Biological Forum – An International Journal **15(10): 73-76(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Animals as Bioindicator to Predict Weather Forecasting in Tamilnadu

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(Received: 15 July 2023; Revised: 16 August 2023; Accepted: 13 September 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: A study was conducted at Salem and Kanchipuram districts of Tamil Nadu to find out various indigenous weather forecasting methods followed by ethnic people, especially farmers and fisherman. Biotic indicators are used by farmers for weather prediction in indigenous knowledge's covering various beliefs and customs, social and religious taboos, music, ecology communication methods, vegetation, season and climate etc. The bioindicators are mainly focused in this study based on the behaviour of animals. The farmers and ethnic people were selected by using simple random sampling. The data was collected in personal interview by using well structured and pre tested interview schedule. The percentage analysis used to analyze the collected data. Among different indigenous practices, based on behaviour of animals fourteen traditional weather prediction related to rainfall and other climate changes were identified. These are grass roots innovations which are helpful to the farmers to make their farming decisions and cropping patterns and other related activities.

Keywords: Animal behaviour, Traditional knowledge, Weather foresting, Salem, Kanchipuram, Tamil Nadu.

INTRODUCTION

Traditional beliefs are abundant particularly in the farming community. Farmers, ethnic and local people, fishers are immediately to recognize weather conditions. Traditional knowledges are more on various aspects like season and climate, weather forecasting, rainfall, land preparation crop varieties, water management, manures and manuring, irrigation, plant protection and post harvest operations including storage and processing of agricultural farm products (Chisadza *et al.*, 2015).

The local people through the accumulation of experiences and knowledge, informal experiments and understanding of the environment in a given culture are able to predict weather that is either favorable or unfavorable to their crop and other production systems (Ravi Shankar *et al*., 2008). In tropics farming is extremely weather sensitive farmers were depend on lot of things in and around them to predict weather. In tropical countries, farmers were experiencing seasonal rain fall, cyclone, floods and droughts and adjusting their farming system according to change in weather condition. Farmers were aware of when the monsoon season is coming and going to be and accordingly they decide their crop production system. The climate change is the important components to address weather forecasting. Similarly, it is associated to increase in weather variation especially in the arid and semi-arid ecosystems of the traditional weather systems found by Sivakumar *et al*. (2005). The different weather parameters like temperature, humidity, sunlight duration, day length and rainfall are apparently more in farming community (Anju and Bonny 2019).

Farmers use different factors (biotic and abiotic) around them like atmospheric condition, behaviour of botanicals and trees, animals, birds and insects to predict rainfall. These biotic factors different behaviours are observed by farmers based on monsoon which they predict possibility of rain and the intensity of rain in short period. Successful farming is measured by farmers mainly on amount and distribution of rainfall in a crop season. Anandraja *et al.* (2008) identified that fifteen traditional weather and climate related practices that farmers in Coimbatore district of Tamil Nadu to help in their farming system to predict forecasting weather events. Acharya (2011) proposed that the behaviour of animals can reliably be used to predict the onset of the rainy season, upcoming rain, and occurrence of floods or typhoons and draughts by animals alter their natural behaviour for upcoming natural calamities.

MATERIALS AND METHODS

The present study was carried out to document the traditional indigenous knowledge of some biotic factors to predict weather forecasting and climate

change in Tamil Nadu. The indigenous knowledge were collected from four villages of Salem district (western zone) and four villages of Kanchipuram district (coastal area) of Tamil Nadu located insouthern India. The study was mainly based on the data collection from the primary sources, interviews and group discussions with local elder people and personal interactions with villagers of particular zone of Tamil Nadu.

The farmers were selected by simple random sampling and the data was collected through a well structured interview schedule and group discussions in each selected villages were organized. Farmers who are above 45 years were involved in the group discussions. Information on demographic characteristics and indigenous knowledge of forecasting the onset of the rainy seasons were emerged in discussions and documented. Approximately 30 farmers in each village around 240 farmers were participated. Questionnaires were prepared to different group of elders included issues on traditional climate forecast knowledge, seasonal rainfall predictions and past climatic events documented through interviews.

The different behaviours of animals were observed by farmers based on which they make decisions about possibility of rain, flood or draught occurring and in some cases the intensity of rain. These were main innovations which time tested and to facilitate farmers to make their farming decisions in different seasons. Statistical the percentage analysis was used to analyze the data for weather predictions.

RESULTS AND DISCUSSION

A. Animals and their behaviours as indicators to predict weather

The behavioural appearance of animals are frequently used by local people to predict weather and climate in their communities. In traditional weather forecasting, the unusual behavior of certain animal's aggressive and abnormal activities to predict onset of the rainy season and upcoming rain was observed by Chanu *et al.* (2019).

Behaviour of animals like cattle, sheep, goats and frog etc were to predict rain for short range. Totally 14 animals and other living beings are listed in Table 1. This traditional knowledge and ethnic local people's long standing cumulative experiences such as cloud formation, wind directions, wind speed, air temperature, relative humidity, solar radiation, precipitation amount and lightning were indicate of rains in a particular season. The indigenous rain forecasters reasonably predict exact nature of rainfall for the entire season, including good and undesired effects (e.g., flooding, cyclone and droughts etc) (Dital *et al*., 2017).

Animals behaviour are tuned to day length, temperature, humidity, solar radiation and seasons. The behaviour of animals like grazing, sounds of animals, flocking, jumping, restless and crocking are used for the predict weather forecasting. Animals can sense that the days are getting longer, hotter or cold and they agitated and begin to return home early from grazing land. Farmers observed that when average number of cows are lying down in a grazing land, rain is coming on the way as the cows sense the moisture in the air and are making sure they found dry place to lie down. If average numbers stand up in their fields or pastures weather may be good also acknowledged (Tirlapura *at al*., 2022). If cattle become restless to predict rain few hours early by sensing cool breezes formed before rain. Therefore, they jump joyfully and return to home early with raising tail (Ravi Shankar *et al.,* 2008). The cattle look at the sky frequently because high moisture in atmosphere for immediate rain similar observation by Rengalakshmi Raj (2011) in Tamil Nadu.

