

Rachel
Carson
Center
Perspectives

How to cite:

Singh, Vipul. "Gangetic Floods: Landscape Transformation, Embankments, and Clay Brick-Making." In: "Asian Environments: Connections across Borders, Landscapes, and Times," edited by Ursula Münster, Shiho Satsuka, and Gunnel Cederlöf, *RCC Perspectives* 2014, no. 3, 23–28.

All issues of *RCC Perspectives* are available online. To view past issues, and to learn more about the Rachel Carson Center for Environment and Society, please visit www.rachelcarsoncenter.de.

Rachel Carson Center for Environment and Society
Leopoldstrasse 11a, 80802 Munich, GERMANY

ISSN 2190-8087

© Copyright is held by the contributing authors.

SPONSORED BY THE



Federal Ministry
of Education
and Research

Deutsches Museum 



Vipul Singh

Gangetic Floods: Landscape Transformation, Embankments, and Clay Brick-Making

Introduction

The Gangetic basin, traditionally famous for large-scale crop production and rice farming, has witnessed gradual alteration in its land-use pattern over the last hundred years. Shifting of the Ganges riverbed and deterioration of both surface and ground water quality are now serious concerns in the Gangetic basin—the Patna district being one such region facing this problem.

In his *An Account of the Districts of Behar and Patna in 1811–12*, Francis Buchanan mentioned the changing courses of the rivers and their tributaries and branches in Bihar. Since then, many of the channels mentioned in this survey have become dead, dry, and extinct, and the Ganges has continued to shift in a northward direction near Patna. Geologists have been looking at the long-term dynamics of the change in the course of the river Ganges and they have attributed these changes to “geomorphic diversity (linked especially to precipitation gradients) and tectonic history in the frontal orogenic areas which, in turn, impact sediment supply into the basin” (Sinha et al. 2005). The river basin geomorphology is undoubtedly an important causative factor for the “hydrological response of a basin,” but other human-induced factors cannot be considered insignificant. The annual flooding in the Gangetic basin is an age-old phenomenon, and historical documents indicate that attempts to control the devastation of the flooding have long been made through structural means like bunds and embankments. These structures acted as levees or artificial banks that were raised along the immediately surrounding land to prevent it from flooding. Based on the study of the archival records in coordination with fieldwork on the implications of these flood-control attempts, my proposition is that these efforts have had grave implications for the ecology of the region.

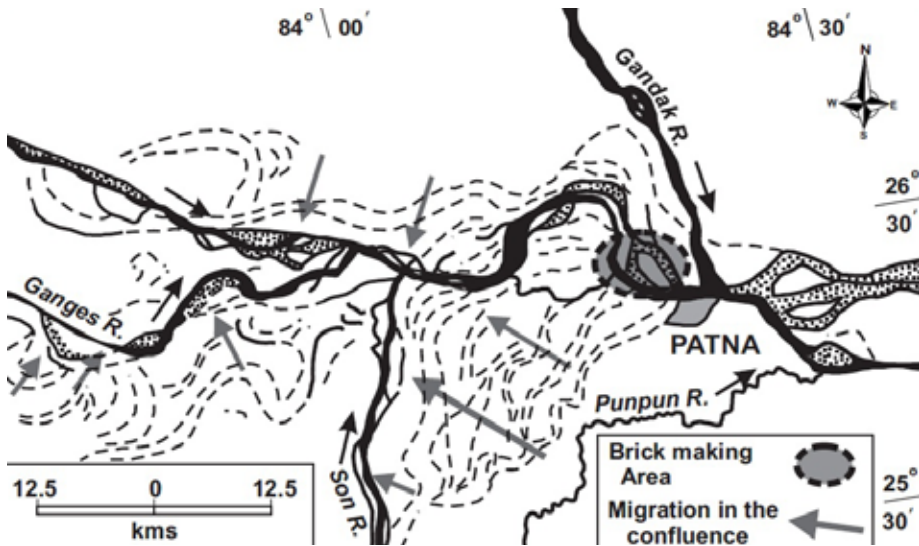
Embanking the Ganges

During the seventeenth and eighteenth centuries Patna, Bankipore, and Dinapur—now known as Danapur—emerged as major military bases for the colonial government

(in the form of the East India Company). Patna also emerged as a major hub for global trade after the British East India Company established a factory for calico and silk there in 1620. Later it became an important trading center for saltpeter. Bankipore became the site of the houses and offices of the English officials, which were constructed on high platforms along the banks of the Ganges. The second neighboring township, Danapur, was built as a cantonment (military base) on the confluence of the banks of the Son and the Ganges rivers at Digha. Physiographical analysis of the region would indicate that it is “a typical doab area” (that is, a strip of land lying between two confluent rivers) and also a “flood prone” area. The entire region is surrounded by the river system, with the Ganges flowing from northwest to southeast and the Punpun River flowing from west to east.

