WATER RESOURCES AND THEIR QUALITY IN UPPER IALOMITA RIVER BASIN

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Abstract. Fitting Ialomița upper river basin began in the interwar period of the last century and was intensified after the flood that took place in the 70s during the same century. In this context, we can speak of an anthropized river system for 72 km of the river (from springs - altitude over 2400 meters, to the contact with the High Plain of Targoviste). Some water resources and reserves were reduced, making the degree of satisfaction to be between 50-75%. The karst hydrostructures from the mountainous area could meet the water needs of downstream consumers (subcarpathian area), but they are insufficiently controlled and estimated, both quantitatively and qualitatively. Totaled, the two resources - surface water and groundwater - reach a volume of water of 1.104 billion cubic meters / year (of which 824 million cubic meters / year is surface resource).

Geographic setting

The basin area of upper Ialomița is 686 km^2, which represents 6.62% of the total basin area of 10,350 km^2. *Ialomita River*, originating in the Bucegi Mountains, at over 2300 m, crosses the mountainous and hilly area up to Targoviste, covering 71 km (17.03% of the total length of 417 km), going down a slope of approx. 2010 m. It presents a coefficient of sinuosity of 1.88 on its entire course, with values slightly lower in the mountainous and hilly areas (between 1-1.50). The density of the hydrographic network is between 0.100-0.260 km/km^2.

At the contact between the hills and plains, Ialomița has an average flow of 7.97 m^3 / s (11.61 l/s/km^2).

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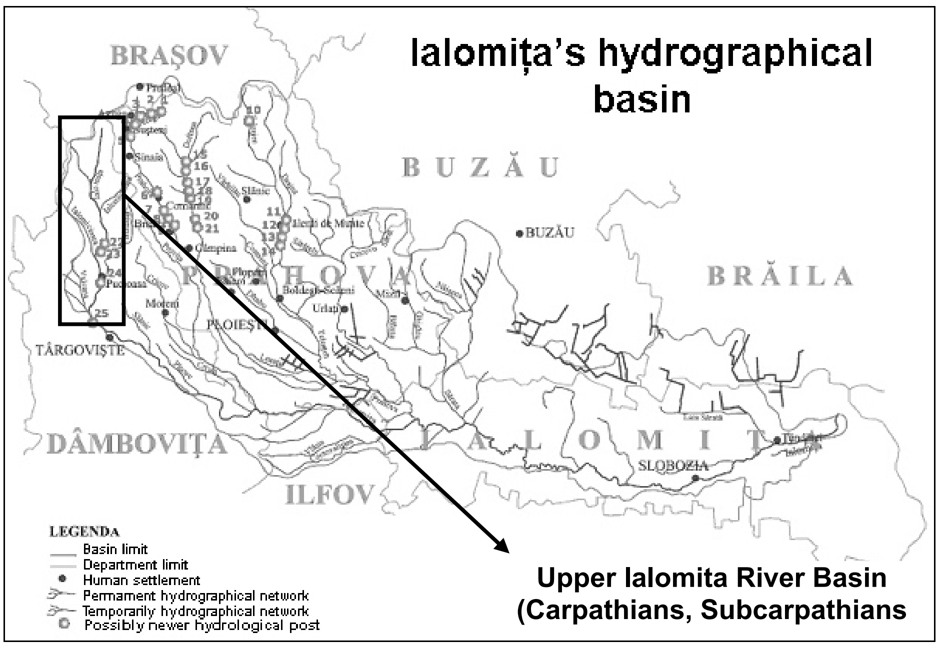
1. Water resources

Groundwaters constitute an important resource of water, with superior characteristics by comparison with surface water. They are frequently used to supply water to population and economic units. Groundwater in the Carpathian and sub-Carpathian area belonging to upper Ialomița river basin, is influenced by the geological formations (tectonic, petrographic variety, physical and chemical rock properties, thickness of the deposits, etc.) and so we encounter phreatic and deep water structures. They originate in the ford of the river, and take the form of various hydrostructures.



