CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Brian Christensen; Oleksandr Stubailo

Project Number

J0606

Project Title

Landslide Prevention

Abstract

Objectives/Goals

The objective is to determine how the type of ground material and the type of prevention measure affect the amount of water needed to start a landslide. The hypothesis is that compact materials will need more water to slide than loose materials, and that the preventive measures that provide water runoff will make materials more resistant to sliding than other preventive measures. This project is important because landslides are a prime safety concern in California and around the world. Such investigations are the first step to helping people who live in landslide-prone areas avert future disasters.

Methods/Materials

An experiment was designed to simulate the occurrence of a landslide. Five types of ground materials were studied: Top soil, sand, compact top soil, gravel, and clay dirt. In addition, four ways of preventing landslides were tested using top soil: Covering the soil with a net, covering the soil with a waterproof tarp, installing a drainage pipe, and reinforcing the soil with stakes. Five trials were done for each variation. In each trial, 2.5 L of a material were placed on the top of a board that was 1.5 meters long and propped up at a 30-degree angle of elevation. Water was then poured on the material to simulate rainfall until more than half of the material slid past the halfway point of the board. The amount of water used was recorded.

Results

Compact ground materials required more water to slide than loose materials. Prevention measures that drained water were better than those that did not drain water. The compact dirt required an average of 1762 mL of water to slide, making it the most landslide-resistant ground material, and the top soil needed only 637 mL, making it the least resistant. Out of the preventive measures, covering the soil with a waterproof tarp and installing a drainage pipe were close for best, at 2254 mL and 2199 mL of water, respectively. The worst was reinforcing the soil with stakes, which barely improved the performance of top soil.

Conclusions/Discussion

The results support the hypothesis. The more compact a material is, the more resistant it is to landslides, and the best way to reduce the risk of a landslide is to divert the water flow. There are many other aspects of landslides that would be interesting to explore in future studies, such as the effect of vegetation on ground#s resistance to sliding and the destructive power of landslides.

Summary Statement

The project is about determining which ground materials are most resistant to landslides and testing different ways of reducing landslide risk.

Help Received

Our parents helped us purchase materials that were used in the project.