

Traditional Weather Forecasting Through Folk Proverbs and Indigenous Beliefs in the Shekhawati Region of Rajasthan, India

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Abstract

Traditional weather forecasting is an important component of indigenous ecological knowledge, particularly in arid and semi-arid regions where agriculture depends heavily on variable rainfall. The present study documents traditional weather-forecasting practices preserved through folk proverbs and indigenous beliefs in the Shekhawati region of Rajasthan, India. Field investigations conducted during 2022-2025 in Jhunjhunu and Sikar districts involved 45 traditional knowledge holders, including farmers, shepherds, village elders, and folk singers. Data were collected through field surveys, semi-structured interviews, focus group discussions, participant observation, and informal interactions. A total of 52 weather-related proverbs were documented and classified into meteorological, astrometeorological, and biotic indicators. Meteorological indicators were predominant (22; 42.31%), followed by astrometeorological (16; 30.77%) and biotic indicators (14; 26.92%). The documented indicators included wind direction, cloud patterns, sky conditions, temperature, astronomical phenomena, animal and bird behaviour, insect activity, and plant phenology, and were traditionally used to anticipate rainfall, drought, monsoon patterns, and agricultural prospects. Several indicators showed plausible associations with established meteorological and ecological processes, demonstrating the empirical basis of local forecasting knowledge. However, the concentration of this knowledge among older respondents highlights the need for its systematic documentation and intergenerational transmission. Integrating indigenous forecasting knowledge with scientific weather information may strengthen climate-resilient agriculture and locally appropriate adaptation strategies in drought-prone regions.

Key words: Indigenous knowledge, Traditional weather forecasting, Folk proverbs, Weather indicators, Shekhawati, Rajasthan

Weather is a fundamental component of the natural environment that influences ecosystem functioning, agricultural productivity, and human livelihoods. Since ancient times, societies have relied on meteorological observations and forecasts for their survival, resource management, and agricultural planning. Agriculture is highly sensitive to climatic factors such as rainfall, temperature, humidity, and seasonal variability, so timely weather information is essential for decisions related to sowing, irrigation, crop management, and harvesting [1-4]. Long before the rise of modern meteorology, indigenous communities developed sophisticated weather forecasting systems based on cumulative observations of environmental phenomena. These forecasting traditions, preserved through oral transmission, folk sayings, and customary methods, are an integral part of traditional ecological knowledge [5]. Indicators such as cloud formation, wind direction, atmospheric conditions, astronomical phenomena, plant phenology and the behaviour of animals, birds and insects have long been used to forecast upcoming weather conditions [6-8]. Such forecasting systems remain an integral part of indigenous climate knowledge in many regions of the world [9-10].

Numerous studies indicate that Indigenous weather-forecasting systems provide valuable insights into local environmental dynamics and can complement scientific forecasts, particularly at the local scale [11-15]. Integrating Indigenous and scientific forecasting approaches can improve agricultural decision-making and strengthen resilience to climate variability [16-18].

In India, traditional weather forecasting methods vary according to ecological and cultural contexts. Farmers in Tamil Nadu use environmental indicators to make agricultural decisions [19], while communities in Uttarakhand interpret atmospheric, biological, and seasonal signals to predict the weather [20]. In the arid region of Ladakh, forecasting integrates environmental observations, biological behaviour, and traditional calendars [21]. Reviews further highlight the use of diverse abiotic and biotic indicators for predicting rainfall and other weather conditions across India [22]. Despite the growing recognition of indigenous meteorological knowledge, its systematic documentation in the arid and semi-arid regions of northwestern India is still limited. In Rajasthan, especially in the Shekhawati region, traditional weather forecasting is rooted in folk wisdom and long-term environmental observations

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passed down through generations. However, this knowledge is becoming increasingly vulnerable due to socio-economic changes, changing agricultural practices and a decline in the transmission of knowledge from generation to generation. Therefore, systematic documentation and critical evaluation are essential to protect this important component of traditional ecological knowledge.

