South Bihar geography and the agricultural cycle: Gaya and Shahabad in the nineteenth and early twentieth centuries

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Introduction

Modern technology has detached agriculture from its traditional moorings, in particular from its close association with geography and the seasons. Motor traction, fertilisers, pesticides, biotechnology, the exploitation of subsurface acquifers and accurate monsoon forecasting have enabled man to break the shackles which the terrain and climate imposed on the choice and timing of crops. Rice is now not only grown in western India—something inconceivable a century ago—but also gives yields which compare favourably with those in eastern India. Hybrids have also telescoped agricultural time and the traditional agricultural calendar. It has been a veritable conquest over nature, the antecedents of which can perhaps be traced to the neolithic past, when man first learnt the science of growing his own food.

Until modern times, however, technological changes were few and far between. New technology was absorbed gradually over several decades, and sometimes even centuries, as it entailed wide-ranging adaptation in several interrelated spheres. Marc Bloch described old agrarian regimes as interlocking systems, where it was difficult to axe one part without destroying the whole.[1] Technology was organic in nature and deeply imbricated in ecology and society; it was not neatly packaged, as it is today, offsetting adaptations in related spheres. Agriculture was then straitjacketed by the terrain and the seasons.

This essay is concerned with traditional agriculture, although it studiously avoids issues relating to agricultural technology, which is a subject in its own right. There is possibly an element of a-historicity or timelessness

[1] Marc Bloch, *French Rural History* (translated by Janet Sondheimer), London, 1966, p. 214.

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implicit in the use of the word 'traditional' for our quest of the 'traditional' keeps taking us further back in time. This essay, then, is addressed to what Fernand Braudel has immortalised as the 'longue duree', 'a history whose passage is almost imperceptible . . . a history in which all change is slow, a history of constant repetition, ever-recurring cycles . . . the story of man's contact with the inanimate'.[2]

The Terrain

The Hill Tracts

The old undivided[3] districts of Shahabad and Gaya lay between the river Ganges and the Chotanagpur plateau. This juxtaposition determined their geography and also shaped the pattern of land use and agricultural practices. The southern portions of these districts comprised the outer fringes of the relatively thinly populated Chotanagpur plateau. One fifth of the area of Shahabad was occupied by the Kaimur Hills.[4] The Kaimur hills are not high, and their boundaries are irregular, deeply indented in some places by narrow recesses or glens. These glens are of the most picturesque but savage grandeur, being surrounded by rocky walls, with their base fringed with woods.[5] The tract was densely wooded in the nineteenth century, abounding with wild animals and birds.[6] In contrast to its grand, steep boundary hills, the tableland comprised detached hills of comparatively little elevation and, therefore, had roads of tolerably easy access even at the beginning of the nineteenth century. The greater part of the space between these smaller hills consisted of undulating lands. These were in some places filled with rocks and stones, and unfit for cultivation; but in many places it very much resembled the red soil region of Karnataka, and was cultivated with wheat, barley and mustard, very often after cultivating a crop of *bhadoi*. Francis Buchanan, a remarkable and perceptive scholar-official who toured the region extensively in the early nineteenth century, however, bemoaned the fact that these swell lands were for the

[2] F. Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (translated by Sian Reynolds, 1978) Vol. I, Preface to the first edition, p. 20.

[3] The old Shahabad district is presently divided into the districts of Bhojpur and Sasaram. The district of Gaya now comprises Nawadah, Jehanabad, Aurangabad and Gaya.

[4] *Census of India, 1911, Vol. V. Bengal, Bihar, Orissa and Sikkim*, by L.S.S. O'Malley, Calcutta, 1913, p. 19.

[5] Francis Buchanan, *An Account of the District of Shahabad in 1812–13*, New Delhi, 1986, p. 8.

[6] The pink-headed duck (Rhodonessa Caryophyllacea) known locally as 'Lal Sir', which became extinct after 1935, was described by Hunter as one of the more common birds of the area. W.W. Hunter, *A Statistical Account of Bengal, Vol. XII. Districts of Gaya and Shahabad*, London, 1877, p. 180. Salim Ali & S. Dillon Ripley, *A Pictorial Guide to the Birds of the Indian Subcontinent*, BNHS, Centenary Publication, 1983, p. 80.

most part neglected, the chief attention of the highlanders being paid to the cultivation of some very narrow valleys that wound through the swelling grounds, and although seldom above 100 yards wide, ran to considerable length. These valleys contained numerous springs of water, which made them admirably suited for rice, which they produced luxuriously with no trouble of cultivation. Buchanan remarked that although 75 per cent of the whole cultivation on the tableland consisted of this description of land, the whole extent was trifling.[7]

Southern Gaya, similarly, had a number of ridges and spurs projecting from the Chotanagpur plateau, as well as semi-detached ridges and isolated peaks that rose abruptly from the level plain and spread to form irregular links between the ridges. These low ranges struck northeastward, until they reached the Ganges in Monghyr district.[8] The Barabar hills and the Rajagriha hills formed the two major clusters in the district. These hills were almost barren and conspicuous by their nakedness even at the time of Buchanan's rambles. Further south, however, the hills were not so hideous. There they were extensively forested, the precipices covered with trees and bamboos and although they did not have the great dimensions of the Kaimur hills in Shahabad, Hunter and O'Malley described a wide variety of fauna and flora in this tract.[9] The cropping pattern in the forested and highland region of Gaya was broadly similar to that in southern Shahabad. Only a small proportion of the area was cultivated. Rice was grown in areas of assured water supply. The remaining agriculture mostly consisted of bhadoi followed by rabi.

The elevation of the hills was not considerable and rarely exceeded 1500 ft. The Grand Trunk Road, which traversed the districts from east to west, very roughly divided the hilly southern parts of the district from the flat flood plains adjoining the river Ganges to the north. The hills attained their maximum elevation towards the south and the undulation became more gentle as they approached the plains on the north. The flood plains, however, were not quite so flat, sloping rather sharply towards the Ganges. The average slope of the country to twenty miles of Gaya town was six feet, and north of that two feet per mile.[10]

The revolution in communications which metalled roads and the railways induced in the north practically bypassed the southern hill tracts. These

[7] Buchanan, *Shahabad*, p. 11.

[8] L.S.S. O'Malley, *Bengal, Bihar, Orissa & Sikkim*, New Delhi, 1979 (first published 1927), pp. 21–34.

[9] Francis Buchanan, *An Account of the District of Behar and Patna, 1811–12*, New Delhi, 1986, p. 8. Hunter, *Statistical Account of Bengal*, p. 28. The presence of the Great Indian Bustard and the Siberian Crane are recorded in L.S.S. O'Malley, *Bengal District Gazetteers, Gaya*, Calcutta, 1906, pp. 14–15.

[10] *Final Report on Survey and Settlement of Tikari Ward Estate, the Govt. Estates and the Belkhara Mahal in Gaya District (1893–98)* by C.J. Stevenson-Moore, Calcutta, 1898, p. 2.

were the true 'famine tracts', where the administration could rarely penetrate even if it wanted to in times of distress. The poor people here were dependent upon forest produce in the best of times to supplement their diet, and in times of distress they had to perforce fall back almost exclusively upon these products.[11]

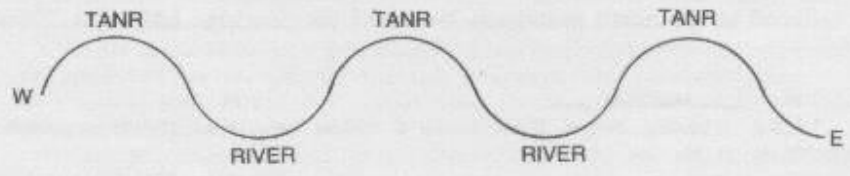
The Rice Bowl

The lowlying flood plains between the hill tracts and the Ganges constituted the rice bowl of a primarily rice based agricultural economy. Winter rice was the chief crop, and whatever area shown as rabi in this ecological niche consisted mainly of *paira* rabi crops—mainly khesari and gram—which were sown in the stubble of the standing rice just before the *hathia* rains set in. The semi-diara tracts however were islands of rabi in this flood plain, their cropping pattern resembling that of areas of dry agriculture in that it comprised a crop of bhadoi followed by rabi.

