

Parameter assessment of sediment deposit at Dam Lake

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Abstract- Geotechnical investigation is conducted to assess the subsoil characteristics for infrastructure development projects in the study area. The investigated physical and mechanical parameters are mainly required for design of foundations, retaining structures and site development works. This study assures safety and economic benefit in long run in terms of functional and structural stability which may be caused due to deformation or settlement of subsoil and risk associated to natural hazards. Also, this geotechnical investigation will ensure precautions to minimize damages, cost savings and reduce frequency of future repair and maintenance. This geotechnical investigation will form a part of Detail Project Report (DPR) for strategic planning, technical feasibility and suitability of the area which is a pre-requisite in construction industry. The experimental results and quantity estimate of sediment deposit will allow the relevant stakeholders to propose alternate use of the sediment in road works.

Keywords: dam, sedimentation, parameter, design, foundation

I.THEORY

Main Parameter Determination for Dam Engineering is Sedimentation. The sedimentation of the scientific interest in stream which fills the dam lake is a long – lasting one. This occurrence was prompted by widespread sediment transport observations which show meandering pattern. The morphodynamics of sedimentation river bends which induce sediment transport to the dam lake plays an important role. First, helical secondary flow structure in river bends with connection of dam lakes is given [1]. In the temporal evolution over geological timescales are observed. The general interest in river sedimentation is focused on fluvial meanders, initially sketched by configurations related to meander migration as the result of sedimentation in the valley connected to the Dam [2], [3], and [4]. It was established a sinuous stream boundary layer in a laboratory experiment, observing that scour near bend apexes alternated with

shallower areas between pool and riffles pattern that an increase in sediment load accelerated the evolution of sedimentation at meanders. It is proposed that the main transfer of sediment leading to increase of bed features was the sending of sediment from the eroding concave -outer bank to the downstream inner-convex bank [5]. Geomorphological occurrences at flow boundary layer regarding sedimentation of river boundary layer, occurrences or meander behaviour had been generated, the amount of field-based observations began to decline the theoretical and modelling theories which were given on engineering and fluid mechanics investigations. Sedimentation of river boundary layer or mending bend theory which proposed by [6] and [7], intended by bank erosion which observing from steady flow changes induced by river bend, without the explaining the theory of Bar [8].

Instability of the alternate-bar type in straight channels has long been identified as the cause of fluvial meandering. The condition of inerodible sidewalls, however, does not allow a meandering channel to develop. Herein a stability analysis of a sinuous channel with erodible banks allows for delineation of a ‘bend’ instability that does not occur in straight channels, and differs from the alternate-bar instability. In the case of alluvial meanders, the two mechanisms are shown to operate at similar characteristic wavelengths. This provides a rationale for the continuous evolution of alternate bars into true bends such that each bend contains one alternate bar.

The same bend instability applies to incised meanders. A mechanism for incised alternate bars which differs from that for the alluvial case appears to operate at different characteristic wavelengths than that of bend instability. Analysis of data suggests that meandering in supraglacial meltwater streams is primarily due to the alternate bar mechanism, whereas the meandering

of rills incised in cohesive material and of caves is likely due to the bend mechanism.

The meander wavelength of incised reaches of meandering streams is often longer than that of adjacent alluvial reaches. An explanation is offered in terms of bend instability.

Bend Theory given by Blondeaux and Seminara [8], unified the two theories, giving that Bend Theory is a particular case of the more general Bar Theory. Linear stability analyses modified these theories, but subsequent research incorporated non-linearities and

width variations, concluding that small random changes in channel planforms which show connection to the Dam Lake. that they show zig zag form with meandering scours because of sediment transport. There are also very important advances in the numerical simulation of meandering river evolution because of the erosion from valley boundary layer [10], [11], [12]. The assumptions based on relatively simple kinematic models and then transitioning to more morphodynamic-based topics [13], [14], [15], [16], [17], [18].

