mullancheera	Boils and burns	Apply the leaf juice on boils and burns.
Amaranthus viridis L.	Amaranth-aceae	Cheera	Scorpion sting	Grind the leaves and apply on the affected part.
Amorphophallus sylvaticus Kurth.	Araceae	Kattuchena	Cough/ dysentery Heart disease Rheumatism	Drink the decoction of the dried root Drink one spoon leaf juice per day Boil the water with bark of the tree and bath
Anacardium occidentale L.	Anacardi aceae	Kashumavu	Skin disease To increase sexual power	Apply decoction of the bark on the affected part Grind the cashew nuts, mix with water and drink
Ananas comosus Merril.	Bromeliaceae	Kaithachaka	Indigestion	Eat the fruit
Andrographis paniculata Nees.	Acanthaceae	Kiriyath	Cirrhosis in childrin Fever, cold and cough	Drink the leaf juice mixed with honey Drink the dicoction of the leaves along with Ocimum leaves.
Aristolochia indica L.	Aristolochi-aceae	Uruthookki	Fever/ dysentry /indigestion Cholera	Drink two table spoon of the plant juice,thrice per day Drink the decoction of the root and Aegle marmelos root

			Insect and snake poison	Grind the root with Curcuma longa rhizome and drink.
Asparagus racemosus-Willd.	Liliaceae	Sathaveri	To increase sexual power and body power Jaundice	Grind the tuber with milk and jaggery and drink. Grind the tuber with honey and drik.
Averrhoa bilimbi L.	Oxalidaceae	Bilimbi/ chilimbi	Piles and scurvy	Eat the curry of bilimbi fruit
Azadirachta indica A.Juss.	Meliaceae	Aryaveppu	Body pain Poisonous organisms bite Malaria/ Chicken pox	Massage the paining portion with leaf juice Grind the leaf Curcuma longa rhizome and apply wound mouth. Drink the decoction of the leaves along with Oldenlandia leaves
Bacopa monnieri(L) **Wettst.**	Scrophulariaceae	Brahmi	To increase memory power Epilepsy/ Mental disorder	Drink the leaf juice mixed with butter. Boil the leaf in milk and drink
Barleria cristata L.	Acanthaceae	Kana - kambaram	Swelling	Grind the roots and leaves and applying on the swelled portion
Barringtonia racemosa Roxb.	Lecithidaceae	Samudrappu	Jaundice	Drink the kernals of the drupe with milk
Bauhinia tomentosa L.	Caesalpiniaceae	Mandaram	Inflammation of liver	Drink the decoction of the root bark.
Benincasa cerifera Savi.	Cucurbitaceae	Kumbalam (elavan)	Epilepsy/ Nervous diseases	Drink the juice of the fruit

Biophytum sensitivum DC.	Geraniaceae	Muckutty	Gangrene Cough/ Oedema/ chest pain Dysentry Gonorrhoea	Grind the stem and apply on the gangrene. Grind the whole plant with honey and drink. Drink the leaf with butter milk and drink. Grind the root and drink
Boerhaavia diffusa L.	Nyctaginaceae	Thazhuthama	Swelling/ Poison Kidney disease	Grind the whole plant and mix in water and drink. Drink an ounce of leaf juice, twice per day
Bombax malabaricum DC.	Bombacaceae	Ilavu	Piles	Grind dried flower and seeds with goat milk , add sugar and drink.
Calotropis gigantea R.Br.	Asclepiadaceae	Erucku	Fever Ear pain	Drink leaf juice mixed with honey Apply leaf juice two or three drops in the ear.
Cardiospermum helicacabum L.	Sapindaceae	Uzhinja	Stomach pain Hair cleaning	Drink decoction of the whole plant Grind the leaf and use as shampoo.
Carica papaya L.	Caricaceae	Kappalanga	Ring worm infection Chronic diarrhoea	Apply latex oozing out from the fruit on the wounds. Eat the fruit
Cassia fistula L.	Caesalpiniaceae	Kanikonna	Skin disease Constipation	Drink the decoction of the bark Drink the milk mixed with inner portion of the fruit without seeds.

Cassia tora L.	Casealpiniaceae	Thakara	Leprosy/ skin diseases	Grind the leaf and apply on the affected part
Centella asiatica Urb.	Apiaceae	Kudangal	For memory power To increase sleeping	Drink the plant extract mixed with butter or ghee Eat the leaf
Cinnamomum zeylanicum Bl.	Lauraceae	Karappa	Nausea/ Vomiting	Decoction of the bark
Cissus quadrangularis L.	Vitaceae	Changalam paranda	Sprain/ Fracture Scurvy/ Irregular menstruation	Grind the leaves and young shoot and put it in coconut oil, boil for half an our, apply the oil on the affected part Drink the juice of the stem
Citrus medica L.	Rutaceae	Cheru narakam	To increase disease resistance Bad breath Scorpion bite	Drink fruit juice Keep fruit juice about 10 minutes per day in mouth Grind the inner part of the fruit with Ocimum tenniflorum leaves and mix with cows urine and apply on the affected part
Clerodendron infortunatum L.	Verbenaceae	Vattapiriyan	Rheumatism/ to increase sexual power	Drink the leaf juice
Clerodendron serratum Spr.	Verbenaceae	Cheruthecku	Fever and lung disorders mixed with honey	Drink decoction of the bark and root

Clitoria ternatea L.	Papilionaceae	Shanku pushpam	Spider poison To increase intelligence and memory	Grind the root mix with milk and drink Grind the root, mix with ghee or butter and drink.
Cocos nucifera L.	Palmaceae	Thengu	Wounds	Apply the powder prepared from the tender petiole of the leaf
Coccinia indica W&A.	Cucurbitaceae	Koval	Diabeties	Drink the juice of the roots and leaves. Eat the tender fruit
Costus speciosus Sm.	Zingiberaceae	Channakoova	Pin worm trouble To reduce the size of uterus	Cook the tuber and eat Eat the cooked tuber
Crataeva religiosa Forst.f.	Capparidaceae	Nirmathalam	Disorder of urinary organs	Drink the decoction of the bark
Croton tiglium L.	Euphorbiaceae	Neeralam/ neervalan	Snake poison eye Bald head	Grind the seeds with lemon juice and draw on the Grind the seeds and make a paste, apply on the head
Cucurbita pepo DC.	Cucurbitaceae	Mathan	Burns	Grind the leaves and apply on the burns
Curcuma aromatica Salisb.	Zingiberaceae	Kasthuri manjal	To enhance face beauty Scorpion and spider sting	Grind the dried rhizome, mix with water and apply on the face Grind the fresh rhizome and apply on the wound mouth

Curcuma longa L.	Zingiberaceae	Manjal	Anti poisonous agent Insect poison	Add in food preparations and use Grind the rhizome and apply on the affected part, drink the leaf juice.
Cuscuta reflexa Roxb.	Convolvulaceae	Akasavally	Disinfectant Constipation	Boil the plant in water and use for cleaning wounds Whole plant decoction used
Cyclea peltata Hk.f &T.	Menispermaceae	Padakizhangu/ Padathali	Urinary obstruction/ skin diseases/ fever Head louse	Drink the decoction of the tuber Wash the hair using leaf paste
Cymbopogon flexuosus *Wats.*	Poaceae	Pulthilachedy (Inchipulllu)	Rheumatic pain Goiter	Apply the oil on the paining part. Put the leaf in hot water and bath Decoction of leaf and root is put in coconut oil and boil about ten minutes, after cooling apply on the throat and head.
Cynodon dactylon Pers.	Poaceae	Karukapullu	Skin diseases Blood oozing out from the nose	Mix the leaf juice with coconut oil and boil about ten minutes apply on the affected part Inhale with the leaf juice
Cyperus rotundus L.	Cyperaceae	Muthanga	Dysentery/ pin worm trouble/chronic diarrhoea	Grind the tuber and eat

Datura metel L.	Solanaceae	Ummam/ ummatham	Pain in joints and swelling To prevent hair fall	Grind the leaf and apply on the paining portion Crush the seeds and and apply the juice on the hair
Datura stramonium *L.*	Solanaceae	Veluthaummam/ ummatham	As above	As above
Derris trifoliata Lour.	Fabaceae	Rheumatism	Rheumatism	Bark of the plant is used
Dioscorea alata L.	Dioscoreaceae	Kachil	Leprosy and piles	Cook the tuber and eat
Dioscorea esculenta Burk.	Dioscoreaceae	Cheru kizhangu	Swelling	Grinded tubers are applied
Dolichos biflorus L .	Fabaceae	Muthira	Urinary bladder stone For blood purification	Eat the cooked seeds. Drink the water used for cooking Crush the fried seeds, mix with jagery and eat
Dolichos lablab.	Fabaceae	Muthira (Avara)	As above	As above
Eclipta alba Hassk.	Asteraceae	Kayyonni	Headache/ prevent hair fall	Mix leaf juice with coconut oil and boil about ten minutes and apply the oil on hair
Elephantopus scaber L.	Asteraceae	Anachuvaty	Wounds and scratches in the eye	The whole plant is crushed along with Cuminum cyminum, mix with breast milk and pore drop by drop into the eye.
Elettaria cardamomum Mat.	Zingiberaceae	Ealam	Urinary obstruction	Grind one gram seed and mix with an ounce of alcohol and drink
Emblica officinalis	Euphorbiaceae	Nelli	Eye diseases	Apply fruit juice into the eye

Gaertn. Emilia sonchifolia DC.	Asteraceae	Muyal cheviyan	Tonsillitis Piles	Grind the whole plant and apply on the tonsil Grind whole plant, mix with butter milk and drink
Musa superba Roxb.	Musaceae	Kalluvazha	Diabetes	Drink the powder of the seeds mixed with milk
Eriodendron pentandrum Kurz.	Bombacaceae	Panji	Diabetes	Drink the juice of the root
Erythrina indica Lam.	Papilionaceae	Murick	Pain in joints	Apply leaf juice externally, warm the body by hot water bag
Euphorbia hirta L.	Euphorbiaceae	Kuzhinaka pala	Wounds	Crush the leaves and apply on the wounded part
Eucalyptus citriodora.	Myrtaceae	Eucalyptus	Tooth ache	Apply plant oil in the paining portion
Evodia roxburghiana Benth.	Rutaceae	Kanati	Fever To improve complexion	Drink the leaf juice. Boil root bark in oil and apply
Evolvulus alsinoides L.	Convolvulaceae	Vishnu kranthi	To raise memory & intelligence	Extract the plant Juice and mix with ghee and drink
Excoecaria agallocha L.	Euphorbiaceae	Komatty	Rheumatism	Apply the plant juice boiled in oil
Ficus bengalensis L.	Moraceae	Ithy	Enlargement of liver and spleen	Drink the juice of the bark
Ficus gibbosa Bl.	Moraceae	Peral	Menstrual disorders	Drink the decoction of the bark
Ficus glomerata Roxb.	Moraceae	Athy	Menstrual disorders	Decoction of the bark with bark of F. gibbosa,

				F.religiosa, F. bengalensis and drink
Ficus religiosa L.	Moraceae	Arayal	Wound cleaning and healing	Wash the wound with the bark decoction and apply the powder of the dried barks on wounds
Justicia gendarussa Burm.f.	*Acanthaceae*	Vathamkolli	Lung diseases	Drink 20ml of the leaf juice mixed with honey
Glochidion zeylanicum A. Juss.	*Euphorbiaceae*	Neervatty	Itches	Apply leaves on the itched part
Gloriosa superba L.	Liliaceae	Menthonni	For easy delivery Head bug For abortion	Grind the tuber and apply on the umbilicus,on the palm, and on the sole and sides of the vagina. Wash the head by the leaf juice Grind one gram tuber and drink
Glycosmis pentaphylla Corr.	Rutaceae	Panal	Chronic diarrhoea Antiseptic	Grind the root and drink Grind the stem and mix with water and wash the wounds by it
Gmelina arborea Roxb.	Verbenaceae	Kumizhu	Rheumatism/ swelling/pain Head ache	Drink the decoction of the root, leaf and flower Grind the leaf and apply on the head
Gossipium arboreum L.	Malvaceae	Paruthy	Rheumatism Wound healing	Grind dry seeds and mix with milk and drink Grind the flower and apply on the wound
Gossipium	*Malvaceae*	Paruthy	As above	As above

herbaceum L. Helicteres isora L.	Sterculiaceae	Idampiri valampiri	Diabetes Dysentry and worm trouble	Drink the decoction of the root Drink the decoction of the whole plant
Heliotropium malabaricum.	Boraginaceae	Thelkada	Digestive problems Burns Rheumatism	Drink the decoction of the root Apply leaf juice on the burns Drink the decoction of the whole plant
Hemidesmus indicus R.Br.	Asclepiadaceae	Nannari/ naruneendi	Skin diseases/ leprosy/ Scorpion bite Leucorrhoea	Drink the decoction of the dried root Grind the root, mix with milk and drink
Hibiscus rosa-sinensis L.	Malvaceae	Chemparathi	Gas trouble Infantile eczema	Grind the flower, mix with milk and drink Put the flowers in lemon juice about an hour and take the juice and drink
Holarrhena antidysenterica Wall.	Apocynaceae	Kudakappaala	Diarrhoea Gangrene	Grind the dried bark, mix with milk and drink or one gram of dried seed powder mix with honey and drink Wash the gangrene by the bark juice
Holigarna arnottiana Hook.f.	Anacardiaceae	Cherumaram	To increase body power	Crush four seeds, put it in a glass of hot milk, add a spoon of ghee and sugar and drink for about one month

