



Climatic Ecosystem of India: Case Study of Indian Monsoon in the Seventeenth Century

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ABSTRACT

By definition, climate includes all the weather-related factors that affect a place over a prolonged period, such as temperature, precipitation, humidity, wind, river and sea currents, flood patterns, and vegetation.¹ Additionally, due to its intrinsic instability, it is prone to sudden, unforeseen changes, disruptions to hydrological and biochemical feedback loops, and arbitrary shifts in temperature and precipitation patterns. The search for universal rules of nature and mathematical regularity was well defined in the late eighteenth and nineteenth centuries in India.

Keywords: Monsoon, varshakala, Garmee, summer, Flood, Sub-Continent

Introduction

India's unique topography and geography impact the country's incredibly variable climate. The nation is renowned for its tropical weather, which features sweltering summers, monsoon rains, and chilly winters. The entirety of India—comprising the northern Himalayas, the Ganga Doab, the entire southern region, and the coastal areas—can be broadly classified based on diverse climatic conditions. With frigid winters and warm summers, the northern Himalayan region, which encompasses the states of Jammu & Kashmir and Himachal Pradesh, has a subarctic climate. The area experiences heavy snowfall during the winter when temperatures often vary from 5°C to 25°C. The Punjab, Haryana, Uttar Pradesh, and Bihar regions of the Indo-Gangetic Plain have humid subtropical climates. In these regions, winter is not very harsh, and temperature found from 5°C to 20°C, while hot summers exceed 40°C. In addition, a monsoon season lasts from June to September, producing torrential rain. The southern peninsula experiences tropical dry and humid weather. Temperatures in the area range from 20°C to 40°C throughout the year, making it hot and muggy. The monsoon in the southwest lasts from October to December, both monsoon seasons in the area. India's coastline regions have heavy rains and a tropical maritime environment with considerable humidity. Year-round here, it's hot and muggy.

Many Arab, Persian, and European travellers have highly praised the climate of India. They were highly inspired by the monsoon, summer and autumn months. The majority have commended India's climate, including Shahauddin-Al-Umari, who wrote Masalik-ul-Absar, noted more significant part of the country is located in the second and third climate zones. Except for the fields where rice is grown, it is a significant and healthy country.² In his subsequent writing, he stated, "Hind has a temperate climate, with little seasonal variation. It wasn't as hot or chilly as it would have been in the springtime all the time. A lovely breeze blows in this area. For four months, the rain falls nonstop, primarily from the end of spring until the start of summer."³ According to Char Chaman author Chandra Bhan Brahman, the best climate in the world is located in India. He claims the city is fresh, beautiful, and invisible during every season and harvest time. The body enjoys it during the winter. It feels very reasonable in the bazaars and byways during the summer. The state of the interior of the homes is imaginable. An excess of ice is added to this moderation. It always feels fresh with raindrops when it rains. For those with keen eyes, every morning and evening, paint a new image.⁴

On the other hand, European tourists needed to be made aware of the variety in the climate of India. He merely had a bad attitude about the heat. They had trouble adjusting to the climate in India, particularly in the heat. Many of them solely criticised the climate of India for its intense heat and high rainfall. They were unable to comprehend the significance of India's climate. India's ecology, economy, and culture are linked to each season. Many went to the Himalayan areas, where snow-capped mountains and a pleasant, temperate environment usually greeted them. Many travellers described the four seasons: most of southern India experienced a consistent climate throughout the year, although the coastal regions experienced significant humidity. Here, the summers were sweltering, which he found intolerable. The rainy season followed, which he found enjoyable, but the monsoons had him deal with many difficulties. There are harshly hot months, two to three months of winter, a monsoon season, and the autumn season is utterly different from the rest of the world. The winter season in India lasts for a very short period; only in the northern region does the temperature sometimes go down significantly, whereas in the southern region, the temperature never goes down much. There is no snowfall anywhere in India except in the hilly areas. The hilly areas, with their cool climate and cool breeze, provided respite from the heat to the rulers and the people. Babur mentioned the harsh weather of Kabul; he wrote that certainly, the climate of Kabul is very pleasant, even in summer one cannot sleep at night without a fur coat.⁵ However, European travellers have not described the winter season of India much, because the winter season in India was of very short duration, and that too was not a remarkable event for them. According to him, there were two seasons in India, summer and winter. European travellers who came to India often considered the rainy season to be the beginning of winter.

