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FIELD GUIDE

INPRE - 6

EXPLORING THE GEO-ARCHAEOLOGICAL, GEO-HERITAGE, AND CULTURAL MARVELS IN MIDDLE GANGA PLAIN (GANGA, VARANASI, MIRZAPUR AND SARNATH)







Vinay Kumar and Kuldeep Prakash

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Field Guide Book

INPRE-6

Exploring the Geo-archaeological, Geo-heritage, and Cultural Marvels in Middle Ganga Plain (Ganga, Varanasi, Mirzapur and Sarnath)

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Table of Contents

1. Team Leaders 1
2. Abstract 2
3. Preamble 3
4. Research Problem 4
5. General Introduction to the Field Trip 5-8
6. Location(s) Description 8-22
7. Field Transect 23
8. Flora, Fauna and Climate on the Area 24
9. Geological issues to be discussed during the field trip 24-25
10. National and International Significance of the Proposed Field Trip 26-29
11. Conclusion 30-31
12. Acknowledgement 31
13. References 32-34
14. Annexure 35-36

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Abstract

The Middle Ganga Plain (24°30′ –27°50′ N; 84°47′ –87°50′ E) is an alluvial tract of post-tertiary silty deposits of about 1300–1400 m deep underlain by Himalayas occupying a region of 144,409 km 2 within which the Ganga River and its tributaries have been carving and are still carving a tectonic, climatic, and anthropogenic landscape with significant geo-heritage and geo-cultural values. An attempt has been made in this field-based study and synthesis to document and understand the regional geo-heritage, palaeo-geography, and cultural values in the area of the Ganga corridor (Varanasi–Mirzapur–Sarnath) and the adjacent Vindhyan plateau (Chandraprabha basin). A drainage-geomorphology-based approach has been used (Khadar/Bangar: Tertiary–Recent alluvium), supported by remote sensing and field-verified drainage geomorphology, available published stratigraphic and excavation information, and field visit/cave exploration at Ramnagar cliff, Rajghat, Aktha, Agiabir, Chunar–Baragaon quarry complex, Mirzapur, and Sarnath to unravel the alluvial tract, palaeo-drainage, and settlement pattern with an objective to relate the landform changes with anthropogenic activity in the region. The incised meander of the Ganga in the Varanasi belt between cliffs has been ascribed to neo-tectonic activity (pull-apart of Ramnagar) and not to climatic changes; the river downcutting happened to reach the Varanasi belt near 40 ka, with the final incision occurring after Ramnagar was thrown up after 7 ka, with monsoon base level being a lesser factor. While it has been hypothesized on the basis of available findings till recent times that there was no Pleistocene settlement in the Middle Ganga Plain, the evidence in the Vindhyan plateau suggests epi-Palaeolithic occupation, which could be possible as the older sites were buried deep under alluvium. The settlement in Middle Ganga Plain appears to be restricted to the relatively safer and elevated interfluves, particularly along the lakes/ponds and associated minor streams, with the peak occupancy occurring between 3.5 and 3 ka. Preceding and following the PGW culture (from 1500 years BCE), multiple cultural phases ranging from NBPW, Sunga–Kushana, Gupta, and medieval periods were represented in this region with their respective material culture, urban development (expressed in the city of Varanasi), and religious practices. A combination of weakening of the southwest monsoon and enhanced aridity in the region centred around 5 ka with tectonic warping and channel switching in the Chandraprabha basin could be the prime factor for the observed cultural changes. The palaeo-geographical settings and settlement patterns in the region have been crucial factors for the geo-cultural values, such as the development of the city of Varanasi as a commercial hub in the Ganga basin and the ancient Mauryan to medieval Chunar sandstone mining and sculpting activities (Baragaon, Ashokan pillars), Mirzapur's rock art expression evolving from the non-anthropomorphic Upper Palaeolithic to Mesolithic to Neolithic motifs (and the Sarnath Buddhist, Jain, and Hindu temples) and its potential to be explored as a field-based integrated heritage study and value-based educational site.

Preamble

Varanasi's geology in Middle Ganga Plain is characterized by alluvial plains formed by the Ganga and Varuna rivers, with the Older Alluvial Plain representing the oldest geomorphic surface. At Varanasi Ganga flows along a gravity fault, where the Ramnagar side is an up -thrown block. Ramnagar cliff section represents 'Khadar' or newer alluvium developed within the valley of Ganga and the surface is the result of interaction of rivers flowing both from north bringing Himalayan sediments and south carrying craton derived sediments. The Area also witnessed two tectonic events; first around 40 ka BP followed by the second event at 7 ka BP respectively. River Ganga came to near Varanasi about 40,000 BP; and to its present incised location at about 7 ka following the uplift of Ramnagar area. The main reason of Ganga River incision is tectonic, and the role of climate and base-level is subordinate. Though, the monsoon was strong supporting high discharge and sediment load in the rivers and sea level rising. After the uplift of Ramnagar area at about 7000 BP, the surface was degraded by gulling activity for about 4000 years, before it was occupied by man around Gupta Period. These are the main issues to be addressed under post conference fieldwork. Besides this the Geo-morphology and geo-archaeology of Vindhyan Plateau Region covering the region of Chunar and Mirzapur having the cultural marvels of prehistoric rock paintings dating back to around 10000 BCE, and geo-archaeological sequence and cultural heritage at the sites of Agiabir, Rajghat, Aktha and Sarnath, the narrow lanes and colourful street art of vibrant city of Varanasi that surround the various ghats reflecting the cultural vibrance and ethos of the city will also be highlighted during the field trip.

Research Problem

In the sense of Global research Problem into this Field trip can be summarised into understanding how tectonics, monsoon-driven climate change, and fluvial dynamics in large alluvial basins control landscape evolution, burial/exposure of archaeological records, and the long-term trajectory of human settlement and culture. Also in transect uniqueness of this research visit of the Varanasi, Mirzapur, Chandraprabha, and Sarnath corridor offers a rare combination of a tectonically incised Ganga reach, deeply aggrading alluvium adjacent to exposed Vindhyan plateau, a well-dated sequence of climate and tectonic events, and an exceptionally rich continuous cultural record, making it an ideal global reference transect for integrated geo-archaeological and geo-heritage studies. While extending the current research problem, the global research problem posed by the study is the role of tectonics, monsoon climate, and river dynamics in large alluvial basins in shaping the landscape and the on-going burial or exposure of archaeological remains as indicators of human responses to Late Pleistocene – Holocene change. In these terms, the Varanasi, Ramnagar, Mirzapur, Chunar, Chandraprabha, Sarnath transect is unique in providing a natural laboratory where the trunk stream Ganga takes a narrow-incised meander bend cut into a gravity fault, with an upthrown Ramnagar block explaining the first-order tectonic control of the drainage pattern (Ala Eldin et al., 2000a; Shukla & Janardhana Raju, 2008; Yadav et al., 2024). The Middle Ganga plain here is exceptionally thick with post-Tertiary alluvium of 1300–1400 m covering any Pleistocene archaeological sites that might have been present (Ganguli & Singh, 2016; Shah, 2008; Vaishnav et al., 2025). However, there is also a Vindhyan plateau on the same section, preserving epi-Palaeolithic and later finds, a juxtaposition unique in the Ganga basin but otherwise representing a single interface of deep aggrading plains against rocky outcrops. The southwest monsoon's withdrawal at 5 kya, linked to its reduced strength and aridity, caused tectonic warping in the basins of the Chaurahdra plain, cutting the channels, and lowering water tables, potentially impactful on the patterns of human settlement and cultural change through time (Jha et al., 2024; Sastri et al., 1971). The transect spans the range of geographical variability that includes prehistoric rock art landscapes, epi-Palaeolithic and Neolithic people, Chalcolithic and NBPW settlements, Sunga-Kushana and Gupta cultures, medieval settlements, and the modern urban and religious center of Varanasi, framed by Chunar and Baragaon quarries and sculptures, as well as the city of Sarnath as a major religious center (Shinde & Singh, 2023). Thus, the combination of tectonic geomorphology, excellent sedimentary geology, monsoon-tectonic controls on landscape, and archaeobiology provides this region with an outstanding value for geo-archaeological and geo-heritage research, with a high potential to serve as a model for field studies that emphasize integrated and values-based education and heritage research.

General Introduction to the Field Trip

It is admitted that the Ganga has been cradle of Indian culture and civilization. As Sir Mortimer Wheeler has correctly put it, "if the Indus gave India a name, it may almost be said that the Ganges gave India a faith and is at least as worthy as her sister of our solicitude". Though not a clear-cut physical unit, the Middle Ganga Plain (24º30′N- 27º50′N and 84º47 'E - 87º50′E) is a large physical area (144,409 Sq. km.) having immense human, cultural and economic significance that makes it the heart of India. It attained its present form during the post- tertiary period when this deep trough was filled up by fine alluvium brought down from the Himalayas in the north with an average thickness of 1300-1400 meters. In historic times, the main river Ganga, watered by several tributaries, flowed gradually in a twisting fashion, forming an ox-bow lakes, some of which are perpetual. These lakes were rich in aquatic fauna and the lands around them were covered with wild grasses, many of which have edible grains. With the onset of the milder climate of the Holocene, the wetland gradually turned into grassland, which attracted small animals.

