

**INFLUENCES OF SLEEPER/TIE MATERIAL CHOICES ON GEORISKS IN
RAILWAY SYSTEMS UNDER CLIMATE UNCERTAINTIES**

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ABSTRACT

Railways have been a critical catalyst for economic and social growth around the world. They have been developed using local materials to effectively suit whole-life design, construction and maintenance. The choice of construction materials often affect the life cycle performance and play a key role in resilience of rail assets and infrastructure in an uncertain setting derived from geotechnical risks, operational changes, natural hazards and climate change effects. Nowadays, in railway industry, various materials are being installed in railway tracks as supporting structure. Railway sleepers or ties are an important element, which redistributes wheel load onto track foundation and importantly secures rail gauge. Among them is manufactured by steel, timber, polymer, composite and concrete. The choice of these sleeper materials is

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mainly arose from local suitability and compatibility in a specific railway network. This research is the world first to investigate the georisks and potential consequences on track capacity and performance of railway systems under climate uncertainties. It highlights track failure modes, short-term and long-term stability, and ground-borne vibration, which causes excessive maintenance and service downtime. The insight into the influence of sleeper material choice will help saving life cycle costs and reducing carbon footprint from repetitive track reconstruction activities.

(200 words)

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