Chapter 4

FLOODS AND THE COLONIAL RESPONSE

One major pre-occupation of the colonial state in North Bihar was to control floods, which occurred annually during the monsoons. "In the earliest correspondence of the district during the British era, there are clear indications that floods constituted one of the greatest obstacles with which the administration had to contend with."¹

The whole of North Bihar from Saran up to Purnea may be considered as a "huge inland delta as all the principal rivers emerging from the mountainous regions debouch in the plains and eventually flow into the Ganges."² The process of delta building towards the Ganges was going on for thousands of years and almost the "whole of it was built up by the principal rivers bringing from across the Himalayas the stock of building materials or detritus."³ The perennial rivers were mostly land builders and "in the process of land building oscillated from east to west like the pendulum of the clock in the range of hundreds of miles."⁴

The ideal natural condition under which the rivers acted and conserved themselves in the deltaic region has already been described in Chapter I. But unfortunately, in the colonial period, this natural working of the rivers had been tampered with, with 'devastating' results. S.C. Mazumdar, the Chief Engineer of Bengal in 1942, argued, "the works carried out ... have not only caused deterioration in the river channels making their maintenance more and more difficult but have also made the very problem of protection against flood damages, which they were intended to solve, more and more acute."⁵

¹ Muzaffarpur DG, 1907, p.64.
² Ghosh, op. cit., p.iii.
³ Ibid., p.iii.
⁴ Ibid.
⁵ Mazumdar, op. cit., p.17.
North Bihar was subject to floods almost every year and there was never any attempt made by earlier rulers to control it. The Muzaffarpur District Gazetteer of 1907 reported that "during the period of Muhammadan supremacy, neither canals... nor embankments were erected to prevent the havoc caused by the overflow of rivers...."\(^6\)

1. Embankments

Erection of embankments along rivers in North Bihar was started by the colonial state on a large scale from the beginning of the 19th century. Initially, it began with the restoration and extension of old dilapidated zamindary embankments, and construction of others to protect important colonial establishments. In the first few years, there was an indiscriminate construction of embankments on very 'unscientific' lines and the rivers invariably breached them in several places. During this period whenever a flood problem arose, "the answer was, 'let us build a bandh'\(^7\). And famine relief work, which frequently comprised the erection of bandhs, was in no small measure responsible for the present trouble\(^8\). Along with the construction of public embankments, European planters, indigo factories and big zamindars also constructed many private marginal embankments. In the initial stages, the embankments did give some temporary respite from annual floods, but in the long run, it proved to be an evil which not only caused more floods but also changed the nature of the floods. As the deterioration caused by these embankments to the river channels and the drainage system, affecting public health and productivity of the soil, etc., took several years to manifest, they were universally accepted till the end of the 19th century as the most effective protection against floods. It was only in the last quarter of that century that the negative impact of embankments was beginning to be felt and its role in controlling flood was being critically examined.

---

\(^6\) Muzaffarpur DG, 1907, p.69.

\(^7\) Bandh was used to denote both, cross-bunds which were used for damming of water, and embankments which were put up along the river banks to check the spill of the river. In this part of the thesis bandh is used to denote the latter.

\(^8\) Ghosh, p. ii.
2. The History of Embankments in North Bihar

It would be wrong to assume the embankments on the rivers of North Bihar to be an entirely colonial project. In fact, most of the embankments in Bengal (which were locally known as bandhs in Bihar) maintained as public embankments were in existence before the Company's accession to the Dewani. The earliest reports from Resident Collectors and other local officers of the period pointed out the dilapidated condition of the bunds in their respective districts and solicited authority to repair them. But there was no information as to the description of bandhs to be repaired or to the extent to which the Government was responsible for the expense of such repairs. In some instances the Government was expected to repair the bandhs and its obligation to maintain them seems to have been clearly established; but in other cases the expense was stated to have been readily borne by the inhabitants.9 We would discuss the history of some of the important embankments in North Bihar in this section.

2.1. Gandak Embankments

The embankments on the river Gandak were constructed by one Dhausi Ram, the Naib of Mohammad Kasim Khan, Subedar of Bihar, in the year 1756 at a cost of over a lakh of rupees. However, nothing was done to maintain the bandh with the result that it gave way at several places leading to destructive floods. In 1797 the Government took the control of the bandh and repaired it at a cost of Rs. 36,000 recovering almost the whole of the amount from the zamindars who benefited from it. Although some repairs were done from time to time, between 1820 and 1825 the bandhs were in such ruinous state that the zamindars had to petition the Government to repair them thoroughly or to allow them to do it themselves.

Eventually, it was decided to reconstruct the embankment which was accomplished in 1830.\(^{10}\)

It was from this time that the government started taking a direct interest in the embankments, in their structure, purpose and general condition. Several enquiries for that purpose were undertaken, particularly on the river Gandak. When asked to furnish the status of embankments on the margins of the Gandak the Board of Revenue reported that they were not aware when these embankments were first constructed. The only information it had was that for the Tirhut embankment, on the left bank of the river. A Committee of Embankments had been formed in 1809, and since that time it had been continually under European supervision. As far back as 1796 the Saran embankments had been placed under European supervision for the purpose of special repairs. This was, however, not continued and they were neglected by the zamindars.\(^{11}\) (Gandak River flowed through Champaran and Saran Districts. Since Champaran, till 1866, was in the Tirhut district, the embankment in the Champaran district on the Gandak was called Tirhut embankments. The embankments on the Gandak in Saran district were known as Saran embankments)

In 1829 an inquiry was conducted by W.R. Fitzgerald, Superintendent, Government Embankments. He reported that the Tirhut embankment was in generally efficient condition and, though not so well formed, they fully served the purpose of their erection. He further reported that in Saran district the right bank of the river had encroached upon and destroyed a considerable portion of the embankment. Instead of flowing gradually over its bank, as it usually did in most situations, it had entered the interior country in a volume of such magnitude that no crops that were grown in the region could withstand. He added that it was

---

\(^{10}\) Ghosh, *op. cit.*, p.15.

\(^{11}\) Inglis, *op. cit.*, p.356.
to prevent the disastrous effect of such inundations that he advocated the necessity of restoring the Gandak embankments. He contrasted the flourishing appearance in the Tirhut side with the impoverished state of Saran district where, because of inundation, both Europeans and natives were anxious that the embankments should be restored and they were willing to pay the cost. The embankments were restored under the supervision of Captain Sage at a cost of Rupees 60,000, which was paid by the zamindars.¹²

In October 1841 the question of maintaining or relinquishing the Gandak embankments was raised. The Military Board was called upon to report upon this matter. The Board submitted reports by Major Garstin and Captain Green. Major Garstin argued in favour of the embankments¹³:

I am inclined to think that originally the bunds in Saran were not required... The question is now totally altered from the bunds having been kept up for so many years... The increased population, instead of seeking land in other directions, have located themselves on the ground recovered I may say from the river, by the erection of these bunds, and the whole district, including the parts which used to be annually inundated is now densely populated and highly cultivated... I must now under existing circumstances give it as my opinion, that Government neither in justice to individuals, nor in regard to their own revenue, alter the system, that is, altogether abandon the bunds. The evils of this would be to throw thousands of square miles out of cultivation for the greater part of the year and cause a consequent loss of revenue.

Captain Green echoed the same feelings and believed that the Saran embankments “have operated most extensively in reclaiming and protecting vast tracts of land from inundation, and crops of wheat, indigo and sugarcane are now safely cultivated when formerly nothing but supul grass or at best paddy was to be seen....”¹⁴ But by constructing the bandh in the first place the land-building activity was stopped, and the area that was

---
¹² Ibid.
¹⁴ Ibid, pp.67-68.
flood prone at that time would have been raised above the flood level whereby no bunds would have been required.

In 1868-69 Captain Jeffreys investigated the question of remodelling the embankments on the Gandak together with an irrigation scheme. In March 1869 Mr. T.B. Stoney received the executive charge of the embankments, and he prepared a scheme for the work. The plans and estimates (Rs. 3,24,204) were sent to the Government of India in a letter dated 24 March 1870.