It is generally discussed that during Palaeolithic times human occupation of the Ganga Plain did not take place, because the stones, the prerequisite for making stone tools, were not available. It is further emphasized that Ganga Plain did not witness early development of agriculture and urban life, despite being a fertile, agriculture-suitable land. Reasons postulated were that Ganga Plain was a dense and tangled forest throughout Pleistocene and Early Holocene. Significant developments in the Ganga Plain took place only with the introduction of iron in the fourth millennium BP when enterprising farmers cleared the forest. But recent archaeological investigations suggest that the Epi-Palaeolithic or late Upper Palaeolithic represents an important stage in the human adaptation and evolution of cultures in the Middle Ganga Plain. It is now a well-established fact that ecology played an important role in the origin of the first settlements in the Middle Ganga Plain. Ganga is the trunk river of the Ganga Plain, and downstream of Allahabad it becomes the axial river of the Ganga Plain. All along its length, the Ganga River and its active floodplain is incised in the River Valley Terrace Surface. In the Varanasi sector from Buxar to Saidpur, the Ganga River shows the narrowest valley and flows to NE direction. The active Ganga River channel is bordered by cliffs of varying heights for several kilometres. The incision of the Ganga River is a matter of debate, and models ranging from climate, tectonics and sea-level-related base-level changes have no consensus.



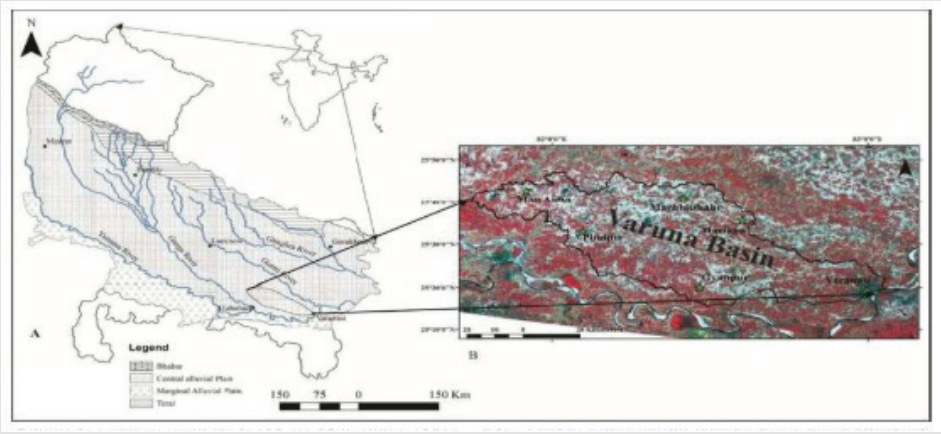


Figure 1: Location map of Middle Ganga Plain.

Geo-morphology and geo-archaeology of Middle Ganga Plain and Vindhyan Plateau Region

Traditionally, two regional geomorphic areas are identified, namely, Khadar (Newer Alluvium) and Bangar (Older Alluvium). Additionally, close to the Himalayan orogen, Bhabhar and Terai regions are identified. On the Bangar surface, Bhur (Aeolian ridges) are present. In general, three regions in the Ganga Plain are recognised, namely Piedmont Plain, Central Alluvial Plain and Marginal Alluvial Plain. Regional geomorphic surfaces are identified and considered to be formed during the last climate cycle of 128 kyrs. All these surfaces are depositional and have a sediment cover younger than the time of their formation. The topmost few meters on all the surfaces is a Holocene deposit.

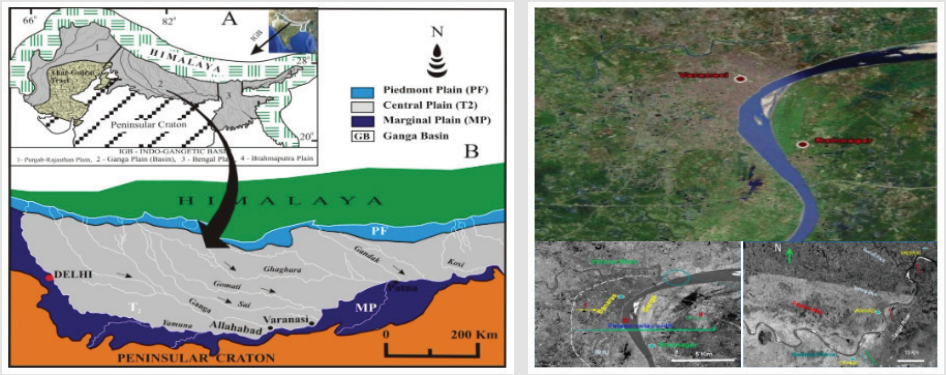


Figure 3: Drainage network of Ganga Plain.

At Varanasi Ganga flows along a gravity fault, where the Ramnagar side is an up-thrown block. Ramnagar cliff section represents 'Khadar' or Newer alluvium developed within the valley of Ganga. The surface is the result of interaction of rivers flowing both from north bringing Himalayan sediments and south carrying craton derived sediments. The area witnessed two tectonic events; first around 40 ka BP followed by the second event at 7 ka BP respectively. River Ganga came to near Varanasi about 40,000 BP; and to its present incised location at about 7 ka following the uplift of Ramnagar area. The main reason of Ganga River incision is tectonic, and the role of climate and base-level is subordinate. Though, the monsoon was strong supporting high discharge and sediment load in the rivers and sea level rising.

Similarly, the Chandraprabha river basin in Chandauli district near to Varanasi is the important river of upper Vindhayan upland plateau. The extent of Chandraprabha River is 24°45'N to 25°15'N and 82°55'E to 83°20'E and total geographical area of the Chandraprabha basin is 1355.80 sq.km which originates in Mirzapur district and flows through the upper part of the Mirzapur and Chandauli districts. The study of the oldest habitation is found in Chandauli district in Vindhyan Plateau Region in Naugarh from where epi-Paleolithic tools have been recovered by U.P State Archaeology Department. Preliminary studies indicate that human settlement in basin was controlled by landform changes and monsoon rainfall

variation. Recent studies indicate a period of increased aridity in the area around 5Ka, which is related to the weakening of the south-west monsoon system. Many studies have indicated weakening of monsoon during middle to late Holocene around 5 Ka. It is also postulated that around 5Kyrs tectonic activity produced warping of land and disruption of minor river channels in the study area. These factors must have caused drying of small water bodies and small river channels and lowering of ground water level. These geological factors must have influenced the settlement pattern and migration of humans in the Chandauli district adjacent to Varanasi on the banks of Chandraprabha River. In the last few decades geo-archaeological studies in the India based on geo-morphological, Palaeo-botanical, geochemical and isotope studies on sediments, lake sediments and fossils has provided scientific databases for climate and vegetation changes in the late Pleistocene – Holocene. In the Mesolithic period, with an increase in population, inhabitants began to utilize rock-shelters for occupancy and additional activities. During Chalcolithic and Iron Age period human activity was restricted to riverbank areas. No human settlements are recorded till NBPW period. The NBPW settlements occupied the area only in the central half of the district, in the dissected plateau of the south and pedi-plain in the central part of district. It is only during the Early Historic period that settlements are recorded from the older alluvial plain that covers the northern half of the district. Sunga period settlements were restricted in the central part along Karmnasa River. No site of Kushana or Gupta period is reported from Chandauli District. However settlements of post Gupta period are present in plain areas near streams. Settlements of the late medieval period thrived all over the district, except in the northern part.

In the present field trip the archaeological site, geomorphic setting and type of culture remains areas on the bank of Chandraprabha river of district of Chandauli will be visited and attempt will be made to show the visitors the relationship between geomorphic setting and human settlements and also climatic changes in late Pleistocene-Holocene to understand the human settlement and cultural developments in the area.

Location(s) Description

The choice of geomorphology and chronology as approaches is appropriate and effective in this study, as it enabled the authors to understand the Middle Ganga Plain and the Vindhyan Plateau's land development and settlement patterns. Remote sensing and field verification were used to thoroughly examine the study sites and identify their chronological trends and patterns. These two factors, in combination with the researchers' thorough analysis, allowed the investigators to form the geo-archaeology basis of this region, following the chronological trends. The application of chronology, in particular, was relevant in this case, as it enabled the researchers to ground their findings in time. The lack of sedimentological assessments limits the scope of information that could be presented in the article, as identifying the characteristics of different sedimentations can allow the investigators to

understand more about the site and its development patterns. Similarly, there is a need for geochemical analysis of the field stops, as such a procedure would enrich the findings with additional data that can provide a more comprehensive understanding of the region and its geographical development and the relationship between human activity and the local environment.

Archaeological Heritage in and around Varanasi

When we talk about the archaeological heritage in and around Varanasi, Stone Age sequence in Middle Ganga Plain particularly in Uttar Pradesh was not well known till the archaeologists of the Banaras Hindu University initiated meaningful field studies in the Vindhya-Kaimur region, adjacent to the Ganga plains. The evidence for the emergence and expansion of food producing economy in the middle Ganga plains could be found from the excavation of Senuwar site, in the foot-hills of Kaimur ranges. The excavations of a number of sites demonstrate that most of the early Historical urban centres have developed over Chalcolithic or the Copper using cultural horizons. The noteworthy sites where this feature could be ascertained are Senuwar , Khalradih, Narhan, Agiabir etc.



