

Indigenous Tamil Agro-Ecological Wisdom as a Model for Global Climate Action: A Case Study in Bridging Sangam Ecological Thought and the Post-COP30 Global Climate Action Architecture

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Abstract- Climate action has become the organizing imperative of global sustainable development policy, yet the 2025 United Nations Climate Change Conference (COP30) in Belém closed with a familiar verdict: meaningful progress on implementation mechanisms, but persistent gaps between global ambition and locally grounded delivery. This paper argues that agrarian civilizations with deep textual ecological traditions — Tamil Nadu foremost among them — hold an underused resource for closing that gap. Drawing on the Sangam-era grammar Tholkappiyam, the ethical corpus of the Thirukkural, and the Ettuthogai–Pattupattu anthologies, alongside modern Tamil agrarian literature and Tamil Nadu's contemporary climate and agriculture policy, the paper develops a three-tier comparative framework linking ancient ecological classification, present-day state practice, and the global climate governance architecture that emerged from COP30 — including the Belém Adaptation Indicators, the Baku-to-Belém climate finance roadmap, and the Belém Declaration on Hunger, Poverty and Human-Centered Climate Action. The analysis shows that the Sangam-era Ainthinai (five-fold ecological classification), its associated water-harvesting ethic, organic-manuring practice, crop diversification, and farmer-centred social ethic anticipate, in vernacular and literary form, principles that global climate policy is only now formalising as adaptation indicators and finance priorities. The paper concludes that global climate action will be more effective, and more genuinely global, if it treats regional ecological literatures as a legitimate evidence base alongside scientific and policy data, and if climate finance architecture is redesigned to reach community-led, indigenous-knowledge-based adaptation directly.

Keywords- Climate Action; SDG 13; Indigenous Knowledge Systems; Sangam Literature; Tholkappiyam; Tamil Nadu; COP30; Climate Adaptation; Agroecology

I. Introduction

The urgency of global climate action is no longer contested; what remains contested is how the world translates diplomatic commitment into practice at the scale of villages, watersheds, and farms. Scientists have repeatedly warned that the 1.5°C threshold established under the Paris Agreement will be breached, at least temporarily, within the current decade, and the 2025 UN Climate Change Conference (COP30) in Belém was explicitly framed by its Brazilian presidency as the “COP of Implementation” — a summit meant to move the world from pledges to delivery.

Its outcomes were consequential: nations agreed to roughly sixty Belém Adaptation Indicators under the Global Goal on Adaptation, operationalised the Loss and Damage Fund, and endorsed a Baku-to-Belém Roadmap targeting USD 1.3 trillion in annual climate finance by 2035, with adaptation finance itself set to triple over the same period.

Agrifood systems — the livelihood base for an estimated 1.2 billion people worldwide — were placed at the centre of the summit's Action Agenda through initiatives such as RAIZ (Resilient Agriculture Investment for net-Zero land degradation) and TERRA (agroforestry and agroecology for family farmers).

Yet even sympathetic observers of COP30 noted that the negotiated text fell short of a formal roadmap to fully mainstream agrifood systems across every negotiating stream, and that climate finance for food systems in particular remains poorly matched to need: CGIAR's assessment called for a “fair share” of roughly USD 400 billion for food systems within the wider finance roadmap, with direct access for local and community actors identified as a persistent bottleneck.

This is the structural problem that motivates the present paper: global climate governance is increasingly willing to name agroecology, water stewardship, soil health, and farmer-centred equity as adaptation priorities, but it continues to look for these solutions primarily in scientific and technical literature, overlooking centuries-old regional literary and ethical traditions that already encode sophisticated ecological reasoning in vernacular form.

Tamil Nadu offers an unusually rich case for correcting this omission. Its agricultural civilisation is documented across more than two millennia of continuous literary production — from the Sangam corpus (circa third century BCE to third century CE), through the ethical treatise Thirukkural, into twentieth-century Tamil fiction and the organic-farming manifestos of writers such as G. Nammalvar, and finally into the state's own climate and agriculture policy documents. This paper treats that unbroken textual record as a primary data source for climate action scholarship in its own right, and asks what a genuinely global perspective on climate action gains by reading it alongside the outcomes of COP30.

II. The Global Climate Action Landscape, 2025–26

Three features of the current global climate governance moment are directly relevant to an agrarian, literature-grounded case study such as this one.

