

Considerations Upon The Droughts Of Oltenia And Their Effects

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ABSTRACT

In this paper we analysed the droughts that affected Oltenia after 1987. The frequency and intensity of this phenomena increased proportionally with the intensification of the climatic risk phenomena asociated with the global warming of the atmosphere. In matters of frequency and intensity, the droughts and the early heat waves in the warm season determined a fast-growing aridity especially in the South of Oltenia. These have drastically reduced the agricultural productions playing an essential role in the raising prices of food and daily use products; this raise is strongly related to the climatic risk phenomena. This paper highlights important aspects of tohese phenomena in Oltenia, and we extended our analysis to the droughts of the cold season. The analysis is based on the processing of long data series from meteorological and pluviometric stations in Oltenia and has a crucial importance for the regional climatic evolutions, being of great use to climatologists, meteorologist, agronomists students, those who try to achieve a master or doctor degree and also to those interested in the evolution of the climatic phenomena in Oltenia.

KEY WORDS: drought, dryness, heat waves, aridity, desertification, draining, climatic changes, precipitations, average temperatures.

1. INTRODUCTION

Droughts are extremely complex climatic phenomena determined by a great range of factors as: atmospheric precipitations, the air and ground temperature, the water reserve in the ground which is accesible to plants, the humidity of the wind (or, to be more precise, the low humidity degree of air also known as the dryness of the air), the evapotranspiration and the wind speed.

Global and regional climatic changes, the anthropic impact on the environment, the irrational use of ground resources led to an extension of the area affected by droughts, to intensifications in the processes of dryness and desertification, and also to the increase in frequency and duration of droughts in certain regions of the world and even of our country.

The apparently unstoppable raise in the price of food, as the global food crisis is primarily based on the quick extension and evolution of droughts and other manifestations of climatic changes. These phenomena are present in our country and their implications at all development levels of social and economic life are undeniable.

2. MATERIALS AND METHODS

In the analysis of dryness and drought phenomena some of the most helpful criteria and methods are:

-the analysis of unperiodical variations and anomalies of the quantities of precipitations (monthly, seasonly, semestrial and annual)

-the frequency of the pluviometric time type (tables 1), when Hellman's Criterion is applied to monthly and annual quantities (the criterion also establishes the percentage anomaly intervals of seasonly and semestrial quantities in relation with the normals)

-the use of Walter Lieth climatogram

-the use of the standard index of precipitations (SIP)

In this paper we mostly used Hellman's criterion and the data base is made up of the recordings from meteorological stations in Oltenia with long data successions (some of them recorded more than 120 years ago), We've also drawn graphics which are very helpful when using the comparative analysis in the study of these phenomena and we processed the published statistics in order to appreciate the effects of drought periods.

Tables no. 1, Pluviometric Time Type According to Hellmann's Criterion

applied to the monthly precipitations			applied to the annual precipitations		
The time type	The Anomaly (%)	Abreviation	The time type	The Anomaly (%)	Abreviation
Excessively Rainy	>50	ER	Excessively Rainy	>20	ER
Very Rainy	30.1...50.0	VR	Very Rainy	15.1...20.0	VR
Rainy	20.1...30.0	R	Rainy	10.1...15.0	R
Little Rainy	10.1...20.0	LR	Little Rainy	5.1...10.0	LR
Normal	-10.0...+10.0	N	Normal	-5.0...+ 5.0	N
Little Droughty	-20.0...-10.1	LD	Little Droughty	-10.0...-5.1	LD
Droughty	-30.0...-20.1	D	Droughty	-15.0...-10.1	D
Very Droughty	-50.0...-30.1	VD	Very Droughty	-20.0...-15.1	VD
Excessively Droughty	>-50.0	ED	Excessively Droughty	>-20.0	ED

3. THE EVOLUTION OF DROUGHTS IN OLTENIA

The precipitations and temperatures conditions, strongly related to the drought and dryness phenomena, recorded in the 20th century great unperiodic variations. The analysis of negative anomalies of the annual and monthly quantities of precipitations in relation with the multiannual average value considered normal for the Southern half of Romania "sheltered" by the Carpatho-Balkanian orographic barrage from the Western air circulation, yet exposed the the Eastern circulation and Pontic influences, highlights the differences between the climatic areas: the West is characterised by oceanic and submediterranean influences, the center by the interference of Western, South-Western and Eastern influences, the East by continental influences, the littoral with Pontic influences and the Carpathian Curvature limitrophe area.

The negative anomalies of the annual quantities of precipitations in relation with the multiannual average value emphasize the driest years and also the intensity of the drought in those years.

