

**A SOCIO-CULTURAL AND ECOLOGICAL STUDY OF THE
MID-LAND LATERITE HILLOCKS ALONG KAVVAYI RIVER BASIN**

**STATUS REPORT BASED ON A PILOT STUDY
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A SOCIO-CULTURAL AND ECOLOGICAL STUDY OF THE MID-LAND LATERITE HILLOCKS ALONG KAVVAYI RIVER BASIN

1. MID-LAND LATERITE HILLOCKS – CONTEXT OF THE STUDY

The environment of Northern Kerala is governed by its peculiar geographic features. A unique feature of this region is the presence of laterite hillocks which give fascinating undulations for the midland terrain in particular. Such hillocks are present up to Malappuram district towards south and they are spread to South Karnataka towards north. In geographical documentation, we do not find the term 'laterite hillock'. In Government records such as those of the revenue department, geography and mining departments etc. also there is no landscape marked as hillock. The term laterite denotes the peculiar soil or rock formations which are marked in such maps. Such landscapes in Governments term are 'waste lands' even though nothing related to hill is a waste. Formerly the act of leaving a land uncultivated was regarded as 'wasting' it. This has given it the name wasteland. Similar to the hillocks there are other ecosystems like the wetlands of the coastal area. All these show the lack of awareness of ecological importance of various landscapes.

Kavvayi river basin is a small, typically compact one, restricted to the mid-land and lowland regions. It provides us with an example for a landscape with the different kinds of laterite hillocks forming a

complex array throughout the entire region. Even though the upper part of Kavvayi is above 75 MSL, the land here also generally show the features of mid-land.

The hills are seen as isolated elevations in the midst of paddy fields or other cultivated lands towards the coastal low land region. Towards the upper region the hillocks assume the form of interconnected and continuous vast stretches of rocky lands along the sides of the streams. They are in the form of undulating lands with laterite covering on the top. Most of them on their upper surface have flat laterite beds. Their foldings give origin to streams leading to slopes and valleys.

1.1 Cultural History

The three geographic subdivisions namely lowland, mid-land and high land in this region also vary in their cultural history. Formerly the lowland region of North Malabar was only sparsely inhabited. This condition prevailed upto a comparatively recent past. Human settlement was restricted to certain pockets like Kavvayi, Pazhayangadi, Valapattanam, Kannur and Thalassery which were formerly related to trade based on water transport. Otherwise the coastal area was occupied by fisher folk and some Muslim families. With the establishment of West Coast Railway and road transport system, the settlements increased and the coastal region was gradually subjected to urbanization. The availability of cultivable land and abundance of fresh water might have promoted the inhabitation. By 1970, with gulf remittance pouring in a big way there was a sudden develop-

mental change. The entire coastal region was converted into urban settlements.

Towards the northern part of Kerala, as the boundary narrows down to the west the highland includes only the foot hills of Western Ghats. This region was also sparsely occupied for settlement. At least upto 1940s, the highland was occupied by tribals such as Mavilas, Velluvas and Velans. They were in the form of scattered groups with small population size. Along with them, more recently there were a few upper class families engaged in swidden mode of agriculture (Freeman 1999). After the Second World War, there was a sudden and massive migration of people from South Kerala to the highlands of Malabar and this event converted these highlands into real human settled areas. Narration of its ecological as well as economic impact on the corresponding mid-land and low land areas require extensive explanation which is beyond the scope of discussion here. This was supplemented by new settlers who were evacuated from Ezhimala and others in the low land who sold their property for attractive price and migrated towards east.

The mid-land of North Kerala has a glorious cultural history. Sangham Literature provides evidence for the opinion that human settlement in this region was started in the mid-land (Padmanabhan et.al, 2002). '*Thiyyathimalika*' is an ancient cave situated on the slope of Aechilamvayal Kunnu, the hillock towards the eastern boundary of Payyanur Municipal area. Other examples are the caves and umbrella stones (locally called '*aduppoottikallu*') near Ezhilode at the

boundary of Knuhimangalm and Cheruthazham Panchayath. Our ancestors selected hill slopes and valleys for living. This region receiving an annual rainfall of 3000 to 4000 mm. Perhaps provided home for a more comfortable settlement. The microclimate with mist and humidity was highly favourable for living. A great variety of food items were cultivated or otherwise available in nature. Different kinds of rice, tubers, fruits, green leafy vegetables etc. were abundant. Species like pepper, ginger and turmeric were grown in each household. The region was self sufficient with regard to major food items. Medicinal plants were available in plenty. The compounds were vast and contained almost all kinds of trees, each species with a specific niche which requires individual explanation. Palms for example were common and wellknown to have role in controlling insect pests. In brief, there existed some kind of food security in mid-land. Elder people know about more than thirty wild varieties of leafy vegetables which were available on the uncultivated portion of the hillocks. Even now many of them are being used by local people. Farmers are still aware of the springs originating from the hills. The spongy nature of the laterite facilitates storage of rain water which is let out in the form of springs to the valleys throughout all seasons. Vast stretched of agricultural fields and perennial streams are located along the valleys of these hills. Of the nineteen rivers between Manjeswaram and Mahe only five originates from the Western Ghat Highlands. Others have their watershed areas in the laterite hills of mid-land. The water holding capacity of the hills and their rich biodiversity enriched the slopes, valleys, paddy fields and the streams.

The health of the hills became the prosperity of the valley. Each hilltop has the capacity for storing water. Interestingly enough rockpools and lakes are present at Peringome, Eramam, Meenkulam and Madayi.

1.2 Surangam

Surangams are horizontal tunnels made on the slopes of laterite hillocks. There is perennial water flow from each of such tunnels. This shows the waterholding capacity of the laterite. In Kasaragod district there are many such tunnels made by privateland owners. A considerable area is irrigated by water from each *surangam* (Kamalakshan. K, 2002). Such a method of irrigation has not been accepted by the farmers of Kavvayi watershed. No *surangam* has been noticed on the hillocks of this region.