Hygrophila spinosa T. And.	*Acanthaceae*	Vayalchulli	Jaundice/ Anemia/ Rheumatism Diarrhoea To increase sperm production	Drink the decoction of the root Grind seeds with butter milk Grind the seeds and mix with milk, add a spoon of sugar to it and drink
Ichnocarpus frutescens R.Br.	*Apocynaceae*	Palvalli	Fever	Drink the decoction of the leaves and stalk
Indigofera tinctoria L.	*Fabaceae*	Neela amari	Jaundice/ cirrhosis Scorpion sting/spider bite / snake bite	Drink the leaf juice mixed with honey Grind the plant and apply on the wound
Ipomoea paniculata R.Br.	*Convolvulaceae*	*Palmuthuck*	Rheumatism For more breast milk For changing the lean body to fat body	Drink the decoction of the tuber Grind the tuber with milk and drink Mix the powder of the tuber with equal amount of barli powder, add ghee and sugar to it, boil and drink – one glass per day for one month
Ipomoea pes-caprae Sweet.	*Convolvulaceae*	Atampavally	Rheumatism	Grind leaves and apply externally
Ixora coccinea L.	*Rubiaceae*	Chethi/ thetty	Chronic diarrhoea/	Grind leaf with equal amount of pepper seeds, mix with butter milk and drink twice a day

			Infantile eczema	Grind the flower and mix with coconut oil and boil for ten minute, apply this oil on the eczema
Jasminum grandiflorum L.	*Oleaceae*	Pichakam	Gleers in the mouth Gangrene To stop the breast milk production	Chew two or three leaves, three times per day Grind the leaves and apply on the wounds Grind the flower and apply on the breast
Jasminum pubescens Willd.	*Oleaceae*		Bites of cobra	Use roots of the plant
Jasminum scandens Vahl.	*Oleaceae*		Ring worm infection	Drink the decoction of the root
Kaempferia galanga L.	*Zingiberaceae*	Kacholam	Vomiting Nasal diseases and head diseases	Drink the dried rhizome powder mixed with honey Smell the rhizome powder mixed with oil
Kalanchoe pinnata.	*Crassulaceae*	Ilamulachi	Boils/ wounds/ bites of insects	Grind the leaves and apply
Lantana Camara L.	*Verbenaceae*	Kongini/ arippool	Tetanus whole plant Rheumatism/ malaria	Drink the decoction of the Drink decoction of the whole plant
Lawsonia Inermis L.	*Lythraceae*	Mylanchi	Jaundice Ingrowing toe nail	Drink the decoction of the whole plant Apply leaf poultice on the nail
Leucas aspera spring Spr.	*Lamiaceae*	Thumba	Worm trouble/ vomiting/ stomach pain Scorpion bite	Drink leaf juice mixed with latex of Ferula foetida Grind leaf and

			To purify uterus	apply on bitten area Drink the juice
Limonia crenulata Roxb.	*Rutaceae*	Cherukattu naragam	Malignant and persistent fever	Drink the decoction of the dried fruit
Macuranga peltata M.Arg.	*Euphorbiaceae*	Vatta/uppila	Venereal sores	Apply gum oozing out from wounds of the stem,
Mallotus philippinensis M.Arg.	*Euphorbiaceae*	Kapila kurukkootti / sindhoora maram Worm trouble	Urinary bladder stone	Drink the decoction of the leaf Eat the fruit powder
Mangifera Indica L.	*Anacardiaceae*	*Mavu*	Scorpion sting Cirrhosis Tooth care	Grind the leaf and apply Eat the ripened fruit Clean the tooth by old leaves
Manihot esculenta Cranz.	*Euphorbiaceae*	Maracheeni/ Kappa	Sores	Grind the fresh rhizome and apply
Merremia tridentata Hall.f.	*Convolvulaceae*	Prasarini	Paralysis of hand	Drink the decoction of the whole plant
Mimusops elengi L.	*Sapotaceae*	Elengi	Fever Head ache	Drink the decoction of the bark Smell the flower soaked in water
Mimosa pudica L.	*Mimosaceae*	Thottavady	Breath obstruction in children Wounds	Drink the leaf juice mixed with tender coconut water Crush the tender leaves and apply on wounds

Mirabilis jalapa L.	*Nyctaginaceae*	Nalumani chedy	Boils	Grind the leaves and apply on boils
Momordica charantia L.	*Cucurbitaceae*	Paval	Diabetes Ulcer	Drink fruit juice mixed with honey, early morning Grind fruit and ficus leaves, cook with rice and eat
Moringa oleifera Lam.	Moringaceae	Muringa	Pain in joints and swelling Blood pressure Stomach pain related to menstruation To slow the ejaculation	Grind the bark with salt and apply Cook the leaf without salt and eat Drink the decoction of the root Grind the seeds and mix with milk and drink
Mucuna prurita Hook.	Fabaceae	Naykurna	Rheumatism Pin worm trouble	Drink the decoction of then root and seeds, twice per day Eat the hairs of the fruit mixed with jaggery or butter, in the early morning
Murraya koenigii Spr.	Rutaceae	Kariveppu	Diarrhoea and dysentery	Grind the leaf and eat, or drink the decoction of the leaf
Musa paradisiaca L.	Musaceae	Vazha	Ulcer To stop menstrual bleeding	Drink the juice of the stem Eat the tender fruit with jaggery
Myristica fragrans Houtt.	Myristicaceae	Jathi	Indigestion/ stomach pain	Grind the seeds with water and drink

			Tooth care	Powder the seeds with salt and use it to clean the tooth
Naravelia zeylanica DC.	Ranunculaceae	Vathacody	Coryza	Crush the whole plant and boil with water and inhale the vapour
Naregamia alata W&A.	Meliaceae	Nilanarakam	Dysentry Rheumatism	Drink the decoction of the root mixed with honey Drink the decoction of the whole plant
Nelumbium speciosum.	Nymphaeaceae	Ponthamara	To reduce the effect of snake poison Bleeding at the time of pregnancy	Grind the flower with water and drink it continuously Drink the decoction of the flower and tuber
Nerium indicum.	Apocyanaceae	Arali	Bronchitis Gangrene	Eat the bark powder Grind the leaf and bark and apply
Oldenlandia corymbosa L.	Rubiaceae	Parpataka pullu	Infantile eczema Jaundice To purify the uterus (after delivery)	Grind the Curcuma rhizome and olderdia (equal amount), boil in coconut oil and apply Grind the whole plant with milk and drink Eat the leaf curry
Oldenlandia umbellata L.	Rubiaceae	Parpataka pullu	Same as above	Same as above

Ocimum gratissimum L.	Lamiaceae	Ramathulasi	Seminal weakness	Drink the decoction of the leaves
Ocimum sanctum L.	Lamiaceae	Krishna thulasi	Sting of scorpion/ spider/ snake bite	Grind the leaf with Curcumin and Boerhavia diffusa and apply on the wound mouth and drink the juice
Oxalis corniculata L.	Oxalidaceae	Puliyarila	Dysentery	Grind the whole plant with butter milk and drink twice per day
Pandanus tectorius Sol.	Pandanaceae	Kaitha/ thazha	Headache/ rheumatism	Apply the oil from the bracts on the affected part
Passiflora foetida L.	Passifloraceae		Headache head	Grind the leaves and apply on the
Pergularia extensa N.E.Br.	Asclepiadaceae	Veliparathi	Rheumatism	Drink the decoction of the plant
Phyllanthus niruri L.	Euphorbiaceae	Keezharnelli	Jaundice Indigestion	Drink the juice of the whole plant Drink the juice of the plant
Piper longum.L.	Piperaceae	Thippali	Fever/ cough/ anemia Delivery care preparations Medicinal preparations	Grind the seeds with milk and drink Eat powder of seed with dry grape Plant used entirely
Piper betel L.	Piperaceae	Vettila	Lung diseases	Apply castor oil on the betel leaf and heat and massage on chest

Piper nigrum L.	Piperaceae	Kurumulaku	Itching Cough &fever	Powder the seeds and boil in coconut oil and apply on the itched portion Drink decoction of pepper dried ginger and Piper longum seeds
Plumbago rosea L.	Plumbaginaceae	Chuvanna koduveli	Chronic diarrhoea	Grind one gram of purified tuber with 100ml of butter milk and drink
Plumbago zeylanica L.	Plumba ginaceae	Vella koduveli	Elephantiasis/ leucoderma/ swelling	Grind the tuber and apply externally
Pongamia pinnata.	Fabaceae	Ung	Swelling related to sprain and contusion Skin diseases	Crush the bark and boil in coconut oil and apply externally on the affected portion Grind the leaf and Plumbago roseasea's tuber with butter milk and drink
Pothos scandens L.	Araceae	Anapparuva	Small pox	Powder the leaves and apply externally on the body
Premna latifolia Roxb.	Verbenaceae	Munja	To reduce body fat Fever	Drink leaf juice mixed with honey Crush the leaves and boil in water and bath
Pseudarthria viscida.	Fabaceae	Moovila	Piles	Drink the decoction of the root and Sida plant

			Fracture	Eat the powder of the root
Psidium guajava L.	Myrtaceae	Pera	Diarrhoea Cholera	Grind the bark of the root and drink Drink decoction of the leaves
Pterocarpus marsupium Roxb.	Fabaceae	Venga	Boils	Apply bruised leaves on boils
Quamoclit pinnata Boj.	Convolvulaceae	Minnichedi	Bleeding piles	Drink the juice of leaves mixed with hot ghee
Raphanus sativus L.	Brassicaceae	Mullangi	Urinary complaints	Eat the cooked tuber
Rauwolfia serpentina Benth.	Apocynaceae	Amalpori/ sarppa gandhi	Blood pressure To remove opacity of the cornea	Drink decoction of the root Apply the leaf juice in the eye
Ricinus communis L.	Euphorbiaceae	Aavanack	Constipation Headache Boils	Drink 15 ml of caster oil mixed with hot water Apply the leaf on the head Apply the leaf poultice on the boils
Ruta graveolens L.	Rutaceae	Arutha	Epilepsy/ hysteria/ worm trouble	Drink quarter spoon of leaf juice
Saccharum officinarum L.	Poaceae	Karimp	Jaundice Cough	Drink the stem juice Eat the sugar candy
Santalam album L.	Santalaceae	Chandanam	Vomiting	Grind the stem, mix with water and drink

Saraca indica L.	Caesalpiniaceae	Asokam	Menstrual diseases Infantile eczema	Drink the decoction of the bark. Boil the flower in coconut oil and apply
Sarcostemma brevistigma W&A.	Asclepi-diceae	Somalatha	To increase immunity	Drink the juice of whole plant.
Scoparia dulcis L.	Scrophulariaceae	Kallurukki	Urinary bladder stone	Grind the whole plant with water and drink.
Sesamum indicum L.	Pedaliaceae	Ellu	Chronic diarrhoea Burns	Grind the seeds with water and drink Mix the seed oil with coconut oil and apply
Sida acuta Burm.	Malvaceae	Manja kurumthotty Fever	Rheumatism/ Gonorrhoea	Drink the decoction of the whole plant twice per day Drink the decoction
Sida cordifolia L.	Malvaceae	Aana kurumthotty	As above	As above
Sida retusa.	Malvaceae	Kurumthotty	As above	As above
Sida spinosa L.	Malvaceae	Kattu benthiam	Scalding urine and gleet	Drink the decoction of the leaf
Sida vernonifolia Lam.	Malvaceae	Valli kurumthotty	Cuts and bruises Diarrhea in Pregnancy	Grind leaves and apply Use the leaves
Sissambelos perara L.	Menisper maceae	Malathanny	Cough / Dysentery/ Miscarriage of uterus Heart diseases	Drink the decoction of the root

			Swelling of breast	Drink the leaf juice Grind the leaf and apply
Sonneratia acida L.f .	Lytheraceae		Swelling and sprain	Apply fruit as paultice
Smilax zeylanica L.	Liliaceae	Karyilanchi	Dysentery Venereal diseases	Grind the root and mix with curd milk and drink Drink decoction of the root
Sphaeranthus indicus L.	Asteraceae	Adakka maniyan	Skin diseases Ulcer/bleeding Body power Elephantiasis	Grind the whole plant and apply Drink the decoction of the whole plant Eat the powder of the dried flower mixed with honey Drink the leaf juice
Spondias pinnata Kurz.	Anacardiaceae	Ambazham	Ear ache Blood purification	Apply leaf juice in the ear Eat the tender fruit
Strobilanthes heynianus	Acanthaceae	Kurinji	Rheumatism/ skin diseases	Drink the decoction of the whole plant
Strychnos Nux-vomica L.	Loganiaceae	Kanjiram	Pain in joints/ swelling	Grind the bark of the stem with tender coconut fiber juice and apply
Syzygium cumini(L) Skeels.	Myrtaceae	Njaval	Dysentery Diabetes	Drink the decoction of the bark, mixed with honey Eat the seeds
Tabernaemontana divaricata.	Apocynaceae	Nanthyar vattam	Tooth pain	Chew the root

			Abrasion in the eye	Soak flower in water (12 hrs)and apply juice of the flower in the eye
Tamarindus indica L.	Caesalpiniaceae	Valanpuli	Body pain	Soak the leaf in water boil it and bath
Tectona Grandis L.f.	Verbenaceae	Theku	Cracks on the heel	Apply the oil the nuts on the heel
Terminalia arjuna W&A.	Combretaceae	Vella maruthu	Ear ache Scorpion sting	Apply the juice in the ear Apply ash of bark
Terminalia bellerica Roxb.	Combretaceae	Thanny	Care of the hair Cough	Apply the oil on the hair Eat the powder of the seed coat mixed with honey
Terminalia catappa L.	Combretaceae	Batham	Colic pain/ headache Leprosy/ Scabies and other skin diseases	Drink the juice of tender leaves Apply an ointment prepared from the tender leaves
Terminalia chebula Retz.	Combretaceae	Kadukka	Throat diseases Chronic Ulcers / Wounds	Grind the seed with honey and drink Grind the fruit and apply externally
Terminalia tomentosa W&A.	Combretaceae	Thembavu	Diarrhoea	Drink the decoction of the bark
Thespesia populnea Cav.	Malvaceae		Scabies/ Psoriasis and other skin diseases	Grind fruit leaves and root and apply externally