The Russian traveller Nikitin mentioned that winter in Cambay begins in June; of course, he was talking about the rainy season because the rainy season provides relief from hot days. They could not understand the seasonal cycle of India because the country from which they came had only winter and summer seasons. But Babur had divided the seasons of India into their months. He says that in India there is a winter season of four months. Babar says that 'the people of Hind have divided the year into three seasons of four months each, and each of them has divided them into two months based on heat, rain and cold. Some European travellers have described the winter months of India. Especially in Kashmir, where the temperature went below zero in winter and snowfall was common, John Marshall, commenting on the cold months of Kashmir, said that in wintertime there is a lot of frost and thick snow in Kashmir.⁶ The winter was pleasant for the Europeans, but they observed that the winter had no significant effect on the Indians. To protect themselves from cold, Indian people used to wrap only a thick warm blanket around their body, and at night they used a quilt. Niccolo Conti clearly stated that Indians use very little wool. Bernier also says that 'these people cover their bodies with long, thick clothes during the winter months, and they do not wear coats.'⁷ The climate of Kashmir in winter was very cold, with much snowfall and little wind. Francisco Pelsart mentioned that December to February were very cold. The mountains remain constantly white and snowy, except in places where the sun shines in the warm season. Abul Fazal has described 'the beauty of Kashmir', mentioning 'it was the favourite spot of Akbar in his case, who visited it thrice.'⁸ Francisco Pelsart pointed out that the winters were miserable for the inhabitants; they tried to keep warm from the burning of cow dung, and the fire was lit outside the room because the houses had no chimney or fireplace. He mentioned that the smoke from this fire, in the whole city, was so great that the eye burned and the throat seemed to be choked. Since ancient times, people have been aware of rainfall, but they did not have any clear knowledge about the monsoon cycle. The monsoon was very important for India because it provided sufficient moisture to the soil and fruits. Babur praises the Indian rainfall system; He writes that 'the air is very nice in the rain. Sometimes it rains 10, 15, or 20 times a day; torrential streams flow together, and rivers flow where there is no water.'⁹ Joannes De Laet, the Flemish geographer, naturalist, and Director of the Dutch East India Company, visited India during the reign of Jahangir. He described the climate of Golconda; according to him, the year is divided into three seasons. From March to June were summer months in which the heat is almost intolerable, and the wind blows from the west, being exceedingly hot. July to October months were comparatively pleasant because the season was of rains. He mentions that it 'rains almost continuously, and sometimes with such violence as to wash away the house.'¹⁰

The monsoon was not uniform everywhere, nor was the rain continuous, but it was significant for every region. Bernier writes that rainfall is influenced by the sea, mountains, and topography, and due to the different conditions of the land, it comes from different sides. He observed that "on the Coromandel coast, rain clouds reached from the south while on the Malabar coast cloud came from the west; Being close to the sea creates rainy conditions. To the south of the sea lies the Coromandel Coast, which is more open; to the west is the Malabar Coast, which extends to Bab-el Mandel, Arabia, and the Persian Gulf."¹¹ John Ovington said that 'rain also comes from different parts in different regions; Some from the south, some from the west, and some from the east.'¹² He further mentioned that "In the Maldive Islands, which number 12 thousand, the rain follows the flow of water from the west; it is carried by a strong current towards the east for six months, i.e., from April to September; The other six months are warm and cool, with winds blowing from the east."¹³ Regarding the nature of rainfall in India, Bernier writes that "these rains come sooner or later, are more or less abundant, and continue for a longer or shorter period."¹⁴ The author of the *Kitab-Al-Beruni-Fi-Tahqiq-Ma-Al-Hind* also says that Hind have tropical rains in summer, which are called varshakala, and these rains are more copious and last longer.'¹⁵ He also mentions that there is no rain in any month in

