

# A Palaeo-Environmental Study of Sitapur District

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## *Abstract*

*Sitapur District, situated in the north-central region of Uttar Pradesh, constitutes an integral segment of the Middle Ganga Plain. It represents a dynamic fluvial landscape shaped by the continuous interplay between natural geomorphic processes and anthropogenic activities. Lying within the catchment zones of both the Sharada–Ghaghara system and the Gomti River, the district features a multi-fluvial environment characterized by thick Quaternary alluvial deposits. This study reconstructs the palaeo-environmental history of Sitapur through an integrated analysis of its sedimentary processes, geomorphological features, palaeo-channels, and regional ecological proxies. The region's environmental evolution is deeply tied to historical flooding, channel avulsion, and the aggradation of alluvium during the Pleistocene and Holocene epochs. Variations in monsoonal intensity played a pivotal role in dictating fluvial dynamics and landscape stability. Although direct prehistoric excavations within the district are scarce, the presence of stable geomorphic surfaces, combined with comparative archaeological data from the broader Middle Ganga Plain, suggests highly favourable conditions for early human habitation. During historical periods—spanning the Mauryan, Gupta, Mughal, and British eras—intensified human interventions such as deforestation, agricultural expansion, and canal irrigation fundamentally altered the natural ecosystem. The study concludes that Sitapur's modern environmental framework is a cumulative product of long-term natural evolution and sustained human*

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*modification, offering a valuable model for interdisciplinary research in Quaternary studies, archaeology, and environmental history.*

**Keywords:** *Palaeo-environment, Sitapur District, Middle Ganga Plain, Gomti River, Sharada–Ghaghara System, Holocene, Pleistocene, Palaeo-channels, Fluvial Geomorphology, Human–Environment Interaction.*

## **1. Introduction and Topographical Setting**

Geographically positioned within the Lucknow Division of Uttar Pradesh, Sitapur District extends between the latitudes 27°6' N to 27°54' N and longitudes 80°18' E to 81°24' E. The Gomti River forms its natural western and south-western boundary, delineating it from Hardoi, while the Ghaghara River marks its eastern frontier against Bahraich. The district is bounded by Kheri to the north and the districts of Lucknow and Barabanki to the south. Covering a geographical expanse of 5,743 sq. km. with a population of approximately 4.47 million, the district is drained by several rivers moving west to east, notably the Gomti, Kathna, Sarayan, Chauka, Kewani, and Ghaghara [1].

Topographically, the region is a homogeneous alluvial tract that can be broadly classified into two distinct geomorphic zones: the western elevated upland (*Uparhar*) and the eastern low-lying floodplain (*Ganjar*). The district's soil composition is intrinsically linked to its fluvial network. The uplands feature fertile loam that transitions into stiff clay within topographical depressions and becomes increasingly arenaceous (sandy) at higher elevations. The regional slope follows a north-west to south-east gradient, dropping from roughly 505 feet above sea level in the north-west to 400 feet in the south-east. This gentle gradient translates to a fall of less than two feet per mile, rendering the slope largely imperceptible to the naked eye.

## **2. Palaeo-Environments**

The geomorphological foundation of the Indian subcontinent traces back to the fragmentation of Gondwanaland. The subsequent northward drift and collision of the Indian plate with Eurasia (c. 50–35 million years ago) resulted in the Himalayan orogeny. The detritus eroded from these nascent mountains was deposited by river systems into the foreland basin, gradually constructing the fertile Indo-Gangetic plains [2]. Tectonic adjustments in this region remain active, influencing river avulsions and seismic activity.

During the Pleistocene epoch (beginning approx. 1.6 million years ago), the earth experienced cyclical glacial (cold/arid) and interglacial

(warm/wet) phases. These global climatic oscillations manifested in the tropical Indian subcontinent as alternating phases of high and low precipitation. The catastrophic Toba volcanic eruption in Sumatra (~75,000 BP) also deposited widespread ash layers across peninsular India, likely causing severe ecological bottlenecks for early hominin populations.

