

HYDRO-METEOROLOGICAL DATA PREPARATION FOR ECOSYSTEM HYDROLOGICAL MODELLING IN THE RIPARIAN FOREST OF HIDEGVÍZ VALLEY EXPERIMENTAL CATCHMENT

Csenge Nevezi¹, Tamás Bazsó¹, Zoltán Gribovszki¹, Péter Kalicz¹,
Előd Szőke¹

¹ University of Sopron, Faculty of Forestry, Institute of Geomatics, Civil Engineering and Hydrologics

In the Hidegvíz Valley experimental catchment in Hungary the meteorological data have been collected since the 1990s and used for various purposes including hydrological studies. Current research began in 2018–19, that aimed to reveal the connections between the hydrological and botanical characteristics in riparian forests and a wet meadow. Changes that occurred in both ecosystems in the groundwater levels, soil moisture and vegetation, showed that the local meteorological events influence these factors. Therefore we decided to analyse longer periods in which meteorological extremes strongly influenced hydrological conditions and so status of ecosystems. Further measurements and their analysis were also required because more accuracy and detail were needed for future water balance modelling.

The measured data between 2017–2020 were chosen as a starting database. For the first analysis we selected three meteorological parameters, i. e. the precipitation, the air temperature, and the air humidity. These parameters were measured by automated instruments, except for the precipitation. We found that the automated tipping-bucket rain gauge needs validation by a manual measurement (Hellmann-type rain gauge), because the data that collected by the automated device will be invalid if the rain intensity is too high.

In 2017 and 2018, the annual precipitation was distributed evenly, but in the following two years we observed some extremes. In 2019 and 2020, the spring was especially dry, the lowest monthly sum was 1.2 mm in 2020 April. 2019 April was similar (19.5 mm), but after the drought period intense rainfall events arrived in May, resulted a monthly total of 214.1 mm. Air temperature and air humidity has not been showed such extremes as the precipitation.

This study showed that detailed analysis of meteorological parameters is crucial for hydrological modelling data preparation because errors and extreme event can cause serious problems during modelling process and, also in case of evaluation of model results.



Figure 1: The location of Hidegvíz-valley in Europe.
Top left: The sampling area in the Hidegvíz-valley. This area is the primary spot for meteorological data collecting, currently planning on to assign two more measuring spots for more accuracy.



Figure 2: The sampling area near the Hidegvíz-valley research building. It shows the wet meadow during the vegetation period, the riparian elder forest also seen on the background.

