

To mention the influence of the forest-litter (4), and the holding of the snow cover (5), suggests the third topic of my article.

III. *The influence of the forest upon the mechanical condition and the erosion of the soil under its cover*, is due simply to the impedance offered to the fall of water by the forest litter. A heavy rain falling unimpeded upon bare clay soil, almost invariably packs it, puddles it, and injures its texture, its capacity to convey water. Upon lighter soil the effect of the rainfall is less injurious, but is always in the direction of compacting. The forest litter, by breaking the force of the rain-drops, allows the soil to remain open and friable. The tree roots also, penetrating the soil, form channels for the entrance of water. Then, on sloping ground and on hillsides, the loose litter retards the run-off, and allows the water more time to percolate the soil. Thus, the rainfall is encouraged to become ground water, which, from the resistance offered by the compact subsoil, flows slowly down to lower levels, and supplies springs and streams perennially. In the forest, with its litter removed, the rainfall and the melted snow, instead of becoming seepage water, largely run off the surface, denuding the hillsides of serviceable soil, and stripping them to the bare rock; while the rapid rush of surface water occasions destructive freshets. Later in the season springs and streams dry up.

Mr. J. W. Toumey, of the Washington Bureau of Forestry, writes in the Year-book for 1903 on "The Relation of Forests to Stream Flow." The following is a quotation from that article: "In a careful study of the behavior of the stream flow on several catchment areas in the San Bernardino Mountains, it has been found that the effect of the forest in decreasing surface flow on small catchment basins is enormous, as shown in the following tables, where three well-timbered areas are compared with a non-timbered one:—

PRECIPITATION AND RUN-OFF DURING DECEMBER, 1903.

Area of Catchment basin.	Condition as to Cover.	Pre- cipita- tion.	Run-off per square mile.	Run-off per- centage of pre- cipitation.
Sq. miles.		Inches.	Acre-ft.*	Per cent.
0.70	Forested . . .	19	36	3
1.05	do . . .	19	73	6
1.47	do . . .	19	70	6
0.53	Non-forested	13	312	40

At the beginning of the rainy season, in early December, the soil on all four of these basins was very dry as a result of the long dry season. The accumulation of litter, duff, humus, and soil

*640 acre-feet equal 12 inches of precipitation over a square mile.