The transition into the Holocene (c. 10,000 BP) introduced relatively warmer and wetter climatic conditions. Seminal palaeo-environmental studies, such as those by De Terra and Paterson (1935) in the Soan Valley, and subsequent research in the Belan and Son valleys, indicate that the Late Pleistocene was predominantly cool and arid. Conversely, the Early Holocene witnessed heightened rainfall and the expansion of forest cover. Analogous studies in the Thar Desert demonstrate a mid-Holocene climatic optimum (6000–4000 BP) characterized by abundant surface water, which coincided with a surge in prehistoric human occupation across the northern plains.

### **3. Regional Geological Framework**

Sitapur is situated entirely atop the Gangetic alluvium, resulting in a scarcity of rocky mineral deposits. The primary geological extractions include brick-earth and *kankar* (calcareous nodules). *Kankar* is predominantly found in sub-surface layers beneath alkaline (*usar*) tracts and has historically been utilized as a resilient building material in regional architecture [3].

Climatologically, the district experiences a sub-tropical monsoon climate. The Indian Summer Monsoon is active from mid-June to early October, yielding an average annual precipitation of 974.0 mm. Historical rainfall data (1901–1950) indicates significant annual variability, with extremes ranging from 197% of the normal in 1936 to a mere 48% in 1918. Temperature profiles show a sharp decline starting in November, with January minimums averaging 8°C (47°F), occasionally approaching freezing during western disturbances. Summer peaks in May and June frequently reach 46°C (115°F), accompanied by dry, desiccating westerly winds (*loo*). The post-monsoon and winter seasons are typically characterized by clear skies and subsiding humidity.

### **4. Drainage System and Water Resources**

The hydrological architecture of Sitapur is governed by the Gomti and Ghaghara systems. With the exception of minor seasonal rivulets that swell destructively during monsoons, the primary rivers maintain perennial flow [4].

#### **4.1 The Gomti River and its Tributaries**

Originating in Pilibhit, the Gomti skirts the western boundaries of Chandra, Misrikh, and Aurangabad parganas. Its highly sinuous nature has historically earned it the moniker *Ghumti* (winding). The river valley exhibits varying widths, featuring high, ravine-dissected banks near Manwan. While susceptible to high-discharge floods, the elevated banks generally mitigate widespread inundation. The adjacent floodplains consist of sandy *bhur* soils, characterized by shifting sand dunes and localized depressions that complicate agriculture.

- **Kathna:** Entering from Shahjahanpur, this tributary flows through Maholi and Chandra, eventually merging with the Gomti. Its basin includes narrow floodplains bordered by forested banks and swampy tracts that are vulnerable to waterlogging during wet cycles.

- **Sarayan:** Rising in Kheri, the Sarayan traverses the district longitudinally. It functions as a critical drainage channel but occasionally triggers severe flooding in Sitapur town. It is fed by smaller streams like the Jamwari, Purai, and Behta, all of which navigate through localized depressions and swamp chains before merging into the Sarayan.

#### **4.2 The Ghaghara River and its Tributaries**

Forming the eastern district boundary, the glacier-fed Ghaghara (historically the Kauriala) is a massive, braided river known for severe lateral shifting and bank erosion. In the early 20<sup>th</sup> century, its eastward migration transferred several villages between Sitapur and Bahraich.

- **Chauka and Dahawar:** The Chauka enters from Kheri and acts as the primary hydrological lifeline for the *Ganjar* lowlands. Its historical avulsions, particularly the diversion of its waters into the Dahawar river network, drastically alter the flood dynamics and agricultural viability of the eastern parganas.

- **Jhils and Tanks :** The district is dotted with numerous shallow lakes (*jhils*), representing abandoned river channels and topographical depressions. While essential for winter irrigation, they are prone to rapid desiccation in summer and overflowing during monsoons. Prominent *jhils* are clustered in the Biswan and Sidhauri tehsils (e.g., Barela, Bakhera, and Bhandia).