The only problem in the execution of the project now was about who was liable to pay for these projects; the Government or the zamindars. The colonial government obviously was too happy to put the burden on the zamindars and argued:

...The Board of Revenue reported in 1863 ' that the engagement entered into between the Government and the landholders of Sarun and Tirhoot put the latter under the same liabilities as to those to which the landholders of Midnapore are subject, as regards the payments for the repairs of the Gunduck embankments: but these engagements make no provision for construction.'

The Government of India in its letter dated 13 May 1870, stated that it was decided that works of this nature should be paid by the owners of the lands protected, and till such details about payments were settled, the estimates were not to be sanctioned.

On 17 December 1873, Bengal Government asked for renewed sanction for estimates aggregating Rupees 2,72,396 for the Champaran embankment above Dommurea, and aggregating Rupees 2,68,921 for the lower embankments, from the Government of India. These embankments were brought under the Embankment Act on 5 May 1874.

---

15* Inglis, p.358.
16* Ibid., p.361. A detailed discussion on this question will be found in the next section
17* Ibid.
18* Ibid., p.363.
regards allocation of expenditure it was said that since the embankments were brought under
the new Act [VI (B.C) of 1873], "under the provision of which all future expenditure, whether for ordinary repairs or for extension of improvements, will be recoverable from the
landholders: but the Act not being applicable retrospectively the past expenditure cannot be
so recovered". The Government of India sanctioned the outlay as chargeable to the
Government.19

An agreement was finally reached between the Government and the zamindars on
the question of payment for the maintenance of the embankments. In a letter dated 28
December 1881 to the Board of Revenue a contract was approved for the maintenance of the
Saran embankment for 20 years with effect from 1 April 1880, at the rate of Rupees 200 per
mile per annum. For a length of 119 ½ miles of the embankment the annual sum payable by
the zamindars was Rupees 23,000.20

Similarly, by a notification dated 12 January 1885, the contract for the upkeep of the
Tirhut embankment, a length of 52 miles 400 feet, at a sum of Rupees 2,08,300 for a period
of 20 years commencing from 1 April 1883 was also passed. In the project prepared in 1869
it was proposed to close the head of the Baya nala by the embankment, which was, however,
not done. In 1893 a project for a sluice across the gap was put forward and approved. The
estimated cost of the works was Rupees 12,465, and the Indigo-Planters Association
contributed Rupees 5,000.21

The contract for the maintenance of Saran and Tirhut embankments were renewed
for a period of another 20 years from 1 April 1900 and 1 April 1903 respectively. The
contract for the maintenance of Champaran embankment was renewed for a period of 20

19 Ibid., pp.364-65.
20 Ibid., p.365.
21 Ibid., p.366.
years, the charge payable being increased to a rate of Rupees 20,000 per year equivalent to Rupees 352 per mile on the length of 56 miles 3,960 feet. In the previous 20 years the Government claimed to have had incurred considerable outlay in retired lines and protective works in excess of the sum payable to under the former contract.22

2.2. Turki Embankment

This embankment along the Bagmati in Muzaffarpur district was first constructed in 1810 by the Manager of the Kanti Indigo Factory to safeguard its indigo cultivation and for more than half a century it continued to be maintained by the factory. In 1875 it was taken over by the Government under the Embankment Act and the Executive Engineer, Gandak Division, was placed in charge of the embankment. It extended for 26 miles along the southern bank of the Bagmati and protected an area of 90 ¼ square miles in the Doab between that river and the Burhi (or Little) Gandak. It was being maintained under what is known as the Takavi system, i.e., the cost of maintenance was recovered through the annual apportionment of the expenditure incurred from the persons benefited. The annual cost of maintenance amounted to Rs. 4,580 in 1904. After the earthquake of 1934 the bandh was no longer maintained and reached a dilapidated condition.23

In a letter dated the 17 February 1881 the Superintending Engineer, Major Heywood, mentioned that there was some dispute about the embankment between the indigo factory and the local raja24:

...the recent history of the embankment shows that in 1833, 1852, 1860, 1861, 1868 and 1870, the bund broke at the village Turki, and that the repairs were invariably opposed by the Rajah of Turki, but in each case the Magistrate or Commissioner directed that the bund should be repaired, and in the last mentioned

23 Ghosh, p.47.
24 Inglis, p.370.
year it is estimated that the repairs cost the owners of the ... factories the large sum
of Rs. 14,000.

Their difference of opinion was regarding the desirability of having this embankment, but both Major Heywood and Mr. Hughes, Executive Engineer, believed that
*as it had been in existence for several years, it would be better to retain it.* This view was also taken by the Chief Engineer, Levinge, who also supported the request made by the owners of the factories that the upper end of the embankment, which was liable to be outflanked in high floods, should be extended to high ground.\(^{25}\)

In 1884 a short extension at the upper end of the embankment was authorised by the Government under the Embankment Act of 1882. This small matter had, however, given rise to a prolonged discussion owing to conflicting interests. It was contemplated that the district road should be left as it was and not raised as had been proposed in 1881. The District Engineer of Champaran in 1883 corroborated it\(^{26}\):

> The road from Teturea to Sigari (the one in question) has risen to its present height by yearly additions since 1874. At that time there was only a cart track following the level of the country. When the road was first made there were culverts and bridges provided to pass off the flood waters; most of these have gradually been done away with and the road converted into an embankment...It is, I think, advisable to leave the general level of the road as it is, but not at present to close up the breach made by the late floods....

The question about the road came to the front again in 1892 when orders were passed in a Bengal Government letter, dated 4 March 1892, that the road might be raised and a weir built from funds paid by the proprietors of the Kanti Indigo concern. The object of the proposed work was to exclude a portion of the Bagmati spill from the country to the south of the river, which was already protected by the existing embankment. It was obvious that the

spill could only be excluded by retaining it in the area to the north of the embankment, thereby increasing the depth of the flood in this area. But the Commissioner, Patna Division, argued that the "benefit to the land south of the embankment will be greater than the injury to the lands to the north."²⁷

After the floods of 1893, it was decided to not raise the height of the embanked road any further and certain culverts were permanently closed, as they were a source of danger to the Turki embankment.

2.3. Embankments on the Ganges

Traditionally, the flood of the Ganges in its course through the province was allowed to spread at will. On the left or the north bank it was to some extent hedged in, first in the Saran district by the bank of the Bengal and North-Western Railway (B&NWR), and lower down in the Darbhanga and Monghyr districts by some regular flood embankments.

The flood bank in the Darbhanga district was known as the Bazitpur embankment. The exact antiquity of this embankment was not known but what was known was that it had existed for several years before it was taken over under the Embankment Act VI (B.C) of 1873 in 1880. This was done after the inundation caused by the flood having got behind this embankment from breaches in private embankments in the Monghyr district and by overtopping the small _bandhs_ on the left or north bank of the Byah river about half a mile above the commencement of the Bazitpur embankment. This flood damaged, and in some places completely destroyed, the crops over 20 to 25 square miles in Darbhanga district and a large area in the Monghyr district. In 1880 this embankment was extended and the total

²⁷ _Ibid._, p.373.
length in charge of the PWD officers was 17 miles 3,960 feet in the Darbhanga district and 11 miles 1,320 feet in the Monghyr district. 28

A few miles down stream of the Bazitpur embankment, there was another private embankment near the Begusarai sub-divisional headquarters in the Monghyr district. H. Wheeler, then Sub-divisional Officer of Begusarai, in a letter dated 10 December 1894, provided the history of this embankment 29:

In front of the villages of Kesawe, Ulao, Paspura, and Keithanwa immediately south of Begusarai and some 3 or 4 miles from it, there seems to have existed from early times some fragments of the bund maintained in an inefficient way by the local zamindars for the protection of the land behind it. The first mention of it in official correspondence is in a letter from Mr. Gupta, Sub-divisional Officer, to the Collector dated 21st August 1888. Mr. Gupta then refers to this embankment as an old work, the existence of which was hardly known to the Engineering Overseers.