Thevetia neriifolia Juss.	Apocynaceae	Manja araly	Intermittent fever	Powder the bark and mix with honey and drink
Tinospora cordifolia Miers.	Menispermaceae	Chittamruthu	Chronic diarrhoea/ dysentery Gonorrhoea Leprosy/ jaundice	Eat starch of the root and stem Drink the juice of fresh plant, 15ml per day Drink the juice of the stem, (10-15ml), mixed with honey, twice per day
Tragia involucrata L.	Euphorbiaceae	Kotithoova	Cough/ lung diseases Leprosy Baldness	Powder of the whole plant, dried grapes and Piper longum seeds(3 gram each) and mix with honey and eat Grind the root and apply externally Rub the fruit over the head with a little water
Tribulus terrestris L.	Zygophyllaceae	Njerinjil	Urinary obstruction/ swelling/ body weakness	Drink the decoction of the whole plant
Trichosanthes cucumerina L.	Cucurbitaceae	Kattu patavalam	Headache Skin diseases Boils	Grind the root and apply on the affected part Drink the decoction of the whole plant Grind the leaf and apply on boils
Tylophora asthmatica W&A.	Asclepiadaceae	Vallipala	Asthma	Grind the leaf and Cumine seeds and dry under shade and eat half gram, twice per day

			Ulcer in mouth / digestive disorders	Chew three leaves per day
Urena labata.	Malvaceae	Uthiram	Rheumatism	Grind the root and apply externally
Vernonia cinerea Less.	Asteraceae	Puvankuruntal	Fever Urinary obstruction/ Scorpion sting	Drink the decoction of the whole plant Drink the decoction of the whole plant
Vetiveria zizanoides(L) Nash.	Poaceae	Ramacham	Fever Vomiting	Pulverize the rhizome and make it into a paste with water and apply externally for cooling the body Drink the decoction of the roots and seeds along with coriandrum
Vinca rosea L.	Apocynaceae	Nithya-kalyani/ Savamnari	Blood pressure/ cancer Diabetes	Plant is used to prepare medicines Drink the leaf juice mixed with honey
Vitex negundo L.	Verbenaceae	Karinochi	To overcome unconscious ness Epilepsy Throat pain/ ulcers in the mouth	Apply the leaf juice drop by drop in the nostrils Apply the leaf juice in the nostril Keep the decoction of the leaves in the mouth
Vitex trifolia L.	Verbenaceae	Vellanochi	Rheumatism Intermittent fevers	Apply the leaf juice externally Powder the dried leaves and eat a table spoon, twice per day

			Fever accompanied by vomiting and severe thirst	Drink the flowers mixed with honey
Withania somnifera Dun.	Solanaceae	Amukiram	Painful swellings	Bruised and young leaves are applied
Zingiber *officinale Rosc*.	Zingiberaceae	Inchi	Ear ache Indigestion Coryza	Heat the juice of the rhizome, apply three drops in the ear Eat the powder of the dried ginger mixed with jaggery Drink the decoction of the dried ginger
Zingiber wightianum Thw.	Zingiberaceae	Mala inchi	Fibrosities	Drink the decoction of the dried rhizome

Table 10 Ornamental Plants of Kalliasseri *Panchayat*

Sl. no	Botanical Name	Family	Vernacular Name	Attractive part
1.	*Acalypha wilkesiana Muell Arg.*	Euphorbiaceae		Leaves
2.	*Adhathoda beddomei Cl.*	Acanthaceae	Adalotakam	Flower
3.	*Adhathoda vasica Nees.*	Acanthaceae	Adalotakam	Flower
4.	*Agave americana L.*	Agavaceae		Leaf
5.	*Allamanda cathartica L.*	Apocynaceae	Kolambichety	Flower
6.	*Alocasia indica Schott.*	Araceae	Mankanda chempu	Spathe
7.	*Alocasia macrorrhiza Schott.*	Araceae	Assam chempu	Spathe
8.	*Alocasia montana Schott.*	Araceae		Spathe
9.	*Aloe vera L.*	Liliaceae	Kattarvazha	Leaf
10.	*Amaranthus caturus Heyn.*	Amaranthaceae	Cheera	Flower
11.	*Amaranthus caudatus L .*	Amaranthaceae	Cheera	Flower
12.	*Andrographis paniculata Nees.*	Acanthaceae	Kiriyath	Flower
13.	*Anthurium andraenum.*	Araceae	Anthurium	Spathe
14.	*Anthurium clarinervium.*	Araceae	Anthurium	Spathe
15.	*Anthurium crystallinum.*	Araceae	Anthurium	Leaf
16.	*Anthurium warocqueanum.*	Araceae	Anthurium	Spathe
17.	*Aralia alata.*	Araliaceae		Leaf

18.	*Aralia foliolosa Seem.*	Araliaceae		Leaf
19.	*Asparagus glumosus.*	Liliaceae	Evergreen	Leaf
20.	*Asparagus racemosus Willd.*	Liliaceae	Sathavari	Leaf
21.	*Barleria cristata L.*	Acanthaceae	Parvathichety	Flower
22.	*Barleria gibsoni Dalz.*	Acanthaceae	Parvathichety	Flower
23.	*Bauhinia tomentosa L.*	Caesalpiniaceae	Mantharam	Flower
24.	*Begonia sps.*	Begoniaceae	Begonia	Leaf&flower
25.	*Borassus aethiopium.*	Palmaceae		Leaf
26.	*Bougainvillaea spectabilis Willd.*	Nyctaginaceae	Katalasuchety	Calyx
27.	*Calanthe veratrifolia R.Br.*	Orchidaceae	Orchid	Flower
28.	*Calliandra emarginata.*	Fabaceae	Powder puff	Flower
29.	*Calotropis gigantea R.Br.*	Asclepiadaceae	Erukku	Flower
30.	*Canna indica L.*	Cannaceae	Thottavazha	Inflorescence
31.	*Canna orientalis Rosc.*	Cannaceae	Thottavazha	Inflorescence
32.	*Caesalpinia pulcherrima Sw.*	Caesalpiniaceae	Rajamally	Inflorescence
33.	*Carissa hirsuta Roth.*	Apocynaceae		Leaves& flower
34.	*Cassia alata L.*	Caesalpiniaceae	Puzhukkadi thakara	Inflorescence
35.	*Cassia bicapsularis.*	Caesalpiniaceae		Inflorescence
36.	*Cassia biflorus.*	Caesalpiniaceae		Inflorescnce
37.	*Cassia occidentalis L.*	Caesalpiniaceae	Mattan thakara	Inflorescence
38.	*Cassia fistula L.*	Caesalpiniaceae	Kanikonna	
39.	*Celosia argentea L.*	Amaranthaceae	Celosia	Flower
40.	*Cestrum nocturnum*	Solanaceae	Anthimulla	Flower
41.	*Chrysanthemum sps.*	Asteraceae	Jamanthi	Inflorescence

42.	*Cleome gynandra.*	Capparidaceae		Inflorescence
43.	*Clerodendron inerme Gaertn.*	Verbanaceae	Puzha munja	Inflorescence
44.	*Clerodendron paniculata.*	Verbanaceae	Hanuman kireedam	Inflorescence
45.	*Clerodendron thomsonae Balf.*	Verbenaceae	Bleeding heart	
46.	*Clitoria ternatea L.*	Fabaceae	Sankupushpam	Flower
47.	*Codiaeum variegatum L.*	Euphorbiaceae	Croton	Leaf
48.	*Costus speciosus Sm.*	Zingiberaceae	Channakoova	Phyllotaxy
49.	*Crinum asiaticum*	Amaryllidaceae	Sukhadarsanam	Flower
50.	*Crossandra infundibuliformis*	Acanthaceae	Priyadarshini	Flower
51.	*Dahlia sp.*	Asteraceae	Dahlia	Flower
52.	*Dracaena sps.*	Liliaceae		Flower
53.	*Ervatamia coronaria Stapf.*	Apocynaceae	Nanthyarvattom	Flower&fruit
54.	*Euphorbia pulcherrima Willd.*	Euphorbiaceae		Leaf
55.	*Euphorbia splendens Boj.*	Euphorbiaceae		Leaf
56.	*Ficus elastica Roxb.*	Moraceae		Leaf
57.	*Gomphrena globosa L.*	Amaranthaceae	Vadamally	Flower
58.	*Graptophyllum pictum L.*	Acanthaceae		Whole plant
59.	*Grevillea robusta A.Cunn.*	Proteaceae	Silver oak	Leaf
60.	*Hedychium coronarium Koen.*	Zingiberaceae	Sugandhi	Flower
61.	*Hibiscus mutabilis L.*	Malvaceae	Poopparuthi	Flower
62.	*Hibiscus syriacus L.*	Malvaceae		Flower
63.	*Hibiscus rosasinensis L.*	Malvaceae	Chemparuthi	Flower

64.	*Impatiens concinna H.K.f.*	Balsaminaceae	Balsam	Flower
65.	*Ipomaea purpurea Roth.*	Convolvulaceae	Morning glory	Flower
66.	*Ixora coccinia L.*	Rubiaceae	Checky/Thetty	Flower
67.	*Jacquemontia caerulea Choisy.*	Convolvulaceae	Jacquemontia	Flower
68.	*Jasminum grandiflorum L.*	Oleaceae	Pichy	Flower
69.	*Jasminum malabaricum W.*	Oleaceae	Mulla	Flower
70.	*Jasminum pubescens Willd.*	Oleaceae	Kurukuthi mulla	Flower
71.	*Jasminum scandens Vahl.*	Oleaceae	Pichy	Flower
72.	*Jasminum sambae.*	Oleaceae	Mulla	Flower
73.	*Lantana camara L.*	Verbenaceae	Arippoo	Flower
74.	*Maranta arundinaceae L.*	Marantaceae	Koova	Leaf
75.	*Michelia champaca L.*	Magnoliaceae	Chempakam	Flower
76.	*Mirabulis jalapa L.*	Nyctaginaceae	Nalumanichety	Flower
77.	*Mussaenda frondosa L.*	Rubiaceae	Mussaenda	Calyx
78.	*Opuntia sps.*	Cactaceae	Kallichety	Stem
79.	*Petunia sps.*	Solanaceae		Flower
80.	*Pellionia sp.*	Urticaceae		Flower
81.	*Phyllanthus sps.*	Euphorbiaceae	Phyllanthus	Leaves
82.	*Pilea sps.*	Urticaceae		Make fences of gardens
83.	*Plumbago rosea L.*	Plumbaginaceae	Koduveli	Flower
84.	*Plumbago zeylanica L.*	Plumbaginaceae	Koduveli	Flower
85.	*Plumeria acutifolia Poir.*	Apocynaceae	Vellachempakam	Flower

86.	*Podocarpus sps.*	Coniferae		Leaf
87.	*Polyscias sps.*	Araliaceae		Flower
88.	*Portulaca quadrifida L.*	Portulacaceae	Pathumanichety	Flower
89.	*Pseuderanthemum sp.*	Acanthaceae		Flower
90.	*Quamoclit pinnata Boj.*	Convolvulaceae	Minnichety	Flower
91.	*Rosa sps.*	Rosaceae	Rosachety	Flower
92.	*Salvia officinalis L.*	Lamiaceae	Salvia	Flower
93.	*Sanseviera roxburghiana Schult.*	Liliaceae		Flower
94.	*Saraca indica L.*	Caesalpiniaceae	Ashokam	Flower
95.	*Tabernae montana divaricata.*	Apocynaceae	Nanthyarvattam	Flower
96.	*Tagetes sp.*	Asteraceae	Mallika/Chettippoo	Flower
97.	*Thevetia neriifolia Juss.*	Asclepiadaceae	Manja arali	Flower
98.	*Thunbergia erecta T.And.*	Acanthaceae	Neela kolambi	Flower
99.	*Thunbergia grandiflora Roxb.*	Acanthaceae	Kukkoolatha	Flower
100	*Turnera ulmifolia L.*	Turneraceae		Flower
101	*Vernonia cinerea Less.*	Asteraceae	Poovankurunthal	Flower
102	*Vinca rosea L.*	Apocynaceae	Savamnari/ Nithyakalyani	Flower
103	*Zinnia elegans.*	Asteraceae	Zinnia	Flower

Table 11 Flora of Kalliasseri *Panchayat*

	Botanical Name	**Family**
1.	*Abrus precatorius L.*	Fabaceae
2.	*Acacia auriculiformis.*	Mimosaceae
3.	*Acalypha indica L.*	Euphorbiaceae
4.	*Acalypha wilkesiana M.Arg.*	Euphorbiaceae
5.	*Acanthus ilicifolius L.*	Acanthaceae
6.	*Acampe praemosa.*	Orchidaceae
7.	*Achras sapota L.*	Sapotaceae
8.	*Achyranthes aspera L.*	Amaranthaceae
9.	*Acorus calamus L.*	Araceae
10.	*Adenanthera pavonina L.*	Mimosaceae
11.	*Adhathoda beddomei Clark.*	Acanthaceae
12.	*Adhathoda vasica Nees.*	Acanthaceae
13.	*Aegiceras corniculatum Blanco.*	Myrsinaceae
14.	*Aegle marmelos Corr.*	Rutaceae
15.	*Aerva lanata Juss.*	Amaranthaceae
16.	*Agave americana L.*	Agavaceae
17.	*Aglaia elaeagnoidea.*	Meliaceae
18.	*Ailanthes malabarica DC.*	Simarubaceae
19.	*Alangium salvifolium (L.f)Wang.*	Alangiaceae
20.	*Albizia lebbeck Benth.*	Mimosaceae
21.	*Albizzia odoratissima Benth.*	Mimosaceae
22.	*Albizzia procera Benth.*	Mimosaceae
23.	*Allamanda cathartica L.*	Apocynaceae
24.	*Alocasia indica Schott.*	Araceae
25.	*Alocasia macrorrhiza Schott.*	Araceae
26.	*Alocasia montana Schott.*	Araceae
27.	*Aloe vera L.*	Liliaceae
28.	*Alpinia calcarata Rosc.*	Zingiberaceae
29.	*Alstonia scholaris R.Br.*	Apocynaceae
30.	*Amaranthus caturus Heyne.*	Amaranthaceae
31.	*Amaranthus caudatus L.*	Amaranthaceae
32.	*Amaranthus gangeticus L.*	Amaranthaceae