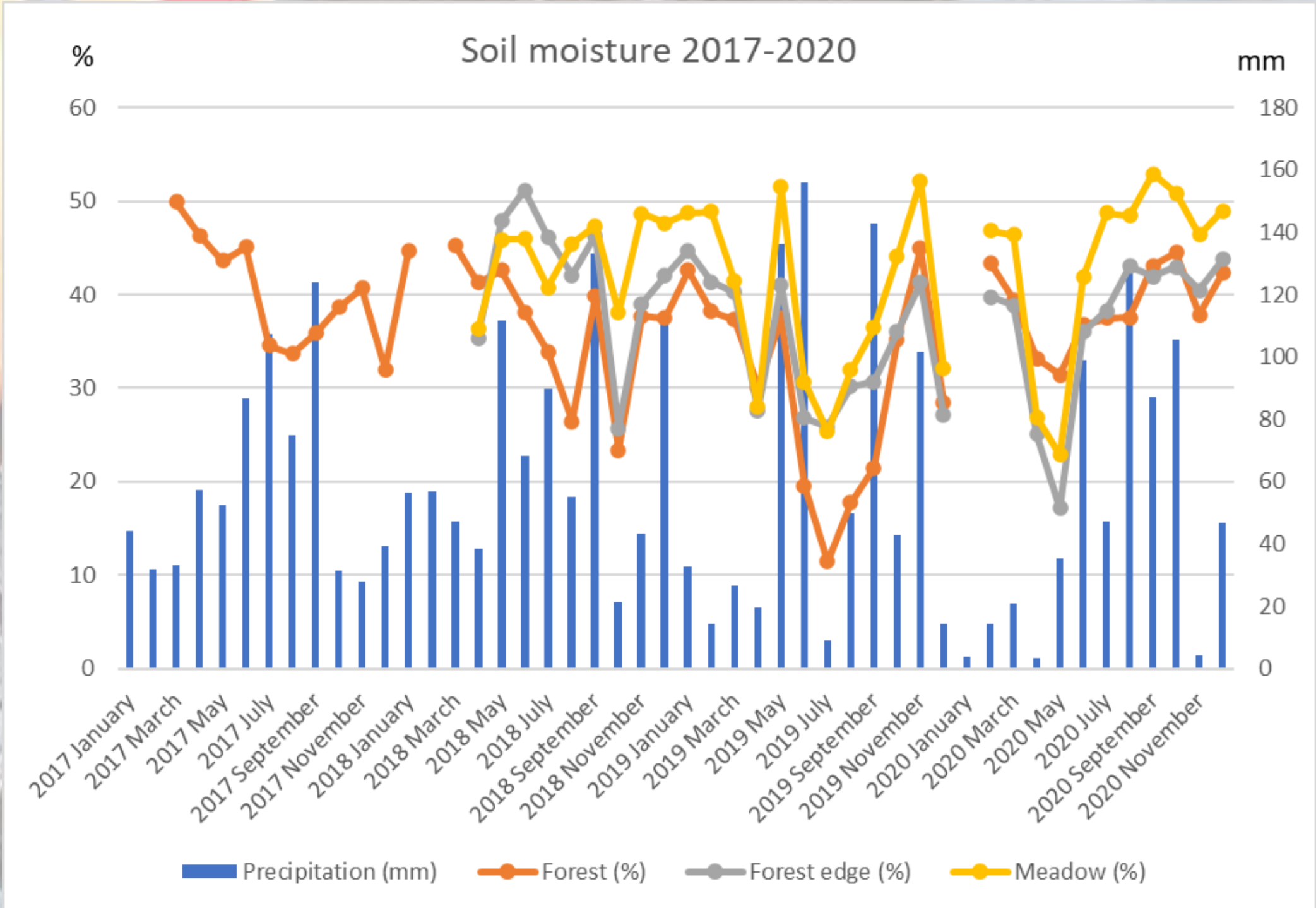


Figure 3: Observed soil moisture between 2017-2020. Surface soil moisture was measured with a TDR device. In winter, there are occasionally data gaps, because of the frozen ground.

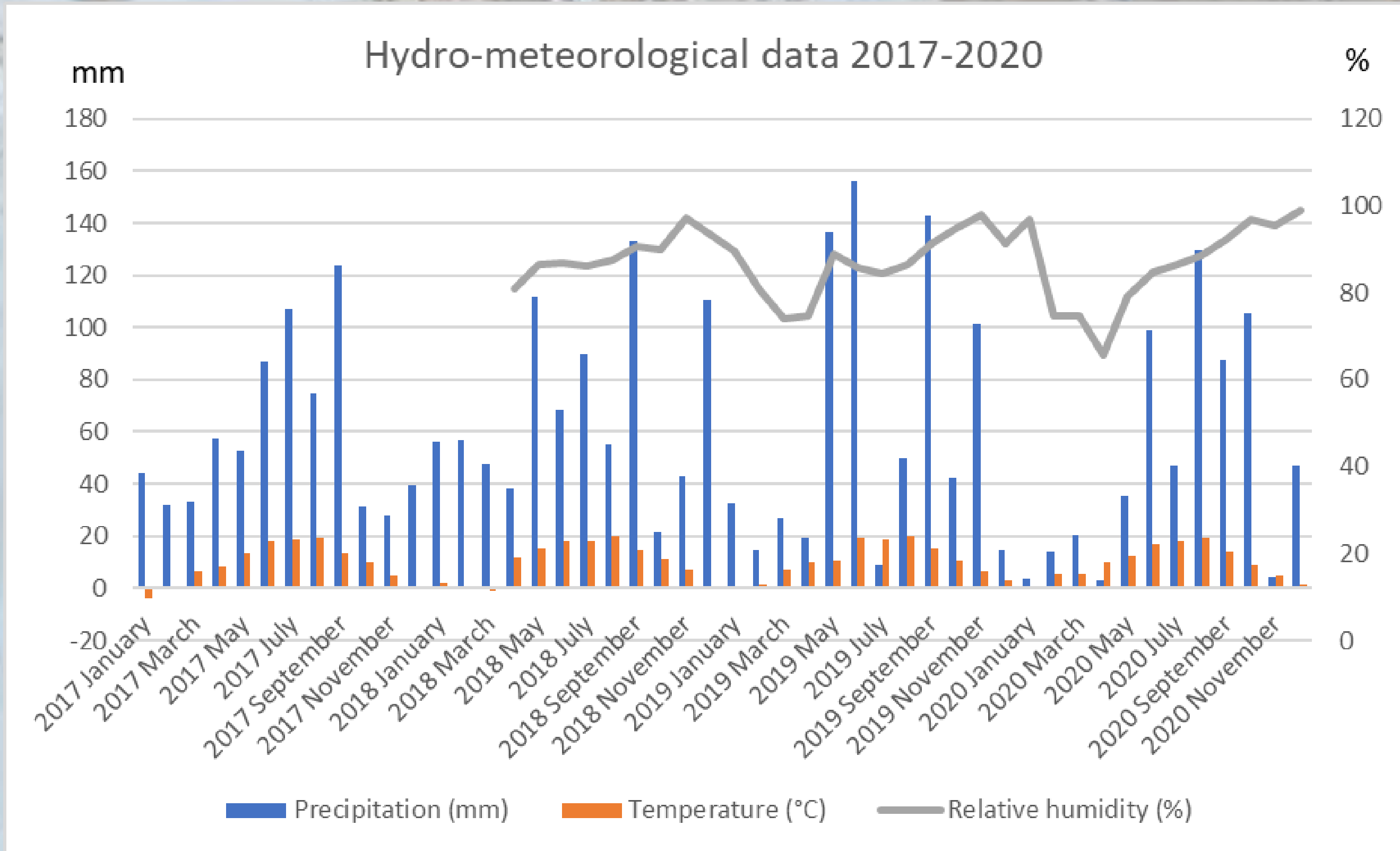


Figure 4: Observed hydro-meteorological data between 2017-2020. The lack of RH data in 2017 was caused by an equipment malfunctioning. Since then the data logger was repaired, and portable temperature-RH measuring data loggers were placed in the sampling area, in case of another malfunction.



Figure 5: Two portable temperature-RH data loggers in the meteorological station located in Hidegvíz-valley.