The lowest annual quantities of precipitations in all the period of observations in each station were registered in distinct years and generally range from 200 and 300 l/m², yet the lowest value of annual precipitations was 178.3 l/m² registered in Dragasani in 1907 due to the oceanic and submediterranean influences on the one hand, and the local influences on the other hand-the role of orographic barrage of the relief, the Southern exposition of slopes-fronting the wet tropical air-which-when gradually crossed from North and North-West accelerates the increase of the precipitation potential as a consequence of the forced ascension of the air and the adiabatic cooling of the air mass-this being the place where the highest anomaly by comparison to the normal value, because here the normal values are also high due to the same causes. This shows great variation in time of the annual quantities of precipitations, the anomalies being very high as opposed to the values registered in other stations. The lowest minimum value for the South-Eastern Romania is 203.0 l/m² registered in Constanta in 1953 as a result of the Eastern and North-Eastern influences that are accentuated by the presence of the Black Sea (here thermic inversions of evaporation at the surface of the water take place, descending currents dissolve the cloudiness hence, the amount of precipitations is reduced), yet, this is the place where the lowest anomaly by comparison to the normal value was registered, mainly because the low normal value determined by the same factors. This shows, in contrast, a higher uniformity in time of the quantities of precipitations, the anomalies being, on the whole, lower than those recorded in other stations.

The highest negative anomaly for Oltenia is 459.5 l/m² in Râmnicu Vâlcea in 1925, and the lowest anomaly is 161.2 l/m² in Bechet in 2000. Hence, we can assert that in Oltenia a territorial variation from North to South imposed by the relief levels is encountered.

We remark that in Drobeta-Turnu Severin, Slatina and Caracal the lowest annual precipitations for the whole period of meteorological observations in our country, as well as in other stations in Oltenia-yet another proof of the intensity of the drought in 2000.

An important characteristic of Romania, by its geographical position, by the presence of the Carpathian Mountains which, by interacting with the general circulation of the atmosphere divides the

country into regions where the weather and climate are different (the multiple external climatic influences), is that the droughts never took place and never had the same intensity in all the regions of our country.

3. 1. THE DROUGHT OF 1991-1993

The analysis of the pluviometric time type shows that this drought had actually begun in 1987 when, in the South of Oltenia and in the Romanian Plain-especially in the warm season, droughty and extremely droughty months were recorded (tables 2).

Tables no. 2, Pluviometric Time Type According to Hellmann's Criterion in 1992
(Source: processing data)

Meteorological station	Months												Annual	DT	RT	NT		
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII						
Craiova	ED	R	ED	N	ED	N	ED	N	ED	ED	ED	ED	ED	ED	ED	8	1	3
Băilești	ED	ED	ED	VR	ED	LR	ED	ED	ED	ED	ED	ED	ED	ED	ED	10	2	0
Bechet	ED	VD	ED	VR	VD	ER	ER	ED	ED	VD	ED	ED	ED	ED	ED	9	3	0
Calafat	ED	ED	ED	ER	D	LR	ED	ED	ED	ED	ED	ED	VD	ED	ED	10	2	0
Tg. Jiu	ED	ED	ED	LD	ED	LR	D	ED	ED	N	D	VD	ED	ED	ED	10	1	1
Apa Neagră	ED	ED	ED	VD	ED	ER	VD	ED	VD	R	VD	N	ED	ED	ED	9	2	1
Polovrași	ED	ED	ED	D	VD	VR	D	VD	ED	N	VD	VD	ED	ED	ED	10	1	1
Tg. Logrești	ED	VD	ED	LD	VD	VR	LD	ED	VD	D	VD	VD	ED	ED	ED	11	1	0
Dr. Tr. Severin	ED	ED	ED	LD	ED	ER	D	ED	ED	LD	ED	R	ED	ED	ED	10	2	0
Băcleș	ED	ED	ED	N	ED	ER	ED	ED	ED	ED	ED	VD	ED	ED	ED	10	1	1
Slatina	ED	VD	VD	LD	ED	N	ED	ED	ED	ED	ED	ED	ED	ED	ED	11	0	1
Caracal	ED	D	ED	LD	ED	ER	ED	VR	ED	ED	ED	ED	ED	ED	ED	10	2	0
Rm. Vâlcea	ED	ED	ED	VD	ED	ER	ED	VD	VD	N	ED	ED	ED	ED	ED	10	1	1
Drăgășani	ED	VD	ED	LD	ED	D	VD	N	ED	VD	ED	ED	ED	ED	ED	11	0	1
Petroșani	ED	LD	ED	LD	ED	ER	ED	D	VD	N	VD	VD	ED	ED	ED	10	1	1
Parâng	VD	ER	ED	VD	VD	VR	ED	N	LD	LR	D	ED	VD	ED	ED	8	3	1
Droughty Time ¹(DT)	17	15	17	13	17	1	16	14	17	11	17	15	170	83.33%				
Rainy Time (RT)	0	2	0	3	0	14	1	1	0	2	0	1	24	11.77%				
Normal Time (NT)	0	0	0	1	0	2	0	2	0	4	0	1	10	4.90%				