Figure 5: Archaeological Site of Agiabir.



Figure 6: Excavated site of Rajghat.

To reconstruct the local history the archaeologists of the Banaras Hindu University commenced their academic pursuit from the excavation of Rajghat (ancient Varanasi) which represent the ancient settlement of Varanasi on the northern outskirts of the city, near the confluence of Ganga and Varuna. The Ganga takes a northerly course in Varanasi and therefore it is called Uttaravahini there. The city location on the confluence of Varuna and Assi rivers made the city a sacred area, and the semi-circular shape to the left bank of the river made it suitable for anchoring the large sailing boats which were used for trade down the river upto the Bay of Bengal. Such a location of the city made it a great trading centre which emerged in the middle of the first millennium BCE as an urban metropolis with localization and specialization of the industries and crafts. The proliferation of the city is elaborately mentioned in the Tripitaka and Jataka tales. There are mentions of a well-developed ship-building industry, craft communities specialization in sandalwood, ivory and cloth, whose work was praised far and wide for its value and beauty. The elevated landscapes with three higher areas were conceived to be three sectors of the city, namely Onkara-khanda in the north, Visvesvara-khanda in the middle and Kedara-khanda in the south. The ancient city settlement of Rajghat falls under the Onkara-khanda.

Excavation at Aktha

Excavations at Aktha near Varanasi-Sarnath are particularly significant. From the simple village settlement, Varanasi appears to have developed into a large and famous urban centre in early Historical times, which is well documented in the archaeological remains of Rajghat. That this urban centre was surrounded by a number of satellite settlements, which were catering to the needs of the city dwellers could, further be reconstructed on account of the excavations of such small sites as Saraimohana, Kotwa, Tilmanpur etc.



Agiabir Site

Another important proto-historic settlement of Agiabir near Varanasi is located on the left bank of Ganga in Mirzapur district of Uttar Pradesh. The ancient settlement extends in more than one and half km along the river Ganga and has been partly eroded by it. The constant water supply, navigational route, fertile land and easy accessibility of raw materials attracted the inhabitants of Agiabir to settle here for a longer period. The location of this site is very significant as it lies between two important historical cities of Middle Ganga Plain, Rajghat (Ancient Varanasi) and Jhusi (Pratisthanpur) located at a distance of 50 km and 80 km respectively. The other important geographical feature of this site is its close proximity with Vindhyan ranges, which are at a distance of 30 km south from this place. The inhabitants subsisted on agriculture and animal domestication. However, hunting of wild animals and fishing were also practiced to a certain extent. The ceramic assemblage of this period comprises NBPW, black slipped ware, a few grey ware and red ware. Potterworkshop area was also found during the excavation which was mostly inhabited by potters who indulge themselves in the making of pottery.

Hills of Chunar

The hills of Chunar lying very close to Varanasi are an important resource zone for the supply of sandstone to the entire middle Ganga plains. The field investigations carried out in this region were very rewarding, as archaeological evidence for ancient stone quarries could bed is covered here. It is now possible to demonstrate the entire mechanism of stone chiseling from quarrying of the stone blocks from the Vidhyan sandstone formations, transportation of the blocks to the workshop sites and the identification of chiselling workshops around Varanasi and Sarnath, Chunar fort around 35 kms from Varanasi has been a silent spectator to the 2500 years of history and has undergone major changes based on the preferences of each and every ruler that has held this fort. The Chunar fort built by Maharaja Vikramaditya who was the king of Ujjain for his brother Raja Bharatihari in 56 BCE makes for a compelling visit too. Steeped in history and legends, the fort had been under the rule of several dynasties including the Mughals and then, the British with a mix of Hindu and Islamic architectural elements. As per Alhakhand, king Sahadeo made this fort as his capital and renamed it Nainagarh in 1029 CE. In 1177 CE Chunar first came into prominence, when Prithviraj Chauhan established his fort here. Later, the fort was ruled by Mughal emperor Babur, Shershah Suri, Akbar and then it passed to the nawabs of Awadh and finally the British ruled over this fort till India got independence. In the words of Sanjeev Sanyal "A walk through the fort is a walk through Indian history". It was once said that he who controlled Chunar fort also controlled the destiny of India. Due to its unique location, it has always been of strategic importance for every ruler. The fort has been rebuilt several times by the different rulers who have controlled the fort. As a result, the architecture of the fort is a unique blend of different styles and cultures. The fort's walls and pillars display intricate stone carving, showcasing the artistic prowess of the craftsmen of that era. The fine craftsmanship can also be seen in the stunning jali work (lattice screens) and delicate stone motifs adorning the interiors. The prime attractions of Chunar fort are Samadhi of Bharathari, Sonwa Mandap, Hanging place, bungalow of Warren Hasting and mysterious underground tunnel. Also, in Chunar is the tomb of Iftikhar Khan, which is a great example of Mughal architecture. The Ghanta Ghar in Mirzapur town which is about an hour from Chunar is an ornately carved clock tower which stands out for its spectacular architecture and is known to be the place from where the IST (Indian Standard Time) is calculated. This is due to the fact that the 82.5°E longitude, which is the Standard Meridian of India, passes through Mirzapur.

Baragaon Quarry Site

Barely 5 km away from the famous Chunar Fort, Baragaon might have been the place from where stones for the Ashokan pillars were supplied. Baragaon, primarily a village of stone cutters, was the ancient quarry from where sections of sandstone were extracted, chiselled and transported to build the (Ashokan) pillars. It is located atop the Chunar hill, houses an ancient quarry that supplied "pattika (pillars)" used to build the Ashokan pillar in Sarnath and 80 pillared hall in his palace at Pataliputra. The quarry was a chance discovery by archaeologists P. C Pant and Vidula Jayaswal from BHU in early 1990s. It is believed that Ashoka procured the famous Chunar sandstone from this quarry for his pillar including the lion capital in Sarnath. Stone blocks found in Baragaon bear ancient inscriptions which date back to the third century BCE. The quarry also supplied pillars for the hypostyle assembly hall

in Ashoka's Kumrahar palace in Patna. The palaeography of the inscribed blocks suggests that sandstone was quarried from the hills of Chunar from Mauryan time up to the medieval period.



Figure 9: Ancient quarry site of Baragaon.

Rock Painting of Mirzapur

Cave paintings found in India are among the richest, largest, and most diverse repositories of rock art. In the pre-historic time when the basic needs of people such as food, water, clothing and shelter were fulfilled people felt the need to express themselves. Painting and drawing were the oldest art forms practiced by human beings to express themselves, using the cave walls as their canvas. The abundance of food and water made Mirzapur and its surrounding area an ideal place for early settlers to express their art. The area still has traces of very impressive rock painting. The first discovery of rock paintings in India was made in 1867-68 by Archibald Carlleyle in a rock-shelter near Sohagi Ghat in Mirzapur district of Uttar Pradesh in the Vindhyan range. It was reported much later by Vincent Smith in 1906. Most of the Pleistocene art of the region is non-iconic. Simple iconic animal and human forms appear for the first time in upper Palaeolithic rock paintings in the late- Pleistocene period. It was followed by an explosion of creativity in the form of rock art. Numerous motifs, designs, animal, human and imaginative forms in varied styles were created by Mesolithic artists, and were used in the expression of environment life and thought processes. With the beginning of cattle-domestication a new trend of evolution began in rock art in the late Mesolithic or even earlier in the upper vindhyas in Mirzapur region. Thus developed the Neolithic and Neolithic-Chalcolithic rock art in the region. Among the major rock painting sites found in the region are the Lakhania rock shelters, Kauva khoh rock shelters, Lakhma caves, Sohagi ghat etc.



Figure 10: Rock paintings of Mirzapur.

Cultural Marvels of Varanasi and Sarnath

Kāśī, Vārānasī, Avimukta, Ānandavana, Rudravāsa, Mahāśmasāna or Banaras as it is popularly called, is one of the most famous cities in the world to be seen and to be believed in its myriad expressions of religious faiths, rituals and festivals, traditional and ancient forms of worship and belief that are being practised since time immemorial. It is reflected in the varied expressions of asceticism, spiritual and meditative exercises, in the inimitable rhythm and living style of the local people, in traditional education, music, dance, various art forms and craftsmanship that still continue to be transmitted through generations. The name Kāśī is the most ancient. It was used nearly three thousand years ago to refer to the kingdom of which this city became the capital. In course of time, the name came to refer to the capital city as well. It was on the outskirts of Kāśī that the Lord Buddha came to preach his first sermon in the sixth century BCE. The somewhat later Jātaka tales of the Buddhist tradition speak of the "town of Kāśī", As for its etymology, it has been suggested that the name Kāśī comes from Kāśa, the name of an ancient king, whose dynasty later produced the famous legendary king Divodāsa of Kāśī, or that it comes from kāśa, the name of the tall silver-flowering grass which grows wild along the riverbank. Most commonly, however, it is said to derive from the Sanskrit root kāśa, "to shine, to look brilliant or beautiful". Kāśī, sometimes called Kāśikā, is the shining one, the luminous one, the illumining one.Its most famous māhātmya, the Kāśī KhanḌa explains: "Because that light, which is the unspeakable Śiva, shines (kāśate) here, let its other name be called Kāśī." The word play of Sanskrit continually underlines the relation of the City of Light to the light of enlightenment. For example, the city is called "City of Light, which illuminates liberation," moksa-prakāśikā.