Drainage

The line of drainage in Gaya was from south to north, and in Shahabad from the southeast to the west and north. Rivulets, with their source in the Chotanagpur tableland, followed the line of drainage. The district of Gaya was consequently divided into a number of parallel strips running north to south, separated by some eight wide rivers: the Punpun, Morhar, Phalgu, Dhadhar, Tilaiya, Dhanarjay, Khuri and Sakri. These rivers were frequently divided into two or more streams running in approximately the same parallel direction from the south to north, and emptying into the river Ganges. The river Sone, which formed a natural divide between the two districts, also followed the same south to north line of drainage.

Each of these parallel strips was higher in the centre and sloped down on each side to the river, so that a section of the district from east to west represented a series of undulations each separated by a river:



[11] Bengal Land Revenue Proceedings, January 1869, No. 262, *ibid.*, June 1869, No. 157, 'A' Series. Bengal Agriculture (Famine) Proceedings, March 1897, Nos. 194–205, 'A' Series.

These rivers had wide sandy beds which were nearly dry during the greater portion of the year. In flood time they were full, and were frequently deep with dangerous torrents but, owing to the rapid slope of the district from south to north, the water was carried off very quickly, and these floods rarely lasted for more than a few days.[12]

Water Harvesting

If the flood waters were rapidly carried off on account of the northward slope, so was rain water. The region has a stiff clayey soil which, on account of this northward slope, would not normally have absorbed monsoonal precipitation had it not been for remarkable indigenous water harvesting structures made possible by this peculiar topography.

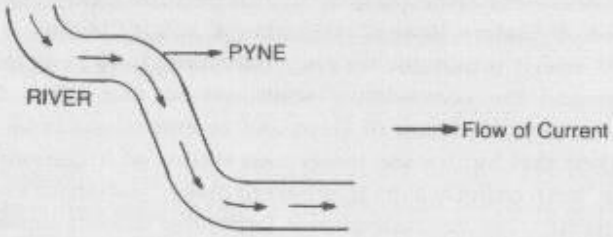
'To a ryot of Eastern Bengal', remarked L.S.S. O'Malley, 'the country would seem utterly unsuitable for rice cultivation, both from the nature of the surface and the comparative scantiness of rain fall'.[13] George A. Grierson, one time Collector of Gaya and an ethnologist in his own right, also remarked that but for the indigenous system of irrigation the district would have 'been entirely a dry and barren plain'.[14] Grierson's remark may seem exaggerated, but rice cultivation is impossible without copious watering in critical operations.

The central portion of the parallel strips of land, called *tanr* land, was too high for artificial irrigation to reach, and depended for its moisture on the rainfall, which had a tendency to flow off rapidly as tanr watersheds sloped strongly east and west to the rivers on each of the parallel strips. A series of low retaining walls were, therefore, built across the line of drainage, connected by other banks running north and south, to trap the rain water. The main embankment, called *gherawa*, was about four feet high, and enclosed a considerable area, say 50 acres. This area was again split into minor embankments called *genra*, enclosing a space of about an acre and within these again *kiaris* or *als* retained the water of each plot. The whole system went by the name *genrabandi* and was aptly described as resembling an enormous, albeit irregular and untidy, chessboard. The peculiar demands of irrigated paddy cultivation also imposed limits on the size and shape of plots. Small differences in level can have disastrous effects on the efficient distribution of water, and therefore in most traditional wet rice landscapes, such as those of South China and South Bihar, the boundaries of the fields closely follow contours that would be imperceptible to the dryland farmer. The fields are also, on average, much smaller than those found in areas of dryland farming, and more stable in

[12] George A. Grierson, *Notes on the District of Gaya*, Calcutta, 1893, pp. 51–52.
[13] O'Malley, *Bengal District Gazetteers, Gaya*, p. 120.
[14] Grierson, *Notes on the District of Gaya*, p. 60.

size and shape, being relatively less responsive to social pressures deriving from partition, sale, etc.[15]

The moisture obtained through genrabandi in tanr lands was insufficient for rice, and tanr lands therefore grew only bhadoi and rabi crops. Practically all the bhadoi crop outside the semi-diara area was grown on these high-lands. It was the portion of the parallel strips nearer the rivers and at a lower elevation that was rice-growing (dhanhar). This portion was served by the remarkable *pyne* and *ahar* water harvesting structures known as *gilandazi*. The pyne was an artificial channel drawn from the outside of a river bed, where the current was strong, at an elevation higher than that of the village or villages through which it passed.



Pynes were of variable size and length. A small pyne irrigating a single village was called *khaspyne*. Some were as much as 10, 12 or even 20 miles in length, and irrigated hundreds of villages. The largest pynes, like the Barki pyne on the estate of the Raja of Maksudpur[16] that fed a number of distributaries and irrigated many thousand acres, were known as dasiain pynes, literally pynes with ten branches. Smaller channels taking off from the main pyne were called *bhoklas*, while the smallest channels that led into the fields were known as *karhas*. Where the level of the water in the pyne or bhokla was below that of the fields on either side, the water was raised by some of the artificial means in use, such as the *lath kunri* (lever and bucket) and *chanr* or *sair* (water bucket).

During the rainy season, from July to September, the pynes were full and flowed well, but as the rains ceased and the rivers dried up, the water had to be led into the pyne by means of training works known as *derhiain* or *baluain*. If there was no rain at the time of the *hathiya nakshatra*, a sudden activity was seen in the rivers. Training works were vigorously pushed on at the heads of the pynes to try and lead every drop of water left

[15] J. Needham, *Science and Civilization in China*, Vol. VI; *Biology and Biological Technology. Part II, Agriculture*, by Francesca Bray (OUP, 1981), Section 41, pp. 106–107.

[16] The Barki pyne took off from the Phalgu and ran nearly 6 miles north-east, with many large and small distributaries taking water from it and capable of supplying a large area with water. Bengal Land Revenue Proceedings, January 1908, Nos. 103–106, 'A' series, p. 2.

in the beds of the rivers into the pynes. Bandhs were also erected at customary places to block up what water there was to give a head into the pyne.[17]

Pynes and ahars were constructed, repaired and maintained at the cost of all the villages irrigated. A headman of one of the proprietors, generally of the zamindar who owned the largest number of villages benefited, made an estimate of the cost and apportioned it. The proprietors contributed the allotted amount, and the work was finished under the supervision of this headman. Petty repairs were done by the cultivators themselves. In the case of a dasiain pyne there was always an arrangement among the land-owners for the distribution of water conveyed by it which was called *parabandi*. Each village had its turn for taking water on certain hours of a day. A celebrated register of distribution, the *lal bahi*, prepared by the former owners of the Tikari Raj, contained *parabandi* arrangements of the principal pynes on this sprawling estate.

Although fields bordering on the pyne were also watered directly from it, since all the rivers issuing from the Chotanagpur plateau were dry for the major portion of the year—the river Punpun being the exception—pynes alone were not sufficient for irrigation purposes. The pyne consequently frequently ended in an ahar or reservoir, embanked on all sides in which water was stored for critical periods. The bottom of the ahar was higher than the land it was supposed to irrigate. When irrigation was required, the embankment was cut and the water descended by gravitation.

While pynes generally led to ahars, there were ahars which were not connected to pynes at all and which tapped rain water directly. Ahars were almost always rectangular in shape, with embankments raised on three sides of the rectangle, while the fourth side was left open for the drainage to enter. Owing to the slope of the land, the highest embankment (the *pith* or back) was usually on the north, and this embankment generally ran east and west. Embankments known as *alang* projected southwards from the main embankment, diminishing in height as they proceeded, according to the ground level. If the ahar was built on a drainage rivulet or pyne, thereby receiving the drainage of a larger area than its own, there was a spill or weir passing off surplus water, generally to another ahar further north.

In smaller ahars, where the quantity of water banked up was not great, it was generally sufficient to cut a narrow passage through the eastern bank of the deepest spot to draw off the water as required. If the mass of water was greater, a half-pipe, formed out of the trunk of a palm tree and known as a *donga*, was let into the bank to protect it from excessive erosion. Ahars were often of great size, the largest irrigating about 1,000 acres, and in the case of very big ahars, a masonry dam was often built into the bottom of the main embankment (the 'pith').

[17] O'Malley, *Bengal District Gazetteers, Gaya*, pp. 127–28.

When water was needed to irrigate the lands to the east or west on the same or higher level, it was lifted by one of the methods for raising water into a channel on a higher level through which it flowed into the fields to be watered.