From Negotiation to Implementation

COP30 was the first Conference of the Parties held after the full Paris Agreement policy cycle came into effect, with countries submitting a new round of Nationally Determined Contributions (NDC 3.0) intended to be more ambitious and delivery-focused than earlier cycles. The choice of Belém, at the mouth of the Amazon, was itself a statement about the centrality of ecosystems, forests, and Indigenous rights to the negotiations, and the summit produced two notable roadmaps announced by the COP30 presidency — one on phasing out fossil fuels and one on ending global deforestation — alongside the formally negotiated adaptation and finance outcomes.

Adaptation, Finance, and the Local-Global Gap

The adoption of the Belém Adaptation Indicators gives the Global Goal on Adaptation, for the first time, a structured way to measure progress across sectors including water, food, and ecosystems. The Baku-to-Belém Roadmap's USD 1.3 trillion target and the tripling of adaptation finance by 2035 represent a substantial scaling of ambition.

However, as CGIAR's statement at COP30 emphasised, investment in agricultural research and development yields a documented tenfold return, yet food systems remain under-financed relative to their share of climate vulnerability, and the finance that does exist is rarely structured for direct access by local actors — the farmers' cooperatives, watershed associations, and community seed banks that would be the practical implementers of any agroecological transition.

The Turn Toward Indigenous and Traditional Knowledge

The Belém Declaration on Hunger, Poverty and Human-Centered Climate Action, endorsed by forty-three countries and the European Union, explicitly recognises that climate action and social justice are inseparable, and calls for climate-responsive social protection centred on the people most exposed to climate shocks — smallholder and subsistence farmers foremost among them.

This sits within a broader, decade-long shift in international climate science and policy toward recognising Indigenous and traditional ecological knowledge as a legitimate complement to technical and scientific solutions. What is comparatively underdeveloped, this paper argues, is the systematic use of regional literary corpora — not oral testimony alone, but written, canonical, historically dated textual traditions such as the Sangam corpus — as primary evidence within that turn.

Objectives

- To identify climate-relevant ecological principles embedded in Sangam-era Tamil literature, with particular attention to the Ainthinai land-classification system set out in the Tholkappiyam.
- To trace how these principles persist, are contested, or are reinvented in modern Tamil literature and in Tamil Nadu's contemporary agricultural and climate policy.
- To map both the ancient and the modern Tamil material against the global climate action architecture that emerged from COP30 (2025), testing where indigenous literary ecological knowledge anticipates or diverges from current global adaptation priorities.
- To propose policy recommendations, at global, national, and local scales, for integrating regional ecological literatures and community-led practice into climate finance and adaptation planning.

III. Methodology

This study uses a qualitative, interpretive, comparative-textual method, triangulating three tiers of source material.

Source Corpus

- **Ancient tier:** the Tholkappiyam (particularly its Porul Adhikaram treatment of the five ecological tracts, or Ainthinai), the Thirukkural (notably its chapters on rain, agriculture, and governance), and the Ettuthogai and Pattupattu anthologies, including the Purananuru and Agananuru.
- **Modern tier:** twentieth- and twenty-first-century Tamil literature engaging agrarian change (Ki. Rajanarayanan's *Gopalla Gramam*, Prapanchan's *Vaanam Vasappadum*, Azhagiya Periyavan's *Kalathur Gramam*, G. Nammalvar's *Iyarkai*

Vivasayam), alongside Tamil Nadu government policy documents, most notably the Tamil Nadu State Climate Action Plan for Agriculture (2021).

- **Global tier:** the negotiated and Action Agenda outcomes of COP30 (2025), including the Belém Adaptation Indicators, the Baku-to-Belém finance roadmap, and the Belém Declaration on Hunger, Poverty and Human-Centered Climate Action, read alongside FAO and CGIAR programmatic statements from the same summit.

Analytical Framework

Material from all three tiers was thematically coded along four axes that recur across both the ancient Tamil corpus and current global adaptation frameworks: (i) water governance, (ii) soil health and land management, (iii) biodiversity and crop diversification, and (iv) socio-economic equity for farming communities. These axes were then used to construct a comparative mapping (Section 6) that reads Sangam-era concepts, present-day Tamil Nadu practice, and global climate-policy instruments as three historically distinct but thematically continuous responses to the same underlying ecological problems.