In the extreme South of Oltenia droughty and extremely droughty months were recorded in 1983, 1985, 1986 also, the drought had a slow evolution in time with short periods in which the precipitations were almost normal, but the lack of precipitations in the ground and the freatic layers gradually accumulated and increased in time, even though the annual quantities of precipitations were close to normal.

The peak of the drought was reached in the summer of 1993 when, seven counties in the South of the country were gravely affected and when the Government of Romania had to promulgate the law 70/1993 about the covering the payments efectuated for the crops (tables 2 and 3). In these 2 years the drought was violent as it determined the drying of cultures, fields and even of certain areas in forests.

Also, the absence of precipitations was long for example-the droughty time has been of 19 months of 24 in Bailesti-Romanian Plain out of which 15 was excesively droughty as in Tg Jiu and Slatina; 20 months in Caracal-South-East of Oltenia and also Bacles in The Hills of Mehedinti, Petrosani Depression (tables 4 and 5).

¹ DT expressed in months/meteorological station of droughty time (DT), similarly we define the (RT) and the (NT) .E.G. If we recorded for the meteorological station X in the month Y droughty time we say we have had a case of month/station droughty time; this measurement has a space and time meaning useful in tackling with drought and precipitation exceedings. Lately, measures like the average quantity of precipitations in the whole country for a month, or for a year which has a spece and time meaning were defined.

Tables no. 3, Pluviometric Time Type According to Hellmann's Criterion in 1993
(Source: processing data)

Meteorological station	Months												Annual	TD	TR	TN
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII				
Craiova	VD	LR	ER	ED	VE	ED	ED	VD	D	ED	ER	VD	ED	9	3	0
Băilești	VD	VD	R	ED	N	ED	ED	VD	D	ED	ER	D	ED	9	2	1
Bechet	VD	N	LR	ED	N	ED	ED	VD	VD	ED	ER	VD	ED	8	2	2
Calafat	ED	ED	LR	ED	VR	ED	ED	N	LD	ED	ER	D	ED	8	3	1
Tg. Jiu	ED	ED	ER	VD	VE	ED	VD	D	N	ED	ER	D	ED	9	2	1
Apa Neagră	ED	ED	ER	D	D	ED	ED	N	N	VD	VR	VD	ED	8	2	2
Polovragi	ED	ED	ER	VD	D	ED	VD	D	N	VD	LR	R	ED	8	3	1
Tg. Logrești	ED	LD	ER	VD	VE	ED	ED	VR	ER	VD	VR	LD	VD	8	4	0
Dr. Tr. Severin	ED	ED	ER	ED	N	ED	ED	N	D	ED	ER	D	ED	8	2	2
Băcleș	ED	ED	ER	ED	LD	VD	ED	LD	D	ED	ER	VD	ED	10	2	0
Slatina	ED	N	ER	ED	D	D	ED	VR	ER	VD	LR	ED	ED	8	4	0
Caracal	ED	D	LR	ED	ED	ED	ED	ED	D	LR	ED	ED	ED	10	2	0
Rm. Vâlcea	ED	ED	ER	LD	VD	ED	VD	N	LD	VD	R	N	ED	8	2	2
Drăgășani	ED	N	ER	VD	D	N	ED	VD	VD	D	N	ED	ED	8	1	3
Petroșani	VE	ED	ER	ED	VD	D	VD	D	D	ED	D	N	ED	10	1	1
Parâng	ED	N	VR	VD	D	VD	VD	N	LR	ED	LD	N	ED	7	2	3
Droughty Time (DT)	17	12	0	17	13	16	17	10	11	17	2	13	145	71.08%		
Rainy Time (RT)	0	1	17	0	1	0	0	2	3	0	14	1	39	19.12%		
Normal Time (NT)	0	4	0	0	3	1	0	5	3	0	1	3	20	9.80%		

From the annual negative deficits of precipitations we name:

-in 1992: 259.7 l/m² (46.48% of the normal value) in Calafat, 275.2 l/m² in Dr. Tr. Severin (36.69% of the normal value), 286.0 l/m² in Băcleș (46.24% of the normal value), 289.5 l/m² (33.46% of the normal value) in Polovragi, 296.6 l/m² (32.43% of the normal value) in Apa Neagră, 304.9 l/m² (53.72% of the normal value) in Băilești, 308.0 l/m² (40.40% of the normal value) in Tg Jiu, 321.3 l/m² (55.02% of the normal value) in Slatina etc.