Kāśī, As Mark Twain said in 1898 - "Banaras is older than history, older than tradition, older even than legend and looks as twice as old as all of them put together". The living cultural traditions of this city that so matchlessly and magically symbolize Indian culture in all its manifestations express themselves in an equally exceptional architectural ambience.

The river Gangā, that is the source and the culmination of the spiritual and life energy of Kāśī, adorns the city. The river front and the long uninterrupted stretch of more than 84 ghāṇsis the facade of the architectural zone of present-day Kāśī. These ghāṇs have been witness, through the centuries, to great saints like the Buddha and Mahavīra, to poets like Kabira and Tulsidāsa, to religious philosophers like Śankrāchārya and to millions of pilgrims who still carry the light of faith through generations making Kāśī so special. For over 2,500 years this city has attracted pilgrims and seekers from all over India.



Figure 8: Rana mahal Ghat with ancient Varanasi Monumental Heritage.

From its commanding position on the river Ganges, Banaras has witnessed the entire history of Indian civilization as it evolved mostly in North India. From the ancient Aryan kingdoms and the irregularities, through the golden Mauryan and Gupta empires, to the thousand years of Muslim and British domination, the historical currents of the times have passed through Banaras. Previously it was generally accepted that the antiquity of Kāśī, reconstructed on the basis of archaeological evidence, cannot be pushed beyond 800 B.C., but with the excavation at sites such as Sarāi Mohanā, Akathā, Rājghāt, etc. it seems the antiquity is going back further up to 1500 B.C. The recent evidence of flourishing settlements found by the Department of Ancient Indian History, Culture and Archaeology, Vārānasī, along the ancient Paňchkrośī Parikramā such as Mahāvana, Babhaniyāon, Oudhé, Khuśihārī, Kāśīpurā, Délhanā, Kursāto, Rasūlpur etc. has also challenged the validity of the previous notion through archaeological and scientific study. It is noteworthy that the areas in and around Vārānasī region which lies along the rivers such as Gangā, Varunā, Gomatī, Chandraprabhā, Karmanāśā and its tributaries have led to flourish hundreds of ancient settlements.

These settlements, some of them excavated recently such as Latif Śāh, Malhar, Raja Nal-Ka-Tila, Raipura etc. served as the centre of various craft activities that not only catered to the need of Vārānasī city but also played an important role in socio-economic and cultural life of Vārānasī. There are several smaller tributaries of these rivers flowing down the Vindhyan ranges which have facilitated the transportation of different kinds of stones, ore and other raw materials to the settlements surrounding the capital city of Kāśī Mahājanapada. The excavations at Rājghāt, Agiābir, Dwarkāpur, Anai, Akthā, Rāmnagar, Prahlādpur, Raipurā, Latif Śāh, Babhaniyāon etc. conducted by the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, Vārānasī, have brought to light interesting evidence of fine crafts objects. There are exquisite pieces of ivory, bone, beads, semi- precious and precious stones and metal objects dating back to c.1500-600 BCE.

Vārānasī has been revered by both the Brāhmanic and Śramanic streams of Indian culture because of its strong association with Śaivism as well as with two major Śramanic religions i.e. Buddhism and Jainism. The tvipiḍaka mentions Isipatana (literally means the abode of sages, presently identified as Sārnāth) as the most preferred place for ascetics to do penance and meditation.Thus this place was popular for inter faith interaction among spiritual persons since the ancient time. The Jain literature refers to Kāśī as a Jain tīrtha (holy place) because of four of the Jain Tīrthaukaras (the "ford-makers"). In the 8th century BCE. Pārśvanatha was born around Bhelupur in Vārānasī who established the triad-principle of the Mahāvratas ('great vows'): Ahimsa (non-violence), Asteya (non-stealing) and Aparigraha (non-accumulation). The main Jain images excavated at this site belong to the 9th-11th centuries CE. Pārśvanatha was followed in the 6th century BCE by Mahāvīra, a contemporary of the Buddha, who also visited Vārānasī during his 42nd year of itinerant teaching. The spiritual magnetism of Vārānasī had attracted the Lord Buddha here in the 6th century B.C. to 'Turn the Wheel of Law'. By the turn of 3rd century B.C., the great Buddhist king Aśoka had built a monastery township that flourished till 11th century CE. Now, the restored Sārnāth has become a place of pilgrimage for Buddhists, and a place of spiritual tourism for others.



Figure 11: Ratneshwar Mahadev Temple (Kashi Karvat temple) near to Manikarnika Ghat.

Kāśī was established and recognised as a great sacred place (tīrtha). During the first half of the 7th century the Chinese Buddhist pilgrim, Hsuan-tsang, arrived in the city and described it as thickly populated, prosperous and an important seat of learning. He mentions twenty important temples, and according to him one of the Éivaliugas was about 30m. high covered with copper plates. The arrival and preaching of Ādi Śankarāchārya in 8th century mark there revival of the Brahmanical thought, which finally uprooted Buddhism from this soil.

During the reign of Akbar's grandson Shah Jahan (1628-1657 CE.), the imperial policy changed and a few temples under construction were destroyed. By the order of his successor, Aurangzeb (1658-1707 CE), between 1669-1673 CE many temples including the city's greatest temples like Viśveśvara, Kéittivāsa and Vindu Mādhava were razed and their sites were forever sealed from Hindu access by the construction of mosques. In 1665 CE the French traveller Jean Baptiste Tavernier, a dealer in jewels, paid a visit to Vārānasī and described the grand temple of Vindu Mādhava at the river side, which he described as a "great pagoda". His account is notable because the temple was demolished in 1673 CE by the armies of Aurangzeb. Despite its reputation as a stronghold of Hindu orthodoxy and conservatism, Kāśī participated in the vibrant devotional resurgence from the 14th to early 17th centuries CE. Among the active poets and reformers the most notable were Ballabha, Rāmānanda, Kabir, Raidas, Tulasīi, Chaitanya and Guru Nanak. Kabir, indeed, was one of the greatest figures in all of Indian literature, whose colloquial songs are still sung today.

The British rule brought a major change in the ancient paụḌit-student pattern of learning of Kāśī that had predominated here for 2,500 years. By the approval of the British Governor-General Warren Hastings in 1791 CE, Jonathan Duncan, a British resident in Vārānasī, founded a Sanskrit College, and in 1853 CE the present buildings of the college were built in Gothic style. On similar lines in 1898 CE (Singh, 2018). Annie Besant, the founder of The Theosophical Society in India started a Central Hindu College, a campus which proved to be the only nucleus of a growing university. In 1916 CE, the Viceroy of India, Lord Hardinge, laid the foundation stone of what would become one of the largest and most beautiful universities in Asia, the Banaras Hindu University. The great part is played by Mahamana Pt. Madan Mohan Malviya in giving the University its present shape deserves a special mention here.

Varanasi is believed to be the greatest 'Tirth' or crossing place between the earth and heaven. For a Hindu, to visit Varanasi and bathe in the water of the Ganga, is to cleanse the sins of the thousands of the past rebirths. The combination of the Kashi -the holy city, Ganga the Celestial River and Shiva the supreme God, makes Varanasi an immortal destination. Mark Twain, the American writer, complimented this heritage city in the words: "Benaras is older than history, older than tradition, even older than legend and looks twice as old as all of them put together."



Figure 12: Evening arti at Ghat of Varanasi.

Varanasi is a city replete with temples, kunds (tanks or reservoirs), ghats and gallis (narrow streets). A walk along the bustling ghats one can witness the atmospheric vibes as pilgrims and tourists jostle for space with saffron-clad sadhus, trinket sellers, fortune tellers and tea and snack vendors. Watching the day unfold here from dawn to dusk is indeed a fascinating experience. Some of the best ghats to witness this include the Dashashwamedh Ghat and the Assi Ghat. An early morning boat ride on the Ganges just in time to catch the spectacular sunrise is another great idea to savour the ambience and the activity of the ghats. For a quintessential Varanasi experience, a walk along the narrow alleys and labyrinth of streets that lead to the main temple. Here tiny shops sit cheek by jowl and these hole-in-the wall establishments vigorously sell everything right from holy beads, fresh flowers, vermilion to snacks and souvenirs. They even offer locker services for keeping your valuables safe as you visit the main temple.



Figure 13: Kasi Vishwanath Temple at Varanasi.

If temple hopping is of interest, there are several less-visited places like the Nepali temple crafted in the Pagoda style of architecture. Also called the Shri Samrajeswar Pashupatinath Mahadev Mandir, this 19th century temple has been constructed in wood, terracotta and stone and is the plica of the famous Pashupatinath Temple in Kathmandu. On Mir Ghat is the Vishalakshi Mata temple which is known to bea Shakti Peeth and considered highly auspicious.

Beyond temples, Varanasi offers a multitude of interesting places and the Man Singh observatory next to the Dashashwamedh Ghat is one of them. Built in the Mughal-Rajput architecture style, this 18th century masonry structure reflects the brilliance of the ancient Indian astronomers and houses several important instruments related to the study of heavenly bodies and the calculation of time. The complex also houses the virtual experiential museum which traces the history, evolution and significance of Varanasi through several interactive displays. Varanasi is incidentally the birthplace of warrior queen Jhansi ki Rani Lakshmi Bai and the memorial dedicated to her near Assi Ghat forms for an engaging visit. There are displays all around the statue which capture the history of her illustrious life.