On representation of Mr. Gupta (the SDO) the District Board had given funds for repairs and a length of about 14 miles was repaired and restored in 1889. This embankment from then on was known as ‘Gupta bandh’. The Government, however, did not approve the action of the District Board in restoring the embankment, and it had not been kept in repair. In 1894 the embankment breached at several places due to a high Ganges flood. Wheeler and other local officials were in favour of repairing and bringing the embankment under the Embankment Act. This proposal was not accepted at the head-quarter as it was feared that the repairs would be "prejudicial to the country. The flood water, which at present are

28 Ibid., pp.350-51.
29 Ibid., p.351.
injurious to a part of the Monghyr district, will, if excluded, go towards increasing the
damage caused by floods elsewhere."\textsuperscript{30}

The question came up again in 1905 when there was another high flood in this part
of the river, again submerging the town of Begusarai and the surrounding areas. This tract
was liable to inundation by the floods of the Ganges from the south and by the flood of the
river Burhi Gandak from the north. The railway embankment, along the north bank of the
Ganges, acted as the dividing embankment between the two floods. Maconchy,
Superintending Engineer, said that there were two ways of preventing the damage; 1) to
provide sufficient waterways under the railways and the Tirhut road to allow the escape of
the Ganges spill towards the Burhi Gandak; or (2) to build up the ‘Gupta bandh’ to a safe
height above flood level and of proper section and thus exclude the flood altogether. The
second option was preferred, as the first one required heavy expenditure and the doubts
about the possibility of increased flood level were removed by the fact that there was an
extensive tract of open country opposite that bandh.\textsuperscript{31} The embankment was taken over
under the Embankment Act in June 1907 and renewed at an estimated cost of Rs. 88,422. \textsuperscript{32}

2.4. Gogra Embankments
A part of the Saran district was liable to inundation from the Gogra when the river was in
high flood, and when this happened, which was not very often, a temporary demand arose
for a protective flood bank. There were some private embankments, but they were not well
maintained.\textsuperscript{33}

In 1870 C.B. Garrett, the Collector of Saran, noted a petition filed by several
zamindars requesting for the embankments at certain points on the Gogra and on the large

\textsuperscript{30} \textit{Ibid.}, p.352.
\textsuperscript{31} \textit{Ibid.}, p.352.
\textsuperscript{32} \textit{Ibid.}, p.352.
\textsuperscript{33} \textit{Ibid.}, p.374.
streams or *nassee* running up from that river into the interior of the district. Traditionally these *nassee* were all embanked, and maintained by the *zamindars*. However, "of late years these [had] all been allowed to fall into disrepair. One great reason for this [was] that formerly this part of the country was all in the hands of the Manjhi *rajah*, who kept up these embankments at his own expense. This family [was] now completely broken up and the lands [had] fallen into the hands of a herd of petty proprietors...."\(^{34}\)

This was the time when a considerable degree of debate started among the government officials about the efficacy of embankments. In 1890 there was a high flood in the Gogra, the effect of which was aggravated by heavy local rainfall and a high Ganges. Lees, the Executive Engineer, Gandak Division, in his report wrote, "from Guthnee to Damri the left bank [was] for the most part below high flood level, and although the *Zemindars* for many years past [had] managed to protect their lands to a great extent from inundation by a series of marginal embankments, these were not proof against the last flood, and it was the water which found its way over the bank in this length that flooded a large area in the Saran district this year."\(^{35}\)

Lees had also opined that the *zamindari* embankments did not cause any appreciable rise in the Ganges near Danapur. Buckley, Superintending Engineer, Sone Circle, did not agree with Lees regarding the probable effect of the embankment on the Ganges flood level. He also said that an embankment on the left of the river should be followed by one on the right, which is in the United Provinces. He concluded by saying\(^{36}\):

"I have personally very little doubt that it would be a mistake to embank the Gogra. It would only be laying up trouble for the future. The lower part of Saran have been

\(^{35}\) *Ibid*.  
\(^{36}\) *Ibid.* (emphasis mine)
subject to floods from time immemorial; the people should adjust their arrangements to the facts. Floods are not unmitigated evil: they fertilize the soil very greatly. If the Gogra is to be embanked, why not the Sone? To embank these big rivers without more knowledge than we possess at present is to tamper with one of the great forces of nature, and we cannot tell the ultimate results.

Buckley, who resumed charge of the Circle, was generally opposed to the scheme and felt that Bengal could not afford to commence the ‘attack’ on Gogra. He added that if the North West Provinces leads the ‘attack’ on it then Bengal might have to respond.37

Odling, then Chief Engineer, on the other hand, preferred that the government not interfere in the matter. In a note dated 28 December 1893 he argued38:

I think there can be no doubt that the only prudent course is for Government to abstain from constructing any embankment on the Gogra river or interfering with the existing embankment at all...it is certain that protection can only be afforded at the expense of others, and with the certainty that the danger and loss will be transferred elsewhere.

Accordingly, Government orders were given in the Resolution dated 8 February 1894 to the effect that Government would not undertake any work, but if the zamindars concerned liked to repair the existing private embankments they might do so.39 This settled the matter for the moment.

There were several zamindari embankments along the left bank of the Gogra to check the Gogra floods. They were not well cared for and were breached or overtopped during abnormal floods, like the one in 1938. Some of them, such as the Admapur bandh on the left bank of the Gogra, Tajpur bandh on the left bank of the Daha and the Naini bandh

---

37 A detailed discussion on the dispute between the Governments of Bihar and the United Provinces is given in Chapter 5.
38 Ibid., p.378.
39 Ibid.
on the left bank of the Tail nala, were repaired by the Government in 1939 and taken over by the PWD.\(^{40}\)

Described above are only those embankments, which were in some stages taken over as 'Public Embankments' and, then repaired, renovated and rebuilt by the Government. There were, however, innumerable marginal embankments on almost all the rivers built by the zamindars, planters and well-to-do people. In fact, the Government in the initial years was to encourage the construction of embankments by the zamindars as the belief was that it was the bounden duty of the latter to do so. One of the oldest embankments constructed by the zamindars was the Bir bandh.

2.5. Bir Bandh

This bandh was a very old earthen embankment, some 20 to 30 feet high in places and about 50 miles long, which ran from the foot of the outer range of the Nepal hills southwards into the district of Bhagalpur. It was constructed at the distance of 6 to 8 miles from the western bank of the Kosi to check the encroachment of the river westwards. Its origin is, however, covered in mystery. There was an opinion that in old days this bandh existed up to the Ganges, but it seems that a greater portion of it was effaced from existence and there was no evidence available to show that it ever stretched that far. In 1938 its length in the British territory was about 2 ¼ miles only and it had gaps at five places. During the floods of 1938 and 1939 about ½ mile of the bandh was eroded away. In the Nepal territory the length of the bandh was formerly about 16 miles. Due to the westerly swing of the Kosi the portion of the bandh from Raniganj to Babia ghat was gradually breached and eroded and was

\(^{40}\) Ghosh, p.9.
completely washed away by 1939. In 1941 only about 8 miles of the bandh remained intact.  

In North Bihar the government took over and maintained only some embankments, and in all the cases the expenditure for the same was collected from the zamindars. The concern of the government was not only with the question of embankments, but also with other questions, which will be discussed in the next section.

3. Acts and Principles for the Management of Embankments

From the very beginning of the colonial rule in Bengal, with the occurrence of frequent floods and the resultant damage to crops, the attention of the Government was forced on the subject of embankments and drainage. The issues that bothered them related to- Which embankments needed to be kept up, and which were to be abandoned? How far was the state bound to bear the expense of those retained? Which officers could be given the charge of supervision of embankments? Which powers should be given to them of taking over, on behalf of the public, existing works, or of constructing new works? What authority the concerned officers of the State needed to exercise, to compel the zamindars or others benefiting from these works to fulfill their obligations, and levy from them the necessary costs? From the beginning of the 19th Century these issues became crucial topics of debate and discussion among the policy makers. But it was only in 1855, that a comprehensive Act was passed on the subject of embankments.

Let us now focus on the legislation on flood control and drainage. This would help us to understand not only the concerns of the colonial government on the question of floods, but also how they influenced, first, the legislations themselves and, second, the nature of


41 Ibid., pp.119-20.
intervention in flood control. This section is largely based on a *Manual* written by Sir Henry Leland Harrison in 1875, at that time the Collector of Midnapur.