The two chief occasions on which water was drawn off the pynes and ahars were when the paddy was to be transplanted, and during the second flooding of the rice fields during the *hathiya nakshatra*, following which spring crops were sown in the bed (*pet* or belly) of the ahar, called *rubiduba*.[18]

Two features of the pyne and ahar irrigation systems must be understood for these features critically affected the evolution of this system during the period under study. First, most of these systems, from their very nature, were extensive and a large proportion of them served more than one village.[19] Second, the system required constant maintenance for the pyne, and more especially the entrance thereto, rapidly silted up and the supply of water could thus be entirely cut off or very much restricted.[20]

The origins of the 'pyne and ahar' system, collectively known as *gilandazi*, are clouded in antiquity. It has been suggested that this system was already well in place during the time of the *jatakas*, for there is a reference to communally excavated ahars in the *kunala Jataka* and in Megasthenes' description of Bihar.[21] This system may well have been in place even as early as the days of the Rig Veda.[22]

Extensive gilandazi works were described by Francis Buchanan in his account of the district of Bihar.

> I now proceed to describe a river called Punpun, which, from the number of canals that it supplies with water for irrigation, is of vast importance to agriculture. For this purpose, indeed, some of its tributary streams would appear, since the time of Major Rennell's survey, to have been entirely diverted from its channel and have been so much subdivided among the fields, that they can no longer be traced to a junction.

The Phalgu was similarly exploited. In the dry season dams of clay were made across it to turn the water upon the fields. In the rainy season the numerous branches and canals received an immense torrent that rushed down the Phalgu and dispersed it through the country so that it seldom

[18] O'Malley, *Bengal District Gazetteers, Gaya*, pp. 129–30.

[19] Grierson, *Notes on the District of Gaya*, pp. 51–60; Bengal Land Revenue Proceedings, March 1916, Nos. 10–13, 'A' series.

[20] Bengal Land Revenue Proceedings, January 1908, Nos. 103–106, p. 2.

[21] Nirmal Sengupta, 'The Indigenous Irrigation Organisation in South Bihar', *The Indian Economic and Social History Review*, 17, 2, 1980, pp. 164–65.

[22] Harbans Mukhia, 'Was There Feudalism in Indian History?' *Journal of Peasant Studies*, 8, 3, 1981, p. 228.

overflowed. The Dhadhar and Dhanarjay were dry on the surface in the middle of December, but little canals dug into the sand collected fine streams for watering the fields. The Khuri and Sakri and their branches were subdivided into various channels which afforded a copious supply of water for cultivation.[23]

The district of Shahabad did not have such elaborate or extensive gilandazi works. The land was flatter, (although not dead level) and the channels of the rivers were narrower. The Kao, which was about 500 yards wide in the middle of its course, was perhaps best suited for irrigation in the district but it had not been applied to this use. Reservoirs were however constructed. As in Gaya, these were made along gentle declivities, receiving water from the catchment area above to supply the rice fields below. The land between the reservoirs and the villages, which was usually situated on the highest parts, was cultivated with crops which came to maturity in spring.[24]

The reservoirs in Shahabad, however, were not well-maintained even at the opening of the nineteenth century,[25] and the harvest was largely a gamble on the unpredictable monsoons. The opening of the Sone Canal in 1873, however, secured agriculture in northern Shahabad to a degree which could never be attained in Gaya (except, of course, in the Daudnagar and Arwal Thanas which were served by the Patna Canal Branch of the Sone Canal system).

The Sone Canal System

The Sone Canal Project was first proposed by Colonel Dickens in 1855, but active operations were commenced in 1869, by the construction of an anicut at Dehri-on-Son, about half a mile south of the causeway which carried the Grand Trunk Road from Baraon in Gaya to Dehri in Shahabad. The weir was 12,500 feet long, 120 feet broad and eight feet above the normal level of the river bed. Two main canals, the western and the eastern, branched off from the headworks at Dehri, on either side of the river Sone.

The western main canal system was in Shahabad, and aligned with the natural drainage of the country which sloped gradually from the southeast corner towards the west and north. It had five main branch canals in the district—Arrah, Bihea, Dumraon, Buxar and Chausa—with a total length of over 300 miles, excluding distributaries and channels leading to the fields. The initial expectation was that it would irrigate over one million

[23] Buchanan, *Behar and Patna*, pp. 8, 26–35.

[24] Buchanan, *Shahabad*, pp. 11–12, 23–27. Evidence of J.H. Toogood, Superintending Engineer, Sone Circle, *Report of the Indian Irrigation Commission 1901–3*, Vol. IV, Evidence, Calcutta, 1903, p. 210.

[25] Buchanan, *Shahabad*, p. 13.

acres, [26] but this turned out to be a gross overestimate. The Indian Irrigation Commission found that in fact it irrigated a little less than fifty per cent of the expected acreage.[27]

The eastern main branch system flowed through the districts of Gaya and Patna. The Eastern Main Canal itself was only eight miles long. Its main branch however, known as the Patna Canal, was 79 miles in length, of which 43 miles lay in the district of Gaya.[28] The eastern main branch system commanded approximately 1,70,000 acres in Gaya, but once again, irrigated at most about 50 per cent of the area commanded.[29]

The monsoons failed in 1873, but the crops, over a large area in both the districts, were saved from famine by the water supplied by the canals which were thrown open despite being in an unfinished state. The premature admission of water into the canals had the effect of throwing back the final completion of the works, as a result of which the canals could be formally opened only in mid-1875.[30]

The Sone canals had an almost revolutionary impact on agriculture in the areas within its catchment area. The initial resistance to the canals was broken by the happy coincidence that it was thrown open prematurely in a year when there was a major failure of the crucial *hathiya* rains. The amazing rescue of drying rice, albeit in a limited area, left a feeling of respect for the canals which might otherwise have taken a long time to grow.[31]

The Sone canals transformed agriculturally backward thanas like Daudnagar and Arwal in Gaya into fertile rice fields[32] on the one hand, and triggered major shifts in the cropping pattern on the other. Perhaps the most remarkable result of canal irrigation was the impetus given by it to the cultivation of sugarcane. Before the opening of the canals, the area under cane was only 1800 acres in the two districts. The canals had an immediate impact on lands adjoining the canals which were rapidly converted into sugarcane fields. By 1879 the area under cane had risen to 22,000 acres in Shahabad and to 13,000 acres in Gaya by 1884. By the second decade of the twentieth century sugarcane acreage touched 40,000 acres in Shahabad

[26] Hunter, *Statistical Account of Bengal*, pp. 170–74.

[27] *Report of the Indian Irrigation Commission, 1901–3*, Calcutta, 1904.

[28] Hunter, *Statistical Account of Bengal*, pp. 22–23.

[29] O'Malley, *Bengal District Gazetteers, Gaya*, p. 132. The area actually irrigated rose gradually from under 30,000 acres in 1893–94 to 56,000 acres in 1914–15. *Agricultural Statistics of India*, 1904–5 to 1920–21. There is possibly some connection between the failure of the Sone canals to irrigate the area projected, and the spread of rice and sugarcane cultivation, both of which, and especially the latter, take much more water than wheat.

[30] *Bengal Revenue Administration Report*, 1873–74 and 1875–76.

[31] Commissioner of Patna to the Officiating Secretary to the Government of Bengal, dated 29.10.1873. Correspondence Relating to the Famine in Bengal and Bihar from October 1873 to 31 May 1874 (Cal. 1874). *Bengal Revenue Administration Report, 1878–79*.

[32] *Tikari Settlement Report*, pp. 3–4.

and 35,000 acres in Gaya. Since cane was invariably grown in rotation with other crops, the land on which cane was actually cultivated may have been twice as much.[33]

The impact of canal irrigation on foodgrain cropping patterns is intriguing. It was originally expected that the Sone canals would lead to a large increase in rabi—in particular wheat—cultivation. The long-term result of canal irrigation, however, was to intensify the traditional cropping pattern which gave pride of place to rice, with a *paira*—cash—crop being sown in the stubble of the ripening rice.[34]

The Diara Belt

The 1873–74 agricultural season showed how the Sone Canal secured agriculture in a large portion of Northern Shahabad and Western Gaya, making them practically immune to famine. There was, however, a portion of northern Shahabad which, although not irrigated, had never been dependent on the uncertain monsoons—this was the 'semi-diara' belt between the Ganges and the main line of the East India Railway covering an area of some 400 square miles.[35]

The EIR ran along what was believed to be the old bed of the Ganges, which had gradually shifted northwards. This area was regularly flooded and, except for the villages and fields situated on the highest spots, usually confined under water for four months. 'Although it produces no rice or sugarcane', remarked Francis Buchanan,

> this is by far the most reliable part of the district, for the crops never fail. The river deposits a fine mould, and scarcely ever covers a field with sand . . . when it retires, the country gets a very slight ploughing and is sown with wheat, barley, peas . . . which, without weeding, manure or any other expense, produce with very great luxuriance, provided there is rain towards the end of October, to facilitate the ploughing. If this rain should be wanting the crop may be a fourth less than when it assists the farmer's labour . . . . In the commencement of the rainy season it is usual to sow this land with maize or janera: if the floods rise high, these are entirely lost; but then the following spring crops are uncommonly rich. On such fields as the floods do not reach, and sometimes, as in the year 1813, they cover only a small portion, the maize and janera are very productive and make ample compensation for the scantiness of the spring crops that follow.[36]

[33] *Bengal Revenue Administration Report*, 1879–90. O'Malley, *Bengal District Gazetteers, Gaya*, p. 112. *Report of the Indian Irrigation Commission*, Vol. IV, p. 210.