2. Alpine hydrostuctures

The hydrostructure of Bucegi Massif. According to the position of the permeable rock formations in relation to the waterproof formations in the foundation and to the drainage system, in the Bucegi Massif we can single out three types of hydrostructures (Al. Istrate, 2002):

♦ *Karst hydrostructures*

- Bucegi north hydrostructure and Tatarului Gorge-Scropoasa hydrostructure, formed in the limestone deposits of the Jurassic and of the Cretaceous period, in the superior conglomerates facies of Bucegi

- the Lespezi-Orza and Rătei hydrostructures, formed in the Jurassic calcareous stones
- Raciu-Piscu cu Brazi hydrostructure, formed in the calcareous breccias facies of Raciu and in the superior conglomerate facies of Bucegi;

♦ *hydrostructures with fissure-triggered primary and secondary intergranular porosity*:

- the hydrostructure of Bucegi Cuesta
- the hydrostructure of Brânduşei micro-depression;

♦ *hydrostructures with intergranular porosity, delimited within the granular deposits*

- the hydrostructure of the frontal till from the springs of Ialomiţa river
- the hydrostructure of the alluvial plain of Ialomita river.

The North Bucegi karst hydrostructure is supplied with water by the rain and the snow, by leakage of surface water from the Leaota crystalline and the direct infiltration of rainfall in the superior conglomerates facies of Bucegi. The drainage of this structure is located in the eastern slope, by the springs that appear in the alignment Morarului Valley in the north and Pelesului valley in the south, in the following points: Jepilor valley, Urlătoarea Mare valley and Urlătoarea Mică Valley, Babei Valley, Peleş Valley, which amount to a flow of approximately 500 l/s.

These springs occur at the same altitude as the springs of the depression of Padina: the spring upstream of Bears' Cave (Peştera Urşilor), Horoaba, Coteanu and Păstrăvăriei springs with water discharges oriented south and southeast. The hydrostructural water discharge east and southeast is influenced by the tectonics of the area, and by the faults oriented east-west or north-west - south-east.

The appearance of the crystalline fundament at the surface, due to the erosion of Ialomiţa and of its tributaries from the right side (Horoaba and Coteanu) suggests that this hydrostructure is limited southwards. The southern limitation of this hydrostructure by the structural uplifting of the crystalline foundation could explain the overflow nature of the springs on the eastern slope of the Bucegi massif and even the karst springs of Padina depression. The existence of the breccias of Raciu in the basis could explain the high water-bearing potential of this zone. Already in 1969, D. Patrulius suggested that the water-bearing structure situated on the level of the breccias of Raciu allow the water to leak from Ialomiţa valley into Prahova Valley.

Currently, there are no systematic measurements on the flows of the springs on the eastern slope of the Bucegi Mountains, which have only been estimated at a minimum flow of 225 l/s and an average flow of 500 l/s (Gh P. Constantinescu, 1980). Point measurements were made by Al. Istrate the years

1984-1985, on the springs Horoaba, Coteanu and Păstrăvărie.

Horoaba Spring is the most important spring in the depression of Padina, with flow values between 57 l/s and 160 l/s.

Coteanu Spring, comes second in the depression of Padina regarding the volume of water, with flow values between 62 l/s and 93 l/s.

Downstream of Cheile Mici ale Tătarului, on the right slope, there is Păstrăvăriei Spring, with flow values between 19 l/s and 53 l/s.

As a result, most of the flow of the North Bucegi hydrostructure is discharged towards Prahova Valley and only a part to Ialomiței Valley.

South of Cheile Tătarului is delimited the *Cheile Tătarului - Scropoasa hydrostructure*, which overlaps the depressions of Bolboci and Zanoaga.

The storage and circulation of the groundwater is generated by the relationship between the crystalline foundation of Leaota and the sedimentary layer belonging to the flysch area and to the superior conglomerates facies of Bucegi.

The drainage occurs on the southern and south-western slope of Colții Dichiului Mount and is given by two groups of springs. The first group discharges its waters in Ialomita River, and the second in Scropoasa Valley. So the flow of this hydrostructure reaches Ialomita river. The water-bearing potential of these springs in natural regime has a cumulative minimum flow of 220 l/s (95% assurance) and a maximum flow ranging around 800-1000 l/s. The flow of these sources is influenced by the water loss of Bolboci lake and could constitute a source of water in the area of water deficit situated in the Subcarpathians of Ialomița, between Ialomița and Cricovul Dulce.

