THE QUALITY RESOURCES

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Abstract: *A significant element characterizing a lasting development in Braila Plain region, but also in any other similar area, would be an environment factor that is the water, with an increasing importance when considered against the high dryness background. Generally speaking, both the consumed water and the consumption structure reflect the quality and quantity of water resources and, implicitly, the economic potential of the region at issue. As for Braila Plain, here there is a paradox to be considered: even if the region is bordered by highly significant rivers (The Danube and Siret) with huge flows – not to mention here the salty water lakes or underground streams with a more or less drinking water – the need of drinking water becomes obvious, mostly in summer and autumn. The climate, morphometric and lithological conditions confer certain peculiarities upon the waters resources of the Northern-Eastern Romanian Plain. One can say about the Braila Plain hydrographical network that it is poor and this is due to the discharge, situated under the value of 1 l/sqkm, but also to the very low relief energy. The allochthonous Rivers: the Danube, Siret, Buzau and Calmatui are affected by the relief climate conditions and also by the size and the geographic position of the hydrographical basins.*

Keywords: *dryness, evapo-perspiration, mineralization, hydrographical basin, climate conditions*

Jel Classification: *Q - Agricultural and Natural Resource Economics; Environmental and Ecological Economics, Q2 - Renewable Resources and Conservation, Q25 - Water*

1. INTRODUCTION

The climate, morphogenetic and lithologic conditions give some peculiarities to the water resources from the North-East Romanian Plain. One can say about the Braila Plain hydrographical net that it is poor and this is due to the way of flowing, which is under 1 l/s. sq. km, but to the reduced relief energy.

The Braila Plain water resources are represented by lakes and underground waters are strongly affected by the dryness influences of the continental climate of this area. Rains do not succeed to constantly feed the lakes or underground waters by infiltration due to evapo-perspiration which exceeds a lot their values in some year's periods, so that lakes often have a temporary character, and the permanent ones have various volume, depending on the water quantity fallen in certain periods. Also, the underground waters have to suffer too, due to both dryness in excess and to permeability of layers from underground horizon cover.

The water resources of lakes and underground waters are qualitatively affected by progressive accumulation of salts under the climate conditions of Braila Plain.

Table no. 1 Water resources quality of Braila Plain

Water resource	Length (km)	Flow (m^3/s)	Average Surface (ha)	Minerali-sation Character (g/l)	Hydro-chemical Charac-ter	Type	Tempo-rary Charac-ter
Danube	65	6000	-	0,2-0,5	carbonate	sweet	permanent
Siret	33	210	-	0,9	sodium-chloride	sweet-salt mix	permanent
Buzau	120	27,1	-	0,9-1,0	sodium-chloride	sweet-salt mix	permanent
Calmatui	80	1,4	-	1,5-2,0	chlorate-natrium	sweet-salt mix	permanent
Brotacelul (abandoned branch)	-	-	20	12,0	-	sweet-salt mix	dried
Salt Lake-Batogu (abandoned branch)	-	-	580	170,0	chlorate-magnesium	salt	dried
Bentu Lake Batogu (abandoned branch)	-	-	80	150,0	magnesium -soudium-chloride	salt	dried
Salt Lake (abandoned branch)	-	-	170	80,0	sulphate-sodium	salt	permanent
Ianca Lake (loess lake)	-	-	322	200,0	magnesium sodium	salt	permanent

					chloride		
Plopu Lake (loess lake)	-	-	300	119,0	magnesium sodium chloride	salt	permanent
White Lutu Lake (loess lake)	-	-	500	-	pisciculture facility	-	permanent
Salt Lake Movila Miresii (loess lake)	-	-	200	270,0	chlorate-natrium	salt	permanent
Seaca Lake (loess lake)	-	-	150	-	pisciculture facility	-	permanent
Esna Lake (loess lake)	-	-	260	-	-	sweet passing	permanent
Liscoteanca Lake (as alluvial plain)	-	-	64	-	-	sweet-salt mix	dried
Phreatic waters	-	-	-	0,5-1,0 1,0-10,0	acid carbonate sulphate-chlorides sulphate-chlorate	sweet-salt mix	permanent
Depth waters	-	-	-	0,5-9,0	-	sweet and sweet-salt mix	permanent

2. INFORMATION

Rivers limiting Braila Plain: The Danube, Siret, Buzau and Calmatui are affected not only by the climate and relief conditions, but also by the size and geographic position of the hydrographical fields. As hydrographical fields are larger and rivers have more tributary streams, bigger than their flow and salts quantity is lower, giving them more diversified utilizations. Rivers Calmatui and Buzau, having reduced hydrographical fields and a high degree of mineralization, are much less used as drinking water supply or irrigating water.