The present study documents and classifies traditional weather forecasting proverbs and local beliefs from the Shekhawati region of Rajasthan. The study also analyzes the ecological basis and contemporary relevance of the documented indicators, classifying them into meteorological, astrometeorological, and biological groups, and discusses their significance in the context of sustainable agriculture and climate adaptation.

MATERIALS AND METHODS

Study area

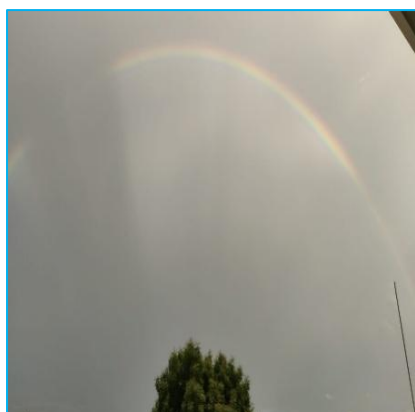
The present investigation was conducted in the Shekhawati region of Rajasthan, India, between 2022 and 2025. The study area comprises the districts of Jhunjhunu and Sikar, located in the north-eastern part of the state (Fig 1). The region is characterized by an arid to semi-arid climate with low and erratic rainfall, frequent droughts, and high dependence on rain-fed agriculture, where indigenous weather forecasting remains an important traditional practice.

Study villages were purposively selected to document indigenous weather-forecasting traditions and associated knowledge systems. Information was gathered through repeated field surveys, semi-structured interviews, focus group discussions, participant observation, and informal interactions with local knowledge holders (Plate 1). The study involved 45

respondents, comprising experienced farmers, shepherds, village elders, folk singers, and other traditional knowledge holders. Prior informed consent was obtained from all participants before data collection. Weather-related folk sayings were recorded in the local dialect, translated into English, and classified into meteorological, astrometeorological, and biological indicators based on their primary predictive significance. The data were analyzed using descriptive statistics and qualitative interpretation, and their ecological relevance was assessed.



Fig 1 Location map of Shekhawati region



(a) Rainbow



(b) Solar halo



(c) Partridge wing-coloured clouds



(d) Ants carrying eggs



(e) Dancing peacock



(f) Lapwing eggs



(g) Khejri tree



(h) Discussion with farmers



(i) Interview with a shepherd

Plate 1 Folk Indicators and indigenous knowledge used for traditional weather forecasting

RESULTS AND DISCUSSION

A total of 45 respondents from selected villages in the Shekhawati region participated in this study (Table 1). Most respondents (73.33%) were over 55 years of age, indicating that

the older generation largely retains traditional knowledge related to weather forecasting. A relatively low representation of younger respondents suggests a gradual decline in the transmission of indigenous weather-forecasting knowledge to younger generations.

Table 1 Demographic characteristics of respondents (n = 45)

Demographic variable	Category	Number of respondents	Percentage (%)
Gender	Male	28	62.22
	Female	17	37.78
Age group (Years)	45–55	12	26.67
	56–65	18	40.00
	Above 65	15	33.33

The survey recorded 52 traditional proverbs and indigenous beliefs related to weather forecasting, reflecting ecological knowledge accumulated over generations. These proverbs embody a culturally embedded system of environmental observation, interpretation, and local weather prediction in the semi-arid landscape of Shekhawati. They are primarily used to anticipate rainfall, drought, monsoon patterns,

seasonal changes, and agricultural conditions. Based on their primary forecasting cues, they were classified into Meteorological (42.31%), Astrometeorological (30.77%), and Biotic indicators (26.92%) (Fig 2, Table 2). These indigenous forecasting practices demonstrate the significant role of traditional ecological knowledge in understanding local weather patterns and supporting climate-resilient.