Multan, and he tells us about the months of rainfall when the fields receive maximum rainwater. John Fryer also said that 'there is no rain from November to May, hence land winds blow all the time and people suffer from the suffocating heat.'¹⁶

Peter Mundy observed that these are two types of winds, the easterly and westerly.'¹⁷ He further said that "easterly wind starts from the month of September, that remains until the middle April following perpetual fair weather conditions, apart from perchance two or three days."¹⁸ He said that "the western wind beginning the middle of April, continued September again, next three months whereof fall the rains accompanied with great storms and violent currents etc."¹⁹ Pietro dell Valle pointed out that "the time of rain, being about three months, beginning about the middle of June, and during which time the rain is continual and very great; whence some upon this account call these three months winter."²⁰ William Finch confirmed this statement, he said that the winter (monsoon) here (Surat) begins about the first of June and continues till the twentieth of September; but not continuous rains as at Goa, but for some six or seven days the rainfall keeps on changing continuously these days it rains heavily with strong winds and thunder, .²¹ He further said that during this time rain always brings a cruel storm which they call the tuffon (gale), fearful even to men on land; which is not alike extreme every year, but two or three days at the most.²² Thevenot was in Golconda, where he stayed for two months; where he saw months of monsoon. He said that rain began in the month of June, during this period heavy rain, lightning and thunder were common. He said that the thunder lasted not above four days, and the heavy rain poured down with great storm of wind till the middle of July; in the rest of three months from August to October, there fell great rains, but without any thunder and storm. Thevenot mentions that 'the rivers overflowed so prodigiously that there no one can pass over the bridges, only with the help of elephants could cross the river.'²³ Gemelly Careri who was in Daman in c. 1696, wrote that from May till the end of September is the time of continual rain and storms.

After this the showers gradually decrease, and the horizon clears up like the first dawning of the day.'²⁴ Bernier also describes the ending of monsoon; he says, generally the rains stop in October.²⁵ In some places, especially the Hindu community (Bania) traders who participated in maritime trade celebrated the passing of the monsoon as sea trade reopened. John Ovington gives a colourful description of these festivals; he writes that they used to offer many types of things as Prasad to the ocean to please it. He writes that "they throw coconuts into the sea to calm the storms and anger of the sea.

This festival called Nardi Purnima or Coconut Day was celebrated on the full moon day of July-August.²⁶ On this day, the sea was worshiped in the coastal areas and a fair was also organized. Ovington described the festival as the largest one celebrated on the West Coast. The oceans were revered by them; they believed that their worship and offerings would calm the monsoons. He says that the priest Brahmins used to perform worship and sought blessings for the protection of sea journey, on this occasion local boys were very happy with these festivals, for whatever coconuts were thrown into the water, they would immediately swim and take them out. He also mentions rain, 'Sometimes for three or four hours such showers fall from these perfect clouds, that streams flow over the streets and rise so high in height that it is forbidden to ride on horseback.'²⁷ Ovington saw that the monsoon was the only source of water for the fields. During this season people would sow rice, and conserve water. He observed that the monsoon starts at the end of May and continues for three or four months till mid-September. Rainfall is more abundant in the months of June and July and sometimes continues for ten or fifteen days without any interruption. Ovington was in Mumbai where rainfall is high, but many areas in India experience such rainfall.