Analysing table no. 1, one can see that most of own Braila Plain waters have either a temporary character or large salt content with a sweet-salt mix or salt character. These are not important reserves for developing human activities in this area. Only the Danube and partially Siret River, among surface waters, and East part of depth waters (waters of Fratesti layers), constitute reserves for water supply of localities or for their usage in agriculture and industry.

Lakes' water having a salt character and the concentrate muck can constitute resources for watering treatments. These cannot be accordingly set up for this aim due to many fluctuations of the water lake volume and possibility of getting a sweet-salt mix and even sweet character when humidity is in excess. Only in the case of Lacu Sarat the facilitating of a touristic resort, based on watering treatment, has registered a certain interest, a regional one especially.

Lacu Sarat Braila area is put in an environment protection program, precisely for proper using of the therapeutic lake water and muck properties.

The high dryness specific to Braila Plain conditions favoured the drying of more lakes from this area. Brotacelul Lake, situated near Faurei city, and set up as entertainment base, completely dried, being an obvious example of the non-efficiency of the facilitating works. Nevertheless, even without special facilitating works, the salt lakes of this area are sometimes utilized as watering treatments by local people.

The variation amplitude of the phreatic waters hydrostatic level as well as the high salt content makes it impossible to be used in the local water supply, many Braila Plain places being water fed by either the Danube or by high depth waters.

Concluding, the Braila Plain water resources are insufficient, that is why all the economical branches and social communities apply to the Danube river water resources.

The Statistic Yearly Book for environment specifies the fact that within Braila County there are over 600 possible pollution sources as chimneys, outlet holes, industrial losses and leakages, escapes from industrial and houses waste deposits.

Romania's economic situation has favoured the environment factors state, so that now, the main water pollution economic agents are: SC Celhart Donaris, Aptercol and CET which deliver waste into the Danube through a canal net, but these industrial units have decreased their activity due to economical difficulties.

Consumed water quantity, on one hand, and consumption structure, on the other hand, reflect generally, the water resources quantity and quality and, implicitly the economic potential of the analysed area.

It's a paradox with Braila Plain: while it is bordered on all its sides by water flows, among them some of paramount importance (the Danube and Siret rivers), with high stream discharge, and adding some (salt water) lakes and underground waters (with variable drinking qualities), the drinking water need is acutely felt, particularly in summer and autumn.

Drinking water supply in Braila Plain is made either through a water delivery culvert Gropeni-Ianca-Faurei, or through their area sources.

In the North-Eastern part of Braila county, localities Cotu Lung, Vamesu, Muchea, Latinu, Silistea, Tudor Vladimirescu are supplied by own underground sources, by high depth (over 100 m) supply wells, and water quality is mostly within drinking limits.

In the North-Western part, localities Maxineni, Romanu, Salcia Tudor, Gulianca, Scortaru Nou are supplied by underground sources, by high depth (over 150 m) supply wells. In this area, water quality is mostly not-drinking, exceeding mineral substances (except Maxineni).

In the Western part, localities Gradistea, Sutu, Faurei, Racovita, Ianca, Mircea Voda are supplied by an area water system, by water from Gropeni and from delivery culvert Gropeni-Ianca-Faurei (Danube water treated at Gropeni, Tepes Voda and Ianca stations), and water quality is good (for drinking).

In the South-Western part, the localities Tirlele Filiu, Bordei Verde, Berlesti, Ciresu, Batogu are supplied by an area water system from Ianca, from main pipe, water quality is mostly within drinking limits.

In the South-Eastern part, the localities Unirea, Tufesti, Lanurile, Viziru, Cuza Voda are supplied by 60-80 m depth wells and water quality is out of drinking limit, exceeding mineral substances.

It was found that around locality of Tepeş Vodă, the wells are infiltrated with oil, and the water cannot be used, not even for the animals. In 1999, deficiencies in centralized system water supply have been found in localities Gropeni, Ianca, Movila Miresei, Faurei and Insurăţei. As solution, water supply from high depth reactivated and desanded wells have been proposed. Water from wells cannot be chlorinated; according to the valid laws in localities with less than 5,000 inhabitants that benefit of sanitary protection of the high depth wells, water should not be chlorinated. Local authorities proposed themselves to purchase chlorination devices, so that such situations should be prevented in the future.

