



Ministry of Water Resources
Government of the People's Republic of Bangladesh

Summary Report

Prediction of Riverbank Erosion 2026

(Jamuna, Ganges and Padma Rivers)



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C_≈GIS

Center for Environmental and Geographic Information Services

Summary Report

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1. Background

Riverbank erosion, one of the major natural disasters in Bangladesh, causes untold misery every year to thousands of people living along the banks of the rivers of Bangladesh. Bank erosion alone has rendered millions homeless and has become a severe social hazard. Most slum dwellers in large urban and metropolitan towns and cities are victims of riverbank erosion.

Implementing protective structures against riverbank erosion comes with a high price tag. However, in conjunction with these physical measures, more economically viable non-structural strategies, such as erosion prediction, can significantly minimize the impact of riverbank erosion and alleviate the associated hardships. Using an erosion prediction tool aids in well-informed decision-making and efficient river management. Government bodies overseeing river management, including formulating strategies for constructing bank safeguards and implementing urgent measures, are incorporating these predictions into their practices.

Since 2004, predictions for morphological changes have been conducted for the Jamuna River, followed by the Ganges and the Padma. Thus, it has been 22 years since predictions were made available to national-level stakeholders. Evaluation of the predictions for the last few years shows a reasonably good match with the occurrences. It is to be mentioned here that CEGIS has updated the existing prediction tools for the Jamuna, Padma, and Ganges rivers by analyzing good-quality long-time series images and by categorizing particular shapes of sedimentary features in 2017, as river morphology is changing over time, with changes in river planform due to natural and human interventions. Over the past several years, these methods of predicting morphological changes and bank erosion were successfully applied in a number of BWDB and WARPO projects, including the RBPP, JMREMP, FAP 21, Monitoring of the BWDB Training Project and EMIN. The results of the applied method are in good agreement with field observations. The predictions of riverbank erosion along the Jamuna, Padma, and Ganges rivers are presented in the following sections.

National-level government and non-government agencies use this prediction technology. CEGIS disseminated erosion prediction information to the community on a pilot basis at four locations along the Jamuna and Padma Rivers in 2007. For community-level dissemination, CEGIS prepares a large poster in Bangla format and demarcates the high-risk and risk zones by red and yellow flags. The community took the prediction positively and used it to save their properties. The projections have proved to be a valuable means of reducing the suffering of the vulnerable people, which instigated the UNDP to take initiatives to include the vulnerable people in the Safety Net Programme, utilizing the experiences of CEGIS.

Furthermore, BRAC, Bangladesh, disseminated the erosion prediction results to the local community from 2016 to 2018 to reduce the loss of properties and suffering of people at different locations in the three major rivers in Bangladesh, and the prediction results revealed the effectiveness of the local community. In addition, CARE Bangladesh also disseminated erosion prediction results to the local community along the bank of the Jamuna River in 2020.

Prediction activities were funded by the Jamuna-Meghna River Erosion Mitigation Project (JMREMP) and EMIN project of the BWDB and WARPO from 2005 to 2008 by the UNDP. The JMREMP and FRERMIP of BWDB have funded erosion prediction efforts in recent years. This year, the study is supported by the Research and Development fund of CEGIS.

2. Objectives

The erosion prediction study targets two principal objectives:

- Prediction of riverbank erosion for 2026 at different vulnerable locations in the Jamuna, the Ganges, and the Padma rivers; and
- Assessment of erosion prediction made in 2025.

3. General Considerations

Predictions have not been made for locations with less erodible bank materials, as it is challenging to estimate small amounts of erosion (1 to 50 m) with reliable accuracy using LANDSAT satellite images at 30 m X 30 m resolution. It is to be noted here that erosion may occur at any place following banklines, especially in the Jamuna River. Sometimes, if the predicted erosion is less than 100m, it is not incorporated into the report. Moreover, the BWDB has contracted several bank protection structures along the riverbank. Therefore, no prediction has been made for those particular locations.

