

EMBANKMENT OF LOWER AJOY RIVER AND ITS IMPACT ON BRICK-KILN INDUSTRY IN CENTRAL BENGAL, INDIA

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ABSTRACT

Embankment is a quite common structural measure of flood control. Almost all the important rivers in India like Ganga, Brahmaputra, Mahanadi, Koshi, Damodar, Ajoy, etc. are jacketed by embankment. Sometimes, the embankment becomes unable to resist the heavy thrust of water during peak discharge period. It causes breaching of embankment and results sandsplay on the floodplain. In Lower Ajoy Basin huge sandsplay had been occurred in 1978. It had drawn the attention of entrepreneurs to build up brick-kiln industry. After the devastating flood of 2000 A.D., caused by breaching of embankment, huge sand deposition has been taken place on the agricultural land. These sands become the source of raw materials for brick-kiln industries. Hence, extensive field survey has been conducted to map the location of brick-kiln industries and to explain their causes of concentration.

Key-Words: *embankment; sandspaly; floodplain; brick-kiln industry*

INTRODUCTION

Lower Ajoy Basin is a most flood prone area in Central Bengal. Embankment has been constructed on the along the Lower Ajoy river to control the flood. But embankment is only effective for small and medium scale flood protection. In case of higher magnitude floods occurred due to excessive rainfall in the monsoon, the embankment is subject to breach. It results massive sand deposition on the vast tract of agricultural land adjacent to river. Confinement of river flow within embankment does affect the river and its flow characteristics which in turn induces social and economical impacts in the area (Mani, et.al. 2006). Brick-kiln industry in an important economic activity that has been concentrated along sides the river in Lower Ajoy Basin. In recent time, it has been found that most of the brick-kiln industries tend to be located adjacent to the river. Due to sandsplay caused by breaching of embankment, the primary activity like crop cultivation has been declined to a greater extent and the brick-kin industry has been growing up in the study area.

METHODOLOGY

The research method is primarily based on field survey to detect the micro-topographical changes. Survey of India's toposheets have been consulted thoroughly and satellite imageries have been analyzed for change detection. Moreover, some secondary data have been collected

from various sources like Irrigation and Waterways Department and River Research Institute, Government of West Bengal. Both primary and secondary data have been processed with the help of GIS software to explain the result.

LOCATION OF THE STUDY AREA

Ajoy River is one of the most important rivers of West Bengal. It is a right bank tributary of the river Bhagirathi. River Ajoy with a length of about 299 km is originated from the eastern part of Chhotanagpur plateau, near Chakai hill, under the administrative jurisdiction of Monghyer district in Bihar and flowing down through Jharkhand it confluences with Bhagirathi at Katwa of Burdwan district in West Bengal. The lower course of the river has been determined below from 80 metres contour near Pandabeswar (23°44' N, 87° 17' E) where abrupt change in the slope of the long profile is found due to differential geological formation (Mukherjee, 2002). Therefore, the Lower Ajoy Basin has been demarcated from Pandabeswar to Katwa (23°39' N, 88° 08' E). It has been noticed that most of the brick-kiln industries are located along the Lower Ajoy river within two kilometers distance from the river.

EMBANKMENT ON LOWER AJOY RIVER

Since long time past embankments had been constructed along Ajoy river. In ancient period partial attempts were made to control the flood by embanking the river. It was very much sporadic in nature. In British period embankments were constructed and maintained by the so-called Zaminders the British Government permitted them to construct embankments according to their need. These „Zamindary embankments“ were constructed mainly to protect their cultivated land. Side by side the British Government itself had constructed some segments of embankments. The main purpose of was to increase revenue collection by protecting cultivable land. It is noteworthy that the embankments constructed by the government itself were scientific to some extent. But the Zamindary embankments were totally unscientific in nature. They were frequently subjected to breach causing devastating flood in the basin area.

