Rain in Literary Science

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ABSTRACT

Rain has always been likened to benevolence by poets across all ages. Everyone recognises that rain is the fundamental source that sustains all living beings in this world. This is precisely why poets have metaphorically compared rain to charity. Many of the poetic references that describe rain in symbolic terms align remarkably with modern agricultural science a realisation that becomes apparent to discerning readers. While rain is often used metaphorically in literature, the ancient Tamils also possessed a profound understanding of the scientific reasons behind the occurrence of rain. The aim of this study is to highlights the scientific insights about rain as reflected in classical Tamil literature.

Keywords: Rain, Science, Movement, Monsoon, Clouds, Rainbow

Preface

“For those who give, it gives in return –

The rain gives even to those who do not.”

Thus, the great sage **Thiruvalluvar** eloquently praised the glory of rain. He states that without rain, even the divine beings lose their greatness; offerings, the penance of sages and acts of charity all come to a halt, Our ancestors revered rain as "nectar bestowed from the sky." Poets even imagined it as the pure water of a celestial maiden, Though imagination delights the heart, it is science that truly satisfies the intellect. Many scientific truths are embedded within our ancient literature, This Paper aim to explore such scientific insights related to **rain** as expressed in classical literary verses.

Science

Rain is a phenomenon in which water vapor in the atmosphere condenses into clouds and falls to the Earth's surface due to the force of gravity. It is a key part of the **water cycle**, where water evaporates, forms clouds, falls as rain, and eventually returns to the ocean.

Rain formation begins when the Sun's heat causes water on the Earth's surface to evaporate. This water vapor rises into the atmosphere and upon cooling, turns into clouds. Within the clouds, the vapor condenses further into water droplets. When these droplets grow large enough, they fall to Earth under gravity as rain.

Tiny droplets falling are called **drizzle**, larger droplets are called **rain** and when ice crystals or snowflakes fall, it's known as **snow** or **hail**, depending on their form. These are the various forms of precipitation.

The **northeast monsoon** winds bring the most rainfall to Tamil Nadu. The ancient poet **Aalathur Kizhar** was well aware of this. When he sang about **Killi Valavan**, the Chola king, who died at Kulamuttram, he blessed him with a long life, saying:

“May you live long like the many fine drops that fall from the great cloud that forms at the foot of the Himalayas, trained by sweet thunder, and comes down through the eastern wind.”

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This blessing reflects a scientific understanding of rainfall during that time. As the northeast monsoon winds blow toward the Chola region, they bring clouds with them. The poet imagines these clouds as having originated from the **Himalayas**.

A cloud that forms near Calcutta and moves toward southern Tamil Nadu is poetically described as a gift from the Himalayas. Aalathur Kizhar beautifully captures this in his words:

"Even if only a few fine drops fall from the great monsoon cloud trained by sweet thunder after touching the Himalayas –may you live long!"

Through this, we see a remarkable blend of **scientific insights** and **poetic expressions** from classical Tamil literature.

Rain

The Tamil language uses many words to refer to **rain**, such as *mazhai*, *peyal*, *kaar*, *maari*, *thooral*, *thuvulai*, *saaral*, and *aali*. Poets have used the word *mazhai* with numerous descriptive epithets, including:

Ani mazhai, **azhi mazhai**, **aali than mazhai** (cool rain), **idi mazhai** (thunder rain), **aethila peyyum mazhai** (unexpected rain), **kanam mazhai**, **kamanchool maamazhai**, **kali mazhai**, **kazhi mazhai**, **kaar mazhai**, **kaar edhir kilai mazhai**, **karuvi maamazhai**, **kondal vaanmazhai than mazhai**, **thoyyal maamazhai**, **thozhil mazhai**, **nalleni yaamathu mazhai** (midnight rain), **naal mazhai**, **nun mazhai** (light rain), **padu mazhai** (heavy rain), **pazha mazhai** (customarily deceiving rain), **perumazhai** (great rain), **maamazhai**, **maari maamazhai**, **vala mazhai** (fruitful rain), and **vizzhntha maamazhai** (pouring heavy rain).