Table 2 Folk weather forecasting proverbs recorded from the Shekhawati region of Rajasthan

S. No.	Folk Proverb	Meaning	Indicator	Weather predicted
1.	<i>Aagam sujhe sandani daude thalan apar, Pag patake bai the nahi Jad meh avan har</i>	Restless behaviour of camels indicates impending rain.	Animal Behaviour	Rainfall
2.	<i>Aasadhi Punam dina nirmal uge Chand, Koi Sindh koi Malwe Jaya katsi fand</i>	A clear full moon on <i>Ashadha</i> Purnima indicates famine.	Moon Observation	Drought
3.	<i>Aasojan me moti barse</i>	Even light rain in <i>Ashwin</i> is considered valuable.	Rainfall–Month Relation	Agricultural benefit
4.	<i>Adra bhre khabda, Punarbasu bhare talab</i>	<i>Adra</i> Nakshatra brings scanty rain; <i>Punarvasu</i> Nakshatra brings abundant rain.	Nakshatra	Rainfall
5.	<i>Agasto ugyo meh pugyo</i>	Appearance of the Agastya star marks the end of the rainy season.	Star Observation	End of monsoon
6.	<i>Akha Teej ke tithi dina, Guru Rohini Snjut, To Dank khe Bhaddli upje naj bhot</i>	<i>Akha Teej</i> with <i>Guru-Rohini</i> conjunction indicates abundant grain production.	Calendar Observation	Good monsoon
7.	<i>Ammar hariyo chuve tapariyo</i>	Green skies indicate normal rainfall.	Sky Colour	Normal monsoon
8.	<i>Ammar peelo meh seelo</i>	Yellow skies indicate absence of rainfall.	Sky Colour	Dry weather
9.	<i>Ammar rachyo meh machyo</i>	Red skies indicate heavy rain.	Sky Colour	Rainfall
10.	<i>Asadha sud nomi ghan badal ghan beej, Kotha kher khankherlyo jholi rakho beej</i>	Clouds and lightning on <i>Ashadha</i> <i>Navami</i> indicate abundant harvest.	Clouds and Lightning	Good crop yield
11.	<i>Badal rahe raat ka baasi to jano chokas meh aasi</i>	Cloudy skies overnight indicate rain.	Clouds	Rainfall