1.3 Hillocks as Sacred Lands

For the society, hills remain sacred in various ways. A few to be mentioned are,

- i) Sacred groves :** Remnants of original forest are present on the slopes of many hillocks. They remain protected owing to the myths and taboos. Their ecological importance is wide and descriptive. They increase the water holding capacity of the mid-land hillocks. The major sacred grooves in Kavvayi watershed are *Nakravanam*, *Soolapkavu*, *Theyyottukavy*, and *Konginichalkavu*. These are connected with the major tributaries of Kavvayi river.
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- ii) **Worship Sites** : These are holy places of various kinds. Some of them have engravings on rocks. There are various kinds of figures as that of *Thrisoolam*, foot prints, symbolic wells, tanks etc. There are various stories about such places . They also remain protected by myths and taboos. Eg.: Kunhimangalam, Madayi, Kuttoor etc.
- iii) **Theyyam and Pooram** : They are cultural activities centered on many hillocks.
- iv) **Caves** : Caves are recorded as burrial places of the Sangham period. Eg: Kunhimangalam.
- v) **Umbrella stones** : These are also burial places eg: Kunhimangalam.
- vi) **Veerakallu** : They are symbols of hero worship.
- vii) **Burrial grounds** : Vast areas of the hillocks are used as burrial groudns by people belonging to different religions.

1.4 Biodiversity

It is difficult to generalize the biodiversity of hillocks. Each hill has its own natural wealth. Studies on Madayi para alone has documented 38 species of grasses and 280 species of other plants of which 24 have medicinal values. 92 species of butterflies and 68 species of birds have also been recorded (Jaffer, 1998). There is abundant fodder for cattle. Green manure is available in plenty. The ritual performers of *theyyam* and *pooram* obtained the required

materials (flowers leaves etc.) from this land. Such a system of living existed in the mid-land of this region, the land of hillocks, valleys, paddyfields and streams. The system enriched by ecological diversity might be the reason for early inhabitation in the mid-land of this region (Padmanabhan et.al, 2002)

1.5 Provocation for the present study

Only a few and brief studies are available on the socio-economic aspects of the hillocks. Biodiversity of hillocks has been studied along with sociological and ecological importance. Padmanabhan et.al(2002) gives a comprehensive description of the historical, geological and ecological aspects of the hillocks. (Mid-land Laaterite Hills of North Kerala, an ecological Approach). Jaffer (1998) made a study of species diversity of Madayipara. The studies available on wetlands (Nalini Naik et.al, 2002) and that of sacred groves of this region (Jayarajan et.al, 2003) documented the relation of these habitats with hillocks. The study of biodiversity of Kalliassery (Sreedharan, 2001) gives an idea of the mid-land habitat.

The problems demanding our immediate attention is the threat which questions the very existence of the hillocks. It is nothing but mining activity. There is intense rock and soil mining going on in the mid-land of this region. This process is not checked by the authorities who seem to be not bothered of its after effect. The existing rules are openly violated. The local people are also not aware of the ecological impact. Hence this study is an attempt to draw the attention of the society to the grave mistake of the transformation of the

natural landscapes. The inadequacy of knowledge on the ecological importance, coupled with the vanishing traditional methods of agriculture poses a big threat to the mid-land hillocks. The study would also attempt site specific exercise in awareness development and capacity building in local community.

1.6 Objectives

Specific objectives of the preliminary study were,

- 1) To make a review of the available literature.
- 2) To collect secondary data from local bodies and other institutions.
- 3) To identify and map out the hillocks along Kavvayi river basin.
- 4) To get an idea of the demand for stones and soil.
- 5) To study the problem of the labourers.
- 6) To study the magnitude of damage caused by mining.
- 7) To know how laws are enforced.

1.7 Methodology

- 1) The entire portions of the river basin was visited and places were identified on the map. The hillocks were identified and marked.
 - 2) Problems were studied taking Aechilamvayal as typical example. Three group discussions were conducted in this spot with the help of voluntary organizations.
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- 3) Participated in three seminars on the problems of Kavvayi river basin.
 - 4) Participated in a workshop conducted by voluntary organizations as an initial step to protect Kavvayi water shed.
 - 5) Participated in a public meeting at Kuniyan.
 - 6) Held discussions with Municipal and Panchayath authorities of Payyanur and Karivellur.
 - 7) Held discussions with officials of Geology and Mining Department, Kannur.
 - 8) Census of Payyanur Municipality was examined as sample.
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2. STUDY AREA

Kavvayi river basin is situated in the former 'Kuvvoy' Taluk of Malabar Province. It was the northernmost taluk of Malabar. The capital of the Taluk was Kavvayi. William Logan named it as Kavvil City. He also named Kavvayi river as Ezhimala river which formed the northern boundary of Payyanur village. Payyanur is one among the 64 villages established by Parasurama for the settlement of Brahmins whom he brought to Kerala. According to the description of Ward and Conner (1906), the greatest length of Kavvayi Taluk was from East to West, 39 miles and its breadth, North to South, 16 miles. The whole perimeter measured 125 square miles. The land contained then 55 ½ square miles paddy fields, 5 square miles estuaries and rivers, 7 square miles occupied by houses and shops, 23 square miles of flat plains and the remainder by hills, mountains and forests (Ward and corner, 1906) According to a census of 1827 there were 83 individuals per square miles. But most part of the eastward area was mountainous, hilly and very thinly inhabited. The bulk of the population was confined almost to a space not exceeding twelve miles from the coast and lying parallel to the coast. Eastern hilly highlands then remained unoccupied. The capital city was composed of a few streets occupied by the 'Moplahs' (Muslim families) who were both merchants and cultivators. The Kavvayi river flowing to the west was broad and people crossed it by country boats and platforms tied to it. The importance of Kavvayi City continued upto the early 20th century (as evidenced by registration documents and postal covers). As surface transport became more established, the port town of Kavvayi lost its importance.

