



## **Examination of Extreme Hidrological Conditions in Hungary Utilize GIS**

N. M. Forgoné, P. Köles, G. Balla

Fac. of Agricultural and Environmental Sciences, Szent István University, Gödöllő, Hungary  
([balla.gabor@mkk.szie.hu](mailto:balla.gabor@mkk.szie.hu) / +36 28 410-804)

Agricultural production in Hungary is influenced by geographical conditions and at times struggles with considerable amounts of excess water. At other times, the supply of water is insufficient for day to day agricultural operations.

The average 500-600mm yearly precipitation on the Great Hungarian Plain is hardly enough to sustain production without irrigation considering the water consumption of plants and the requirements of agricultural practice. Although in theory this value of precipitation should not cause water excess, in reality excess waters still appear, provoking damage primarily in agricultural practice but also in industrial and residential areas.

The sequential dry growing seasons in 1980-1990s – and economical problems – pushed the works connected with the surface drainage systems (like maintenance, research, development) into the background. However, knowing the cyclicity in the distribution of precipitation, the possibility of the fall of the maximal amount of precipitation in consequent years has to be kept in mind. The droughty years (1999-2000) have been followed by destructive floods and excess-waters. This effect demonstrates the two-facedness of the water-regime of the Great Hungarian Plain.

Excess-water problem appears in water management in connection with the flood protection and the river control. The additional water entailed by precipitation moved by gravitation, could not course to rivers because of bunds. The additional inland water which generates agricultural damage or delays growth of plants is called excess-water in Hungary. During the last century, Hungarian engineers built drainage systems which drive the excess-water from fields into receiver streams during the last century.

The VTT is a complex program, which includes the setup of the basin flood protection safety of the Tisza-river, rural development, and landscape-management in close connection with the needs of environmental protection. The construction of Cigánd water-reservoir is one of the main steps of this project. Its primary task is to decrease flood peaks and to reserve huge amount of water during high water level. Besides the planning of the structure and its control mechanisms it is highly recommended to develop landscape management features and establish the conditions of water-driving system.

The harmful water-surplus limits the productivity of vegetation, decreases its amount, worsens its quality; all these factors result in the reduction of the income.

The drought appears when the root zone of soil is run out of the water easily absorbable by the plant, not counting the precipitation of the previous period.

These effects are especially important when the plant is in its critical growing phase, when the water need of the plant is maximal. Sometimes the whole growing season can be considered as critical phase because the plant requires easy reachable water and air in the root zone permanently. The water-surplus and the drought can affect the same area in different period of the year.

We deal in our research with the surface drainage systems from the water management point of view, with the objective to replace the current land drainage status with a new expecting status. We want to give alternatives to the practice to be able to consider excess-water course priorities within certain catchment areas. This is especially important because the sensitivity of farms to excess-water damage has increased and has segregated within a drainage area. This work tries to give an environment friendly solution for the land use of the endangered territories during arid and wet periods. We also described the workflow of the decision making procedure.