33.	*Amaranthus spinosus L.*	Amaranthaceae
34.	*Amaranthus viridis L.*	Amaranthaceae
35.	*Amorphophallus companulatus Bl.*	Araceae
36.	*Amorphophallus sylvaticus (Roxb)Kunth.*	Araceae
37.	*Anacardium occidentale L.*	Anacardiaceae
38.	*Ananas cosmosus Merr.*	Bromeliaceae
39.	*Andrographis paniculata Nees.*	Acanthaceae
40.	*Anona reticulata L.*	Anonaceae
41.	*Anona squamosa L.*	Anonaceae
42.	*Anthurium andraenum.*	Araceae
43.	*Anthurium clarinervium.*	Araceae
44.	*Anthurium wacqueanum.*	Araceae
45.	*Antiaris toxicaria Lesch.*	Moraceae
46.	*Antidesma menasu Miq.*	Euphorbiaceae
47.	*Aralia alata.*	Araliaceae
48.	*Aralia foliolosa Seem.*	Araliaceae
49.	*Areca catechu L.*	Arecaceae
50.	*Aristolochia indica L.*	Aristolochiaceae
51.	*Artocarpus altilis L.*	Moraceae
52.	*Artocarpus heterophyllus Lam.*	Moraceae
53.	*Artocarpus hirsutus Lam.*	Moraceae
54.	*Asparagus glumosus.*	Liliaceae
55.	*Asparagus racemosus Willd.*	Liliaceae
56.	*Averrhoa bilimbi L.*	Oxalidaceae
57.	*Avicennia officinalis L.*	Verbenaceae
58.	*Axcoecaria agallocha L.*	Euphorbiaceae
59.	*Bacopa monnieri (L)pennel.*	Scrophulariaceae
60.	*Bambusa arundinaceae Willd.*	Poaceae
61.	*Barleria cristata L.*	Acanthaceae
62.	*Brleria gibsonia Dalz.*	Acanthaceae
63.	*Barleria montana Nees.*	Acanthaceae
64.	*Barringtonia racemosa Forst.*	Lecythidaceae
65.	*Bauhinia tomentosa L.*	Caesalpiniaceae
66.	*Begonia sps.*	Begoniaceae
67.	*Benincasa cerifera Savi.*	Cucurbitaceae

68.	*Biophytum sensitivum(L)DC.*	Geraniaceae
69.	*Bixa orellana L.*	Bixaceae
70.	*Boerhaavia diffusa L.*	Nyctaginaceae
71.	*Bombax malabaricum DC.*	Bombacaceae
72.	*Borassus aethiopium.*	Arecaceae
73.	*Bougainvillaea spectabilis Willd.*	Nyctaginaceae
74.	*Bruguiera eriopetala W&A.*	Rhizophoraceae
75.	*Buchanania sps.*	Anacardiaceae
76.	*Bulbophyllum Neilgherrense.W.*	Orchidaceae
77.	*Butea sps.*	Fabaceae
78.	*Caesalpinia pulcherrima S.W.*	Caesalpiniaceae
79.	*Cajanus cajan.*	Fabaceae
80.	*Calanthe veratrifolia R.Br.*	Orchidaceae
81.	*Calliandra emarginata.*	Fabaceae
82.	*Calophyllum inophyllum L.*	Clusiaceae
83.	*Calotropis gigantea R.Br.*	Asclepiadaceae
84.	*Calotropis procera R.Br.*	Asclepiadaceae
85.	*Calycopteris floribunda Lam.*	Combretaceae
86.	*Canavalia ensiformis DC.*	Fabaceae
87.	*Capsicum anum L.*	Solanaceae
88.	*Capsicum frutescens L.*	Solanaceae
89.	*Cardiospermum halicacabum L.*	Sapindaceae
90.	*Carallia integerrima DC.*	Rhizophoraceae
91.	*Careya arborea Roxb.*	Lecythidaceae
92.	*Carica papaya L.*	Caricaceae
93.	*Caryota urens L.*	Arecaceae
94.	*Cassia alata L.*	Caesalpiniaceae
95.	*Cassia fistula L.*	Caesalpiniaceae
96.	*Cassia occidentale L.*	Caesalpiniaceae
97.	*Cassia siamea Lam.*	Caesalpiniaceae
98.	*Cassia tora L.*	Caesalpiniaceae
99.	*Casuarina equisetifolia Forst.*	Casuarinaceae
100.	*Cayratia pedata Juss.*	Vitaceae
101.	*Cayratia tenuifolia Gagn.*	Vitaceae
102.	*Centella asiatica (L)Urban.*	Apiaceae

103.	*Chrysophyllum cainito L.*	Sapotaceae
104.	*Cinnamomum zeylanicum Bl.*	Lauraceae
105.	*Cissus quadrangularis L.*	Vitaceae
106.	*Citharaxylum bracteatum.*	Annonaceae
107.	*Citrus medica var.acida Brand.*	Rutaceae
108.	*Citrulus vulgaris Schrad.*	Cucurbitaceae
109.	*Cleome viscosa L.*	Capparidaceae
110.	*Clerodendron fragrans R.Br.*	Verbenaceae
111.	*Clerodendron inermae Gaertn.*	Verbenaceae
112.	*Clerodendron infortunatum L.*	Verbenaceae
113.	*Clerodendron paniculata.*	Verbenaceae
114.	*Clerodendron serratum (L)Moon.*	Verbenaceae
115.	*Clerodendron siphonanthus R.Br.*	Verbenaceae
116.	*Clerodendron thomsonae Balf.*	Verbenaceae
117.	*Clitoria ternatea L.*	Papilionaceae
118.	*Coccinia indica W&A.*	Cucurbitaceae
119.	*Cocos nucifera L.*	Arecaceae
120.	*Codiaeum variegatum L.*	Euphorbiaceae
121.	*Coffea arabica L.*	Rubiaceae
122.	*Colocasia antiquorum Schott.*	Araceae
123.	*Commiphora caudata Engl.*	Burseraceae
124.	*Corypha umbraculifera L.*	Arecaceae
125.	*Costus speciosus S.M.*	Zingiberaceae
126.	*Crataeva religiosa Forst.*	Capparidaceae
127.	*Crinum sps.*	Amaryllidaceae
128.	*Crossandra sps.*	Acanthaceae
129.	*Crotalaria sps.*	Papilionaceae
130.	*Croton tiglium L.*	Euphorbiaceae
131.	*Cryptolepis elegans Wall.*	Asclepiadaceae
132.	*Cucumis melo L.*	Cucurbitaceae
133.	*Cucurbita pepo L.*	Cucurbitaceae
134.	*Curculigo orchioides Gaertn.*	Amaryllidaceae
135.	*Curcuma canannoorensis..*	Zingiberaceae
136.	*Curcuma aromatica Salisb.*	Zingiberaceae
137.	*Curcuma oligantha.*	Zingiberaceae

138.	*Cuscuta reflexa Roxb.*	Convolvulaceae
139.	*Cyathula prostrata Bl.*	Amaranthaceae
140.	*Cyclea peltata Hf&T.*	Menispermaceae
141.	*Cymbopogon citratus(DC)Stapf.*	Poaceae
142.	*Cynodon dactylon(L)Pers.*	Poaceae
143.	*Cyperus rotundus L.*	Cyperaceae
144.	*Dahlia sps.*	Asteraceae
145.	*Datura metel L.*	Solanaceae
146.	*Datura stramonium L.*	Solanaceae
147.	*Delonix regia Raf.*	Caesalpiniaceae
148.	*Derris trifoliata Lour.*	Fabaceae
149.	*Desmodium gangeticum DC.*	Fabaceae
150.	*Dioscorea alata L .*	Dioscoreaceae
151.	*Dioscorea bulbifera L.*	Dioscoreaceae
152.	*Dioscorea esculenta Burk.*	Dioscoreaceae
153.	*Dioscorea pentaphylla L.*	Dioscoreaceae
154.	*Dolichos biflorus L.*	Fabaceae
155.	*Dolichos lablab L.*	Fabaceae
156.	*Eclipta alba Hassk.*	Asteraceae
157.	*Elephantopus scaber L.*	Asteraceae
158.	*Emblica officinalis Gaertn.*	Euphorbiaceae
159.	*Emilia sonchifolia DC.*	Asteraceae
160.	*Ensete superbum Roxb.*	Musaceae
161.	*Eriodendron pentandrum Kurz.*	Bombacaceae
162.	*Erythrina indica Lam.*	Papilionaceae
163.	*Eucalyptus citriodora Hook.*	Myrtaceae
164.	*Euphorbia hirta L.*	Euphorbiaceae
165.	*Euphorbia pulcherima Willd.*	Euphorbiaceae
166.	*Euphorbia splendens Boj.*	Euphorbiaceae
167.	*Evodia roxburgiana Benth.*	Rutaceae
168.	*Evolvulus alsinoides L.*	Convolvulaceae
169.	*Excoecaria agallocha L.*	Euphorbiaceae
170.	*Ficus asperima Roxb.*	Moraceae
171.	*Ficus bengalensis L.*	Moraceae
172.	*Ficus elastica Roxb.*	Moraceae

173.	*Ficus gibbosa Bl.*	Moraceae
174.	*Ficus glomerata Roxb.*	Moraceae
175.	*Ficus religiosa L.*	Moraceae
176.	*Flacourtia sps.*	Flacourtiaceae
177.	*Garcinia cambegia Derr.*	Clusiaceae
178.	*Gendarussa vulgaris Nees.*	Acanthaceae
179.	*Glochidion zeylanica A.Juss.*	Euphorbiaceae
180.	*Gloriosa superba L.*	Liliaceae
181.	*Glycosmis pentaphylla Corr.*	Rutaceae
182.	*Gmelina arborea Roxb.*	Verbenaceae
183.	*Gomphrena globosa L.*	Amaranthaceae
184.	*Gossipium arboreum L.*	Malvaceae
185.	*Gossypium herbaceum L.*	Malvaceae
186.	*Graptophyllum sps.*	Acanthaceae
187.	*Grevillea robusta A.Cunn.*	Proteaceae
188.	*Grewia microcos L.*	Teliaceae
189.	*Grewia tiliaefolia L.*	Teliaceae
190.	*Hedychium coronarium Koen.*	Zingiberaceae
191.	*Helicteres isora L.*	Sterculiaceae
192.	*Heliotropium malabaricum.*	Boraginaceae
193.	*Hemidesmus indicus R.Br.*	Asclepiadaceae
194.	*Hibiscus esculentus L.*	Malvaceae
195.	*Hibiscus mutabilis L.*	Malvaceae
196.	*Hibiscus rosasinensis L.*	Malvaceae
197.	*Hibiscuss syriacus L.*	Malvaceae
198.	*Holarrhena antidysenterica Wall.*	Apocynaceae
199.	*Holigarna arnottiana Hk.f.*	Anacardiaceae
200.	*Hopea parviflora Bedd.*	Dipterocarpaceae
201.	*Hugonia mystax L.*	Linaceae
202.	*Hydrocotyl asiatica R.Br.*	Apiaceae
203.	*Hydnocarpus alpina W.*	Flacourtiaceae
204.	*Hygrophila spinosa T.*	Acanthaceae
205.	*Ichnocarpus fruitescens R.Br.*	Apocynaceae
206.	*Indigofera prostrata Willd.*	Fabaceae
207.	*Indigofera tinctoria L.*	Fabaceae

208.	*Impatiens concinna L.*	Rubiaceae
209.	*Ipomaea companulata L.*	Convolvulaceae
210.	*Ipomaea hederacea(L)Jacq.*	Convolvulaceae
211.	*Ipomaea palmata Forsk.*	Convolvulaceae
212.	*Ipomaea paniculata R.Br.*	Convolvulaceae
213.	*Ipomaea pes-caprae SW.*	Convolvulaceae
214.	*Ipomaea pes-tigridis L.*	Convolvulaceae
215.	*Ipomaea purpurea Roth.*	Convolvulaceae
216.	*Ipomaea wighti Choisy.*	Convolvulaceae
217.	*Ixora coccinea L.*	Rubiaceae
218.	*Ixora brachiata Roxb.*	Rubiaceae
219.	*Jacquemontia caerulea Choisy.*	Convolvulaceae
220.	*Jambosa vulgaris DC.*	Myrtaceae
221.	*Jasminum grandiflorum L.*	Oleaceae
222.	*Jasminum malabaricum L.*	Oleaceae
223.	*Jasminum pubescens Willd.*	Oleaceae
224.	*Jasminum sambae Ait.*	Oleaceae
225.	*Jasminum scandes Vahl.*	Oleaceae
226.	*Jatropa curcas L.*	Euphorbiaceae
227.	*Jussieua sps.*	Onagraceae
228.	*Kaempferia galanga L.*	Zingiberaceae
229.	*Kalanchoe pinnata pers.*	Crassulaceae
230.	*Kandelia rheedii W&A.*	Rhizophoraceae
231.	*Kirganelia reticulata Baill.*	Euphorbiaceae
232.	*Lagenaris vulgaris Ser.*	Cucurbitaceae
233.	*Lagerstroemia flos-reginae Retz.*	Lythraceae
234.	*Lantana camara L.*	Verbenaceae
235.	*Lannea coromandalica Meril.*	Anacardiaceae
236.	*Lawsonia inermis L.*	Lythraceae
237.	*Lepidagathis keralensis.*	Acanthaceae
238.	*Leucas aspera Spr.*	Lamiaceae
239.	*Limonia crenulata Roxb.*	Rutaceae
240.	*Listea sp.*	Lauraceae
241.	*Luffa acutangula Roxb.*	Cucurbitaceae
242.	*Lycopersicon esculentum Mill.*	Solanaceae