12.	<i>Bajnas pawan suriya baje, Ghadi palak mahi meh gaje</i>	North-west winds indicate imminent rain.	Wind Direction	Rainfall
13.	<i>Barse Bharani, chhode Parni</i>	Rain in <i>Bharani</i> Nakshatra indicates drought-induced livelihood migration.	Nakshatra Observation	Drought
14.	<i>Beri baje suriyo to haalo kiya puriyo, Ghar baithi janiyo to bhato kiya aaniyo</i>	North-westerly winds indicate no further rain.	Wind	End of rainfall
15.	<i>Bhadarvo gajyo kal bhajyo</i>	Rainfall in <i>Bhadrapada</i> month prevents famine.	Rainfall–Month Relation	Good season
16.	<i>Bhado ki chhath chandni je Anuradha hoy, Ubad khabad boy de ann ghnero hoy</i>	<i>Anuradha</i> Nakshatra on Bhadrapada Chhath predicts high grain yield.	Nakshatra Observation	Good harvest
17.	<i>Chand chhode hirani to log chhode parni</i>	Moon setting before <i>Mrigshira</i> indicates severe famine and livelihood migration.	Lunar–Nakshatra Observation	Famine
18.	<i>Chidi jo nhave dhoor me meha aavnhar, Jal me nhave chidkali meh vidatin bar</i>	Sparrow dust-bathing indicates rain; water-bathing indicates the return of the monsoon.	Bird Behaviour	Rainfall or monsoon withdrawal
19.	<i>Din men syal sabad jo karai, nischaya hi kal halahal padai</i>	Daytime howling of jackals indicates famine.	Animal Behaviour	Drought
20.	<i>Do sawan do bhadwa do kati do magh, Dhandha dhoori bechkar naj bisawan jai</i>	Two Sawan or Bhadrapada months indicate famine.	Lunar Calendar Anomaly	Famine
21.	<i>Ghur brsale lunkdi unchi ghuri khinant, Bheli hoy jo khel kre, to jaldhar ati barsant</i>	Foxes denning at high altitudes indicates heavy rain.	Animal Behaviour	Heavy rainfall
22.	<i>Girgit rang birang ho, Makhi chatke deh, Mankdiyan cheh cheh kre jad at jo meh</i>	Activity of chameleons, flies and spiders indicates heavy rain.	Animal/Insect Behaviour	Heavy Rainfall
23.	<i>Jalan ghani jowar kairan ghani kapas, Akan ghno gaun, khejda ghani bajri</i>	Flowering in some plants predicts crop yield.	Plant Phenology	Agricultural productivity
24.	<i>Jay din main pade tawdo, ratan thanda bav, Dank Kahe he bhaddli yo kala ro swabhav</i>	Hot days and cold nights indicate an impending drought.	Temperature	Drought
25.	<i>Je purwa lyave purvai to suki nandi nav chalai</i>	Easterly winds in <i>Bhadrapada</i> indicate heavy rainfall.	Wind	Heavy rainfall
26.	<i>Jeth badi dashmi divas je Shaniwar hoy, Pani hoy na dharan me birlo jeeve koy</i>	Specific calendar combinations indicate severe drought.	Calendar-Based	Drought
27.	<i>Jeth mas jo tape nirasa, to jano birkha ki aasa</i>	Intense heat in Jyeshtha indicates good rainfall.	Temperature Condition	Good monsoon
28.	<i>Jeth me chale purvai to Sawan suko jai</i>	Easterly winds in Jyeshtha indicate a dry Sawan.	Wind	Drought
29.	<i>Jetha ant bigadiya punyu na padva</i>	Rain on Jyeshtha Purnima is unfavourable for agriculture.	Moon Observation	Poor crop season
30.	<i>Jhinguria bole ghna, nadi tata neer, Anda le chinti chadhi to barkha bharpur</i>	Loud cricket calls and ants carrying eggs uphill indicate abundant rainfall.	Insect Behaviour	Abundant Rainfall
31.	<i>Jo barse Uttara to dhaan na khave kurta</i>	Rain in Uttara Nakshatra indicates abundant production.	Nakshatra Observation	Bumper harvest
32.	<i>Kati ro meh katak Barabar</i>	Rain in Kartik month damages crops.	Rainfall–Month Relation	Untimely rainfall
33.	<i>Soma, Sukra Surgura je chanda ugant Dank khe he Bhaddli jal thal ek karant</i>	A moonrise during Ashadha on Monday, Thursday, or Friday predicts heavy rainfall.	Moon Observation	Good rainfall
34.	<i>Magh mas jo pde seet, mehe nhi janiyo meet</i>	Severe winter in Magh indicates poor rainfall the following year.	Temperature	Drought
35.	<i>Na bhijyo kakdo to kyu tere hali lakdo</i>	No rain on Cancer Sankranti indicates famine.	Calendar Event	Drought
36.	<i>Naada tanka bald bikawan, mat baje tu aadhe savan</i>	Southeasterly winds during mid-monsoon indicate famine.	Wind Direction	Drought
37.	<i>Nimboli suke neem pe pade na nichhi aay, Ann na nipje ek kan kaal padego aay</i>	Dried neem fruits on the tree indicate famine.	Plant Phenology	Drought
38.	<i>Papiho piyu piyu kare, mora ghani ajag, Chhatra kare moriya sire nadiya bahe adhag</i>	Common Hawk-Cuckoo calls and peacock dances indicate heavy rain.	Bird Behaviour	Heavy Rainfall
39.	<i>Purwa upar pachhwa firey, Ghar baithe Panihari bhare</i>	A shift from easterly to westerly winds indicates heavy rainfall.	Wind	Heavy rainfall
40.	<i>Rohan baje Mrig tep, Galo hali kyu khape</i>	Strong winds and thunder in Rohini, or intense heat in Mrigashira, indicate drought.	Nakshatra	Drought