In the initial years the primary concern of the Government, as mentioned above, was to find out who was responsible for the construction and maintenance of embankments. The main effort of the Government was to consider the ways and means to pressurise the zamindars and others to construct and maintain embankments. Here we must remember that after the acquisition of the Bengal province from the Nawabs, the Company officials were engaged in a debate about the general land and agricultural rights. Finally, by the Permanent Settlement of 1793, the zamindars were identified as the group responsible for collecting revenue from the peasants and to pass it on to the government. In other words, zamindars were considered as the crucial link between the Company and the countryside in terms of revenue collection and general agricultural relationships. The same was reflected in the policies on the embankments. According to the Regulation XXXIII of the Code of 1793 of the Permanent Settlement, the Government, on the one hand, recognised its obligation to repair certain embankments, while, on the other hand, it clearly laid down that there were other existing embankments, as well as reservoirs and water-courses not considered public works, and new works of the same nature, whose repair and construction were matters of public interest and fit objects of legislation.  

Regulation VIII of 1793 contained a clause whereby it was mentioned that the zamindars had agreed to maintain embankments (poo/bundy) according to custom, and if they neglected these works, the loss would be theirs.

---


43 *Ibid*, p.3.
Thus, while it was agreed that large works were to be the responsibility of the colonial state, no specification was made about which works fell under this category. On the other hand, while the obligation of the zamindars to construct and maintain all other embankment and drainage works was distinctly recognised both by the Regulation and by particular covenants, no machinery was provided to enforce attention to these duties. Harrison writes, "Perhaps it was over-sanguinely hoped that their own interests would be a sufficient inducement to the landowners to look after these works."\textsuperscript{44} This vagueness in the government policy soon became a problem.

It soon appeared that these hopes were delusive and a number of problems were encountered in the construction and management of embankments. These problems soon made themselves apparent and one of the objects of the next Embankment Regulation (VI of 1806) was to provide a remedy for it. The Regulation transferred the supervision of embankments maintained at the expense of Government from the Collectors to the Embankment Committees, of which the Collector was an \textit{ex officio} member. These Committees were vested with a general control over the embankments, which were maintained by the Government as well as those which were repaired at the expense of the zamindars and farmers. However, it was not intended to interfere with the zamindars and farmers in the repair of the embankments situated in the lands held by them so long as that duty was effectually and properly performed. The Committee was, however, at liberty, whenever they deemed it necessary, to call upon any zamindar or farmer to make such repairs as may be required. However, the provisions of this Regulation was restricted exclusively to the embankments; the maintenance of reservoirs, tanks and water-courses, the importance of which the previous Regulation recognised, was not provided for (except

\textsuperscript{44} \textit{Ibid.}, p.4.
water-courses through embankments), an omission which remained without remedy up to the 1873 Act.\textsuperscript{45}

These two Regulations (of 1793 and 1806), with another very brief one (XI of 1829), which abolished the Committees and transferred the powers and authority exercised by them to "such officers as the Governor-General in Council may appoint", formed the only legislative sanction for interference on the part of the Government in the embankment and drainage of the country until the Act of 1855. In these there was no means of forcing proprietors or other people to undertake any \textit{new works}, however necessary. No alternative remained with the Government but either to leave them undone or for the Government to construct them themselves.\textsuperscript{46}

A very important reason for the colonial state to try out methods to force the \textit{zamindars} to build and maintain embankments was to avoid any kind of difficulty in the collection of revenue which resulted from destruction of crops due to floods. The terms of the Permanent Settlement of 1793 provided that while the public demand on no account was to be increased, no remission shall be claimed or granted on the score of loss from inundation. However, in frequent instances the state was compelled to forego its share of revenue altogether, or to receive payment of its revenue in distant installments. It was therefore considered "equitable that the \textit{zamindars} be required to defray the cost of protection from such calamities in all cases when it was not a part of the original contract that the Government should undertake that work, especially as there is reason to conclude that in parts of the country subject to inundation the public demand upon the land was fixed at the decennial settlement with reference to that contingency."\textsuperscript{47}

\textsuperscript{45} \textit{Ibid.}, pp.4-5.
\textsuperscript{46} \textit{Ibid.}, p.5.
\textsuperscript{47} \textit{Land Revenue Records}, pp.106-107.
The mismanagement of the embankments kept up by the zamindars, and even of embankments generally, continued. H.V. Bailey, Collector of Midnapur, spoke in 1851 of the ‘incompleteness’ of the system for the proper maintenance and repairs of bandhs. The real cause for this, according to him, was "the want of trustworthy and ready local supervision". It was believed that the government appointed supervisor at the local level, the poolbundy darogah, was working in direct concert with the zamindars at the cost of the government’s interests and the larger public good.

Attempts were now made to put an end to this. Act XXXII of 1855 made a decided effort to cope with the difficulty over the control of embankments. As regards the control of embankments, it left little to be desired, but as regards the obligation of the zamindars to pay for any new works, however necessary and beneficial, it was silent. It also gave the executive officers no summary powers in emergent cases, which was the immediate cause of its repeal. It, however, tried to define clearly what were ‘public embankments’; they were any embankment that was maintained, or to be maintained, by the officers of the Government at the expense either of the Government or of any private person.

It also specified that only regarding the maintenance and improvement of embankments already maintained at the expense of the zamindars and others was the expenditure leviable from them as the arrear of revenue; and if the Superintendent took over an embankment, the zamindar was only liable for the cost of an embankment of the same size as before. Though the zamindar might make a new embankment, the silence of the Act as to recovering any portion of its cost indicated that the work must be done entirely at the expense of the Government. This was somewhat modified by the Supplementary Act (VII, B.C. of 1866), which provided for the acquisition of land for embankment and for division

48 Ibid., p.8.
49 Ibid., pp.8-9.
of the cost among the persons benefited; but as regards the expenses of construction, no change was made. \(^{50}\)

3.1. Act No. VI of 1873

The attempt of the colonial state to grapple with the embankment issue continued. The Act of 1873 was introduced due to circumstances as stated in the letter of the Public Works Department, Government of India, to the Government of Bengal, dated 28 October 1868. In 1867, there were severe floods in the 24-Pargana due to obstruction of one of the drainage lines by a zamindar, who refused to remove it even at the insistence of the Executive Engineer. Such a situation required official legal intervention. \(^{51}\)

The Governor-General in Council was of the opinion that there should be a special officer in every embanked district in Bengal, not only empowered, but bound to do forthwith all that the public good required in respect to the control of the natural channels which carried off the surface water of the country, and to take all the needful measures for giving relief from inundations of an injurious character. \(^{52}\)

A draft Act was accordingly prepared, the novelties of which were the legalisation of summary procedure in emergent cases, and enlargement of the definition of the word 'embankment' so as to give power to remove obstructions to drainage. Provisions were also introduced for the better apportionment of expenses among all persons benefited. A Section in the Bill as drafted in 1871, placed the onus on the zamindars of maintaining all existing and future embankments. Both the British Indian Association (an association taking up the cause of the landlords) and the Maharaja of Burdwan petitioned against this Section, and it was finally modified. \(^{53}\)

\(^{50}\) Ibid., p.9.  
\(^{51}\) Ibid.  
\(^{52}\) Ibid., p.10.  
\(^{53}\) Ibid.
The principal features of the new Act, as it was finally passed, were said to be:

1) It has been declared law that the persons benefited are responsible for the expenditure on all necessary embankment and drainage works, except so far as the Government accepted definite obligations at the time of the permanent settlement.

2) The powers of the executive officers of the Government to control works affecting the inundations and drainage of the country have been amplified and more clearly defined.

3) The duty of supervising this department and initiating works is transferred from the Superintending Engineer to the Collector, who was the officer originally charged with the duty.

4) Ample provision is made for enabling the Collector to act summarily in cases of emergency. Besides the above, many useful emendations are made in point of detail.

Arguing against the opinion that there should be minimum Government interference in individual action, Harrison, the author of *Embankment Manual*, pointed out that:

...landed property cannot anywhere be so isolated from its surroundings as to make it a matter of individual liberty for its owners to make what embankment he likes on it, or leave what he likes unmade, irrespective of the effect of his action on his neighbours. Most emphatically is this the case in dealing with the deltaic rivers and water-courses of Bengal...In the ever-changing circumstances of the Bengal rivers a new embankment may often be necessary, or the enlargement of an old embankment, which is in principle scarcely distinguishable from the construction of a new embankment, be imperatively called for...In organising the embanking and drainage of a large tract of country, what is needed is unity of design and control; some guarantee that all the individual works are parts of the whole, subsidiary to one another, or at least not militating against each other.