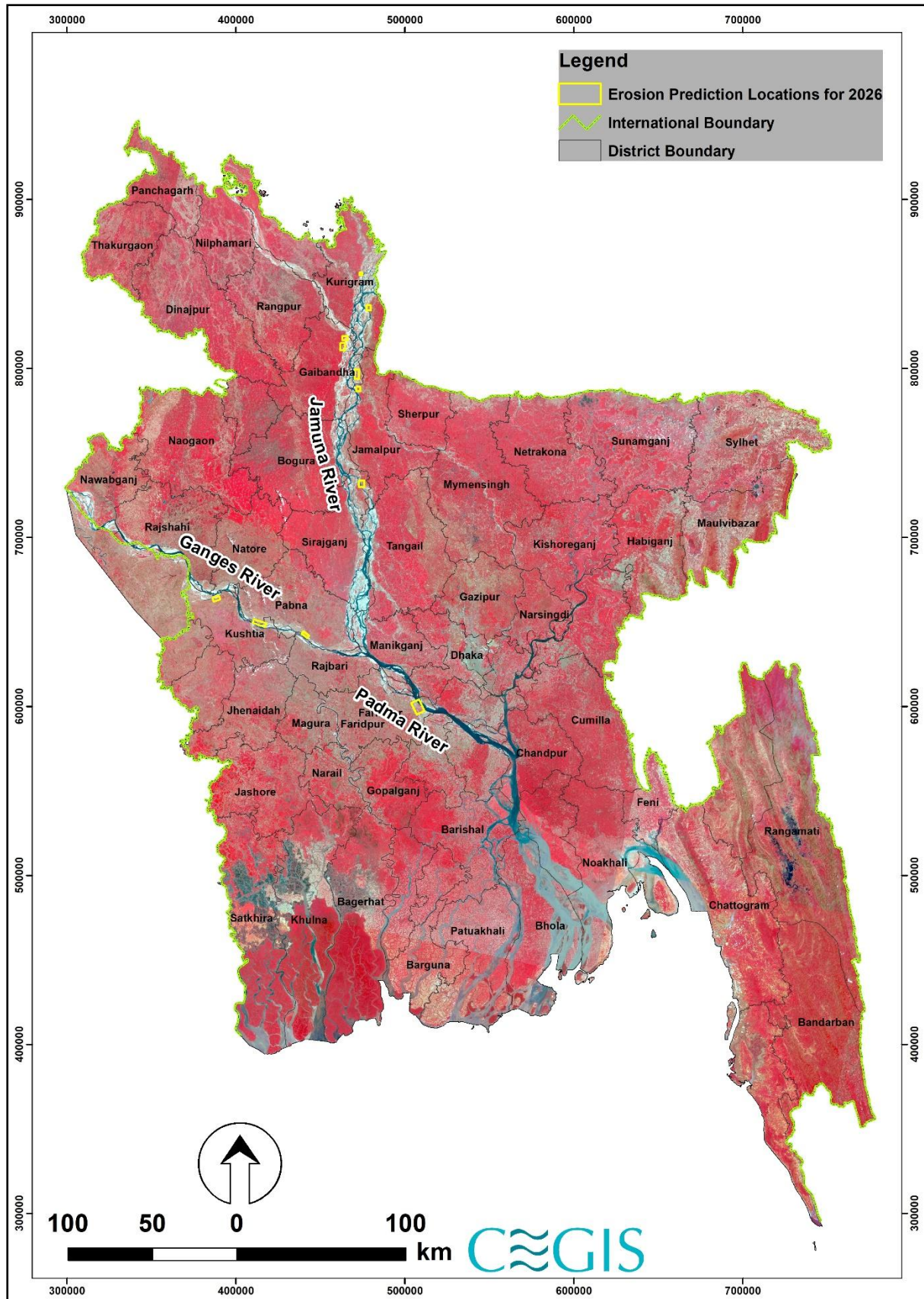


Figure 1: Index Map Showing Erosion Vulnerable Locations along Major Rivers for 2026

4. Erosion Monitoring for 2025 and Prediction in 2026

Erosion along the Jamuna River, 2025

In 2025, the land eroded along the Jamuna was 348 ha. The Brahmaputra flood embankment is an essential feature that protects against floods along the right bank of the Jamuna River. Table 1 gives a summary. Table 2 shows the monitoring details.