The surface of a great portion of the country is covered with laterite or pudding stone from which iron could be extracted (Ward and Conner, 1906). The higher hills towards east are composed of granite.

Kavvayi river is typical among the 14 mid-land originated rivers of Kasaragod and Kannur Districts. It has a watershed area confined to mid-land hillocks and their valleys. Hillocks are situated along its basin upto the western boundary of the mid-land. Initially Kavvayi river opened into the Lakshadweep Sea at the North-West point of Ezhimala. But later the river mouth became closed with sand barrier. As a result, the direction of the flow changed. It flows seventeen kilometers north parallel to the sea and opens into the sea at Thaikkadappuram. The former Kavvayi in the present Taliparamba Taluk. Abdul Samad et.al(1996) gives a comprehensive description of Kavvayi watershed as follows.

2.1 Location

The Kavvayi watershed is located between 12°05' to 12°15' North latitudes and 75°05' to 75°20' East longitudes. It is spread over the districts of Kannur and Kasargod. The boundary is formed by Hosdurg Taluk of Kasaragod in the North, Kannur and Taliparamba Taluk in the South, Hosdurg and Taliparamba in the East and the Lakshadweep Sea in the west. The watershed has a total area of 164.76 square km, covering 14 villages spread over 9 local bodies in the two districts.

Kannur District :

- Payyanur Municipality
 - Karivellur-Peralam Pachayath
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- Kankole-Alapadamba Panchayath

Kasaragod District :

- Pilicode Panchayath
- Cheruvathur Panchayth
- Kayyur-Cheemeni Panchayath
- Padne Panchayath
- Trikaripur Panchayth
- Valiyaparamba Panchayth.

2.2 Physiography

The Kavvayi river emerges from Cheemeni village at an elevation of 114 m above MSL near Velichamthodu at the North-Eastern portion of the watershed. The river flows to the Kavvayi backwaters at an elevation of less than 3 m. The general elevation ranges from 114 m to 85 m in the upper region, 68 m in the middle region to less than 3m in the lower region. Three streams coming from the north join the main stream. The upper and middle regions are gently sloping (3-5%) and lower region is very gently sloping (1-3%). The broad landforms of the upper region are upland laterites and of the middle region are mid-land laterites. The landforms of the lower region are subdued sand dunes and beaches.

2.3 Drainage

The Kavvayi watershed is drained by Kavvayi river, having a length of 31 km. The river is west flowing and its tributaries are Kankol stream, Vannathichal, Kuppithodu and Kuniyan stream. The

Marttalayi stream in the northernmost region join directly to the Kavvayi backwaters.

2.4 Geology

The major rock types of the upper region are Anthrosite and Dolerite and those of the middle region are Authorosite, laterite, sand stone and clay with lignite intercultation and Dolerite. The formations of the lower region are coastal sand and alluvium and sand stone and clay with lignite interactions.

2.5 Climate

Average annual rainfall in this region is 3226 mm. 2476 mm is received during south-west monsoon and 515 mm. during North-East Monsoon. The maximum, minimum and mean temperature are 32°C, 23°C and 27.5°C. respectively. The maximum temperature is experienced during the month of March and minimum during the month of December. The mean humidity is 78% at 8.30 hrs and 74% at 17-30 hrs.

2.6 Soil

Texture of the soil is gravelly clay with moderate surface gravelliness in the upper and middle regions and sandy in the lower region. Soil is generally well drained.

2.7 Land use

Nearly 90% of the upper and middle region is agricultural land, con-

sisting of mixed plantation and paddy. Rest of the area comes under waste land with or without scrub, and covered mainly by laterite. Such lands are at present widely used for mining laterite stones and soil. Nearly 80% of the lower region is agricultural land with mixed plantation. 15% is water body. Rest comes under wasteland. A considerable portion of the wasteland is occupied by mangrove vegetation.

3. LATERITE

Laterite stone was used as building material in Kerala for centuries. Ancient buildings like temples are examples. Its geological nature was described only later by Francis Hamilton Buchanan (1807), a medical officer of East India company from Angadipuram in Malappuram District of Kerala. He discovered a type of weathered material which was indurated clay, full of cavities and pores, containing large quantity of iron in the form of red and yellow ochre. It was soft when fresh and could be cut easily and when exposed, it became hard and resisted air and water much better than bricks. He used the term laterite to designate this material (laterite in Latin means brick stone). He defined it as "a residual product of weathering, rich in secondary oxides of iron and aluminium or both--nearly devoid of bases and primary silicates and commonly found with quartz and kaolin and developed in tropical or warm temperate climatic regions. It is capable of hardening after the treatment of wetting and drying and can be cut and used for bricks, and is brick red in colour". It is porous and shows vermicular structure. In vernacular, it is called as "chenkalu", "Ishtikkallu", "cheekkallu" etc.

Laterite is found in the region of mean annual temperature of 23 to 26°C and rainfall 1200 to 4000 mm and with the number of rainy months 8 to 10. Laterite can occur at every altitude from sea level to about 2500 m. A considerable area of the former cultivated land is covered by laterite. Plateaus formed are flat topped. Undulating and sloping plateau surface occur based on parental rocks. Laterite can be formed from any type of rock. Removal of top soil (alkaline upper horizon) creates an acidic environment which further accelerates the laterisation process.

Laterites are of two groups :

- 1) Primary laterite formed by aerial weathering, known as residual laterite.
- 2) Secondary laterite or detrital laterite formed by partial or complete consolidation of lateritic material.