Before the East India Company rule, *zamindars* (big landholders) and local rulers used their own resources to try and control rivers locally, typically in the form of embankments. However, the colonial government believed that embankments on a heavily silt-laden river not only prevented river water from spilling over, but also, by trapping the silt and sand within, slowly raised the riverbed. Therefore, in the long run, this would require them to increase the height of the embankments accordingly. Despite this, they still gave preference to construction of bunds or embankments.

The East India Company needed a public works infrastructure for its own survival and to enforce its government. Since they had to face a lot of resistance from the native rulers, they desperately needed roads, bridges, canals, embankments, barracks, and cantonments to facilitate the movement of their troops. Such infrastructure was also needed for the consolidation of their rule and for penetration further into the interior for revenue. In fact, a bill to promote the construction of lines of communication as feeders to railways, high roads, navigable rivers, and canals was presented in 1863. On account of this, the construction of a new railway line between Howrah and Mirzapur was planned. But the tragedy was that it was designed parallel to the Ganges, which created an obstruction to the natural flow of the flooding river. Correspondence related to the administration of the Ferry Funds of Bengal of the 1850s and 1860s indicates that the collected funds were used to make new embankments along the southern side of the Ganges. The idea was not only to protect the new settlement but also to provide “roads as feeders” in connection with the railways.



Shift in confluence of the Ganges and other rivers in the Gangetic basin around Patna. (Map designed by Vipul Singh. After Matra and Ghose 1992, 28.)

At that time, nobody cared that all three rivers surrounding Patna—the Ganges, the Son, and the Punpun—had had a long history of shifts in their river channels. Today we can identify the ancient channels of the rivers using Indian remote sensing satellites. These images indicate that the modern township of Patna lies in the historic floodplain.

The physical shape of Patna was gradually transformed by the East India Company as per its immediate requirements and also because of the fact that company employees did not want to live in the old town, preferring to maintain a distance from the local population. However, the utmost consideration for “erecting cantonment and establishing headquarters at Patna” was the “greater security of the provinces” and the facilitating of the “dispatch of soldiers to assist in collections” (Srinivasachari 1962, 372). The year 1770 was the turning point for the changing landscape of Patna, when two provincial councils known as the Controlling Councils of Revenue were formed to supervise the revenue matters—one at Murshidabad responsible for Bengal and the other at Patna responsible for Bihar. In 1793, Patna also became a separate judicial district.

In 1783 and 1787 there was major flooding of the Ganges, which had important implications for the future of state policy concerning the rivers under colonial rule. A general fear of the company’s factory being washed away developed, and it was proposed to

secure the bank of the Ganges near Patna with piles and fascines made with bundles of wood. The local officials and engineers mooted the idea that in order to save the buildings from the invasion of the Ganges at its full flow, it was essential to elevate the bank with sal timber or fascines of brushwood, or to build a fort-like wall from strata of *kankar* rock to provide the banks with the solidity and sustainability to resist the furious running waters. The official correspondence of the late eighteenth and nineteenth century would suggest that the prime focus of the company at that time was on preserving and protecting the cantonment. There was a growing concern to monitor further encroachment and manage the course and rapidity of the river, and therefore, the bank opposite the cantonment was kept well sloped to reduce the pressure of the river current. Some sort of round bastion at Bankipore was thus intended to throw the force of the river Ganges towards the mouth of the Gandak. Buchanan's account suggests that the eastern part of the town was raised "in consequence of the European settlement."

Emergence of Clay-Brick-Making Units

Construction of embankments along the river had its own repercussions. The Ganges has shifted almost seven kilometers from its original riverbed over the last century. The change has been gradual, but the last few decades have seen major shifts in the course. The oscillation of the Ganges has been a regular feature noted by and often discussed by people living in the area. However, the most recent shift of the Ganges is a new phenomenon. It has happened largely because of the embankments prevent the river from spreading onto the southern side during the flood months. Therefore, when the flood recedes, the silt is deposited along the banks, causing the river's main bed to shift annually.