After independence the scenario of flood control has been changed. Directorate of Irrigation and Waterways Department, Government of West Bengal, has made extensive attempts to control flood of Lower Ajoy basin. On the right bank continuous scheduled „D“ embankment was constructed long ago and the ex-Zamindary embankments thereafter have since been remodeled in design section in „seventies“ (Project Report, 1999). Spilling on left bank is almost an annual feature. Before „seventies“ the embankments were all ex-Zamindary except for a small one near Bolpur. However, the Directorate of Irrigation and Waterways Department, Government of West Bengal, in 1968 has taken control over the left bank embankment of Lower Ajoy river. Thereafter the ex-Zamindary embankments have been remodeled, realigned and maintained by the concerning authority.

1. Man Singh Committee (1959):

Embankments constructed along Ajoy river were mainly to protect the agricultural lands of the so-called Zamindars. It is quite natural that they did not pay any attention to the long

term viability of the embankment and the environmental damages caused by it. After the devastating flood in 1959, the Government of West Bengal had setup a committee under the chairmanship of Man Singh, the former chief engineer of Irrigation Department, West Bengal. The prime task of the committee was to find out the causes of flood in Middle and South Bengal and to suggest some preventive measures (Project Report, 1999). In January, 1962, the committee had submitted its reports to the State Government. The recommendations of the committee were:

1. The Irrigation Department should determine a sustainable policy of the ex-Zamindary embankments.
2. The non-viable embankments should be removed after examining their un-necessity.
3. The essential flood protective embankments should be reinforced and remodeled.

The valuable recommendations have not practically been implemented though they are still relevant.

2. N. K. Ghosh Committee (1980):

After 1979 a committee was setup regarding the Ajoy embankment under the chairmanship of Nirod Kumar Ghosh, the then chief engineer of Irrigation Department, Government of West Bengal (Project Report, 1999). Regarding the reconstruction, remodeling and maintenance of the Ajoy embankments, the committee has made the following recommendations:

1. Embankment of Ajoy should be reconstructed estimating 300,000 cusecs discharge from Loba [confluence point of Hinglo with Ajoy ($23^{\circ}42''$ N & $87^{\circ}23''$ E)] to Nutanhat [confluence point of Kunur with Ajoy ($23^{\circ}32''$ N & $87^{\circ}54''$ E)] and estimating 350,000 cusecs from Nutanhat to Katwa [confluence point of Ajoy with Bhagirathi ($23^{\circ}39''$ N & $88^{\circ}08''$ E)].
2. The minimum gap between left and right bank embankments should be 1300 metres .
3. The height of the embankment should be 1.20 metres higher than the maximum flood height of 1971.
4. Top width of the embankment should be 4.50 metres.