Whenever clouds are formed in lower level energy is produced from water vapour and excess heat released which cannot be tolerated by sheep and goats in field or pasture. Hence, they formed flock and move in group which is observed and used by farmers to predict upcoming rain (Seetharaman, 2001). Due to increasing moisture goats felt uneasiness and sweating it changed resting places and flapping of ears observed by Chhaganbhai (1992); Ravi Shankar *et al.* (2008) in Andhra Pradesh.

Dogs were restless and barking longer day when cloud formation takes place and excess heat released from water vapour into the atmosphere indicating rain (Anandaraja *et al*., 2008). In cloud formed in lower level frogs under stones were become restless due to insufficient oxygen and come out from holes for air, hence they produce sound crock it predicts rain in short period. In high altitude foxes were howling due to steady increase in relative humidity indicate dry season. Snakes were moving from mountain and search prey indicate summer season Tirlapura *et al.* (2022). Crabs were making bigger hole and come to the bund predict high rainfall. In traditional weather forecasting, when deer become restless occurrence of flood (Seetharaman, 2001). In humans joint pain and sweating due to excessive barometric pressure indicate upcoming rain in night.

It is making arrangements for weeding and harvesting and ready for plough and sowing for farmers for upcoming rainy season and important legumes and fodders an integral part of semi-arid regions of the tropics found by Usha *et al*. (2020). In short range weather forecasting farmers plan for field operations, soil preparation, drying of soil, irrigation schedule, seed preparation, cropping pattern and manure applications Didal *et al*. (2017). The documentation of the large variety of indigenous technical knowledge based activities without scientific validation and documenting the prevalent practices with the traditional one (Prakash *et al*., 2012).

Table 1: Bioindicator of animals and other beings prediction of weather forecasting in Tamil Nadu.

Sr. No.	Animals	Scientific name	Animal biological Behaviour	Weather Forecasting
1.	Cows	*Bos indicus*	Grazing cows returning home early with raising of tails	Indicate rains
	Cattle		Cattle predict rain very early hours by sensing cool breezes before rain. Hence, they look at the sky frequently and jumping joyfully	Rain within short range
	Calves		Calves jumping happily	Good rain season
2.	Goats	*Capra hircus*	Due to high moisture uneasiness and sweating of goats so that flapping of ears Goats does not browse in herbs, shrubs and low trees	Immediate Rain
			No interest in taking feed and water, Frequently change resting places, and shout long time	Rain within 2-3 days
3.	Sheep and goat	*Ovis aries*	Increased libido in sheep and goat and frequent mating	A sign of good rain
			Whenever clouds are formed in lower level, energy is released from water vapour and excess heat are formed, it cannot be tolerated by sheep and goats. Hence, flocking of sheep and goats occur and also move in group	Rain within short range
4.	Dogs	*Canis familiaris*	Barking continuously and sharply in long day Jumps irregularly on the road at mid day	Supportive indicator of rain
5.	Pigs	*Sus domesticus*	Grunting of pigs	Rains are near
6.	Deer	*Axis axis*	Becoming restless	Adverse weathercondition (Flood)
7.	Snakes	Serpentes	Moving down the mountain	Good rain season
			Snake climbs up on trees	Drought
8.	Rats	*Rattus rattus*	Come out from their burrows and start to dig the ground in deep	Natural calamity
9.	Crab	*Gecarcinus quadratus*	Comes to the bund	Indicate Rain
			If crab makes bigger hole in the channel	High rainfall
10.	Frogs	*Bufo melanostictus*	Frogs crocking in chorus under stones and in a water body during afternoon and leaping of small frogs	Immediate rain.
			Frogs start singing in the initial days of the *Jayestha* (May)	Early rain
			Frogs in the well makes continues sound. So farmers decided an irrigation and weeding	High rainfall
11.	Fox	Vulpes vulpes	Steady increase in relative humidity with saturation at this time sensed by foxes and howling in the morning and evening.	Indicator for onset of rains
			Howls from a low laying location	Probability of high flood
			Howls irritably at higher place	Prolong draught
			Foxes cry during the day	Severe drought
12.	Tortoise	*Geochelone elegans*	Frequent appearance	Good rain season
13.	Humans	*Homo sapiens*	Arthritis pain in the joints	Imminent rain
			Sweating is high in day time	Rainfall during night
14.	Donkey	*Equus asinus*	Sweating in Ears	Indicate rain with short period

CONCLUSIONS

The study revealed that traditional knowledge systems have the various ethnic and local communities in the area where they live in harmony with their environments for many generations. This traditional knowledge systems are important tools in environmental conservation and natural disaster management. The changing animal behaviour predict rainfall forecasting can be utilized for the purpose of short-term and long-term seasonal rainfall predictions by local communities. These are grassroots innovations which are time tested and facilitated by the farmers to make their farming decisions according to seasons.

FUTURE SCOPE

This study will help to documenting the large variety of indigenous technical knowledge to predict weather and conserve the future generations.

Acknowledgement. Authors are further thankful to the TANUVAS, Chennai and ethnic people in different parts of particular district who shared their traditional knowledge and provided the useful information necessary during the field studies.

Conflict of Interest. None.

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How to cite this article: S. Usha and T. Mahesh (2023). Animals as Bioindicator to Predict Weather Forecasting in Tamilnadu. *Biological Forum – An International Journal, 15*(10): 73-76.