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Protection of Meandering River Embankment

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Abstract

Rivers flowing over gently sloping ground begin to curve back and forth across the landscape cause a threat to embankment. Specially Meandering Rivers along their courses erode one side and deposit silt /sediments on the other side. Scouring side is always subjected to erosion and requires certain river training works depending on particle size of sub soil. In this article some temporary and permanent protective measures are discussed considering techno commercial aspects. Depending on geotechnical, hydrological, hydrographical aspects; socio economical aspects and overall financial resources concerned Engineers prepare most effective river embankment protective scheme.

Keywords: River, embankment, scour, spur, pitching and protection

1.Introduction

The rivers continuously transfer water and sediment load in the downstream direction. The Himalayan rivers continuously change courses in their lower reaches, and the Ganga and its tributaries are no exception. These rivers have the tendency to shift their courses within limits. The changing course may be by processes of meander migration or by adopting new distributaries. The Ganga has continuously changed its geometry of meandering in West Bengal during the last three centuries, and former courses are left behind as moribund channels.

As a result of such meandering one bank is subjected to silt deposit and another scouring. Generally external face becomes scouring and internal face becomes subject to silt deposits. Engineering activities are required for river training works for maintaining navigability, for protecting adjacent locality and water supply & Irrigation purposes. The present article is for discussion on Embankment protection which is a burning problem in various districts of West Bengal.

2.Materials And Methods

2.1 Temporary Protective measures: -

a) Bamboo piling and Sal/ Eucalyptus Bullah piling.
b) Bamboo Porcupines.

c) Semipermeable spurs.
d) Sand filled bag dumping.

Figure:1 - Sand filled bag dumping

Figure:2 – Bamboo piling

Figure:3 – Bamboo Porcupines

Figure:4 – Bullah Piling

Figure:5 – Semipermeable Spurs

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Semi-Permanent Protective measures: -

a) Laterite Boulder Pitching, b) Brick Block Pitching,
c) Concrete Block Pitching, d) Concrete Porcupine
e) Sausage, f) Gabion wall
g) Vetiver grass planting.

Figure:6- Laterite Boulder Pitching

Figure:7- Brick Block Pitching

Figure:8- Concrete Block Pitching

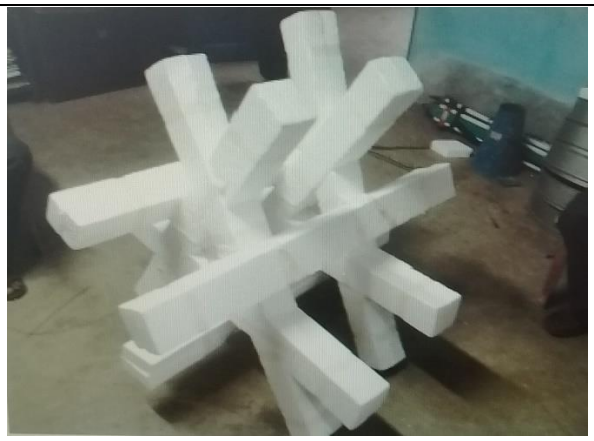

Figure:9- Concrete Porcupine

Figure:10- Sausage used in Protection

Figure:11- Gabion wall

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Figure:12- Embankment with & without Vetiver

2.3 Permanent Measures: -

a) R.C.C. Retaining Wall
b) Cold or Hot-Pressed Steel Sheet Pile

Figure:13- Sheet Pile Wall

Figure:14- R.C.C. Retaining Wall

3. Conclusion

Role of Engineers are very crucial in selecting proper protective measures. While selecting embankment protection following points are to be considered before going to technical alternatives: -

a) Importance of Area to be protected.
b) Population of the area to be protected.
c) Use of the area to be protected (Industrial/ Wasteland/ Fertile Land).

d) Public Buildings and Infrastructure in the vicinity of area to be protected.

On the basis of assessment of the area to be protected, Engineer will finalise the Protective scheme as per available financial resources. If meagre amount of fund is available Engineer has no other alternative and he/she will prepare a temporary scheme. If sufficient fund is available Engineer will choose Semi Permanent/ Permanent Protective measures on the basis of Importance of the utilities adjacent.

Before finalizing scheme detailed investigation (Geotechnical, Hydrological, Hydrographic) are required. Historic data are also required to assess the High Flood Level of the area. Information from Local, CWC/ Irrigation/ SMPK will help for finalizing the effective scheme.

4.Acknowledgements

Since 1996, till date it was the opportunity to execute many River embankment protection works. Those Projects inspired for writing this article.

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