



Specifications of Temporal Distribution of Droughts in Azerbaijan

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Abstract

The initial stage of the drought usually begins with low active high anticyclones and is accompanied by stable (from several weeks to 2-3 months) with high temperatures and the whether condition on small number of the precipitation. As a result, the stock of the soil moisture is reduced, high temperatures gradually reduce humidity, increase possible evaporation, and the threat to agricultural crops gradually increases. The drought is a very dangerous atmospheric phenomenon in reducing the productivity of agriculture, but also it is one of the processes that lead to the depletion of water resources. Thus, the study of the drought as one of the aftereffects of the contemporary warming world became one of the problems, exciting not only researchers, but the world community as a whole. In the presented article there determine distribution specifications of the drought for the last 120 years in Lenkoran, which is the one of largest economic regions of Azerbaijan.

Keywords: Drought; Anomaly; Productivity; Intensity; Repeatability

Introduction

The severe drought in Azerbaijan has been observed in 2000 y. In the same year, the average temperature anomaly in the country has been consisted of + 1.3°C, the number of annual precipitations-444 mm, which is 8.3% less than the norm of precipitations. In June-July the average air temperature has been 1.6°C above the norm. In summer months of 2000 y. fallen precipitations have been consisted of only 38% of the corresponding norm. July has been particularly dry, and the number of precipitations has been 93% below the norm. In June this estimate has been 56%, and in August-42%. The duration of the period without precipitation in the Central Aran has been more than 50 days. The absolute maximum of the air temperature has been fixed in some arid regions [1]. The absolute maximum in the territory of Azerbaijan has been 46.1°C (Julfa point), which at 1.5°C above the corresponding temperature of the previous period, covering

the term more than 100 years. The drought has been also strongly affected the vegetation: the growing term has been ended at 1.0-1.5 months earlier than the natural term. If the growing period of some forage crops ends in mid-April in ordinary years, then in the year 2000 their vegetation has been ended in early March. Due to the strong drought in the summer months, in mid-July the grass cover in the summer pastures in the alpine meadows has been dried up. The production of wheat, potatoes, grapes and cotton has been significantly decreased in many regions. As a result of the fire in 8 administrative regions the areas of 110 km² have been suffered. Generally, the drought of 2000 y. has been caused a large amount of damage in the economy of the country. As noted in the previous chapters, along with the method proposed by Pedin DA [2], the methods proposed by Mishers AV [3] have been comparatively studied and dry years have been determined by the formula (1).

Method

On studying drought there have been used SPI indices in the article:

$$SPi = (X_i - \bar{X}) / S_s$$

Where X_i shows the average annual precipitation; \bar{X} the climatic norm of the precipitations; S_s the mean quadratic fluctuations. According to the formula (1), the degree of the severity of the drought is determined according to the data of the Table 1 [1,2].

SY	The degree of the drought
0,0-(-0,99)	low
(-1,0)-(-1,49)	average
(-1,5)-(-1,99)	severe
-2,0or less	very severe

Table 1: The degree of the drought.

The Analysis of Calculations

The drought greatly varies in severity, for example, although severe drought has been observed in Lankaran in the spring of 2001 and autumn of 2005 it has been observed in very close territories: in Astara in the spring of 2001 and autumn 2007 and in Yardymly in the spring of 1998 y. The spring of 1998, 2000, 2001, 2006 y.y and the autumn 2002, 2005, 2007 y.y have been dry in all regions of the province. In the remaining years, weak and moderate droughts have been occurred unevenly across the regions. As can be seen from the figure below the repeatability of the drought in Lankaran increased by 9% in the second half of the last 100 years. For the last 20 years there have been 10 droughts of varying severity. It consists of 4.4% of arid years that occurred in the territory in 1900-2014 y.y The repetition frequency of the drought in different seasons mainly coincides with 1891-1900, 1950-1960 and 1991-2000 y.y But extreme droughts have been observed here in 1917, 1938, 1952, 1954, 1964, 1971, 1978, 1981, 1992 and 2005 y.y Figure 1[2,3].