[34] *Report of the Indian Irrigation Commission, 1901–3*, Vol. IV, pp. 210–20.

[35] *Final Report on the Survey and Settlement Operations in the District of Shahabad, 1907–16*, by J.A. Hubback, Patna, 1928, pp. 1–3.

[36] Buchanan, *Shahabad*, pp. 13–14.

The 1868–69 agricultural year was one of the worst in the six decades covered by this study. The monsoons failed and the bhadoi, aghani and rabi crops were so poor that near famine conditions prevailed in the two districts. The semi-diara belt south of the Ganges, however, yielded a 12–14 anna maize crop in the bhadoi, which was exported to the north-western provinces. The following rabi crop was also excellent.[37]

The rains in 1867, on the other hand, were excessive, being above the annual average by about 50 per cent, and both the Ganges and the Sone were in flood that year, destroying the janera crop. Mr. H.W. Alexander, Collector of Gaya, echoing what Buchanan had observed over 50 years earlier, remarked:

> the lands near the river sown with this crop are always liable to be flooded and are moreover sown with the full knowledge of this risk; should they escape a flood in any year, a full harvest is reaped; should they be destroyed the land is rendered by the flooding more rich and fertile for the ensuing rubee crop. No crops could look finer than do the rubee crops now on the very lands which a few months ago were under water . . . thus the gains on the rubee almost compensate for the loss to the Bhadoi.[38]

The annual flooding of the Ganges differed in two crucial respects from the floods caused by the various rivers which had their origin in the Chotanagpur Plateau and emptied into the Ganges. First, the Ganges deposited a fine mould, adding to the fertility of the area inundated by it as described above, and second, the Ganges floods took several weeks to recede. The floods caused by the other rivers, including those of the Sone,[39] were of a flash variety on account of the northward slope. Although the crops near the banks of the rivers were lost on account of the force of the torrent, these floods did not last for more than a few days at most, and the crops were generally unaffected.[40] For the same reason the floods did

[37] Bengal Land Revenue Proceedings, November 1868, No. 189, 'A' Series.

[38] Hunter, *Statistical Account of Bengal*, p. 147. Bengal Land Revenue Proceedings, August 1867, No. 72; March 1868, No. 114, 'A' series.

[39] The Sone was very flood-prone. There were serious floods in 1864, 1867, 1869, 1870, 1876, 1884, 1888, 1892, 1901, 1906, 1913, 1916 and 1917.on an average once every five years between 1860 and 1920. *Bihar and Orissa, District Gazetteers, Shahabad*, by O'Malley, revised edition by J.F.W. James (1924), pp. 83. Bengal Land Revenue Proceedings, August 1869, Nos. 134-135, 'A' series. *Ibid.* , September 1870, Nos. 1121-122. Mr. J. Mc Namara, District Engineer of Shahadabad felt that the construction of the E.I.R. mainline increased the frequency and intensity of the floods. for the track embankments tampered with the natural drainage of the country (Bengal Land Revenue Proceedings, March 1868, No. 14, 'A' series). It seems likely that the construction of the Sone Canal reduced the frequency of floods by tapping the excess water for irrigaion.

[40] J. Mc Namara, District Engineer Shahabad to H.W. Alexander, Collector Shahabad in Bengal Land Revenue Proceedings, March 1868, No. 14, 'A' series.

not generally deposit much mouldy silt, for swiftly flowing rivers carry larger particles, such as gravel and sand; however, the belief that the Sone (named after the golden sand associated with the river) left a deposit of sand which was injurious to crops was probably not justified.[41]

The annual flooding of the Ganges and the creation of a large semi-diara area south of that river derived from the structure of the Ganges river system. As the Ganges approached the flat country and the sea, it grew in width and sluggishness and was inclined to meander and frequently alter its course. It is likely that the Ganges flowed much farther to the south in historical time, and that the semi-diara area once formed the bed of the river.[42] The northward march appears to have continued between 1860 and 1920, at least in two large reaches of the river, the adjoining districts of Ghazipur and Ballia being chief sufferers. The Ganges deepstream had a tendency to change at the end of each rainy season, and the large true diara tracts which diluviated on one side of the river and alluviated on the other generated administrative problems and boundary disputes which nobody was really equipped to handle.[43] The alluviated diaras were very fertile, and cultivation on them began within a few seasons of their formation.

In 1862 about 4500 acres of Mouzah Shiupore Diara, originally on the left side of the Ganges in Ghazipur, alluviated on the Shahabad side to which it was transferred in 1867.[44] Khawaspore Mahal, which had been permanently settled with the Maharaja of Dumraon during the Permanent Settlement and had subsequently diluviated, began to re-form in 1868 and during the next ten years 10,000 bigahs were measured.[45]

In 1867 a large diara tract called Amirpur, including a whole pargana and some odd villages comprising 30,279 acres with a revenue of Rs. 37,098, was transferred from Ghazipur to Shahabad as the mainstream of the Ganges had shifted.[46] In 1874, however, a small portion of Amirpur diara, estate Tika Simaraya, re-formed on the Ghazipur side.[47]

[41] *Ibid.* Thus the Sone flood on 18 July 1869, which receded within a few days, did little damage to the bhadoi on ground and 'improved the land considerably by leaving behind it a mouldy deposit'. Bengal Land Revenue Proceedings, August 1869, No. 135 1/2, 'A' series. The extensive inundation in 1914 likewise did little damage. Bihar and Orissa, Agriculture 'A' Proceedings, March 1914, Nos. 56–58.

[42] Hunter, *Statistical Account of Bengal*, p. 164, who cites the account of Huientsang. Francis Buchanan was of the same opinion., Buchanan, *Shahabad*, p. 26.

[43] Bihar and Orissa Land Revenue Proceedings, September 1917, Nos. 1–2, 'A' series.

[44] Bengal Land Revenue Proceedings, August 1977, Nos. 18–20, 'A' series. *Ibid.*, December 1917, Nos. 1–2, 'A' series.

[45] When the Mahal was surveyed in 1846 only 190 bigahs were found. Bengal Land Revenue Proceedings, May 1880, Nos. 15–17, 'B' series.

[46] Hunter, *Statistical Account of Bengal*, p. 164. Bengal Land Revenue Proceedings, November 1868, Nos. 62–64, 'A' series. Bihar and Orissa Land Revenue Proceedings, September 1917, Nos. 1–2, 'A' series.

[47] Bengal Land Revenue Proceedings, December 1874, Nos. 35–46, 'A' series. *Ibid.*, December 1875, Nos. 72–79, 'B' series.

