CALIFORNIA FIRE SCIENCE CONSORTIUM

JOINT FIRE SCIENCE PROGRAM

Research Brief for Resource Managers

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A Historic 1934 Flood after a Chaparral Fire

Kraebel, C. J. 1934. The La Crescenta flood. American Forests 40:251-287.

This report is one of the first and most dramatic accounts of the southern California "fire-flood" cycle that documented the magnitude of postfire debris flows in denuded watersheds.

Charles Kraebel described what happened to the southern California towns of La Crescenta, Montrose, Verdugo and La Canada, located at the base of the steep San Gabriel Mountains, on New Year's Day, 1934. The Verdugo Watershed had burned several months previously, in November, 1933. Prior to New Year's day a storm landed on previously rain saturated, fire-denuded upland slopes and produced 13 inches (330 mm) of rain over a period of 63 hours. Shortly before midnight, there was an intense downpour of about 1 inch/hour (25.4 mm hr^{-1}), that sent a torrent of water, mud and boulders from the mouths of the mountain canyons onto the homes below. A total of 34 people were killed, 200 houses destroyed and at least 200 more were damaged.

The deluge of mud and rock traveled at the rate of 1,000 cu ft per second (28 m^{-3} s^{-1}) for each square mile (2.59 km^2) of the burned area. By comparing this disaster to the nearby, chaparral-covered Arroyo Seco and San Dimas watersheds, Kraebel found that burned slopes lost more than 50,000 cubic yards of soil per square mile (14,750 m^{-3} km^{-1}), while the unburned watershed, San Dimas, lost only 56 cubic yards per square mile (16 m^{-3} km^{-1}), of topsoil (Table 1).

Management Implications

- Burned chaparral slopes have the potential for devastating debris flows if fall fires are followed by intense winter rainfall.
- Chaparral provides important watershed protection, flood control and erosion control to adjoining communities.

The author made the heartfelt point that "Perhaps no person who witnessed this storm, and the tremendous contrast in its effect upon burned and unburned watersheds, needs further proof of the function of a forest cover in the protection of life and property against disaster."

Table 1

RUNOFF AND EROSION
from
Burned and Unburned Watersheds
Storm of Dec. 30-31, 1933 and January 1, 1934, Calif.

Watershed	Rainfall for storm in inches	Total area of watershed in square miles	Percentage of total area: Unburned	Percentage of total area: Burned	Runoff—Maximum cubic ft. per second per square mile	Erosion—Cubic yards per square mile
Verdugo	12.56	19.13	67	33	1000	50,000
Arroyo Seco	12.32	16.24	99.4	00.6*	58**	No Record
San Dimas	10.82	16.85	100.0	0	51	56
Haines	11.26	1.45	68	32	1000	67,000

* Recorded by U. S. Geological Survey. Other records computed from channel measurements.

** This area of fifty-eight acres lightly burned in backfiring during the battle with the main conflagration, was too small to affect appreciably the runoff from this large watershed. Forest officials in the canyon reported that the material which muddied the water of the Arroyo Seco in its lower reaches came directly from the gullying of road-slopes of the new Angeles Crest Highway.