

of climatic change. It consisted of alternating epochs of colder or moister climate on the one hand and of warmer or drier climate on the other. In non-glaciated regions one of the most notable features of the colder or moister epochs must have been an increase in the size of rivers analogous to the increase in the size of glaciers in glaciated regions. Hence, such epochs may fitly be termed »fluvial» when we speak of regions where rivers increased in size, just as they are called »glacial» in regions where glaciers increased in size

Whatever the cause of »fluviation» may have been, it seems safe to say that in non-glaciated regions, such as most of Central and Western Asia, a fluvial epoch was a time of increased humidity, because of either increased precipitation or a diminished evaporation. In either case the size of rivers, springs, and enclosed lakes would increase, and the soil would be more damp than in an interfluvial epoch such as the present. Under such conditions the processes of weathering or rock-decomposition would be more active. Therefore, in places where the underlying rock was not already protected by a thick layer of soil, weathering would proceed rapidly until such a layer was formed. In regions which are now arid this would be especially true. Under conditions of aridity, plants are so scarce that the soil is not held in place, even on very gentle slopes. It is washed away by occasional torrential rains almost as fast as it is formed. Increased humidity would cause an increased growth of vegetation, the roots of which would be effective agents in holding in place the new soil and half-decomposed rock produced by the more rapid weathering.

Proceeding from these great perspectives to a more recent and localised case we may, for a moment, listen to R. D. OLDHAM. Speaking of the Sind valley he says that:

glacial action is excluded, for this lower part is filled, to a depth of some 300 feet, by stream deposits, the greater part consisting of fine-grained alluvium. This has been cut into terraces by the river, and the terraces, like the existing stream bed, are covered by waterworn boulders. It is difficult to believe that a glacier could have flowed over this deposit, nor is there any sign of one having done so, and it is equally inconceivable that this deposit, which is a continuation of the Karewahs of Kashmir, could have been formed and again eroded since the retreat of the glaciers.¹

Higher up signs of glacier action were found.

A part of the village of Gund is built on a great *roche moutonnée*, and the hillside is smoothed and striated for a height of about 500 feet above the bottom of the valley, the glacier having probably reached another hundred feet above this level.

Similar signs were found a couple of miles above Gund. Above Sonamarg and its moraines the valley remains open and straight but no certain signs of glaciation could be seen. He shows the changing glacial phenomena which have taken place with the Sonamarg moraines and the moraines which project into the Gumber valley at Mechoi, as well as the different conditions of different valleys depending upon the relative size of the collecting area, the niveau of the permanent snow-level, the loss of area by cutting back of valleys and, finally, the proportional amount of precipitation.

¹ R. D. Oldham: *Note on the Glaciation and History of the Sind Valley, Kashmir. Records of the Geological Survey of India.* Vol. XXXI. Calcutta 1904, p. 142 *et seq.*