The word *peyal*, which also means rain, is used in many forms, such as: **Adhir peyal**, **azhi peyal**, **aar peyal**, **aar thali pozhindha vaar peyal**, **igu peyal**, **imizh peyal**, **iravup peyal**, **ular peyal**, **uravup peyal**, **uru peyal**, **ellup peyal**, **kathazh peyal**, **kanaip peyal**, **kaar peyal**, **than peyal**, **thalai peyal**, **thaazh peyal**, **thullup peyal**, **thuli thalai kondha nali peyal**, **thuli peyal**, **nadunaal kalai peyal**, **paattam**, **parupp peyal**, **peyar kadai naali**, **peyal kaal**, **peyalum ovaadhu**, **pongu peyal**, **perum peyal**, **mali peyal**, **maal peyal**, **migu peyal**, **van peyal**, and **vambap perum peyal**.

The word *kaar*, another synonym for rain, appears with expressions like **kaar**, **kaarbayam pozhindha neer thigazh kaalai**, and **thali tharu than kaar**.

Thuvulai, another word for rain, is seen in phrases like **thuvulai thoova**, **thoom thuvulai**, and **thoottum thivulai**. Similarly, *urai* appears as **per urai**, **urai vizhl**, **kathazh urai**, **parurrai pal thuli sithari urai**, and **maari per urai**.

The word *maari* (rain) is used in phrases like **kaala maari**, **kaalodu patta maari**, **patta maari**, **perunthani maari**, **vamba maari**, **varaiyaa marapin maari**, and **vizhundha maari**.

Saaral (drizzle) is seen in **thali pozhil saaral**. *Thuli* (drop) appears in **azhi thuli**, **aali azhi thuli**, **kanai thuli thalai**, **kurun thuli**, **kuruuth thuli**, **thuli serinthaangu**, **thoo thuli**, **mali thuli**, **thooval**, and **mayangu thuli**.

References to **the end of rain** include phrases such as **mazhai kazhi visumbu** (sky after rain), **mazhai kani maariya** (fruit of rain changed), and **mazhai peyal marantha** (forgotten rain). Distant rain is also described in ancient poems like those in the **Kurunthogai**. Even though the Sangam poets mainly focused on personal (inner) and social (outer) lives, they skillfully embedded **scientific insights** in their works.

When poets call rain-bearing clouds "**clouds of compassion**" or liken them to the **complexion of Lord Krishna**, they are also expressing a keen understanding of **atmospheric science**. White clouds do not bring rain. **Dark clouds**, rich in moisture, do. These clouds contain **electrical energy** and have the power to generate **lightning and thunder**. That's why dark clouds are compared to Lord Krishna. The devotees sing joyfully, **"Kanna! Kaarmugil Vanna!"** (O Krishna, you are the color of dark clouds). Because like the clouds that shower gentle,

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life-giving rain, **He is full of compassion and strength**—willing to shower His grace and unleash divine justice where needed.

When the **sun heats the salty ocean water**, it turns into vapor. This vapor rises and floats in the sky. Winds push it higher and higher. These clouds are then drawn by winds to the **mountains**, where cool forests chill the clouds. As the temperature drops, the clouds release rain. The **rainfall on the mountain peaks** then flows down as **streams and rivers**, benefiting all living beings.

From the **dark sea**, clouds rise due to the **sun's heat**—these clouds carry rain. When they are full, **electric charges** within them lead to **thunder and lightning**. These **dark monsoon clouds**, born from the sea, travel to the **mountains** to shower rain. This is captured beautifully in the **Kurinji poem (47–55)**:

"The dense monsoon cloud, taking in less as it gave more, stirred the vast sky like a rhythmic drum, resonating like the sweet sound of a veena; as it rolled, stunned by the swirling winds, the lord with long, flowing hair released clear waters."

The **Kurinji poet** has eloquently described the **scientific process of rainfall** in poetic beauty.

LITERATURE AND RAIN

The poems of Sangam poets, who celebrated inner (love) life in harmony with nature, contain many references to rain that closely align with today's meteorological and scientific understandings. For example, water from seas and lakes evaporates due to the sun's heat. This vapor rises into the atmosphere, where it cools and condenses into clouds. When sufficiently dense, these clouds release rain. This process, where evaporated water returns as rain, forms streams and rivers and eventually rejoins seas or lakes, is what we now call the **hydrological cycle**. Such fundamental physical concepts of rainfall are referred to in ancient Tamil literature.

