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ARTICLES

சங்க இலக்கியத்தின் ஐந்திணை மரபுசார் சூழலியல் அறிவும் ஈரோடு மாவட்டத்தின் உள்ளூர் அறிவு மரபுகளும்: களஆய்வு மற்றும் புவியியல் தகவல் அமைப்பு (GIS) அடிப்படையிலான ஒப்பிட்டு மதிப்பீடு

Traditional Ecological Knowledge of the Five Landscapes in Sangam Literature and Local Knowledge Traditions of Erode District: A Field-Based and GIS-Assisted Comparative Assessment

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ABSTRACT

The five-fold classification of landscapes in Sangam literature is not merely a poetic tradition; it is an ancient Tamil ecological classification that views land, season, living organisms, occupations, food and water as an interconnected whole. This paper proposes a research framework for identifying and assessing the traditional ecological knowledge embedded in this classification by comparing it with the local knowledge systems of farmers, pastoralists, hill communities and water-dependent livelihood groups in present-day Erode District. Ecological references from 40–60 selected poems of four Sangam anthologies – Kuruntokai, Natrinai, Akananuru and Ainkurunuru – are classified by landscape. The Sathyamangalam–Thalavadi–Bargur hills, the pastoral villages of Anthiyur–Bargur, the Cauvery–Bhavani and Lower Bhavani irrigation regions and rainfall-deficient areas are proposed as comparative field sites, where semi-structured interviews, direct observation, seasonal calendars and participatory mapping will be conducted with 30–40 knowledgeable informants in 6–8 villages and integrated with GIS layers of elevation, slope, soil, land use, water resources and rainfall. The central argument is that Sangam-period geography cannot be "verified" from present-day landscapes, but similarities and differences can be "assessed" from available evidence; each comparison is therefore classified as "corresponds", "partially corresponds", "differs" or "insufficient evidence". Because Erode is landlocked, Neithal is treated only as a comparative component, not as a field site. The distinctive feature of the study is the integration of four forms of evidence – literary evidence, local knowledge, field observation and GIS data – around the same ecological component.

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ஆய்வுச் சுருக்கம்

சங்க இலக்கியத்தின் ஐந்திணைப் பகுப்பு வெறும் கவிதை மரபு அன்று; நிலம், பொழுது, உயிரினம், தொழில், உணவு, நீர் ஆகியவற்றை ஒருசேரப் பார்க்கும் ஒரு பழந்தமிழ்ச் சூழலியல் வகைப்பாடு. இக்கட்டுரை அந்த வகைப்பாட்டில் பொதிந்துள்ள பாரம்பரிய சூழலியல் அறிவை, இன்றைய ஈரோடு மாவட்ட விவசாயிகள், கால்நடை வளர்ப்போர், மலைவாழ் சமூகத்தினர், நீர்நிலை சார்ந்த வாழ்வாதாரக் குழுக்கள் ஆகியோரின் உள்ளூர் அறிவுமரபுகளோடு ஒப்பிட்டு மதிப்பிடுவதற்கான ஒரு ஆய்வுச் சட்டகத்தை முன்வைக்கிறது. குறுந்தொகை, நற்றிணை, அகநானூறு, ஐங்குறுநூறு ஆகிய நான்கு தொகை நூல்களிலிருந்து தேர்ந்தெடுக்கப்படும் 40–60 பாடல்களின் சூழலியல் குறிப்புகள் திணைவாரியாக வகைப்படுத்தப்படுகின்றன. சத்தியமங்கலம்–தாளவாடி–பர்கூர் மலைப்பகுதிகள், அந்தியூர்–பர்கூர் மேய்ச்சல் கிராமங்கள், காவிரி–பவானி மற்றும் கீழ்பவானிப் பாசனப் பகுதிகள், மழைக்குறைவுப் பகுதிகள் ஆகியவை ஒப்பீட்டுக் களங்களாக முன்மொழியப்படுகின்றன. 6–8 கிராமங்களில் 30–40 அறிவுசார் தகவலாளர்களிடம் அரைக்கட்டமைக்கப்பட்ட நேர்காணல், நேரடிக் கவனிப்பு, பருவகால அட்டவணை, மக்கள் பங்கேற்பு வரைபடம் ஆகியவை மேற்கொள்ளப்படும். களப்புள்ளிகள் உயரம், சரிவு, மண், நிலப்பயன்பாடு, நீர்வளம், மழை ஆகிய GIS அடுக்குகளுடன் இணைத்து ஆராயப்படும். இக்கட்டுரையின் மையக் கூற்று: இன்றைய நிலப்பரப்பைக் கொண்டு சங்ககால நிலவியலை "உறுதிப்படுத்த" இயலாது; ஆனால் ஒற்றுமைகளையும் வேறுபாடுகளையும் ஆதாரங்களோடு "மதிப்பிட" இயலும். அதனால் ஒவ்வொரு ஒப்புமையும் "ஒத்துப்போகிறது", "பகுதியளவு ஒத்துப்போகிறது", "வேறுபடுகிறது", "போதிய ஆதாரம் இல்லை" என்ற நான்கு நிலைகளில் வகைப்படுத்தப்படுகிறது. ஈரோடு கடற்கரையற்ற மாவட்டம் என்பதால் நெய்தல் நேரடிக் களமாகக் கொள்ளப்படாமல் ஒப்பீட்டுக் கூறாக மட்டுமே வைக்கப்படுகிறது. இலக்கியச் சான்று, உள்ளூர் விளக்கம், களக் கவனிப்பு, GIS தரவு என்ற நான்கு ஆதாரங்களை ஒரே சூழலியல் கூறின்மேல் இணைப்பதே இவ்வாய்வின் தனித்துவம்.

திறவுச் சொற்கள்: ஐந்திணை; பாரம்பரியச் சூழலியல் அறிவு; கொங்கு நாடு; ஈரோடு மாவட்டம்; புவியியல் தகவல் அமைப்பு (GIS); சூழல் இலக்கியத் திறனாய்வு

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1. Introduction

The Sangam poets did not see land merely as a backdrop. The *kuriñci* that blooms on the hill slope, the *koṉṟai* that flowers in the rainy season, the *vāḷai* fish that leaps in the paddy field, the bark of the *yā* tree that the elephant strips in the parched wilderness – for them these were not only similes for a state of mind; they were signs that identified time and place. When a flower was seen, the season was known; when the behaviour of an animal was observed, the place where water lay was known. This is what present-day ecological anthropology calls "Traditional Ecological Knowledge" (TEK).

Over the past few decades, attempts in Tamil scholarship to read the *tiṇai* theory from an ecological perspective have multiplied. Most of them, however, focus on the text alone. Very few studies go into the field to test where the knowledge stated in the poems agrees with, and where it departs from, the knowledge of people living today. Likewise, field studies documenting local knowledge rarely use Sangam literature as a comparative yardstick. There is a gap between these two fields. Erode District is a suitable setting in which to fill it. Within a single district lie, side by side, the eastern slopes of the Western Ghats, pastoral forest-fringe villages, the river-irrigated fields of the Cauvery and Bhavani, and dry lands with low rainfall. Sites such as Kodumanal, which have yielded

archaeological evidence of the Sangam period, are also in this district. It is a landscape where literature, history and present-day life meet.

This paper does not attempt to "discover" Sangam-period geography on a present-day map. Over two thousand years, forests have shrunk, rivers have been regulated by dams, and crops and animals have changed. The study therefore avoids the term "geographical verification" and adopts the term "comparative assessment". Its aim is to assess, with evidence, how far traces of Sangam knowledge are visible in today's landscape, and how landscape and livelihood account for their being visible.

2. The Tiṇai Theory and Traditional Ecological Knowledge

2.1 The Tripartite Scheme of Tolkappiyam

The grammatical basis of the *tiṇai* theory lies in the *Akattiṇaiyiyal* of the *Poruḷatikāram* of *Tolkappiyam*, which divides the elements of a poem into three – primary (*mutal*), native (*karu*) and proper (*uri*):

முதல் கரு உரிப்பொருள் என்ற மூன்றே

நுவலுங் காலை முறைசிறந் தனவே

பாடலுள் பயின்றவை நாடுங் காலை

When one examines what is employed in poems,

the three – the primary, the native and the proper elements –

stand, when stated, in excellent order.