The city is also home to one of the most illustrious universities of the country, the Banaras Hindu University founded by Pandit Madan Mohan Malaviya. The sprawling campus is home to colleges and learning centres that teach everything right from fine arts to yoga and music to medicine. The Bharat Kala Bhavan Museum inside the campus houses one of the finest collections of miniature paintings. The Ramnagar Fort and museum offer glimpses of the glorious past of the kings of Benaras. Known to be the home of the Maharajas of Benaras, the complex also has a museum where vintage cars, weapons, palanquins, antique furniture, clocks etc can be seen.



Figure 14: Banaras Hindu Main Entrance, Lanka, Varanasi.

The narrow lanes that surround the ghats are home to many vintage structures that reflect the days of yester years. Keep an eye for colourful street art that has been creatively done, reflecting the cultural vibrance and ethos of the city. One of the lesser-known heritage structures is the Dalmia Bhavan that was built between 1835 and 1845 by the illustrious Goswami family of Serampore in West Bengal. An example of Indo-Saracenic architecture with neo-classical elements, this property currently owned by Kunal Dalmia, is slated to be converted to a luxury property in a few years.

Varanasi has been the melting pot of many faiths, sects and cultures since ancient times. This unique interfaith and intercultural synthesis of Varanasi has evolved to establish the city as the 'Cultural Capital of India'. In its cultural journey from Janpada-Mahājanapada Period to the present day, it has incorporated and moulded a rainbow of cultural traits which has culminated in epithets such as Ānandavana, Avimukta, Rudravāsa, Mahāśmaśāna, Mokshdā etc. The vibrant cultural heritage of Varanasi is manifested in various dimensions such as archaeology, art, architecture, iconography, literature, music, dance etc. including the Brāhminic, Buddhist and Jain traditions.

Previously it was generally accepted that the antiquity of Varanasi, reconstructed on the basis of archaeological evidence, cannot be pushed beyond 800 BCE, but with the excavation at sites such as Sarāi Mohānā, Akathā, Rājghāt, Sārnāth etc (Upadhyay et al., 2025). It seems the antiquity is going back further up to 1500 BCE (Upadhyay et al., 2025). The recent evidence of flourishing settlements found by our department along the ancient Panchkrośī Parikramā such as Mahāvan, Babhaniyāon, Oudhé, Khuśihārī, Kāśīpurā, Délhanā, Kursāto, Rasūlpur etc. has also challenged the validity of the previous notion through archaeological and scientific study.

It is noteworthy that the areas in and around Varanasi region which lies along the rivers such as Gangā, Varunā, Gomati, Chandraprabhā, Karamnāśā and its tributaries have blossomed hundreds of ancient settlements. These settlements served as the centre of various craft activities that not only catered to the needs of Varanasi city but also played an important role in socio-economic and cultural life of Varanasi. There are several smaller tributaries of these rivers flowing down the Vindhyan ranges which have facilitated the transportation of different kinds of stones, ore and other raw materials to the settlements surrounding the capital city of Kāshi Mahajanapada. The excavations at Rājghāt, Agiābir, Dwarkapur, Anai, Akthā, Rāmnagar, Prahlādpur, Rāipurā, Latif Śāh etc conducted by our department have brought to light interesting evidence of fine crafts objects. There are exquisite pieces of ivory, bone, beads, semi-precious and precious stone and metal objects dating back to 9th -8th century BC. The geo-cultural landscape of Varanasi has abundant heritage temples, mahals, kothis, kunds etc. The documentation of the heritage buildings of this holy city was started by James Princep who made a computation of around one thousand Hindu temples and three hundred thirty three mosques in Varanasi at his time. The recent documentation done under the UPE project by our department revealed 407 main Hindu Temples and 178 main Mosques in present day city of Varanasi along with a handful of Gurudwaras, Churches, Mathas, Jain Temples and Buddhist Viharas.

Varanasi has been revered by both the Brāhminic and Śramanic streams of Indian culture due to its strong association with Śaivism as well as with two major Śramanic religions i.e. Buddhism and Jainism. Tipitaka mentions Isipattan (literally means the abode of sages, presently identified as Sārnāth) as the most preferred place for ascetics to do penance and meditation. Thus this place was popular for interfaith interaction among spiritual persons since ancient times.

Apart from Buddhist place of importance, Varanasi has been a major Śramanic centre of Jainism too. The Jain literature refers to Kāśī as an important Jain Tīrtha because four of Jain Tirthankaras were born here. They were Supārśvanātha, Chandraprabhu, Śréyānsnātha and Pārśvanātha. Supārśvanātha was the seventh Tirthankara of Jainism. It is believed that he was born in Bhadainī locality where the temple of Supārśvanātha is adjacent to the Śvétāmbara Jain temple. Chandraprabhu, the eighth Tirthankara, is said to have born at Chandrāvatī, which is a village situated on Varanasi-Ghazipur Road. Śréyānsnātha was the eleventh Tirthankara of Jainism. Interestingly, the present name of Sārnāth is derived from Tirthankara Śréyānsnātha who was born at Simhapur which is a village near Sārnāth. Pārśvanātha was the twenty-third Tirthankara who lived in the 8th century BCE. He was born near the mythical tank of Dandakhata which is presently identified with the Jain temple in Bhélūpura area, known as Pārśvanātha temple.

The Śramanic influence on Varanasi remained intact during the medieval times too. Sant Kabīr, known as 'Sadgūrū' (The True Guru) was born in Lahartārā locality here. Another illustrious personality of medieval India, Sant Raidāsa or Ravidāsa, popularly known by his title 'Sant Śiromanī' (The Jewel among Saints) was born in a nearby village Sīr Govardhanapur. Varanasi has successfully preserved the material heritage as well as cultural legacy of both the saints which attract lakhs of their followers annually to the city.

The prehistoric rock art heritage dating back to around 10000 BCE are scattered in the Varanasi and its adjoining areas, especially in Lalganj, Marihan and Chunar tehsils of Mirzapur. It is sad to note that the primitive paintings in rock shelters that were earlier documented have now disappeared due to human vandalism, illegal stone-cutting and weathering process, however some new and unreported painted rock shelter sites have come to light recently.

Traditional arts and crafts have been the backbone of the economy and social structure of Varanasi. The heritage of Woodcraft is one of them. Wooden craft was profusely used for various purposes including the construction of temples and buildings, especially since the Post Gupta Period. Even today, while walking through the city, one can find old buildings adorned with carved door-jams, panels, carved wooden doors, frames and sculptures etc.

The legacy of music and dance in Varanasi is tremendous and is acclaimed internationally. The 'Banāras Gharāna' of tabla playing has a powerful sound emanated by the use of more resonant strokes on tabla. The Banāras Gharāna' in Kathak dance is a major school of kathak dance along with the Jaipur Gharana and the Lucknow Gharana. It has made an important presence in the field of classical dances of India with its unique emphasis on footwork and facial expressions.

According to the Atharva Veda Varanasi (the chief city of the Kashi) was connected with the river Varanavati but the name Varanasi is probably derived from a combination of the names of the Varuna and the Assi, affluents of the Ganga, between 'which the city is situated, having been described thus in the Puranas. Varanasi is mentioned in the Ramayana and the Mahabharata as being the capital of the kings of the realm of Kashi. It has also been mentioned in Jain, Buddhist and classical Sanskrit literature. The appellation Varanasi seems to have been corrupted into Banaras, a name which continued in official use till May 24, 1956, when the State Government changed it back to Varanasi.

Sarnath is one of the four most important Buddhist pilgrimage destinations in the world. It has special significance because it is the place where the Buddha gave his first sermon (Mani, 2012; Singh, 2014). The very first "Sangha" was also founded over here. The name Sarnath derives from the Sanskrit word Saranganatha (or Sarangnath in the Pali language), which translates to"lord of the deer" in the English language. The most imposing structure at Sarnath is the Dhamekh stupa rising to a height of about 33.5 mt. Another remarkable structure the Chaukhandi stupa is a three tiered (Trimedhi) stupa of Gupta period. It is surmounted by an Octagonal super structure constructed during the Mughal period to commemorate Humayun's one night stay at this spot. Mulagandhakuti vihara stands where Lord Buddha is believed to have spent his first rainy season in meditation. Housing a vast collection of artifacts, Sarnath Archaeological Museum provides a visual narrative of Sarnath's historical and cultural evolution (Brown, 2002; Sahni, 1914). Many people are surprised to discover Sarnath has Jain & Hindu connections too. Sarnath is equally sacred to Jains being the venue of austerities and death of Sreyansanath, the eleventh tirthankara.

The region encompassing the Ganga, Varanasi, Sarnath, and Mirzapur represents an exceptional heritage landscape where geoheritage and archaeological significance intersect. The Ganga River's formation through Himalayan tectonic uplift and Quaternary fluvial processes has created extensive alluvial plains, terraces, and sedimentary deposits that provide critical evidence for geological and environmental studies. Mirzapur's Vindhyan sandstone formations, Precambrian sedimentary rocks, quartzite hills, and rock shelters preserve invaluable records of prehistoric human occupation and artistic expression, including internationally significant rock art complexes. Sarnath, inscribed on the UNESCO World Heritage List in July 2026, is recognized for its outstanding universal value as a foremost Buddhist archaeological and pilgrimage site, featuring monuments such as the Dhamekh Stupa and Ashokan Pillar. Together, these sites illustrate a continuous interaction between geological evolution, human cultural development, and living religious traditions, making the area a prime example of integrated geoarchaeological and cultural heritage worthy of international recognition and conservation.