In 1892 five estates, namely, Shahpur, Palia, Kulharia, Raikishenpalli and Sarwanpur, in the Umarpur diara, which were temporarily settled and assessed to revenue in the North-west Provinces, were transferred to Shahabad on account of changes in district boundaries caused by diluvion.[48] In 1906, 14 villages bearing a revenue of Rs. 4686 were similarly transferred from Ballia to Shahabad on account of the northward movement of the main-stream of the Ganges.[49]

Tenure and Geography

Bhaoli Tenures

George Grierson, in his spirited defence of the Bhaoli (Produce Rent) system in Gaya, pointed to the organic connection between the huge investment in the 'pyne and ahar' water harvesting structures and the continued prevalence of produce rents. He argued that bhaoli rents were almost exclusively confined to those lands which were not capable of improvement by the tenant as a small 'capitalist', but which required a large 'capitalist' to make any improvement at all.[50]

> In those lands, the amount of the crop depends on the irrigation facilities . . . . Now a single irrigation channel . . . benefits thousands, often belonging to different villages separated miles apart and it is manifest that the expense of creating or maintaining it cannot be borne by any single tenant. It must be borne by a capitalist, and the only capitalist available is the Landlord. Custom has therefore decreed that the gilandazi . . . shall be made and maintained by the landlord, each tenant paying him his quota of the expense.
>
> But it is found by experience that if a fixed rent is paid to a landlord for this land, the temptation to misappropriate the contributions for gilandazi is irresistible, and the irrigation is starved. The agreement is therefore so framed that the amount of contribution and the amount of rent alike depend on the amount spent by the landlord on gilandazi. And as this bears a fixed proportion to the actual produce of the land on which it is spent, the contribution and the rent are conveniently contracted for by the tenant giving the landlord each year, half, or in some cases 9/16 of the produce as it is reaped. In this way, if the landlord spends a large amount he gets an exceedingly large return for his capital invested. This is well known, and every wise landlord in Gaya lays out on gilandazi every pice which he can scrape together.[51]

[48] Bengal Land Revenue Proceedings, October 1902, Nos. 218–221, 'B' series.
[49] *Ibid.*, September 1917, Nos. 1–2, 'A' series.
[50] Grierson, *Notes on the District of Gaya*, p. 68.
[51] *Ibid.*, pp. 71–72.

Francis Buchanan found that between 75 and 90 per cent of the rent in the two districts was paid in kind in the second decade of the nineteenth century. When revenue settlement operations were conducted some 100 years later, Gaya still had over two-thirds of the tenant area under produce-rent, while Shahabad now had only 20 per cent. The decline of produce-rent in Shahabad, and its persistence in Gaya, was possibly linked to the extension of canal irrigation in the former, and the continued dependence on 'pyne and ahar' irrigation in the latter. Canal irrigation not only secured agriculture within its catchment area, but was also not dependent on landlords for its upkeep. In Arwal thana in Gaya, much of which was protected by the eastern branch of the Sone canal, the percentage of the area under produce-rent fell sharply from 94 in 1812 to 39 a century later.[52]

Towards the end of the nineteenth century about 70 per cent of the cultivated area in Gaya was held on bhaoli, the area under bhaoli greatly exceeding the area covered by the 'pyne and ahar' system. This tenure was also popular in lands which for some reason gave very precarious crops. In such lands no peasant would engage for it on any other terms, for a failure of the crop ensured proportionate relief in rental obligation.[53]

In Shahabad, where only about 20 per cent of the tenant area was held on produce-rent at the time of the settlement operations, about two-thirds of this area was situated in the four backward southern thanas of Karghar, Sasaram, Bhabhua and Mohania.[54] Indeed, at a time when landlords were desperately trying to reverse the universal tendency to get produce-rents commuted, settlement officers were taken aback by the 'absolutely unprecedented' action of some landlords who sought to get produce-rents commuted to cash rents in these areas.[55] The backwardness and insecurity of agriculture in this region induced landlords to turn to fixed cash rents to stabilise their highly fluctuating annual incomes, whereas in the more advanced thanas they sought to reverse the process of commutation encouraged by the secular trend of increase on agricultural prices. They stood to lose in a system in which their cash income was fixed while agricultural prices rose sharply.

By the early years of the twentieth century landlords were finding it increasingly difficult to maintain 'pynes and ahars' in good repair on account of the rapid subdivisions of their estates and diminition in their incomes. Tenants, moreover, stood to gain by paying a fixed rent in cash, even if it was fixed at a relatively high level, at a time when agricultural prices showed a secular, long-term increase. The universal trend towards commutation of produce-rents was barely kept in check by the need to

[52] *Shahabad Settlement Report*, p. 110. *Final Report on the Survey and Settlement Operations in the District of Gaya, 1911–18*, by E.L. Tanner. Calcutta, 1919, pp. 89–90.

[53] *Tikari Settlement Report*, p. 28.

[54] *Shahabad Settlement Report*, p. 110.

[55] *Ibid.*, p. 92.

maintain gilandazi works, wherever these were kept in good repair. This burgeoning movement to commute produce-rents was understandably opposed by the landlords, and the first rumble of rural ferment was heard in the estates of the Raja Maksudpur towards the end of the nineteenth century, and was to culminate in the Kisan Sabha movement in the 1930s.[56]

'Guzashta' *Tenures*

Areas of stable agricultural income requiring little investment had a natural propensity for cash rent, as illustrated by the existence of *guzashta* tenures in northern Shahabad. *Guzashtadars* were tenants who paid fixed cash rents which had not been enhanced as far as memory went. A number of landlords, with the notable exception of the Dumraon Raj admitted that this was indeed so. Hubback, the Settlement Officer of Shahabad, was of the opinion that *guzashtadars* were representatives of *khudkasht raiyats* of the eighteenth century who had succeeded in preserving their rights.[57] According to Francis Buchanan, a judge at Arrah had decided sometime before 1812 that their rents could not be enhanced on the expiry of the term for which pattas had been granted under the Permanent Settlement regulations.[58]

What is striking is that the guzashta area coincided with the semi-diara area which grew rabi crops, i.e., the area between the E.I.R. mainline and the river Ganges. Although only 16.7 per cent of the total tenant area in Shahabad was held on fixed cash rent, 93 per cent of this was in the four northern thanas of Buxar, Dumraon, Arrah and Shahpur. Indeed, 43 per cent of the total tenant area in these four thanas was on fixed cash rent.[59]

The argument that ecology determined tenure is not a deterministic one. Tenurial relations are social relations mediated by the human agency; they are relations of power, of rights, of domination, subordination and of hegemony and force; they inevitably involve a struggle of some sort between opposing parties, whether muted or hegemonic, or violent, through use of force. Tenants in the diara region could take advantage of the extreme fertility of the soil, the low production costs, and above all, the constant and confusing fluctuations in the land in their cultivating possession, to hold large areas at low rates. It is also possible that wheat, the major crop in this Rabi tract, was, even in Mughal terms, grown on *nagdi*. These natural advantages, combined with their pugnacity, enabled diara tenants to establish hereditary tenure as suggested by the term 'guzashta'.

[56] W. Hauser, 'The Bihar Provincial Kisan Sabha 1929–1942—A Study of an Indian Peasant Movement', Ph.D. Thesis, University of Chicago, 1961. Alok Sheel, 'The Congress and the Raiyat. A Study of Three Agrarian Movements, 1928–40', M.Phil Thesis, Jawaharlal Nehru University, New Delhi, 1980, Chapter IV.

[57] *Shahabad Settlement Report*, pp. 69–81.

[58] Buchanan, *Shahabad*, p. 340.

[59] *Shahabad Settlement Report*, pp. 74, 112.

The guzashtadars waged a bitter battle to establish and cling on to their rights. The intransigence of the raiyats of Shahabad occasioned comment from the early days of British Rule:

> The raiyats of Shahabad are remarkable for their tricks and refractory behaviour, and when the 'kists' are demanded, they make various and improper excuses and evasions, nor do they attend to the people put over them to enforce payment, but frequently beat and drive them away . . . . It is not here, as in Bengal, where a peon, acting by Order, can bring a whole Pargana of raiyats before the Collector without the least trouble. In this part of the country, and particularly in Shahabad, it is very different, for they do not scruple here to oppose an armed force sent by Order of Government.[60]

A little less than three decades later, Francis Buchanan described a 'tenantry too high spirited to submit to the most trifling abuse and being willing to fight with any one'.[61] This spirited attempt to establish and maintain guzashta rights did not, however, go uncontested, as *The Land Revenue Administration Report of 1877–78, The General Administration Report of 1881–82* and the *Shahabad Settlement Report* clearly indicate. Landlords attempted to not only prevent the growth of guzashta rights, but also to destroy all those rights currently held. Despite the vehement protests of the Dumraon Raj, the settlement operations ensured that a very substantial proportion of guzashta tenants were entered in the Revenue Records as *Sharah Muiyan*, or tenants at fixed rates, in the Arrah and Buxar subdivisions.[62]

The 'Kamia' *System*

That variations in ecology generated some compulsion for particular tenures is also illustrated by the geographical bias of the *kamia* system of bonded labour. Agriculture in the southern hill tracts, precarious at all times, was characterised by high seasonality, for only one labour intensive crop was generally grown, viz., rice. There are certain crucial labour intensive operations in paddy cultivation, such as transplanting, which must be completed within a few days. Gyan Prakash has argued that the extreme peaks and troughs of labour demand in these southern tracts favoured the creation of special bonds between labourers and landlords: the kamia system of bonded labour was deeply entrenched in these parts.[63]

[60] J.R. Hand, *Early English Administration of Bihar, 1781–85*, Calcutta, 1894, p. 46.