243.	*Macaranga peltata M.Arg.*	Euphorbiaceae
244.	*Mallotus philippinensis M.Arg.*	Euphorbiaceae
245.	*Mangifera indica L.*	Anacardiaceae
246.	*Manihot esculenta Cranz.*	Euphorbiaceae
247.	*Maranta arundinacea L.*	Marantaceae
248.	*Melastoma malabathricum L.*	Melastomaceae
249.	*Melochia corchorifolia L.*	Sterculiaceae
250.	*Memecylon malabaricum Cogn.*	Melastomaceae
251.	*Merremia umbellata Hall.f.*	Convolvulaceae
252.	*Michelia champaca L.*	Magnoliaceae
253.	*Mimusops elengi L.*	Sapotaceae
254.	*Mimosa pudica L.*	Mimosaceae
255.	*Mirabilis jalapa L.*	Nyctaginaceae
256.	*Monocharia vaginalis Presl.*	Pontederiaceae
257.	*Momordica charantia L.*	Cucurbitaceae
258.	*Morinda tinctoria Roxb.*	Rubiaceae
259.	*Moringa oleifera Lam.*	Moringaceae
260.	*Morus alba L.*	Moraceae
261.	*Mucuna hirsuta W&A.*	Fabaceae
262.	*Mucuna pruriens Baker.*	Fabaceae
263.	*Murraya Koenigii Spreng.*	Rutaceae
264.	*Musa paradisiaca L.*	Musaceae
265.	*Musa superba Roxb.*	Musaceae
266.	*Mussaenda frondosa L.*	Rubiaceae
267.	*Myristica fragrans Houtt.*	Myristicaceae
268.	*Naravelia zeylanica DC.*	Rananculaceae
269.	*Naregamia alata W&A.*	Meliaceae
270.	*Nelumbium speciosum Willd.*	Nymphaeaceae
271.	*Nerium indicum Mill.*	Apocynaceae
272.	*Ochna heyneana W&A.*	Ochnaceae
273.	*Ocimum basilicum L.*	Lamiaceae
274.	*Ocimum canum Sims.*	Lamiaceae
275.	*Ocimum gratissimum L.*	Lamiaceae
276.	*Ocimum tenuiflorum L.*	Lamiaceae
277.	*Oldenlandia corymbosa L.*	Rubiaceae

278.	*Oldenlandia umbellata L.*	Rubiaceae
279.	*Olea dioica Roxb.*	Oleaceae
280.	*Oxalis corniculata L.*	Oxalidaceae
281.	*Pandanus tectorius Soland.*	Pandanaceae
282.	*Passiflora edulis Sims.*	Passifloraceae
283.	*Passiflora foetida L.*	Passifloraceae
284.	*Paveta indica L.*	Rubiaceae
285.	*Pedilanthus tithymaloides Poit.*	Euphorbiaceae
286.	*Pellionia sps.*	Urticaceae
287.	*Pergularia extensa N.E.Br.*	Asclepiadaceae
288.	*Persea macrantha.*	Loraceae
289.	*Petunia sps.*	Solanaceae
290.	*Phyllanthus niruri L.*	Euphorbiaceae
291.	*Pilea sp.*	Urticaceae
292.	*Piper betle L.*	Piperaceae
293.	*Piper longum L.*	Piperaceae
294.	*Piper nigrum L.*	Piperaceae
295.	*Pisum sativum L.*	Papilionaceae
296.	*Plumeria acutifolia Poir.*	Apocynaceae
297.	*Plumbago rosea L.*	Plumbaginaceae
298.	*Plumbago zeylanica L.*	Plumbaginaceae
299.	*Pithecolobium Saman.*	Mimosaceae
300.	*Podocarpus sp.*	Convolvulaceae
301.	*Polyalthia longifolia H.k.f&T.*	Anonaceae
302.	*Polygonum hydropiper L.*	Polygonaceae
303.	*Polyscias sp.*	Araliaceae
304.	*Pongamia glabra Vent.*	Fabaceae
305.	*Portulaca quadrifida L.*	Portulacaceae
306.	*Pothos scandens L.*	Araceae
307.	*Premna latifolia Roxb.*	Verbenaceae
308.	*Prunus avium L.*	Rosaceae
309.	*Pseudarthria viscida W&A.*	Fabaceae
310.	*Pseuderanthemum sp.*	Acanthaceae
311.	*Psidium guajava L.*	Myrtaceae
312.	*Pterocarpus marsupium Roxb.*	Fabaceae

313.	*Quamoclit pinnata Boj.*	Convolvulaceae
314.	*Quisqualis indica L.*	Combretaceae
315.	*Raphanus sativus L.*	Brassicaceae
316.	*Rauwolfia serpentina Benth&Kurz.*	Apocynaceae
317.	*Rhaphidophora pertusa Schott.*	Araceae
318.	*Rhizophora mucronata Lam.*	Rhizophoraceae
319.	*Ricinus communis L.*	Euphorbiaceae
320.	*Rosa sp.*	Rosaceae
321.	*Ruta graveolens L.*	Rutaceae
322.	*Saccharum officinarum L.*	Poaceae
323.	*Salacia reticulata W.*	Hippocrateaceae
324.	*Salvia officinalis L.*	Lamiaceae
325.	*Sanseviera roxburghiana Schott.*	Liliaceae
326.	*Santalum album L.*	Santalaceae
327.	*Sapindus emarginatus Vahl.*	Sapindaceae
328.	*Saraca indica L.*	Caesalpiniaceae
329.	*Sarcostemma brevistigma W&A.*	Asclipiadaceae
330.	*Sauropus pubescens H.Kf.*	Euphorbiaceae
331.	*Scoparia dulcis L.*	Scrophulariaceae
332.	*Selaginella sp.*	Selaginellaceae
333.	*Sessamum indicum L.*	Pedaliaceae
334.	*Sida acuta Burm.*	Malvaceae
335.	*Sida cordifolia L.*	Malvaceae
336.	*Sida retusa.*	Malvaceae
337.	*Sida spinosa L.*	Malvaceae
338.	*Sida vernonifolia Lam.*	Malvaceae
339.	*Sissambelos perera L.*	Menispermaceae
340.	*Solanum melongena L.*	Solanaceae
341.	*Sonneratia acida L.f.*	Lythraceae
342.	*Sorghum bicolor Moench.*	Poaceae
343.	*Smilax zeylanica L.*	Liliaceae
344.	*Sphaeranthus indicus L.*	Asteraceae
345.	*Spathodea companulata Beauv.*	Bignoniaceae
346.	*Spilanthus calva W.*	Asteraceae
347.	*Spondias pinnata Kurz.*	Anacardiaceae

348.	*Stachytarpheta indica Vahl.*	Verbenaceae
349.	*Sterculia foetida L.*	Sterculiaceae
350.	*Strobilanthes Sp.*	Acanthaceae
351.	*Strychnos nux-vomica L.*	Loganiaceae
352.	*Syzygium cumini(L)Skeels.*	Myrtaceae
353.	*Syzygium jambolanum DC.*	Myrtaceae
354.	*Tabernae montana divericata.*	Apocynaceae
355.	*Tagetes sp.*	Asteraceae
356.	*Tamarindus indica L.*	Caesalpiniaceae
357.	*Tectonia grandis L.f.*	Verbenaceae
358.	*Terminalia arjuna W&A.*	Combretaceae
359.	*Terminalia bellerica Roxb.*	Combretaceae
360.	*Terminalia catappa L..*	Combretaceae
361.	*Terminalia chebula Retz.*	Combretaceae
362.	*Terminalia pallida Brandis.*	Combretaceae
363.	*Terminalia tomentosa W&A.*	Combretaceae
364.	*Thespesia populnea Cav.*	Malvaceae
365.	*Thevetia neriifolia Juss.*	Apocynaceae
366.	*Thunbergia erecta T.And.*	Acanthaceae
367.	*Thunbergia grandiflora Roxb.*	Acanthaceae
368.	*Tinospora cordifolia(Willd)Miers.*	Menispermaceae
369.	*Tinospora malabaricum.*	Merispermaceae
370.	*Tragia involucrata L.*	Euphorbiaceae
371.	*Tribulus terrestris L.*	Zygophyllaceae
372.	*Trichosanthes anguina L.*	Cucurbitaceae
373.	*Trichosanthes cucumerina L.*	Cucurbitaceae
374.	*Triumfetta rhomboidea Jacq.*	Tiliaceae
375.	*Turnera ulmifolia L.*	Turneraceae
376.	*Tylophora asthmatica W&A.*	Asclepiadaceae
377.	*Urena lobata L.*	Malvaceae
378.	*Utricularia flexuosa Vahl .*	Lentibulariaceae
379.	*Utricularia reticulata Sm.*	Lentibulariaceae
380.	*Uvaria narum Wall.*	Anonaceae
381.	*Vateria indica L.*	Dipterocarpaceae
382.	*Vernonia cinerea Less.*	Asteraceae

383.	*Vetiveria ziznoides(L)Nash.*	Poaceae
384.	*Vigna sublobata*	Fabaceae
385.	*Vinca rosea L.*	Apocynaceae
386.	*Vitex altissima L.*	Verbenaceae
387.	*Vitex negundo L.*	Verbenaceae
388.	*Vitex trifolia L.*	Verbenaceae
389.	*Waltheria indica L.*	Sterculiaceae
390.	*Withania somnifera Dun.*	Solanaceae
391.	*Xylia xylocarpa Taub.*	Mimosaceae
392.	*Zingiber officinale Rosc.*	Zingiberaceae
393.	*Zingiber wightianum Thw.*	Zingiberaceae
394.	*Zingiber zerumbet Sm.*	Zingiberaceae
395.	*Zinnia elegans*	Asteraceae
396.	*Zizyphus oenoplia Mill.*	Rhamnaceae
397.	*Zizyphus rugosa Lam.*	Rhamnaceae

Table 12 List of Tubers of Kalliasseri *Panchayat*

Sl. no.	Botanical name	Family	Vernacular name
1.	*Amorphophallus companulatus Bl.*	Araceae	Chena
2.	*Amorphophallus sylvaticus (Roxb) Kunth.*	Araceae	Kattuchena
3.	*Curcuma longa.*	Zingiberaceae	Manjal
4.	*Colocasia antiquorum Schott.* *Local varieties:* *Eaya chempu* *Thalu*	Araceae	Chempu
5.	*Dioscorea alata L.*	Dioscoreaceae	Kachil
6.	*Dioscorea esculenta Burk.*	Dioscoreaceae	Cherukizhangu
7.	*Ipomaea batatas Lam.*	Convolvulaceae	Madurakizhangu
8.	*Maranta arundinaceae L.*	Marantaceae	Koova
9.	*Manihot esculenta Cranz.*	Euphorbiaceae	Maracheeni/ Kappa
10.	*Zingiber officinale Rosc.*	Zingiberaceae	Inchi

Table 13 Plants for Fumigation and Chewing of Kalliasseri *Panchayat*

Sl. no	Botanical name	Family	Vernacular	Notes
1.	*Areca catechu L.*	Arecaceae	Kamung	Fresh seeds are used for chewing with piper betel leaf
2.	*Leucas aspera Spreng.*	Lamiaceae	Thumba	Whole plant fired and the smoke coming out from it is used to keep away the mosquitoes.
3.	*Oscimum canum Sins.*	Lamiaceae	Tulasi	The whole plant put on fire and the smoke coming out used to keep away mosquitoes.
4.	*Ocimum tenuiflorum L.*	Lamiaceae	Tulasi	Same as above
5.	*Piper betle L.*	Piperaceae	Vettila	Leaf used for chewing with arecanut
6.	*Vetiveria zizanoides (L)Nash.*	Poaceae	Ramacham	Dried roots are used.
7.	*Vitex negundo L.*	Verbenaceae	Karinochi	Plant burnt to produce smoke for keeping away mosquitoes.

