

of small streams, where avalanches or an advancing glacier cross a valley and pond back its drainage. The valley of the Dranse, in Switzerland, has several times suffered from this cause. In 1818, the glacier-barrier extended across the valley for more than half a mile, with a breadth of 600 and a height of 400 feet. The waters above the ice-dam accumulated into a lake containing 800,000,000 cubic feet. By a tunnel driven through the ice, the water was drawn off without desolating the plains below.

The amount of sediment borne downward by a river is not necessarily determined by the carrying power of the current. The swiftest streams are not always the muddiest. The proportion of sediment is partly dependent upon the hardness or softness of the rocks of the channel, the number of tributaries, the nature and slope of the ground forming the drainage-basin, the amount and distribution of the rainfall, the size of the glaciers (where such exist) at the sources of the river, the chemical composition of the water, and probably other causes. A rainfall spread with some uniformity throughout the year may not sensibly darken the rivers with mud, but the same amount of fall crowded into a few days or weeks may be the means of sweeping a vast amount of earth into the rivers, and sending them down in a greatly discolored state to the sea. Thus the rivers of India, swollen during the rainy season (sometimes by a rainfall of 25 inches in 40 hours, as at the time of the destructive landslip at Naini Tal in September, 1880), become rolling currents of mud.¹³⁹

¹³⁹ In his journeys through equatorial Africa, Livingstone came upon rivers which appear usually to consist more of sand than of water. He describes the Zingesi as "a sand-rivulet in flood, 60 or 70 yards wide and waist deep. Like all these sand-rivers, it is for the most part dry; but, by digging down a few feet, water is to be found which is percolating along the bed on a stratum of