A Study of Glacial Movement Based on the Kuna and Dana Glaciers

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Objective: Glaciers have been moving in the Sierra for thousands of years. Recently these glaciers have been melting. I wanted to see if Sierra glaciers are still moving. Methods: I measured movement of the Kuna and Dana glaciers. At each glacier I augured 4-meter holes into glacial ice and placed 5-meter PVC stakes as markers. I surveyed the stakes using a laser rangefinder. After 2 months I resurveyed the stakes. Glacier expeditions required wilderness camping and use of ice climbing equipment. I also created my Glacial Movement Prediction (GMP) procedure for the widespread evaluation of Sierra glacier movement. My procedure weighted 10 criteria by their importance to glacial movement. Using GIS analysis and satellite imagery I rated the criteria for 15 glaciers. Results: My measurements of the Kuna and Dana glaciers showed movement. Kuna Glacier: Stake 1 moved 1m. Stake 2 moved 0.8m. Dana Glacier: Stake 1 moved 1.1m. Stake 2 moved 1.2m. Stake 3 moved 1.2 m. My GMP procedure indicated that 8 glaciers have likely stagnated and 7 are in stages of movement. Conclusion: Movement of the Kuna and Dana glaciers was 3 times smaller than the nearby Maclure glacier. This suggests they are in a slowing down period that will soon end with stagnation. Across the world glaciers are indicators of the irreversible effects of climate change. Glaciers in the Sierra are melting away which will have negative impacts on riparian habitats, alpine hydrology, and water availability. However, there is very little data on glacial status in the Sierra. My project is one of only three glacial movement studies done in the Sierra in the last 150 years. We must take action to learn more about the current welfare of environments across the world as they respond to the changing climate.

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