Vulnerability along the Jamuna River, 2025

Erosion prediction was done for both banks of the Jamuna River for 2026. The results are summarized as follows (Table 3):

- **Vulnerable locations:** Erosion is predicted for seven (7) locations. Out of which three (3) locations are along the right bank and four (4) are along the left bank. The lateral extension of which would be more than 100 m. The locations along the left bank are in Kurigram, Jamalpur, Gaibandha, and Sirajganj, and the locations along the right bank are in Gaibandha and Kurigram Districts.
- **Land and settlement:** About 460 ha of land and 64 ha of settlement are vulnerable to erosion. The predicted maximum land erosion (about 223 ha) is in Gaibandha District, while settlement (about 31 ha) is in Kurigram District. The second and third-highest predicted erosion-vulnerable land are in Kurigram (about 106 ha) and Sirajganj (about 83 ha) Districts.
- **Educational institutions:** Two (02) educational institutions in Gaibandha District, including two government primary schools, are vulnerable to erosion.
- **Mosques:** Three (3) mosques might be vulnerable to erosion. Two (2) in Kurigram and One (1) in the Jamalpur Districts.
- **Health Center/Community Clinic:** One (1) community clinic may be vulnerable to erosion in the Jamalpur District.

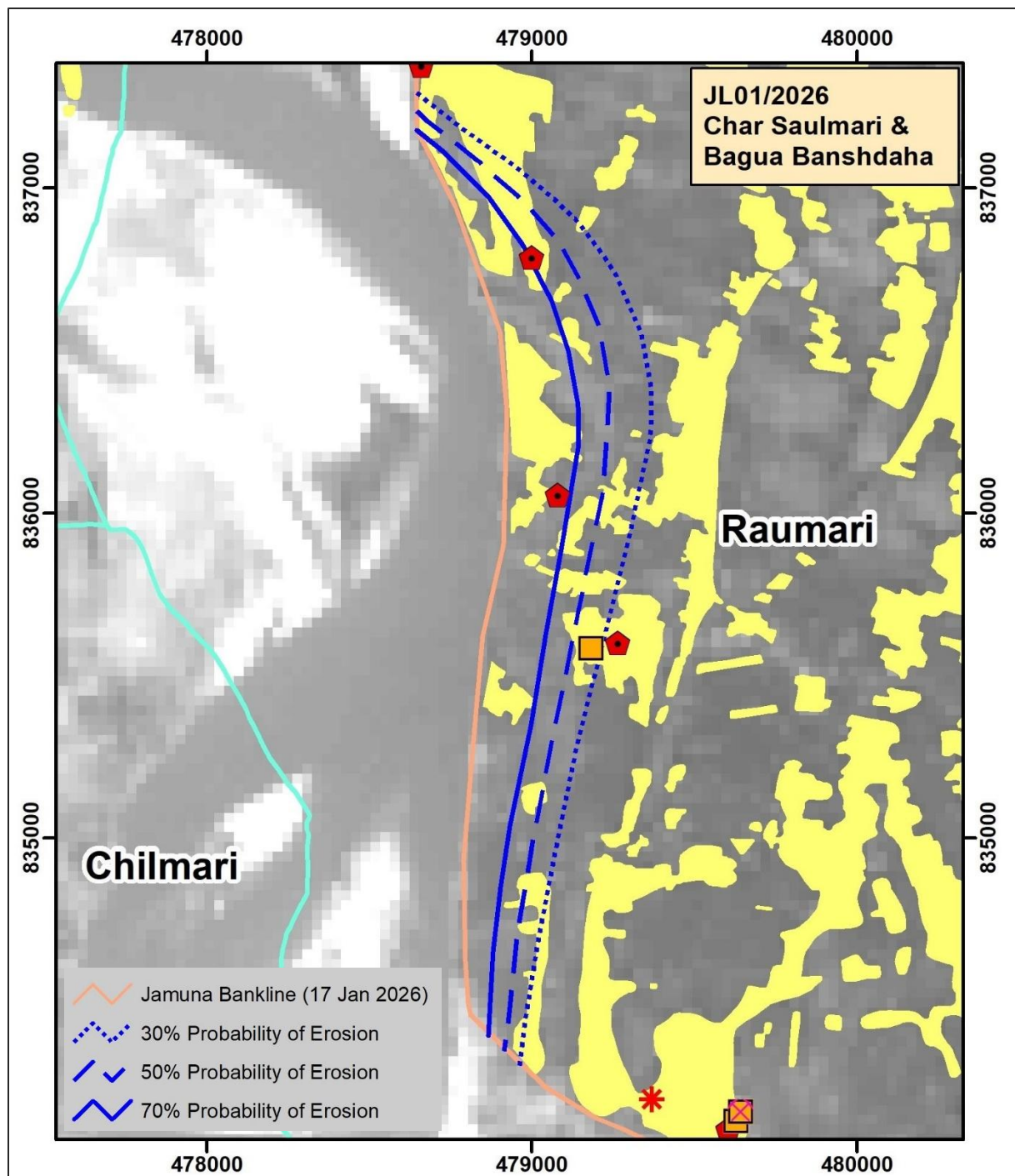


Figure 2: Erosion Prediction for 2026 along the Jamuna River

Erosion along the Ganges River, 2025

In 2025, about 593 ha of land along the Ganges River were eroded. Table 1 summarizes the situation. Table 2 presents the monitoring details.

Vulnerability along the Ganges River, 2026

The vulnerability assessment of land, settlement, roads, educational institutions, hat/bazaars, health centers, and government and non-government offices, etc., for the year 2026 is presented in the following (Table 3):

- Erosion vulnerable locations: Erosion is predicted for three (3) locations. Out of which two (2) locations are along the left bank and one along the right bank of the river. These locations lie in Pabna and Kushtia Districts.
- Land and settlement: About 320 ha of land and 5 ha of settlements are vulnerable to erosion. The predicted maximum land erosion is about 215 ha in the Pabna District, while the vulnerable settlement has been found to be about 5 ha in the Kushtia District.
- Educational institutions: One (1) high school in Kushtia District is vulnerable to erosion.