In the *Natrinai*, under the *Mullai* landscape (symbolizing forests and rainy season), the poet **Ilandiraiyan** mentions rain pouring as "**kamanchool maamazhai**" (a great rain that drew water from the ocean), and another unnamed poet states "**innīr tadangadal vāyil uṇḍu, silnīr ena**" (the vast sea at the mouth contains sweet water), implying rain originates from the sea. Similarly, **Marungur Pattinaththu Sendhan Kumaranar** wrote, "**vAnam naḷi kaṭal mukandu, seṛitaka iruḷi kanai peyal pozhindhu**," referring to dark clouds drawing water from the sea and raining heavily.

Along the same lines, **Perungkundrur Kizhar**, in a *Kurunji* (mountain landscape) poem, describes, "**maakadal mukandu, maṇi niṛatthu aruvith thāl̲ nīr**," i.e., water drawn from the vast ocean cascades down like a shining waterfall.

In another poem from *Kurunthogai*, **Kachchi Pettai Nannagaiyar** describes the rainy season: Just as a woman weakened by pregnancy feels desire for sour tamarind, the rainclouds, filled with moisture drawn from the sea, unable to climb the skies immediately, are driven by winds toward fertile mountains, where they burst into heavy rainfall. She writes, "**Mun nāḷ thingaḷ niṟai poruththu...perungali vānam ērtarum pozhuthe**," portraying the clouds traveling to rain over green hills.

This vivid imagery mirrors the current **Southwest Monsoon**, where clouds from the **Arabian Sea** are pushed to rise over the **Western Ghats** and result in rainfall. In the *Pattuppāṭṭu* anthology, in the fifth poem on **Senguttuvan**, the poet **Paranar** notes how the clouds absorb water from the ocean: "**maḻai koḷak kuṟaiyāthu, punal puka niṟaiyāthu, vilaṅgu vali kaṭavum tuḷaṅgu irung kamanchool**," describing how clouds remain full, pulling water from the sea, moving with intensity, and thundering with might.

Likewise, in the *Paripāṭal*, poet **Nallanthuvanār** captures the overflowing rain: "**niṟai kaṭal mukandu urāy, niṟaindu nīr tuḷampum tham porai thavirpu asaivida pozhindhanru vAnam; nilam maṟaivathu pōl malir piñal thalai thalaī**," Here, he portrays the sky, having drawn water from the filled sea, releasing it as rain to lighten its burden. The resulting floodwaters spread across the land, submerging it completely.

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This translation showcases how deeply Sangam literature integrates poetic expression with acute observation of natural processes—anticipating scientific principles such as evaporation, condensation, and precipitation centuries before modern meteorology.

Movement of Clouds

Several Sangam verses describe the movement of rainclouds that form over the sea and travel westward (to the right). These references suggest an early understanding of the **northeast monsoon winds** and how they influence the movement of clouds and rainfall.

Cloud Movement Toward the West

- **"valanērpu aṅkaṇ iru visumbadhira ēr̲oru peyal toṭanginrē vānam"** *(Ainkurunūru – 469)*

"The sky in the west begins to rain, as the clouds turn right and rise into the open sky."

- **"paṇai mul̲aṅgu ezhili pauvam vāṅki tāl̲ peyar̲ perunīr valan ēr̲pu vaḷaii"** *(Akanān̲ūr̲u – 840)*

"Gathering the thunderous and splendid Pauvam clouds, the large water-filled clouds arc rightward."

- **"koṇḍal māmal̲ai kuṭakku ēr̲pu kul̲aitha"** *(Nar̲r̲iṇai – 140)*

"The heavy rainclouds swirl and rise like a mighty swirl to the right."

- **"kaṭal mukaṅdu koṇḍa kāmañ cūl māmal̲ai cuṭar nimir min̲n̲oṭu valan ēr̲pa"** *(Akanān̲ūr̲u – 43)*

"The great rainclouds, having drawn water from the sea, move westward flashing with lightning." These lines all point to **clouds forming over the sea and moving westward**, which clearly indicate an early understanding of **northeast monsoon wind patterns**.