Based on altitudes laterite has been classified as low level laterite and high level laterite (Grubb, 1973)

Distribution of laterite in Kerala is mostly confined to less than 600 m. altitude. They form low flat topped ridges and hills, between the foothills of western Ghats and Arabian sea. This region is included mainly under mid-land located from Malappuram to Kasaragod. (Thomas Varghese and Byju, 1993) . Vast stretches of laterite-capped hillocks are characteristic features of Kannur- Kasargod Districts. They are of 60 to 140m. Along the coast, hard laterite cover is exposed to marine terraces, which are also seen in southern region.

4. HILLOCKS OF KAVVAYI RIVER BASIN

Kavvayi river has got four main streams as tributaries, all rising from Cheemeni laterite earth belt. The river opens into Kavvayi backwaters (*Kavvayi Kaya*). Towards the northern part Mattalayi stream also joins the backwaters. Hence this stream is also included in the Kavvayi watershed area. Mattalayi stream arises from Kayyur region. Towards the upper side of the basin, there is an almost uniform laterite land with slight undulations. The middle part is well undulating with a number of hillocks on the two sides of each stream. Further lower, the basin is formed of wider paddy fields with streams transecting them and with hillocks on the two sides. Towards the coast only a few isolated hillocks are present.

The geological nature of the land is not specified in any of the revenue records. The uncultivated land is generally marked as wastelands. Almost the entire land is privately owned. A few plots are under the ownership of the Government. Some plots are the common property of the society. Eg: Theyyottukavu, Konginichal Kavvu, Paliyerikavu, Kottakkunnu etc. Settlers from South Kerala since nineteen fifties have occupied the cultivable areas since they got the land for very low price. Major portion of such lands have been converted into rubber plantations. Non-cultivable lands are the rocky areas. At present, the mining activities are found much profitable in such areas.

A preliminary survey could locate 75 hillocks in the Kavvayi river basin. This number is based on the local names of the land. Since the laterite bed is in the form of a continuous belt, there is chance for variations

in the local names and for their subdivisions. Only the original inhabitants, that too elderly persons know about the individual names of the hills. Five major sacred groves namely Nakravanam, Soolappukavy, Paliyerikkavu, Theyyottukavu and Konginichal Kavvu are located in this river basin. The positions of the hillocks have been marked in relation to the map of Kavvayi river basin (Land Use Board)

4.1 TYPES OF LATERITE HILLOCKS

Two type of laterite hills are seen in this region--laterite rock hills and laterite soil hills. The rock hills are covered by laterite rocks. The exposed laterite in contact with air is converted into hard black coloured rocks having uneven surface. According to Buchanan's description 'it looks like the skin of a person suffering from skin disease'. Beneath this surface, upto certain depth the laterite stone continues. As it goes deeper, the laterite becomes soft. Beneath it is clay. Such laterite rock hills generally have flat top surface. Vaipiriam and Velichamthody are examples. Such laterite belt of Kavvayi riverbasin from Cheemeni, Valichamthodu, Mathil and Vaipiriam region extends into the Aravanchal, Peringome and Padiyottuchal towards east, into Eramam region towards south and into Karinthalam region towards north. Plant growth is possible only in spaces among the laterites where a little soil remains. Usually the top surface is covered with grass, herbs, shrubs & some smaller trees. Rock pools and lakes are present on some of such hills. Eg: Madayi, Meenkulam, Peringome, Eramam etc. However such water bodies are not seen on the hills of the study area.

The laterite soil hill is comparatively at an early stage of metamorphosis in which the process of laterisation is not completed. There is no

rocky structure. The top as well as lower layers are formed of soil only. Surface consists of red laterite soil. After certain depth the soil becomes clayey. White clay remains at the bottom. On the surface of such hills, certain isolated blocks of laterite stones are also seen in some places. Pools are not seen on such hills. Water percolates to deeper layers at a faster rate. Such hillocks are present more towards the coastal area. Madikunnu, Kotholikunnu, Vettukunnu, Veethukunnu etc. are examples. Entire surface of such hills have been utilized for cultivation, leaving only government – owned land.

5. ECOLOGICAL IMPORTANCE OF THE HILLOCKS

Kavvayi river basin can be taken as a single ecological unit, the hillocks playing the basic role. UNEP has chosen the slogan "Water-Two, Billion People are dying for it!" for the last years' Environmental Day Celebrations. The issue of water-its quality and its guaranteed availability to all people regardless of income or social status is one of the most pressing challenges facing the world community today. Land transformations have brought about depletion of water in Kavvayi basin too. Even under these circumstances the local people are not aware of the scarcity of water.

Water availability is facilitated by the streams with hillocks along their sides. Many of the streams get dried up after rainy season. Yet underwater flow is maintained by the hills. The region gets 4000 mm of rain. The rain water percolates through porous laterite. The water mixed with biotic matter at the top becomes acidic. This removes the calcium deposits of the lower horizon, resulting in the formation of vacuities. The rain water is stored in these vacuities which form the underground reservoir of water.

There are 68 sacred groves in the mid-land region of Kavvayi river basin (Jayarajan et.al,2003). Most of them are in hill slopes. Some of them are large and conspicuous. *Nakravanam* of Kayyur is in the water shed area of Matalayi stream. *Soolappurkavu* and *Paliyerikkavu* are enriching Kuppithodu. *Theyyottukavu* is a major source of water for Kankol stream and *Konginichalkavu* enriches the *Vaipiriamchal*. *Theyyottukavu* is worth mentioning as a major sacred grove of Kerala having an extent of 60 acres or even more. The ecosystem diversity and species diversity have been

described in detail in the study on sacred groves by Jayarajan et.al.(2003). It is evidenced that the water holding capacity of the hill is increased multifold by the sacred groves. The sacred groves also add to the biodiversity of the hills. 246 species of macro flora from 83 families, 117 species of butterflies 8 species of spiders, 11 species of amphibians, 23 species of reptiles, 178 species of birds and 24 species of mammals have been identified from sacred groves alone. Of these, ten species belong to schedule I in the Wildlife (protection) Act 1972. To this list are to be added the species seen in other parts of the hillocks as mentioned earlier.