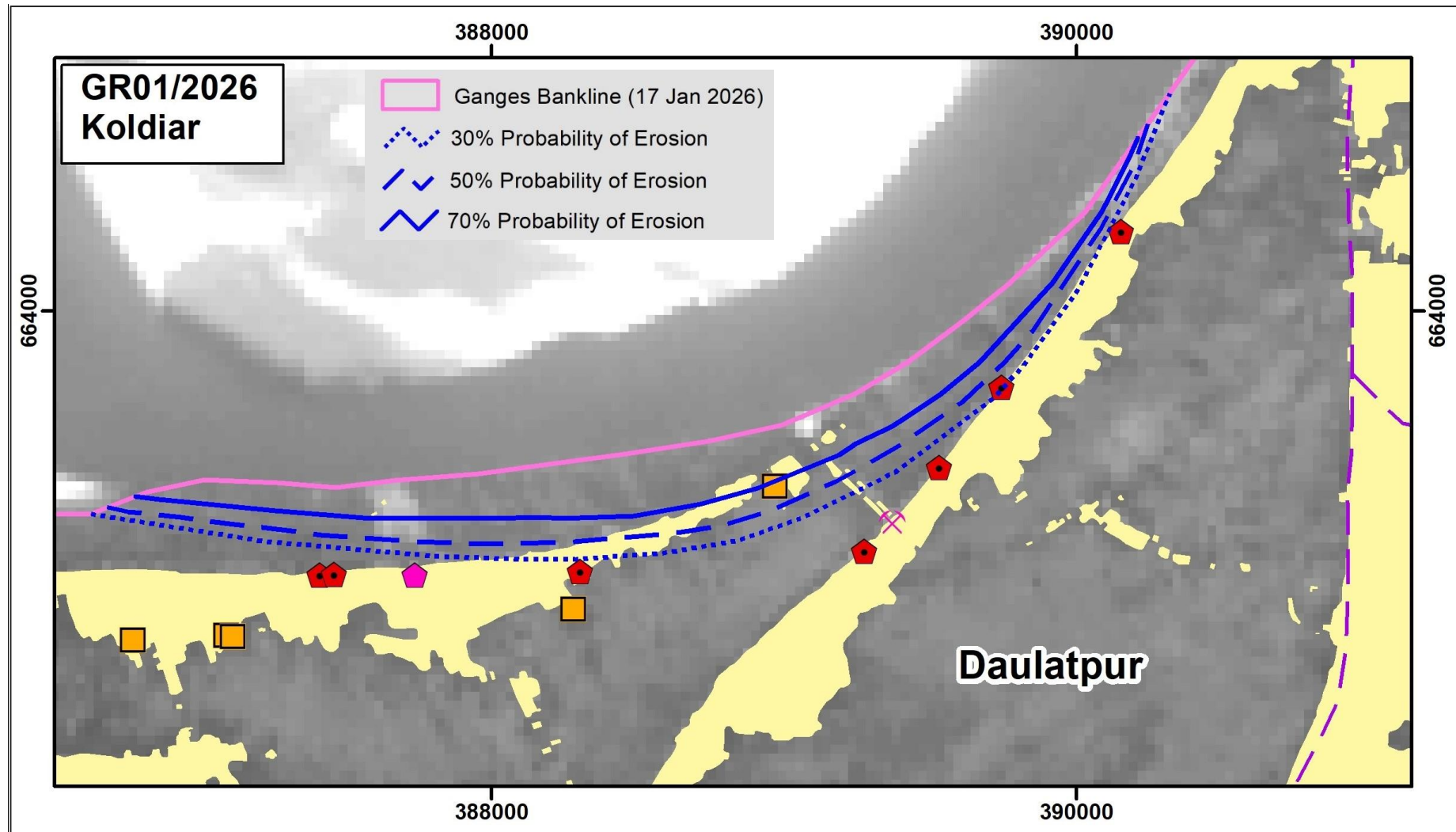


Figure 3: Erosion Prediction for 2026 along the Ganges River

Erosion along the Padma River, 2025

In 2025, about 93 ha of land along the Padma River were eroded. Table 1 provides a summary, and Table 2 provides monitoring details.

Vulnerability along the Padma River, 2026

The vulnerability assessment of the land, settlement, roads, educational institutions, hat/bazaars, health centers, government, and non-government offices for the year 2026 is presented in the following (Table 3):

- **Erosion vulnerable location:** Erosion is predicted for one (1) location along the right bank in Faridpur District.
- **Land and settlement:** About 135 ha of land and 4 ha of settlement are vulnerable to erosion in Faridpur District.