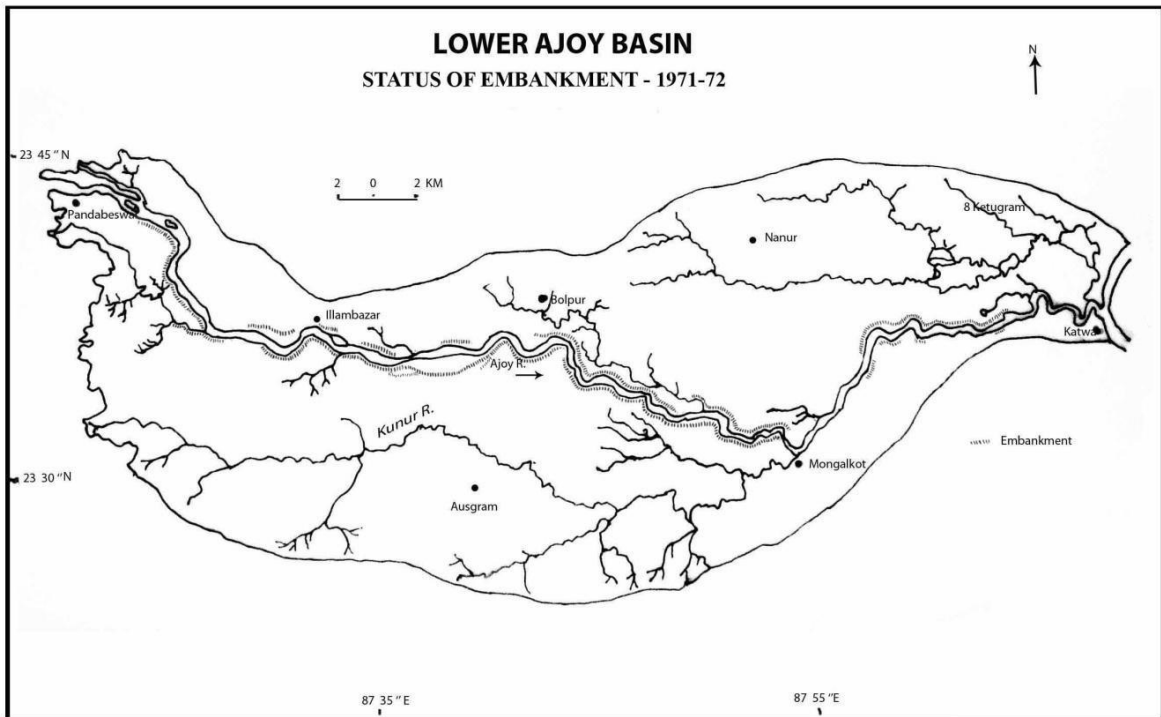


Figure 1

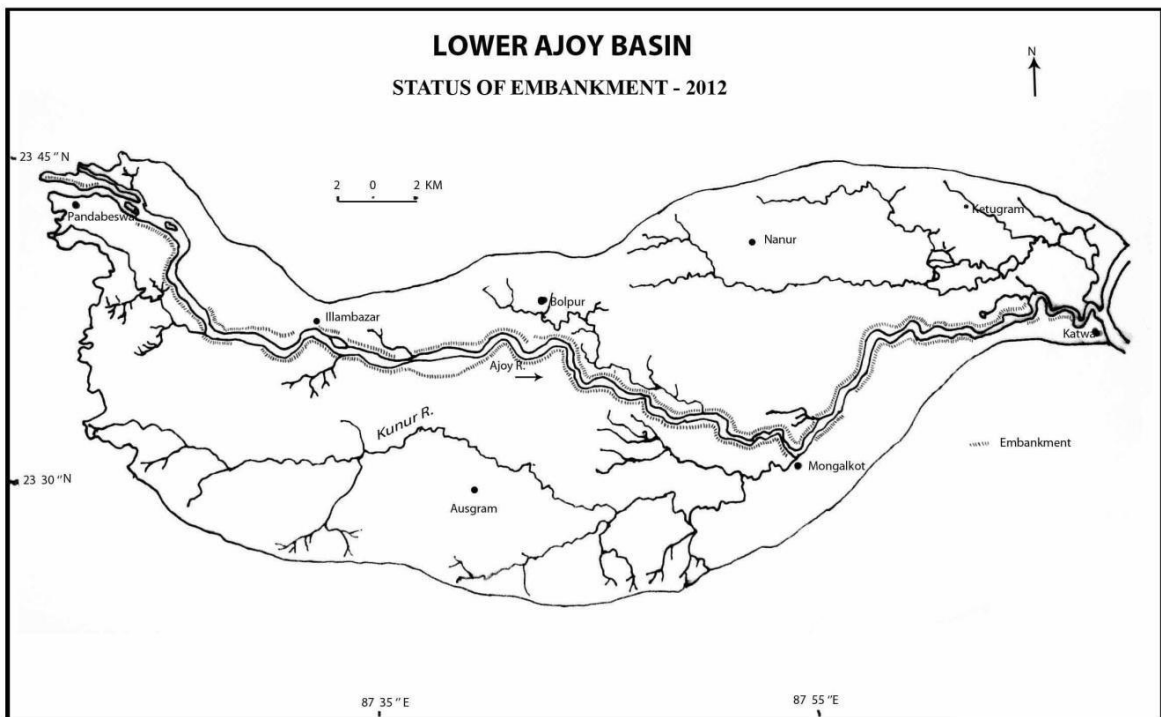


Figure 2

Now, the embankments of Ajoy river is looked after and maintained by the Irrigation and Waterways Department except a part of left embankment stretching from Billeswar to Charkhi under Ketugram police station. Here, the length of embankment is about 6 km and it is looked after and maintained by the local Gram Panchayet (Billeswar Gram Panchayet). As already mentioned, construction of embankments is the only structural measure available with the Irrigation Department to give relief to the people from the menace of flood. The Department has made some remarkable advancement renovating embankments in flood control sector by taking up remodeling and strengthening of its existing embankments ravaged by 1999 and 2000 flood with HUDCO and NABARD loan.

