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Challenges against the construction at river side & analyzing the technologies for its approximate solution

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Abstract - Infrastructure development near the riverside possess lot of hydrological problems. This current research reviews various aspects of bridge engineering, river management, and foundation analysis. The studies are based on the challenges and complexities associated with bridge construction, maintenance, and restoration, highlighting the need for advanced methodologies and comprehensive evaluations. The analysis encompasses topics such as historical bridge designs, river sensitivity, soil-well interaction, and the dynamic response of structures under lateral loads.

Keywords - River management, construction

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1. INTRODUCTION

The process of urbanization in Asia has led to a heightened demand for residential structures. Meeting the housing requirements of all urban residents is a feasible task that can be accomplished. The potential resolution of significant housing challenges could be achieved through the recognition of urban slums as energy producers and significant contributors to the construction sector. It is plausible for an organization to alter its perspective from viewing impoverished individuals as passive recipients of assistance to regarding them as engaged contributors in shaping their own destiny. The phenomenon of swift population expansion is being observed in virtually all developing nations, yet there has been a lack of corresponding progress in the domains of housing and infrastructure. This issue is particularly prevalent in communities residing in metropolitan areas that have limited financial resources and inadequate infrastructure, services, and environmental amenities. Individuals exhibit a proclivity for inhabiting both formal and informal urban settings, encompassing both lawful and unlawful urban territories. Furthermore, a significant number of existing communities' priorities factors other than the well-being of their inhabitants, ease of access, and ecological standards. Despite the improved housing amenities, individuals with low-income are being excluded from official settlements due to pricing barriers.

2. LITERATURE REVIEW

Connor et. al. [1] The primary subsidiary activity of the project is the management of fundamental materials. Nevertheless, there have been occurrences where bridges necessitated strengthening or refurbishment before attaining their expected longevity. Bridges generally have a lifespan ranging from 75 to 100 years. The Balad Bridge located in Baddi, Himachal Pradesh, underwent reconstruction as a result of significant erosion, a reduced foundation at one of the pier sites, and other potential factors. The severity of the scour was unforeseen as the bridge was constructed to accommodate the maximum projected flow and the resulting scour depth. As a result of the unforeseen intensity of the abrasion, a comprehensive assessment of any supplementary factors that may have played a role was deemed necessary. Upon receiving feedback from local inhabitants regarding comparable issues at adjacent bridges, it became evident that there could be supplementary contributing factors.

According to the sources [2], Dick and other similar structures are constructed using materials such as stone, gravel, rock, soil, or piles. These structures are typically situated with a base at the riverbank and a head at the regulating line. The Waal River, which happens to be the most significant tributary of the Rhine in the Netherlands, is subjected to

regulation by an estimated 500 groynes. "Space for" is a term used to describe the allowable physical area or capacity for a particular object or activity. The aforementioned theory is substantiated by the observation that the groynes have been instrumental in preserving the depth of the primary channel, surpassing the necessary level, owing to the substantial degradation of the low-water bed during the preceding decades. The flood-carrying capacity of the river could be enhanced by decreasing the groynes in specific segments of the river, thereby decreasing the effective turbulence during high water levels. Reducing the height of the groynes is likely to cause a disturbance in the hydrodynamic forces that are presently in equilibrium on the groyne-fields, leading to a notable impact on the morphology. To evaluate the impact, it is imperative to understand the manner in which groynes alter the configuration of the river. A more comprehensive understanding of the sediment exchange between the groyne fields and the main watercourse is necessary. The purpose or objective of. Our study examines the impact of groynes on the morphology and hydraulic characteristics of a watercourse.

Hamidah et. al. [3] Today, fluvial geomorphologists are in an ideal position to apply their field of study and provide guidance on pressing environmental issues. Fluvial geomorphologists are increasingly tasked with addressing a variety of river-related issues, predicting system changes, and collaborating with management to implement strategies. Some people believe that fluvial geomorphology is unsuitable for this task because many theories regarding the formation, evolution, and process of the landscape have not yet been thoroughly analyzed. Others, however, argue that geomorphologists have access to a variety of concepts, tools, and sufficient data to predict future river changes with a high degree of certainty. Although it has been neglected in recent years, the concept of river sensitivity must be at the center of such evaluations. In this article, I analyse the concept of river sensitivity using canonical literature. I provide examples to illustrate how this concept can be modified and applied to landform, reach, and catchment-scale evaluations. At the scale of the landform, geometric and textural sensitivity influence morphological sensitivity.

Budiharjo et. al. [4] In India, rivers serve as the true expression of the environment and the people. Rivers serve a significant influence in people's existence. The river system provides irrigation, potable water, accessible transportation, electricity, and a food source for our rapidly expanding population. Several of India's main communities are situated along sacred rivers. River water must always be monitored appropriately. The unpredictable monsoon is primarily responsible for India's reliance on agriculture. Due to this, insufficient irrigation in one region and waterlogging in another are significant issues.