South of the Scropoasa lake takes shape the Lespezi-Orzei karst hydrostructure, which is intersected by Ialomița river, up to the crystalline foundation. At the contact between the crystalline and the limestone, there are several temporary, small springs. One of them is captured and used to provide with water the limestone quarry from Lespezi.

On the level of the depression of Rătei, a karst system develops in the northern slope of Rătei Valley, a tributary of Ialomița River. Following the loss of surface water of the valley, through a system of cracks and from the surface waters, theRătei surface hydrostructure has been formed. It presents a spring that has been captured since 1910 and used to supply Targoviste town with water. Rătei Spring has a flow ranging from 16 l/s to 45 l/s.

In the eastern part of the Bucegi Massif is located a hydrostructure situated in Raciu syncline, in which we can distinguish: the depression of Raciu in the north and the depression Piscu cu Brazi in the south, extending towards Ialomița basin westwards, up to Ialomicioara de Sus Valley (Runcu).

In the depression of Raciu there is an initial spring at the contact between the calcareous breccias of Raciu and a crystalline plot that appears at the surface on the right side of the Ialomița River. This spring is intermittent, with a flow of 4 l/s and 5 l/s, being intersected by the upstream waterway Dobrești-Gâlma. On the axis of Raciu syncline, there appear the Gâlma springs, in the left slope of Ialomița River, with a flow of 10-12 l/s and captured in the 1970s to supply with water the town of Pucioasa. On the southern flank of this syncline there are several more small streams, some captured for the Hydroelectric Power Plant Gâlma-Moroeni.

Also in Raciu syncline, there is a second group of springs with a flow of 5-7 l/s, located on Tâța Valley, which was captured between 1987-1988, to supply with water the locality of Dealu Frumos. In the same syncline, there is also a smaller spring on the left of Ialomicioara de Sus Valley, downstream from the confluence with the Vaca Valley. It has a flow of 3-4 l/s and was captured in the years 1984-1985, to supply with water the village of Runcu.

The hydrostructures with fissure-triggered primary and secondary intergranular porosity are found in Albian deposits (Al. Istrate, 2002) . They generate many springs with low flows, such as:

- the diffuse springs from the left slope of Ialomița river, at the contact with the Scropoasa - Lăptici facies along the Bucegi Cuesta;
- the springs of the Brândușei Valley and Porcului Valley, at the contact between the gritstones of Babele and Scropoasa-Lăptici facies;
- the spring of the western slope of Ialomita valley, downstream from the confluence with Tătarului Valley, with a flow rate of approximately 10 l/s, which occurs at the contact between the Bucegi conglomerates and the crystalline foundation;
- the spring behind the Padina chalet, linked to the conglomerates of Bucegi.

If the previously presented hydrostructures situated in carbonated deposits, belonging to the Jurassic and the lower cretaceous period can be categorized as deep water-bearing structures, the hydrostructures with intergranular porosity delimited from the level of the Quaternary granular deposits are not situated deep underground (groundwater).

Among the latter, the most important is the *frontal till hydrostructure* from of the confluence of Ialomița Valley with Șugările and Doamnei valleys. Here we have lines of springs developed on the southern abrupt slope of the till, constituting a source of water for Peștera Hotel.

The hydrostructure situated in the Quaternary alluvial deposits of the Ialomiței riverside upstream of Zănoagei Gorge is currently affected by Bolboci storage lake.

3. Subcarpathians hydrostructures

The sub-Carpathian sector consisting of Myo-Pliocene formations with a wide variety of sedimentary rocks influences the position and the characteristics of the groundwater. The lithological makeup, characterized by an alternation of permeable horizons (conglomerates, grit stones, gravels, sand) and impermeable horizons (clays and marls) with non-homogeneous thicknesses and presence of faults, hydrocarbon resources and salt pits, influences the distribution, the location and chemical characteristics of the groundwater.

The sub-Carpathian area is characterized by an average groundwater-feeding potential in relation to the quantities of precipitation that are differentiated, depending on the altitude. The high degree of fragmentation of the relief and the non-homogeneous forest vegetation carpet reduce water infiltration, leading to a rapid drain on the inclined slope, favoring surface drainage rather than infiltration in the underground.

The Paleocene deposits, spread on extensive areas in the northern part of the Sub-Carpathian area, consisting of grit stones, marls and clays, have a reduced groundwater storage capacity due to poor water supply by means of the fissure systems. This favors the presence of springs along the fault lines situated at the contact of the Paleocene formations with the Miocene ones. Their flow rate is fluctuating, depending on the amount of rainfall in the area.