The total length of the Ajoy embankment is about 136.16 km, out of which the right bank accounts about 80.97 km and left bank comprises about 55.19 km. The total area protected by the right bank embankment is about 37040 hectares and the left bank embankment protects about 29785 hectare. Due to the existence of a remodeled and well maintained scheduled embankment on the right bank, the embankment on the left bank remains most vulnerable.

IMPACT OF EMBANKMENT ON BRICK-KILN INDUSTRY

Brick-kiln industries are largely found along both sides of Ajoy river. In Lower Ajoy Basin, from Pandabeswar up to the confluence of Ajoy with the Bhagirathi, brick-kiln industries are quite common. Here embankment plays an important role in drawing the attention of entrepreneurs of this industry. Embankment itself serves as a medium of communication for this industry. As embankment is constructed to protect flood, the countryside of the embankment is free from frequent inundation and it offers a favorable condition for brick-kiln industry. Therefore, most of the brick-kiln industries are situated on the countryside of the embankment. Nearby urban centres, like Illambazar, Bolpur, Nutanhat and Katwa tender a good market for this industry and they are well connected to the bank of the river. Therefore, clusters of brick-kiln industries are found in the river adjacent areas of Illambazar, Bolpur, Nutanhat and Katwa.

It is noteworthy to mention that the rapid growing of this industry has a very close link with the devastating flood and consequent breach of embankment in Lower Ajoy Basin. The most prominent effect of the breaching of embankment and the occurrences of flood is the sandsplay as post flood hazard (Mukhopadhyay, 2010). Previous literatures say that before, the devastating flood of 1978, a few brick-kiln industries were developed along Ajoy river. But in the flood of 1978, a recorded amount of sandsplays had been taken place due to breaching of embankment. Huge deposition of sand with average thickness of 1 – 1.5 metres, renders the agricultural land unsuitable for crop cultivation. The cost of removing sand from the agricultural land is so high that the farmers opt to sell their land at a cheaper rate and become land less labourers. This type of situation had drawn the attention of few comparatively rich people to set up the brick-kiln industry. Generally, owners of brick manufacturing facilities have limited access to loans, and the bricks they produce are entirely for the local market, mainly for residential units. They acquired the land from the farmers at a cheaper rate. The landless farmers become the source of labours for the brick-kiln industries. Table-1 will reveal the fact that after breaching of embankment, the involvement of labour force in brick-kiln industry has comparatively been

increased. The good quality sandy soils of the river banks serve the raw materials for this industry.

Table: 1 **Impact of embankment breach on occupational structure of the sample villages**

| | | Sample villages | | | | | |
|----------------------------------|-------------------------------------|---|---------|---------|----------|---------------|------|
| | | Maliara | Basudha | Gitgram | Nabagram | Srikrishnapur | |
| Percentage of work-force engaged | Before embankment breach (1999) | Cultivator | 62.6 | 59 | 61.4 | 58.9 | 61 |
| | | Landless agricultural labour | 24 | 23.5 | 26 | 27 | 26.3 |
| | | Brick-kiln industry | 4.4 | 5.5 | 2.6 | 3 | 3.2 |
| | | Other secondary and tertiary activities | 9 | 12 | 10 | 11.1 | 9.5 |
| | Just after embankment breach (2000) | Cultivator | 48.5 | 45 | 50.5 | 48.6 | 50 |
| | | Landless agricultural labour | 30.2 | 32 | 29 | 31 | 34 |
| | | Brick-kiln industry | 7.5 | 6.5 | 6.5 | 5.1 | 4 |
| | | Other secondary and tertiary activities | 13.8 | 16.5 | 14 | 15.3 | 12 |
| | At present (2012) | Cultivator | 59.4 | 52.2 | 53.3 | 50 | 55.5 |
| | | Landless agricultural labour | 16.5 | 17.8 | 16.7 | 24 | 22 |
| | | Brick-kiln industry | 8.6 | 7.3 | 8.2 | 4.8 | 5.1 |
| | | Other secondary and tertiary activities | 15.5 | 22.7 | 21.8 | 21.2 | 17.4 |