41.	<i>Rohan reli to rupaye ki adheli</i>	Rain in Rohini Nakshatra indicates scarcity.	Nakshatra	Drought
42.	<i>Ugantro machhlo athantro mokh, Dank khe he Bhaddli nadiyan chadhsi gokh</i>	A sunrise rainbow and intense sunshine at sunset indicate heavy rainfall.	Rainbow	Heavy rainfall
43.	<i>Sangar gani ker til aak gana kapas, Fogas fotiya badli bandhe samay ki aas</i>	Abundant flowering and fruiting of indicator plants indicate good crop yield.	Plant Phenology	Good harvest
44.	<i>Sanp goyra dedra kidi makodi jai, Dar chhode bahar bhme nhi meh ki aas</i>	Movement of reptiles, frogs and insects indicates rain.	Animal Behaviour	Rainfall
45.	<i>Savan me suriyo bhalo bhadarva purvayi, Asojan me chale pichhva bhar bhar gada layayi</i>	North-westerly winds in Sawan and westerly winds in Ashwin indicate a good harvest.	Wind	Good monsoon
46.	<i>Sawan surangi khejri kati biranga khet, Sawan birangi khejri kati suranga khet</i>	Khejri phenology indicates future crop conditions.	Plant Phenology	Crop forecast
47.	<i>Saware ro gajiylo nahi jaaye</i>	Morning storms indicate rain.	Thunder	Rainfall
48.	<i>Sukarwari badli rahe, Sanichar chhaye, To yun bhakhe Bhaddali bin barse na jaye</i>	Friday clouds persisting until Saturday indicate rain.	Clouds	Rainfall
49.	<i>Suraj kund aur Chandra Jaleri, Tutya teeba bhargi dehri</i>	Halos around the sun or moon indicate impending rain.	Solar/Lunar Halo	Rainfall
50.	<i>Teetar pankhi badli, vidhva kadal rekha, Ba barse ba ghar Kare ime meen na mekh</i>	Partridge feather-shaped clouds indicate rain.	Clouds	Rainfall
51.	<i>Tole mil ke kanwli aay thalan baithnt, Din chothe ke panchwe jal-thal ek karant</i>	Grounded eagles indicate rain within 4-5 days.	Bird Behaviour	Rainfall
52.	<i>Unche mathe titudi barse musladhar, Neeche mathe titudi, ave akal apar</i>	Lapwing nesting at higher elevations indicates heavy rainfall.	Bird Nesting Behaviour	Heavy rainfall

Table 3 Distribution of proverbs according to indicator categories

Indicator category	Number of proverbs	Percentage (%)
Meteorological Indicators	22	42.31
Astrometeorological Indicators	16	30.77
Biotic Indicators	14	26.92
Total	52	100.00