Kean et. al. [5] A drainage system that is inadequate could be used to prevent crop injury. The depletion and deterioration of water resources could be the most pressing resource issue of the twenty-first century. The essay focuses on the issues and difficulties surrounding the intertwining of rivers in India and the ecological effects of the Inter-River Linking (IRL) Project. Inter-River Linking (IRL) Project Difficulties and Obstacles Concerning its economic viability, environmental impact, and social costs, the Inter-River Linking Project faces numerous obstacles and difficulties.

Sari et. al. [6] The reader will learn about the past, present, and future of bridge engineering in the following chapter. There is no dispute regarding the close connection between the evolution of technology and human civilization. Engineering has a history that predates humanity. Throughout the history of civil engineering, bridges have frequently contributed to the advancement of technical knowledge. The first section of this chapter will discuss the evolution of significant bridge designs, as well as changes in building materials and construction methods. Notably, historic bridges are frequently mentioned in legends and folklore. Researching the history of a bridge from the time of its construction to the end of its useful life always yields a fascinating portrait of its particular historical and cultural context.

Deng et. al. [7] To analyses the behaviour of a rigid caisson foundation immersed in nonlinear homogeneous soil under lateral load, a generalized Winkler model with four springs and dashpots has been developed. The Caisson foundation is simulated using the generalized Winkler model, which contains four springs (rotating and concentrated shear springs). Dashpots are linked in parallel to capture the viscous properties of soil resulting from both radiational damping and hysteresis damping. In order to analyse the static and dynamic response of the caisson foundation, two scenarios were examined: one including observed soil nonlinearity and the other including observed soil and interface nonlinearity. These two examples demonstrate that the soil and contact have a substantial effect on the inertial response of the caisson foundation.

Baschak et al. [8] examined structures for supported bridges that were encompassed by uniform soil in their investigation. Due to the concentrated strain on the pier head, the superstructure is constructed with two degrees of freedom, and the pier is regarded as a beam. The proposed model is comprised of translational and rotational springs in addition to dashpots that are rattled by the free field displacement profile. According to the research, the operating duration of a system is determined by its aspect ratio. The recommended course of action is trustworthy.

Rawson et. al. [9] Build a model to illustrate the concept of soil-well interaction using. The results of the study indicate that the contact between the soil and the well increases the response of a rigid

foundation, and that this response increases as soil stiffness decreases.

Poulard et. al. [10] conducted an experiment to determine how foundation displacement might influence the seismic response of a narrow bridge pier. The input in this experiment was monotonous and progressively cyclic. Consideration was given to three potential foundation sizes—large, medium, and small—with corresponding FOS values of 1.07, 0.55, and 0.50. The structure is protected by the base's swaying motion, which is resistant to seismic disruption.

Zhang et al. [11] Due to the inherent complexity and iterative nature of bridge construction projects, there is a high demand for project management to implement cutting-edge methodologies for a more comprehensive evaluation of performance data in uncertain circumstances. Despite the fact that new technologically based methods such as simulation have proven to be effective ways to manage cyclical and unpredictable project behaviour, the application of simulation-based models in the construction industry, particularly in the construction of bridges, is substandard. This article examines the utility of contemporary modelling techniques in the construction industry. As part of a broader inquiry into the viability of simulation-based scheduling and management solutions for New Zealand construction projects, this study examines the recurrent, unpredictable, and complex nature of these projects.

Songs et. al. [12] There is a concise explanation of nine prevalent arguments for river restoration. Motives propose more general objectives as opposed to formally defined and particular repair goals. Sometimes, the numerous objectives of restoration overlap. This is largely due to the fact that river restoration initiatives frequently attempt to address multiple goals simultaneously.

Chuanglin, along with others [13] There has always been a need for bridges to cross rivers, valleys, hills, and other obstacles. It's possible that the initial bridge was a tree that had fallen across these impediments. Several novel bridge designs, such as "Steel and RCC bridges," were created as civil engineering advanced. Today, a bridge represents the national development of any nation. In this analysis, the necessity of bridges is discussed alongside the various types of bridges, their international and Indian history, and a categorization of bridges according to the materials they are constructed from. A bridge is a structure that allows vehicles to pass over an obstruction without obstructing the road below. A route may be required for a conduit, canal, road, train, or even a path for humans.

Sellers et. al. [14] Bridge designs will vary based on the bridge's function and the conditions of the location in which it will be built. The first bridges were made from naturally occurring materials, such as timbers cast across a stream or stones in a river. To travel from one area to another, some early Americans traversed narrow tunnels or wells using bamboo or tree poles. Using long reeds as fasteners, sticks, logs, and deciduous branches were regularly attached together.

3. CONCLUSION

The Inter-River Linking (IRL) Project in India faces obstacles and difficulties concerning its economic viability, environmental impact, and social costs. It requires careful evaluation and consideration of various factors before implementation. Bridges have been instrumental in advancing technical knowledge throughout the history of civil engineering. Understanding the evolution of bridge designs, construction materials, and techniques provides insights into historical and cultural contexts. The behavior of foundations, including caisson foundations immersed in soil, under lateral loads has been analyzed using generalized Winkler models. Soil properties and contact with the foundation significantly affect its response, emphasizing the importance of studying foundation-soil interaction.

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