

Abstract

The doctoral thesis deals with the evaluation of influences of causal factors that significantly affect runoff processes in landscape. The research is mainly focused on the examination of land and soil cover impacts and partially pays attention to the effects of surface drainage and snow cover. The main effort was to find out the extent of influences of each individual factor on runoff from a different type of landscape.

In order to find the correct answer, a methodical approach was applied to small experimental paired catchments where the research has been continuously undergoing since the year of 2006 (the presented results have been collected for 11 years of observations). The small experimental paired catchments are located at the foothills of the Šumava Mountains and they represent small area neighbouring catchments of similar physical-geographic and hydrographic conditions. The catchments were selected as the comparative ones where the main differences are the landscape and soil cover. Moreover, the character of surface drainage is regarded to be an important variable. In the catchment area of the Zbytinský Brook, there predominates the grassland which is largely drained by the subsurface drainage system. In the catchment area of the Tetřívčí Brook the dominant cover is formed by the forest which is criss-crossed with a network of surface drainage channels. The purpose was to find out if there were any significant differences in their runoff response when comparing the nature of the two catchments.

The runoff response was evaluated from the point of view of long-term time series lasting for the entire period of observation, including the expressions of their variability or extremity. The analysis was also focused on the detection of different runoff responses in the case of short-term rainfall-runoff events. The variety of different types of causal conditions has shown that the runoff response cannot be described using a single pattern for both catchments and, in some cases, is significantly different. In the last few years there has been a significant drop in runoff from the forest catchment. Despite this, the forest catchment proves more relevant runoff response in most of the observed events and overall greater runoff variability.

The soil water retention has been analysed and the differences in snow accumulation and melting have been detected in the catchments. In the forest catchment of the Tetřívčí Brook, experimental research has been carried out in a detailed study of the influence of surface drainage channels and the groundwater level fluctuations on runoff. The retention conditions of the catchment are primarily determined by the saturation level and by the character of soil cover which is related to historical changes in management and to soil improvement steps. The study has proved that forest needs to be assessed as a complex unit of interacting factors, where the vegetation cover itself has no direct impact on the catchment runoff.

Long-term balance evapotranspiration losses were monitored and at the same time the changes of water content in soil were recorded. A gradual climate transformation resulting in extreme weather fluctuations and longer periods of droughts is reflected in a small water cycle in the different types of environment. A relatively large proportion of precipitation

transformed into soil moisture does not take part in runoff due to increased forest transpiration and limiting conditions for the formation of drainage paths in the soil.

Key words: experimental research, paired catchments, land and soil cover, runoff process, rainfall-runoff event, drainage system