— Tolkappiyam, Porul., Akam. 3

The primary element (*mutaṟporuḷ*) is land and time. The native elements (*karupporuḷ*) are the deity, food, animals, trees, birds, drum, occupation, lute and so on proper to that land. The proper element (*uripporuḷ*) comprises the modes of love: union, waiting, sulking, lamenting and separation. Viewed ecologically, the primary and native elements together define a complete ecosystem: which plants grow in which land, which animals live there, what work people do and what they eat are all shown as interconnected components. The aphorism that enumerates the four lands indicates the nature of each with concise epithets:

மாயோன் மேய காடுறை உலகமும்

சேயோன் மேய மைவரை உலகமும்

வேந்தன் மேய தீம்புனல் உலகமும்

வருணன் மேய பெருமணல் உலகமும்

முல்லை குறிஞ்சி மருதம் நெய்தலெனச்

சொல்லிய முறையாற் சொல்லவும் படுமே

The forest world dear to Māyōṉ, the world of dark-clouded hills dear to Cēyōṉ,

the world of sweet waters dear to Vēntaṉ, the world of wide sands dear to Varuṇaṉ –

these are also named, in the order given, Mullai, Kurinji, Marutham and Neithal.

— Tolkappiyam, Porul., Akam. 5

"The forest world", "the world of dark-clouded hills", "the world of sweet waters", "the world of wide sands" – each of these compresses the primary ecological character of a land into a single phrase. Forest, cloud-wrapped hills, sweet water and wide sand are remarkably close to the criteria that geographers use in land classification today: vegetation cover, elevation, water resources and the nature of the soil.

2.2 Palai: A Fixed Land or a Transformed Land?

A notable feature of *Tolkappiyam* is that it names only four lands and does not designate *Palai* as a separate land. The idea that *Palai* has no land of its own is clearly expressed in the *Kāṭukāṇ kātai* of *Silappatikaram*:

முல்லையும் குறிஞ்சியும் முறைமையில் திரிந்து

நல்லியல் பிழந்து நடுங்குதுய ருறுத்துப்

பாலை என்பதோர் படிவங் கொள்ளும்

When Mullai and Kurinji depart from their proper order,

lose their gracious nature and inflict trembling distress,

they take on the form that is called Palai.

— *Silappatikaram, Katukan Kathai*

That is, the form of *Palai* appears when *Mullai* and *Kurinji* lose their nature under fierce sun. This is a very important methodological caution for the present study. *Palai* is not a fixed geographical unit; it is a change of state. Identifying an area that looks dry today as "Sangam *Palai*" is therefore wrong at the level of theory itself. The appropriate approach is instead to compare the seasonal dynamics of drought and the ways in which people adapt to it.

2.3 Previous Studies Reading the Tiṇai Ecologically

When A. K. Ramanujan translated Sangam *akam* poems into English (1967; 1985), he explained, through the concept of the "interior landscape", how land functions as a symbolic language of states of mind. George Hart (1975), Kamil Zvelebil (1973) and Takanobu Takahashi (1995) examined in detail the grammatical and aesthetic structure of the *tiṇai* tradition. These studies viewed land primarily as a poetic symbol.

Later studies by scholars such as Nirmal Selvamony presented the *tiṇai* as a complete socio-ecological system, that is, as a theory of "*tiṇai* ecology", in which human beings, other living beings, land and deity function interdependently. Ecocriticism in Tamil has grown through readings of this kind.

2.4 Traditional Ecological Knowledge: A Theoretical Framework

Fikret Berkes (1999) defines traditional ecological knowledge as a cumulative body of knowledge, practice and belief about the relationships of living beings with one another and with their environment, handed down through generations by cultural transmission and continually evolving through adaptation. Two elements of this definition are important for the present study. First, TEK is not only knowledge but also practice and belief. Second, it is not a frozen tradition but a living one.

In the Indian context, Madhav Gadgil and Ramachandra Guha (1992) studied the resource-management traditions of forest, pastoral and water-dependent communities. Gadgil, Berkes and Folke (1993) emphasised the role of local knowledge in biodiversity conservation. The People's Biodiversity Registers prepared at panchayat level by the biodiversity boards are state-supported efforts to document such knowledge.

2.5 The Research Gap

The two traditions described above have so far largely operated separately. Literary scholars remain within the text; field researchers rarely take up literature for comparison. A methodology that brings literary reference, local oral explanation, direct field observation and spatial (GIS) data to bear on a single ecological component has not yet been fully developed in Tamil. In particular, no such comparison has been carried out with a focus on a specific region such as the Kongu region. The present study targets exactly this gap.

3. The Study Area: Erode District

3.1 Physical Setting

Erode District is a landlocked inland district in the middle of the Kongu region. In its north-western part, where the Western and Eastern Ghats meet, rise the Sathyamangalam, Thalavadi and Bargur hills. A large part of this area now falls under the Sathyamangalam Tiger Reserve. Thalavadi is an upland plateau adjoining the Karnataka border.

Descending south and east from the hills, the land turns into an undulating plain. The Bhavani River flows from west to east and joins the Cauvery at Bhavani town. The Cauvery forms the district's eastern boundary. The Moyar flows through the forest into the Bhavanisagar reservoir, and the Noyyal River touches the southern part of the district. The district administration's profile identifies the Cauvery–Bhavani water resources and the forest areas as hallmarks of the district.

Within a small geographical area, this setting produces four distinct ecological zones: hills, forest fringe, river-irrigated plain and rain-fed dry land. This is a rare opportunity for *tiṇai* comparison.

3.2 The Tradition of Water Management

The agricultural history of Erode is the history of water management. The Kalingarayan canal, believed to have been cut from the Bhavani River in the thirteenth century by the Kongu chieftain Kalingarayan, is still used for irrigation. The Bhavanisagar dam, built in the mid-twentieth century, and the Lower Bhavani Project canal that starts from it have turned a large part of the district into irrigated land growing paddy, sugarcane, turmeric and banana. The Erode turmeric market owes its fame to this.

At the same time, in uplands beyond the reach of the canals, open wells, tanks, ponds and small pools (*kuṭṭai*) are the only water sources. The *kavalai* method of lifting water from wells with bullocks was a distinctive feature of Kongu agriculture. Although it has largely been replaced by electric pumps, the words and memories associated with it are still alive among elderly farmers. Such "disappearing knowledge" is one of the documentation targets of this study.

3.3 Communities and Livelihoods

Indigenous communities, including the Sholagar and Urali, live in the hill areas, and other communities, including the Lingayats, live in the Thalavadi–Bargur areas. Their lives are interwoven with millet farming, the collection of minor forest produce and animal husbandry. The "Bargur cattle", named after the Bargur hills, are recognised as a distinct indigenous breed – direct field evidence for comparison with the *Mullai tiṇai*.

On the plains there are many livelihood groups: irrigation farmers, dryland farmers, goat and cattle herders, river fishers and weavers. Inland fishing takes place in the Bhavani and Cauvery rivers and in the reservoirs. This is important for comparison with *Neithal*, but, as we shall explain later, it is not "equivalent" to *Neithal*.

3.4 Historical Connection: Kodumanal

The archaeological site of Kodumanal, on the bank of the Noyyal near Chennimalai in Erode District, links the region directly with the Sangam age. Excavators identify it as the "Koṭumaṇam" mentioned in *Patirruppattu* as a town famed for the production of ornaments. According to K. Rajan, beads, evidence of iron smelting and potsherds bearing Tamil-Brahmi inscriptions have been found there (Rajan, 1994). This evidence shows that the world spoken of in Sangam literature was not alien to this land. Nevertheless, the existence of an archaeological connection alone does not allow the conclusion that today's local knowledge has continued unbroken from the Sangam age. This study observes that distinction carefully.



Figure 1. The diversity of Erode District: physical setting, water-management tradition, indigenous and community livelihoods, and the archaeology of Kodumanal (infographic; labels in Tamil)

Figure 1 sets out four key themes in clear illustrations: the physical setting of Erode District, its water-management tradition, indigenous and community-based livelihoods, and the archaeological history of Kodumanal. It conveys the diversity of the Kongu region.

4. Objectives of the Study

1. To classify, by *tiṇai*, the ecological knowledge contained in selected Sangam poems.
2. To document the knowledge traditions of Erode District relating to soil, water, agriculture, livestock and climate.
3. To examine the similarities, differences and contexts of use between literary references and the knowledge recorded in the field.
4. To compare field records with land use, soil, water resources, elevation and rainfall data through GIS.
5. To develop recommendations for conserving local knowledge and using it in environmental education.

5. Research Approach

The study follows a mixed methodology integrating three approaches: literary analysis, ethnographic fieldwork and spatial analysis. The ecological records of selected Sangam poems are analysed, and local knowledge is gathered through fieldwork in selected villages of Erode District. At the outset, 40–60 poems, 6–8 villages and

30–40 knowledgeable informants are envisaged. The final sample size will be fixed on the basis of data saturation in the field, the scope of the study and practical feasibility. Spatial data will be compared, where necessary, through mapping and GIS-based analysis.

5.1 Literary Analysis

Selection of poems: poems dense in ecological elements will be selected by purposive sampling from *Kuruntokai*, *Natrinai*, *Akananuru* and *Ainkurunuru*, ensuring a roughly equal number of poems for each *tiṇai*. Because *Ainkurunuru* is compiled in sets of one hundred poems for each *tiṇai*, each by a single poet (*Marutham* – Orampokiyar; *Neithal* – Ammuvanar; *Kuriṉji* – Kapilar; *Palai* – Othalanthaiyar; *Mullai* – Peyanar), it provides a uniform basis for comparison across *tiṇai*s.