Clouds Colliding with Mountains to Cause Rain

- **"veñcuṭar karanta kāmañcūl vān̲am neṭumpal kun̲r̲attuk kur̲umpala mar̲uki tāil perumpeyal tal̲aiiya yāmattu"** *(Nar̲r̲iṇai – 261)*

"The rain-laden sky that hides the sun moves toward the tall mountains, clashes, and showers heavily at night."

- **"vaḷiporu min̲n̲oṭu vān̲iruḷ parappi viḷivu'unr̲u kiḷaiyoṭu mēlmalai mur̲r̲i taḷipol̲i cāral tatar malar tāai"** *(Pathirruppathu – 12)*

"With lightning and darkness spread across the sky, the clouds cover the upper hills and pour droplets like blooming flowers." These poetic lines describe **orographic rainfall** – where clouds are pushed up by mountain ranges, condense, and rain – a concept widely accepted in modern meteorology.

Rain Clouds After Showers Become Soft and White

- **"peytu pulan tiraṅta poṅkal veṇmal̲ai eḵku'ur̲u pañcit tuyyappaṭṭanna"** *(Akanān̲ūr̲u – 217)*

"The clouds, having poured out their rains, now appear soft and white like carded cotton." This suggests an observation of **post-rain cloud dissipation**, where rainclouds lighten and become wispy.

Ancient Tamil Understanding vs Modern Satellite Views

Today, astronauts aboard space missions capture photographs showing the Earth's oceans and continents clearly from 200–300 km above. Cloud formations appear clustered over oceans and spiral in circular patterns in the atmosphere. Amazingly, the **inner vision (imagination and insight)** of Sangam poets mirrors these modern observations.

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Astounding Insight of Mullai Poet Nappūthanār

The poet **Nappūthanār** of *Mullaippāṭṭu* is worthy of being called an ancient meteorologist. He poetically describes:

- The ocean's thunderous roar,
- Its cooling effect,
- The dark clouds rising after absorbing sea water,
- And finally, the westward spiraling movement of those clouds:

"pāṭimiḻ paṉikkaṭal paruki valanērpu kōṭukoṇṭu ezhunda koṭuñcelavu ezhili" *(Mullaippāṭṭu: 5–6)*

“From the frost-touched sea of classical Tamil, clouds rise drawing in water, spiraling rightward with force and brilliance.” This poetic verse captures **evaporation, cloud formation, and directional movement**—a remarkable ancient parallel to today’s atmospheric science. Through deep poetic insight and vivid imagery, **Sangam poets accurately observed and understood the monsoon system**, including:

- Evaporation from the sea
- Cloud formation and westward movement
- Orographic rainfall due to hills
- Dissipation of clouds post-rainfall

Their verses are not only literary masterpieces but also early records of **proto-scientific meteorological knowledge**—long before the age of satellites or formal science.

The Movement of Rain

The ancient Tamil poem *Mullaippāṭṭu* beautifully expresses the movement of rain: how clouds rise from the frost-covered seas, travel to the sky toward the right (west), and then release rain when met with cool air. This concept is illustrated in the verse:

"As the wet Earth curves like a discus, with a conch-engraved strong, circular arm That channels water, rising like the mighty Vishnu, Drinking the frosty sea, it rises spiraling to the right, A majestic force leaping up with fierce energy." *(Mullaippāṭṭu: lines 1–5)*

This describes not only the **evaporation and upward spiral of clouds** but also **indicates the arrival of the rainy season** (monsoon).

Movement of Venus and Rain Prediction

Sangam poets also observed the **planet Venus** in the sky to forecast rainfall:

- If Venus travels **northward**, it was believed that rainfall would be **plentiful**.
- If Venus moves **southward**, rainfall would **decline**.