Although there was sufficient rainfall in India, its nature was different in different regions. The south coastal and eastern regions experienced heavy rainfall while the western parts were known for less rainfall. There was sufficient rainfall in Northern India but sometimes many days passed without rain. The areas of Ganga Doab were notorious for their floods. Bernier wrote that the rains on the Bengal and Coromandel coasts begin and ends a month earlier than those on the Malabar coast. It rains very heavily in Bengal for four months; he wrote that 'during this period it sometimes rains without interruption for eight days and nights.'²⁸ He particularly described the rains of Delhi, where he lived for several years, noting that the rains were never the same. He wrote that "Sometimes the rains begin or end a fortnight or three weeks earlier, and sometimes in one year, they may be more abundant than in another."²⁹ He writes that "once, two entire years of Delhi passed without a drop of rain, with the result that drought became widespread and famine occurred."³⁰ He further writes that "in Delhi and Agra, the rains are neither so heavy nor continue for so long. Sometimes two or three days pass with often little rain."³¹ Edward Terry also found that the rainfall in India was not uniform, he writes that 'Rainfall was never uniform in three months, there was more or less rain every day'³² Pietro Della Valle describes the rainfall system of Gujarat, he writes that 'There is very little rainfall in Gujarat throughout the year.'³³

Edward Terry also writes that in Surat, Agra, and many other areas this never happens; Rain falls only in one season of the year. Rain begins when the Sun approaches the northern troposphere and continues until it returns to the tropics. They begin with violent rainfall and end with the most terrifying storms of thunder and lightning 'I can tell you that sometimes there are even worse rains and storms, yet they rarely cause any harm'. He then wrote 'In those three months it rains more or less every day, sometimes a full quarter of the moon, with scarcely any interval; there is a lot of rain along with the heat of the sun.'³⁴ John Fryer stated that "the monsoon winds and rains are prevalent throughout India, with variations only in the mountains."³⁵ He further said that on the coasts the south winds remains down for eight months, of which four months are May, June, July, and August. Bernier writes that heavy rains occur unless large numbers of clouds pass over the course of several days towards the west. Bernier writes that "It was essential that the stretch of sky to the west of Delhi should first be filled with clouds, and that those clouds should receive some obstruction, such as air less hot and less rarefied, and more capable of being condensed and resisted; or encountering other clouds and contrary winds, they become so dense, overloaded and heavy, that they burst and fall in rain;

Just like it happens when the wind pushes the clouds from a high mountain."³⁶

a. The Monsoon Season as a Major Hindrance

The monsoon months were also a major hindrance for European travellers and traders, who always tried to avoid their travels during the monsoon. Many times the rain became a cause of great trouble for the people, especially for the people who lived near the river. Due to excessive rainfall, people's houses, fields, and animals were washed away in floods. In many places, entire villages were submerged in floods, causing huge loss of life and property. John Fryer draws attention to the monsoon rains, saying that during or after the monsoon, the Indus and Ganga rivers overflow their banks, and enter the villages located near the river. Tavernier reported that during the monsoon, navigation was suspended until the end of the monsoon because wind and rain disturbed the ocean currents during the season. He wrote that 'navigation in the Indian seas is not done at all seasons as is done in our Europe, it is necessary to take note of proper weather, outside of which no one dares to go to sea. The months of November,

December, January, February, and March are the only months of the year when you travel from

Hormuz to Surat and from Surat to Hormuz.'³⁷ John Albert de Mandelslo was stranded in Surat due to the monsoon and was forced to remain in India until the withdrawal of the monsoon. He wrote that 'since the rains would begin, no more ships were expected from Europe and that he would have to postpone his intention to return to Germany until the fair season.' Edward Terry tells about his Indian travels during the monsoon. They suggest avoiding travel during monsoon. He wrote that 'the journey is very short and can easily be completed in two months; But during the long rainy (monsoon) season, and slightly before and after, the winds are usually so violent that they pose a major threat in the Indian Ocean.'³⁸ During monsoon, not only the travellers faced problems, but the local people also had to face many problems. All business and social activities came to a halt and people locked themselves in their homes as rainwater blocked all roads. John Marshall who was an English employee in