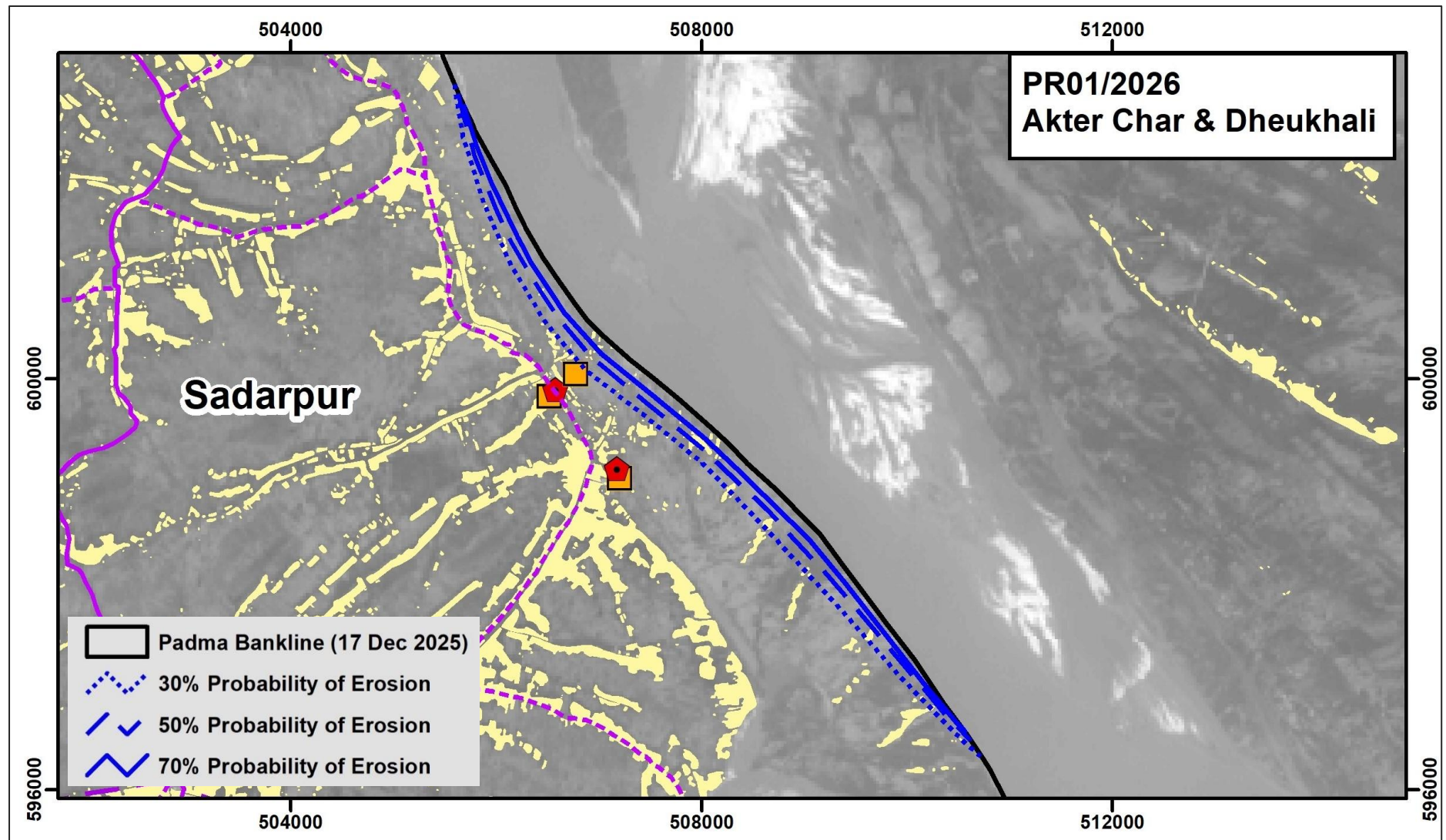


Figure 4: Erosion Prediction for 2026 along the Padma River

5. Accuracy of Erosion Prediction Made in 2025

CEGIS always makes efforts to carry out predictions in a conservative manner, not giving false indications to people. Assessment of riverbank erosion prediction made for 2025 shows a reasonable match with the occurrences (Table 1). Erosion prediction was made for five (5) locations in the Jamuna River, two (2) locations each in the Ganges and Padma Rivers. Erosion occurred in four (4) locations as predicted in 2025 for the Jamuna River. However, there were two (2) locations where erosion was not predicted. The Padma River also shows relatively good matching with the prediction. Erosion occurred in all predicted locations. In addition to that, the prediction also indicates a good match with the Ganges River. Erosion occurred in all the locations as predicted in 2025, while there were two (2) locations where erosion was not predicted.

Table 1: Evaluation of the Prediction of the Previous Year (2025)

Features		Jamuna		Ganges	Padma
		Right bank	Left bank		
Land (ha)	Predicted (50%)	61	158	156	402
	Occurred	91	257	593	93
Location (no)	Predicted	02	03	02	02
	Occurred	02	04	04	02

6. Potential Users

The erosion vulnerability assessment presented above represents a 50% probability. The vulnerability of different features has also been found in the range of 30% and 70% probability. Although eleven (11) vulnerable locations have been identified as the most susceptible to erosion along both banks of the Jamuna, Ganges, and the Padma Rivers, other locations may also be at risk.

