

Difference in overlandflow generation and soil runoff in Kherlen drainage area, Mongolia

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Problem of soil erosion caused by overgrazing is becoming serious in Mongolia. It is necessary to elucidate actual condition of soil erosion quantitatively for considering effective counter plan. But very few studies about soil erosion have been carried out in Mongolia. The present study revealed the difference in overland flow generation and soil runoff comparing overgrazed and not overgrazed small basins in Kherlen river area to elucidate soil erosion process. The not overgrazed drainage basin (BGN) composed of granite is located near Baganuur town and the overgrazed drainage basin (KBU) composed of sandstone near Kheren Bayan Ulaan village. The water discharge and soil runoff were measured in two observed drainage basins. The area of BGN is 0.071 km² and that of KBU 0.080 km². The relief of BGN is 105m and that of KBU 160 m. Humus layer occurs in the soil layer of BGN with grass growing thick and partly larch forest. But thin grass vegetation almost without humus layer occurs and scattered breccias and soil crusts are distributed in KBU. The observed periods were from April 18 to September 30, 2003 for BGN and from April 19 to September 29, 2003 for KBU. The total precipitations of two observed drainage basins from May to September 2003 show about 290 mm much more than the precipitation of the recent 10 years.

The results of the observations show the distinct difference in runoff characteristics between BGN and KBU as follows. The peak discharge with the water level of about 0.5 cm in the Parshal flume associating with the rainfall event of more than 6mm/10min occurred and the hydrological curve showed gentle recession limbs continuously for a few days after peak discharge. On the other hand, the peak discharges with the water level of about 1 cm and 33 cm in the Parshal flume were generated associating with the rainfall of 8.2 mm (0:20-1:00, June 21) and that of 7.4 mm (2:00-2:40, June 21), respectively. The peak discharge of KBU occurred associating with rainfall within 10 or 20 minutes. The very quick rising and recession of water level implies that Hortonian overlandflow was generated in KBU. But the runoff characteristics of BGN show that Hortonian overlandflow was not generated in BGN.

Soil runoff was measured from June to September by sediment trap put near the parshal flume. The results of the measurement are as follows: the weight of soil runoff of June is 354g, that of July 144g, that of August 74g and that of September 0g in BGN, that of June 367g, that of July 15,852g, that of August 143g and that of September 0g in KBU. The results show that the soil runoff was generated in KBU much more than BGN. The soil runoff in KBU mainly occurred associating with the rainfall event of June 21. This means that soil erosion was generated by Hortonian overlandflow in KBU. The cause of the generation of Hortonian overlandflow is thought to be the formation of crust due to overgrazing.

It is concluded that soil erosion was induced by Hortonian overlandflow in overgrazed drainage basin (KBU), but very little soil erosion was generated in not overgrazed drainage basin (BGN).