Method of recording: for each ecological reference, the following details will be recorded in a data table: text, poem number, poet, *tiṇai*, *tu̲rai* (situation), edition used, the explanation of the old commentator, the original word, the type of reference (plant, animal, soil, water, season, occupation, food), its present-day scientific identification (where possible) and the degree of certainty of the identification. Because the scientific identification of Sangam plant names is disputed in many cases, it will be marked at three levels: "certain", "probable" and "doubtful".

Function of the reference: whether a reference occurs in the poem as a simile, as an implied meaning (*uḷḷu̲rai*) or as a direct description of the landscape will also be recorded. An animal behaviour used for an implied simile may or may not also be an ecological observation. If this distinction is ignored, there is a danger of misreading a poetic convention as a direct scientific statement.

5.2 Fieldwork

- **Semi-structured interviews** with elderly farmers, herders, knowledgeable elders of hill communities, irrigation turn-keepers, fishers and traditional healers. Women's knowledge (seed saving, food processing, knowledge of wild greens) will be recorded with particular care.
- **Direct observation** of practices such as sowing, harvesting, grazing movements and water distribution, season by season.
- **Seasonal calendars:** a participatory method in which people themselves draw and explain the Tamil months, the rainy season, flowering times, cropping seasons and grazing seasons.
- **Participatory mapping:** villagers themselves draw their land – grazing places, water bodies, groves and soil types.

A key rule: oral statements and directly observed practices will be recorded separately. "In my grandfather's time they used to do it this way" is a memory record; seeing someone do it today is a practice record. Both are valuable, but they carry different evidential weight.

5.3 Spatial Recording and GIS Comparison

GPS points of consented field locations will be collected and linked with the relevant ecological details (vegetation type, type of water body, soil type, land use). They will then be overlaid in the open-source GIS software QGIS with the layers listed in Table 1.

Table 1.GIS layers, possible data sources and their use in the comparison

Layer	Possible data source	Use in the comparison
Elevation, slope	SRTM / Cartosat DEM	Differences in slope between Kurinji, Mullai and Marutham

Layer	Possible data source	Use in the comparison
Land use, land cover	NRSC Bhuvan LULC; Sentinel-2	Classification of forest, pasture, irrigated field and fallow
Vegetation greenness	Sentinel-2 / Landsat NDVI (several seasons)	Seasonal change in greenness; drought stress
Soil	NBSS&LUP soil maps; district soil health cards	Comparison with local soil terms
Water resources	Network of rivers, canals, tanks and ponds (government maps and field records)	Access to irrigation; seasonality of water bodies
Rainfall	IMD gridded data; CHIRPS	Rainfall variability; selection of drought areas

These are only "possible" sources; the final choice depends on data resolution, access permission and year. GIS is not used here as a "tool of proof"; it is only a "tool of contextual explanation" that shows in which ecological conditions the field records cluster.

5.4 Evidence Assessment Scale

Each comparison will be classified into one of the four levels in Table 2.

Table 2. The four-level evidence assessment scale

Level	Meaning	Evidence required
Corresponds	The literary reference and the local knowledge are essentially the same	Literature + oral account + observation; GIS context not in conflict
Partially corresponds	One element matches; another has changed	At least two sources in agreement
Differs	Local knowledge runs contrary to the literary reference	Field evidence for the difference
Insufficient evidence	The data needed for comparison are not available	–

"Insufficient evidence" should not be regarded as a failure. The purpose of the scale is to show openly what cannot be stated with certainty.

5.5 Triangulation

The strength of the study lies in linking a single ecological component with four sources: literary evidence, local explanation, field observation and GIS data. For example, a reference to water management in *Marutham* can be compared with (a) the wording of the poem, (b) the explanation of water distribution given by farmers in the Lower Bhavani irrigated area, (c) the practice observed on the day the canal sluice is opened and (d) the map of the irrigation network. If all four point in the same direction, the correspondence is strong; if they conflict, that conflict is itself a research finding.



Figure 2. Research methodology: a mixed-methods design combining literary analysis, ethnographic fieldwork and spatial analysis (infographic; labels in Tamil)

Figure 2 shows the mixed-methods research design built by combining literary analysis, ethnographic fieldwork and spatial analysis. It also presents, in a simple vector design, the sample sizes and the Sangam texts used.

6. Tiṇai-wise Analysis of the Literary Evidence

This section takes a few sample poems from each *tiṇai* and brings out the ecological knowledge they contain. They are not a complete corpus but prototypes for generating hypotheses to be tested in fieldwork.

6.1 Kurinji: Flowering, Honey and Millet Fields

The most celebrated poem of the *Kurinji tiṇai*, by Devakulathar:

நிலத்தினும் பெரிதே வானினும் உயர்ந்தன்று

நீரினும் ஆரளவு இன்றே சாரல்

கருங்கோல் குறிஞ்சிப் பூக்கொண்டு

பெருந்தேன் இழைக்கும் நாடனொடு நட்பே

Greater than the earth it is, loftier than the sky,

beyond all measure deeper than the waters –

my bond with the man of the hill country,

where on the slopes the bees build great honeycombs

from the blossoms of the dark-stemmed kuriñci.

— Kuruntokai 3

To express the measure of her love, the heroine describes the hero as a man of the land where, on the hill slopes, bees build great honeycombs from the flowers of the dark-stemmed *kuriñci*. The poem contains three ecological observations: the *kuriñci* is a plant of the slopes (*cāral*); its stem is dark; and its flowering is directly linked with honey production. That the *kuriñci* (*Strobilanthes* species) flowers gregariously once in many years, and that honey becomes abundant at that time, is a fact known to present-day botany. The word *peruntēṉ* ("great honey") may be read as pointing to this abundance in the flowering season.

Field hypothesis: do the hill communities of Sathyamangalam–Bargur possess classificatory knowledge of the honey-collecting season and of the relationship between flowering plants and types of honey? Is this knowledge associated with particular elevation and slope zones?

Responses from local informants:

> *"Yes. Our ancestors knew from experience the season for collecting honey, the plants that flower at that time and the nature of the honey obtained. We also know that the flowering plants and the honey season change as the altitude of the hill, the slope and the type of forest change."*

The Sangam poets also observed the soil of *Kurinji* closely. *Kuruntokai* 40, attributed to the poet known as Chempulappeyalneerar, speaks of two hearts mingling "like rain falling on red earth". Rainwater falling on red soil takes on the colour of the soil and mingles with it inseparably – this becomes the simile. It is an everyday observation of the colour of soil and its interaction with water, which may be compared with the classification of soils by Kongu farmers into *cemmaṇ* (red soil), *karical* (black soil) and *maṇaṟpāṅku* (sandy soil).

Another scene that recurs in *Kurinji* poems is the guarding of millet fields (*tiṉaippuṉam*). To stop parrots and other birds from eating the millet ears sown on the hill slope, the heroine and her confidante drive them away by making noise from a raised platform (*paraṇ*). Some poems speak of a wild elephant entering the millet field. These are everyday experiences of hill-based millet farming.

Field hypothesis: how are bird-scaring and the protection of crops from elephants organised in the cultivation of ragi, sorghum and other millets on the Thalavadi plateau today? Do elements such as raised watch platforms, night watch and noise-making devices correspond to the literary scene?

Responses from local informants:

> *"Around Thalavadi we grow millets such as ragi and sorghum. When the crop ripens, birds come and damage the grain, so we keep watch in the field and make noise. In places near the forest, we also guard the fields at night in the seasons when elephants may come. In some places people watch the field from a raised spot.*

> *"Sangam literature speaks of women guarding the millet fields, driving away birds and keeping watch. Because the basic need to protect the crop still exists today, some practices look similar. But we cannot say that the practices of the Sangam age and those of today have come down in direct continuity. Such similarities may also have arisen because the farming conditions are alike."*

6.2 Mullai: The Rainy Season, Koṉṟai and Livestock

The proper theme (*uripporuḷ*) of the *Mullai tiṇai* is "waiting": the heroine waits, trusting the hero's promise that he will return in the rainy season. *Mullai* poems therefore record seasonal signs very finely. The arrival of the rainy season was known not only from clouds, thunder and rain but also from the flowering of *koṉṟai*, *piṭavam*, *kōṭal* and *mullai*. A poem by Kovarthanar says:

மடவ மன்ற தடவுநிலைக் கொன்றை

Foolish indeed are the ko<u>n</u>rai trees with their spreading trunks.