Figure 15: Dhamekh stupa at Sarnath.

Field Transect

Transect Route:

Mirzapur (Vindhyan Plateau) – Chunar – Varanasi (Ganga Riverfront) – Rajghat – Aktha – Sarnath

Total Distance: Approx 110-130 kms

This transect runs roughly SW to NE through a major geo-cultural crossroads in North India.

Table 1: Tentative Field Trip Transect Table

Stop	Location	Theme	Key Observations
1.	Mirzapur (optional)	Geoheritage & Prehistory	Vindhyan sandstone, quartzites, Precambrian rocks, rock shelters, geomorphology, prehistoric settlements, rock art
2.	Lekhania / Morhana Pahar (optional)	Geoarchaeology	Rock paintings, Mesolithic occupation, weathering of sandstone, human adaptation
3.	Chunar Fort & Sandstone Quarries	Geology & Archaeology	Vindhyan sandstone, ancient quarrying, Ashokan inscriptions, fort architecture, stone resources
4.	Ganga River Section	Fluvial Geomorphology	River terraces, natural levees, channel morphology, sedimentation, floodplain evolution
5.	Varanasi Ghats	Cultural Landscape	Crescent-shaped river bend, geomorphology of ghats, sacred landscape, ritual practices, riverfront architecture
6.	Rajghat Excavation Site	Urban Archaeology	Early Historic settlement, NBPW, stratigraphy, urban development, cultural sequence
7.	Aktha	Early Buddhist Archaeology	Early settlement associated with Sarnath, archaeological remains, settlement expansion
8.	Sarnath	UNESCO World Heritage	Dhamek Stupa, Ashokan Pillar, monasteries, Gupta sculptures, Buddhist pilgrimage landscape

Flora, Fauna and Climate on the Area

The paleo context of fauna and climate in the Middle Ganga Plain and the Vindhyan Plateau is defined by the influence of tectonic movement, monsoon climate, and valley dynamics during the Late Pleistocene and Holocene epochs (Srivastava, 2020). The alluvial valleys of Ganga River and its tributaries, located in the Middle Ganga Plains, were formed by the tectonic movements and monsoon flows. This region was dominated by grassland with a scattering of thickets and mostly C4 plants, which indicated a warm paleoclimate that existed 45,000 years before present (BP) and earlier(J. Singh, 2025). Evidence of human presence on this plain dates back to at least 45,000 BP, with a large number of Palaeolithic and Mesolithic findings (Shukla & Janardhana Raju, 2008; J. Singh, 2025). However, there is a possibility that humans were living in this region earlier, since many ancient sites were covered by thick sediments. Human activity was strongly dependent on the geomorphological conditions and monsoon climate variations, as about 5,000 years ago, the southwest monsoon flow decreased, causing water bodies to become dry (Agrawal et al., 2013; Srivastava, 2020). This process impacted the local human population as they were accustomed to living near the wetlands and rivers. Therefore, human-made settlements were found to be located primarily on high terraces to avoid frequent flooding. Regarding the Vindhyan region, the rock paintings from Mirzapur illustrate the historical relationship between people and their changing natural environment from the Upper Paleolithic to the Neolithic times. The tectonic movements and disrupted river channels determined the environmental shifts in humans' cultural landscapes during the Late Quaternary (Sastri et al., 1971). For instance, in the Chandraprabha basin, the combination of a regional decline in groundwater levels and reduced monsoon rainfall about 5,000 years ago aggravated the geomorphological hazards for the local inhabitants. Paleo-botanical and sedimentological analyses support this statement, illustrating the impact of Late Quaternary climate variability on vegetation shifts and human cultural development (Agrawal et al., 2013; Jha et al., 2024; Sastri et al., 1971). Thus, the paleo context of fauna and climate in the Middle Ganga Plain and the Vindhyan Plateau involves the intricate relationships between monsoon variations, tectonic movements, valley dynamics, and human settlements. These data do not include modern people's observations or current climate and vegetation patterns.

Geological issues to be discussed during the field trip

As we all know, geology and climate are among the major factors influencing the behaviour and movement of humans; and the natural setting affects the life of humans strongly. The human life of the Middle Ganga Plain has been essentially governed by the shifting of the rivers, abandonment of river channels, formation and shrinkage of lakes. The Ganga plain

shows a variety of landforms produced during the last 1,00,000 years in response to the changes in base level, tectonics and climate. There have been many long-term and short-term changes in the rainfall pattern of the Ganga Plain. The Ganga plain was grassland with few thickets at least since 45 kyrs BP, where C4 type vegetation dominated (Agrawal et al., 2013; Jha et al., 2024; Srivastava, 2020).

There is evidence of occupation in the Ganga Plain at least since 45 kyrs. There is also evidence of Palaeolithic and Mesolithic tools in some parts of Ganga Plain. It has been argued that due to the high rate of sedimentation, older habitations are buried several meters below the surface. The large-scale occupation of the Ganga Plain by humans took place between 3.5 to 3 kyrs BP (Agrawal et al., 2013; Jha et al., 2024; Srivastava, 2020). The district of Varanasi is mainly composed of Gangetic alluvium, the deposition of which commenced from the Pleistocene period after the final upheaval of the Himalayas and is still continuing. It consists of interbedded layers of sand, silt and clay, which are associated in places with kankar. Sections obtained by sinking wells have generally given a profile of about 35 feet of loam or clay mixed with sand in varying proportions, 30 feet of blue silt, 20 feet of strong clay and below that a water-bearing stratum of reddish sand.

The study of the site of Ramnagar (Varanasi)in Middle Ganga Plain demonstrates that on the surface, the oldest occupation of human settlement is about 1500 BCE, represented by Pre PGW culture. During the NBPW period, the numbers of archaeological sites are in good numbers spread all over the area(Kanungo et al., 2010, 2021). These sites are located on the banks of small rivers, ponds and lakes and mostly occupy upland interfluve service (Older Alluvial Plain) (Fritz, 2021; Kaur et al., 2019; Shah, 2008). Then follows the Shunga - Kushana period when settlement sites increased manifold everywhere. It is followed by settlement sites of Gupta period which show an increase in number of sites in some districts and decrease in other districts(Fritz, 2021). Then followed the settlement of the medieval period, when the number of sites increased dramatically. These sites of the medieval period occupied even new areas and this is related to the increase in the population. It is important to note that most of the settlement sites of the Middle Ganga Plain are multi-cultural. In other words different cultures occupy the same site. It suggests that earlier cultures selected the most favourable setting of the landscape, and the later cultures followed the earlier traditions. In many sites they were breaks between two cultures. It can be argued that changes in the settlement pattern is related to the changes in the climate, particularly the rainfall. Majority of the settlement sites are located on the upland interfluve, consisting of Older Alluvial Plain and Older Flood Plain. Other geomorphic areas have very few habitation sites. The sites on the upland interfluve areas are along the lakes, ponds and banks of small rivers. These areas have good supply of water, but are safe from floods.

The Vindhyan rocks which occur in the southern portion of the district in tahsil Chakia consist of different kinds of quartzite and sandstone belonging to the Dhandraul and Scrap-Sandstone stages. The mineral products that are commonly found in this district arereh, kankar and brick and pottery earths.

National and International Significance of the Proposed Field Trip

Many say Varanasi is the oldest city in the world. Most say it is the oldest city in India. An eminent American writer Mark Twain when visiting Varanasi 100 years ago says, "Banaras is older than history, older than tradition, older even than legend, and looks twice as old as all of them put together". Excavations, scientific analysis and historic documents support the fact that Varanasi is one of the ancient continually living cities of the world. The land of Varanasi (Kashi) has been the ultimate pilgrimage spot not only for the Hindu but also for the Buddhist, Jaina and Sikhs for ages. It has a unique culture, which has developed thousands of years during which it has been one of the major cultural centers of northern India. The whole culture of Varanasi revolves around the river Ganga, which is the heart and soul of the city. Varanasi is also famous for its trade and commerce, especially for the finest silk and gold and silver brocades, since the early days.

The Ganga basin occupies the central position of the Indo-Gangetic foreland basin system. It is densely populated and highly cultivated. The Ganga basin is a peripheral foreland basin where fluvial sedimentation has been taking place since quaternary (Jha et al., 2024; Shah, 2008, 2015; Vaishnav et al., 2025). Several well defined geomorphic surfaces have been identified and considered to have formed in response to climatic and base level changes during late quaternary (Sastri et al., 1971). The geological evolution of Varanasi area is intimately related to the Ganga River which is the trunk river of the Ganga basin. Broadly it is a boundary between the Ganga plain and Vindhyan Plateau. The Varanasi area of the Ganga basin is geo-morphologically unique in terms of topography, channel behaviour and Ganga river valley as compared to adjoining sectors. The Ganga basins show a number of geomorphic surfaces of regional extent, and, thus, are of genetic significance. These surfaces have differences in spatial distribution, elevations, nature of sediment character and stratigraphic records. All these geomorphic surfaces though were formed at different times during quaternary are vertical accreting and have a few metre thick Holocene sediment cover younger to their age of formation. The rivers got incised during late quaternary Holocene times, and before incision they possessed much wider valleys and were freely migrating within their valley repeatedly changing channel position. Because of the incision, a high cliff is exposed towards the Ramnagar side, while the Varanasi side is gradually rising to the same level. At Varanasi Ganga River carries a mixed sediment load derived both from Himalayan and peninsular craton including Vindhyan rocks. Rajghat, Agiabir, Chunar and Baragaon quarry site are located on the bank of the river Ganga and after the visit of these archaeological sites we may get insight into rich heritage, settlement pattern and other aspect of life of this region (Ala Eldin et al., 2000b; Kaur et al., 2019).