Source: village level survey

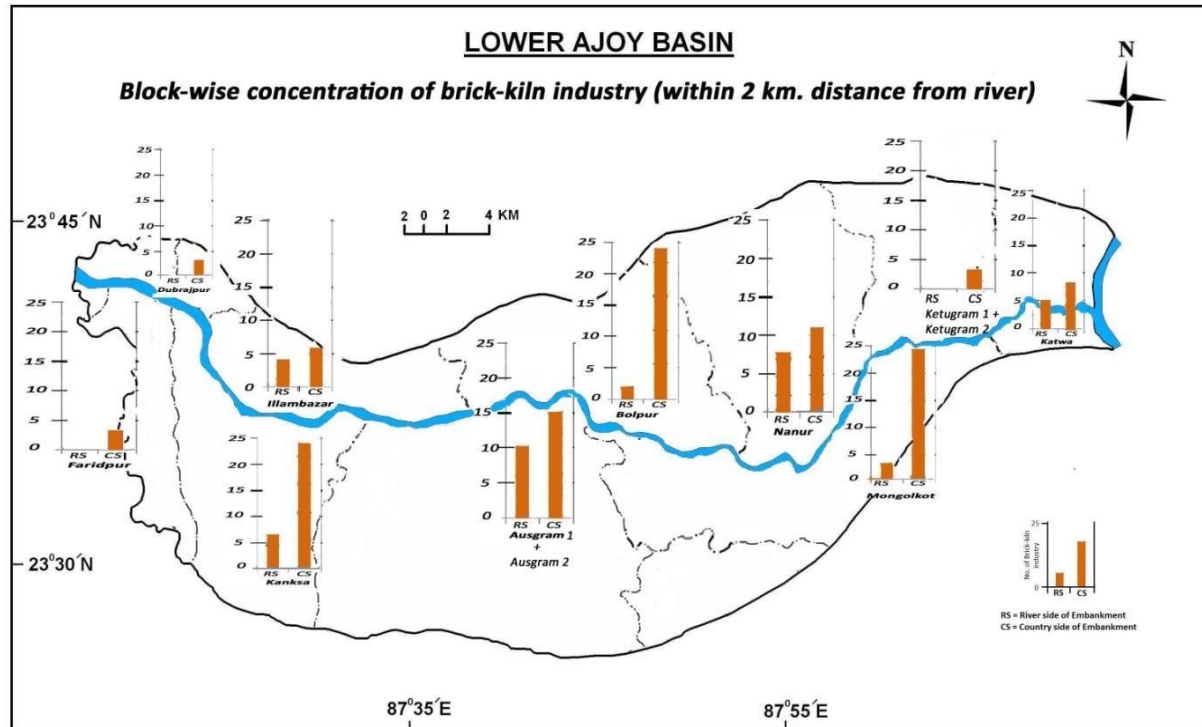


Figure 3

Presently, with the increasing demand of bricks for private and public constructions more numbers of brick-kiln industries are being concentrated along both sides of Ajoy river. It is noteworthy to mention that the brick-kiln industries are not only found to the countryside of the embankment but the riverside of the embankment also has experienced a large number of brick-kiln industries having concentrated. Total 157 brick-kiln industries are located in the river adjacent areas of Lower Ajoy Basin, out of which 60 industries are on the left bank side and rest 97 industries are on the right bank side. Table –2 gives the account of block wise distribution of brick-kiln industries along the river banks. The table shows that the maximum numbers of brick-kiln industries are concentrated in Kanksa block of Burdwan district on the right bank side of the river. About 29 brick-kiln industries (18%) are found in Kanksa block. On the other hand, minimum numbers of the industries are found in Dubrajpur block of Birbhum district on the left bank side of the river. Here only three brick-kiln industries are located.