— Kuruntokai 66

In this poem, the confidante says that the *ko<u>n</u>rai* trees, which have blossomed believing that unseasonal rain is the rainy season, are foolish. Hidden in these words, spoken to console the heroine, is a subtle ecological insight: the flowering of trees is triggered by rain; unseasonal rain can cause unseasonal flowering; and so predicting the season from a single sign can be mistaken. This is very close to what present-day plant phenology tells us.

Field hypothesis: in the pastoral villages of Anthiyur–Bargur, which plant, bird and insect signs are used to know the onset of the rainy season and the time of sowing? Do notions such as "false rain" and "untimely flowering" exist in local speech?

Responses from local informants:

> *"We do not know when the monsoon will come just by looking at the sky. The elders also watch for certain trees flowering, new shoots on certain plants, the arrival of certain birds at a particular time and the appearance of many insects. Only by putting these together with the nature of the clouds, the direction of the wind and the heat do they judge the rain.*
>
> *"Sometimes clouds gather as if rain is coming, a little rain falls, and then there is no more rain. This is sometimes called 'false rain' (poy ma<u>l</u>ai). Similarly, the elders take trees flowering earlier or later than usual as a sign that the season has changed. Now, the old people say, because of climate change the old signs no longer all fit in the same way."*

Among the native elements of the *Mullai* land, herds of cattle and herders are paramount. Grazing cattle on the grasslands beside the forest, bringing them home in the evening, and bartering milk, curd and ghee form the background of the *Mullai* poems. In the forest-fringe villages of Erode, the tradition of grazing indigenous cattle such as the Bargur breed in areas adjoining the forest continues today. The *kiṭai* tradition, widely known in the Kongu country, of penning livestock in fields at night to manure them is another form of the link between grazing and farming.

Field hypothesis: how do the seasonal shift of grazing places, knowledge of fodder plants and access to water correspond with the forest-fringe and water-body locations shown in GIS? How has this knowledge changed because grazing has been restricted by forest laws?

Responses from local informants:

> *"In the rainy season we use the green pastures and the areas near water bodies for the cattle. Places such as the forest edge, streams and ponds fit with our traditional grazing knowledge. Because forest regulations no longer let us graze freely as before, the practice of shifting grazing places and the use of traditional knowledge have declined."*

6.3 Marutham: Paddy, Water and the Field Environment

The *Vēṭkaippattu*, the opening section of *Ainkurunuru*, belongs to the *Marutham tiṇai*. In its first poem, the heroine's mother blesses the king and prays, "May paddy flourish in plenty; may gold greatly abound." The very order of these blessings shows the priorities of a paddy-growing country: abundance of paddy, wealth, the yield of the fields, and gifts to suppliants.

The environment of the *Marutham* poems is rich: pools and ponds beside the fields; lotus and *āmpal* in them; *vāḷai* fish leaping in the water; otters catching fish; buffaloes lying in the mud; sugarcane growing; farmers

working to the beat of the drum. These poems show that the field is not a monocrop plot but a wetland environment shared by aquatic organisms, birds and animals.

Field hypotheses: (a) How is local knowledge of reading the soil, crop rotation and sowing time (proverbs such as "*āṭippaṭṭam tēṭi vitai*" – "seek out the Āṭi season to sow") expressed in the irrigated villages of the Cauvery–Bhavani and Lower Bhavani?

Responses from local informants:

> *"Not all field soil is alike. We decide which crop to plant by looking at the colour of the soil, its moisture, how the soil turns when ploughed and how long water stands on it. Practices such as paddy in one season and another crop or an intercrop in the next have also existed, depending on the place.*
>
> *"Proverbs such as 'āṭippaṭṭam tēṭi vitai' show generations of knowledge about the time of sowing. But now we sow only after also considering the change in the timing of rain, the availability of irrigation water and market demand."*

(b) What are the methods of sharing canal water in turns, the terms used for them, and who is responsible?

Responses from local informants:

> *"When water comes in the canal, everyone does not get it at the same time. There is a practice of using the water in turns, by upper and lower fields. There are people responsible for opening and closing the channel and diverting the water. The terms for this vary a little from village to village. Only if the water turns are followed properly will the tail-end fields get water, so cooperation among farmers is important."*

(c) What has changed between the elders' memories and the present state of field biodiversity – field fish, waterbirds and aquatic plants?

Responses from local informants:

> *"The elders say that in the past, when water stood in the fields, there were many kinds of small fish, frogs, crabs and waterbirds, and many kinds of plants on the field bunds. Now we feel that some creatures have declined because of changes in farming methods, the use of pesticides, changes in land use and the length of time water is available. In some places they can still be seen."*

Here the verdict "differs" may be expected to appear often. Chemical fertilisers, pesticides, the spread of monocropping and dam-regulated water supply may have taken today's field far from the diverse wetland field depicted in the Sangam poems. Documenting that difference precisely is also a contribution of this study.

6.4 Palai: Drought and Adaptation

The poem that shows the ecology of the *Palai tiṇai* most subtly is by Palai Padiya Perunkadunko:

நசைபெரிது உடையர் நல்கலும் நல்குவர்

பிடிபசி களைஇய பெருங்கை வேழம்

மென்சினை யாஅம் பொளிக்கும்

அன்பின தோழி அவர் சென்ற ஆறே

His longing for you is great; surely he will show his grace.

The path he has taken, my friend, is a path of love:

there the great-trunked tusker strips the bark

from the tender boughs of the yā tree to ease his mate's hunger.

— Kuruntokai 37

The confidante consoles the heroine: the path taken by the hero, who has left to seek wealth, is harsh, but even there it is full of love, for the male elephant strips the bark from the tender branches of the *yā* tree to relieve the hunger of the female. That elephants strip and eat tree bark for food and moisture in the dry season, when grass fails, is a behaviour recorded in present-day studies of elephant ecology. That the scene of *Palai* is bound up with the wild elephant also supports the *Silappatikaram* idea that *Palai* is the forest transformed in summer.

Palai poems repeatedly feature the parched wasteland (*curam*), waterless springs, trees scorched by the sun, animals seeking shade and the hardships of travellers. They present drought both as a seasonal condition and as a set of ways in which living beings cope with it.

Field hypothesis: in drought areas selected on the basis of rainfall and water-scarcity data, what are the methods of water storage (*kuṭṭai*, farm ponds, wells), the choice of drought-tolerant crops (horse gram, sorghum, ragi and others) and livelihood adaptations (migration, sale of livestock, alternative occupations)? What do local people know about the summer behaviour of elephants in the Sathyamangalam forest?

Responses from local informants:

> *"In years of low rain, farming depends on water sources such as kuṭṭai, farm ponds and wells. In years of water shortage we choose crops that need little water, such as sorghum, ragi and horse gram. We cannot grow the same crop every year; we decide only after seeing how the rain is.*
>
> *"When farming alone is not enough, people also take up alternative livelihoods such as rearing livestock, wage labour and other occupations. Some families also go to other areas for work.*
>
> *"In the villages adjoining the Sathyamangalam forest, local people have experiential knowledge of the times when elephants come near human settlements in search of water and food. They know, from long experience, the places where water is available in summer and the routes the elephants take. This knowledge may be the experience of generations; even so, we cannot say that elephants behave in the same way every year."*

6.5 Neithal

The *Neithal tiṇai* speaks of coastal life: fishing, salt making, drying fish, waves, the *puṉṉai* and *tāḻai*, the *aṉṟil* bird and the sea crow. Because Erode is a landlocked district, there is no direct field for *Neithal* here.

Neithal is nevertheless not entirely unconnected with Erode. Sangam poems repeatedly speak of salt traders called *umaṇar* travelling inland with salt loaded in carts, which shows that maritime goods were bound up with inland life through barter. Moreover, in inland fishing in the Bhavani and Cauvery rivers and the reservoirs, elements of knowledge such as the seasonal movement of fish, nets, the use of boats or coracles (*parical*) and fish drying can be compared with the knowledge of the *Neithal* poems, and similarities and differences recorded.

Key definition: the Cauvery riverbank or river fishing must not be classified as "*Neithal* land". The defining elements of *Neithal* – salt water, waves and coastal sand – are absent from the riverine environment. In the GIS maps, therefore, inland water bodies will be shown as a separate category; *Neithal* will appear only in the comparative table.



Figure 3. Tiṇai-wise analysis of the literary evidence: Sangam sources, ecological observations and field hypotheses for the five landscapes (infographic; labels in Tamil)

Figure 3 presents, in a vector design, the Sangam literary evidence, ecological observations and field hypotheses for the five *tiṇai*s – *Kurinji*, *Mullai*, *Marutham*, *Palai* and *Neithal* – and explains the method of comparing literary data with fieldwork.

7. Comparative Assessment of Tiṇai and Field: Fieldwork and GIS

7.1 A Tiṇai-Based Field Plan

The areas in Table 3 are only recommendations for the first round of field selection. Their correspondence with a *tiṇai* must be assessed on the basis of field data; declaring an area "Kurinji" in advance and then searching for data would amount to circular reasoning.