Number of Days – 5

Day 1: Arrival at Babatpur Airport or Varanasi Railway station

Day 2: Varanasi

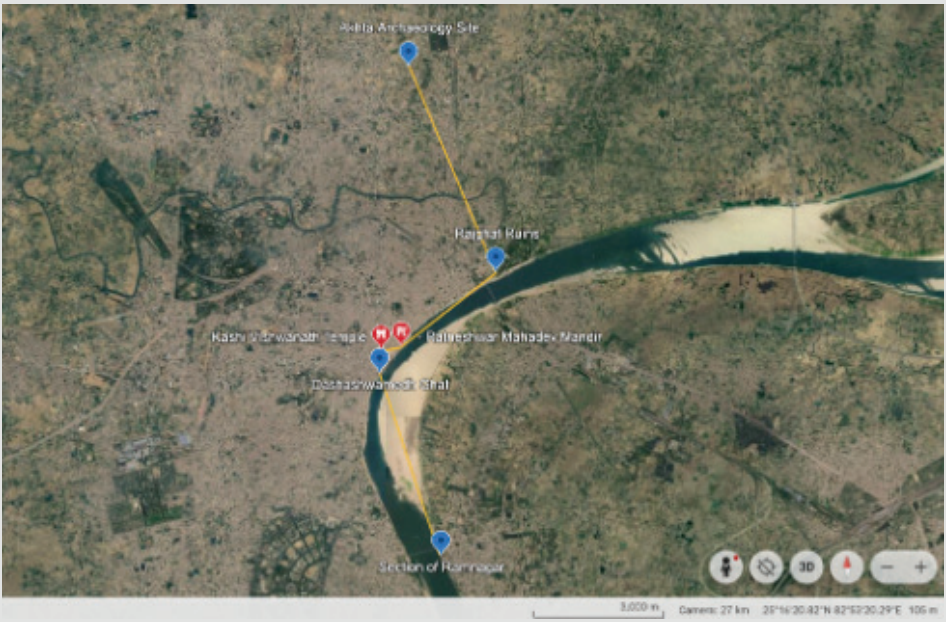


Figure 16: Google Earth Map for Visiting plan in 2nd Day.

The visit to the exposed section of Ramnagar and the adjoining area of interest by boat, along with the visit to the Rajghat Archaeology Site, reveals significant historical insights. Recent excavations at Rajghat suggest its history may extend back to 1500 BCE, uncovering ancient settlements and a thriving craft economy that highlight the city's importance as a center of trade and culture. Archaeologists from Banaras Hindu University have pursued academic research at Rajghat, representing the ancient settlement of Varanasi located on the northern outskirts of the city near the confluence of the Ganga and Varuna rivers. Excavations at Akhta near Varanasi-Sarnath are particularly significant, showing the evolution of Varanasi from a simple village settlement into a large and famous urban center in early historical times, as documented by archaeological remains at Rajghat. A heritage walk in Old Varanasi includes notable sites such as the Kashi Vishwanath Temple and the Shri Samrajeswar Pashupatinath Mahadev Mandir, a 19th century Nepali temple modeled after the famous Pashupatinath Temple in Kathmandu. The Ratneshwar Mahadev Mandir, also known as the Leaning Temple of Varanasi, is one of the most photographed Hindu temples in the city. Evening Aarti at Dashashwamedh Ghat by boat offers a vibrant cultural experience, while the ghats of Varanasi, including Dashashwamedh and Assi Ghats, provide lively

atmospheres filled with pilgrims and local vendors. Early morning boat rides on the Ganges offer serene views of the sunrise and the bustling activities along the ghats. The Varanasi Ganga Aarti, held at sunset and sunrise at Dashashwamedh and Assi Ghats, is a highly choreographed ceremony distinct from those in Haridwar and Rishikesh. Varanasi is renowned for its exquisite silk weaving, producing some of India's finest silk and brocade textiles, and has a rich tradition of woodcraft historically significant in temple and building construction. The city hosts numerous cultural festivals reflecting its rich tapestry, including religious celebrations and traditional music and dance events, with vibrant festivities during Dev Diwali and Dussehra. As one of the oldest continuously inhabited cities in the world, with a history possibly extending back to 1500 BCE, Varanasi has been a significant center for various religious traditions such as Hinduism, Buddhism, and Jainism, deeply influencing its cultural landscape.

Day 3: Sarnath



Figure 17: Sarnath Buddhist Site in Google Earth Image.

After-breakfast, we can explore Sarnath to visit the Dhamek Stupa, Chaukhandi Stupa, and Sarnath Archaeological Museum. We will learn about Ashokan Pillars and Buddhist relics and study the monastic ruins. This place has great historical significance as one of the four holy cities of Buddhism. Apart from that, Sarnath possesses ancient remains dating back to the Mauryan and Gupta periods. Dhamekh Stupa, Chaukhandi Stupa, Dharmarajika Stupa, and Mulgandhkutti Vihara are the four main stupas and monasteries. However, the Sarnath Archaeological Museum contains rare relics to study the culture and history of this site.

Moreover, Sarnath carries enormous religious importance to Buddhism as the place where Lord Buddha delivered his first sermon. It is also considered holy by the Jains as the location where Sreyansanath, the eleventh Tirthankara, undertook severe ascetic practices and died. Many pilgrims visit this place to attain spiritual benefits and knowledge. Sarnath is undoubtedly one of the most frequented ancient tourist centers in India. It possesses cultural values and traditions handed down through generations. The archaeological museum covers the antiquity and cultural history of this place. We will return to Varanasi from Sarnath.

Day 4: Mirzapur and Chandauli

Mirzapur lies in the Middle Ganga plain, a region presenting unique alluvial deposits with clear traces of anthropogenic activities. The landscape shaped by the rivers Ganga and its tributaries influenced the settlement pattern and cultural heritage of the region. Chunar Fort is the most prominent site of Mirzapur district. This fort was built in 56 BCE by the ruler of Chandauli, Vikramaditya, for his younger brother Raja Bharatihari. Later, it became popular in 1177 AD under the rule of Prithviraj Chauhan and was acquired by the Mughals in 1526 AD under the rule of Babur. The last rule of Chunar Fort was in the hands of the British during the revolt of 1857 (Gautam et al., 2022; Shah, 2015).

A few kilometers away from Chunar Fort, the Baragaon village marks the historic site of an ancient quarry. Baragaon gets its name from stone cutters in ancient times and was known to be the best and most ancient sandstone mined for the Ashokan Pillars (Fritz, 2021; Jha et al., 2024). Another ancient site in Mirzapur is Agiabir, a pre-historic settlement close to Varanasi on the left bank of the Ganga River. It is over one and a half km long, located on the banks of the Ganga, and partially submerged in the river due to the meandering of the river (Jha et al., 2024).

Chandraprabha River flowing through Chandauli District originates from Mirzapur, forming part of the Upper Vindhyan Plateau. The early prehistoric inhabitants settled along the river valleys based on the geomorphological setting and monsoon regime. The earliest evidence of human settlement in Chandauli District's Naugarh Hills dates back to the Upper Paleolithic age. The region has had a dense settlement due to its geomorphology and has changed through various cultural phases, including the Neolithic, NBPW, and Sunga (Kanungo et al., 2010, 2021). About 5,000 years ago, there was a shift in the South-west Monsoon climate causing dryness, restricting riverine traffic and trade, and changing vegetation, which ultimately led to the decline of the population. Further, active thrust faulting has hampered minor river systems by uplifting the riverbeds and making them stagnant. Therefore, the geomorphology of Mirzapur district, together with the paleoenvironment has shaped the culture and settlement pattern of Mirzapur district, Chandauli district, and the Vindhyan Upland.