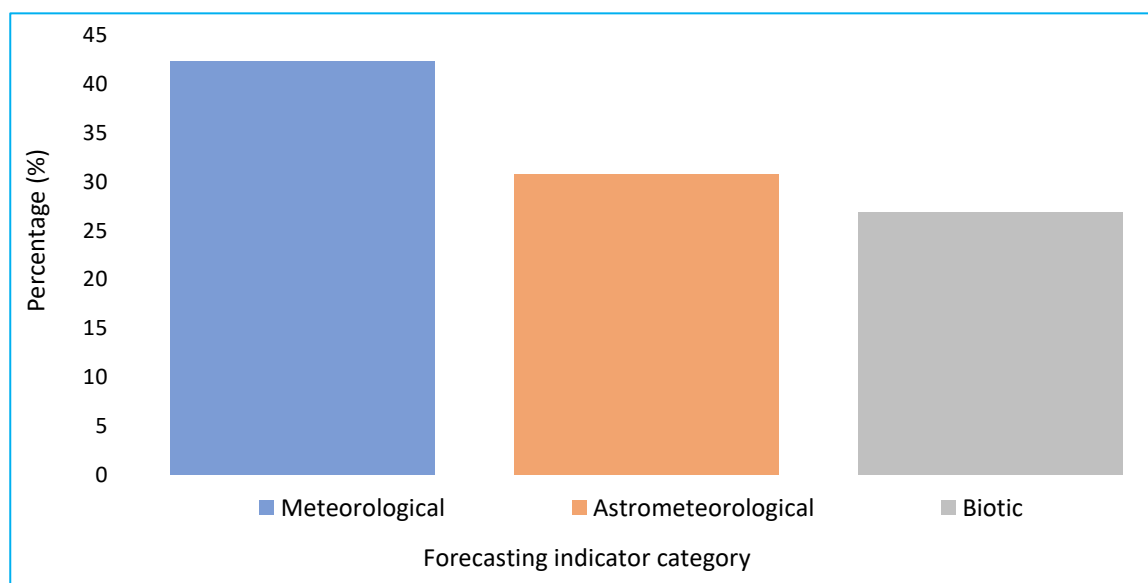


Fig 2 Forecasting indicators used by respondents (%)

Meteorological indicators

Weather-related indicators were the largest category, comprising 22 (42.31%) of the 52 proverbs documented. These proverbs rely on observable atmospheric phenomena, such as wind, clouds, rainfall patterns, temperature, thunder, and lightning, as well as visual phenomena like rainbows and changes in sky colour, to predict weather conditions (Table 2). Wind-related observations were the most frequent (7; 31.82%), followed by cloud characteristics and atmospheric optical

phenomena (4 each; 18.18%). Rainfall-month relationship and temperature-related indicators were found in three proverbs each (13.64%), while thunder and lightning were mentioned in only one proverb (4.55%) (Fig 3).

The predominance of wind-related indicators highlights the importance of wind direction in predicting monsoon behaviour in the semi-arid landscape of Shekhawati. For example, the proverb “*Purwa upar pachhwa firey, ghar baithe panihari bhare*” associates a change in wind direction with

abundant rainfall, while “*Teetar pankhi badli*” associates the appearance of clouds shaped like pheasant wings with impending rain. A similar dependence on wind direction and cloud characteristics is observed in indigenous weather forecasting systems prevalent in India and other parts of the world, where atmospheric circulation and specific cloud formations are widely recognized as indicators of rainfall and changing weather conditions [23-24]. The close relationship between these traditional observations and established meteorological principles suggests that they are based on long-term empirical observations of local atmospheric processes.

Astrometeorological indicators

Astrometeorological indicators accounted for 16 (30.77%) of the 52 documented proverbs and were based on observations of the moon, stars, constellations, solar and lunar halos, and traditional calendar events (Fig 4). Constellation and lunar observations in this category accounted for 68.75% of the total, reflecting their importance in traditional agricultural calendars and weather forecasting. For example, the proverb “*Jo barse Uttara to dhaan na khave kutra*” predicts a bountiful harvest after rain during the Uttara nakshatra, while “*Suraj kund aur Chandra Jaleri*” associates halos around the Sun or Moon with impending rain. There is evidence of similar use of celestial signs such as the moon, stars, halos and seasonal celestial phenomena for weather forecasting among indigenous communities living in different parts of the world, where these served as reliable indicators of seasonal changes and rainfall variability [25-26]. The connection of solar and lunar halos to rainfall is also supported by modern meteorology, as these optical phenomena are produced by ice crystals in cirrostratus clouds that typically precede rainfall, demonstrating the strong empirical basis of indigenous weather-forecasting practices.

Biotic indicators

Of the 52 documented proverbs, 14 (26.92%) were based on biological indicators, including observations of animal behaviour, bird activity, plant phenology and insect activity

(Fig 5). Animal-based and bird-based indicators together accounted for 64.28% of this category, highlighting their importance in indigenous weather forecasting. Respondents associated the dancing of peacocks, nesting of lapwings at high places, the call of cuckoos before the monsoon, and ants carrying eggs to higher places with the coming rain. Plant-based indicators primarily include the flowering and fruiting phenology of *Prosopis cineraria*, *Azadirachta indica*, *Capparis decidua*, and *Salvadora persica*. Comparable indicators have been documented from traditional forecasting systems in India and other regions of the world, where changes in animal behaviour, insect activity, and plant phenology are widely recognized as reliable predictors of weather variability [27-30]. The consistency of these biological responses with changing environmental conditions suggests that indigenous forecasting is based on long-term ecological observations.