The percentage deficites ranged from 17.83% in Parâng in the high mountain area and 55.02% in Slatina in the Getic Piemont at the Northern limit of the Oltenian Plain. In this year the droughty time had a an extension of 83.33% month/meteorological station.

-in 1993: 141.9 l/m² (25.40% of the normal value) in Calafat, 165.7 l/m² (29.19% of the normal value) in Băilești, 181.8 l/m² (26.22% of the normal value) in Dr. Tr. Severin, 186.0 l/m² (25.69% of the normal value) in Rm. Vâlcea, 196.0 l/m² (34.53% of the normal value) in Bechet, 205.3 l/m² (22.44% of the normal value) la Apa Neagră, 222.8 l/m² (25.75% of the normal value) in Polovragi, 218.3 l/m² (28.03% of the normal value) in Petroșani, 235.4 l/m² (24.32% of the normal value) in Parâng, 236.1 l/m² (43.59% of the normal value) in Caracal etc. The percentage deficites ranged from 18.84% in Tg. Logrești in the Hills of Oltenia and 43.59% in Caracal South-East of Oltenia. In this year the droughty time had a an extension of 71.08% month/meteorological station.

Even though in 1993 the lack of precipitations was lower than in 1992, the effects on the cultures and the vegetation in general were truly destructive, so the „peak” of the drought was reached.

In figure 1 we reveal the evolution of this drought referring to the number of months/meteorological station of droughty time. Between 1987 and 1993 the extension of droughty time ranged from 50.49% in 1987 to 83.33% in 1992, with an average of 64.62%.

Some of the most affected counties were: Mehedinti, Dolj, Olt and Teleorman. From the disasters that occurred we mention:

- on extended areas, the corn cultures were destroyed in proportion of 95-98%.
- there was no unaffected crop.

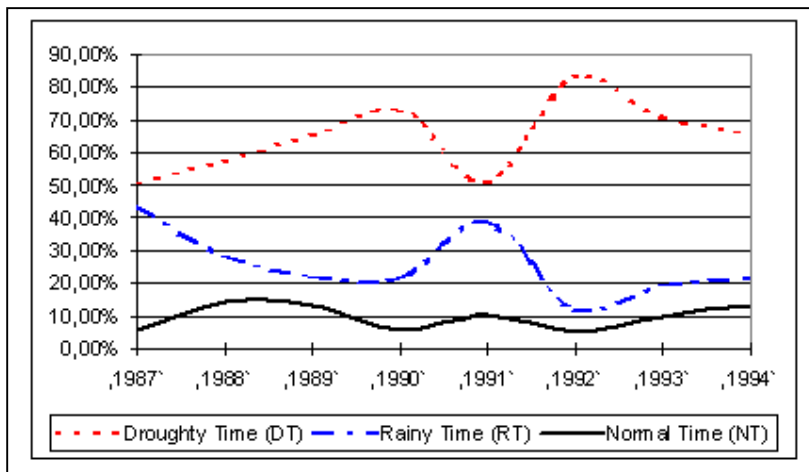


Fig. no. 1, The evolution of droughts in 1987-1994 (%)
Time Type (months/meteorological station)
(Source: processing data).

For Dolj we mention some of the calamities:

-260000 ha of corn culture 100% destroyed. The average production for the county was of 200 kg corn cabs/ha.

-4500 ha of soy culture 100% destroyed;

-3000 ha bean culture 100% destroyed;

-orchards, vineyards and hayfields were gravely affected;

Only in Dolj 10 282 billions Romanian leu-at the value of 1993-were given in

order to cover the spendings for the establishment of crops. The drought led to the drying of rivers and lakes.

In various cities, including Bucharest the drinking water was rationalised and the energy production in the hydro-electric plants along the Danube was drastically reduced. On the Danube and in the Delta special measures for navigation had been taken. After the analysis of the draining on the rivers in the South of the country this was considered the second most acute drought, after the one in 1946. Its duration in Oltenia was of about 8 years and, in 1991, the precipitations started again and a short period of interruption appeared a typical situation as droughts tend to be interrupted by short rainy periods. For the 7 counties taken into account by the law 70/1993 this was a catastrophic drought. It is notable that, thermically speaking, no maximum temperature records were exceeded even if some canicular days were recorded for the summer.