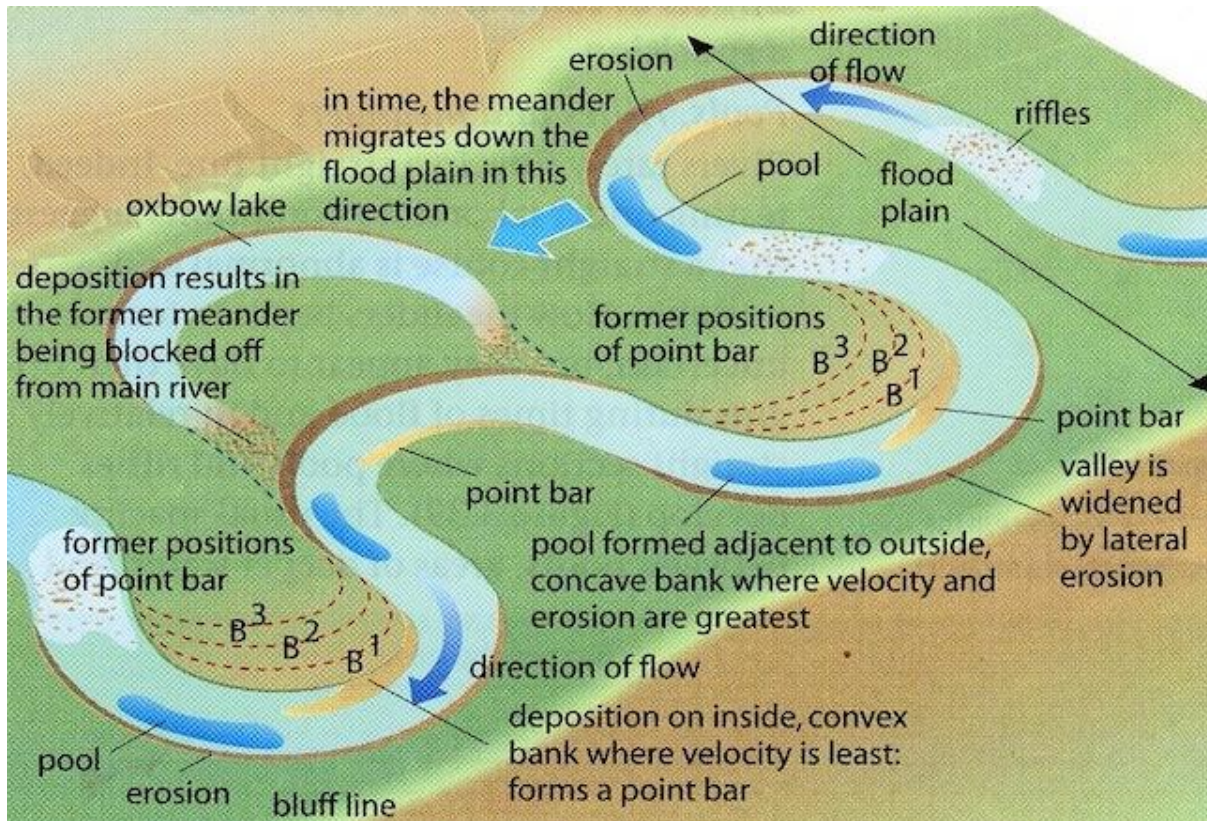


Figure.1. Sediment transport mechanism [9]

II. DISCUSSION

The sand is accompanied by organic carbon, washed in from soil and plants. The transport in water thus gains relevance for the climate: Rivers carry the carbon, which was previously removed from the atmosphere via photosynthesis, as sediment into the sea, where it is stored for thousands of years without harming the climate [19].

Researchers at the GFZ German Research Centre for Geosciences have now quantified the individual

processes of the journey for the first time and report on them in the journal Nature Geoscience. An important result of the work: It is in particular undisturbed meandering sections of a river where carbon is deposited and reabsorbed, and then transported further into the sea. In river sections with straight, stable banks, on the other hand, only the suspended particle load passes through, while the carbon in the river floodplains is slowly decomposed again to CO₂ by microorganisms. GFZ working group leader Dirk Sachse says, "The Río Bermejo was an ideal natural

laboratory for us because it has no significant tributaries." Sachse is also director of the "Landscapes of the Future" topic in the Helmholtz program "Changing Earth – Sustaining Our Future." He says, "This means that natural river courses that have space to erode floodplains can remove more carbon from the atmosphere than straight river sections. In this respect, straightening of rivers by humans could also contribute to the increase in atmospheric CO₂ concentration. What's exciting now is answering the question of whether we can help the climate by giving rivers more space again and not impeding natural river meandering." [19].

The international team led by first author Marisa Repasch of GFZ studied the processes in the river and its floodplains with a diverse set of instruments. Analyses of cosmogenic beryllium-10 content, for example, indicated the duration of sediment transport. Dating based on the unstable carbon isotope ¹⁴C, in turn, allowed conclusions to be drawn about the age of the particles of organic origin. During fieldwork in Argentina, samples were taken from the river at multiple stations along the source-to-sink pathway. "Naturally meandering rivers erode material from floodplains and transport it to the sea, where it remains for a long time," says Marisa Repasch, summarizing the results, "in contrast, artificially stabilized river courses are far less effective carbon sinks."

Dam deposition parameters include sediment thickness (up to 18m), storage volume loss, particle size sorting (coarser in front, finer in back), and physical/chemical properties like 1.22 g·cm⁻³ bulk density and 54.10% porosity. These parameters are monitored using GIS, DEMs, and grading entropy to assess capacity, stability, and environmental impacts.

III. CONCLUSION

When the deposition is made by sliding II, remarkable sorting characteristics are present in the sliding direction. The coarser and ner particles were mainly concentrated in the front and back parts of the deposition, respectively.

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sedimentation river bends which induce sediment transport to the dam lake plays an important role.

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