At the end of 2000, water supply of Braila city, North area from Galati-Serbesti pipe-line delivering drinking water from Vrancea County has been stopped. This Braila North area has been connected to the main water supply city pipe-line, so that now the entire town is water fed from the Danube, Chiscani area.

The locality Baldovineşti, which was benefiting of drinking water from Vrancea County, as Serbeşti pipe-line was transiting this place, remained without drinking water, and further interrupted the water supply to North area of Braila. The inhabitants of Baldovineşti remained with no drinking water source, the few wells of this area having non-drinking water, with a strong oil taste. Resuming of centralized water supply system depends also on the possibilities of consumption countering of this place.

The total length of the drinking water distribution net has increased in the last years, offering the possibility to another 65 rural localities to be supplied with drinking water.

Table no. 2 Simple total length of the drinking water distribution net (km)

Year	Total	out of which towns	Localities with distribution net	Towns
1991	1014,0	670,0	55	4
1992	1021,5	681,1	55	4
1993	1024,4	683,0	55	4
1994	1049,7	707,7	55	4
1995	1056,7	708,6	56	4
1996	1121,8	699,3	61	4
1997	1132,8	705,4	61	4
1998	1137,5	695,8	61	4
1999	1139,3	697,6	61	4
2000	1080,4	706,6	65	4

(Source: Yearly Book of Braila County, 2002)

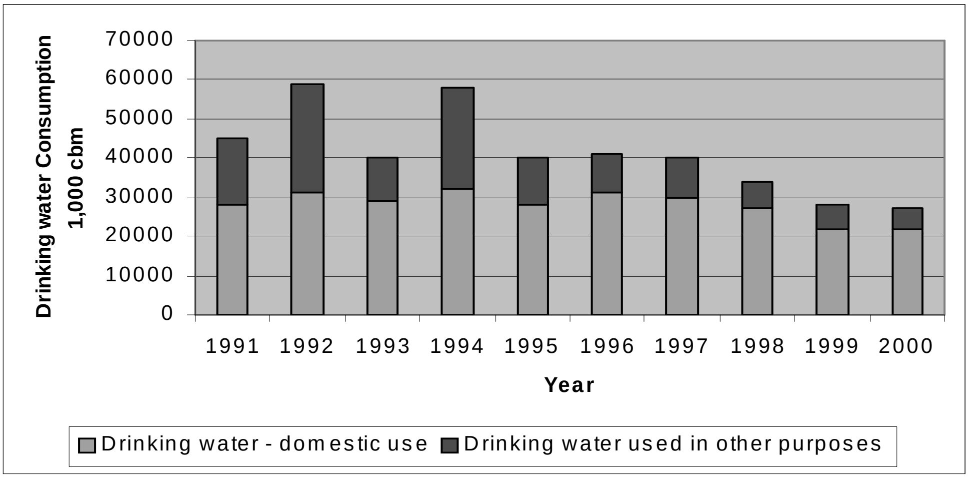
Braila County counts 127 rural localities and 4 urban localities. One can see from Table no. 2 that the drinking water distribution has been entirely solved for the urban environment and, within rural environment, ensuring of drinking water through the distribution net only for 51 % of localities.

The drinking water problem is not solved yet for the total area of Braila Plain due also to natural (missing local drinking water reserves) and economical conditions of the county, and no improving solutions can be forecast in the near future.

Analysing the total drinking water distribution and the domestic use consumption, it is observed a continuous decrease during period 1991-2000, the value of the total supplied drinking water volume in 2000 is 65% of the 1991 value.

The drinking water volume, supplied for domestic use, is registering fluctuations, but for the last period it was found a steady decrease, along with the population receding.

Figure 1 Water consumption evolution in Braila County during 1991-2000 (thousand cm)



The domestic use water consumption per capita has also registered fluctuations, with a more important decrease in the last years, reaching the value of 65.3 cbm/year, which is under the country's average.

The reducing of Braila County economic power has determined the abolishing or activity restraining of many agricultural and industrial units, which implicitly led to water consumption decrease in these fields.