East India Company also criticized the Indian monsoon, he mentioned that 'this in the rain times is very dirty, when the monsoon breaks up, but after is very pleasant.'³⁹ Ralph Fitch, who was in Burhanpur, has described that it was a densely populated town, but during the monsoon months, June, July, and August, no one passed on the road, not even horses crossing the road. This could not be done because there was a lot of water on the roads.'⁴⁰ Thévenot also gives a similar description in his diary, he writes, 'I came to Brampur (Burhanpur) in the worst weather; And at that time there was so

much rain here, that the lower streets of this city were filled with water, and these streets looked like many rivers.¹⁴¹ William Hawkins also faced the problem of excessive rainfall in the monsoon, he writes that due to heavy rain and excessive water, he was delayed by twenty days in traveling to India. People also could not undertake their journey due to excessive rain.¹⁴² He does not tell how people spent their time during the rains but he tells about how he spent his time. He says that during this period he spent most of his time with Indian businessmen. He wrote that when the weather was clear he could go out of doors; Otherwise, there was heavy rain which continued and he had to stay indoors.¹⁴³ John Ovington reached Bombay during the monsoon season. Due to the monsoon he got stranded on the coast of Bombay. He wrote that monsoons are generally extremely dangerous as they are mostly accompanied by thunderstorms and strong winds, which put ships in danger of being lost if they are not put into port in time.¹⁴⁴ He has written in detail about the nature of Mumbai's monsoon, writing that 'it is the only season of the year proper for rain, during which all navigation comes to a halt. There is also a general halt to all travel on land: during this time, all land transport is closed. All European and Indian ships are berthed in the harbour. This system continues in these parts for three or four months from the end of May to mid-September. 'The rains are heaviest in June and July, and sometimes continue for ten or fifteen days, without interruption, during which time the presence of the sun or the stars is interrupted.'¹⁴⁵ John Fryer also observed that 'when it starts raining, all business stops.' There is no point in even going to sea or traveling in any kind of country.'¹⁴⁶ Father Sebastian Manrique, who was in Hooghly in 1640, gives a similar account, writing that 'until the arrival of the monsoon, the merchants continue to sell and buy and generally carry on their business as usual. And during the monsoon the traders would rest in their storehouses made of strong canes, called native bamboo, for five or six months until the return of favourable weather, in India, this season is called monsoon.'¹⁴⁷

Monsoon not only disrupted travel and trade but also brought many problems. The most important problem in this was flood. Many towns and villages were submerged in water every year due to excessive rainfall during each monsoon. Abul Fazal has recorded in *Ain-e-Akbari* that due to excessive rains, the rivers used to get flooded. Akbar also faced great difficulty in conquering Bengal during the monsoon and crossed the river with great difficulties. John

Marshall, who was in Allahabad (Prayag), recorded a gruesome scene of the flood, writing 'There was a huge flood due to the overflow of the river Ganges. that night the water rose so much that it surrounded the city, and only a few people could survive this flood.'¹⁴⁸ Whenever such a calamity occurred, they did not get any help from the government; many times some people took advantage of this calamity as an opportunity to earn profits. John Marshall wrote that many people escaping this flood tried to take shelter in the Nawab's palace to save their lives, but the Nawab demanded five rupees in exchange for shelter.. And those who could not pay were forcefully thrown out of the palace. He wrote that many people saved their lives by living on trees for four to five days without food and water, many took shelter on the roofs of their houses, and only a few people could escape by boats. Many people died without food. They could not get any help or food from the government. He wrote that the Nawab had closed the fort, and 17 thousand people had died in the flood besides the poor people in the city, to whom no attention was paid, which was a very large number.'¹⁴⁹ Thévenot who was in Golconda also described the misfortune of people brought by the monsoon. He says that due to monsoon rains, thousands of people got in trouble; their houses got washed away due to a flood in the river of Bagnagar.

