Climate Change Impact on Road Construction: a Case Study of Borrow Pits in Part of Anambra State, Nigeria

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Key words: Engineering survey; Positioning; Remote sensing; Borrow pits; Environmental degradation; Climate-resilient infrastructure

SUMMARY

The development of infrastructure is becoming increasingly hampered by climate change, especially when it comes to building and maintaining roads. With a focus on borrow pit operations in certain areas of Anambra State, Nigeria, this study examines the effects of climate change on road construction. When improperly maintained, borrow pits—which supply vital resources like laterite and gravel for road construction—become major environmental stressors, particularly in light of the changing climate.

This study uses a case study methodology to investigate how extreme weather events, temperature swings, and increased rainfall intensify soil erosion, flooding, and land degradation near borrow pit sites. The study evaluated the environmental and infrastructure effects of borrow pit exploitation using a mixed-method approach that included field observations and GIS-based spatial analysis. The findings reveal that unreclaimed or poorly rehabilitated borrow pits contribute significantly to surface runoff, sedimentation, and road pavement failure, all of which are caused by climate variability.

The study concludes by recommending sustainable borrow pit management practices, the integration of climate-resilient road design strategies, and the enforcement of environmental regulations. These measures are critical to reducing the vulnerability of road infrastructure to climate-related impacts in Anambra State and similar ecological regions. The research underscores the necessity of adopting climate-adaptive planning in civil engineering and environmental policy for road construction projects.

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