As to agriculture, the water quantity used for irrigations and cattle breeding is directly influenced by the climate area with a dry feature, the rainfall level, the structure of cultures, of soil, etc.

Braila County agricultural area set–up for irrigations has decreased from 352,769 ha (1991) to 332,353 ha (2000), meaning that in 2000 this area was 69.7% from total agricultural area, as against 75.5% in 1991.

Besides Braila Plain waters having a more or less drinking character, there are here other water categories – the salt lakes. A special attention has been given to them, by adopting some measures leading to water protection and preservation and to muck therapy qualities. These measures have been materialized in Lacu Sarat location, where there are also facilities typical of water therapy exploitation. To protect these therapy qualities, a series of measures are proposed also for Lacu Sarat, Movila Miresei.

The high salts content of waters and muck of some Braila Plain lakes determined some scientists to propose taking advantage of some minerals from these waters.

Braila Plain non-mineralized waters are usually used as water supply sources for human locations, industrial units or irrigation water. In exchange, Braila Plain mineralized waters can be approached in studies as therapy use, as mineralized natural waters for irrigation of certain soils or as extracting some chemical elements (potassium, magnesium, bromine, iodine, boron and lithium) existing in high enough concentration to be industrially abstracted.

As to irrigation set-up plan, the Eastern area of Braila Plain is fit for recovery with priority on short and medium term, and the Western part is fit to areas already existing which are set-up by irrigation and drain works.

In spite of the steps provided to be taken, the economical activity – perceptibly in decline – does not show that it will act in the direction of pollution preventing, nor the authorized organizations have significant actions. This is also due to the fact that most of industrial units, potentially sources of pollution, either have restrained their activity or have been abolished.

Braila Plain hydrographical network – bounding rivers, lakes and underground waters - is poor.

Lithological and morphometric conditions as well as particular climate of Bărăgan Northern area give some peculiarities to waters from this perimeter.

A continental climate with shades of excess, the semi-endorheic flowing nature, the existing loess layer on almost all the plain surface, all these lead to small slopes of rivers, with effects of meandering and abandoned branches, small and very small flows, sometimes drying up of some streams, feeding of rivers from underground waters, forming lakes in settlement depressions of loess deposits, a high chemism of both surface waters and underground ones.

Braila Plain hydrographical network bears the stamp of the temperate-continental climate and of the relief, formed by relative smooth fields with closed depressions, in which there are temporary or permanent lakes. The hydrographical net of this zone has a very low density, one of the lowest of the country, varying between 0 and 0.3 km/sq.km.

The running waters – the Danube, Siret, Buzău and Calmăţui, bounding Braila Plain - are allochthonous rivers, with a transiting nature.

The surface waters are represented only by Ianca Valley, which practically is dry all the year and by different kinds of lakes, strongly mineralized.

The underground waters are represented by both small depth waters and by high depth ones, with a smaller or higher mineralization degree.

The rivers bounding Brăila Plain (which practically are not part of this relief unity) are important due to the fact that the underground waters from this perimeter are drained by the limiting hydrographical net and there are obvious mutual relations between the underground waters and rivers, especially within flood plains. As to underground waters regime, this is conditioned, first of all, by climate and then by local factors (lithology, slope, relief breaking up degree, streams, lacustrine basins, etc.)

The streams of this region bear the impression of the paleo-geographical changes. Buzau river migrated, leaving more valleys, among them being that of Calmăţui and Rîmnic, until having channelled on the present course; also nowadays, this river has deviations when high floods occur.

A diverting to North of Calmăţui river, downstream of Rubla, has been also noted, where Holocene eluviations of Buzau river have not been felt anymore, and the river could adapt to the new tectonics.

The Ianca Valley is the result of the Danube migration from West to East.

Even The Danube, Siret, Buzau and Calmăţui are not strictly part of Braila Plain, these are closely related to the watery horizons, either during low flows period these are fed from watery basins or during high waters period these can feed the watery basins. At the same time, it takes place a change of chemical substances, influencing the chemism of the underground waters or of the running ones.

In Braila Plain, where lakes and underground waters have a low drinkable degree, the allochthonous/bounding courses represent the main source for water feedings and irrigations.

The Danube borders, the Western part of Braila Plain, has a stream down direction from South to North. Due to a very low region, the slope is small – $0.027\%_0$ – it frequently appears new branches and cloggings on branches with smaller flows and slopes.