This is referenced in several verses:

> **"Even if bright-beaming Venus moves southward..."** *(Puṟanāṉūṟu 35:7 – Vellakkudi Nākanār)*
>
> **"Even if Venus runs toward the southern direction..."** *(Puṟanāṉūṟu 117:2 – Kapilar)*

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Further elaborated in *Paṭṭinappālai*:

"Even if the bright and famous Venus turns direction and moves south, Even if the clouds scatter and birds dry up from lack of dew, Even if the sky deceives us and fails to rain –The mountain-top-fed Kaveri, Flowing from the hills to the ocean, Will still spread and shine like gold." *(Paṭṭinappālai: lines 1–7 – Kadiyalūr Uruthiraṅkaṇṇanār)*

These verses show an **early understanding of planetary influence** on rainfall and reflect how **observational astronomy and meteorology** were interconnected in ancient Tamil thought.

Scientific Understanding in Sangam Literature

Ancient Tamils were **keen observers of the sky**. They noted cloud behavior, the direction of wind and rain-bearing clouds, and the influence of celestial bodies on weather patterns. These insights formed the basis for predictive weather knowledge. Thiruvalluvar captures the **fundamental truth** of rain in a single couplet:

"If water is absent, so is the world; If the sky does not rain, it does not flow." *(Tirukkural 20)*

This profound concept – that **life cannot exist without water**, and that **rain is the source of that water** – mirrors the modern phrase *"Water is the elixir of life."* However, **this truth was recorded in Tamil literature over 2,000 years ago**, centuries before its recognition elsewhere.

The Sangam poets not only celebrated rain in poetic terms but also demonstrated:

- Understanding of **hydrological cycles**
- Observations of **cloud movement**
- Insights into **wind directions and rainfall**
- Predictions based on **celestial movements (like Venus)**
- A scientific outlook long before the age of modern meteorology

Their deep engagement with **nature, astronomy, and weather** shows that **ancient Tamil literature** was not merely lyrical, but **rich in scientific thought and environmental wisdom**.

Rain Indicators

Literature serves as a time capsule, preserving the essence of ancient Tamil life — not only its aesthetic beauty but also its scientific insights. Among such insights are the signs of impending rain and the reasons behind it, which the ancient Tamils understood well. One such example appears in this verse:

"If tiny ants, Carrying their eggs, Move toward elevated ground, It's a sign of certain rainfall." *(Puṟanāṉūṟu 173)*

This suggests that when ants carry their eggs and move to higher land, it is an indication that **rain is imminent**. From this, we can see that the ancients **predicted rainfall based on natural signs** and animal behavior.

Saturn (Shani) and Rainfall

In ancient Tamil texts, **Saturn is referred to as "Kariyavan" (the dark one)** and **"Mai-meen" (the black planet/star)**. Modern scientists say Saturn contains **sulfur**. The belief was that **if Saturn emits smoke**, it would **diminish rainfall** and bring **hardship to both the king and the people** (Balasubramanian, 2004).

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Hydrological Cycle

In contrast to early Greek thinkers who had an **unclear understanding of the water cycle**, Sangam poets had a much **more accurate and scientific view**. For example:

- **Thales**, an ancient Greek philosopher, believed that **water originates at the sea floor**, is **absorbed by the earth**, and then **emerges from mountains as rivers**.
- **Aristotle**, teacher of Alexander the Great in the 4th century BCE, said that **cold air condenses into rain** – a slightly more developed idea.

However, around the **same time or earlier**, Tamil poets had a **clearer understanding** of the **entire hydrological cycle**. For instance, *Kadiyalur Uruthirankannanar* (2nd century BCE), in his poem *Paṭṭinappālai*, describes:

"As water touches the sky and pours down as rain, And that rain flows and fills the sea again, Just as in the season when monsoons come, Water rises from the land And spreads again from the land to the sea – Like the countless goods, Impossible to measure, That flow in and out of the harbor." *(Paṭṭinappālai 126–131)*

This beautiful comparison draws a parallel between the **natural water cycle** and the **economic trade cycle** of imports and exports at the port of Puhar. The poet clearly outlines how:

- **Sea water evaporates, forms clouds, and rains**.
- **Rainwater collects into rivers and returns to the sea**.

Such vivid poetic expression shows that **ancient Tamils had a remarkably advanced understanding** of the **scientific processes behind rainfall**, long before these ideas were formally explained in Western science.