#### **4.3 Palaeo-Vegetation and Fauna**

- **Vegetational History:** The floristic composition of Sitapur is dictated by micro-topography, soil type, and groundwater proximity. Mid-

19th-century historical records indicate that extensive forest tracts still existed, particularly along the Kathna and Sarayan riverbanks. However, post-1857 agricultural reclamation and subsequent World War II strategic clearances largely eradicated these woodlands, reducing them to isolated patches of *dhak* (*Butea monosperma*) and scrub. The riparian zones continue to support tall grasses like *moonj* and *kans*, while the remaining arboricultural landscape features species such as mango, banyan, *pipal*, *semul*, *babul*, and *khair*.

• **Faunal Evolution:** Faunal biodiversity has experienced a sharp decline over the past century due to habitat loss. During the era of the Nawabs of Avadh, the dense tamarisk jungles along the Chauka River harbored a robust tiger population. The conversion of these wetlands into arable land has led to the extirpation of apex predators. Current mammalian fauna is largely restricted to resilient species such as jackals, foxes, nilgai, and small remnant herds of blackbuck. The district's wetlands, however, remain vital wintering grounds for migratory avifauna, including varied species of geese, teals, and cranes, supplementing a rich resident bird population.

#### **4.4 Naimisharanya: A Palaeo-Ecological Archive**

Situated on the left bank of the Gomti River, Naimisharanya (Nimsar) functions as both a site of immense religious antiquity and a critical palaeo-ecological archive. Etymologically derived from *Nemi* (the circumference of a wheel) or *Nimisha* (the twinkling of an eye), texts such as the *Vayu Purana* and the *Mahabharata* describe it as a sprawling forest hermitage capable of sustaining 88,000 ascetic scholars.

Ecologically, this signifies that the region originally supported a dense, highly productive forest ecosystem (*Aranya*) fuelled by a robust hydrological network. The focal point of the site is the *Chakra Tirtha*, a perennial, spring-fed hexagonal reservoir [6]. Archaeological investigations at the adjacent mounds reveal that systematic cultural habitation began during the Late Northern Black Polished Ware (NBPW) period, around 200 BCE, correlating with the Shunga dynasty's regional dominance. The site's transition from a dense prehistoric forest to a structured settlement underscores the progressive anthropogenic footprint on the Gomti interfluvium.

#### **5. Conclusion**

The palaeo-environmental history of Sitapur District reflects a continuous interaction between geological forces, fluvial dynamics, climatic

fluctuations, and human activity. Evolving primarily through quaternary alluvial deposition by the Gomti and Ghaghara systems, the district's geomorphology was sculpted by late Pleistocene and Holocene climatic oscillations. Variations in monsoonal intensity governed river discharge, wetland formation, and vegetation patterns, creating a diversified ecological mosaic of marshlands, ravines, and fertile uplands.

While direct prehistoric excavations are limited, the region's geomorphic stability suggests it provided favourable ecological niches for early adaptation. From the Mauryan period through the British administration, human interventions—including aggressive deforestation, agricultural expansion, and canal construction (e.g., the Sarada Canal)—progressively dismantled the natural forest cover. The shifting courses of the Ghaghara and Chauka rivers further illustrate how natural hydrology and human management jointly reshaped the *Ganjar* lowlands.

The historical trajectory of Naimisharanya perfectly encapsulates this evolution: transitioning from a dense, sacred forest ecosystem into a permanent agricultural and cultural hub by 200 BCE. Ultimately, the modern environmental configuration of Sitapur is the cumulative outcome of tectonic processes, climatic variability, and millennia of sustained human modification. This district-level reconstruction offers a robust framework for future interdisciplinary research in archaeology, quaternary geology, and environmental history within the Middle Ganga Plain.

### **References**

1. District Gazetteer of Sitapur. (1964). *District gazetteer of Sitapur*. Government of Uttar Pradesh.
2. Laha, B. C. (1972). *Bharat ka aitihāsik bhūgōl* (R. K. Dwivedi, Trans.).
3. Singh, I. B. (1996). Geological evolution of the Ganga Plain: An overview. *Journal of the Palaeontological Society of India*, 41.
4. Singh, U. (2008). *A history of ancient and early medieval India: From the Stone Age to the 12th century*. Pearson Longman.
5. Tewari, D. P. (n.d.). Naimisaranya in tradition, literature and archaeology. *Indian Journal of Archaeology*.
6. *Devi Purana*. (n.d.). Chapter 71.