In the Neocene deposits formed from an alternation of grit stones, marls, conglomerates and Sarmatian limestone, there appear water-bearing horizons which are fed with waters coming from the strata ends or on the fault lines, and, because the water passes through salt-yielding and gyps-yielding clays, there appear springs with low flows and a high mineralization degree.

Important groundwater resources are present in the Quaternary formations. The aquiferous complex structures of these deposits are found in the interfluves, composed of the eluvia of the leveling surfaces and the diluvial and colluvial deposits of the slopes. Through the slope deposits takes place the drainage of the groundwaters from the interfluvial areas towards the terraces and meadows (Al. Istrate, O. Murărescu, 1999; Şt. Nedelcu A., 2000).

Along the main valley corridors have been developed groundwater aquifers in Quaternary alluvio-proluvial deposits. This type of structure favors the storage of large water quantities in the meadows of the rivers: Dambovita, Prahova and Ialomita. The alluvial deposits from the meadows of these rivers may reach thicknesses of 3-8 m, depending on which the piezometric level varies between 0.5 and 2 m, with the increasing of the thickness of the complex water-bearing structure from upstream to downstream. The implementation of storage lakes, such as those on the Ialomita river at Pucioasa and Doiceşti has influenced the groundwater level in the sense that it has recorded an increase upstream of these lakes and a decrease downstream (Loghin V., 1999).

In the area of terraces, the aquifers are fed by rainfall and natural discharge from the neighboring slopes. The piezometric level in the terraces varies between

3-10 m, and the drainage directions are generally towards the axis of the valley corridors.

In the structural-geological units of the Sub-Carpathians can be distinguished, based on the research conducted to date, several water-bearing structures:

- *the internal flysch area* has little groundwater, but it is drinkable. There are some occurrences of mineral waters in the area Dealu Mare – Dealu Frumos;

- *the external flysch area*, also with modest groundwater resources, but drinkable. Drinking water that could be used, but with a low potential, can be found in the Dacian-Romanian deposits in the axis of Valea Lungă syncline located north of Moreni town and in the axis of Gura Bărbuleț syncline;

- the *trench area* provides favorable conditions for the storage and circulation of the groundwater through the filling of the Dacian basin with river-lake deposits.

In the latter is separated the internal trench on the level of the Romanian-Upper Pleistocene deposits, where a highly dynamic hydrostructure appears, given by the contour conditions, which leads to the restoration of the groundwater reserve. This hydrostructure which has an average potential offers significant perspectives and occupies the interfluves Dâmbovița - Arges and Prahova – Cricovul Dulce, on the level of Edera - Satu Banului syncline. It has an important water-bearing structure for the area, given the scarcity of the water resources in the area.

The external trench, which makes the passage to the Wallachian platform, which worked as an area of fluvial-lacustrian storage up to the Holocene, consists of Quaternary deposits with thicknesses of 100-300 m. In the latter can be separated several hydrostructures with a significant water-bearing potential:

- the Upper Pleistocene hydrostructure, at the contact with the piedmont plains southwards: Targoviste, Pintenul Măgurii;

- the Upper Holocene hydrostructure, along the main hydrographic arteries, up to the area of the internal flysch.

From the above, we remark an uneven distribution of the underground water resources, with a concentration in the southern and western sector and a major deficit in the sub-Carpathian flysch area.

Most important are the hydrostructures of the Lower Pleistocene, Upper Pleistocene and Upper Holocene.

The hydrostructure of the Lower Pleistocene is characteristic of Cândeşti gravel deposits, with an estimated flow of approx. 1500 l/s and Edera - Satu Banului syncline, which may provide a flow of 330 l/s, of which between 75-80% is exploited for the town of Moreni and the localities Măgureni-Filipeştii de Pădure.

The Upper Pleistocene hydrostructure is characteristic for the southern piedmont plains, with flow rates estimated between 100 and 750 l/s, exploited for the water supply of the towns in that geographic area. This hydrostructure represents as well a local water source for various institutions, particularly in the agriculture. The lack of systematic measurements makes it difficult to quantitatively estimate the water-bearing potential.