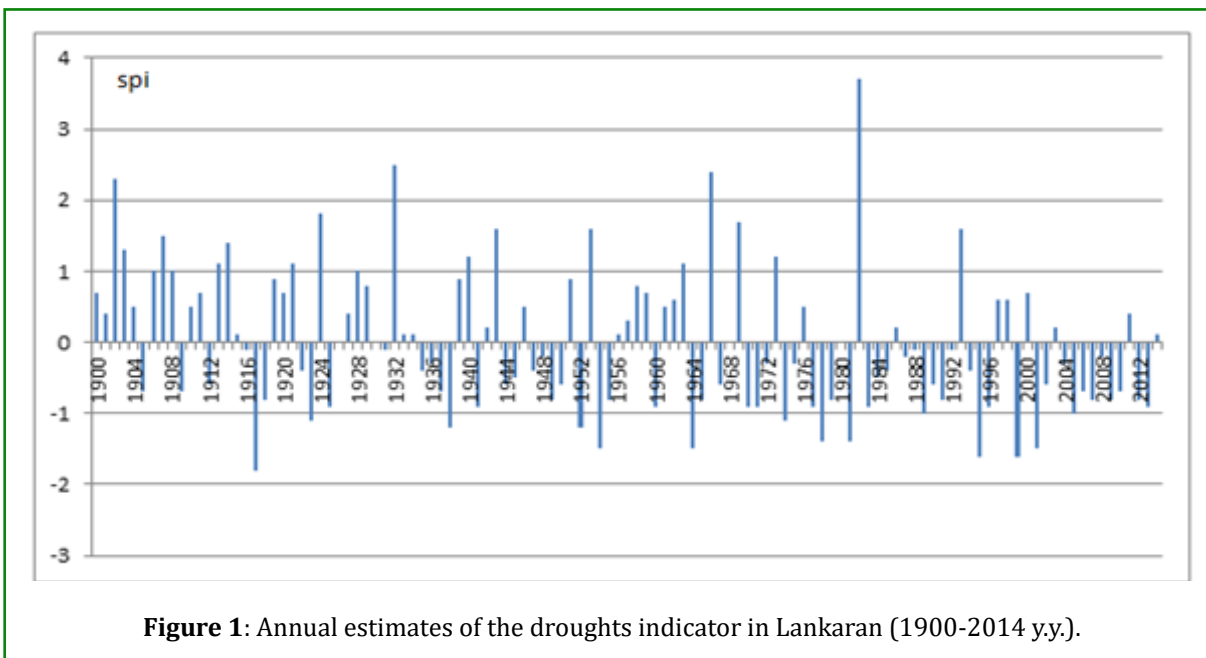


Figure 1: Annual estimates of the droughts indicator in Lankaran (1900-2014 y.y).

Figure 1 shows that in the second half of the period on 1900-2014 y.y. in the research area there observe more arid years than those in the first. Thus, in the 1900-1941 y.y. period there 13 times have been observed species of the drought, and 1942-1991 y.y. period-29 times. It consists of about 25% of the total number of dry years in the second half of the period.

A great repetition of the arid years has been occurred in 1950-1960 y.y. and 1980-1990 y.y.. The repetition frequency of severe droughts is about 3-4 years. For the period from 1991 to 2007 y.y., there have been 10 droughts, which is 22% of drought years [2,3].

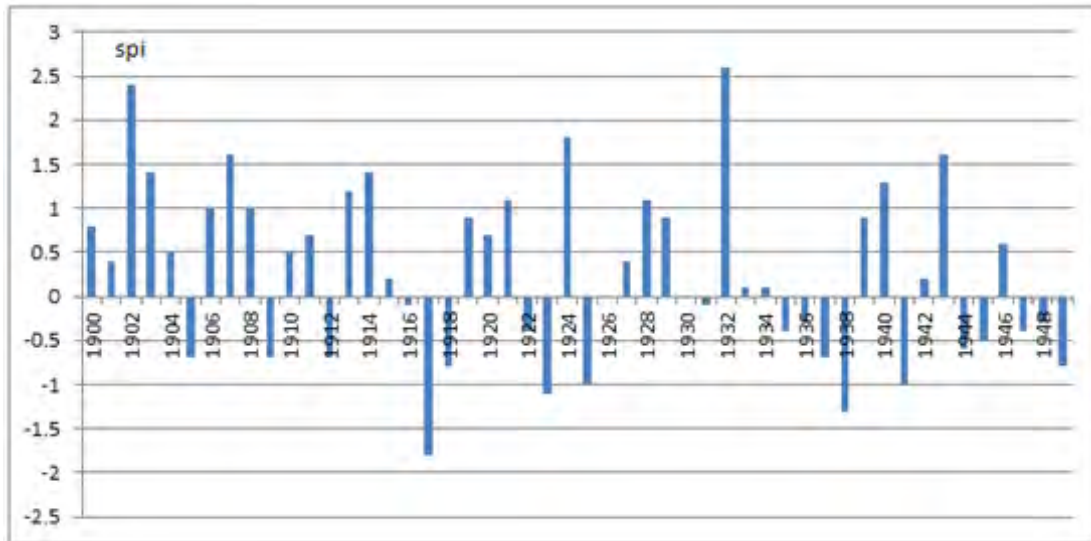


Figure 2: Annual estimates of the droughts indicator in Lankaran (1900-1950 y.y.).

Figure 2 shows that the frequency of the drought in the region increases up to once a year. Although the number of precipitations significantly increased between 1900-1914,

by 1938 the number of precipitations in the region decreased to 25-30% and creates the basis for the next drought.