[61] Buchanan, *Shahabad*, p. 339.

[62] *Bengal Land Revenue Administration Report*, 1877–78. *Shahabad Settlement Report*, pp. 66, 71, 76.

[63] Gyan Prakash, *Bonded Histories: Genealogies of Labour Servitude in Colonial India*, Cambridge, 1990, pp. 29–32.

Ties of bondage however constitute a social relationship. They are not simply the product of man's relationship with the inanimate, but are essentially a result of man's interaction with man. There is, therefore, a certain contingency about all relationships of subordination and control, for though they may be mediated by man's contact with his physical surroundings, they emerge through a process of conflict and historical experience.[64] While single paddy cultivation may well have created some conditions conducive to bondage, it would be naive to conclude that the high agricultural seasonality of single paddy cultivation necessarily 'determined' bondage in any sense. Bonded labour emerged in a variety of geographical settings, including the fringes of the Central Indian tribal belt, where no rice was grown. The circumstances of bondage clearly varied from place to place.

Agricultural Time

Agriculture was finely tuned not only to the terrain but also to the rhythms of the seasons. The collective wisdom of his forefathers spawned a cosmology which passed to folklore and told the agriculturist when to grow what, and the signs that foretold a good harvest or impending disaster. It is easy for a historian living in the age of science to describe this cosmology as fictitious with little basis in fact. Recent experience,. however, has shown that Indian agriculture continues, to a lesser degree perhaps, to be a gamble on the monsoons. Agricultural cosmology and associated folklore helped hedge the risks inherent in monsoon agriculture in a pre-scientific age. The obsession with wind, temperature and sky patterns reflected in local folklore perhaps anticipated in a rough and ready rustic fashion the wind, temperature and pressure parameters which have recently been identified as critical to a scientific forecast of the Indian monsoons.[65] It would, therefore, be a little condescending, to say the least, to regard with disdain the peasant's mentalité which distilled the observations and experiences of practising agriculturist over millenia.

[64] E.P. Thompson, 'Eighteenth Century English Society. Class Without Class Struggle?' *Social History*, 3, 2, 1978.

[65] The Indian Department of Science and Technology and the Indian Meteorological Department have together devised qualitative (parametric) and quantitative (power regression) models for predicting the Indian monsoons. Sixteen global and regional parameters have been identified, on the basis of data collected since 1951. Six parameters relate to temperature (including the El Nino, temperatures in east coastal, central and northern India and the northern hemisphere), four parameters relate to pressure, three to wind and two to snow cover in the Himalayas and Eurasia. The argument is that whenever 60 per cent or more parameters were favourable, subsequent rainfall was normal (+/− 10 per cent) on all occasions since 1951. Vasant Gowariker, *et al.*, 'Parametric and Power Regression Models: New Approach to Long Range Forecasting of Monsoon Rainfall in India', *Mausam*, 1989. 40, 2, pp. 115–22.

The Seasons

The year was popularly divided into three seasons: the hot season (*garmi*), beginning in the month of *phagun*; the wet season (*barsaat*), beginning in the month of *Asarh*; and the cold season (*jaara*), beginning in the month of *kartik*. There were also three harvests in the year. The bhadoi, which tapped the early rains, the kharif, the main harvest of rice, and the rabi, which matured during the winter. For agricultural purposes, however, it was the fine tuning of the seasons from year to year that was of critical importance. There were sharp annual variations in the quality of the agricultural year, and although traditional water harvesting structures, and subsequently the Sone canals, provided a measure of insurance against the vagaries of the seasons, it was primarily the quality of the agricultural year which determined the quantity of the harvest.

The critical variable in monsoon agriculture is rain and the seasons were almost wholly dependent on rain. Agricultural operations, consequently, were in turn contingent on timely rainfall. The average annual precipitation in the two districts was just over 40 inches per annum. Deficient rainfall resulted in a deficient harvest and a year of monsoon failure was consequently one of agricultural disaster. However, even in years of average to good rainfall it was the distribution, rather than the quantum of rain which presaged a good harvest, a fact strikingly demonstrated in 1873–74 and 1888–89.

In 1873 rainfall was only marginally deficient in the headquarters and Aurangabad subdivisions, and normal in the other two subdivisions. Indeed, it is difficult to believe that there could have been such an extensive harvest failure in a year of almost normal rainfall. The *Aradra* rains were delayed, but in July there was excessive precipitation amounting to twice that of average years, varying from 20 inches in the west to 27 inches in the east of the district. In August the rainfall was slightly below normal, but still sufficient to maintain the inundations caused in the preceding months. Consequently, the autumn crops were seriously injured, and many reservoirs, on which the winter rice depended, burst. The hathiya rains practically failed. As a result, although the total annual rainfall was practically normal, the bhadoi out-turn was 50 per cent and the *aghani* less than 40 per cent. This pattern was repeated in 1888–89, when the total rainfall was much above average, but the bhadoi and rabi yielded only 40 per cent and the aghani 50 per cent of the normal out-turn.[*]

The Agricultural Calendar

The agricultural calendar that prevailed in South Bihar was a curious mix of solar and lunar movements. The year was divided into 12 months. One

[*] O'Malley, *Bengal District Gazetteers, Gaya*, pp. 121–23.

month was from one full moon to the next, the time taken by the moon to transit across the 27 *nakshatras* or asterisms of the ecliptic.

It may seem paradoxical that although the agriculturist followed the lunar month, agricultural time was contingent on solar movements. It is the position of the sun which shapes the seasons and this seems to have been fully recognised. In Western cosmology the ecliptic, or the path the sun, the moon and the planets appear to trace through the stars in the sky, is divided into 12 zodiacal signs of 30° each. In Indian cosmology, the ecliptic was from very early times, divided into 27 Nakshatras.[67] The nakshatras are not of equal length, for the sun takes between 308 and 336 hours to transit through a nakshatra. Consequently, nakshatras range from 13 to 16 days, there being approximately 2 1/4 nakshatras in each month.[68] Practically every agricultural operation commenced in a particular nakshatra and each asterism had its favourable weather and signs which passed into folklore.

The Early Rains

Agricultural operations began with ploughing and the commencement of sowing in the month of *Jeth* (mid-May to mid-June). Rains in the preceding month of *Baisakh* were essential for these operations, especially since the soil was stiff and clayey and consequently required repeated ploughing. Rains in the month of Baisakh therefore presaged a bountiful harvest:

> If King Baisakh rains,
> Every grain of paddy will produce two of rice.

The *Baisakh* rains were followed by hot and dry weather in the asterism of *Krittika* and then ideally by rain in the asterism of *Rohini*. *Mirgsira*, which followed Rohini, was dry:

> If it rains in Krittika there will be
> no rain in the following six asterisms.

And

> If mirgsira is hot, Rohini rains,
> and Aradra gives a few drops.

[67] The Indian nakshatra system possibly antedated, and in any case developed independently of, the better known zodiacal system of classical antiquity. Indeed, the Indian nakshatra divisions were closer in conception to the Chinese *Hsiu*, although it has not been seriously argued that the Chinese and Indian systems were greatly influenced by each other. René Taton, ed., *History of Science. Ancient and Medieval Science. From the Beginnings to 1450*. Translated by A.J. Pomerans, New York, 1957, pp. 136–48.

[68] Deduced from N.C. Lahiri, *Condensed Ephemeris of Planet's positions according to the 'Nirayana' or Indian System for Fifty-two years from 1890–1941*, Astro Research Bureau, Calcutta, 1942. The complex and confusing relationship between lunar and solar time is described in greater detail in the Appendix.

Saith Dak, hear O Bhillari,
Rice will be so plentiful that even dogs
will turn up their noses at it.[69]

The *Aradra* Rains

Sowing was recommenced, and transplanting begun, in the asterism of Aradra (June–July). The Aradra rains were critical for the three main bhadoi crops, viz., 60 day rice,[70] janera or maize, and marua, all of which were sown broadcast:

If you sow 60 day rice in Aradra,
You strike distress with a club
and drive it away.[71]

Aghani rice, the main crop in the two districts, was also sown in the asterism of Aradra. The sowing of this crop was therefore contingent on the Aradra rains.

If Aradra rains,
everything grows.