Day 5: Drop at Babatpur Airport or Varanasi Railway station attend INQUA 2027 Conference

Conclusion

This field-based geoarchaeological and geoheritage assessment (and related INQUA 2027 pre-field transect) provides an insight into the tectonic, climatic, and fluvial forces that shaped the landscape, and hence the burial/exposure of archaeological horizons, with implications for cultural trajectories in the Middle Ganga Plain and the adjacent Vindhyan Plateau of Varanasi-Mirzapur-Sarnath corridor (24°30′ -27°50′ N and 84°47′ -87°50′ E). This corridor hosts an exceptionally thick post-Tertiary alluvium (~1300-1400 m) of the Middle Ganga Plain (Khadar/Newer Alluvium and Bangar/Older Alluvium with wider piedmont, central, and marginal alluvial plains) juxtaposed against the exposed Vindhyan sandstone-quartzite belt, including the Chandraprabha basin, comprising a unique "reference transect" of deep aggrading plains against outcrops representing ancient sequences. The study uses a drainage-geomorphology approach supplemented by remote sensing data, field-based geomorphological verification, published stratigraphies and excavations, and reconnaissance field surveys and cave visits at Ramnagar cliff, Rajghat, Akhta, Agiabir, Chunar-Baragaon quarry-hill complex, Mirzapur rock-shelter clusters, and Sarnath to document the relationship between geomorphological changes and cultural patterns. The narrow alluvial valley of the Ganga at Varanasi is found to be primarily neotectonically controlled (rather than climatically or base level controlled), which influenced the development of a confined meandering reach, with the Ganga capturing the Varanasi belt scarp during 40 ka and further downcutting to reach its present position after ~7 ka, with gully incision continuing for millennia before significant anthropogenic activity. With the extreme thickness of alluvium, the discovery of Pleistocene settlements in the Middle Ganga Plain has been masked (possibly buried under younger sediments), unlike the epi-Palaeolithic tools (Naugarh) and rock art sequences in the Vindhyans, which represent a continuum from essentially non-iconic/non-anthropomorphic Upper Palaeolithic motifs through to Mesolithic and Neolithic/Neolithic-Chalcolithic depictions (Lakhania, Kauva Khoh, Lakhma, Sohagi Ghat). Settlement patterns were found to be closely related to palaeoecology and geomorphology, particularly the selection of safer interfluve or terraced (Older Alluvial Plain/Older Floodplain) zones for habitation, presumably to access perennial fresh water lakes/ponds and smaller streams in addition to avoiding the floods, with large scale expansions commencing at ~3.5-3.0 ka. These terraces and interfluves were typically multi-cultural and reused, with cultural breaks possibly related to hydroclimatic impacts. The cultural sequence ranges from pre-PGW/PGW (with the possibility of Varanasi being dated to ~1500 BC, as suggested by the PGW at Rajghat, Aktha, and related contexts), NBPW, Sunga-Kushana, Gupta, and medieval phases, with varied expressions of material culture, craft production, and urbanization, with Rajghat exemplifying the emergence of a major commercial/metropolitan center during the first millennium BC due to its confluence setting (Ganga-Varuna-Assi), with navigability, natural harbors, and craft industries (ivory, bones, beads, metals), supported by satellite villages. In the Chandraprabha basin and adjacent Chandauli-Mirzapur hills, a significant cultural transition occurred at ~5 ka, related to weakening of the SW monsoon and increasing aridity, exacerbated by tectonic warping and consequent channel switching, and waterlogging of small water bodies and lowered ground water levels, with implications for settlements, with district-scale patterns (limited early PGW, later NBPW and Early Historic expansions, and medieval nucleations) being explained by these monsoon-tectonic interactions. This study emphasizes the geo-cultural values and

conservation challenges in the Vindhyan-Sarnath transect, including the long-standing Chunar sandstone mining/sulpture tradition that has supplied the Mauryan-to-modern pillar stones (and Baragaon quarry's role in the Ashokan pillar and medieval mining/metallurgical traditions), with Mirzapur's globally significant rock art landscape threatened by vandalism and illegal stone quarrying, and the religious-palimpsestic ghat and temple heritage of Varanasi, as well as its traditional crafts and music/dance, intertwined with the Buddhist complex of Sarnath (with Dhamekh and Chaukhandi stupas, Ashokan pillar, Museum, and Jain/Hindu connections) and being inscribed on UNESCO's World Heritage List in July 2026. While the study supports the utility of geomorphological and chronological frameworks, it also identifies research gaps, including limited sedimentological analyses and the need for geochemical assessments, to better understand the processes and palaeo-environments. The article highlights the potential of the Varanasi-Mirzapur-Sarnath corridor as an international study area for examining Late Pleistocene-Holocene landscape transformations, with implications for archaeological visibility under extreme alluvial cover, settlement patterns, resource use, and sacred landscapes for multidisciplinary field-based studies with conservation/value-based educational and managerial implications.

Acknowledgement

The whole work of INQUA 2027 Pre-Field Visit would not be completed without the generous support, guidance, and cooperation of several individuals and institutions. We would like to express our sincere gratitude to Prof. U. K. Shukla for his valuable guidance, motivation and support during the planning of the field visit itinerary. His experience helped us to develop the academic and organizational dimensions of this pre-field excursion. We are also highly obliged to Prof. Anil K. Pokharia for the fabulous idea and guidance that motivated us to plan this event. The whole project design and mission of the programme were enriched with his knowledge and vast experience. Our special thanks also go out to the Department of Geology and the Department of Ancient History, Culture and Archaeology for their tremendous support, cooperation and help during the organization of this pre-field visit. We are also obliged to Uttar Pradesh State Archaeology Department and Archaeological Survey of India, Sarnath Circle for their immense cooperation and support to organize this trip. The INQUA 2027 Pre-Field Visit could not be completed without the contribution of these institutions and individuals, directly or indirectly.

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Annexure

Field Excursion Guidelines: Do's and Don'ts

To ensure the safety of all participants and to promote responsible scientific field practices, all participants are requested to adhere to the following guidelines throughout the field excursions.

Keep a valid passport (for international participants) or a government-issued photo ID (for Indian participants) with you at all times during the field excursion.

Do's	Don'ts
1. Follow the instructions of the excursion leaders, coordinators, and local authorities at all times.	1. Do not collect rocks, fossils, archaeological artefacts, biological specimens, or any other materials without prior authorization.
2. Remain with the group and inform the excursion leader before leaving the designated route.	2. Do not damage, deface, or remove material from geological outcrops, caves, monuments, heritage structures, or other natural features.
3. Wear appropriate field attire, including sturdy closed-toe footwear, full-length trousers, a hat or cap, and weather-appropriate clothing.	3. Do not wander alone or separate from the excursion group without informing the field leaders.
4. Carry sufficient drinking water, personal medications, sunscreen, insect repellent, and other essential field supplies.	4. Do not climb unstable slopes, cliffs, rock formations, or enter hazardous areas unless specifically instructed or supervised.
5. Keep a valid photo identification and your excursion registration details with you during travel.	5. Do not swim or enter rivers, lakes, lagoons, or coastal waters unless expressly authorized by the excursion leaders.
6. Respect local customs, religious sites, cultural heritage, and private property.	6. Do not consume alcohol, recreational drugs, or engage in unsafe or irresponsible behaviour during the excursion.
7. Follow the Leave No Trace principles by carrying back all waste and helping to keep field sites clean.	7. Do not operate drones or other restricted equipment without obtaining the necessary permissions.
8. Use designated trails and approved observation areas to minimise environmental disturbance.	8. Do not photograph restricted installations, sensitive locations, or local residents without prior permission.
9. Observe geological, ecological, archaeological, and cultural features carefully without causing any damage.	

10. Record field observations systematically and collect samples only with prior permission from the excursion leaders and the relevant authorities.

11. Exercise caution near cliffs, riverbanks, caves, unstable slopes, road cuts, and other potentially hazardous terrain.

12. Respect wildlife by maintaining a safe distance from animals, birds, reptiles, insects, and their habitats.

13. Immediately report any illness, injury, emergency, or hazardous situation to the excursion organizers.

14. Be prepared for changing weather conditions and comply with all safety advisories issued by the excursion leaders.

9. Do not create excessive noise or disturb local communities, religious activities, wildlife, or natural habitats.

10. Do not leave valuables unattended or rely solely on mobile phone connectivity in remote areas.

11. Do not undertake any activity that may compromise your safety, the safety of fellow participants, or the conservation of the area's geological, ecological, archaeological, or cultural heritage.

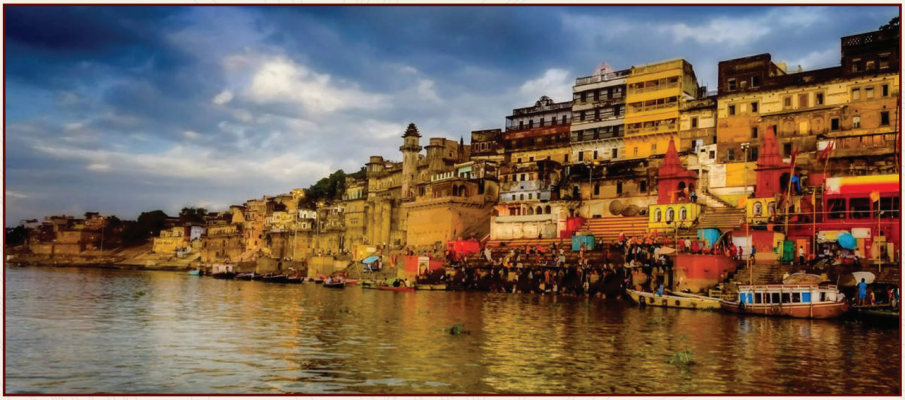
Disclaimer

Participation in the field excursions is entirely at the participant's own risk. While the Organising Committee and excursion leaders will make every reasonable effort to ensure participant safety and provide appropriate guidance, they shall not be held responsible for any personal injury, illness, loss of personal belongings, property damage, delays, or unforeseen incidents arising during travel or field activities. Participants are expected to act responsibly, follow all instructions issued by the excursion leaders, and comply with applicable local laws and regulations throughout the excursion.













Scan for
Field Guide Book

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