IV. Case Study: Tamil Nadu's Layered Ecological Wisdom

The Ainthinai System as Proto-Ecological Zoning

The Tholkappiyam sets out a five-fold ecological classification of land known as Ainthinai: Kurinji (hill and mountain tracts), Mullai (forest and pastoral woodland), Marutham (riverine plains and wetland paddy country), Neytal (littoral and coastal sand tracts), and Palai (arid or drought-prone land, understood less as a fixed region than as a seasonal or degraded state of the other four). Each tinai is defined not only by topography but by an integrated bundle of associated deity, staple food, flora and fauna, occupation, and water source — in effect, a bioregional planning unit centuries before that vocabulary existed. Commentarial tradition even records that the Pandya kingdom encompassed all five tracts, the Chera country was dominated by Kurinji, and the Chola country by Marutham, indicating that this classification carried real administrative and agricultural weight rather than existing as poetic ornament alone.

This is directly relevant to a central plank of the COP30 Action Agenda: agro-ecological zoning as a tool for climate-resilient land-use planning, embodied in initiatives such as RAIZ and TERRA. The Ainthinai framework demonstrates that matching crop choice, water strategy, and settlement pattern to ecological zone is not a recent scientific innovation for Tamil Nadu but an inherited civilisational logic, one that contemporary land-use and agro-climatic zoning exercises could draw on more explicitly than they currently do.

Water Governance: From Vaan Sirappu to Watershed Management

Water occupies a structurally central place in the Sangam-Tholkappiyam-Thirukkural corpus. The Thirukkural devotes an entire chapter, Vaan Sirappu (“The Excellence of Rain”), to the claim that rainfall sustains every other form of virtue, wealth, and pleasure on earth, and Sangam poets across the Purananuru repeatedly praise rulers for building tanks and dams — the Kallanai across the Kaveri being the most celebrated example — while criticising those who neglect irrigation infrastructure as leaving “no renown enduring in this world.” The poet Avvaiyar’s counsel that one should settle only

where water is abundant, and that “a place without a river is a dreary waste,” reflects a settlement ethic organised entirely around water security.

Contemporary Tamil Nadu policy pursues comparable goals through different instruments: the System of Rice Intensification (SRI) for water-saving in paddy cultivation, micro-irrigation and drip systems, groundwater recharge schemes, and the Integrated Watershed Management Programme (IWMP). Grassroots literary documentation, such as Marudhan's *Neer Nilam Iyarkai* (2019), records farmers in Thanjavur physically reviving ancestral irrigation tanks (*eri*), describing the act as giving life back to their grandfathers' water bodies. This is precisely the kind of community-led adaptation activity that the Belém Adaptation Indicators are designed to track under their water-security and food-security thematic areas — yet it is exactly this scale of local, tank-by-tank restoration work that CGIAR identified as poorly served by current climate finance architecture.

Soil Fertility and Regenerative Practice

The Thirukkural states plainly that manuring matters more than ploughing, and Sangam-descended agricultural practice relied on green-leaf manuring, farmyard manure, sheep-penning, and crop rotation — the last of these, such as sowing black gram after rice, achieving nitrogen fixation without any theoretical understanding of soil chemistry. This organic, closed-loop approach to soil fertility was substantially displaced during the Green Revolution (1960s–80s), when chemical fertilisers and high-yielding varieties expanded output but, as M. S. Swaminathan himself later acknowledged, risked producing “temporary abundance but permanent loss.” Ki. Rajanarayanan's *Gopalla Gramam* (1976) captures this transition at the level of sensory experience, describing fields that remained green but whose soil had lost its natural scent.

The subsequent organic revival associated with G. Nammalvar's *Iyarkai Vivasayam* (2007) and state-level adoption of Integrated Nutrient Management (INM) and vermicomposting represent a conscious, literature-documented return to Sangam-era soil practice, now validated by agronomic science. This trajectory maps closely onto the COP30 RAIZ initiative's land-degradation and soil-restoration targets, suggesting that Tamil Nadu's organic-farming movement is not merely a domestic agricultural policy but a live instance of exactly the kind of regenerative-agriculture transition that global climate policy is now trying to scale.