Table 3.A tiṇai-based field plan for Erode District

Tiṇai	Field to be studied in Erode	Local knowledge to be documented	Elements to be studied through GIS
Kurinji	Sathyamangalam–Thalavadi–Bargur hills and forest slopes	Plant identification; seasonal signs; use of forest resources; honey collection; guarding millet fields	Elevation, slope, vegetation distribution, land use
Mullai	Pastoral villages to be selected around Anthiyur–Bargur	Livestock care; fodder plants; seasonal grazing; the *kiṭai* tradition	Grazing places, access to water, forest edges
Marutham	Villages to be selected in the Cauvery–Bhavani and Lower Bhavani irrigated areas	Reading the soil; crop rotation; sowing time; water distribution	Soil type, irrigation network, cropped area

Tiṇai	Field to be studied in Erode	Local knowledge to be documented	Elements to be studied through GIS
Palai	Drought areas to be selected on the basis of rainfall and water-scarcity data	Water storage; drought-coping crop choice; livelihood adaptation	Rainfall variability, change in vegetation cover, seasonality of water bodies
Neithal	Literary comparison only; no direct coastal field in Erode	Similarities and differences between coastal knowledge and inland river-fishing knowledge	Mapping inland water bodies as a separate category

7.2 Protocol for Selecting Villages

Villages will be selected in two steps. In the first step, the district will be divided into ecological zones on the basis of elevation and slope, land cover, access to irrigation and rainfall, using GIS layers. This will be done without *tiṇai* labels, using ecological criteria alone. In the second step, one or two villages will be selected from each zone, taking into account community consent, accessibility and the presence of knowledgeable elders.

This order matters. The ecological zones are first defined independently and only then compared with the literary *tiṇai*s. This reduces confirmation bias – the tendency to "find exactly what we were looking for".

7.3 Data Integration

Each unit of comparison is an "ecological component" – for example, "signs of the onset of the rainy season", "water retention of red soil" or "summer feeding behaviour of elephants". A record sheet will be prepared for each component, with the fields shown in Table 4.

Table 4. Record sheet of ecological components (revised with spatial data for 2020–2025)

No.	Ecological component	Tiṇai	Literary evidence	GIS / spatial context (2020–2025 data)	Local explanation · observed practice	Evidence status
E01	Signs of the onset of the rainy season	Mullai	*Kuruntokai* 66	Erode normal rainfall 606.5 mm (1991–2020), mostly in October–November; year-wise rainfall for 2020–25 to be computed from IMD/CHIRPS	In fieldwork (both recorded separately)	After field data

No.	Ecological component	Tiṇai	Literary evidence	GIS / spatial context (2020–2025 data)	Local explanation · observed practice	Evidence status
E02	Summer feeding behaviour of elephants	Palai	*Kuruntokai* 37	Sathyamangalam Tiger Reserve: 1,411 km²; 651 elephants. April 2024: a female elephant that came in search of water and food died in the Pudukuyyanur forest area. Summer NDVI: to be computed	In fieldwork	After field data
E03	Kuriñci flowering and honey collection	Kurinji	*Kuruntokai* 3	Forest cover of Erode 40.42% (ISFR 2023). Elevation–slope zones to be defined from the DEM; flowering is not visible from satellites – field records needed	In fieldwork	After field data

No.	Ecological component	Tiṇai	Literary evidence	GIS / spatial context (2020–2025 data)	Local explanation · observed practice	Evidence status
E04	Guarding millet fields / crop–elephant conflict	Kurinji	*Kurinji* millet-field poems	May 2024: fourth human death from elephant attack within two months in the Sathyamangalam area; demand for trenches around private lands. Forest-fringe buffer: to be mapped	In fieldwork	After field data
E05	Field water management and water distribution	Marutham	*Ainkurunuru* 1	Bhavanisagar (full level 105 ft, 32.80 TMC): March 2024 – 67 ft / 9.74 TMC; April 2024 – 47.62 ft / 3.88 TMC; May 2025 – 71.72 ft / 11.77 TMC. Lower Bhavani second crop: 1,03,500 acres (groundnut, sesame)	In fieldwork	After field data

No.	Ecological component	Tiṇai	Literary evidence	GIS / spatial context (2020–2025 data)	Local explanation · observed practice	Evidence status
E06	Infiltration of rainwater through soil and groundwater	Kurinji / Palai	*Kuruntokai* 40	CGWB report, May 2024: the deepest piezometric level in the state, 97.44 m below ground level, in Erode. Over-exploited area in Tamil Nadu: 28.64% (2023) → 30.66% (2024)	In fieldwork	After field data
E07	Water quality of inland water bodies	Neithal (comparison only)	*Neithal* poems (for comparison)	Nitrate pollution and high hardness in groundwater along the Kalingarayan canal (2014–16 samples; published 2020) – data predate the five-year window; fresh sampling needed	In fieldwork	After field data

7.4 An Illustrative Example of the Assessment Method

To show how the assessment will proceed, let us take an imaginary example. This is not field data; it is only a model for explaining the method.

Suppose *Kuruntokai* 66 shows the *konrai* flowering because of unseasonal rain. Suppose an elderly herder in the Anthiyur area says, "Don't trust the tree just because it flowered at the first rain; the second rain has to come." Suppose too that he can be seen in the field postponing his sowing, and that rainfall data for the same season show a long gap after an initial shower. Since all four sources then point in the same direction, the element of knowledge "caution about the reliability of seasonal signs" would be assessed as "corresponds". But if the tree he refers to is

not the *koṉṟai* but another, it would be marked "partially corresponds", because the sign differs even though the logic of the knowledge agrees.

This example reveals an important subtlety: comparison takes place at two levels. One is the level of specific objects (which tree, which bird). The other is the level of the logic of knowledge (how to trust signs, when to doubt them). Similarity may be greater at the second level; at the first, differences may appear according to the local distribution of plants.

7.5 Expected Outputs

- **A source table of ecological references:** the ecological references in the selected poems, with their edition, commentary, scientific identification and degree of certainty.
- **An Erode local-knowledge record:** with community consent, and only the parts permitted to be shared.
- **Comparative GIS maps:** showing ecological zones, field points and evidence levels. Culturally sensitive places (sacred groves, locations of medicinal plants) will not appear on the public map, or will be shown only in generalised form.
- **Recommendations for conserving traditional knowledge:** for panchayat biodiversity registers, school environmental education and local museum initiatives.

7.6 Spatial Indicators for the Last Five Years (2020–2025)

Even before fieldwork begins, it is useful to understand the recent ecological condition of the study sites from official and news data available in the public domain. Table 5 compiles, by *tiṇai*, indicators published during 2020–2025. These are published values only; layers that this study itself must compute from satellite imagery are noted separately later.

Table 5. Recent (2020–2025) ecological indicators for the Erode study sites

Indicator	Field / tiṇai	Period	Value	Source
Forest cover (district)	Kurinji, Mullai	ISFR 2023	40.42% of the district's geographical area; Tamil Nadu lost about 61 km² of forest cover in 2021–23	ISFR 2023 (DT Next report)
Tiger reserve area and species	Kurinji	Current official data	1,411 km²; 112 tigers, 651 elephants	Sathyamangalam Tiger Reserve
Growth in tiger numbers	Kurinji	2011 → 2018; 2022 award	25 → 80; TX2 award in 2022 for doubling the tiger population	Wikipedia (STR)
Human–elephant conflict	Kurinji, Palai	April–May 2024	Four human deaths in two months (around one village); death of a female elephant that came in search of water and food	Deccan Herald (2024)

Indicator	Field / tiṇai	Period	Value	Source
Bhavanisagar water level	Marutham	March 2024	67 ft; 9.74 TMC (full: 105 ft, 32.80 TMC)	The Hindu, Erode edition
Bhavanisagar water level	Marutham	April 2024	47.62 ft; 3.88 TMC; inflow 13 cusecs	The Hindu, Erode edition
Bhavanisagar water level	Marutham	May 2025	71.72 ft; 11.77 TMC; inflow 15,657 cusecs	PTI / Deccan Herald
Groundwater depth	Palai, Marutham	May 2024	Deepest piezometric level recorded in the state, 97.44 m – Erode District	CGWB groundwater bulletin, May 2024
Groundwater over-exploitation (state)	Palai	2023 → 2024	28.64% → 30.66%	CGWB 2024 (DT Next report)
Normal annual rainfall (Erode station)	All	1991–2020 normal	606.5 mm; October 146.0 mm, November 118.6 mm	IMD normals (via Wikipedia)

Three trends shown by the data. First, 2024 was a year of crisis. Storage in Bhavanisagar, which stood at 9.74 TMC in March, fell to 3.88 TMC in April. In the same months, elephants emerging from the forest in search of water and food, and human deaths, were recorded. Field and forest experienced the same drought in different forms. This may be called the present-day form of the *Silappatikaram* idea of

முல்லையும் குறிஞ்சியும் திரிந்து பாலை யாதல்

... Mullai and Kurinji turning into Palai.

