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Drought Continues in Hungary in 1995

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Meteorological Features of 1995

In 1995, Hungary again suffered from serious drought. Fortunately, drought has not extended over the whole country. It is primarily centered in the southeast, a plain area with significant agricultural production.

Meteorological conditions have been the most important factors in the evolution of the drought. The start of 1995 was not ideal; dry conditions during 1994 resulted in poor soil moisture at the beginning of the season. In Figure 1, the water shortage is indicated using the Palmer Drought Severity Index (PDSI), revealing the extraordinarily dry winter conditions in the east.

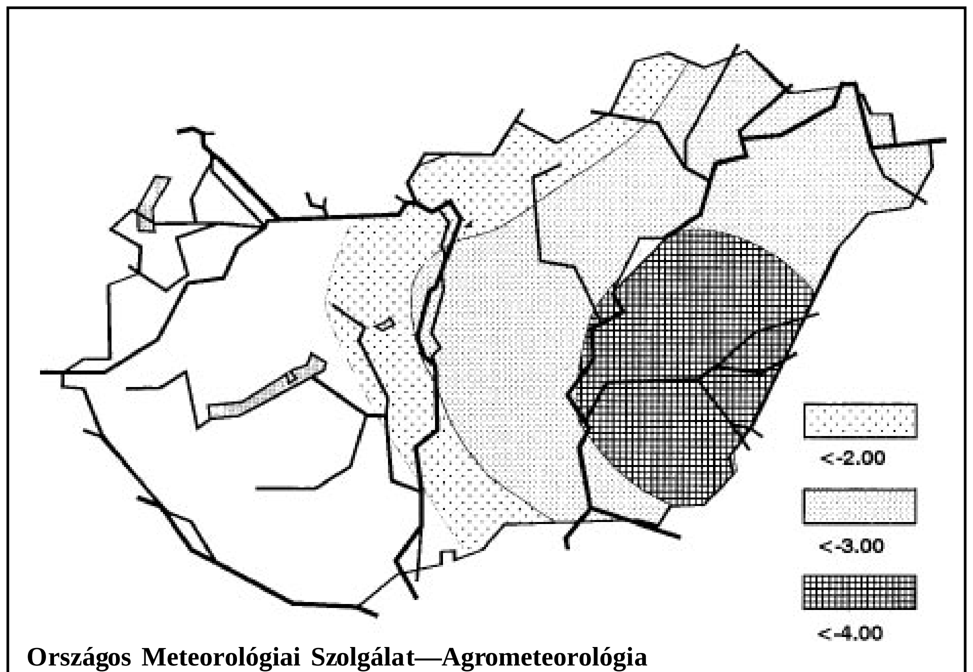

Figure 1. PDSI values in January 1995.

The following February was uncommonly warm, with a monthly temperature anomaly of +4.4°C—even warmer than March. February was wet as well as warm—a +40% monthly precipitation anomaly brought soil moisture levels to near field capacity. By the beginning of spring and the growing season, the situation had become promising, and soil moisture conditions made producers feel optimistic. This optimism lingered: March and April were cooler than average and precipitation was 60%–120% (March) and 100%–200% (April) of average, reducing evaporative loss and keeping soil moisture close to its normal course.

As a result of decreased precipitation in May (60%–80% of average), a vigorous depletion of soil moisture started in the eastern areas and continued in June. Since cereals had ripened before the real heat and drought arrived, and spring had been quite wet, these crops yielded average or abundant harvest. July was extremely hot, similar to July 1994. It was the fifth hottest and driest July in 115 years of record keeping; the temperature anomaly reached as much as +3°C. In July, the eastern part of the country recorded only 10 mm of precipitation, about 25%–30% of the average. The soils continued drying, and by 20 July, the decreasing moisture content reached the drought level.

The hot and dry spell continued in August as well. The limited amount of rainfall meant limited recharge for soil moisture. By August, the water content had diminished throughout the country. The severity of drought can be demonstrated by PDSI values (Figure 2), which exceeded -3 (severe