What appears from the above reasoning is that there was a widening in the concerns of the Government. From an earlier concern that the zamindars were not paying enough attention to, and investing in embankments, the concern now was also regarding how to control the haphazard construction of embankments by individuals which created problems

---

in cultivation and drainage. The negative effects of all the embankments constructed in the previous years started taking effect after existing for more than fifty years. This will be discussed in the next section.

For the moment, let us come back to the question of the responsibility of bearing the expenses of construction and maintenance of such works. Harrison argued that "as the demand of the State, being limited by the Permanent Settlement, the benefit of any improvement passes into the hands of those who have not in any manner limited their claims...."56 On the other hand, a claim was put forth in the petition of the zamindars against the Act of 1855, in which they said that "the Government of the country, in consideration of the general protection afforded to the country and the revenue paid by the people, have always maintained the public embankments." Even Colonel Strachey, in 1867, believed that "the Government, in its position of superior landlord, is, by the custom of India, bound to maintain certain classes of works by help of which the condition of agriculture is secured; of such works may be named irrigation works and embankments. The obligation of the cultivators or landlords to pay the revenue may, in a general way, be said to be contingent on Government maintaining these works."57

Harrison believed that if the statement of Colonel Strachey was restricted to the specific works maintained by the government at the time of the Permanent Settlement it was correct, but if it referred also to the new works, then Section 72 of Regulation VIII expressly enumerated poolbundy among the charges which it was 'intended' should be defrayed by the proprietors from the produce of their lands. He further believed that the wording of the normal form of decennial settlement koobolyut distinctly pledged the zamindars to be

56 Ibid., pp.13-14.
responsible for *poolbundy*. In weighing the obligations of the State in such matters in Bengal, one reasoning which invariably came up was “the sacrifice of revenue, which the permanent settlement inadvertently entailed. Such loss of revenue as from the extension of cultivation and rent increments due to the development of the country, was sacrificed; but the still larger loss due to the deterioration in the value of the currency was evidently lost sight of.”

The 1873 Act also underlined and legalized greater official intervention in embankment policy. An important feature in the 1873 Act was the enlargement of the powers of government officers in dealing with embankment and drainage questions. The first and the most important change was the extension of the power to take charge of the water-courses necessary for drainage.

Another important change in the law was the re-transfer of direct control over the embankment and drainage works from the Superintending Engineer to the Collector. It was supposed that if the Collector was substituted for the Superintending Engineer, “there would be a greater responsibility thrown upon him (the Collector); he would be more careful how he conducted his proceedings, and would not be led away by professional feeling.” Thus, it was admitted that the actions of bureaucrats and engineers, at least in some cases, led to a deterioration of the flood situation owing to their inherent conviction that their knowledge could solve all the problems in a 'scientific' manner. Harrison criticized the over-zealous officials who often complicated the situation.

As regards the general issue, whether the work will be beneficial or not, it is almost impossible that too great care can be taken in deciding it. If it is certain, on the one hand, that much can be done by science to improve the drainage and health of large tracts of country in Bengal, it is equally certain that crude and ill-considered measures often secure assent for a season, especially after the country has been

---

58 Ibid.
59 Ibid., p.18.
60 Ibid., p.20
61 Ibid., pp.27-28.
recently suffering either from calamities of flood or weather, or from unusual waves of sickness, while they ultimately do more harm than good. In such times men's minds are concentrated with far more intensity on recognising the fact that preventable evils exist than in scrutinising carefully whether the suggested remedies are the correct ones. There was also a danger of some officers, who throw far more colour into their hopes and promises than they do close reasoning into their data, or officers with hobbies of their own which clothe true ideas in fallacious surroundings, should obtain premature and ill-considered assent to their schemes, and thereby being discredit to the Act.

3.2. Act II (B.C.) of 1882

The 1880’s saw another legislation by which the government attempted further to gain total control over the embankments and flood control issues. The Act II (B.C.) of 1882 further modified and expanded in some respects the Act of 1873. General power was now taken by the government to prevent the unauthorised construction of, or addition to, an embankment in a notified area (section 6 and 76), whether it might affect an existing public embankment or not.

A significant addition was that (section 63 to 67) which provided for the estimation of the probable cost of maintaining of an embankment, or a watercourse for a series of years and for the formation of a contract between Government and the people responsible for the upkeep, by which the Government undertook the work of maintenance for a fixed annual sum.

By the 1880’s the concerns of the Government had also focused towards cases where the embankments had to be abandoned. Vested interests had developed in places protected by embankments. In some of these places, the government, due to some reasons which will be discussed later, wanted to abandon embankments. Those who had become used to living with the protection afforded by these embankments opposed this. So the concern of the Government was to pass a legislation to avoid paying compensation to these people.

The effect of some embankments in some stretch of the rivers had led to deterioration of the drainage problem in the area to such an extent that the Government had
to intervene. The intervention came in the form of the enactment of the Act II of 1882 which gave powers to the respective authorities to co-ordinate and control the haphazard construction of embankments on 'unscientific' lines. Through this Act the Government notified the whole stretch or part of the river whereby nobody could tamper with the natural working of the river without the permission of the required authorities. But, as will be seen later, this Act was a dead letter as construction of embankments did not stop. Apart from this, the difference of opinion between the civil authorities and the embankment engineers also led to deterioration of the situation.

3.3. Problems in the Embankment Act II of 1882

Experience showed that the Act of 1882 did not afford the control over interference with rivers and embankments which it had sought. In North Bihar interference with rivers and their banks had been going on for a long time with disastrous consequences. The Superintending Engineer, Gandak Circle, commenting on the limitations of the said Act argued 62:

> When once a river has been interfered with the mischief is usually done and may not be reparable and this interference is done with the best motives possible but for want of knowledge of the results...Very few people outside the Engineering profession think that there is the least difficulty in understanding a river or any danger in embanking it or cutting across a loop so as to short circuit it. Infact either of these measures appeals to almost anyone who is not an Engineer.

As an example of such interference, Lyall, late Collector of Bhagalpur allowed the erection of the Banailly embankment and the closing of the river Sati without obtaining the opinion of an expert engineer, causing immense damage to property (this case has been discussed in detail in Chapter 5). During the Darbhanga Famine (1906-07) Egerton similarly closed the Bagmati spill by extending the Punwa bund and thereby caused very great losses in the Warisnagar thana. The tussle between the Embankment engineers and the civil

---

62 Superintending Engineer, Gandak Circle to Chief Engineer, dated 13th January 1919. F. No. XVIR-2/1919, B progs., PWD(I), B&O, pp.4-5.
bureaucracy (Collectors) on the question of the control over the embankments was continuing. The Superintending Engineer criticizing the Act, argued that it did not make seeking of expert opinion in building new embankments obligatory. 63

I do not wish to take away any of the Collector’s power under the Act but that the necessity of obtaining and acting in accordance with expert opinion in such matters is made imperative and obligatory on that officer in every case of this kind before anything is done. The absence of such a provision in the rules under discussion has been a source of considerable damage to life and property and fertile land has been rendered unfit for cultivation as the inevitable result of heavy floods, aggravated by obstructing embankments...In none of the sections of the said Act is the opinion of the Superintending Engineer made binding on the Collector. I am sure that a provision like this will go far towards checking the unscientific handling of rivers and embankments.

3.4. Legislation on Drainage

By the end of the 19th century, the negative effects of the embankments constructed in the previous decades had started showing up. 64 Drainage networks had been irreversibly disturbed and large areas remained water-logged for long periods, in turn disturbing the agriculture cycle and deterioration in the health of some areas. So there was a slight shift in the concerns of the Government, from controlling river floods to improving the drainage of the countryside. The government passed some legislation to deal with the situation. W.A. Inglis believed, “If comparatively little had been done, while much remained to be done, in the matter of improving the means of drainage of the low-lying basin of the Gangetic delta and in parts of North Bihar, this could not be due to the want of legal provision.” 65 A series of acts sought to place the initiative with the executive body of the government.