After their meeting at Giurgeni-Vadul Oii, forming/closing Balta Ialomitei, the Danube branches divide again in two main branches closing Balta Brailei. The Danube branch, - from Eastern part – Macin Branch (The Old Danube) – bordering Dobrogea, is transporting a low quantity of the Danube waters (13% - 780 cm/s) due to a smaller slope - $0.019\%_0$. The branch is 98 km of length, has an average width of 250 m and a high coefficient of meandering – 1.24. The Western branch – Cremenea – bordering Braila Plain, has a higher slope – $0.027\%_0$ – and is transporting a much higher quantity of waters (67% of Vadu Oii flow – 4,020cm/s). The branch has an average width of 500 m and a higher coefficient of dividing (2.7). From this branch, other branches are breaking off: Manusoaia, Pasca, Caleea, Arapu and Vilciu having smaller flows.

Cremenea branch is navigable and in its South part receives Calmatui river as affluent. After branches meeting at Braila, the Danube receives Siret river as affluent on its left side.

The analysis of the Danube monthly flow points out high values during March-April and June-July periods. During rainy years, the highest increases are recorded in May and June, and during dry years, some higher increases happen in April. From these increases and decreases of the Danube flow level, a series of consequences for the neighbouring areas are ensuing.

The Danube water meadow, neighboured with Viziru Field, is embanked on all its length. Now, this surface is not covered anymore by lakes and ponds, but it can be used for agriculture. The arranging plan of the Danube water meadow has been carried on more stages along the time.

The water meadow was embanked, then surfaces drawn out the flooding regime needed other land improvement works and therefore, it has been built a net of draining off, over the embankment, of the water of lakes, ponds, rain-fall stagnating in depression areas and water proceeding from infiltrations from the Danube. In this way, it has been ensured a decrease of phreatic level by about 2 – 5 m, but land surfaces still remained – on bottom of the former lakes and ponds or depression areas – with phreatic water near to soil surface which generated an accumulation of salts, gradually from year to year, under dry conditions.

To avoid salts accumulation, it was necessary to increase the measures of draining-drying up ground by deepening and thickening the open canals net, and especially by deepening the collecting sewers, but also by achieving an underground draining system, horizontally (by buried pipes) or vertically (by pumped wells), in order to lower the underground waters of low areas or to intercept the infiltrations from the Danube.

Finally, after lowering the underground water level, there were executed irrigation works. More perimeters have been arranged in the water meadow area: Calmăţui, Gropeni, Chiscani, with three branches and enclosed space near Braila (water meadow area from confluence of the Danube with Siret).

In the roads of Braila Port, springs appeared at the street level when phreatic level was higher, but these have been drained by special works. Even if the terrace front is consolidated by concrete squares, suffusion phenomena appear after long and teeming rains.

Viziru Field, neighboured by the Danube water meadow looks down upon the area by about 10 meters. In the Eastern part of the field, the phreatic waters depth is between 5 and 15 m. Thus, it is the possibility that between the Danube waters and the phreatic waters to exist mutual relations during high floods and longer dry periods (inflow to field phreatic waters and inflow from field to the Danube water meadow, respectively).

Analysing the daily hydrometric levels of the Danube in Braila station during 1986 – 1995, one can build the daily level hydrograph.

Analysing the hydrographs during same period, one can deduct that the river level depends only on the physical and geographic factors, typical to Braila upstream basin.

The 1992 Danube hydrograph shows a period of spring-summer high waters over which high floods generated by rains are superposed, a sudden thawing or the overlapping of both phenomena in the hydrographical basin. To define this type of hydrologic regime, a very important role is played by the affluent rivers descending from the Alpes. The main period of low waters, within the Danube flow, is remarked within summer-autumn, from September-October, when usually very low flows are observed.

At Braila, the average multi-yearly flow is around 6,000 cbm/s, the average solid flow is 28 billion tons (much lower due to upstream accumulative lakes), and water mineralization is 200-500 mg/l and increases in inverse proportion to the flow, predominating the calcium and bicarbonate ions.

The river **Siret** borders the plain on a small part of approx. 33 km, from its confluence with Buzau river up to its flowing into the Danube. On this part, the river has a low slope of about $0.21‰_0$ and an average flow of approx. 230 cbm/s, when discharges into the Danube. The river low slope, as well as the subsidence phenomenon, favours the lateral erosion phenomena and the appearance of abandoned branches.