Table 14 Climbers and Creepers of Kalliasseri *Panchayat*

Sl. No.	Botanical name	Family name	Vernacular Availability	Status/
1.	*Asparagus glumosus* (Cultivated)	Liliaceae	Sathavary	Occasional
2.	*Asparagus racemosus Willd.*	Liliaceae	Sathavary	Rare
3.	*Canavalia virosa(Roxb)W&A.*	Papilionaceae	Valaripayar	Abundant
4.	*Cayratea pedata Juss.*	Vitaceae		Occasional
5.	*Cryptolepis elegans*	Asclepiadaceae	Cherupulvalli	Abundant
6.	*Derris trifoliata Lour.*	Fabaceae	Ponnamvalli	Abundant
7.	*Dioscorea pentaphylla L.*	Dioscoriaceae	Kattukachil	Abundant
8.	*Evolvulus alsinoides L.*	Convolvulaceae	Vishnukranthi	Abundant
9.	*Hydrocotyl asiatica (L).R.Br.*	Apiaceae	Kudangal	Occasional
10	*Ichnocarpus fruitescens R.Br.*	Apocynaceae	Palvally	Occasional
11.	*Ipomaea companulata L.*	Convolvulaceae		Occasional
12.	*Ipomaea hederacea (L)Jacq.*	Convolvulaceae		Occasional
13.	*Ipomaea pes-caprae SW.*	Convolvulaceae	Adampu	Occasional
14.	*Ipomaea palmata Forsk.*	Convolvulaceae		Abundant
15.	*Ipomaea paniculata R.Br.*	Convolvulaceae		Occasional
16.	*Ipomaea wighti choisy.*	Convolvulaceae		Occasional
17	*Ipomaea purpurea Roth.*	Convolvulaceae	Udayamalari	Occasional
18.	*Jacquemontia caerulea choisy.*	Convolvulaceae		Occasional
19.	*Merremia umbellata Hall.f.*	Convolvulaceae	Varavelly	Abundant
20.	*Mucuna hirsuta W&A.*	Fabaceae	Naykurna	Abundant
21.	*Naravelia zeylanica(L)DC.*	Rananculaceae	Vathakoty	Rare
22.	*Passiflora edulis Sims.*	Passifloraceae	Fassion fruit	Abundant
23.	*Passiflora foetida L.*	Passifloraceae		Rare
24.	*Pothos scandens L.*	Araceae	Aanapparuva	Abundant
26.	*Utricularia flexuosa.*	Lentibulariaceae	Kakkappoo	Abundant
27.	*Utricularia reticulata Sm.*	Lentibulariaceae	Kakkappoo	Abundant

Table 15 (a) True Mangrove Species of Kalliasseri *Panchayat*

Sl. No.	Botanical Name	Family	Vernacular name	Status
1.	*Acanthus ilicifolius L.*	Acanthaceae	Chully	
2.	*Aegiceras corniculatum Blanco.*	Mysinaceae	Halsi	
3.	*Avicennia officinalis L.*	Verbenaceae	Uppatty	
4.	*Barringtonia racemose Roxb.*	Lecythidaceae	Samudrakka	
5.	*Bruguiera cylindrica W&A.*	Rhizophoraceae	Chackara kandal	
6.	*Excoecaria agallocha L.*	Euphorbiaceae	Kannampotti, Kammatty	
7	*Kandelia candal (L)Druce.*	Rhizophoraceae	Cherukandal, Nallakandal	Abundant
8.	*Rhizophora mucronata Lam.*	Rhizophoraceae	Peekandal	Abundant
9.	*Sonneratia acida L.f.*	Lythraceae		
10.	*Sonneratia caseolaris Engl.*	Sonneratiaceae	Blathi	

Table 15 (b). Associated Mangrove Species of Kalliasseri *Panchayat*

Sl. No.	Botanical Name	Family	Vernacular name
1.	*Calamus rotang L.*	Arecaceae	Chooral
2.	*Calophyllum inophyllum L.*	Clusiaceae	Punna
3.	*Cayratia trifolia (L) Domin.*	Vitaceae	Choorivalli
4.	*Clerodendron inermae Gaertn.*	Verbenaceae	Puzhamulla
5.	*Crinum defixum Ker.*	Amaryllidaceae	
6.	*Derris trifoliata Lour.*	Fabaceae	Ponnam valli
7.	*Ipomaea campanulata L.*	Convolvulaceae	
8.	*Melastoma malabathricum L.*	Melastomaceae	Athirani
9.	*Pandanus tectorius Sol.*	Pandanaceae	Kaitha, Thazha

Table 16 (a) Plant Diversity in Home Gardens - Coastal Plain (Irinave Area)

Ward No	House No	Area (in cents)	No.of plant species
I	743	15	23
I	751	16	33
II	586	12	18
II	218	17	35
I	747	27	72
I	705	32	68
I	332	45	37
I	657	51	25
II	597	150	58

Table 16 (b) Plant Diversity in Home Gardens - Mesa (Mangattuparambu)

Ward No	House No	Area (in cents)	No.of plant species
XI	306	10	42
XI	368	17	48
XI	-	20	32
XI	304	25	32
XI	251	48	92
XI	336	62	77

Table 16 (c) Plant Diversity in Home Gardens - Slopes (Kalliasseri)

Ward No	House No	Area (in cents)	No.of plant species
X	441	12	53
IX	280	22	29
X	490	48	52
IX	325	51	28
IX	341	80	95
X	455	92	36
IX	230	9	29
IX	246	100	75
X	111	100	48

Table 17 (a) Flowering Plants in Ward XI - House No 304 - Mangattuparambu - Area 25 cents

1.	*Ocimum tenuiflorum*	17.	*Cassia sp*
2.	*Garcinia cambogia*	18.	*Carica papaya*
3.	*Phyllanthus amarus*	19.	*Mallotus philippinensis*
4.	*Caesalpinia pulcherrima*	20.	*Polyalthia longifolia*
5.	*Musa paradisiaca*	21.	*Prunus avium*
6.	*Rosa sp*	22.	*Ageratum conizoides*
7.	*Ixora coccinea*	23.	*Michelia champaka*
8.	*Cocos nucifera*	24.	*Moringa oleifera*
9.	*Psidium guajava*	25.	*Anthurium sp*
10.	*Syzygium jambolanum*	26.	*Anacardium occidentale*
11.	*Hibiscus rosa sinensis*	27.	*Mimosa pudica*
12.	*Bauhinia tomentosa*	28.	*Euphorbia hirta*
13.	*Mangifera indica*	29.	*Murraya koenigii*
14.	*Artocarpus integrifolia*	30.	*Zingiber officinale*
15.	*Jasminum pubescens*	31.	*Mussaenda frondosa*
16.	*Areca catechu*	32.	*Piper nigrum*

Table 17 (b) Flowering Plants in Ward II – House No 218 – Irinave – Area 17 cents

1.	*Cocos nucifera*	18.	*Cassia alata*
2.	*Ficus religiosa*	19.	*Bryophyllum diagraemontianum*
3.	*Ficus bengalensis*	20.	*Phyllanthus sp.*
4.	*Citrus acida*	21.	*Hibiscus rosa sinensis*
5.	*Cynodon dactylon*	22.	*Phyllanthus emblica*
6.	*Sida acuta*	23.	*Artocarpus integrifolia*
7.	*Moringa oleifera*	24.	*Caesalpinia pulcherrima*
8.	*Datura metel*	25.	*Mussaenda frondosa*
9.	*Curcuma longa*	26.	*Ocimum tenuiflorum*
10.	*Oldenlandia umbellata*	27.	*Calotropis gigantea*
11.	*Euphorbia hirta*	28.	*Areca catechu*
12.	*Anacardium occidentale*	29.	*Amaranthus viridis*
13.	*Colocasia esculenta*	30.	*Tectona grandis*
14.	*Mangifera indica*	31.	*Musa paradisiaca*
15.	*Terminalia bellarica*	32.	*Ageratum conizoides*
16.	*Loranthus sp*	33.	*Urena lobata*
17.	*Carica papaya*	34.	*Phyllanthus niruri*

Table 17 (c) Flowering Plants in Ward IX – House No. 230 Kalliasseri – Area 9 cents

1.	*Murraya koenigii*	16.	*Cyclea peltata*
2.	*Jasminum pubescens*	17.	*Adathoda beddomei*
3.	*Caspicum fruitescens*	18.	*Ixora coccinia*
4.	*Carica papaya*	19.	*Clerodendron infortunatum*
5.	*Amaranthus viridis*	20.	*Pothos scandens*
6.	*Tamarindus indicus*	21.	*Cayratia*
7.	*Phyllanthus amarus*	22.	*Olea diocica*
8.	*Ocimum tenuiflorum*	23.	*Mangifera indica*
9.	*Lycopersicum esculentum*	24.	*Piper nigrum*
10.	*Ananas comosus*	25.	*Caryota urens*
11.	*Hibiscus rosa sinensis*	26.	*Oldenlandia umbellata*
12.	*Bauhinia tomentosa*	27.	*Alstonia scholaris*
13.	*Chasalia curviflora*	28.	*Ageratum conizoides*
14.	*Cissambelos parera*	29.	*Abelmoschus esculentus*
15.	*Artocarpus integrifolia*		

Table 18 Floral biodiversity of the Sacred Groves of Kalliasseri *Panchayat*

Sl. No.	Botanical Name	Vernacular Name	Family
1.	*Abrus precatorius L.*	Kunni	Fabaceae
2.	*Acampe praemorsa*	Maravazha	Orchidaceae
3.	*Adenanthera pavonina L.*	Manchaty	Mimosaceae
4.	*Aglaia elaeagnoidea*	Punyava	Meliaceae
5.	*Alangium salvifolium Wang.*	Ankolam	Alangiaceae
6.	*Amorphophallus sylvaticus Kunth.*	Kattuchena	Araceae
7.	*Antiaris toxicaria Lesch.*	Arayanjili	Moraceae
8.	*Antidesma menasu Miq.*	Aattukurinchal	Euphorbiaceae
9.	*Barleria montana Nees.*	Karikurinji	Acanthaceae
10.	*Bulbophyllum nilghirrense W.*	Mookittakaya	Orchidaceae
11.	*Calycopteris floribunda Lam.*	Pullanji	Combretaceae
12.	*Chasalia curviflora Thw.*	Velutha amalpori	Rubiaceae
13.	*Cissampelos pareira L.*	Malathangi	Menispermaceae
14.	*Cissus sps*	Chandravalli kizhangu	Vitaceae
15.	*Clerodendron viscosum*	Perungilam	Verbenaceae
16.	*Costus speciosus Sm.*	Channakkoova	Zingiberaceae
17.	*Curculigo orchioides Gaertn.*	Nilappana	Amaryllidaceae
18.	*Curcuma cannoorensis*	Kalamukham	Zingiberaceae
19.	*Curcuma digantha*	Kalamukham	Zingiberaceae
20.	*Cyathula prostrata Bl.*	Cherukatalaty	Amaranthaceae
21.	*Desmodium gangeticum DC.*	Oarila	Fabaceae
22.	*Dioscorea bulbifera L.*	Kattukachil	Dioscoreacea
23.	*Ficus asperima Roxb.*	Thaerakan/Paron	Moraceae
24.	*Gloriosa superba*	Menthonni	Liliaceae
25.	*Glycosmis pentaphylla Corr.*	Kurumpanal	Rutaceae
26.	*Hemidesmus indicus R.Br.*	Nannari	Asclepiadaceae
27.	*Holaarhena arnottiana Hk.f.*	Cheru	Anacardiaceae
28.	*Hydnocarpus alpina.W.*	Marotti	Flacourtiaceae
29.	*Ichnocarpus fruitescens R.Br.*	Palmuthuck	Apocynaceae

30.	*Ipomaea pes-tigris L.*	Pulichuvaty	Convolvulaceae
31.	*Ixora brachiata Roxb.*	Marachethy	Rubiaceae
32.	*Ixora coccinea L.*	Kattuchecky	Rubiaceae
33.	*Jasminum malabaricum W.*	Kathambavalli	Oleaceae
34.	*Lepidagathis keralensis*	Nonganam pullu	Acanthaceae
35.	*Lannea coromandalica Meril.*	Karayam	Anacardiaceae
36.	*Listea sp.*	Karotta	Lauraceae
37.	*Melastoma malabathricum L.*	Athirani	Melastomaceae
38.	*Memecylon malabaricum Cogn.*	Koovachecky	Melastomaceae
39.	*Merremia umbellata Hall.f.*	Prasarini	Convolvulaceae
40.	*Monocharia vaginalis Presl.*	Karimkoovalam	Pontederiaceae
41.	*Mucuna pruriens Baker.*	Naykurna	Fabaceae
42.	*Musa superba Roxb.*	Kalluvazha	Musaceae
43.	*Mussaenda frondosa L.*	Vellila	Rubiaceae
44.	*Naravelia zeylanica DC.*	Vathakodi/ Soothravalli	Ranunculaceae
45.	*Olea dioica Roxb.*	Edana	Oleaceaea
46.	*Oldenlandia umbellata L.*	Parppadakapullu	Rubiaceae
47.	*Pavetta indica L.*	Pavatta	Rubiaceae
48.	*Persea macrantha*	Kulirmavu	Lauraceae
49.	*Piper nigrum L.*	Kattukurumulaku	Piperaceae
50.	*Pothos scandens L.*	Aanapparuva	Araceae
51.	*Rauwolfia serpentina Benth.*	Amalppori	Apocynaceae
52.	*Rhaphidophora pertusa Schott.*	Udayarvalli	Araceae
53.	*Salacia reticulata W.*	Aakanayakam	Hippocrateaceae
54.	*Santalum album L.*	Chandanam	Santalaceae
55.	*Selaginella sp.*	Seevothippacha	Selaginellaceae
56.	*Tinospora malabaricum*	Kattamruth	Menispermaceae
57.	*Uvaria narum Wall*	Narumpanal	Anonaceae
58.	*Vernonia cinerea Less.*	Poovamkurunthal	Asteraceae
59.	*Vigna sublobata*	Kattuzhunnu	Fabaceae
60.	*Zingiber zerumbet Sm.*	Malayinchi	Zingiberaceae
61.	*Zizyphus oenoplia Mill.*	Choorikotta	Rhamnaceae
62.	*Zizyphus rugosa Lam.*	Kottamullu	Rhamnaceae

