



## Land factors affecting soil erosion during snow melting: a case study from Lebanon

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### Abstract

Soil erosion is one of the major problems facing the mountainous agricultural lands in Lebanon. In order to assess the land factors acting on soil erosion; a study was conducted in the upper watershed of Ibrahim River in the spring months of April, May and June. Water and bed load sediments from six locations alimented by six sub-basins were sampled. Four sub-basins (1, 2, 3 and 6) were dominated by agricultural lands while lands in sub-basins 4 and 7 were occupied by grassland and bare soils. The highest quantities of suspended sediments were found in waters originating from watersheds dominated by agricultural lands, such as Location 2 (713.72 mg L<sup>-1</sup> in April 2012). Low clay content and the combination of land occupation (orchards = 71%) and slope (20.7 degrees) caused this ecosystem disturbance. Locations 1, 2, 3 and 6 were alimented by runoff water due to the melting of the snow. For this, the concentrations of sediments decreased by 4 fold between April and May in sub-basin 1 and by 11-14 fold in sub-basins 2, 3 and 6. Globally, some 1669.4 tons of sediments were delivered in the upper river during April. Bed load sediments were separated into 4 classes according to their size. The size of the particles found in the bed load reflected to a large extent the type of soils surrounding the watershed. The range of sand in the regions surrounding locations 6 and 7 was 64% and 82%, while the average in the bed load was 80.9% and 78.25% respectively. The silt content in locations 2, 3 and 5 was well reflected in the concentrations of silt in the bed load. In bed load samples, the exchangeable potassium ranged from 70-250 mg kg<sup>-1</sup> in sub-basins dominated by agricultural lands against 20-50 mg kg<sup>-1</sup> in sub-basins dominated by grassland and bare rocks. Further quantitative studies need to be conducted especially during the first rains to fully estimate the water load sediments after a prolonged dry season, characterizing the east Mediterranean. Action must be taken for land conservation by improving the farmer's practices, modifying the frequency of plowing and introducing no tillage beside the maintenance of terraces.

Keywords: Mountains, erosion, sediments, East Mediterranean, river, bed load quality.