The *Upper Holocene hydrostructure* is situated close to the surface, and has been researched in the meadow and lower terrace area of the hydrographic network, in order to turn it into a source of water supply. This hydrostructure is affected quantitatively by the erosion and by the exploitation of the material from the meadows, which has led to a lowering of the water bed of approx. 1.50 - 3 m, while the main source of restoration for the groundwater is the water from the rivers.

It is estimated, for the meadow and the lower terrace of the Ialomita river, a flow of 67 l/s, upstream Fieni, also exploited at the surface.

4. Surface water resources

Average leakage is the most synthetic indicator of water resources within a hydrographic system. It represents the potential water resources of the rivers in the area under analysis, important in the valorization of the water resources for different socio-economic goals.

In order to assess this quantitative parameter and to highlight its aspects, we analyzed and processed series of average monthly and annual flows for different periods, depending on the duration of functioning of the hydrometric station. In this respect, we have analyzed the liquid flows from a number of 22 hydrometric stations, and noticed a remarkable variability in time and space of the average flow.

Ialomita River, along its 71 km course from its springs to Targoviste, has a module flow growing constantly from 1.15 m^3/ s at the entrance to Bolboci Lake up to 7.97 m^3/ s at Targoviste.

Because of the hydro arrangements along it, there appear a number of changes in the liquid flow regime, the affluent module flow in the storage lakes Bolboci, Pucioasa, Doiceşti being higher than the diffluent flow, which is dictated by the needs of water supply of the socio-economic units downstream. These lakes have the role of regulating the liquid flow along the year, in order to mitigate flood waves or draught phenomena that may occur.

So, if the module affluent flow into the Bolboci Lake is 1.15 m^3/ s, the diffluent one is 0.81 m^3/ s, increasing at Moroeni to 6.88 m^3/ s, decreasing again at Pucioasa to 5.58 m^3/ s and increasing at Tirgoviste to 7.97 m^3/ s .

From the alpine region, Ialomiţa receives only one important tributary, Ialomicioara Leaotei, which has a module flow of 0.81 m^3/ s in Fieni.

In the sub-Carpathian area there are a number of tributaries of Ialomiţa River, a part of them discharging their waters in this area and others in the southern plain. These rivers' module flows record average values ranging from 0.17 m^3/s (Slănic at Gura Ocnita) and 1.0 m^3/s (Bizdidel, at Pucioasa).

The variations of the flow from one year to the next reported to the mutiannual average differ from one river to another and from one region to another. The amplitude of the variation of the annual flow during the period under analysis is determined by the climate characteristics and the surface of the hydrographic basins that have a major role in regulating the flow. This is influenced as well by the role of regulator of the storage lakes present along the hydrographic arteries.

In the years 1981, 1990, 1991, 1997, 1998, there were recorded higher rates than the multi-yearly average for all the hydrometric stations in the area. Very low yearly flow averages were recorded in the years 1961, 1964 and 1968, at the existing hydrometric stations of that period, and during 1986-1990, 1993 and 2000, at all the stations situated in the area under analysis. This allows us to notice a succession of periods with high flows in the intervals 1969-1985 and 2005-2007, and with low flows - 1961-1968 and 1986-1990.

The liquid flow is influenced by the hydrotechnical constructions (Bolboci, Scropoasa, Pucioasa, Doiceşti), which impose an antrophized flow regime. So, at the entrance to Bolboci Lake, the average monthly flow with the highest values has been recorded during the period May-June (56%) and with the lowest values during the interval November-March (5.97%).

At the diffluence from the lake, the flows are highest during January-March (35.34%) and August-September (32.57%) and lowest during April-May (6.46%). This is due to the high needs of water supply of the consumers downstream during the above mentioned periods and the restoration of the water supply during the maximum alimentation of the lake.

Where the river enters the Subcarpathians, at Moroeni, high values of the liquid leakage are observed in the interval of April-June (39.63%) and in the months of August (8.85%) and February (8.23%). Volumes of water drained in February may be explained by the penetration of warmer air masses from the Ialomiţei valley, leading to the melting of the snow, and in August, due to torrential rainfall of short duration.

The lowest share of the liquid leakage is recorded in the months of October-November and January (4-5%) either due to evaporation, or the occurrence of the winter phenomena.