— after Silappatikaram

Second, the pressure on groundwater is deepening. In May 2024 the deepest piezometric level in the state was recorded in Erode, and the over-exploited area at state level rose by two percentage points in one year. In uplands beyond the reach of the canals, this increases the importance of knowledge for adapting to drought.

Third, success in forest conservation brings a new challenge. Erode's forest cover is among the highest in the state, and the number of tigers has multiplied over a decade; yet on the same forest fringe, crop–elephant conflict is intensifying. The Sangam scene of guarding millet fields has today become a policy problem.

7.7 The Data Basis of the Comparative GIS Maps

Because this paper is a pre-fieldwork research framework, the maps included here are initial spatial outputs for research planning. The source article does not contain GPS points measured in the field, place codes linked with interview records, soil samples or analysed satellite layers. These maps therefore do not measure the extent of the *tiṇai*s, the density of traditional knowledge, the severity of drought or the strength of literary–field correspondence. The points on the maps are location pointers from public place-name data; they are not the villages finally selected or the places where interviews took place.

The base district boundary is taken from the India ADM2 data of the geoBoundaries gbOpen collection; its metadata give the boundary year as 2021, and the release code used is 9469f09. Only the simplified polygon

boundary of the district record for Erode was used. Place-name locations were obtained from OpenStreetMap data through Nominatim on 27 September 2026; the source records state the licence as ODbL 1.0. These are not maps for land survey or legal boundary determination, and must be compared with the maps of the Erode district administration before the final fieldwork.

The maps use WGS 84 geographic coordinates. A north arrow and a latitude–longitude grid help in comparing places. The same geographic extent is used in both maps. No conclusions about distance or area are computed here. Each place is labelled with the same category – town, taluk or reservoir – as in its public record. Features such as the Bargur hills, the Lower Bhavani canal and the drought sites have not been drawn by guesswork in the absence of accurate place records or line data.

7.8 Comparison of Study Sites and Documentation of Traditional Knowledge

Figure 4 shows, within a single district boundary, public location pointers related to the areas discussed in the paper. It helps in considering places such as Thalavadi as access areas for recording hill-related knowledge, Anthiyur as an access area for recording pastoral knowledge, and the Bhavanisagar–Gobichettipalayam–Bhavani areas as access areas for comparing water and agriculture. It should not be taken to mean that all areas around a town point belong to the same ecological type.

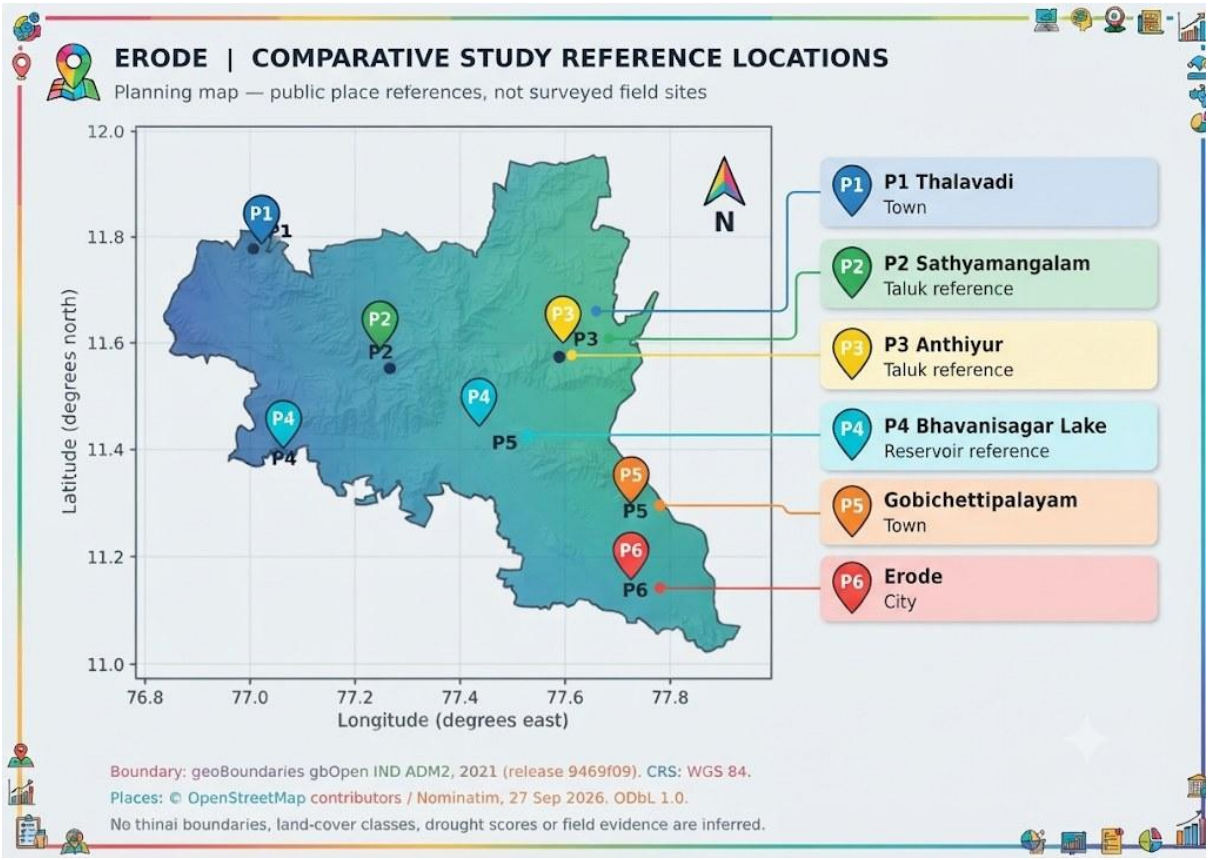


Figure 4. Location pointers for the proposed study areas in Erode District. District boundary: geoBoundaries 2021; place-name data: OpenStreetMap / Nominatim, 27 September 2026. The points are not GPS records measured in the field; their names and uses are given in Table 6.

Table 6. Map location pointers and their use

Code	Type of place record	Coordinates	Proposed use
P1	Thalavadi – town location	11.7771 N, 77.0053 E	Access area for recording hill-related knowledge
P2	Sathyamangalam – taluk location pointer	11.5524 N, 77.2654 E	Access area for recording hill-related knowledge
P3	Anthiyur – town location	11.5753 N, 77.5886 E	Access area for recording pastoral knowledge
P4	Bhavanisagar reservoir – reservoir location pointer	11.4343 N, 77.0661 E	Access area for comparing water and agriculture
P5	Gobichettipalayam – town location	11.4552 N, 77.4351 E	Access area for comparing water and agriculture
P6	Erode – town location	11.3306 N, 77.7277 E	Proposed for repository coordination

Figure 5, on the same spatial base, distinguishes the knowledge-recording work that can be the first focus in each access area. The colours and symbols indicate types of work proposed by the research team; they do not indicate the amount of traditional knowledge already identified or a ranking of conservation need. Several kinds of knowledge may co-exist at each place, and the classification may be revised after the first round of fieldwork.