The Bengal Drainage Act VI (B.C.) of 1880 provided for schemes for the drainage and improvement of any tract of land. Under this Act Drainage Commissioners had to be

63 Ibid., pp.5-6.
64 A detailed discussion on the impact of the embankments is made later in this chapter.
65 Inglis, p. 560.
appointed, the majority of who had to be holders of lands affected by the works of any proposed scheme. Before a scheme could be proceeded with the assent in writing of the holders of at least half the lands to be reclaimed had to be obtained. In apportioning the cost a classification of the degree of benefit conferred by the works on the lands included in the scheme had to be made by the Commissioners.\(^{66}\)

The *Bengal Embankment Act II (B.C.) of 1882* authorized the Government to direct that any water-course which was necessary for the protection or drainage of the neighbouring country may be taken charge of and maintained by the officers of the Government. It thereby became a 'public water-course'. By sub-section of the same act the Government could direct that any sluice or water-course should be made, or any public water-course should be altered, for the improvement of public health, or for the protection of any village or cultivable land. Under this Act the initiative was with the Collector, and the local Government had the authority to direct that works should be done at the expense of estates benefited whether the holders of the estate concurred or not. It, therefore, placed great authority in the hands of the executive authority.\(^{67}\)

The *Bengal Sanitary Drainage Act VIII (B.C.) of 1895* placed the initiative with the District Boards. Action could be taken when there was reason to believe that the sanitary condition of any tract had deteriorated by the obstruction of drainage, whether from natural or artificial causes.\(^{68}\) The power of deciding whether the scheme should be proceeded with was with the District Board. The apportionment of the cost was made both on owners and tenants, and was to be distributed over a period of 30 years commencing on the completion of the works. The funds for the construction was to be advanced by Government under the provision of the Local Authorities Loans Act, 1879. In all cases, owing to the sub-division

of property in the estates, tenures and holdings, the labour and expense involved in making the apportionment of cost was serious. Also, though it was comparatively easy to show that a tract of low-lying country, as a whole, was materially benefited by drainage works, it was often a matter of great difficulty to establish the exact benefit to all the individual properties within the tract. Inglis therefore noted, "Works of this class must therefore, be dealt with slowly and very carefully and by a specially-trained staff."69

The above discussion on the legislative actions taken by the government gives us a fair idea about the widening concerns of the Government on the question of floods and drainage with the passage of time.

It is clear that in the Permanently Settled estates the colonial government was not very eager to invest in public works. The argument was that since it had fixed its share of the land revenue, any investment on public works had to be borne by those who benefited from it, i.e., the zamindars. But at the same time the government was convinced about the efficacy of the embankments as an effective means of controlling floods. So it wanted the zamindars to build embankments themselves, or to pay for any works that the government proposed to build. The legislative sanction were geared towards achieving this balance; effective intervention without cost responsibilities.

The stated attempt was to help the flood situation. It is another matter that even after passing of laws and rules the flood situation in North Bihar did not improve, it worsened further. The government’s control and supervision at the local level remained weak and ineffective, it refused to invest in any public work projects and was also unable to force the proprietors of the land to pay for the projects that it proposed.

69 Ibid., p.561.
This becomes evident from the figure prepared by the Controller of Public Works and Accounts in January 1868. In the ten years, between 1857-58 to 1866-67, no money was spent by the government on public embankments in North Bihar. The Gandak embankments, the only public embankment in North Bihar till 1875, were maintained by the government at the expense of the zamindars. In the same period the money spent by the government in the rest of Bengal on public embankments was Rs. 37,49,004. This should not be construed to mean that the government's intervention in flood control, and its impact, in North Bihar was minimal.

4. Embankments and their Impact

As discussed earlier the construction of embankments in an uncontrolled and uncoordinated manner throughout the 19th century led to increased problems of drainage and floods. As a means of flood protection, embankments not only failed but they changed the very nature of floods in the so-called protected areas. A brief discussion on some of the major problems associated with embankment could be illustrative.

4.1. Embankments and Increased Flood Level

As discussed earlier, in the economy of nature, the silt brought by the rivers was intended to be carried with the flood spill so that it could raise and fertilize the land and reduce the silt content in the river channel. Confinement of the flood within the narrow river channel by means of embankments disturbed this arrangement and a portion of the silt, in excess of what the river could transport, deposited in its bed, raising the river bed. This caused higher flood levels the next time, even when it carried the same volume of water, necessitating even higher and stronger embankments to give protection.

---

Map No. 6

Map of Champaran, Saran, Muzaffarpur, Darbhanga and North Monghyr Showing Flooded Area (1934)

For example, the raising of the flood plane of the river Gogra due to the closing of the natural spill channel by the railway embankment near Inchcape bridge (at Manjhi in Saran district) aggravated the spilling of the Gogra from Guthni on the left bank. As a result depth of inundation in the Saran district was "about two feet more in 1938 than in 1936 though the H.F.L. (Highest Flood Level) recorded at the Inchcape bridge was one foot lower in 1938 than in 1936".71

Similar cases were found in other parts. A typical example is the flood of 1904 in Begusarai in North Monghyr district. While comparing the floods in 1894 and 1904, G.C. Maconchy, Superintending Engineer, South-Western Circle, found that "in spite of the lesser flood (in 1904, as compared to 1894), the damage and depth of flooding have increased. This increase must be attributed to the Railways (embankment)".72

Apart from raising the flood level, embankments disturbed the land building activity of the rivers by spilling and depositing their silt load in the surrounding countryside. This natural function of the river was stopped and thus, the difference between the levels of the bed of the river and that of the countryside kept on increasing, leading the supposedly protected areas to turn into a low-lying chaur where nothing could be grown, and finally became a breeding ground for malaria. As the relative bed level of the river and the countryside increased, it became more and more difficult to drain the countryside.

The town of Madhubani, generally known for its healthy environment turned into a very unhealthy and low-lying area because it was protected by a bandh all round preventing the rivers from depositing silt on the area and building it up to a proper level.73

71 Ibid., p. 4.
72 Selections from the Records of the Bengal Government, Railway Department; Papers from 1896 to 1905 Regarding Insufficient Waterways on the Tirhoot State Railways [Selections (Railways)], p. 64.
73 'Deputy Secretary's Note', 26-6-46, F.No. IVF-11/1946, B progs., ID(I), GoB, p.6-7.
4.2. Floods in 'Protected' Areas

Let us now take a clear look at the floods in these areas. Apart from increasing the flood levels, embankments even as a temporary expedient, were hardly an effective protection against floods as it was impossible to avoid breaches in earthen embankments. The destructive effects of a concentrated discharge through breaches in embankments was more serious than gradual inundation, especially as the flood level of the river, relative to the land, gradually rose as a result of embankments. The sudden rush of floodwater coming out of the breaches completely destroyed the standing crops and swept away the houses.

For example, in the floods of Gandak in August 1903, the breaches caused in the main Gandak embankment near the Parsa thana "entirely destroyed 12,114 bighas of bhadoi and 5,500 bighas of dhan and damaged 1,112 houses".74

Apart from the areas near the breached embankment, the diara lands and lands lying between the outer and the main embankments also witnessed increased flooding. In places where the river encroached upon an embankment, another embankment was constructed around the place so that if the first embankment breached, the second one could give protection from the floods. The outer embankment was generally built at some distance from the existing embankment, and a lot of land came between the two embankments. Rain water remained blocked in this enclosed area as there was hardly any drainage. In the floods of August 1903 in the Gandak, in the Barauli Thana of Gopalganj sub-division, "much greater damage [had] been done by the floods between the churki or outer bund and the main bund."75 Apart from the damage to crops and houses, "the flood [had] also carried away the stores of grains in the houses, as there was no time to save them".76 The worst affected was

74 File No. 4 F/5 of 1903, Public Works Department, Irrigation Branch [PWD(I)], Bengal, January 1904, p. 2.
75 Ibid., p. 1.
76 Ibid., (emphasis mine).
the unprotected *diara* "lying between the Gandak and the bund ... The whole of this strip was flooded and the entire population with their cattle had to take refuge on the bund or inside it".\textsuperscript{77} It is another matter that the people in these *diara* lands were accustomed to floods and had adjusted their agriculture to floods. But after the construction of embankments, these lands experienced floods of greater intensity, duration and depth as all the floodwater of the rivers was now confined within the limited area between the embankments. This sometimes delayed the sowing of, or even destroyed, the *rabi* crops, the most valuable crops for them.