The movement of the riverbed has created new open space and this has been reclaimed by human settlements. Over the last 50 years a number of brick-making units have mushroomed along the banks of the Ganges in Digha. Moving along the banks of the Ganges in Patna one can also find a number of small clay-brick-making units. These areas along the main riverbeds are flooded with Ganges water for half of the year. Then the water in the river starts receding in the month of October and these low-lying areas remain without water for the next six months. It is in these dry months that the brick-making activities take place. In recent years the brick-making units have

increased by leaps and bounds in the region because of rapid growth in Patna and its surroundings and the huge demand for bricks in construction.

The silt deposited along the banks is very fine and thin as well as very smooth. This makes it easier to make bricks from the soil. The large amounts of soil removed when making bricks creates a huge depression in the surface that is then filled up with very fine silt during the next annual flood. The proliferation of these brick-making units has contributed to major landscape transformations in the region. In recent years there have also been concerns about the rising arsenic contamination in the shallow groundwater aquifer. Most of the shallow aquifer zones that are being increasingly exploited in the urban areas of Danapur, Digha, and Maner are heavily affected by arsenic and iron. Recent studies have shown that as one moves away from the riverbank, the frequency of arsenic contaminated sources decreases. The shrinking of the Ganges riverbed could be one possible reason for such contamination, as the water is not being replenished properly. This topic needs further investigation, however.

Another long-term implication of embanking the southern side of the Ganges and of the emergence of permanent brick-making units has been the acceleration in the northward shift of the riverbed. With the growth of permanent settlements on these lands, newly reclaimed by brick-making units and other modern constructions, the Ganges spreads towards the north, i.e., the *diara* land, flood-plain regions adjacent to rivers. My interviews with the people living in these *diara* areas highlight that they are no longer left with any agricultural land for the six months of the year during which they used to cultivate pulses and wheat. The land now remains submerged in water for a longer duration, leaving them with no arable land for agricultural production. This has resulted in the forced migration of many locals to work as laborers in brick-making units or in other fields.

The essential problem with the flooding of the Ganges is that of how to handle sediments and improve drainage. The Ganges plain requires “spread-out flooding,” and this term should not be seen in an inevitably negative light. The available archival sources highlight the broader drive of colonial capitalism: the process of administrative and economic control of the region, through the control of the Ganges river system and its flood control, has led to permanent structures and settlement such as brick-making units in the earlier existing broad riverbed itself. This landscape transformation does not allow any scope for the Ganges to get back to its old bed through its natural reversal cycle.

References

- Buchanan, Francis. 1934. *An Account of the Districts of Bihar and Patna in 1811–12*. Patna: The Bihar and Orissa Research Society.
- Correspondence Related to the Administration of the Ferry Funds of Bengal, Bengal Secretariat Office, Calcutta, 1860.
- Correspondence Related to the Administration of the Local Funds Comprising the Amalgamated District Roads Fund of Bengal for the Year 1860–61, Public Works Department of the Government of Bengal, Calcutta, 1861.
- Guide to the Records in the National Archives of India, Part 2: Home Department, Ministry Affairs (1748–1957)*. 1977. New Delhi: National Archives of India.
- Home Department, Revenue Branch. 28 March 1851. Nos. 20/21, New Delhi: National Archives of India.
- Maitra N. K., and N. C. Ghose. 1992. *Groundwater Management*. New Delhi: Ashish.
- Proceedings of the Council of the Lieutenant Governor of Bengal for the Purpose of Making Laws and Regulations, Nehru Memorial Library and Museum, New Delhi (Microfilm) 1862–1915. V. 1–47.
- Sinha, R., S. K. Tondon, M. R. Gibling, P. S. Bhattacharjee, and A. S. Dasgupta. 2005. “Late Quaternary Geology and Alluvial Stratigraphy of the Ganga Basin,” *Himalayan Geology* 26 (1).
- Srinivasachari, C. S., ed. 1962. *Fort William–India House Correspondence. Vol. 4: 1764–1766*. New Delhi: National Archives of India.
- Secretary to the Government of Bengal Writes to the Secretary to the Government of India, 19 April 1845. Home Department. Revenue Branch. 19 April 1845. Nos. 1–3, New Delhi: National Archives of India.