3. 2. THE DROUGHT AND CANICULAR DAYS OF 2000

The droughty period that started in January 2000 lasted until 17th of July 2002. Three short rainy periods interrupted it in 2001, the rainy days being followed by sunny ones and wind intensifications that had an essential role in the evaporation of the water of the ground and the reestablishment of the lack of water in the soil. The summer of 2000 brought to Romania and Oltenia a lengthy period of canicular days and drought. The drought progressed gradually in the first three months of the year, characterised by precipitation values a lot lower that the normals. The early spring started in February and in late April white frost appeared. The following spring months-April and May brought very low precipitation values. By the end of June, canicular days appeared. In July and August there was a succesion of prolonged canicular days and short intervals when temperatures were less high. Synoptically, we remarked the evolutions of synoptic situations similar to those specific for the drought the difference being that during canicular days the temperatures had high values even at night.

In our country a new thermic record was established for July-on the 5th of July 2000 43.5° in Giurgiu the maximum temperature of this month was reached. The analysis of the pluviometric time types revealed the following:

After the rainy summer of 1999 when in July, 135.4 l/m² in Parâng, 136.4 l/m² in Voineasa, 136.6 l/m² in Slatina, 149.2 l/m² in Tg Jiu, 190.3 l/m² in Petroşani, 331.4 l/m² in Dr. Tr. Severin, 386.3 l/m² in Apa Neagră (Marinică, 2003, 2004, 2006), were recorded the drought established in Oltenia (August 1999 was droughty in most of Oltenia then the little rainy time went on in September, October and November but in December an excess of precipitations was registered.

The characteristics of the drought of 2000 are:

The maximum intensity was reached in 2000 when 12 months of drought were registered in the subcarpathian depression in Apa Neagră and 11 months in Polovragi and Rm. Vâlcea, 10 months in Dr. Tr. Severin and Caracal, 9 months in Bechet, Calafat, Bâcleş, Drăgăşani and Petroşani etc. (table 4).

In 2000 the droughty time had and extention of 80.41%, comparable to that of 1992. From the most important annual deficits of precipitations we name: 294.9 l/m² (52.78% of the normal value) in Calafat, 296.1 l/m² (52.17% of the normal value) in Băileşti in Câmpia Olteniei, 300.00 l/m² (38.52% of

the normal value) in Petroșani, 313.6 l/m² (53.70% of the normal value) in Slatina, 352.9 l/m² (45.54% of the normal value) in Voineasa (jud. Vâlcea), 373.6 l/m² (51.62% of the normal value) in Rm. Vâlcea, 407.7 l/m² (58.81% of the normal value) in Dr. Tr. Severin, 428.9 l/m² (56.26% of the normal value) in Tg. Jiu, 443.7 l/m² (45.83% of the normal value) in Parâng, 495.0 l/m² (57.21% of the normal value) in Polovragi and 576.6 l/m² (63.04% of the normal value) in Apa Neagră.

Tables no. 4, Pluviometric Time Type According to Hellmann's Criterion in 2000
(Source: processing data)

Meteorological station	Months												Annual	DT	RT	NT
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII				
Craiova	N	N	ED	VR	ED	ED	R	ED	ER	ED	VD	ED	ED	7	3	2
Băilești	VD	ED	ED	LD	ED	ED	VR	ED	ER	ED	ED	ED	ED	7	3	2
Bechet	LR	VD	ED	N	ED	ED	D	ED	ER	ED	VD	ED	ED	9	2	1
Calafat	VD	ED	ED	LR	ED	ED	LR	ED	N	ED	ED	ED	ED	9	2	1
Tg. Jiu	ED	ED	LD	D	VD	ED	D	ED	R	ED	ED	VD	ED	11	1	1
Apa Neagră	ED	ED	VD	D	ED	ED	VD	ED	VD	ED	ED	ED	ED	12	0	0
Polovragi	VD	ED	D	LD	ED	ED	VD	VD	N	ED	ED	VD	ED	11	0	1
Dr. Tr. Severin	ED	ED	ED	VD	ED	ED	N	ED	N	ED	ED	ED	ED	10	0	2
Băcleș	ED	ED	ED	VD	ED	ED	N	ED	N	ED	ED	ED	ED	9	3	0
Slatina	ED	ED	ED	ER	ED	ED	ER	ED	ER	ED	ED	ED	ED	10	2	0
Caracal	LR	VD	ED	ED	ED	ED	LD	ED	ER	ED	ED	ED	ED	10	1	1
Rm. Vâlcea	D	D	ED	N	ED	ED	ED	ED	ER	ED	ED	ED	ED	11	1	0
Drăgășani	VD	ED	VD	VD	ED	ED	LD	ED	R	ED	ED	VD	ED	9	1	2
Voineasa	LR	D	ED	N	ED	ED	N	ED	VR	ED	ED	ED	ED	11	0	1
Petroșani	ED	ED	N	D	ED	ED	VD	LD	D	ED	ED	LD	ED	9	1	2
Parâng	N	ED	ER	LD	VD	ED	D	ED	VD	ED	ED	N	ED	10	1	1
Droughty Time (DT)	9	15	13	10	16	17	10	16	4	16	16	14	156	80.41%		
Rainy Time (RT)	4	0	2	3	0	0	5	1	9	0	0	0	24	12.37%		
Normal Time (NT)	2	1	1	3	0	0	2	0	3	0	0	2	14	7.22%		