One unique feature of colonial intervention in flood control during the 19th century was a lack of coordination between different districts of North Bihar. Although the rivers flowed through more than one district, the action to control floods was taken only at the district level. For example, embankments erected along the river in one district caused greater floods in the unprotected parts of other district. A case in point is the inundation in the Darbhanga district in September 1879. The Bazipur embankment on the left bank of the Ganges was "completely outflanked by the inundation waters which entered through the breaches in the old embankment, in the Monghyr district, also by overtopping the small bunds on the left bank of the Byah river".\textsuperscript{78} These inundations 'damaged, and in some places entirely destroyed, the crops over 20 to 25 square miles of country in [Darbhanga] district alone...".\textsuperscript{79}

Throughout the 19th century, the engineers of the Public Works Department repaired, strengthened and tried to find a better alignment for the embankments in order to make them safe from any kind of damage from floods. The most simple and readymade expedient as believed by the government engineers for any damage to embankments was either to strengthen them and increase their height or to construct a *retired line* (of

\textsuperscript{77} Ibid.
\textsuperscript{78} Inglis, *op.cit.*, p. 350.
\textsuperscript{79} Ibid., p. 351.
embankment) around the parts of the embankment, which were breached or overtopped in the previous flood season. In a letter to the Secretary, Government of Bengal, the Commissioner of Patna Division, while reporting the floods of August, 1903 in Muzaffarpur, Saran, and Champaran, wrote, "most of the damage would have been avoided if the Gandak embankments had been strong enough to withstand the sudden and great rise in the river. The collectors point [ed] out that the embankments need [ed] to be strengthened and raised in places". 80

This is precisely where the problem was. Raising the height of the embankment, reported W.A. Inglis, necessarily led to the "raising of the beds of the river embanked, and thus in compelling the heightening of the embankments until a point [was] reached when all life within the protected area [lay] in imminent danger of complete annihilation". 81

The engineers' obsession on embankments, was so complete that, as late as in 1924, when in the month of September breaches occurred in the Champaran embankment due to the encroachment of the river Gandak on its left bank, the only solution they could think of was to repair and remodel an old factory bandh, called the Raj bandh, which was situated between the breached embankment and the villages of Barharwa and Malahi. Even this embankment was washed away and all "other efforts to protect the river bank by means of spurs and pilling" 82 met with failure in the face of the natural action of the river.

In some cases the conditions worsened so much due the existence of embankments for a long time that the river unable to carry its load through the narrow channels burst through all artificial barriers and chose a new suitable channel for itself. For example, in November 1938 a petition was filed before the Minister Local Self Government and P.W.D on behalf of the inhabitants of villages of Sirsia, Kumma, Manikpur, etc. in Sursand and

---

80 File No. 4 F/5 of 1903, PWD(I), p. 2.
81 Inglis, op.cit., p. 376.
82 Proceedings, PWD(I) for September 1929, Bihar and Orissa, pp. 7-8. (Spurs and pillingwere structures put up to divert the course of the river. These were constructed to prevent the erosion of banks or embankments by the rivers.)
Bela P.S., district Muzaffarpur in which they appealed for the excavation of the old bed of
the river Adhwara, which they believed was filled up during the earthquake, to restore the
previous irrigation facilities from the river.

The Executive Engineer carried out investigations which showed that the Adhwara
was once a very vigorous perennial river taking off from Nepal hills offering irrigation and
navigation facilities. The river used to be dammed up for these purposes and the bandhs
were not properly removed after the irrigation season was over. Certain marginal bandhs
were also erected to prevent spilling over the banks and consequent devastation of low areas.
This system of embanking on both its banks and cross-bunding it for irrigation and
navigation purposes led to the rapid deterioration of the channel throughout its entire length
and its capacity was much reduced. Ultimately, the Adhwara breaching its right bank
adopted the irrigation channel at Marhia Tollah and joined the Jamura, which in its turn
breached its marginal bandh and diverted into the Sikao. The Sikao, breaching its bandh
diverted into the Burnad, which unable to carry the combined discharge of Adhwara, Jamura
and Sikao, spilled over its banks and creates havoc in Pupri area.83

Since the diversion of Adhwara through the irrigation channel, the old course of the
river from Marhia to Bhita Dharampur, a length of about 42 miles, silted up and was
abandoned. The diversion took place through a shorter alignment with a favourable effective
bed slope. Only a small discharge of 709 cusecs passed through the old course, whereas the
discharge through the diversion was 4582 cusecs. The discharge of 709 cusecs too was
diverted through other channels taking off lower down, thus leaving the Adhwara course
below Bakchaura almost dry even during the rainy season. During other months of the year

83 'Report of the Executive Engineer', dated 11th February 1941, F.No. VIIIID-10/1941, B progs., ID(I), GoB,
p.3.
only a small discharge passed through the diversion course, which barely met the irrigation needs of the villages situated on its bank while no discharge passed though the old course.84

The Executive Engineer was of the opinion that "any attempt to restore the old course would be unsuccessful. Closing the intake of the diversion channel would require sluices and weirs with embankments at a very prohibitive cost; this again cannot stop spilling (of the river), and will be vehemently opposed not only by those who would be affected by the spilling but also by those on the diversion channel who are getting some irrigation benefit from it."85

What is interesting to note here is that while the Government, by the end of the 19th century, felt in principle the need to co-ordinate and regulate the construction, and in a lot of cases the strengthening and raising of embankments, at the local level things had not changed much. Embankments were being indiscriminately made by zamindars, District Boards and by other Government agencies throughout the 19th century and even in the early part of the 20th century. This led to a situation where different agencies and individuals were at times working at cross-purpose, each trying to keep out floods from his lands. This competitive construction of embankments made the flood situation worse in many areas. This illustrates the ineffectiveness of the colonial regime to implement its lofty principles. At the same time the changed political order (after the acquisition of Bengal) led to the rise of new fragmented interest groups who utilized the embankment issue to their narrow selfish goals.

4.3. Embankments, Irrigation and Drainage

Apart from the fact that embankments were not even good enough as a temporary solution to floods and created complex problems, there were other negative effects. One was the

84 Ibid., p.4.
85 ‘Executive Engineers Note’, dated 16th April 1941, Ibid., p.8.
shutting out of the fertilizing silt which came along with the water, which was earlier used for irrigation.

One prominent case was the Gandak embankment, which extended along the whole length of the river in the Saran district. The complete shutting out of the Gandak water had its disadvantages. Earlier the various streams and water courses which intersected the district received each year a large volume of rich silt laden water which after depositing its silt content ultimately flowed out into the Ganges. P.C. Ghosh in 1942 wrote that "this no longer happens and in the year of drought, irrigation is no longer feasible from these sources and the banks of some of the streams have become so unhealthy that no one will live near them." 86

That the British were not very sure about the embankments even as early as 1840's is clear from Major Garstin's report of 1841 where he had advised the maintenance of the Saran embankment. However, in 1848 he wrote that there is "no proof that the bunds on the Gunduck have done any good to the country at large. I have heard great complaints in the hot weather following a season when the bunds did not give way, of wells drying up; those whose lands lay more remote from the river can obtain no water from it where bunded and if the rains are scanty, suffer much in consequence." 87 Before the existence of embankments it was possible that floods could destroy one out of three crops, but the other two crops could be grown on the same land. On the other hand, in years of drought, the lands protected by embankments could not grow even a single crop.

86 Ghosh, op.cit., p. 15.
87 Embankments in Bengal, p.69.
In fact, it was to remedy this state of affairs that Saran canals were constructed between 1877 and 1880. But after 1890, the canals were opened very irregularly. By the 1830s, the canals were not working at all and were "altogether completely abandoned due to the river receding far away".

Apart from the Saran canals, sluice gates were constructed in some place for purpose of both irrigation and drainage. However, there were only 32 sluice gates in the total length of 95 miles of Saran embankment. In most cases the sluice gates were of no use as the approach channels got silted up.

One of the reasons for North Bihar being one of the most populated and productive region in India was the annual depositing of fertilizing silt brought with the river spill. To cut off this spill by means of embankments was to deprive the lands of natural manure. However, like the other negative effects of embankments, the decline in the productivity of the soil also took years to manifest.

Another problem with the embankments was their role in destroying the drainage system of the region. Most of the drainage channels and distributaries of the rivers of North Bihar flowed away from, rather than towards the rivers. There was a complex network of small rivers, drainage channels and chaurs distributing the flood spill of the rivers into the countryside, and, finally, relieving the flood water into the major rivers again. Thus, apart from relieving the rivers of its silt load, the drainage channel also helped, by bringing with them small fishes, in destroying the mosquito larvae in its early stages of development, thus, keeping the country free from malaria and other diseases.