Table 19 Butterflies recorded from Kalliasseri *Panchayat*

Sl.No	Scientific name	Common name	Family
1.	*Limemtis procis Cramer*	Commander	Nymphalidae
2.	*Neptis hylas*	Common Sailer	Nymphalidae
3.	*Neptis jumbah*	Chestnut streaked Sailer	Nymphalidae
4.	*Hypolimnas misippus Linnaeus*	Danaid Egg fly	Nymphalidae
5.	*Hypolimnas bolina Linnaeus*	Great Egg Fly	Nymphalidae
6.	*Precis almana Linnaeus*	Peacock Pansy	Nymphalidae
7.	*Precis lemonias Linnaeus*	Lemon Pansy	Nymphalidae
8.	*Precis orithya Linnaeus*	Blue Pansy	Nymphalidae
9.	*Precis hierta Fabicius*	Yellow Pansy	Nymphalidae
10.	*Precis iphita Cramer*	Chocolate Pansy	Nymphalidae
11.	*Precis albites Johanssen*	Grey Pansy	Nymphalidae
12.	*Cirrochroa thais Fabricius*	Tamil Yeoman	Nymphalidae
13.	*Telchinia violae Fabricius*	Tawny Castor	Nymphalidae
14.	*Ergolis merione Cramer*	Common Castor	Nymphalidae
15.	*Ergolis ariadne Johanssen*	Angled Castor	Nymphalidae
16.	*Euthalia lepidea Butler*	Grey Count	Nymphalidae
17.	*Syntarucus plinius Fabricius*	Zebra blue	Lycaenidae
18.	*Jamides celeno*	Common cerulean	Lycaenidae
19.	*Curetis thetis brury*	Indian Sunbeam	Lycaenidae
20.	*Euchrysops pandava Horesefield*	Plains cupid	Lycaenidae
21.	*Zizeeria maha*	Pale grass blue	Lycaenidae
22.	*Loxura atymnus Cramer*	Yamfly	Lycaenidae
23.	*Neopithecops zalmora Butter*	Quaker	Lycaenidae
24.	*Chilades laius Cramer*	Lime blue	Lycaenidae
25.	*Troides helena Linnaeus*	Southern Bird Wing	Papilionidae
26.	*Tros aristolochiae Fabricius*	Common Rose	Papilionidae
27.	*Tros hector Linnaeus*	Crimson Rose	Papilionidae
28.	*Chilasa clytia clytia*	Common Mime	Papilionidae
29.	*Papilio paris Linaeus*	Paris Peacock	Papilionidae
30.	*Papilio helena Linnaeus*	Red Helen	Papilionidae
31.	*Papilio polytes Linnaeus*	Common Mormon	Papilionidae

32.	*Papilio ploymnestor Cramer*	Blue Mormon	Papilionidae
33.	*Papilio demoleus Linnaeus*	Lime Butterfly	Papilionidae
34.	*Pathysa nomius Esper*	Spot Sword tail	Papilionidae
35.	*Zetides doson C&R Felder*	Common Jay	Papilionidae
36.	*Zetides sarpedon Linnaeus*	Common Blue bottle	Papilionidae
		Whites	Papilionidae
37.	*Delias eucharias Drury*	Common Jezebel	Pieridae
38.	*Hebomoia glaucippe Linnaeus*	Great orange tip	Pieridae
39.	*Parenonia valeria Cramer*	Common Wanderer	Pieridae
40.	*Belenois mesentina Moore*	Pioneer	Pieridae
41.	*Leptosia mina Fabricius*	Psyche	Pieridae
		Yellows	Pieridae
42.	*Catopsilla pyrantha Linnaeus*	Mottled Emigrant	Pieridae
43.	*Catopsilla crocale Cramer*	Common Emigrant	Pieridae
44.	*Terias brigitta Cramer*	Small Grass Yellow	Pieridae
45.	*Terias hecabe Linnaeus*	Common Grass Yellow	Pieridae
46.	*Danais chrysippus Linnaeus*	Plain Tiger	Danaidae
47.	*Danais melissa Cramer*	Dark Blue Tiger	Danaidae
48.	*Danais plexippus Linnaeus*	Common Tiger	Danaidae
49.	*Euploea core Cramer*	Common Indian Crow	Danaidae
50.	*Euploea coreta Godart*	Double Branded black crow	Danaidae
51.	*Mycalesis mineus Linnaeus*	Dark brand Bush brown	Satyridae
52.	*Ypthima hubneri*	Common Four ring	Satyridae
53.	*Orsotrioena medus Fabricius*	Nigger	Satyridae
54.	*Melanitia leda Drury*	Common Evening Brown	Satyridae
55.	*Elymnias hypermnestra caudata Linnaeus*	Common Palm fly	Satyridae
56.	*Matapa aria Moore*	Common Redeye	Hesperiidae

Table 20 Freshwater Fishes of Kalliasseri *Panchayat*

Sl.no.	Scientific name	Common Name	Vernacular Name
1.	*Heteropneustes fossilis* The brown/reddish brown colour is their juvenile colouration	Stinging Cat fish	Kadu
2.	*Channa gachua*	Snake headed fish	Kayichal
3.	*Clarias dussumieri*		Muzu
4.	*Silurus wayanadensis*	Wayanad silurus	Changali Etta
5.	*Arius sp*	Catfish	Etta
6.	*Megalops cyprinoides*	Ox-eyed herring	Valathan
7.	*Rosbora daniconius*	Common Rasbora	Thuppalothy
8.	*Xenentodon cancila*	Gar fish	Kokki
9.	*Wallago attu*	Boal	Vala
10.	*Syllago sihama*	Lady fish	Nangol
11.	*Stolephorus commersonianus*	Anchovie	Nathal
12.	*Labeo fimbriatus*	Fringe tripped carp	

Table 21 Brackishwater fishes of Kalliasseri *Panchayat*

Sl.No	Scientific name	Common Name	Vernacular Name
1.	*Uropterygius marmoratus*		Malanjil
2.	*Escualosa thoracata*		Natthal
3.	*Stolephorus commersonii*		Natthal
4.	*Stolephorus indicus*		Natthal
5.	*Puntius sarana subnasutus*	Olive carp	Karuva paral
6.	*Mystus gulio*	Long whiskered cat fish	Koori
7.	*Hyporhamphus limbatus*	Pipe fish	Koyala
8.	*Xenentodon cancila*	Garpike	Kolah
9.	*Ambassis commersoni*		
10.	*Terapon jarbua*		
11.	*Caranx ignobilis*		Manang
12.	*Leiognathus brevirostris*	Pondy fish	Mullan
13.	*Gerres filamentosus*	Silver perch	Prachil/Madali
14.	*Gerres limbatus*	Silver perch	Prachil/Madali
15.	*Upeneus sulphureus*	Goat fish	
16.	*Etroplus suratensis*	Pearl spot	Karimeen/Erimeen
17.	*Etroplus maculatus*	Orange chromide	Choottachi/Pallathi
18.	*Stenogobius malabaricus*	Malabar gobi	Kurudan
19.	*Liza parsia*	Grey mullet	Thirutha
20.	*Liza tade*	Red mullet	Kanambu
21.	*Mugil cephalus*	Flat headed mullet	Malan
22.	*Glossogobius giuris*	Bar eyed gobi	Pottan payathi
23.	*Siganus vermiculatus*	White spotted spine	Karadumeen
24.	*Cynoglossus cynoglossus*	Malabar sole	Nang
25.	*Euryglossa orientalis*	Oriental sole	
26.	*Batrachus grunniens*	Toad fish	Thavala pothal
27.	*Trypanchen sp.*	Burrowing Gobi	Chettu Aral
28.	*Arius sp.*	Cat fish	Etta
29.		Tiger fish	Keeran
30.	*Chanos chanos*	Milk fish	Poomeen
31.	*Oreochromis mossambica*	Mozambique cuhlet	Thilapia

32.	*Muraena sp.*	Eel	Malanjal
33.	*Elotris fusca*		Nangal
34.	*Thrissocles malabaricus*	Malabar anchovy	Manang
35.	*Secutor sp.*	Silver belly	Mullan
36.	*Scatophagusargus*	Spotted argus	Kachai
37.	*Lutianus argentimaculatus*	Red snapper	Chemballi
38.	*Lutianus malabaricus*	Malabar snapper	Chemballi
39.	*Platycephalus indicus*	Plough fish	Korappan
40.	*Psettodus erumi*	Halibat	Manthal
41.	*Peleropsis frondosus*	Devil fish	Kakkuman
42.	*Carangdides sp.*	Perches	Prachi
43.	*Lactarias lactarias*	White fish	Kadu
44.	*Pampus chinensis*	Silver pomfret	Akoli
45.	*Pampus argentius*	Brown pomfret	Akoli
46.	*Rasbora daniconius*	Common Rasbora	Pullan
47.	*Parastromatus niger*		

Table 22 Snakes recorded from Kalliasseri *Panchayat*

Sl.	Scientific name	Common name	Vernacular name	Poisonous/ No. Non-poisonous
1.	*Typhlops sp*	Blind snake	Kurudi pambu	Non-poisonous
2.	*Erix conicus*	Russels Earth Boa	Mannooli pambu	Non-poisonous
3.	*Eryx johni*	John's Earth Boa	Iruthalayan pambu	Non-poisonous
4.	*Python morulus*	Indian Python	Malam pambu	Non-poisonous
5.	*Elaphae helena*	Trinket snake	Kattu pambu	Non-poisonous
6.	*Coluber mucosus*	Dhaman or	Chera Common rat snake	Non-poisonous
7.	*Dendrelaphis tristis*	Common Indian Bronze Back or Tree Snake	Villoonni	Non-poisonous
8.	*Lycodon aulicus*	Common Wolf Snake	Shangu varayan	Non-poisonous
9.	*Xenochrophis piscator*	Checkered	Neerkoli Keel Back	Non-poisonous
10.	*Boiga trigonata*	Indian Gamma or Cat Snake		Non-poisonous

11.	*Ahaetulla nasutus*	Common Green Whip Snake	Pachila pambu	Non-poisonous
12.	*Bungarus caeruleus*	Common Indian Krait	Valaya pambu	Poisonous
13.	*Naja naja*	Indian Cobra	Moorkan/ Sarpam	Poisonous
14.	*Vipera russelli*	Russels viper	Mandali, Anali	Poisonous
15.	*Trimiresurus malabaricus*	Rock Pit Viper	Paramandali	Poisonous

Table 23 Birds of Kalliasseri *Panchayat*

Sl. No.	Scientific name	Common Name	Vernacular Name	Family
1.	*Gallopardis spadicea*	Red spur fowl	Mullan Kozhi	Phasianidae
2.	*Gallus sonneratia*	Grey jungle fowl	Kattu Kozhi	Phasianidae
3.	*Dendrocygna javanica*	Lesser Whistling teal	Choolan eranda	Dendro cygnidae
4.	*Picumnus Innominatu smalayorum*	Speckled piculet	Maramkothi chinnan	Picidae
5.	*Dinopium benghalense Tehminae*	Lesser Golden Backed Woodpecker	Nattu maram Kothi	Picidae
6.	*Hemicirars cammente cammente*	Heart spotted wood pecker	Chithrangun marumkothi	Picidae
7.	*Viridis*	Small green barbet	Chinna kutturuvan	
8.	*Rubricapilla malabarica*	Crimson throated barbet	Aalkkili	
9.	*Magalaima haemacephala indica*	Crimson breasted barbet	Chempukotti	Megalaimidae
10.	*Upupa epops ceylonensis*	Hoopoe	Uppooppan	Upupidae
11.	*Coracias benghalensis indica*	Indian roller	Panamkakka	Coraciidae

12.	*Alcedo atthis . taprobana*	Common king fisher	Cheriya meenkothia	Alcedinidae
13.	*Pelargopsis capensis capensis*	Stork billed kingfisher	Kakameenkothi	Dacelonidae
14.	*Halcyon smyrnensis fusca*	White breasted kingfisher	Meenkothi chathan	Dacelonidae
15.	*Halcyon pileata,*	Black capped kingfisher	Karinthalayan meenkothi	Dacelonidae
16.	*Ceryle rudis travancoreansis*	Travancore pied kingfisher	Pullimeenkothi	Cerylidae
17.	*Merops orientalis orientalis*	Small green bee- eater	Nattuveli thatha	Meropidae
18.	*Merops philippinus philippinus*	Blue tailed bee-eater	Valiyaveli thatha	Meropidae
19.	*Cuculis varius varius*	Common hawk-cuckoo	Pekkuyil	Cuculidae
20.	*Cacomantis sonneratii*	Indian banded by Cuckoo	Chenkuyil	Cuculidae
21.	*Eudynamis scolopacea scolopacea*	Koel (Asian koel)	Nattukuyil	Cuculidae
22.	*Cuculis micropterus micropterus*	Indian cockoo	Chakkaikku ppundokuyil	cuculidae
23.	*Centropus Sinensis Parroti*	Crow-Pheasant or Coucal	Chempothu	Centropodidae
24.	*Loriculus Vernalis Vernates*	Indian Lorikeet	Thatha Chinnan	Psittaidae
25.	*Psittacula Krameri maniflensis*	Rose ringed Parakeet	Mothirathatha	Psisttaidae
26.	*Psittacula Cyanocephata Cynacephata*	Blossom Headed Parakeet	Poomthatha	Psisttaidae
27.	*Collocalia unicolor*	Indian Edible-nest Swiftlet	Chithra Koodam Sharappakshi	Appodidae
28.	*Cypsiurus Balasiensis*	Palm Swift	Panankoolan	Appodidae
29.	*Tachymarptis melba*	Alpine swift	Vellavarayan sharappakshi	Appodidae
30.	*Apus affinis affinis*	House swift		Appodidae