The literary and scientific depth found in Tamil Sangam texts illustrates that **ancient Tamils closely observed nature**, **recorded environmental patterns**, and **interpreted them with clarity**. Whether it was ant behavior, planetary movement, or the water cycle, they approached natural phenomena with both poetic elegance and scientific insight.

Rainbow

The cloud carries water within it. Inside the cloud, countless tiny water droplets are spread out and suspended. When sunlight strikes these droplets, the light is **reflected and refracted**. As the sunlight enters and exits these droplets, it **splits into seven colors**, forming a **rainbow** in the sky. This natural phenomenon is known in science as **total internal reflection**. The **dark sea**, the **rain-bearing cloud**, and the **sun** are the key elements responsible for this occurrence. A poet, who understands this well, beautifully weaves all three – along with the **rainbow** born from their union – into his poetry. In *Perumpāṇāṟṟuppaṭai*, the poet refers to the scientific truth that **a rainbow briefly appears in the sky before rainfall begins**, as seen in the lines:

“As the seasons change and the sky grows high and vast, the rainbow arcs across the wide twin heavens, fading as rain nears.” (*Perumpāṇāṟṟuppaṭai 291–292*)

Another poem from *Naṟṟiṇai* (289) refers to the **increased density of clouds** just before heavy rainfall using the phrase:

“The dense darkness gathers as the black sea roars, and heavy rain begins to pour.” Here, the term **‘ceṟitakam’** (meaning tightly packed or dense) indicates the **thickening of the clouds** before rain.

Ancient Tamil poets also **observed and recorded how mountains** that lie **perpendicular to wind direction** can **block clouds and cause rainfall on their slopes**. This is illustrated in these lines:

"The sky, burdened with rain, presses against the peaks of Dantal hills, redirecting the southern and northern winds…" (*Pathitruppathu 31*)

And again in *Naṟṟiṇai 261*:

"The sky, filled with hidden lightning and desire-bearing clouds, strikes against the tall hill, unleashing a downpour over its peaks in the stillness of night."

These poetic observations match modern **meteorological understanding** of **orographic rainfall** — where **clouds pushed by the wind are forced to rise over mountains**, cooling and **releasing rain**. This is echoed clearly in *Pathitruppathu 12*:

"As lightning flashes and dark clouds spread, clouds strike the mountain peaks, pouring cool, refreshing rain over the blooming slopes."

These verses highlight the deep **natural awareness and scientific perception** of the ancient Tamil poets, showing their **understanding of the processes that cause rainbows and rain due to cloud formation, sunlight, wind, and geography.**

CONCLUSION

Tamil literature not only illustrates the lifestyle of the Tamil people, but also shines as a scientific repository that reflects scientific thinking. From the atom to the cosmos, ancient Tamil poets have recorded ideas in Sangam literature that align with scientific and technological advancements. These works revealed that the ancient Tamil people lived with a deep integration of science and everyday life. The positions and movements of planets and stars as calculated by the Tamils are now recognised as part of modern astronomy, The scientific knowledge of the Tamils served as a foundation upon which various branches of science have developed across dimensions. It becomes evident through this Paper that classical Tamil literature continues to resonate with contemporary scientific and technological progress. Thus, Tamil life-literature not only preserves cultural heritage, but also stands as a parallel contributor to scientific thought and innovation.

BIBLIOGRAPHY

1. **Auvvai Duraisamy**, *Sangam Literature*, Tamizhman Publications, Chennai.
2. **Balasubramanian**, Ku. Ve., *Sangam Literature*, New Century Book House, Chennai.
3. **Pinnathur Narayanasamy**, *Naṟṟiṇai*, Saiva Siddhanta Publishing Society,Tirunelveli.
4. **Tatchinamoorthy**. (2011). Palantamilar nākarikamum panpāṭum [Earliest civilization and culture of Tamils]. Chennai: Aintiṇaippatippakam.
5. **Asko Parpola**. (2014). Beginnings of Indian and Chinese Calendrical Astronomy, Journal of the American Oriental Society, 134(1), 107-112.doi:10.7817/jameroriesoci. 134.1.0107.

Internet links

1. https://www.timeanddate.com/eclipse/partial-lunar-eclipse.html
2. https://www.hindutamil.in/news/blogs/67233-10.html
3. https://ta wikipedia.org/