6. SOCIOLOGICAL IMPORTANCE

There is an old saying, which means 'the land not guarded by hills is a desert.' This indicates the awareness of our elder generation, of the importance of hills. Consequently many myths and legends have been developed. As one travels towards east from Payyanur, Aechilamvayal kunnu stands as the gateway to the hilly terrain located further east. There is a laterite cave called *Thiyyathimalika* which is a remnant of Megalethic culture. This is an evidence for the ancient inhabitation in the mid-land of North Kerala. The rock caves which are also seen in several other places were funeral centres. Koragas of Kasaragod district are still observing the tradition of keeping Menhirs and Alignments (*Nadukalluka*) on the graveyard.

The last centuries of Megalithic period was *Palamthamil* Period. This area was under the rule of Tamil Emporor Chera under his rule there were *Chittarasar* ruling local kingdoms. *Mooshakam* was such an ancient royal family. Ezhimala the hill at the coastal line was the capital of Mooshakam. The capital was shifted to *Pazhikunnu* (Madayi) during the rule of King Nannan. (Nair K.K., 1986). According to ancient Tamil literature, in Keral, there were five categories of land (Varier and Gurkkal1991). These *Ainthinai* were named after the most significant flora as *Kurinji* (mountains), *Palai* (arid land), *Mullai* (pastoral land), *Marutham* (riverine area) and *Neithal* (littoral/wetlands). This division was based on productivity. The hillocks represent *Mullai* and their valleys represent *Marutham*. Wild jasmin and 'Kayambu' are the representatives of *Mullai*.

7. EXPLOITATION AND DEGRADATION

Exploitation started with the beginning of settled life in the hill slopes of the mid-land. In the early periods impact of human activity on nature was limited. Initially man gathered food items and then firewood. Then he started collecting items for house building and utilized fodder as he required. He also found materials for agricultural activities on these hills. Agriculture was in a limited area. Selected items were cultivated on slopes. Some timber extraction and mining activities were present. As the rate of human interference increased, transformation became noticeable. Change in agricultural pattern cannot be neglected here. People attracted by cash crops turned into cultivation of areca nut, rubber etc. This brought about further laterisation of soil. By 1950's tapioca cultivation was introduced on the hills by settlers from the south. This resulted in intense soil erosion. Use of pesticides resulted in serious land and water pollution. At present Cheemeni region is subjected to intense pesticide pollution from plantations.

As the demand for land increased, houses were built on the hills especially on flat surface. Gradually buildings of shops and industries appeared on the hill tops. Hills provided space for many schools, colleges and government offices. Consequently the number of shops increased along the road side.

Latrite stone mining initiated a geological transformation. Initially this was limited to local use. Transportation was limited. But this increased as the demand for stone increased. As the rate of urbanization in the low land increased, the demand for building material also increased. As the

transport facility increased, more and more stones were transported to low-land. At present, the demand is going on increasing. Mechanised stone cutting makes the mining process fast and easier. Large scale laterite mining occurs in Vaipiriampkunnu in this area. The result is increased evaporation and soil erosion intensifying water scarcity.

The hillocks are at present in a phase of final disaster caused by the new method of soil mining from the hills. Upto about 1990 the rate of transformation of hillocks was gradual. But in the last decade the rate of exploitation exceeded what has happened for centuries. The mechanical and large scale method of laterite stone mining was followed by soil extraction. By this time, the demand for land in the coastal area increased multifold. Reclamation of wetland was intensified as the soil availability from the mid-land increased. By the introduction of large machines like JCB, the hillocks began to disappear at a fast rate. Construction of new roads and rails also increased the demand for soil.

Here there is simultaneous collapse of three eco systems – the hillocks, valleys and the wetlands. The entire hill disappears within a few days. The remaining topsoil with its biota and minerals is being lost and 'the surface area of earth itself gets reduced!'

The process of degradation was set in pace by the following reasons:

- 1) The development of coastal region is the first reason. The west coast railway line was doubled. More roads were constructed. The inflow of money facilitated the construction of new buildings. Consequently there was an increase in the demand for land. Naturally building materials also had increased demand.
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- 2) As the demand for land increased there was a tendency to reclaim the wetlands, especially mangroves and paddy fields.

The first impact of such a development on the hills was a sudden increase in the extraction of laterite rock and soil and their transport to the low land. Earlier, the mangrove lands were regarded as non-productive. Owners did not get any income from such lands. As the process of reclamation increased, the demand for such wet lands also increased. Reclamation of paddy fields was the next change. This was due to two reasons. Paddy cultivation met with heavy loss for the owner. Demand for land increased the price of paddy fields. Some of them started reclaiming their wetlands. Others sold them for higher price. This tendency led to the search for soil for filling the wetland. Naturally the hillocks became the focus. Meanwhile the facility for extraction and transportation increased. Trucks of new kinds and JCB were introduced in the field. Their number increased as the demand for soil from the low land increased. Initially there was strong protest against the stone cutting machines. But gradually they took over the role of labourers.

7.1 Interest of the land owners :

Owners get good prices for their *Kaipad* and paddy fields. They are happy in that they got money for their 'non-productive' *Kaipad* and for the paddy fields which they had to abandon due to loss in cultivation. Still others invested money for filling the wetlands converting them to coconut plantations. Later major part of such lands were used for building houses and business complexes.