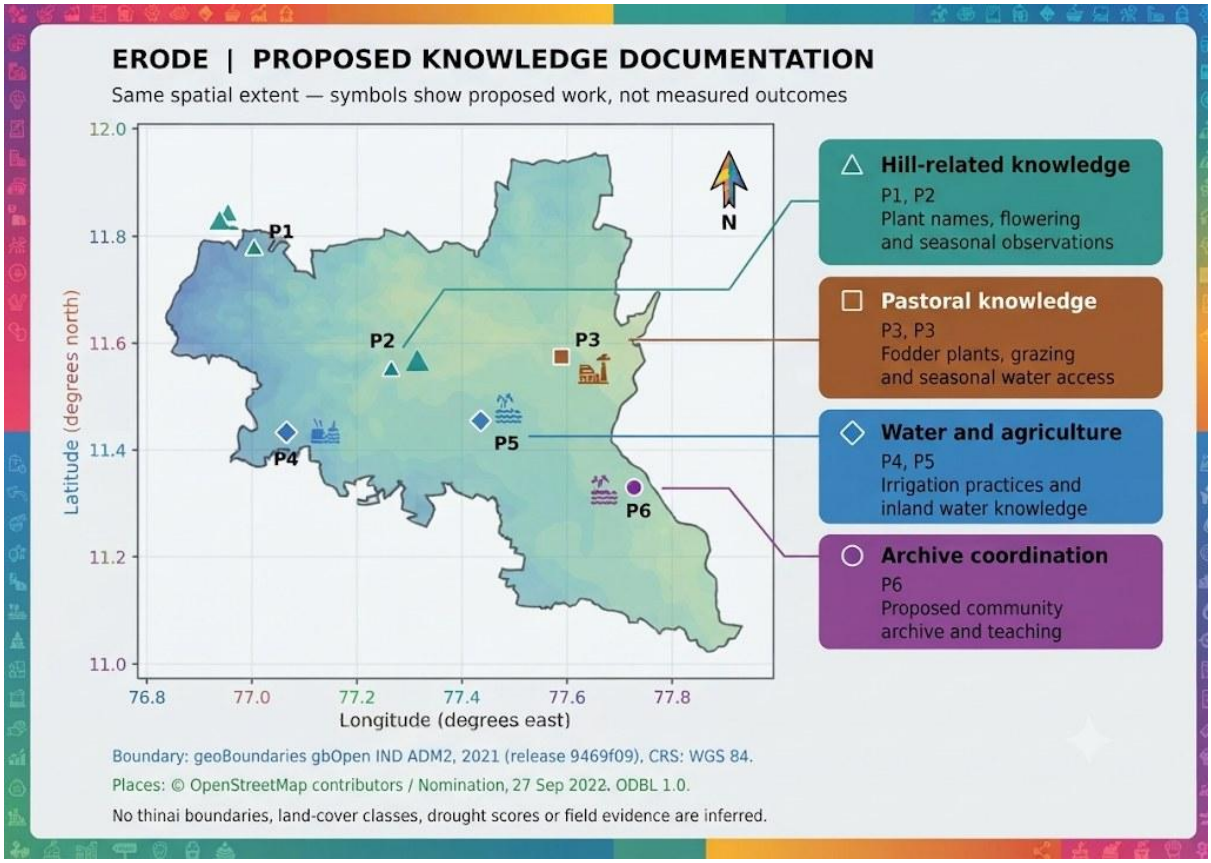


Figure 5. Proposed focus areas for place-wise documentation of traditional knowledge: hill-related knowledge, pastoral knowledge, water–agriculture knowledge and community repository coordination. This is not a map of field results or of tiṇai boundaries. Source: the base data of Figure 4 and the research plan of this paper.

7.9 Comparative Layers to Be Prepared after Fieldwork

Once field records are available, the literary records and GIS layers must be linked through the site code, knowledge-element code, season, interview date, observation date, data source and consent status. Where several knowledge elements occur at one place, a separate record must be created for each.

In the *Kurinji–Mullai* comparison, elevation, slope, forest edge and grazing access should be used as separate layers. In the *Marutham* comparison, the storage value of a reservoir should not be spread across the map as the irrigation status of the whole district; only fields with actual canal connections and water-supply records should be linked. The comparison for *Palai* should focus on seasonal change and drought adaptation. In the literary comparison of *Neithal*, inland water bodies should be shown only as a separate category.

2020–2025 is a span covering six calendar years. The map legend must state whether data were available for every year in that span, or only isolated indicators for some years. The news-based indicators in Table 5, which differ in year, unit of measurement and spatial extent, must not be treated as a single spatial time series. When preparing NDVI or rainfall-change maps, the same season, a comparable data product, cloud masking and the same classification intervals must be used. No such computations have been carried out here.

7.10 Map Quality Control and Limits of Interpretation

Every final map must include a title, year or season, coordinate system, scale, north arrow, legend, data source, resolution and date of preparation. The accuracy of GPS records and the scale of the base map must be stated. Showing district data with village-level precision, and colouring places without data as low values, must be avoided. Areas not recorded in the field must be marked separately.

In assessing correspondence, the decision must be made by combining literary evidence, the informant's explanation, direct observation and spatial context. A match in GIS context alone does not prove continuity of tradition. A place not yet assessed must not be given the code "corresponds". The extent to which sensitive places are generalised, and permission for publication, must be decided with the community; some records may be excluded from the public map altogether.

8. The Tiṇai in Erode

8.1 Is the Tiṇai a Map or a Way of Seeing?

The desire to read the *tiṇai* as a geographical map is natural. It seems possible to draw lines: "this hill is *Kurinji*, this field is *Marutham*." But Sangam literature itself does not allow this. Commentators accepted the blending of *Kurinji* and *Mullai* in a single poem as *tiṇai mayakkam* ("mixing of landscapes"); *Palai* has no land of its own at all. These show that the *tiṇai* is not a rigid boundary line on the land but a way of seeing the union of land, time, living beings and human life.

How, then, should we understand the question – not "Where are the *tiṇai*s in Erode?" but "How do the people of Erode distinguish their land, and how does that distinction compare with that of the Sangam poets?"

Responses from local informants:

> *"In our village we do not call a place just 'hill' or 'field'. We understand a place only by putting together what crops grow there, how water is obtained, what trees are there, where the cattle graze, what the rain is like and what work the people do.*
>
> *"Around Thalavadi, a life based on hills and millet farming is most visible. Around Bargur, hills, forest, grazing and livestock are bound up with one another. In the Bhavani–Cauvery areas, the river, irrigation, fields and farming are what matter. In the Sathyamangalam area, forest, forest resources, livestock and farming are interconnected. So no area can be shut completely inside a single tiṇai.*
>
> *"We can understand the tiṇai spoken of in Sangam literature in the same way. Land alone does not make a tiṇai; land, time, water, plants, animals, occupation, food, settlement and human life together make up its character.*
>
> *"So rather than drawing boundary lines – 'Where is Kurinji in Erode? Where is Mullai? Where is Marutham?' – it would be more fitting to ask, 'By what natural signs do people identify the different parts of Erode?' This approach will be useful when comparing the Sangam idea of tiṇai with the local knowledge of present-day Erode."*

Recording people's own classification of land (folk landscape classification) therefore becomes a central task. How Kongu terms such as *kāṭu* (scrub land), *puñcai* (dry land), *nañcai* (wet land), *mēṭu* (high ground), *paḷḷam* (low ground) and *ōṭai* (stream) divide the land, and where they agree with the *tiṇai* division, offers scope for an interesting comparison.

8.2 The Question of Continuity

The most sensitive part of this study concerns "continuity". In debates on Tamil culture there is a tendency to conclude at once that, if a present-day practice is found in a Sangam poem, it has continued unbroken for two thousand years. This is emotionally attractive but weak in terms of evidence.

Three kinds of explanation for similarity are possible. The first is direct cultural transmission. The second is the independent emergence of similar solutions to similar ecological challenges (convergence). The third is the re-diffusion of Sangam ideas among people in later times through literature, education and the media. The third possibility is often forgotten: someone who repeats what they learned at school – that the *kuriñci* flowers once in twelve years – is not voicing knowledge handed down from their ancestors.

To distinguish among these three, the study follows certain strategies: asking informants where they obtained the knowledge; recording their literacy and educational background; and looking for culturally specific elements (particular words, rituals, taboos) that cannot be explained by ecological need. These will not yield a definitive separation, however; they only help to narrow the possibilities.

8.3 The Value of This Study for Literary Research

Fieldwork may also help us understand literature. The identity of many Sangam plant names is still uncertain. If a plant name still used by a hill community resembles a Sangam word, it may serve as supporting evidence for identifying that word. Likewise, someone who has seen an elephant stripping bark in the field will read *Kuruntokai* 37 with entirely new eyes. This two-way relationship between text and land is the intellectual heart of the study.

8.4 Value for Environmental Education and Policy

In the schools of Erode, Sangam literature and ecology are taught as separate subjects. If a student learns to see the fields and hills of his or her own village through the eyes of a Sangam poem, literature becomes living

knowledge rather than something to memorise. The source table and maps of this study could be turned into teaching materials of this kind.

At the level of policy, the records of this study could contribute to the People's Biodiversity Registers of the panchayats. Moreover, in policy debates on grazing and the collection of minor forest produce in forest areas, documenting the existence of long-standing local knowledge would strengthen the voice of communities. Such use must, however, take place only with the consent of the communities and according to their wishes.

9. Limitations and Ethical Principles

9.1 Limitations of the Study

Distance in time: over two thousand years, land, climate, species distribution and agricultural technology have all changed. Today's land cannot be taken as a proxy for the land of the Sangam age. What this study compares is systems of knowledge, not lands.

The nature of the text: Sangam poems are poetry governed by grammatical convention. Because the *tiṇai* tradition prescribed in advance the native elements proper to each land, the poets may have sung not only what they saw but also what the convention demanded. Not every reference can therefore be taken as direct observation.

Geographical boundary: because Erode is a landlocked district, the Cauvery riverbank or river fishing must not be classified as "*Neithal* land". Likewise, a present-day dry area must not be confirmed as the *Palai* of Sangam literature on that basis alone.

Sample size: 6–8 villages and 30–40 informants are sufficient for in-depth qualitative research, but not for generalising to the whole district. The findings will be presented as specific to the context of each village.

Limits of GIS data: the resolution, year and cloud cover of satellite data will affect the analysis. District-level soil maps do not show field-level micro-variation, and a one-to-one correspondence between local soil terms and scientific soil classification cannot be expected.

