SOME ANTHROPICALY PRESSURES ON THE DANUBE RIVER AND ITS ROMANIAN BOUNDARY TERRITORY BETWEEN BAZIAS AND CEATAL IZMAIL

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Abstract: The paper points out the main pressures' evolution both on the Danube River and its Romanian boundary territories. A special attention is focused on the pressures that exerted from the Romanian territory and their impact on these items
Keywords**:** environment status, hydrological regime, water quality, morphological changes, minor river bed

ANTROPSCHER DRUCK AUF DEM DONAU FLUSS UND DEN RUMÄNISCHEN NEBENLIEGENDEN GEGENDEN ZWISCHEN DEN BAZIAS UND CEATAL IZMAIL QUERSCHNITTEN

Zusammenfassung**:** Die gegenwärtige Vortragung zeigt in einer kurzen Űbersicht die Faktoren vor welche zur Änderung mancher Parameter, der Bestandteile welche die Umwelt der Donau und der nebenliegenden Gegenden auf dem Rumänischen Ufer abwärts Bazias bestimmen, beigetragen haben.
Gleichzeitig wird eine Vorstellung der Entwickelung mancher dieser Parameter, die den Zustand der Umwelt beeinflussen oder gar bestimmen, vollbracht, mit Beharrung mancher Wirkungen auf die Wassermenge und die Wassergűte der Donau sowie auf das Flussbett und den nebenliegenden Gegenden.
Schlűsselwörte: Zustand der Umwelt, Wasserstände, Wassermenge, Wassergűte, Flussbett

1. General background

Romania is placed in the southeastern Europe, on the Danube lower reach between the 1072+400 km (Bazias) and the 0 km (Sulina). The Danube flows only on the national territory on a length of 240 km between Calarasi section (the 375 km) and the confluence with the Prut River (the 135 km). The rest of the Danube flow represents the state border with Yugoslavia, Bulgaria, Moldavia and Ukraine.

The country surface is by 97 % drained by this transeuropean watercourse. The ratio between the Romanian drained surface and the entire Danube hydrographic basin surface has a value of 28%.

A brief survey of the Danube flow regime downstream Bazias shows the following:

- The multi-annual liquid stock value in Ceatal Izmail section (the 80 km) is about $201*10^9$ m^3/year and about $170*10^9$ m^3/year in Bazias section;
- About 34 % of the multi-annual liquid stock of the Danube is recorded in spring, 25 % in summer, 18 % in autumn and 29 % in winter;
- Downstream Bazias there is a good agreement between the periods showing a hydrological deficit of the river by seasons and those ones of the tributaries coming from the Romanian territory;
- The multi-annual solid stock value in the Orsova section (the 955 km) is about $22.6*10^6$ tons/year and about $41.6*10^6$ tons/year in the Ceatal Izmail section (Buta C., 2000).

The biggest impact upon the water users on the Danube lower reach between the Bazias and Sulina, is recorded in summer. Fig.1 shows Zimnicea section (the 544 km) variation of the coefficient ratios resulted from the monthly mean discharge values, (July and August) recorded in the period 1921-1998 divided by the corresponding multi-annual values of July and August monthly discharges in the same period

2. The main factors generating pressures upon the Danube water course and its boundary territory

It may say that the Danube boundary territories from the Romanian riverbank includes all the areas which didn't belong to any hydrographical basin of the main Danube tributaries. The size of these strongly affected by drought territories is about 33,250 sq. km with a number of about 1,600,000 inhabitants who live there

The main factors exerting pressures upon the Danube River and its boundary territory are the following:

- The main tributaries collecting and evacuating the wastewater into the Danube, i.e. the wastewater coming from the big urban, industrial, agricultural and animal breeding centers on the territorial surface. Still there are 190 big economic units (agricultural and industrial) heavy polluting sources are working without water treatment plants. About 60 per cent of those about 2,800 water treatment plants placed on the Romanian territory are not in operation or operate faultily;
- Development of large industrial platforms (chemical and metallurgical) placed on the Danube bank, without taking the corresponding measures for the environmental protection (Drobeta-Turnu Severin, Turnu Magurele, Zimnicea, Giurgiu, Calarasi, Galati, Tulcea)
- The absence of wastewater treatment plants in the European capitals like Budapest, Belgrade and Bucharest (placed on the river Arges about 60 km from the confluence with the Danube) and in the big cities placed on the Danube bank like the Romanian cities: Tulcea, Galati, Braila, Giurgiu etc.
- Massive use of chemicals in agriculture, especially on the irrigated areas affected by the underground big losses from the irrigation cannel networks, ground water polluted phenomenon and ground water levels raise;
- The large drainage systems of the irrigation systems (especially the ones supplied from Danube) or other agricultural lands linked with the big quantities of the chemicals used in the agricultural works there are one of the main sources generating big surface and ground waters pollution. At the national level, at the end of the 1980 years about 1650 drainage systems were recorded on a surface of about $24*10^3$ sq. km. Within the embanked surfaces of the Danube flood plain ($4.4*10^3$ sq. km), about 75 per cent of the surface was fitted out for drainage. The mean discharge evacuated through these drainage systems placed on the Danube embanked surfaces is about 30 m^3/sec.
- Villages development and extension without providing them with waste water treatment plants and without sewage water centralized systems;
- No efficient efforts to reduce the underground massive losses from the drinking and waste water centralized networks;

- The complex fitting out of the Danube river ant its tributaries i.e. Iron Gates I and II storage reservoirs, Danube floodplain embankments (40 year old, about 1200 km of the Danube floodplain banking and $4.4*10^3$ sq. km embanked floodplain), the Danube-Black Sea Channel, irrigation systems supplied by water from Danube etc.;
- Use of agricultural machines much heavier than the existing soil types necessity;
- Uncontrolled deforestation;
- Naval traffic;
- Accidental pollution as the following:
    - The Somes River and the Danube River on the Romanian territory Cyanide pollution phenomenon as a result of the Baia Mare gold extraction plant toxic mud settling tank dikes breaking in 2000;
    - The Danube oil products pollution phenomenon from the river ships;
    - The Iron Gate I lake pollution, especially the sediments pollution with toxic chemicals during the NATO bombing in Pancevo
    - The accidental pesticide (β-cipermetrin) water pollution event occurred in the 1998 in Budapest at the Nagytétény Unit of a Pharmaceutical Chemical Works
- A great number of the accidental pollution sources in the big industrial objectives placed on the Danube's bank like SIDEX – Galati, Turnu Magurele, Drobeta-Turnu Severin etc.

The Romanian water users, which have a Q>100 l/s minimum necessary discharge, sum about 600 units. (50 per cent of which are water-consuming users for irrigation and fish breeding.)

The main cities placed along the Romanian Danube riverbank that generates pressures upon the Danube and its boundary territory are Tulcea (about 97,000 inhabitants), Galati (about 327,000), Braila (235,000), Calarasi (78,000), Giurgiu (73,000), Turnu Magurele (36,000) and Drobeta -Turnu Severin (118,000).

A special water user, directly collecting water from the Danube is Danube-Black Sea Channel, which have 225 m^3. /sec maximum installed discharge (navigation, Cernavoda nuclear power plant cooling, Carasu Valley irrigation system etc). A supplementary water supply for the touristic resorts on the seaside including Constanta town is also collected from the Danube - Black Sea Canal

As related to the irrigation systems, from a total of about $32*10^3$ sq. km, recorded in 1989 as fitted out in Romania, about $22*10^3$ sq. km are placed in the south and southeast of the country and they have the Danube river as supplying source. To irrigate these surfaces with water from the Danube, 71 irrigation systems with surfaces between 10 and 2000 sq. km (Carasu Valley in the Dobrogea Plateau) were fitted out.

3. The evolution of the quantitative pressures from the Romanian territory upon the Danube water resources

The dynamic of the annual water volumes collected in Romania able to satisfy the existing national water users from 1950 to 2000 is presented in Fig. 2.