7.2 Contractors' Interest :

Contractors are investing a good sum in the mining business because their profit is multifold. They are also owners of the mining machine and the transport system. They take up the contract of road construction. They dare to quote the work at a very low rate because they are aware of the soil availability at a cheaper rate. After getting the contract, they purchase some portion of a hill. This price may be attractive to the owner. But while considering the quantity of the soil extracted, the deed is highly profitable for the contractors. Also with the profit motivated mind, they give propaganda that they are standing for the well being of the local people by working hard for the developmental activities in the area. They claim that it is their effort that have brought about the formation of Kilometres of roads in the area. A prominent contractor in Payyanur claims that if he had not transported loads and loads of soil taken from the hills the new bustand would not have come up. He also claims that many labourers are not starving only because of the job opportunity in his contract work. According to him it is cruel to prevent the exploitation of hill by raising any kind of environmental problems.

Another contractor has recently bought five acres of land on *Aechilamvayalkunnu* in Payyanur Municipality area. He says that he had taken the contract of a road only because of the availability of soil in the nearby area. If not allowed to take soil from the plot he had bought, he could not finish the work of the road. This hill is contributing considerably to the Karimkuzhithodu which is a part of

Kavvayi river. The soil mining in this region will seriously affect the paddy fields and the wells in the valley. *Aechilamvayalkunnu* has been subjected to much mining activity in the last decade. A preliminary survey on its valley by interviewing elderly persons reveals that there is decrease in water level in the wells by such a short period as 10 years. A detailed survey is warranted.

7.3 Labourers and their problems

Many agricultural labourers have left their field and joined the laterite quarries or in soil mining. When we consider the quantity of stone or soil transported, the number of labourers are only very meagre. Most of the work is done by machines. In the case of laterite blocks loading and unloading is done by the labourers, but for soil transport, JCB and tipper lorries are used denying any opportunity for the labourers. These labourers, comparatively a few in number unitedly and arrogantly claim for the right of mining since it is their way of living.

7.4 Role of local people

The local people are almost ignorant of the ecological importance of the hills. Most of them are reluctant while being approached to present the problem before them. They are also interested in the conventional concept of development. People even now are under the impression that prosperity of Payyanur will increase when the Naval Academy at Ezhimala attains full fledged establishment, as they would get good transport facilities due to the urbanization of more and more areas.

7.5 Role of the government

The government are having complete control over the land including private property. Any kind of transformation made should be with the permission of the Government. But in real practice such regulations are overlooked by the society and the government departments seem to be reluctant in bringing such regulations into common practice. There are hard and fast rules regarding the reclamations as well as mining. Coastal Regulation Zone Act does not allow the reclamation of wetlands. There are rules preventing filling of paddy fields. According to Mining Act No.67 of 1957, mining should not be done without the permission of department of Geology and Mining. Vested interests find and take advantage of the loopholes in the rule. Much of the wetlands have been reclaimed in this way. The Government departments seem to neglect the transformation of paddy fields. The contractors should get license for mining. But in most places the activity is unauthorized. According to persons who do not want to disclose their names, official checking occurs very rarely and even if the quarry owners are found guilty the case ends in bribery. Above all these the local bodies have the power to take necessary actions on local issues. Any activity causing environmental hazards can be prevented by the Panchayath/ Municipality. But these bodies have their developmental issues. They depend on the stones and soil for the development activities and are hesitating to prevent the activity of mining.

8. AWARENESS BUILDING

While considering the ecological aspect mining in no way can be allowed because it directly affects the sustainability of the ecosystem. Here we are forced to think of an alternative. The society will be then constrained to restrict their need. We should ask ourselves, what is the quantity of laterite stones and soil required for the development. Considering the rate of population growth and the requirement, one could draw a conclusion that such enormous quantity of mining is not required. If we consider the situation ten years ago, the quantity of extraction was much less damaging. The present day large scale mining protects only the interest of the contractors who seem to be more influential on the government than the society in general. In order to overcome this situation, awareness building at various levels is required.

8.1 Contractors :

Contractors are actually aware of the ecological impact of mining. Most of them are educated and can understand the facts. But unfortunately they have made up their mind to follow the path of destruction since they are only profit-driven. Some of the small-scale contractors participated in the group discussions and asserted that they are not prepared to keep away from mining. Large scale contractors did not express their opinion in public.

8.2 Labourers :

Labourers participated in the discussions. But they had come prepared to support the contractors' opinion. They are concerned

only with their job opportunities. They are attracted by the better income. They support the JCB because it can move the soil in all seasons so that they get job throughout the year. They are not prepared to think of the manual labour opportunity in the absence of the machine. Those who are in the field do not think of the restricted number of persons getting the job and the reduction in the work load due to the use of JCB and tipper lorries. They seem to be mobbed by the contractors against any kind of environmental thought. They consider any person speaking against mining as their enemies. So there is risk in any attempt to create awareness among the labourers.

8.3 Government

The Panchayath/ Municipal authorities are aware of the environmental problems. But they cannot stop their development activities. They are looking forward for an alternative. Government officials do not take interest in any such campaign as awareness building.

8.4 Public

Many are aware of the environmental problems. But they are not taking any initiative in any kind of awareness building effort. Only a few persons took part in the first meeting. By the third meeting, there was more participation, and they started expressing their opinions. Generally they are against mining. The contractors threaten them of the increase in price of the soil if mining is not allowed in the nearby hills. In this case a thorough groundwork is necessary to mobilize public opinion.

CONCLUSIONS

The major problem is the concentration of development activities in the low-land region. The process of urbanization here is rapid. As a result many institutions have their buildings constructed by reclaiming the wetlands. People from mid-land and highland travel to these places for various purposes. This demands further expansion of roads and buildings. If such institutions are built on the mid-land, there will be lesser environmental problems. People from coastal region can go to mid-land also. In order to conceive such ideas, there require a change in the concept of development. In order to reduce the demand for soil, the wet land reclamation should be completely stopped. Awareness should be created in this direction.