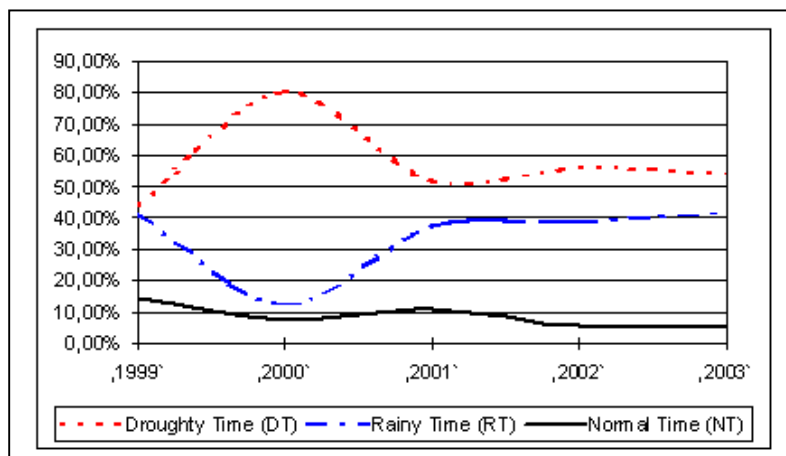


Fig. no. 2, The evolution of droughts in 2000-2003
(%) Time Type (months/meteorological station)
(Source: processing data).

The annual deficit of precipitations ranged from 36.24% in Craiova and 63.04% in Apa Neagră.

The drought of 2000 was general for Oltenia, extremely intense and associated with prolonged periods of canicular days and heat waves in the following intervals: 6-10 June, 21-25 June, 2-12 July, 22-27 July, 3-7 August, 17-24 August. This affected the social life especially by the raise in the price of food and other products.

The values of these deficit of precipitations show that 2000, as a whole was

excessively droughty (table 4). The aridity processes were intense in all the Southern half of Oltenia, especially in the area called „The Sahara of Oltenia²”. In 2001 March, June, July were rainy and January, May and August droughty then, between September 2001 and July 17th 2002 an acute

² In conformity with the informations from the Regional Agency for the Environment Protection in Craiova, the sandy soil area has more than 100000 ha on the left side of the Danube-between Calafat and Dabuleni. This region is known as “The Sahara of Oltenia” and it is an arid zone which presents desertification tendencies. The only country in Europe to have a “Sand Museum” is Romania and it is located in Dabuleni, in the South of Oltenia. This zone is practically a white-sand surface left unaffected during the comunist regime in order to compare the harvest obtained in affected and unaffected sand areas. It is now a museum.

drought settled in. The interruption of this drought took place in the second half of July 2002 when a rainy period which peaked in 2005 started.

In figure 2 we show the evolution of the drought between 1. I. 2000-17.VII.2002. The drought of year 2000 affected 2.6 billions ha in the whole country and produced damages evaluated at 6500 billions Romanian leu-at the 2000 value (source: published data).

3.3. The Drought of 2007

In the summer of 2007 the weather in Oltenia was very unsteady. One of the most important aspects of the weather is represented by the heat waves- 6 in number: 19th-26th of June, 2nd-4th of July, 8th-10th of July, 15th-24th of July, 27th-30th of July and 22nd-25th of August; out of these the first and the fourth were particularly intense. Twice during the summer of 2007 the vegetation on meadows faded, a great number of forest fires affected Oltenia, the country and other states on the continent. All crops were severely damaged, freatic layers drained leaving many places without water alimentation. As a result, the mortality rate among animals was high, as they had no or little food.