Organizations can use the vulnerability assessment results to plan and implement activities to protect existing structures and construct new ones. The BWDB needs to pay due attention to all the vulnerable locations, especially the locations of the vulnerable embankments. The Roads and Highways Department (RHD) and the Local Government Engineering Department (LGED) may initiate necessary action to mitigate the envisaged loss of roads. The Ministry of Education (MoE) and NGOs need to look into the predicted losses of educational institutions. Other relevant organizations may also pay attention to the issue of erosion.

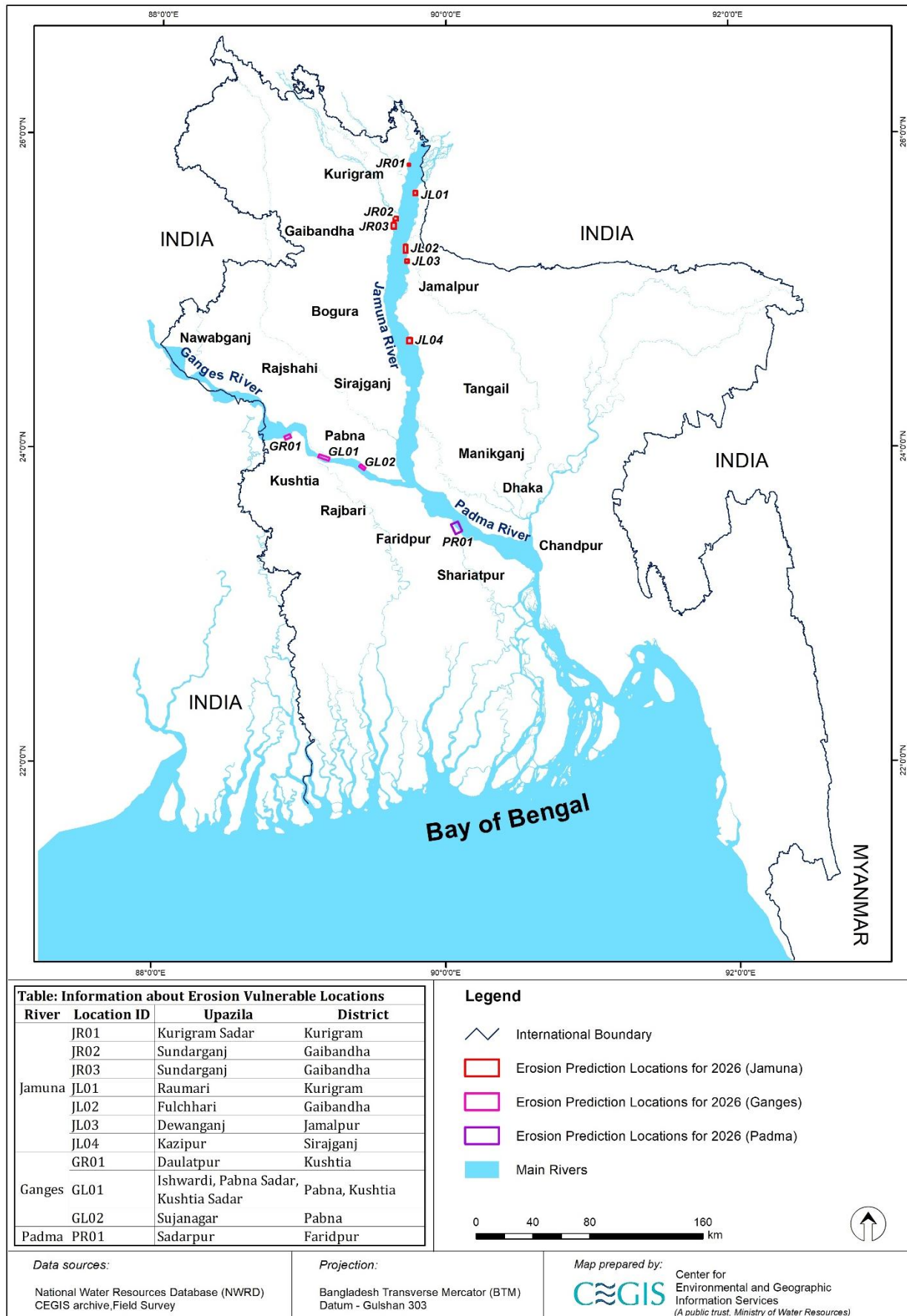


Figure 5: Index Map Showing Erosion Vulnerable Locations along Major Rivers for 2026