Biodiversity and Crop Diversification

Ainthinai-based cultivation distributed crop choice across ecological zones — paddy in the wet Marutham tracts, millets such as *thinai*, *varagu*, and *cholam* in the drier Kurinji and *Mullai* zones — and combined this zonal specialisation with intercropping (foxtail millet with *lablab*, for instance) to diversify household nutrition and spread climatic risk. The Green Revolution concentrated production onto rice, sugarcane, and cotton, narrowing this diversity considerably; the current millet-revival movement in Tamil Nadu, alongside agroforestry promotion, represents an explicit, policy-driven attempt to restore it, motivated in large part by millets' drought tolerance and nutritional density under climate stress.

This dimension of the case study connects most directly to the global agrifood-systems agenda championed by FAO at COP30, which frames crop and dietary diversification as central to both climate mitigation and adaptation. Tamil Nadu's millet revival is thus a concrete, already-in-progress illustration of a strategy that COP30's Action Agenda treats as aspirational at the global scale.

Socio-Economic Equity and Farmer-Centred Ethics

Sangam and post-Sangam ethical literature accords the cultivator, or Uzhavar, exceptional social standing: the Thirukkural holds that only those who plough and eat by their own labour truly live, and Sangam poetry credits the industrious peasantry, not conquest alone, with sustaining a king's prosperity. The same tradition explicitly warns against absentee landlordism. Modern Tamil fiction registers the erosion of this status under mechanised, credit-dependent agriculture — Prapanchan's Vaanam Vasappadam observes starkly that “the land starves while man fattens on money” — while contemporary policy responds with farmer income-support schemes, skill development, and efforts to expand women's participation in agriculture.

At the global level, the Belém Declaration on Hunger, Poverty and Human-Centered Climate Action makes an almost identical argument in contemporary policy language: that climate action and social justice cannot be separated, and that the people most exposed to climate shocks must be placed at the centre of adaptation planning. The convergence here is close enough to suggest that Sangam-era agrarian ethics, translated into modern terms, already articulate the normative core of what COP30 negotiators spent two weeks trying to formalise.

V. Mapping Local Wisdom onto the Global Climate Action Architecture

Table 1 summarises the comparative mapping developed across Section 5, reading each Sangam-era concept against its present-day Tamil Nadu institutional expression and its corresponding element within the global climate governance framework established or reaffirmed at COP30.

Table 1. Sangam ecological concepts, Tamil Nadu practice, and global climate action alignment

Sangam-Era Concept (Tholkappiyam / Thirukkural)	Contemporary Tamil Nadu Practice	Global Climate Action Framework (2025-26)
Ainthinai — five-fold ecological/land classification (Kurinji, Mullai, Marutham, Neytal, Palai)	Agro-climatic zoning; crop-suitability mapping under state agriculture policy	Agro-ecological zoning and land-use planning under the COP30 Action Agenda's RAIZ and TERRA initiatives
Vaan Sirappu — Thirukkural's chapter praising rain as the basis	System of Rice Intensification (SRI), micro-irrigation,	Global Goal on Adaptation water- and food-security indicators;

of all life and prosperity; tank and dam building (e.g., Kallanai)	watershed development (IWMP), tank/eri restoration	Belem Adaptation Indicators agreed at COP30
Manuring prioritized over ploughing; green-leaf manure, farmyard manure, sheep penning, crop rotation	Integrated Nutrient Management (INM), vermicomposting, organic farming movement (G. Nammalvar)	Soil-health and land- restoration targets under the COP30 RAIZ initiative (Resilient Agriculture Investment for net-Zero land degradation)
Thinai-based crop diversity; millets in Kurinji/Mullai, paddy in Marutham; intercropping for risk mitigation	Post-Green-Revolution millet revival, agroforestry, climate- resilient dryland cropping	Crop diversification and climate-resilient seed systems promoted through FAO agrifood- systems programming
Uzhavar (farmer) accorded highest social status; Thirukkural's ethic against absentee landlordism	Farmer income-support schemes; skill development; women's participation in agriculture	Belem Declaration on Hunger, Poverty and Human-Centered Climate Action (endorsed by 43 countries and the EU)

VI. Discussion: What a Global Perspective Gains, and Where It Must Be Cautious

The mapping in Table 1 supports a central claim of this paper: Tamil Nadu's Sangam-derived agrarian tradition is not a quaint historical parallel to global climate policy but a substantively continuous body of ecological reasoning that anticipates, in vernacular and literary form, several priorities that global climate governance has only recently formalised as adaptation indicators and finance targets. Reading these three tiers together suggests two things a genuinely global perspective on climate action should do differently.