Ecological significance and contemporary relevance of indigenous forecasting systems

Documented forecasting traditions integrate meteorological, astrometeorological, and biological observations into a comprehensive environmental monitoring system. Many of the recorded indicators correspond closely to established atmospheric and ecological processes (Table 4), indicating that indigenous weather forecasting is based on long-term empirical observations of the natural environment. Similar findings have emerged from indigenous communities in Asia, Africa, Australia and Latin America, where traditional weather knowledge is increasingly recognized as an important component of traditional ecological knowledge and climate adaptation strategies [31]. Despite the widespread availability of scientific weather forecasts, many farmers continue to integrate traditional forecasts with modern meteorological information to support agricultural decision-making. Such complementary use of traditional and scientific knowledge can increase resilience to climate change, improve agricultural planning, and promote sustainable natural resource management, especially in drought-prone areas.

Table 4 Scientific interpretation of selected indigenous weather-forecasting indicators

Weather-forecasting indicator	Traditional interpretation	Scientific interpretation	Scientific discipline
Change in wind direction	Rainfall or onset of the monsoon	Changes in wind circulation facilitate moisture transport and monsoon advancement	Meteorology
Persistent overnight clouds	Rainfall expected	Stable cloud systems often precede precipitation	Meteorology
Solar or lunar halo	Rainfall likely	Halos are produced by ice crystals in cirrostratus clouds, which frequently precede rainfall	Atmospheric Physics
Intense pre-monsoon heat	Good monsoon	Enhanced land-sea thermal contrast strengthens monsoon circulation	Climatology
Peacock dancing	Imminent rainfall	Behavioural response to increasing humidity and atmospheric changes	Behavioural Ecology
Sparrow dust bathing	Rainfall expected	Behaviour influenced by changes in humidity and environmental conditions	Avian Ecology
Ants carrying eggs to higher ground	Heavy rainfall	Rising soil moisture and humidity trigger flood-avoidance behaviour	Entomology
Lapwing nesting on elevated ground	Heavy rainfall	Adaptive nest-site selection reduces the risk of nest flooding	Avian Ecology
Flowering of <i>Prosopis cineraria</i>	Good crop season	Plant phenology responds to seasonal temperature and moisture availability	Plant Ecology
Persistence of dried neem (<i>Azadirachta indica</i>) fruits on the tree	Drought	Moisture stress influences fruit development and retention	Plant Physiology
Appearance of the Agastya (<i>Canopus</i>) star	End of the monsoon season	Seasonal astronomical marker coinciding with monsoon withdrawal	Astronomy and Agroclimatology

CONCLUSION

This study documents 52 traditional proverbs and indigenous beliefs related to weather forecasting from the Shekhawati region of Rajasthan, reflecting the richness of local ecological knowledge developed through long-term observation of atmospheric, astronomical and biological phenomena. Meteorological indicators were the largest category, followed by astrometeorological and biological indicators, highlighting the diverse environmental signals used by rural communities to forecast rainfall, drought, seasonal changes and agricultural conditions. Many of the documented forecast indicators are consistent with established meteorological and ecological processes, indicating that Indigenous weather forecasting is based on systematic empirical observations rather than solely on cultural beliefs. However, the concentration of knowledge among older

respondents suggests a gradual decline in intergenerational transmission. Integrating indigenous knowledge of weather forecasting with modern meteorological information can increase climate resilience, improve agricultural decision-making, and support sustainable resource management in arid and semi-arid regions. Therefore, systematic documentation and scientific evaluation of this knowledge is essential to preserve an important component of cultural heritage as well as to promote locally adapted climate change strategies.

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