Indeed, the Aradra rains were almost as important as those in the asterism of Hathiya:

If Aradra does not rain at the commencement,
and Hathiya at its end,
saith Dak, hear O Bhillari,
the cultivator is crushed.

Timely rain in Aradra thus meant a good beginning to the agricultural year:

He whose fields are ready in the month of Asarh
is ready also all the year round.

[69] George A. Grierson, *Bihar Peasant Life*, being a discursive catalogue of the surroundings of the people of that province, with many illustrations from the photographs taken by the author, Patna, 1926, first published 1885, p. 277.

[70] Popularly known as *serha* or *sathi*. Sathi was seldom ready in 60 days as its name indicated, unless the rain was copious and regular: 'Serha and Sathi take 60 days if it rains night and day'. Grierson, *Bihar Peasant Life*, p. 248.

It was from the rapidity of its growth that the name 'sathi' was derived. The bhadoi crops required plenty of rain with intervals of bright sunshine to bring them to maturity.

[71] *Ibid.*, p. 278. Although good rains in Aradra indicated an excellent bhadoi harvest, sowing could be deferred, depending on the breaking of the monsoon. Bhadoi crops could be sown as late as the middle of July without the prospect of any serious loss. O'Malley, *Bengal District Gazetteers, Gaya*, p. 108.

Aradra and *Punarbas* are the two main asterisms in the month of *Asarh*. If the rains were late, the sowing of paddy was also put off accordingly. The prospects of a good aghani crop however receded as the rains were delayed, for the asterism of Punarbas and the following asterism of *Pukh* or *Chiraiya* were usually devoted to transplanting and not to sowing:

> Paddy sown in Aradra turns to plenty,
> in Punarbas it has empty ears
> and sown in Chiraiya it turns to nothing.[72]

If the rains failed altogether in Aradra and in the following nakshatras, as they did in 1868, the rice acreage suffered. Nurseries were rooted up—and even transplanted rice ploughed up—and the ground prepared for the rabi crop. Indeed, on such occasions every available paddy field was put down in rabi in addition to the usual rabi lands. All stray rain was carefully stored in 'pynes and ahars' to water the coming rabi.[73]

With the opening of the Sone Canal, Shahabad and a small part of Gaya ceased to be dependent on rain, but the strong positive correlation between rice acreage and rainfall continued in the district of Gaya, where the gilandazi works were moreover fast approaching a state of utter disrepair. Using the rank coefficient of correlation we get an almost perfect correlation of 0.93 between rainfall and rice acreage in Gaya between 1900 and 1910.[74]

The Long Wait for Queen Hathiya

> If towards the end of the rainy season,
> there is no rain in hathiya, then, says Bhaddar
> It is a bad season for farmers and labourers.[75]

Having sown the rice, the agriculturist could only hope that the rains would continue, for rice cultivation requires plenty of water. He waited in particular with trepidation for the crucial rains in Hathiya (second half of September to the first half of October). Queen Hathiya—*Hathi Rani*—as this last spell of wet weather was popularly called, was the harbinger of prosperity. These rains were necessary for the crucial second flooding of the rice fields as well as for sowing the rabi. The rice fields, which were puddled with water at the time of transplantation, were drained in the

[72] Grierson, *Bihar Peasant Life*, pp. 278–79.

[73] Bengal Land Revenue Proceedings, November 1868, No. 137 and No. 143, 'A' series.

[74] Calculated from figures available in *Agricultural Statistics of India*, 1900-1–1910-11. *Bengal Land Revenue Administration Reports*, 1900-1–1910-11.

[75] Mira Pakrasi, *Folk Tales of Bihar*, New Delhi, 1973, p. 27. Bhaddar was a legendary poet from Shahabad. Several such proverbs attributed to him have become part of local folklore.

asterism of *Uttara Phaguni*. The fields were allowed to dry for fifteen days, and at the end of this time they were again flooded in the asterism of Hathiya. It was this practice of draining the rice fields, known as *nigar*, which made the hathiya rains, or failing that, irrigation, essential to successful harvest. If no water could be procured for the second flooding, the plants withered and were fit only for fodder.[76]

Having committed his fields and resources for the winter rice, the agriculturists' fortunes hinged on the hathiya rains.

> Want of rain in Aradra destroys three crops—
> hemp, 60 day rice and cotton,
> but by want of rain in Hathiya everything is ruined,
> both what has been sown and what will be sown.[77]

The experience of 1906 vindicated the rhyme: the Aradra rains were good that year, but the failure of the hathiya badly damaged both the winter rice and the rabi crops. A good rainfall in Aghan (late November) however could still retrieve the rabi as it did the next year, when the hathiya failed yet again.[78] The winter rice however hinged squarely on the hathiya, except in tracts with an assured source of water supply.

Clear skies, overcast skies and the direction of wind were keenly watched as these supposedly helped in forecasting the nature of the coming hathiya rains:

> If the west wind blow in Sawan, the east in Bhadon,
> and the northeast in Asin,
> and if there is so little wind in Kartik
> that even the reeds do not shake, where my dear,
> will you have room to keep your rice?[79]

The westerly wind of *Sawan*, and the easterly wind of *Bhadon* presaged good hathiya rains and formed the subject of several popular rhymes. Should the wind direction be reversed, however, the agriculturist should be prepared for the worst:

> If the east wind blows in Sawan,
> sell your bullocks and buy cows.[80]

Although there were other omens which foretold the nature of hathia

[76] O'Malley, *Bengal District Gazetteers, Gaya*, p. 107.
[77] Grierson, *Bihar Peasant Life*, p. 283.
[78] *Bengal Revenue Administration Report*, 1906–7. *Ibid.*, 1907–8.
[79] Grierson, *Bihar Peasant Life*, pp. 281–83.
[80] Ibid., p. 28.

rains, the ones associated with the seventh day of the bright half (*Sukul Paksh*) of the month of Sawan are perhaps the most intriguing:

> If the sun rises obscured by clouds
> on the 7th day of the bright half of Sawan,
> it will rain up to the festival of Deb Uthan—
> in the asterism of swati.
>
> If the sun rises clear on the morning
> of the 7th day of the bright half of Sawan,
> and afterwards hides itself behind clouds,
> drive away, my dear, your plough and bullocks,
> for the rain is very far off.[81]

The Hathiya Rains

The timing of the hathiya rains determined the quantity of the harvest. Hathiya literally means elephant, and when 'the elephant put its trunk in its mouth',[82] the harvests were poor, despite good rainfall in the aggregate, as in 1873 and 1888. The agricultural seasons of 1904–5 and 1905–6 nicely underscore the importance of timing. There was a heavy downpour towards the end of July and in August, considerably damaging the bhadoi crop which was almost ready for reaping. The hathiya nearly failed, although the winter rice was saved from total failure in large areas by a storm which occurred on 17–18 October 1904. The next year the Aradra rains failed, but this was followed by very heavy rain, which once again damaged the bhadoi. The hathiya, however, was good and consequently so was the winter rice.[83]

The nakshatra of Hathiya was the longest and lasted 16 days. Hathi Rani, or Queen Elephant, was supposed to have four legs, one each of iron, copper, silver and gold. Each leg lasted for 4 days and came in the above order. It was rain in the last leg, that of gold, which gave a bumper crop.[84] It was perhaps this ideal juxtaposition of rain in the fourth quadrant of the asterism of hathiya which inspired the following rhyme, for Chitra is the nakshatra immediately following the fourth leg of hathiya:

> If hathiya rains
> and the clouds of Chitra hover about,

[81] *Ibid.*, pp. 279–80.

[82] This is how a local poet, Phaturi Lal, described the failure of the hathiya rains in 1873 in his *Tale of Famine*. *Bihar Peasant Life*, p. 287.

[83] *Bengal Revenue Administration Report*, 1904–5 and 1905–6.

[84] Grierson, *Bihar Peasant Life*, p. 283. The nigar operations were completed towards the end of Uttara Phaguni. Since the ideal duration for drying was fifteen days, rain in the fourth quadrant of hathiya was the most beneficial.

the paddy cultivator sits at home
and utters cries of joy.

Rain in Chitra, however, was not considered good as the rabi crops were sown in this asterism. It did little good to any crop other than rice.

Rain in Chitra destroys the power of the soil
and is likely to produce blight.[85]

The hathiya generally signalled the end of the monsoons, although it occasionally lingered on. Although rain in Chitra was considered very bad, any drops which fell in the subsequent asterism of *Swati* were the equivalent of a pearl.