First, it should treat long-standing regional literary corpora as primary evidence in adaptation planning, not merely as cultural colour attached after the technical analysis is complete. The Ainthinai classification, for example, is a functioning zonation system with implications for crop choice, water strategy, and settlement pattern; it deserves consideration alongside satellite-derived agro-climatic zoning, not only as an object of literary study.

Second, it should confront directly the financing gap identified by CGIAR at COP30: global adaptation finance is scaling in aggregate (the USD 1.3 trillion Baku-to-Belém roadmap, the tripling of adaptation finance by 2035) but remains poorly structured for direct access by the community-level actors — tank-restoration groups, millet-seed cooperatives, organic-farming collectives — who are the practical inheritors of the

traditions discussed here. Without redesigned, direct-access finance instruments, the convergence documented in Table 1 will remain a discursive parallel rather than a implementable programme.

At the same time, this argument requires two caveats that a rigorous conference paper should not omit. Indigenous and traditional knowledge should not be romanticised as a ready-made solution set: Sangam-era practice operated at a fraction of today's population density and food demand, and integrating it into contemporary climate policy requires validation, adaptation, and combination with precision agricultural science — exactly the synthesis that Tamil Nadu's own SRI, INM, and IWMP programmes already attempt.

Equally, the socio-economic equity celebrated in Sangam ethics coexisted historically with land-tax obligations, caste-structured agrarian labour, and monarchical extraction that modern scholarship rightly scrutinises; contemporary Tamil literature's own critique of rural indebtedness and land fragmentation shows this equity has never been automatic and cannot be assumed to follow from cultural continuity alone. A defensible policy argument treats the ancient corpus as a source of ecological principle and normative language, not as a template for present-day agrarian social relations.

VII. Policy Recommendations

Global Level

- Incorporate documented regional ecological literatures, alongside oral testimony, as a recognised evidence category within Global Goal on Adaptation indicator development and reporting.
- Redesign a defined share of the Baku-to-Belém climate finance roadmap as direct-access windows for community-led adaptation projects (tank and watershed restoration, indigenous seed and millet-value-chain programmes), addressing the access gap CGIAR identified at COP30.

National and State Level

- Formally integrate Ainthinai-informed agro-ecological zoning principles into Tamil Nadu's and comparable states' climate action plans for agriculture, alongside modern agro-climatic data.
- Expand budgetary support for Integrated Nutrient Management, organic transition incentives, and tank/eri restoration under the Integrated Watershed Management Programme, framing these explicitly as climate-adaptation, not only agricultural, expenditure.

Local and Community Level

- Support farmer-led and literary-archive-informed documentation of traditional water-body and soil-management knowledge as an input to local adaptation planning.
- Strengthen seed-sovereignty initiatives and millet value chains, building on the existing revival movement, with direct financing routes that do not require intermediation through large agribusiness or purely state-channel funding.

VIII. Conclusion

Climate action, considered from a genuinely global perspective, cannot rest solely on the diplomatic architecture assembled at successive Conferences of the Parties; it must also draw on the accumulated ecological reasoning embedded in the world's regional literary and agrarian traditions. Tamil Nadu's trajectory from the Sangam-era Ainthinai classification, through the ethical corpus of the Thirukkural, into twentieth-century literary critique and twenty-first-century climate and agricultural policy, demonstrates that sustainability in this region is not an imported or recent idea but a return to inherited ecological consciousness under new institutional and scientific forms.

The comparative mapping developed in this paper shows that this trajectory already anticipates central elements of the post-COP30 global climate action architecture — water and food-security adaptation indicators, land-restoration and soil-health targets, crop diversification, and human-centred, equity-focused climate policy. What remains is the harder, more structural task that COP30 itself only partially resolved: building climate finance and governance instruments capable of reaching the community-scale actors who are the living inheritors of this tradition. A global climate action agenda that treats regions such as Tamil Nadu as sources of policy-relevant ecological knowledge, and not only as sites requiring intervention, would be more effective, and more honestly global, than one that is not.

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