Excessive rainfall during monsoon was also a problem, but the failure of monsoon was a bigger and more serious problem. European travellers only knew the monsoon as a hindrance to daily activities, while they did not realize how important the monsoon was to Indians. Whenever the monsoon failed, it brought with it drought, famine, starvation, and countless deaths. Many European travellers experienced it first hand and recorded the horrific events of countless deaths due to famine. In such a situation, a good monsoon was a relief for them. Cesare De Federici who was an Italian merchant described the famine in Gujarat. He writes that because of this great famine, people were selling their children to the Portuguese for ten shillings. John Marshall arrived in Patna in 1671, at which time the city was in the grip of a terrible famine that lasted for about three to four months. He wrote that about 100 men were dying every day, and the price of wheat, maize, barley, rice, etc. had increased. He writes that since the beginning of October 1671, about 20,000 people have died from famine in Patna and the suburbs, and accordingly not less than 150,000 people may have died in the city.'¹⁵⁰ He further writes that people were selling themselves and their sons into slavery. He wrote that a large number of good and healthy slaves were available in Patna at 4 annas (fourth part of a rupee) and 8 annas (eighth part of a rupee). The famine soon spread beyond Patna to Banaras and Rajmahal and most people moved to Dhaka for relief. Regarding the number of people dying every day, John Marshall says that 250 to 300 people were dying every day and at the same time the prices of grains were also increasing. Similarly, due to the non-arrival of monsoon, there was a terrible famine in Gujarat in 1630-31. John Albert de Mendeslow (1630-38) has given a vivid account of this tragedy. He writes that due to the terrible disaster, the province of Gujarat was left desolate. People turned to cannibalism; this famine set Gujarat back for an entire decade. He writes 'It is indeed true that in the year 1630 there was a severe drought and in the following year incessant rains reduced it to such a miserable condition.'¹⁵¹ Such incidents were common in India due to failure or delay of monsoon. The rise and fall in the country's production depended on the monsoon. The monsoon was a boon for the people of India, a good monsoon brought joy in their lives, and a delay brought stress.

Monsoon not only provides relief from the scorching heat but also provides water to rivers, fields, ponds trees, and plants. Francisco Pelsart writes about the importance of monsoon in people's lives that 'from April to June the fields remain hard and dry. The fields are not suitable for ploughing because of the heat, but when the ground was wet by a few days of rain, farmers could plant indigo, rice, and a variety of grains eaten by the poor, such as sorghum, millet, corn, pulses and seeds for cattle food.'¹⁵² Edward Terry has also given a similar description, he writes that when the land was deprived of rain for nine months, and looked like barren sand, it would wear a layer of green within seven days after the rains started.¹⁵³ Thévenot explained how important the monsoon was for India, writing that these rains make the land of this state extremely fertile, causing all things, especially fruits, and grains, to grow in abundance.'¹⁵⁴ He writes that there was relatively less

rainfall in the plains, but farming was done along the lower lands of the mountains, where water was abundant.⁵⁵ John Ovington has written that the people try to conserve the moisture in the land by lowering the rainwater to a level so that the moisture in it does not get lost and they sow rice in it. John Ovington explained that the land receives good moisture from the monsoon, resulting in the growth of many types of vegetables, rice, trees, maize, flowers, and many types of herbs are grown. Bernier also states that in the month of July, when the heat is at its greatest, the rains also begin to fall, which continues for three consecutive months. In this way the air temperature becomes favourable and the earth becomes fruitful. However, these rains are not regular and occur intermittently on the same day or week.⁵⁶

We get information from European travellers from contemporary literature that monsoon not only brings greenery and moisture to the earth but also provides relief from the scorching heat. As John Fryer writes, the climate from November to May was stifling and extremely hot. From the beginning of May, people, trees, plants, animals, etc. get refreshed by cold showers.⁵⁷ Hamilton, who travelled to Sindh in 1600 AD, has also mentioned the climate of Sindh; he writes that there is no rainfall here. But in other places, once the monsoon passes, the climate feels cool and flowers, trees, crops, and vegetables grow pleasantly, except during the dry summer months. Due to the monsoon, the trees remain green and full of moisture throughout the year. The months of June, July, August, September, and October count as the rainy season in Francisco Pelsart. He says that after the summer days the rainy season brings a pleasant and refreshing atmosphere. Bernier observed that in the month of July, when the heat was almost at its peak, it starts to rain.

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