The highest flows are recorded in spring, from April until June, and minimum flows during November-January. The river waters are classified in the 2nd class quality, being unsuitable to be used as drinking water, but could be used for irrigations.

The river **Buzau** and its water meadow represent the North limit of Braila Plain, bordering it on an approx. 120 km length. This is a young river bed, still dynamic, affected by the subsidence phenomenon and by high floods. The multi-yearly flow recorded at Racovita station is 29.5 cbm/s, and the multi-yearly flow of alluvia in suspension is about 130 kg/s.

Analysing the typical hydrometric levels at Racovita station during 1986-1995, it can be built the daily levels hydrograph.

The analysis of hydrographs shows the fact that Buzau river flow, as a synthesis of what is happening in the basin, is strongly depending on the climate factors and particularly on rain-fall.

It is observed a stage of low waters during winter, when snow-fall is stored at the soil surface due to the low temperatures, without drain generating. Then it follows the phase of spring high waters, generated by the slow snow melting, first in the low areas and then in high ones. Over this phase, it can superpose high floods generated by torrential rains or by sudden snow melting.

During summer, very strong high floods can appear as those registered in 1991, generated by the torrential rains of this season. But during summer-autumn, it is also present the small waters phase, when the lack of rain-fall makes rivers to be fed only from underground. A return of flowing hydrograph is noticed during autumn due to long and low intensity rains. It can also appear high floods, superposing on this stage of hydrologic regime, as occurred in 1991. The analysis of the hydrometric levels, rain-fall and monthly average temperatures in 1991, for Buzau river at Racovita station, comes to support what above exposed.

The distribution chart of the monthly average levels makes evident a main summer minimum point and another secondary winter one. Starting February, water levels and implicitly, the flows gradually increase until May, when the main yearly maximum point is achieved. Further on, the levels gradually decrease to summer minimum points, with a return during autumn to a second secondary maximum point. In the presented case, in September, a strong high flood occurred which disturbed the usual evolution of the regime stages.

Although the Buzau river hydrographs during 1986-1995 varied from year to year, one can say however that the high water levels are in April, May, June, and minimum levels in October, November and January.

Buzau river has a high bed mobility due to alluvia and distinguishes by loss of some water during high level period on abandoned branches Faurei and Ulmu. When high overflow occurs, Buzau river covers the entire meadow up to Surdila Gaiseanca, where through the Buzoele, waters outflow into Calmatui river and from here into the Danube, this being a proof that Buzau river formerly flowed on Calmatui Valley.

In 1969, after a powerful swell of waters, Buzau river left its stream between places of Dedulesti and Maraloiu and created a digression of approx. 20 km, but also it has been found bed water changes among other places like Scortaru Nou, Boarca, Mihail Kogalniceanu. After this flood, the river settled itself a little bit to East within its meadow, this having as consequential effects the fact that the banks of Jirlau and Amara, placed on left riverside and receiving water through canals from Buzau river, became isolated.

Further to river pendulating within its meadow, parts of old streams remain abandoned beds, in which water can persist until drying up, as happened near Filipesti village where lake Brotacelul has been formed and then used for the purpose of recreation until its drying up.

The winds from North-East and, sometimes, even from West sweep the fluvial sands from the abandoned water beds.

The river slope suffers a big change near Dedulesti, where it decreased by 7 times, favouring the increase of splitting and meandering degree and of stagnating water phenomena.

At its confluence with Siret river, the Buzau river has a meandered course with a 4 m depth only, due to maintaining of same level of river bed with that of its middle course, as well as to flow slowing further to confluence.

The Buzau waters have much lower drinkable qualities than those of Siret and the Danube, a high mineralization (900-1,000 mg/l), and hydrochemical type is sodium-chloride. This type of chemism is owed to carry away sodium-chloride by Slanic and Saratel rivers from the sub-Carpathian zone.

The river **Calmatui** borders the South part of Braila Plain on an approx. 80 km distance. This course springs in the Buzau river alluvial cone. The flow has a West-East direction with a small slope of $0.22\%_0$ and high meandering (1.82) and splitting (0.23) coefficients. The minor water bed is narrow (20-25 m) and strongly clogged, due to slope features and river sinuosity.

On its right side and upstream of Baragan, the river Calmatui offers abandoned branches, anastomosed courses, lakes. In the summer, when feeding is reduced, limited only to underground, Calmatui river is just a thin water line, irregularly flowing, with puddles in its deeper parts.