If a single shower comes in Swati,
it enriches people so much,
that even Kurmi women get gold earrings to wear.[86]

The rice fields were drained at the commencement of the Swati nakshatra. The winter rice and other kharif crops were reaped in the month of Aghan (November to December)—broadcast rice in the first half and transplanted rice in the second. Wheat, barley, and other pulses, the main rabi crops, were sown in the asterism of Chitra, following the heavy downpour in Hathiya. If the rabi crops were sown too early, there was the danger of the heavy rains in Hathiya drowning the seed and the sprouting crop. If the hathiya failed, the rabi could still be sown in the hope of rain during the Swati nakshatra, as was done during the disastrous agricultural season of 1868. However, if the rabi crops were sown late, there was the danger that they would not be strong enough to resist an early winter. Since barley was generally sown late, in the asterism of *Bisakh* (not to be confused with the lunar month of Baisakh), there was a proportionate increase in the acreage under this crop on such occasions.[87]

The Winter Rains

Happy are the King and people when it rains in Aghan.

Rains in the month of Aghan (mid-November to mid-December) were crucial, and ideal for the rabi crop. If the winter rains were delayed the prospects of the rabi progressively worsened:

[85] Grierson, *Bihar Peasant Life*, pp. 284–85.
[86] *Ibid.*, p. 283.
[87] Bengal Land Revenue Proceedings, November 1868, Nos. 189 & 191, 'A' series.

If it rains in Aghan,
you will get double an average crop;
if in Pus, one and a half,
if it rains in Magh, one and a quarter;
but if it rains in Phagun,
then even the seedlings which you brought
from your house will be lost.[88]

Any rain in the second half of the month of *Pus* (i.e., early January) was particularly bad as indicated in this:

Rain in the middle of Pus
will give you half Wheat and half chaff.[89]

Unlike rice, the rabi crops did not require repeated and copious watering. 'Pynes and ahars', and the rivers that fed them, were dry during the winter, their beds being frequently cultivated. If the rains failed, temporary wells were dug in every available place, thereby saving a varying proportion of the crop.[90] The Sone canal system subsequently secured the rabi in the area commanded by it. There was one hazard that remained, however. If the hot winds set in earlier than usual, the out-turn of the rabi was badly affected, as in 1866, 1868, 1905, 1906, and 1907.[91]

The cropping pattern of the rabi crop was complex and diversified, adapted to ward off famine in the event of monsoon failure. The rabi harvest was spread over three months. Most of the pulses were reaped in *Magh*; wheat, barley, khesari and but in *Phagun*; and arhar in the month of *Chaitra*. With the gathering of the rabi the agricultural cycle was over, but by then it was almost time for the return of King Baisakh.

[88] Grierson, *Bihar Peasant Life*, p. 286. Severe hailstorms and a heavy rainfall in February badly injured the spring crops in 1866. O'Malley, *Bengal District Gazetteers, Gaya*, p. 121. In 1891 excessive rains in February and March caused much damage to the rabi. *Bengal Land Revenue Administration Report*, 1890–91.

[89] Grierson, *Bihar Peasant Life*, p. 286. Buchanan, *Behar and Patna*, p. 38. The rabi crops were damaged in 1906 and 1907 on account of late rains in February and March. *Bengal Land Revenue Administration Report*, 1905–6 and 1907–8.

[90] Bengal Land Revenue Proceedings, January 1869, No. 262, 'A' series. Grant, the Collector of Gaya, was astonished by the fact 'that it is possible to reap a crop of rubbee which has never felt rain from the hour of sowing to the hour of reaping'. The out-turn was of course affected and on this particular occasion only a 5–6 anna crop was expected. (In revenue parlance this meant 5–6/16 of an ideal crop.) Bengal Land Revenue Proceedings, May 1869, No. 156, 'A' series.

[91] O'Malley, *Bengal District Gazetteers, Gaya*, p. 121. Bengal Land Revenue Proceedings, June 1868, No. 15, 'A' series. *Bengal Land Revenue Administration Report*, 1904–5, 1905–6 and 1907–8.

Conclusion

Gaya and Shahabad districts could be broadly divided into three agro-climatic zones: the hill tracts of the Chotanagpur Plateau, the irrigated, fertile rice-bowl between the hills and the river Ganges, and the flood-prone diluviating diara adjoining the river Ganges. Both agriculture and attendant social relationship bore the unmistakable impress of the geographical context in which agricultural operations were conducted.

While the terrain defined the broad parameters of the cropping pattern, annual fluctuations were influenced by an agricultural cosmology, deeply rooted in local folklore, which distilled observations made over millenia. Wind, pressure, temperature and sky patterns, and their relationship to lunar and solar movements, were keenly watched as these supposedly foretold the quality of the coming agricultural season, in particular the crucial rains in the asterism (nakshatra) of Hathiya. These omens told the agriculturist what to grow, and when, and the sort of harvest to expect.[92]

The purport of this essay is to illustrate the manner in which geography had a well-defined impact on agriculture and on social relationships into which people enter for the purpose of executing agricultural operations. This should not however be misconstrued as an approach which ascribes to geography the status of an independent determinant, or a prime mover, in the historical process. The *longue durée* in history has a scarcely perceptible, albeit far-reaching and all-embracing impact on the historical process. In a pre-scientific age, where technology was backward and technological change slow, and man's ability to manipulate his environment was vastly inferior to what it is in developed countries today, the determining influence of geography on both agriculture and social relationships was correspondingly greater.

Changes in agriculture and attendant social relationships can of course be much faster than changes in the *longue durée*, whose influence is, by definition, long-acting. While the terrain set broad limits to the cropping pattern, and the seasons had an important bearing on annual variations in the choice and mix of crops, it would be naive to suppose that geographical factors were the prime determinants of the cropping pattern. The decision as to what crops to grow was perhaps the most important choice the agriculturist was called upon to make, and he responded keenly to various stimuli: inter alia, prices, the market, new channels of communications, technology, and government policy. Similarly, while geography had a formative influence on tenurial relationships, these were the result of a complex interplay of prices, monetisation, changes in the law and, above all, in the relative strengths of the social groups involved.

[92] While the agriculturist was an astute astral observer, he was also keenly alert to signals from the animal world such as the croaking of frogs, the incessant call of the Brainfever bird (Hawk-cuckoo), the trill of the koel, the dance of the peacock, etc.

APPENDIX

The Agricultural Calendar

Approximate Gregorian Month	*Lunar Month*		*Corresponding Nakshatra (Part of Constellation)*	
PART OF SEPTEMBER	ASIN	DARK	UTTARA PHAGUNI	(Leo)
			HATHIYA	(Corvus)
		LIGHT	CHITRA	(Spica*)
OCTOBER	KARTIK	DARK	SWATHI	(Arcturus*)
NOVEMBER		LIGHT		
	AGHAN	DARK	BISAKHA	(Libra)
			ANURADHA	(Scorpio)
DECEMBER		LIGHT	JESHTA	(Scorpio)
	PUS	DARK	MUL	(Scorpio)
JANUARY		LIGHT	PURBA KHARH	(Sagittarius)
	MAGH	DARK	UTTARA KHARH	(Sagittarius)
		LIGHT	SAWAN	(Aquila)
FEBRUARY	PHAGUN	DARK	DHANISHTA	(Delphinus)
		LIGHT	SATBHIKA	(Aquarius)
MARCH	CHAITRA	DARK	PURAB BHADRAPAD	(Pegasus)
			UTTAR BHADRAPAD	(Pegasus)
APRIL		LIGHT	REOTI	(Pisces)
	BAISAKH	DARK	ASWINI	(Aries)
		LIGHT	BHARNI	(Aries)
MAY	JETH	DARK	KRITTIKA	(Pleiades@)
		LIGHT	ROHINI	(Aldebaran*)
JUNE				

Appendix (Continued)

Approximate Gregorian Month	*Lunar Month*		*Corresponding Nakshatra (Part of Consellation)*	
JULY	ASARH	DARK	MIRGSIRA	(Orion)
		LIGHT	ARADRA	(Betelgeuse*)
	SAWAN	DARK	PUNARBAS	(Castor and Pollux*)
AUGUST		LIGHT	PUKH (CHIRAIYA)	(Cancer)
			ASRRAS (ASHLESHA)	(Hydra)
	BHADON	DARK	MAGGHA	(Leo)
PART OF SEPTEMBER		LIGHT	PURABA PHAGUNI	(Leo)
			UTTARA PHAGUNI	(Leo)

* Star
@ Open star cluster