If the mining activity is to be continued at a moderate and slow rate as the immediate choice before us, from where the mining is to be done is the next question. Here one can think of sustainable utilization as the last resort. Mining should be done only in such places where it will not cause considerable damage. Those hills in the proximity of the low land should be left undisturbed. Such isolated hills when subjected to mining will cause considerable damage. So the activity should be shifted to further east where the hillocks are in the form of continuous laterite bed with falt top. Contractors prefer the former ones like *Aechilamvayalkunnu* because of their proximity, due to which profit will be much higher. So pressure must be built up at all levels to restrict the mining required if any to such places where the watershed will not be affected due to soil erosion. This may require policy change. In order to effect this, there requires massive public opinion which can be built up by a rigorous awareness building programme.

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HILLOCKS OF KAVVAYI RIVER BASIN

I Mattalayi Stream

- | | | |
|------------------------|----------------------|------------------|
| 1. Kayyur | 2. Klayikod | 3. Muzhakom |
| 4. Konnakkara | 5. Venmalam | 6. Chembra Kanam |
| 7. Thazhe Chembrakanam | 8. Kunnumkinattukara | |
| 9. Pala | 10. Nhanamkai | 11. Madikkunnu |
| 12. Kotholikkunnu | 13. Vettukunnu | 14. Veethukunnu. |

II. Kuniyan Stream

- | | | |
|--------------------|------------------|------------------|
| 15. Cheemenikkunnu | 16. Kunhippara | 17. Valiaparambu |
| 18. Anikkadi | 19. Kannadippara | |

III.

Kuppithodu

- | | | |
|------------------|-----------------|-----------------------|
| 20. Plantation | 21. Chembra | 22. Cheemenikkunnu(2) |
| 23. Vengappara | 24. Vallikkadu | 25. Nedumba |
| 26. Thengappara | 27. Kannamkai | 28. Nellikkunnu |
| 29. Padikeel | 30. Vellachal | 31. Kodakkad |
| 32. Olattakkunnu | 33. Chedikkunnu | |

IV Vannathichal

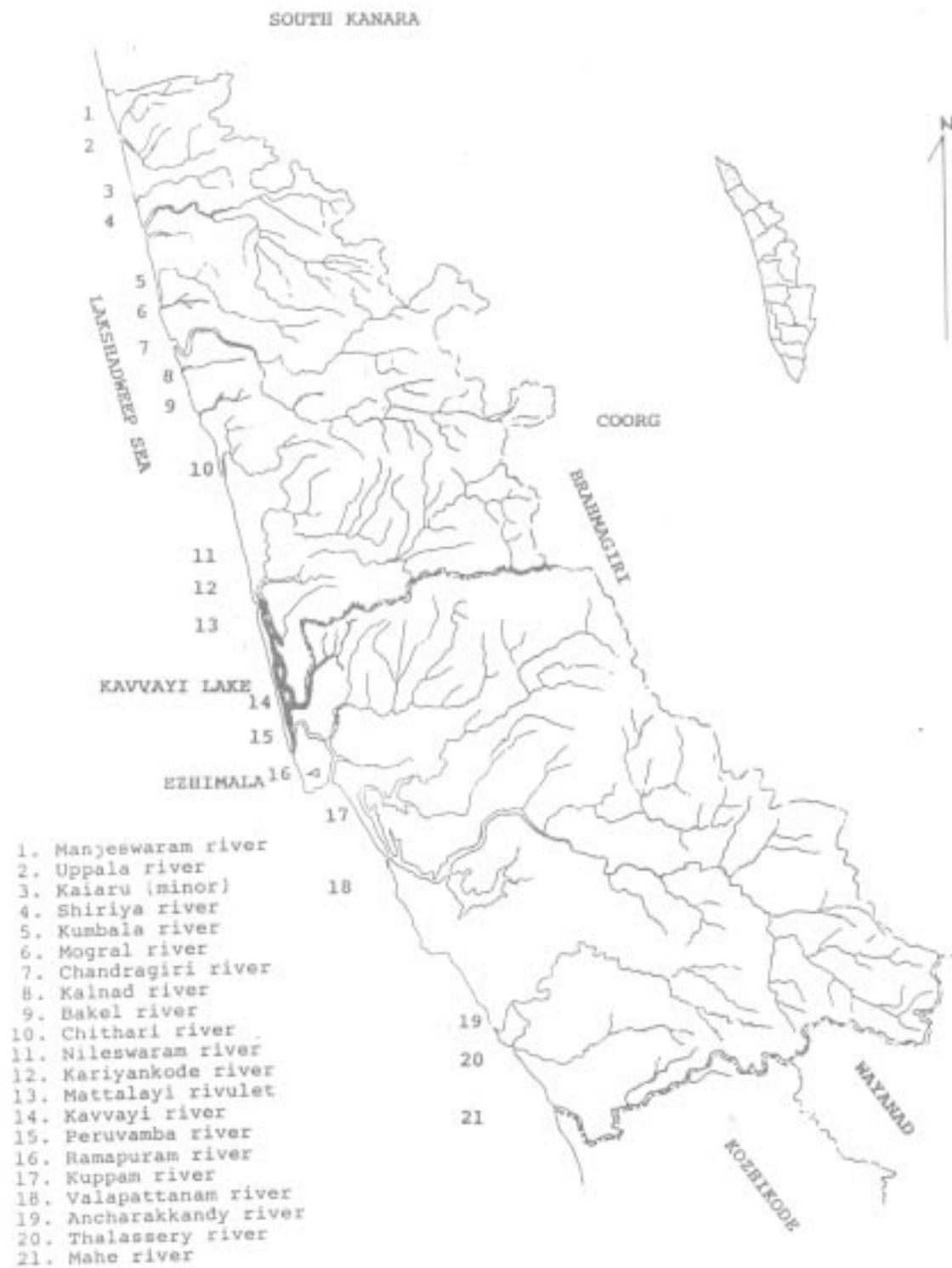
- | | | |
|-------------------|--------------------|---------------------|
| 34. Norman | 35. Vannathikkanam | 36. Ondum |
| 37. Meethalepoyil | 38. Valia Poyil | 39. Karuvathodukana |
| 40. Oyolam | 41. Puthur | 42. Kadayilekkavu |
| 43. Swamimukku | 44. Vareekakavu | 45. Kozhummal Mundy |
| 46. Kottakunu | 47. Navoolkunnu | |