The influence of the storage lake from Pucioasa is felt in the monthly average of the liquid leakage in that the liquid leakage presents approximately equal values in the April-August interval (between 8-14%) and in December (9.31%). In the other months of the year, the liquid leakage is between 4-6%. This can be explained by the role the lake has in regulating the hydrological regime of Ialomița River, reducing flood waves and supplying with water the socio-economic objectives in the area of Pucioasa town.

At Târgoviste the highest volumes of water are recorded during April -June (41.5%). From June until November, the volume of fluid leakage decreases steadily, registering a slight increase in December, after which it decreases until April.

Concerning the tributaries that Ialomița receives in its upper basin, differences can be observed between Ialomicioara, which springs from the alpine area (Leaota), and those whose sources are found in the Subcarpathians.

Ialomicioara presents a rich liquid leakage in the April-June (40%), after which it decreases steadily, registering the lowest values in October and November (between 3-4%). In December, a slight increase (8%) is recorded, then follows a decrease in January, after which the values continue to go down.

Regarding the tributaries from the Subcarpathians, namely Bizdidel, Vulcan, Slănic and Cricovul Dulce, they have a similar evolution concerning the regime of the average monthly liquid leakage. Their largest volumes of water are recorded in March-April (between 30-40%), with a tendency to decrease in August, when we can note a slight increase (8-10%), followed by a continuous decrease until October, when the minimum value is recorded (1-2%). A significant increase is found in December (7-11%), followed by a decrease in January and an increase in February.

5. Lakes

Natural lakes are rare and generally temporary. Regarding the *anthropogenic lakes*, from upstream to downstream, without taking into account the moment of their execution, there are: Bolboci, Scropoasa, Brătei, Ialomicioara I, Moroeni, Runcu, Pucioasa, Bela, Doiceşti.

Bolboci lake is situated in Ialomita River, 10.75 km away from the source, upstream Zănoaga Gorge, downstream of the confluence with the river Bolboci, the tail of the lake reaching up to Tatarului Gorge. It was put into service in 1988. Behind the dam a lake appeared, with a length of 2.2 kilometers and an area of 97 ha, which amounts to a useful volume of 18 million cubic meters and a total volume of 19.4 million cubic meters, with an installed power of 12 MW .

The synthetic characteristics of flood waves, for different degrees of assurance are: 20% for a flow of 60 m^3/s; 5% - 120 m^3/s ;1% - 215 m^3/s, 0.5% - 265 m^3/s; 0.1% - 408 m^3/s, 0.01% - 648 m^3/s.

In the area of the Bolboci dam, the unitary hydrograph is characterized by a period of 36 hours, with a coefficient Cs = 0.28 and a basic flow with a value of approx. 10 m^3/s.

In the *Scropoasa-Dobreşti area*, downstream of a succession of narrow gorges and basinets, on a length of 2.5 kilometers, with a difference of altitude of 304 m, was achieved a dam behind which *Lake Scropoasa* was formed in the 1930s , with a volume of water of 0.55 million cubic meters, which provides for the weekly adjustment of Ialomita river. The lake, fed by the Ialomița river, has a flow of approx. 3 m^3/s in the section and to reach the installed flow of 7 m^3/s, an upstream waterway of 3.5 kilometers was built, bringing water from the Brătei dam.

By its installed power (16,130 kW) and its production capacity of 55 GWh/year, the hydroelectric power plant from Dobreşti was the biggest of its kind in Romania between 1951-1960 (Pop Gr, 1996). At the entrance in Orzei Gorges, on the Brătei River, there is *Brătei Lake*, at 1343 m from the sea level, with level difference of 84 m and a useful volume of water of 0.15 million cubic meters.

In the subcarpathian area there are a series of storage lakes, both on the Ialomita river and on its tributaries.

From the lakes of the tributaries we can enumerate: Ialomicioara I, on Ialomicioara-Bucegi, at 650 m from the sea level, with a level difference of 75 m and a useful volume of water of 0.15 million cubic meters; Runcu Lake on Ialomicioara Leaotei, at 790 m from the sea level, with a level difference of 76 m and a useful water volume of 0.10 million cubic meters; Bela Lake, on Bizdidel River, at 460 m from the sea level, with a level difference of 41 m and a useful volume of water 0.12 million cubic meters.

