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# Improvement of Coastal Flood Protection with Mangroves: A Nature-Based Solution Integrating Sensors for Monitoring and Engineering Approaches

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**Abstract:** *Floods pose a significant threat to coastal and lowlying areas, often causing damage to infrastructure, loss of life, and environmental degradation. This project presents an IoTbased flood control and monitoring system using mangrove trees as a natural barrier, combined with smart sensors for realtime flood detection and alerting. The system utilizes NodeMCU ESP8266 as the central controller, which collects data from a flex sensor to measure wave flow intensity and a moisture sensor to detect rising water levels. When the water reaches a critical level, an alert is triggered via a buzzer, and notifications are sent to users through the Blynk IoT app for timely action. By integrating IoT technology with ecological solutions like mangrove plantations, this system enhances early warning mechanisms and promotes sustainable flood management strategies.*

**Keywords:** IoT, Flood Control, Mangrove Trees, NodeMCU, Flex Sensor, Moisture Sensor, Blynk App, Early Warning System, Smart Monitoring