---

88 An account of the Saran canals has already been given in chapter 2.
89 Ghosh, p. 16.
90 An account of the fish culture of Bengal and its role in mitigating malaria is given in chapter 1.
Colonial interference in the form of embankments contributed in destroying this natural process. A case in point is the Baya nadi in Muzaffarpur district, which was formerly a spill channel of the river Gandak. When the marginal embankment was constructed along the left bank of the Gandak, a gap was left in the embankment for the Baya "but owing to certain complaints of damage done by the flood of the Gandak, the gap was closed in 1894 and a sluice of 5 vents of (5x4') was constructed there". In 1909, the Collector of Muzaffarpur complained "the Baya channel has deteriorated owing to the construction of the Baya sluice..." The series of chaurus, situated on the left bank of the Baya, which used to be drained into it were no longer effectively drained and thereby a very large tract of land was thrown out of cultivation.

The Irrigation Department was not willing to open the Baya nullah sluice and re-excavate the channel as they perceived that "the government would derive no direct benefit and [was] under no obligation to keep open these channels..." But, as one of the contractors for maintaining the Gandak 'taccavi' embankment the government was responsible for restoring some of the useful river spill that were cut off when the embankment was constructed.

By obstructing and destroying the natural drainage of the country, the embankments delayed the subsiding of the flood. Due to the silting up of the Mehura nadi and three other spill channels, viz., Kathhar, Kushihari, and Bijhari, in Saran district, as a result of the existence of the Saran embankments, "Hardia chaur [was] not drained even up to January and consequently rabi crops [could] not be grown over a large tract of the area".

---

91 Ghosh, p. 61.
92 Ibid., p. 62.
93 Ibid.
94 File No. VC/1929, B progs., PWD(I), Bihar and Orissa, p.
95 Ghosh, p. 13.
Thus, embanking of the rivers did not allow the draining of the floodwater into the spill channels, consequently leading to serious deterioration in their condition and in many cases rendering them even incapable of draining the countryside. Many of these streams, which originally spilled over the land they traversed, and supplied rich silt of the rivers, were converted into stagnant pools of water, providing breeding ground for mosquitoes.

For example, the spill channels of the Gandak in Saran district (e.g. Gandaki, Dhanai, Gangri, Khaka) used to carry the excess load of the Gandak during the floods, and then flowed back into the Gandak lower down its course when the floods had subsided. So they not only acted as spill channels of the Gandak, but also acted as drainage channels for the countryside. These channels were abandoned, or became dead channels, after their connection with the Gandak was cut off by the construction of the Gandak embankment. These channels got silted up. Further deterioration was caused in these channels by the people putting up fishing bunds across these channels and reclaiming them for cultivation.\(^\text{96}\)

In fact, from the beginning of the 20th century, an opinion was being put forward, even among a section of the engineering community, about the advantages of reactivating and improving the spill channels as a means of mitigating the effect of floods. Of the four methods put forward by Huntingford, Superintending Engineer, in the meeting of the Drainage Survey Joint Committee on 16 December 1916, for dealing with the flood water, the fourth one, i.e., 'tracing out and improving the spill channels', was considered to be the only one feasible\(^\text{97}\):

\[
\ldots \text{while it will not interfere with the formation of the country in that it will not prevent the spilling of the rivers in high flood, will still dispose off this flood water before it has time to submerge large areas for a considerable time and so destroy crops, also the spilling will be gradual and there will be no danger of the water}
\]

\(^\text{96}\) Ibid.
\(^\text{97}\) File No. II 1-2 of 1917, B progs., PWD(f), Bihar and Orissa, p. 25.
being held up and then, owing to the breaching of some bund or other, being poured over the countryside in a devastating flood'.

Apart from the role of the embankments, the practice of putting cross-bandhs in the nalas for irrigation purposes and putting fishing nets by the people were also responsible for the deterioration of the spill channels and nalas. For example, extensive irrigation was practiced during the hathiya and rabi season by putting temporary cross-bandhs in the Jhanjharpur Balan and Phulparas Balan and their tributaries, viz., the Sugarvey, the Soni, etc. in the Darbhanga district. P.C. Ghosh argued that "these cross-bunds should be properly removed before the commencement of the flood season as otherwise change of river courses may take place with disastrous consequences to the local area".

The chaurs were the most badly affected when the whole drainage network of North Bihar was tampered with and destroyed by the construction of embankments. They received all the drainage of the country and were receptacles of the overflow of the rivers. They were interconnected by several drainage channels and finally drained into the rivers by the end of October allowing for rabi cultivation in and around the chaurs.

The one reason why water remained in some chaurs for most part of the year and could not be drained was due to the silting of the drainage channels originating from these chaurs. For example, an area of one square mile comprising of Narkatia, Siswania and Bhaluahi chaurs in Adapur thana was subjected to over-flooding of the Dudhara left bank spill and an area of one-third square mile remained waterlogged even in the month of January as its drainage channel, the Siswania nala, was badly silted up.

---

98 "... cross bunds and fishing barriers are placed almost every mile for fishing purposes and this has completely destroyed the entire Baya nala as a drainage channel", Ghosh, p. 68.
99 Ghosh, p. 90.
100 Ibid, p. 143.
Another reason for the water-logging of large areas for a very long time was the embankments, which, while stopping the overflow from the rivers, did not allow any drainage into the rivers. In addition, the rainwater drained into the chaurs and remained there for a long time. For example, the Lebura chaur, about one square mile in spread in Lalgunj thana in Muzaffarpur district, was inundated by rain water only and remained water-logged due to deterioration of its drainage channel and due to existence of the Lebura bandh. This was due to the erection of the Lebura bandh across the Jogia nala at village Khazan Chak and the absence of any sluiced culvert in the Gandak embankment.101

Another example of an embankment obstructing the drainage of the chaurs was the Dumardah chaur in Dalsingsarai thana in Darbhanga district. This chaur was mostly in the north and partly in the south of the railway line between Bazeedpur and Mohiuddinnagar railway stations. It was mainly filled with rain water. At the time of the construction of the railway embankment, a channel called Khanua baha was constructed for the drainage of the area. This channel passed through culvert number 4 in the railway line and ended in the Bazeedpur embankment where there was no outlet. The obstruction caused to this channel led to water-logging of around 4 sq. miles with an average depth of 4 feet even in the cold weather. "The whole area in the north of the railway embankment remain(ed) stagnated throughout the year except in summer and hence no crops [could] be grown in it".102

Apart from the flood embankments, the railway and road embankments too, as has been mentioned earlier, obstructed the drainage of the country, and hence delayed the subsiding of the water level in the chaurs. For example, the flood water of Gogra and Gandak collected in the Hardia chaur in Dighwara and Sonepur thanas in Saran district gradually herded up against the northern side of the railway embankment, and thus an area

---

101 Ibid, p. 158.
102 Ibid, p. 162.
of around 50 sq. miles remained waterlogged. This railway embankment sometimes got
breached or was cut by the local people.¹⁰³

One of the consequences of the water-logging of these chaurs even after October-
November was the delaying in the sowing of the rabi crops - in some cases it could not be
sown at all. This was a major loss to the cultivators because the chaurs grew very valuable
rabi crops.

5. Conclusion

Thus colonial intervention, in its various forms, disoriented the natural drainage system of
North Bihar. Not always were the interventions direct or intended, especially in North Bihar
where very few embankments were taken over as ‘public embankments’. Often the factors
lay in the complex processes of change stimulated by the colonial rule in the countryside.
New interests, new socio-economic situation brought about added pressure on the land. The
ruthlessness with which the revenue was collected meant that embankments had to be built
by the zamindars, first to save the standing crops and, second to reclaim lands for the
extension of cultivation in areas hitherto left untouched. However, the most glaring problem
was the lack of appreciation among the British officials about the wisdom of traditional
methods and their obsession with embankments. Keen to ‘control’ the newly acquired
territories, the colonial government often thought of embankments as the ideal method to
‘control’ and ‘tame’ the ravaging rivers. That they were yet to come to terms with it is
evident in their frequent change of policy, something that I discuss in the next chapter.

¹⁰³ Ibid., p. 142.