31.	*Hemiprocne caronata*	Crested tree swift	Kompan sharapakshi	Hemiprocnidae
32.	*Tyto alba stertens*	Barn owl	Velli moongha	Tytonidae
33.	*Otus bakkamoena bakkamoena*	Collared scops owl	Chevian nattu	Strigidae
34.	*Ketupa zeylonensis*	Brown fish owl	Meenmoongha	Strigidae
35.	*Strix ocellata ocellata*	Mottled wood owl	Kalankozhi	Strigidae
36.	*Strix leptogrammica indranee*	Brown wood owl	Kollikkuravan	Strigidae
37.	*Glaucidium radiatum malabaricum*	Jungle owlet	Chempen nattu	Strigidae
38.	*Athene brama brama*	Spotted owlet	Pulinattu	Strigidae
39.	*Caprimulgus asiaticus asiaticus*	Common Indian Nightjar	Nattu rachukku	Caprimulgidae
40.	*Columbia Livia intermedia*	Blue Rock Pigeon	Madapravu, Ambalapravu	Columbidae
41.	*Streptopelia Chinengis Suratensis*	Spotted Dove	Aripravu	Columbidae
42.	*Chalcophaps indica indica*	Emerald or Bronze winged Dove	Omanapravu	Columbidae
43.	*Amaurornis Phoenicurus Phoenicurus*	White breasted Waterhen	Kulakkozhi	Rallidae
44.	*Porzana fusca zeylonia*	Ruddy Crake	Chuvanna nellikozhi	Rallidae
45.	*Gallicrex cinerea*	Kora or Watercock	Theeppori Kannan	Rallidae
46.	*Porphyrio Porphyria Poliocephalus*	Purple Moorhen	Neelakozhi	Rallidae
47.	*Gallinula Chloropus indica*	Indian Moorhen	Pattakozhi	Rallidae
48.	*Gallinago gallinago gallinago*	Fantail snipe	Vishahi valen chundrakada	Scolopacidae
49.	*Numenius phaeopus phaeopus*	Whimbrel	Thettikokkan	Scolopacidae

50.	*Numenius arquata orientalis*	Curlew	Valkokkan	Scolopacidae
51.	*Tringa totanus totanus*	Common red shank	Chorakkali	Scolopacidae
52.	*Tringa stagnatilis*	Marsh sandpiper	Chattuppan	Scolopacidae
53.	*Tringa nebularia*	Green shank	Pachakkali	Scolopacidae
54.	*Tringa ochropus*	Green sandpiper	Karimpan kadakokku	Scolopacidae
55.	*Tringa hypoleucos hypoleucos*	Common sandpiper	Neerkakka	Scolopacidae
56.	*Calidris minnata*	Little stint	Kuruvi manaloothi	Scolopacidae
57.	*Hydrophasianus chirurgus*	Pheasant – tailed jacana	Valan thamarakozhi	Jacanidae
58.	*Metopidius indicus*	Bronze winged jacana	Nadan thamarakozhi	Jacanidae
59.	*Himantopus himantopus himantopus*	Black winged stilt	Pavizhakkali	Charadridae
60.	*Pluvialis fulva*	Eastern golden plover	Ponmanal kozhi	Charadridae
61.	*Charadrius dubius jerdoni*	Little ringed plover	Attumanal kozhi	Charadridae
62.	*Charadrius alexandrinus*	Kentish plover	Cherumanal kozhi	Charadridae
63.	*Charadrius mongolos atrifons*	Lesser sand plover	Mongolian manalkozhi	Charadridae
64.	*Vanellus malabaricus*	Yellow wattled lapwing	Mnjakkanni thithiri	Charadridae
65.	*Vanellus indianus indianus*	Red wattled lapwing	Chorakkanni thithiri	Charadridae
66.	*Glareola lactea*	Small Indian pratincole	Cheriya meeval kada	Glariotidae
67.	*Larus ichthyactus*	Great black headed gull	Valiya kadal kaka	Laridae
68.	*Larus brunnicephalus*	Brown headed gull	Thavittuthalayan kadlkaka	Laridae

69.	*Larus ridibundus ridibundus*	Blackheaded gull	Cheriya kadlkaka	Laridae
70.	*Sterna nlotica*	Gull billed tern	Patha kokkan aala	Laridae
71.	*Sterna caspia*	Caspian tern	Valiyachem kokkanaala	Laridae
72.	*Sterna aurantia*	Indian river tern	Puzha aala	Laridae
73.	*Sterna benghalensis benghalensis*	Indian lesser crested tern	Cheriya kadal aala	Laridae
74.	*Chlidonias hybridus indicus*	Whiskered tern	Kari aala	Laridae
75.	*Pandion haliactus haliactus*	Osprey	Thalipparunth	Accipitridae
76.	*Elanus caeruleus vociferus*	Blackwinged kite	Velli eriyan	Accipitridae
77.	*Milvus migrans*	Pariah kite	Chakki parunth	Accipitridae
78.	*Haliastur indus indus*	Brahminy kite	Krishna pparunth	Accipitridae
79.	*Haliaster leucogaster*	Whitebellied sea eagle	Vellavayaran kadalpparunth	Accipitridae
80.	*Spilornis cheela melanotis*	Crested serpent eagle	Chuttipparunth	Accipitridae
81.	*Circus aeruginosus aeruginosus*	Marsh harrier	Karithappi	Accipitridae
82.	*Cirrus macrourus*	Pale harrier	Meduthappi	Accipitridae
83.	*Accipiter badius badius*	Shikra	Prappidian shikra	Accipitridae
84.	*Phalacrocorax niger*	Little cormorant	Cheriya neerkaka	Phalacroc-oracidae
85.	*Egretta garzetta garzetta*	Little Egret	Chinna mundi	Ardeidae
86.	*Egretta gularis schistacea*	Indian reef Heron	Thira mundi	Ardeidae
87.	*Ardea cinerea rectirostris*	Grey heron	Chara mundi	Ardeidae
88.	*Ardea Purpurea manilensis*	Purple Heron	Chaya mundi	Ardeidae
89.	*Casmerodius albus*	Large Egret	Perumundi	Ardeidae

90.	*Mesophoyx inter media*	Media Egret	Cheru mundi	Ardeidae
91.	*Bubulcus ibis coromandus*	Cattle Egret	Kalimundi	Ardeidae
92.	*Ardeola grayii grayii*	Pond Heron	Kulakokku	Ardeidae
93.	*Butorides Striatus*	Little Green Heron	Chinnakokku	Ardeidae
94.	*Nyeticorax nycticorax nycticorax*	Night Heron	Pathirakokku	Ardeidae
95.	*Ixobrychus sinensis*	Yellow Bittern	Manjakocha	Ardeidae
96.	*Ixobrychus cinnamomeus (Guelin)*	Chestnut Bittern	Mazhakocha	Ardeidae
97.	*Ixobrychus flavicollis flavicollis*	Black Bittern	Kalinkochu	Ardeidae
98.	*Pitta brachyura brachyura*	Indian Pitta	Kavi	Pittidae
99.	*Chloropsis cochinchinensis jeadoni*	Jerdon's chloropsis	Nadan	Irenidae
100	*Lanius Cristatus Cristatus*	Brown shrike	Thavidan Shrike	Laniidae
101	*Lanius schach camicaps*	Rufousbacked shrike	Charakuttay Shrike	Laniidae
102	*Dendrocitta Vagabunda Parvula*	Indian Tree Pie	Aulenjali	Corvidae
103	*Corvus splendens protegatus*	House crow	Pentakakka	Corvidae
104	*Corvus macrorhynchos culminatus*	Jungle crow	Balikakka	Corvidae
105	*Artamus fuscus*	Ashy swallow shrike	Innakkathevan	Corvidae
106	*Oriolus oriolus kundoo*	Golden oriole	Manjakkili	Corvidae
107	*Oriolus xanthormus xanthormus*	Black headed oriole	Manjakaruppam	Corvidae
108	*Coracina macei*	Large Cuckoo-Shrike	Charappoondan	Corvidae

119	*Pericrocotus cinnamomeus malabaricus*	Small Minivet	Theechinnan	Corvidae
110	*Pericrocotus flammeus flammeus*	Scarlet Minivet	Theekkuruvi	Corvidae
111	*Dicrurus macrocercus*	Black drongo	Aanaranchi	Corvidae
112	*Dicrurus leucophaus longicaudatus*	Grey or Ashy Drongo	Kakkathampuran	Corvidae
113	*Dicrurus paradisens paradisens*	Greater Racket-tailed Drongo	Kadumuzhakki	Corvidae
114	*Terpsiphone paradisi*	Paradise Fly Catcher	Nakamohan	Corvidae
115	*Aegithina tiphia multicolor*	Common Iora	Iora	Corvidae
116	*Tephrodornis gularis*	Malabar wood Shrike	Asurakkadan	Corvidae
117	*Tephrodornis pondicerianus pondicerianus*	Common wood shrike	Asurakkadan	Corvidae
118	*Muscicapa dauurica*	Brown Fly catcher	Thavittu pattapidian	Muscicapidae
119	*Copsychus Saularis ceylonensis*	Magpie Robin	Mannathipullu	Muscicapidae
120	*Saxicolodes fulicata fulicata*	Indian Robin	Kalmannathi	Muscicapidae
121	*Saxicola Caprata nilgriensis*	Pied Bush Chat	Chutteenthalak kili	Muscicapidae
122	*Sturnus malabaricus malabaricus*	Grey headed myna	Charathalakkali	Sturnidae
123	*Achridotheres tristis tristis*	Common myna	Nattumyna	Sturnidae
124	*Acridotheres fusanus maharattensis*	Jungle myna	Kinnarimyna	Sturnidae
125	*Hirundo rustica gutturalis*	Eastern Swallow	Vayalkkothi Kathirika	Hirundinidae
126	*Hirundo Smithii filifera*	Wire tailed swallow	Kampivallan Kathirikakili	Hirundinidae

127	*Hirundo danrica erythropygia*	Striated or Red rumped Swallow	Varayan Kathirika	Hirundinidae
128	*Pycnonotus jocosus fuscicandatus*	Red Whiskered Bulbul	Irattathalachi	Pycnonotidae
129	*Pycnonotus cafer cafer*	Red vented Bulbul	Nattubulbul	Pycnonotidae
130	*Iole indica*	Yellow Browed Bulbul	Manja chinnan	Pycnonnotidae
131	*Acrocephalus dumetorum*	Blyth's Reed Warbler	Eatapolippan	Sylviidae
132	*Acrocephalus Stentoreus brunnescens*	Indian Great Reed Warbler	Kaithakallan	Sylviidae
133	*Orthotomus sutorius guzuratus*	Tailor Bird	Thunnaram	Sylviidae
134	*Phylloscopus trochiloides*	Greenish Leaf warbler	Ilam Patcha podikkuruvi	Sylviidae
135	*Turdoides striatus malabaricus*	Jungle Babbler	Kariyilakkili	Sylviidae
136	*Turdoides affinis affinis*	White Headed Babbler	Poothenkeeri	Sylviidae
137	*Mirafra assamica affinis*	Bush Lark	Chempenpadi	Alaudidae
138	*Erumopterix grisea*	Ashy crowned finch-lark	Karivayaran vanampadi	Alaudidae
139	*Galerida malabarica*	Malabar Crested Lark	Kompan Vanampadi	Alaudidae
140	*Dicacm crythror-hynchos crythror-hynchos*	Tickell's Flower Pecker	Chenkokkan Ithikanni kkuruvi	Nectarinidae
141	*Nectarinia zeylonica flaviventrus*	Purple rumped sunbird	Manjathenkili	Nectarinidae
142	*Nectarinia asiatica asiatica*	Purple sunbird	Karuppamthenkili	Nectarinidae
143	*Nectarinia lotenia hindustanica*	Loten's sunbird	Kokkenthenkili	Nectarinidae

144	*Passer domesticus indicus*	House sparrow	Angadikkuruvi	Passeridae
145	*Motacilla maderaspatensis*	Large Pied Wagitail	Valiyavalukulukki	Passeridae
146	*Motacilla cinerea cinerea*	Grey wagtail	Vazhikulikki	Passeridae
147	*Proceis philippinus travancorcensis*	Travancore Baya (Baya weaver)	Aattakkuruvi	Passeridae
148	*Lonchura striate striate*	White backed munia	Aattakkaruppan	Passeridae
149	*Lonchura Punctulata punctulata*	Spotted Munia	Chuttiyatta	Passeridae
150	*Lonchura malacca malacca*	Black headed Munia	Aattachempan	Passeridae

Table 24 Smaller Mammals recorded from Kalliasseri *Panchayat*

Sl.no	Scientific name	Common name	Vernacular name
1.	*Felis chaus*	Jungle cat	Kattupoocha
		Civets	
2.	*Viverricula indica*	Small Indian Civet	Meru
3.	*Paradoxurus hermaphroditus*	Toddy cat/Common Palm Civet	Kallukudiyan veruku
		Mongoose	
4.	*Herpestes edwardsi*	Common Mangoose	Keeri
		Canid	
5.	*Canis aureus*	Jackal	
		Otter	
6.	*Lutra perspicillata*	Smooth Indian Otter	Neer nai
		Ground Shrew	
7.	*Suncus murinus*	Grey Musk shrew	Nacheli, Mochan
		Bats	
8.	*Pteropus giganteus*	Indian Flying Fox	Vowval

9.	*Cynopterus spinx l*	Short Nosed Fruit bat	
10.	*Rousettus leschenaulti*	Fulvous Fruit bat	
11.	*Kerivoula picta pallas*	Painted bat	
		Rodents	
12.	*Funambulus palmarum*	Three striped palm squirrel	Annarakkannan
13.	*Mus booduga*	Indian Field Mouse	Chundeli
14.	*Mus musculus*	House Mouse	Chundeli
15.	*Bandicota bengalensis*	Bandicoot rat	Peruchazhi
16.	*Rattus rattus Linnaeus*	Common House rat	Eli
17.	*Tatera indica*	Indian Gerbille (Antelope Rat)	
18.	*Hystrix indica*	Indian Porcupine	Mullan panni
		Hare	
19.	*Lepus nigricollis nigricollis*	Black naped hare	Moyal

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