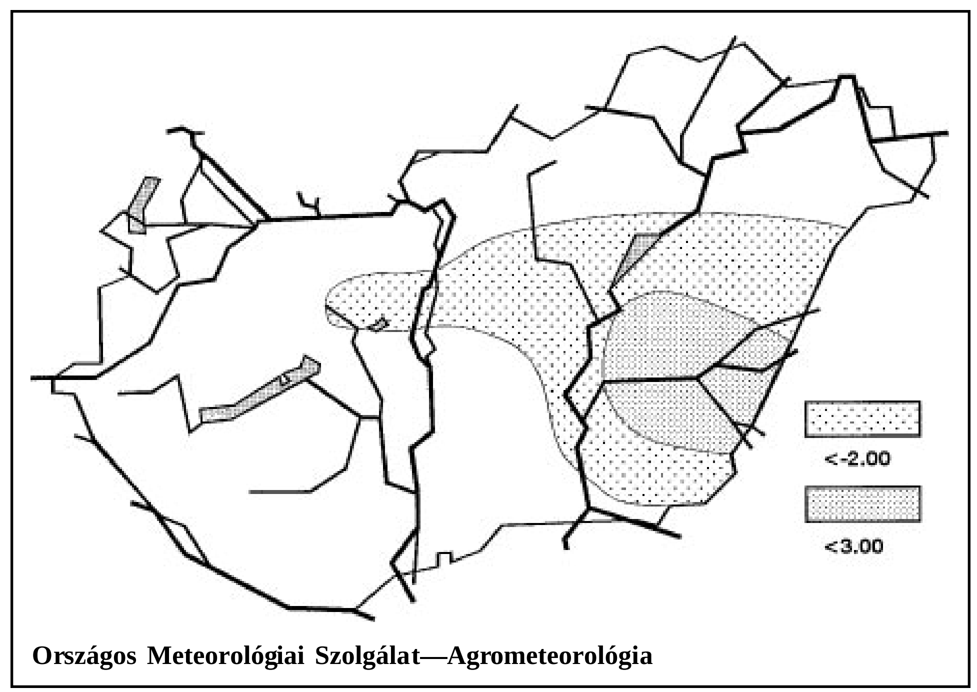

Figure 2. PDSI values in August 1995.

drought) in the southeast; moderate drought (PDSI < -2) covered more than half of the main agricultural areas. Although September was very rainy, October was extremely dry. According to measurements, this October was the second driest in the century, accompanied by temperatures 1.5°–2.5°C above normal. About 90% of the country received rainfall of 5 mm or less (approximately 10% of average); 50% of the country had no measurable precipitation. The surface layers of soils dried out, significantly hindering autumn agricultural activities such as ploughing and sowing. As a consequence, winter cereals were often planted under poor conditions, and at the end of the winter, weak germination and poor quality of wheat seedlings was apparent.

Agricultural Consequences

The warm and dry weather of July and August caused serious agricultural damage. This time period coincided with the silking/milk ripening phenophase of maize, greatly diminishing pollination and yields. Forced silage affected more than 60,000 ha, a figure almost equal to that of 1994 (Bussay et al., 1995). Rains of late August and September did not improve the situation much. Maize yields were estimated at 20%–30% below average. Sugar beet was also affected; an 8%–12% decrease in sugar content was measured, which might affect the sugar industry. Potato crop yields and the starch content of tubers were reduced by 10%–15%.

Droughts in the Last Century

Since 1983, there has been a continuous period of drought in Hungary. In other words, since 1983, only a few years can be regarded as "normal." Compared to the other years in this time period, the drought of 1995 was serious but not extraordinary. To evaluate its place in our climate and the history of droughts, we examined 15 stations representing the entire country and 115 years (1881–1995) of measurements. PDSI values show that a serious drought spell is not unprecedented in our region: numerous extremely dry years occurred during the periods 1921–25, 1932–35, 1943–54, and 1971–78, and from 1983 to the present. The series of dry years of the last decade has significantly reduced the profitability of Hungarian agriculture. Moreover, patterns and ratios of cultivated crops are changing: the planting area of drought-resistant sunflower has tripled, and millet and sorghum have appeared. About 5% of the cultivated land is irrigated. High costs have deterred increases in the amount of land irrigated.

The recent long series of dry years is blamed for the significant fall of the water table, which has characteristically appeared between our two main rivers (Danube and Tisza). In some cases, the decrease is more than 3 meters, which affects both annual and perennial crops such as orchards and vineyards.

PDSI values calculated on the basis of 115 years of data revealed droughts that extended over the entire country (e.g., 1947). One can then conclude that none of the droughts of the last 13 years could be regarded as extreme, in either intensity or extent. However, the recent period is unprecedented in its length. No similar long and continuous dry spell occurred during the 115-year

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time period. The only similar interval happened during 1779–94, reconstructed on the basis of historical data. Those dreadful years brought starving and destitution to the country.