Table: 2 Block wise concentration of brick-kiln industry along Lower Ajoy River

| Name of the block | Location | Number of brick-kiln industry | | Total |
|-------------------|------------|-------------------------------|-------------------------------|-------|
| | | Riverside of the embankment | Countryside of the embankment | |
| Dubrajpur | Left Bank | 0 | 3 | 3 |
| Ilambazar | Left Bank | 4 | 6 | 10 |
| Bolpur | Left Bank | 2 | 22 | 24 |
| Nanur | Left Bank | 8 | 11 | 19 |
| Faridpur | Right Bank | 0 | 3 | 3 |

| | | | | |
|--------------------|------------|----|----|-----|
| Kanksa | Right Bank | 7 | 22 | 29 |
| Ausgram 1+2 | Right Bank | 10 | 15 | 25 |
| Mongolkot | Right Bank | 3 | 24 | 27 |
| Ketugram1+2 | Right Bank | 0 | 4 | 4 |
| Katwa | Right Bank | 5 | 8 | 13 |
| GRAND TOTAL = | | | | 157 |

Source: Field Survey – 2011.

Survey report explains the fact that in many blocks like Illambazar, Nanur, Kanksa, Ausgram, etc. the brick-kiln industries are even located in between river channel and embankment. In the river adjacent areas of Illambazar, Bhedia and Nutanhat, a considerable number of brick-kiln industries are found to be located in between river channel and embankment. Large soil dumping grounds of these industries occupy extensive areas of the river. Therefore, during peak discharge period, particularly in monsoon season, the free flow of river is choked by these industrial activities. It puts tremendous pressure on the embankment and become one of the important causes of embankment breach. Therefore, the brick-kiln industries located in between river channel and embankment play an important role to obstruct the normal river flow and to cause flood in the surrounding areas. The brick industry is also exerting unsustainable pressure on farmlands because of the extensive use of topsoil (UNDP, 2003). The ashes and dust particles of the industry have settled down on the agricultural land and reduced the fertility of soil.

CONCLUSION

Brick-kiln industry in Lower Ajoy Basin is an important economic activity that has been grown up along both sides of the embankment. Breaching of embankment results sandsplay on the floodplain. It renders the fertile agricultural land into sandy waste land. The farmers lost their agricultural land and the percentage of landless agricultural labour increases. In this situation, the brick-kiln industry plays an important role to absorb a certain percentage of labour force. Thus, it creates job opportunity and become beneficial to the landless agricultural labour. But the haphazard growth of this industry creates environmental problems. There is limited government control on the location of this industry and some brick factories even located on the bed of the river. It causes choking of the water during peak discharge period and puts a tremendous pressure on the embankment.

REFERENCES

1. Mani, P., Kumar, R. & Chakravorty, B. (2006). "Effect of Embankment on River and its Flow Regime", Journal of the Institution of Engineers. India. Civil Engineering Division (ISSN. 0020-336X) Vol. 87, pp. 23 – 26.
2. Mukherjee , M. (2002). "Flood of Lower Ajoy basin: A Spatio-Temporal Analysis Since Independence." Unpublished Thesis. Dept. of Geography, Visva-Bharati University, Santiniketan. pp. 250.

3. Mukhopadhyay, S. (2010). A Geo-Environmental Assesment of Flood Dynamics in Lower Ajoy River Inducing Sand-Splay Problem in Eastern India. Ethiopian Journal of Environmental Studies and Management. Vol.3 No.2. 96 – 110.
4. Project Report, (1999). Raising and strengthening of Ajoy Left embankment from 0.00 km (Railway Bridge) to 7.62 km (D/S of Rly Bridge) in P.S. Bolpur, Birbhum, Mayurakshi South Canal Division Shyambati.
5. UNDP. (2003). UNDP-Project on Brick Industry in Bangladesh -
<http://www.undp.org.bd/projects/prodocs/BrickKiln/IKEMBI%20Project%20Brochure.pdf>

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