Table 2: District-wise Riverbank Erosion Monitoring along the Jamuna, the Ganges, and the Padma Rivers for 2025

River	District	Land (ha)	Settlement (ha)	Embankment (m)		Road (m)			
				Active	Inactive	National road	District road	Upazila road	Rural road
Jamuna	Kurigram	149	40	-	-	-	-	-	34
	Gaibandha	39	06	-	-	-	-	-	-
	Jamalpur	49	04	-	-	-	-	-	-
	Bogura	23	02	-	-	-	120	-	-
	Sirajganj	49	01	-	-	-	-	-	-
	Tangail	26	09	-	-	-	568	35	-
	Pabna	02	05	-	-	-	-	-	-
	Manikganj	11	03	-	-	-	-	-	-
	Sub-total	348	70	-	-	-	688	35	34
Ganges	Chapai Nawabganj	82	08	-	-	-	-	-	-
	Rajshahi	152	12	-	-	-	-	-	-
	Pabna	203	-	-	-	-	37	-	-
	Rajbari	72	04	-	-	-	-	-	10
	Kushtia	77	-	-	-	-	-	-	-
	Natore	07	-	-	-	-	-	-	-
	Sub-total	593	24	-	-	-	37	-	10
Padma	Faridpur	58	02	-	-	-	-	-	-
	Shariatpur	14	06	-	-	-	01	-	77
	Madaripur	18	-	-	-	-	-	-	-
	Manikganj	03	01	-	-	-	-	-	-
	Sub-total	93	09	-	-	-	01	-	77
Total		1034	103	-	-	-	726	35	121

Table 3: District-wise Riverbank Erosion Vulnerability (within the range of 50% probability) along the Jamuna, the Ganges, and the Padma Rivers for 2026

River	District	Land (ha)	Settlement (ha)	Embankment (m)	Road (m)				Educational Institution (nos)	Hat/ bazar (nos)	Health Centers/ Community Clinic (nos)	Mosque
					National road	District road	Upazila road	Rural road				
Jamuna	Jamalpur	48	06	-	-	-	-	-	-	-	01	01
	Kurigram	106	31	-	-	-	-	-	-	-	-	02
	Gaibandha	223	17	-	-	-	-	-	02	-	-	-
	Sirajganj	83	10	-	-	-	-	-	-	-	-	-
	Sub-total	460	64	-	-	-	-	-	02	-	01	03
Ganges	Pabna	215	-	-	-	-	-	-	-	-	-	-
	Kushtia	105	05	-	-	-	-	-	01	-	-	-
	Sub-total	320	05	-	-	-	-	-	01	-	-	-
Padma	Faridpur	135	04	-	-	-	-	-	-	-	-	-
	Sub-total	135	04	-	-	-	-	-	-	-	-	-
Total		915	73	-	-	-	-	-	03	-	01	03

7. Conclusions

In 2025, riverbank erosion was predicted along the Jamuna, the Ganges, and the Padma. Satellite images from January 2026 were used to evaluate the predictions made in 2025. Erosion predictions were made for five (5) locations in the Jamuna River, two (2) in the Ganges River, and two (2) in the Padma River. CEGIS always evaluates the prediction made the previous year. The assessment of the riverbank erosion prediction for 2025 shows a rational match with observed occurrences. There were a few locations where erosion occurred, but the prediction was not made.

Using the updated tools, river bank erosion has been predicted for 2026 in eleven (11) vulnerable locations, seven (7) of which are for the Jamuna, three (3) for the Ganges, and one (1) for the Padma River. It is predicted that along both banks of the Jamuna River, with 50% erosion vulnerability, bank erosion would be about 460 ha in 2025, whereas it would be 320 ha and 135 ha along the banks of the Ganges and the Padma Rivers, respectively.



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