Figure 3 shows the droughts of the 115-year time period. For simplicity, we have defined drought categories: *extreme* means an area characterized by

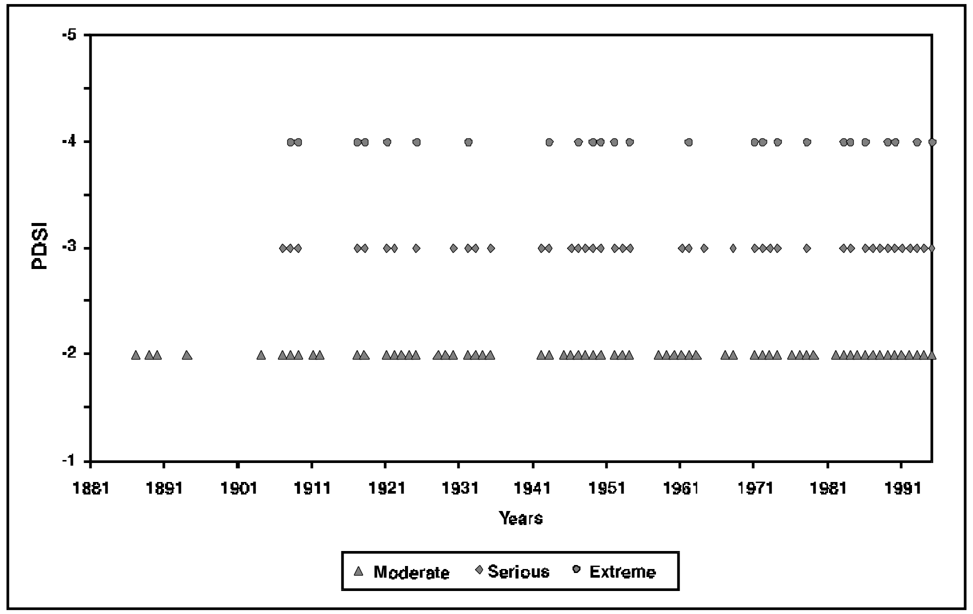

Figure 3. Droughts in Hungary.

PDSI ≤-4 extending over more than 20% of the country; *serious*, PDSI ≤-3 covering more than one-third of the country (33%); and *moderate*, PDSI ≤-2 covering more than half of the country (50%). Each dot over a particular year means that the drought in that year exceeded these thresholds. Comparing years of drought in Hungary with the surface mean temperature (Szentimrey et al., 1992) of the northern hemisphere (Figure 4), one can notice a

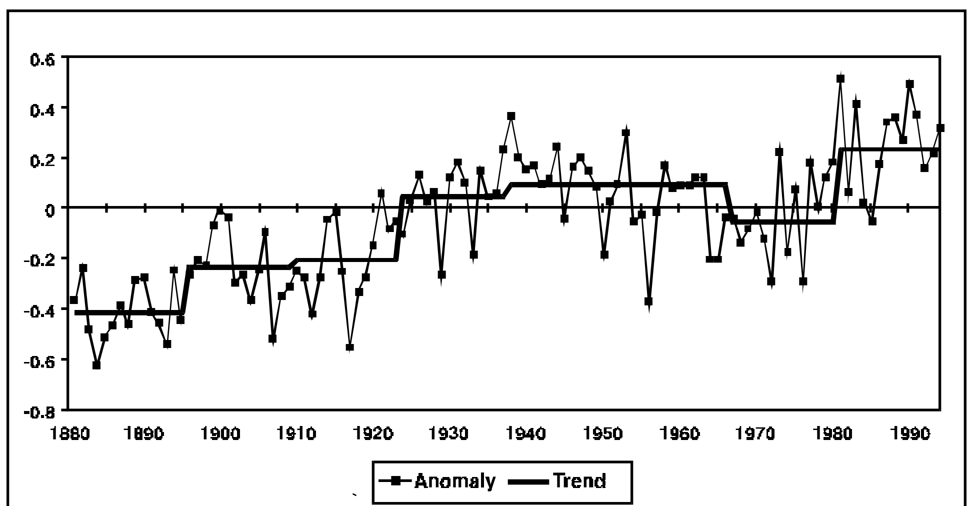

Figure 4. Temperature anomalies and trend of the Northern Hemisphere.

concurrence of increased frequency of dry years and periods of hemispherical warm or warming periods. If this phenomenon continues, the increase in drought frequency could be regarded as a regional sign or indicator of global warming.

References

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