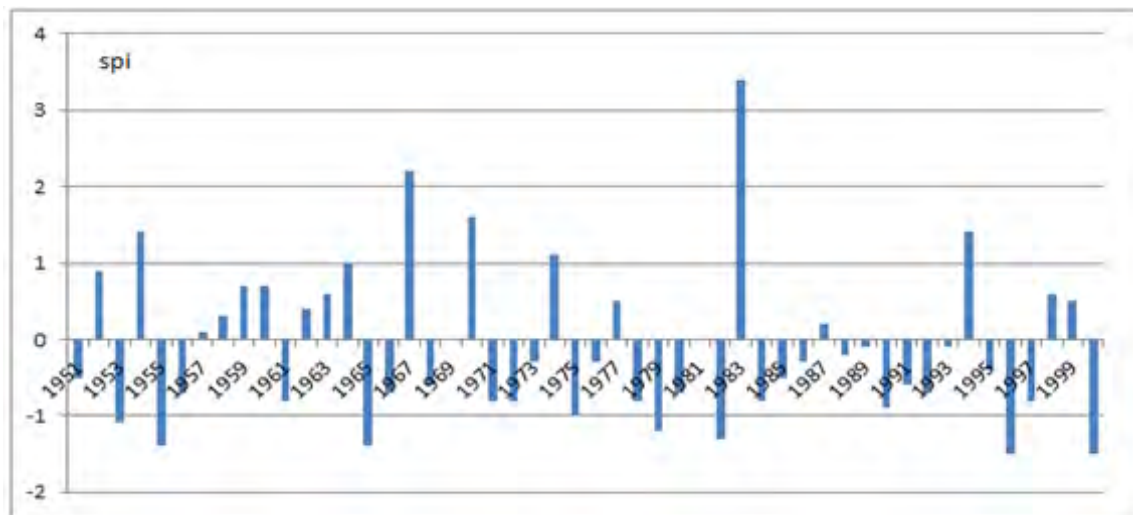
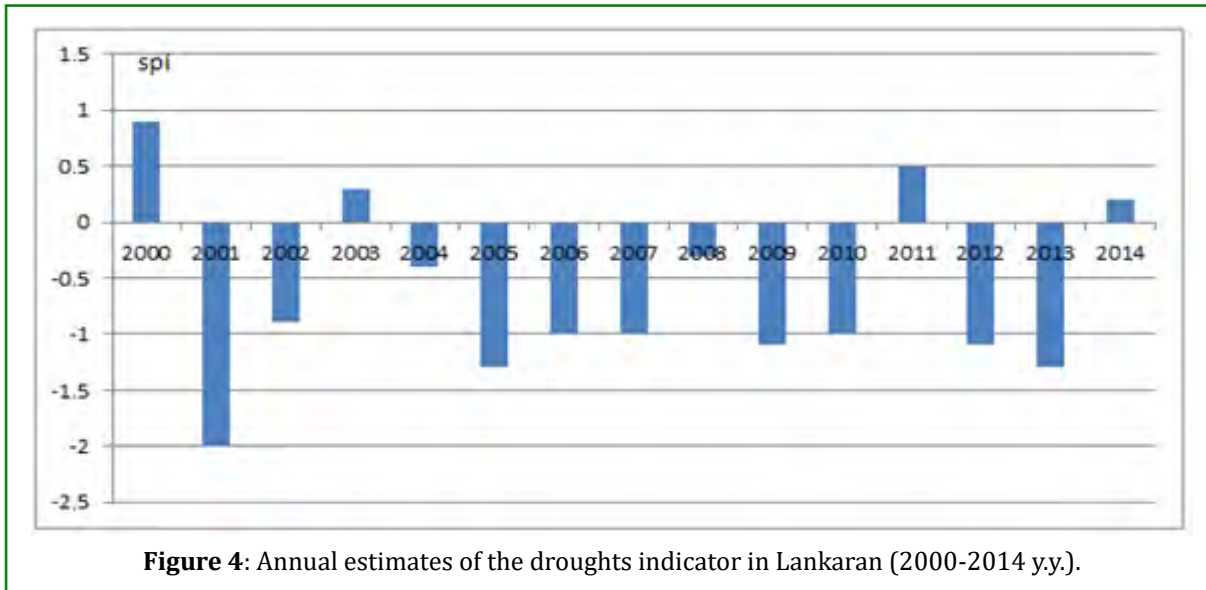


Figure 3: Annual estimates of the droughts indicator in Lankaran (1950-2000 y.y.).

In the Figure 3 it is possible to say that the frequency and intensity of the drought are approximately linearly connected by the increase in the warming period. Thus, for this period

there have been registered about 30 droughts. It means that over 50 years the drought will increase to 60%.



Thus, the contemporary warming period has been marked by the intensification of atmospheric anomalies. Thus, the drought, as one of the most dangerous forms of these anomalies, may be even more tragic for the society. As can be seen from the figure 4, over the 2000-2014 y.y period in the region there have been observed precipitations with the intensity of 0.4 mm only 3 times. And it is 1000 times less than the annual number of precipitations in the region. In the noted period 11 droughts with different intensities have been observed in the region. This speaks of the fact that the repetition degree of the drought has been increased by 80% for the last 14 years.

Result

So, the results of the analysis in the article recommend researchers to focus on the development of the prevention measures against the drought. According to existing sources, the productivity of the agriculture decreases year by year,

mountain glaciers disappear, the area of polar icebergs decreases, the level of the water in the rivers falls, the level of underground waters decreases and so on. Of course, it is impossible to prevent global climate change yet, but it is possible to develop its forecast and soften its consequences, and I urge researchers to unite efforts in this direction.

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