On Ialomita River, there are dams at: Moroeni, Pucioasa and Doiceşti, behind which were formed lakes of different sizes.

Moroeni Lake, at 650 m from the sea level, presents a level difference of 75 m and a volume of useful water 0.40 million cubic meters, was designed for the hydroelectric power plant from Gâlma, where the water arrives through a gallery that captures on the way the water of Rătei and Raciu River as well. The installed power of the hydroelectric power plant is of 15 MW.

Pucioasa Lake is located upstream of the town with the same name. The lake was put into operation in 1975. It has an elongated shape, with a maximum length of 2.3 kilometers, a maximum width of 0.4 km and an area of 90.54 hectares, for the normal level, and 115 ha, at maximum level.

The lake area and dam height lead to the storage of an initial volume of 10.764 million cubic meters. The main problem of this lake is the intense alluvial activity, because it retains most of the solid flow brought by Ialomița and its tributaries. The causes leading to this clogging situation are:

- the change of the slope of the rivers at the passage from the alpine to the hilly area;

- increases erosion level, as a result of the building of the dam at 395 m (initially it was projected at 410 m);
- the location downstream from the confluence with Ialomicioara Leaotei, whose hydrographic basin is developed, mostly in the deforested subcarpathian area which consists of easily erodable materials. So, from an initial volume of water in 1974 (11 million cubic meters), in 1999 the lake reached a volume of 5,033,259 cubic meters of water (48.9% clogged).

By the water intake located on the left side of the river is ensured the capture of water from the lake and its redistribution into river riverbed. Downstream of the dam are assured the necessary water supply for the consumers and for the hydroelectric power plant of Pucioasa (Qi = 12 m^3/s). In this place there is also a water outlet for the trout fishery of Pucioasa (on the right of the storage lake) and for the water treatment station, with a flow of 125 l/s.

Close to the place where the river gets out of the Subcarpathians, a small water storage was achieved, with a dam height of 2-2,5 m. It provides the necessary water for the operation the thermal power plant from Doiceşti.

6. Water quality and the sources of water pollution

There is a distinction between the two major units of relief. In the mountains, most river courses are permanent, with a flow of over 0.5 m^3/ s, with a higher quality (hydrochemical type: calcic bicarbonated, with a mineralization around 200 mg / l or even lower in the high areas). These waters fall into the first category of quality, and in terms of saprobicity they belong to the oligosaprobic class (Ialomiţa up to DOBREŞTI).

Ialomita River is polluted by the limestone exploitation from Lespezi, an increased water turbidity being recorded due to the discharge in the river of the water used in this quarry.

Concerning the water quality in the area of the Subcarpathian Hills, we shall point out that most small arteries in the potential fall into the hydrochemical type of calcic bicarbonated waters, with a mineralization between 200-500 mg / l, except for some that are affected by chlorinated mineral springs, such as Vulcana, Slănic and Cricovul Dulce, tributaries of Ialomiţa. The latter belong to the hydrochemical type of calcic bicarbonated waters with a tendency towards sodium chlorinated, with a degree of mineralization of over 500 mg / l.

The oil-related activity in the area of the hydrographic basins of Slănic and Cricovul Dulce, in the southern part of the Subcarpathians, on the alignment of the settlements Aninoasa - Razvad - Gura Ocnita - Moreni, both through exploitation and through the oil transport and processing network, are sources of pollution for the surface waters.

The sources of pollution from the fruit-growing area of the Subcarpathians should not be neglected either, as a part of the treatment with insecticides-fungicides ends up in the hydrographic network, through superficial drainage.

In this context of the economic activities, the water quality of the autochthonous Subcarpathian rivers is low (categories II and III), but the lack of measurement points allows only for a subjective assessment. However, Cricovul Dulce up to Iedera, belongs to the first category of quality, and between Iedera and Moreni, to the 2^{nd} category of quality.

As for the allochtonous rivers, they belong to the 2^{nd} category of quality.

The important polluting sources for Ialomiţa River are the industrial activities, between Moroeni and Doiceşti and, of course, the household waste from larger settlements: Moroeni, Pietroşiţa, Fieni, Pucioasa, Doiceşti. Ialomiţa.

All along its subcarpathian route, Ialomiţa belongs to the beta-mesosaprobic category and downstream from Doiceşti in the beta-alpha-mesosaprobic category.

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