The multi-yearly average flow of Calmatui at Ciresu station is 1.1 cbm/s and 1.3 cbm/s at its discharge into the Danube.

Following the hydrograph charts of Ciresu station, it has been remarked that an increase trend of Calmatui waters is registered during April-May-June and a decrease in August and October-November.

Analysing the hydrometric level of Calmatui river over time, either marked by extended drought or humidity excess, it is noticed a dependence between temperatures, rain-fall and flow of a river.

What is typical to the flowing regime of this plain river is the fact that, during winter there are small waters period and it has higher values than those during summer with small waters period. Then, high waters and spring floods period appears earlier as against Buzau river, further to fact that Calmatui river has its integral basin in the plain and in this relief unit, the thawing is an early one. From these reasons, powerful floods are found during March, as happened in 1992. In the rest of the year, it remains valid the fact that the floods, also in this case, can appear in any year season, depending on the rain-fall regime.

In 1995, when more abundant rain-fall occurred, in May and June respectively, and corroborated with lower evapo-perspirations in early spring and much higher in summer, the hydrograph chart shows that waters reached high values in May and September.

Ciresu hydrometric station on Calmatui river has available data only for 1990-1995 period.

Minimum river Calmatui waters in 1995 have been registered in March, April, August, and from October on, being corroborated with either low rain-fall in April and October and high temperatures in August which implies a high direct evapo-perspiration.

At Spiru Haret hydrometric station on Calmatui river, near its discharge into the Danube, hydrographs could be built for the 1986-1995 period.

Analysing these hydrographs, it results that the general trend of the increased Calmatui waters is registered in April-May-June, and decreased levels in August and October-November.

The mineralization of Calmatui river is high (1.5-2 g/l), hydrochemical type is sodium-sulphate and hardness is high (31 German degrees). The areas neighbouring the minor river bed have suffered due to high waters' mineralization, which have stagnated on the surface, during flooding periods, producing salting of soil.

In the zone of Ciresu and Gura Calmatuiului, the limit of Braila Plain, Calmatui river does not receive any affluent.

River Calmatui shows as a water line and during lasting dry periods becomes intermittent. Knowing this aspect of the river and its flowing valley, we realize the assertion, that Calmatui Valley is a former Buzau river valley, is justified. In present, it is accepted the hypothesis that starting from the subsidence movement of the inferior course of the Siret and the Calmatui valley dimensions, surely this valley belonged to a river with a higher flow, as Buzau could be. Another assumption has been formulated by G. M. Murgoci (1906-1907), according to which

the common water meadow of Buzau and Calmatui represented in fact a diffluence area with waters outflowing from Buzau river, through more branches. The same author asserts that, one of branches would have been Calmatui and others, Buzoel with Ianca and Buzau, due to sinking from Siret region, the South branches decreased their flow and lost in importance, and Buzau branch gained in flow.
Nowadays, the Calmatui Valley, considered an old stream of Buzau river, is further subject to geomorphologic phenomena related to subsidence movements. Further to this subsidence movement, an intense alluviation of meadows, flooding of river terraces and digression of rivers took place. As subsidence increases along, the action of water deepening (change of longitudinal profile takes place) ceases, more eluviations is brought to the major water beds, depositing gravel and large sands, and then, due to diminishing of the transport power, a finer material is set down.

During April-May, when waters are higher, Calmatui has a course without intermittences, powerful meandered. Following its flow near places like Ulmu, Liscoteanca and Valea Calmatuiului in May 2001, much differentiations of the river bed are not remarked. This is also due to the fact that most of its Insuratei place upstream flow has been arranged, dams have been built, the water bed has been consolidated by cutting of about 70 meanders (bends) with a view to regularize the river.

The Calmatui valley shows like a dissymmetrical one due to its entire situation in the plain area where aeolian actions from North, North-East, which set up its right bank by loess and sand accumulation, and increased erosion actions to left bank, take place. The right bank is higher and more abrupt, showing a lot of creeks at the plain level; sometimes, the altitude difference between meadow and plain levels reaches approx. 25 m.

Within common meadow of Buzau and Calmatui, there are a lot of abandoned branches by Buzau river, generally named as Buzoele. A stream in this meadow, named Buzoel South, has become a draining canal and discharges now into Calmatui river.

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