Similarity ≠ continuity: similarity alone is not evidence of unbroken continuity of tradition from the Sangam age. It is no accident that this paper stresses this point repeatedly; the credibility of the study rests on it.

10. Recommendations

10.1 General Recommendations for All Tiṇais

- **A community GIS atlas in Tamil:** an atlas combining maps drawn by villagers themselves with satellite layers, containing Tamil place names and local terms for soil and water bodies. Sensitive places should be generalised in the public edition.
- **An annually updated monitoring dashboard:** a simple web dashboard that updates the indicators in Table 5 each year, enabling continuous comparison rather than comparison once every five years.
- **Linking with the People's Biodiversity Registers:** with community consent, the records of this study could be offered to the local Biodiversity Management Committee for inclusion in the People's Biodiversity Register. Procedures relating to rights and benefit sharing must be verified separately; registration alone must not be assumed to create rights automatically.
- **A "*tiṇai*laboratory" in schools:** a project in which students record the flowering, birds and rain signs of their village throughout the year and compare them with Sangam poems. This would serve both as citizen science and as a source of phenological data.

- **Joint early warning from traditional knowledge and science:** local seasonal rules such as "wait for the second rain" could be combined with the weather advisories of the IMD and the agricultural university and offered as simple sowing advice in Tamil.
- **Data rights:** a data-governance agreement, under which the communities themselves decide how the data obtained from them are stored and who may access them, should be signed at the very start of the study.

The basis of these recommendations is one: the Sangam poets saw the land as a whole, whereas present-day environmental administration divides it department by department. Seating the forest, water resources and agriculture departments, the panchayat and the communities in front of the same map is the present-day use of the *tiṇai* perspective.

10.2 A Community-Based Register of Traditional Knowledge

In each study village, a small recording committee can be formed with knowledgeable elders, women, young people and representatives of the relevant livelihood groups. They should decide which knowledge may be recorded, which should be kept within the community and which names may be published. Consent should not be merely a signature obtained once; it should be a process reaffirmed at the stages of recording, translation, mapping and publication.

The register can include, separately, the local term, its meaning, the season in which it is used, the procedure, how the knowledge was acquired, whether it is still in practice and the permission for recording. The statement of a single informant should not be recorded as the consensus knowledge of the whole community; differing explanations should also be preserved. Parts approved by the community may be considered, in consultation with the local Biodiversity Management Committee, for inclusion in the People's Biodiversity Register. Inclusion in the register alone must not be assumed to create proprietary or benefit-sharing rights automatically.

10.3 A Tamil Digital Repository and Access Control

A Tamil digital repository can be created that links transcripts, audio recordings, photographs, seasonal calendars and spatial records through a single knowledge-element code. To preserve regional pronunciation, a verified transcription should be kept along with the original audio recording. Where the scientific identification of a local plant name is uncertain, its degree of certainty and alternative identifications should be recorded. Records without community consent and verification of identification must not be released for public use.

The repository can have access levels: a part accessible to the public, a part shared within the community, and a part used only with special permission. In the public edition, informants' home locations, the exact locations of rare plants and sacred places must not be revealed. Consent for storage and consent for online publication must be obtained separately. Version history, backups, a procedure for requesting corrections and a procedure for changing consent should form part of the maintenance of the repository.

The CARE principles proposed by the Global Indigenous Data Alliance (GIDA) will help this approach to data governance: collective benefit, community authority to control the use of data, responsibility and ethics can be implemented to suit local conditions (Global Indigenous Data Alliance, n.d.). Even for records with community consent, the scope of permission should be reconsidered before they are reused for a different purpose.

10.4 Intergenerational Transfer of Knowledge

Paired elder–youth recording workshops can be held at village level. Knowledge such as seed selection, reading the soil, identifying fodder plants, water-distribution terms and seasonal signs should be explained and recorded at the place and in the season in which it is practised. Separate sessions can be arranged for women's knowledge

of seed saving, food and home gardens. Having young people demonstrate a recorded procedure again is one way of assessing the transfer of knowledge.

In local environmental training for school and college students, the reading of Sangam poems, recording of the village's place names, participatory mapping and seasonal observation can be combined. Before student records are published, they should be checked by the teacher and by the person who shared the knowledge. Documentation of medicinal-plant knowledge must not be treated as evidence for medical use; such records should be presented only as cultural description.

10.5 Habitat Measures That Sustain Knowledge

The conservation of traditional knowledge must also attend to the context in which it is used. In hill and forest-slope fields, community observations on plant seasons, honey-collection knowledge and habitat change can be compiled. In pastoral fields, fodder plants, access to water and seasonal practices can be recorded. In irrigated fields, knowledge of water-distribution schedules, sluice names, crop rotation and field biodiversity can be preserved. In water-scarce fields, the water-storage and crop-choice methods valued by the communities can be documented.

On the basis of this information, communities and the relevant departments can consider measures such as the maintenance of tanks or ponds, improvement of fodder resources and local seed exchange. For each measure, the ecological condition of the field, practical feasibility and community preference must be assessed. Engineering measures such as recharge structures or canal modification must not be chosen on the basis of a literary analogy or a preliminary map alone.

10.6 Implementation Responsibilities and Monitoring

Table 7 gives a sequence of activities that may be considered from the day the project begins. The durations are proposals only and must be adjusted to the agricultural season, community consent and field access; they should not be regarded as activities already completed.

Table 7.A proposed implementation plan for the conservation of traditional knowledge

Proposed period	Activity	Participants	Verifiable output
0–3 months	Consent and recording rules	Community representatives, research team	An agreed procedure for recording and sharing
3–6 months	Seasonal field recording; transcription	Knowledgeable elders, young people	Verified knowledge-element records
6–9 months	GIS linking; access levels	GIS analyst, community recording committee	A map edition combining source and permission
9–12 months	Educational use; giving back	Teachers, community committee	Tamil handbook, training, correction log
Annually	Updating and backup	Agreed custodian	Update date, recovery test, community review

In monitoring, success should not be measured by the number of records alone. Indicators such as the proportion of records verified by the community, the proportion with the correct consent status, the records returned to the community and the number of young people able to explain a practice after training can be used. Before publication, the number of records with community consent should be reported against the total number planned for publication. Targets can be set together with the communities once initial field data are available.

10.7 Giving Back to the Community and Continuous Updating

At the end of the study, each participating village should receive a summary handbook in Tamil, a map approved for sharing and an accessible copy of the records of its own knowledge. For areas with limited internet access, printed and offline formats can also be provided. At a community meeting, there should be an opportunity to correct wrong names, missing knowledge and inappropriate explanations. The custodian responsible for maintaining the repository and the time of the next update should be agreed in advance.

In this way, comparative GIS maps help to explain where, and in what context, knowledge is used, while the action plan for conserving traditional knowledge specifies who will control that knowledge, how it will be shared and how it will be carried to the next generation. When the two are combined, the value of literary research does not end with documentation but can extend to community education and local resource stewardship.

11. Conclusion

The Sangam poets observed the land closely. The tree that flowers at the rain, the elephant that strips bark in drought, the rainwater that mingles with red earth, the bee that builds its honeycomb on the *kuriñci* flower – these reveal a world of knowledge standing behind their poetry. The farmers, herders and hill people of Erode still look at their land with the same keenness. The aim of this paper is to set these two ways of seeing on the same table and compare them.

The paper offers three contributions. First, a methodological framework that brings four sources – literary evidence, local explanation, field observation and GIS data – to bear on a single ecological component. Second, a four-level evidence scale – "corresponds", "partially corresponds", "differs" and "insufficient evidence" – which avoids sentimental matching and sets every conclusion openly alongside its evidence. Third, field-testable, *tiṇai*-wise hypotheses derived from poems such as *Kuruntokai* 3, 37, 40 and 66 and *Ainkurunuru* 1.

The study deliberately imposes certain limits on itself. It does not claim to "discover" Sangam geography on a present-day map. It does not declare a riverbank to be *Neithal* or a dry land to be *Palai*. It does not take similarity as proof of continuity. These limits do not weaken the study; they make its conclusions trustworthy. The preliminary maps included here organise the study sites and the types of documentation work; comparative maps of evidence levels will be prepared only after field data are available. Community-verified records, controlled access and intergenerational transfer of knowledge are proposed as the conservation plan of the study.

Finally, a humanistic note. Much of the knowledge to be recorded in this study survives today only among elders in their seventies and eighties. Memories of lifting water with the *kavalai*, knowledge of wild greens and the signs of rain may vanish within a generation. Sangam poems have endured for two thousand years because they were written down. The deeper aim of this study is to offer today's oral knowledge such an opportunity – with the consent of the communities and according to their wishes.

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Conflict of Interest

None declared.

Use of Artificial Intelligence Tools

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