V Kankol Stream

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|-------------------------------|-------------------------|---------------------|
| 48. Nallur para | 49. Kathirkodu | 50. Theyyarmada |
| 51. Peethodu | 52. Velichamthodu | 53. Chekkiyarpu |
| 54. Kariyappu | 55. Parakkadavu | 56. Kililadam |
| 57. Choorikkunnu | 58. Adiyarkallu | 59. Koovachalthattu |
| 60. Payyam | 61. Kootappana | 62. Pullyammanni |
| 63. Vadasseri | 64. Kundyathattil Odi | |
| 65. Kappattuchal Kunnu | 66. Papparatta | 67. Pranthanchal |
| 68. Alakkulathu para | 69. Mappidikunnu | |
| 70. Kasipuram | 71. Chudalapparakunnu | |
| 72. Alakkad Mangalamchalkunnu | 73. Mangalam Chal East | |
| 74. Managalamchal South | 75. Aechilamvayal Kunnu | |
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RIVERS OF KANNUR AND KASARAGOD DISTRICTS

(MAP NOT TO SCALE)



ISOHYETAL

(MAP NOT TO SCALE)



**A SOCIO–CULTURAL AND ECOLOGICAL
STUDY OF THE MID–LAND
LATRITE HILLOCKS ALONG KAVVAYI RIVER BASIN**

Prof. M. Jayarajan.

ABSTRACT

Presence of mid-land laterite hillocks is a unique feature of North Kerala. Laterite is a peculiar type of soil formation. Lack of environmental awareness has resulted in such geographical formations being considered as waste lands. Kavvayi river basin is a good example for such landscapes. The river basin is located between 12° 05' to 12° 15' North latitudes and 75° 05' to 75° 20' East longitudes.

Padmanabhan et.al (2002) cites Sangham Literature as evidence for the opinion that human settlement in this region started in the mid-land. The rich biodiversity and water availability of the mid-land supports this view. Kamalakshan. K (2003) explains the water availability from laterite in his study of 'Surangams'. Many hills are offered sacredness due to the presence of sacred groves or other worship spots. Each hill has its own type of natural wealth.

Only a few and brief studies are available on the socio-economic aspect of the hillocks. The problem demanding our immediate attention is the mining activity in this region. This proper study points towards the necessity for an awareness development programme in order to protect the hillocks.

The geological nature of the laterite was first described by Francis Buchanan(1807) even though it was in common use in the earlier periods. Laterite is found in the region of mean annual temperature of 23 to 26°C and the rainfall of 1200 to 4000 mm. Removal of top soil creates an acidic environment which further accelerates laterisation process. In Kerala laterite is distributed mainly from Malappuram to Kasargod districts. It forms the surface layer of mid-land hillocks.

A preliminary survey could locate 75 prominent hillocks in the mid-land region of Kavvayi river basin. There are two types of them. Towards the west, they are in the form of laterite soil hills and towards east they are in the form of laterite rock hills. The entire surface of the soil hill is utilised for cultivation. Laterite rock covers the rock hills. Rock pools are present on such hills.

The porous nature of the laterite increases the water holding capacity of the hillocks. Such hillocks form the water shed area of the Kavvayi river along with those of the other 13 mid-land originated rivers of Kannur and Kasaragod. The 68 sacred groves present on the hill slopes of Kavvayi basin further enriches the tributaries of the river. They are also centres of biodiversity.

The former social activities were centred on the hills. ***Ezhimala*** was the capital of 'Mooshakam'. During the period of King Nannan the capital was shifted to ***Pazhikunnu (Madayippara)***.

The activities of the original inhabitants of this region did not bring about much transformation of the landscape. But as the population increased due to immigration, cultivation was extended. This resulted in soil erosion and further laterisation. As the demand for laterite increased, machines like JCB and modern trucks were introduced. Mechanised mining of stone and soil speeded up the disaster. Laterite stone is transported to distant low land for construction work. Soil extracted is mainly used for reclamation of paddy fields and coastal wetlands. The whole process has resulted in the simultaneous collapse of three ecosystems namely the hillocks, paddy fields and coastal wet lands.

The water source and biodiversity of hills are lost for ever. The valleys experience scarcity of water. The coastal wetland ecosystem when filled, loses its buffering capacity as flood plains. The entire society has to face the consequence. The monetary benefit goes to the contractors. Job opportunity for the labourers is very meager since machines are used.

Local people are reluctant due to lack of ecological awareness. They are after urbanization. They do not even think of the consequence of mining which results in the disappearance of hillocks one by one. The government departments seem to be least interested in bringing the regulations into practice, even though there are hard and fast rules regarding mining as well as reclamation activities.

In order to overcome such a situation, awareness building at various levels is required. The contractors as well as the labourers even though minority have their selfish motives. The government officials seems to be least interested in resource conservation. Local people do not take initiative in studying the problems. Mining activities should be minimised and restricted to selected places where there will be minimum soil erosion. Paddy fields and coastal wetlands in no way should be allowed to be reclaimed further. Awareness should be created in this direction.