People had to overcome hard times as the price of vegetables and fruit was high for all summer. The water level for the Danube has considerably decreased creating problems in navigation. The violent drought determined the governmental organisations to consider this drought even more critical than the one in 1945-1946. The Romanian Government had to elaborate an anti-drought plan according to which, in some places deep drillings were executed for water as the alimentation by cistern was not a solution.

The last 2 days of July and the entire August brought significant rainfalls and, as a consequence, 5 rainy periods stood out, yet the crops were beyond recover. Nevertheless, these rainfalls straightened out the water alimentation of many places, brought the vegetation back to life and reestablished the feeding conditions for animals. Consequently, the anti-drought measures program was „left behind” and it was never taken into account ever since by the Romanian Parliament. The price of panification wheat increased considerably, reaching 260 €/t by 16th of October and was expected to reach 300€/t almost triple the price in the same period in 2006.

The summer of 2007, which followed the mediterranean winter of 2006-2007 which was very warm in the whole country and especially in the South. The summer of 2007 began with the excessively hot June, that, in its last decade has affected the whole country and especially the South by a strong heat wave. The warm weather was accompanied by a strong drought of a complex type-atmospheric and pedospheric-that, at first, affected seriously the wheat cultures in proportion of 60% at the level of the whole country and then, beginning with the second half of June also the weeding cultures, the vegetal carpet on the meadows, caused the drying out of fountains and had serious economic effects. Then both the drought and the canicular days of July 2007 increased the destructive effects.

The heat wave of July 15-24 2007 was the most intense for this month within the whole period of meteorological observations and marked the exceeding of the monthly absolute thermal maximum of July by 0.8°C -in Calafat we recorded on July 24 2007, 44.3°C that is now the absolute thermal maximum of July in Romania, the old value was 43.5°C recorded in Giurgiu on July 5th 2000). The thermal monthly absolute maximum of air of July in the last century-42.9°C- was recorded on July 5th 1916 and was exceeded by 0.6°C after 84 years on July 5th 2000. To this date we notice a slow evolution of maximum absolute values of July, then, within 7 years another remarkable exceeding by 0.8°C occurred.

We remark that in July 2007 the air temperature reaches and exceeds the climatic threshold of 44°C for the first time. Values of 44°C and above were recorded in Romania once along the history of meteorological remarks only on August 10 1951 when at 4 meteorological stations the temperatures of 44°C and above were reached and exceeded (in Baraganul Brailei, in the Maruntelul Village at the Ion Sion farm- 44.5°C also the absolute maximum of air in Romania and 44°C in Amara-Slobozia and Valea Argovei). In July 2007 temperatures of 44°C and above were registered in Băilești and Moldova Veche 44°C, Bechet 44.2°C, Calafat 44.3°C -which shows a much wider area of extremely hot air related to the last century . This intense and persistent hot wave affected Hungary, Greece, Italy, Romania, Moldovan Republic, Ukraine, Turkey and on July 27th 2007 the forest fires caused by the

canicular days³ took place on extended areas and the media considered that the South and East of Europe were “on fire”.

The drought of 2007 lasted for 150 days, out of which 90 were in the warm season when plants most needed water.

In table 5 we can observe the characteristics of the pluviometric time type in 2007. On the whole, taking into consideration the annual values of precipitations, 2007 was exceptionally rainy in the Northers and Eastern half of Oltenia, rainy in the South-East, normal in the Bacles region, little rainy only in small territories in the South and West of the region (Calafat and Dr Tr Severin) and little droughty in the Bechet region which leads us to the conclusion that in 2007 the annual values of precipitations are of little significance as the drought combined with canicular days and intense heat waves had truly destructive effects.

The percentage positive anomalies had values ranging from 6.05% in Calafat to 51.87% in Voineasa and for the normal and little droughty zones from -9.99% in Bechet to -0.95% in Bacles, thing that shows the variability of precipitation quantities in Oltenia in 2007.

-the 2 exceptionally droughty periods in April-May and June-July 2007 totalized 97 days. According to the National Statistics Institute the drought affected 4 million ha of the agricultural surface of our country, a quarter of these have been completely compromised. (Ziare.com-8 September 2007).

-August 2007 was extremely rainy, the average quantities of precipitation frequently exceeded 200 l/m², so that, overall the summer precipitations were exceeding.

-The extremely rainy period August-November 2007

Tables no. 5, Pluviometric Time Type According to Hellmann's Criterion in 2007
(Source: processing data)

Meteorological station	Months												Annual	DT	RT	NT
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII				
Craiova	ED	ER	ER	VD	ER	VE	ED	ER	ER	ER	ER	D	ER	5	7	0
Băilești	ED	ER	N	VD	R	ED	ED	ER	ER	ER	ER	D	VR	5	6	1
Bechet	ED	ER	D	VD	N	ED	ED	ER	LD	ER	R	N	LD	6	4	2
Calafat	ED	VR	N	VD	VR	VE	ED	ER	N	ER	VR	VD	LR	5	5	2
Tg. Jiu	LD	ER	ER	VD	ER	VD	VD	ER	ER	ER	ER	D	ER	5	7	0
Apa Neagră	LD	ER	ER	VD	R	LD	ED	ER	VR	ER	ER	VD	ER	5	7	0
Polovragi	LD	ER	ER	VD	VR	ED	VD	ER	ER	ER	ER	D	ER	5	7	0
Tg. Logrești	VD	VR	ER	VD	ER	LR	ED	ER	ER	ER	ER	VD	ER	4	8	0
Dr. Tr. Severin	ED	ER	VR	VD	VR	VD	VD	ER	D	ER	ER	VD	LR	6	6	0
Băcleș	VD	ER	LR	VD	N	N	ED	ER	VD	ER	ER	ED	N	5	5	2
Slatina	VD	R	R	VD	VR	ED	ED	ER	R	ER	ER	LD	ER	5	7	0
Caracal	VD	ER	LR	VD	N	VE	ED	ER	N	ER	ER	VR	ER	4	6	2
Rm. Vâlcea	R	VR	ER	VD	N	VE	ED	ER	ER	ER	ER	VD	R	4	7	1
Drăgășani	VD	N	VR	VD	N	ED	ED	ER	ER	ER	LR	VD	VR	5	5	2
Voineasa	ER	R	ER	VD	VR	VD	VR	ER	ER	ER	ER	ED	ER	3	9	0
Petroșani	ER	ER	ER	VD	VR	ED	VD	ER	VR	ER	VR	ED	ER	4	8	0
Parâng	ER	ER	ER	VD	VR	VD	LD	ER	ER	ER	ER	ED	ER	4	8	0
Droughty Time (DT)	13	0	1	17	0	15	16	0	3	0	0	15	80	39.22%		
Rainy Time (RT)	4	16	14	0	12	1	17	12	17	17	2	113	55.39%			
Normal Time (NT)	0	1	2	0	5	1	0	0	2	0	0	0	11	5.39%		

-The main pluviometric maximum had smaller values of precipitations than the secondary pluviometric maximum.

³ Canicular days = period of time when the air temperature, measured in standard conditions reaches and exceeds 35°C

-In the last 8 years, in matters of precipitations, this tendency appeared –that the secondary pluviometric maximum exceeds the main one, the year having 2 periods: one warm and dry (the spring and summer) the other cold and rainy (the autumn and winter the precipitations decreasing during winter).

The account of the loss produced by this drought combined with canicular days is of more than ten million Euros. The most affected fields were: the agricultural field the harvest being compromised and the production of energy from hydrological sources.

In June the average flows of the Danube are of 6.400-6.500 m/s. In 2007, in the first 20 days of June the flow of the Danube was on average 4100 m/s, which meant a decrease of 35-40% of the monthly flow and of the electrical energy production. The production for June 2006 was of 17000 MWh/day and in 2007 it only reached 11000 MWh/day. Even smaller flows-of 2600m/s- were recorded in 1996 at the hydro-electric plant "Portile de Fier" (as Teodor Pavelescu the Manager of the Hydroenergetic and Navigation System "Portile de Fier" declared for Mediafax).

Until 20th of June the drought affected 1.2 million ha of agricultural plants at national level which represents 61% of the agricultural surface 34 counties being considered damaged zones.

Romania imported between 2007 and 2008 more than a million tones of wheat resulting in the increase in the bread price. In our country as a consequence of the intense drought of the summer of 2007 the rise in the price of the basic food was of between 40%-100% and even more for some others.

4. CONCLUSIONS

In the studied period the droughts have been intense and numerous and affected substantially the social life. Their frequency increased and in the warm season they were associated to heat waves which accentuated their effects. Forest, meadow and estate fires burst out. The agricultural productions have decreased and the financial efforts made to reestablish the economy were growing. The intense droughts in the periods plants most needed water were destructive and the loss was considerable and their effects are still visible. Meteorologically, they are a consequence of the persistence of anticyclons and the apparition and establishment of atmospheric circulations of tropical-continental type cause the heat waves that increase the effects of droughts leading to the fading of the vegetation and the degradation of the biosphere. The monitoring of the droughts show that in the whole country 14.7 million ha agricultural surface on average out of which 9.4 arable (64% of the arable surface) were more or less affected by long, frequent droughts that took place in consecutive years.

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