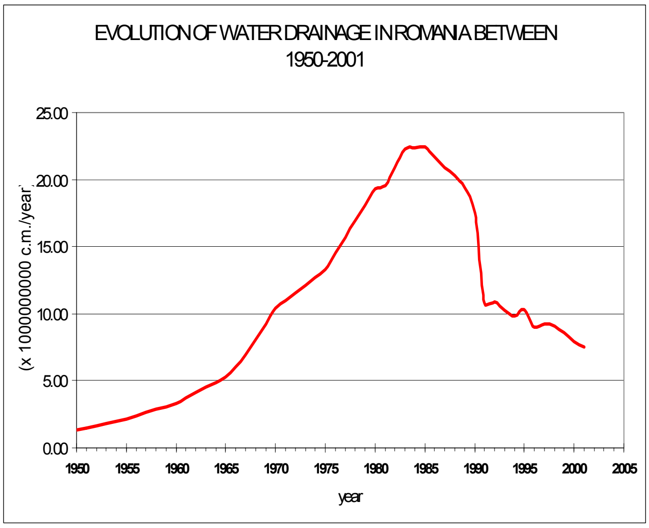

Fig. 2

Before 1989 the irrigation used to be the main Danube water consuming user. The size of the irrigated surfaces, even from the beginning of the irrigation process, about 35 years ago, has not exceeded about 65 per cent of those $22*10^3$ km^2 of the irrigation systems from Romanian's south and southeast.

The water volumes collected from the Danube (especially in the summer months when relatively scarce discharges on the Danube are recorded), have shown the maximum values in the middle of the 80's (about 5-5.5*10^9 m^3/year). These maximum values were recorded in such years with mean water request for irrigation. At the beginning of the 2000 years, up to 20 per cent of the fitted surface has been irrigated with water from the Danube.

In accordance with the computations, during a mean hydrological year and at a developing level corresponding water consuming uses for 1989, the water request in Romania was of about 21-22*10^9 m^3/year of which the mean consumption being of about 52% (Godeanu A. - 1993).

At the same year level, the 19.4*$10^9$$m^3$/year (1.7*$10^9$ m^3/year water for one power group of the Cernavoda Nuclear Plant) collected volume distribution on different types of water uses on the whole Romanian territory, showed the fact that about 42% from this value served for industrial purposes, about 46% for agriculture and the rest for drinking purposes. In the 1989 the ratio between the consumed volume and that one collected was about 57%.

In 1999, because the activity within the big industrial centers was considerably reduced and the irrigation systems were damaged and rarely used, the water demand dropped to about 12.6*10^9 m^3/year. In the same year the total collected volume was of 8.57*10^9 m^3/year and the ratio between the consumed volume and the one collected, dropped to 22%. The structure of the collected volume used to be about 24% for drinking water, about 64% industrial water, about 3% for irrigation and the rest for animal and fish breeding.

In 2001, from a total collected volume of 7.5*10^9 m^3/year, about 64% represents the collected water for industrial purpose and 14 per cent for agriculture (irrigation, animal and fish breeding).

The above-mentioned situation regarding the total water demand for water users on the whole Romanian territory underlines the fact that the ratio between the collected volume and the multi-annual mean stock of the Danube at Ceatal Izmail decreased from about 10% (1989) to 4% (2001).

The observation, which has to be made, is that in a year time, maximum pressures of the Danube upon the water users and these ones upon the Danube usually can be noticed in the summer months and at the beginning of autumn (except for big flows and accidental pollution).

4. The pressures upon the Danube low-flow channel

The main anthropical factors, which have favored, generated and amplified the pressures upon the low-flow channel, are the following:

The storage reservoirs operating on the entire hydrographic basin territory and especially the Iron Gates I and II, have as an effect the decreased value of the solid discharge conveyed in transit along the Danube River and downstream levels regime change. Fig. 3 shows the Danube hydrographical basin fitting out effect upon the monthly mean value variation of the liquid and solid discharge in the Ceatal Izmail section from 1931 to 1999 (Carmen B. 2000)

In this framework, we must remind the Iron Gate I storage reservoir is operated till 1972 and Iron Gate II till 1984. The dams are placed at the 942+950 km (Iron Gate I) and respectively at the 875 km (Iron Gate II) on the Gogosu branch and at the 863 km on the Danube. The main characteristics of these storage plants are shown in table 1.

Tab. 1

	Lake total volume (10^6 m^3)	Lake volume of use (10^6 m^3)	Dam elevation (m)	Power installed (MW)	Annual Mean energy (GWh/year)	Nominal fall (m)	Installed discharge (m^3/s)
Iron Gate I	2,900	150	72.5	2,139	10,500	34.5	8,820
Iron Gate II	800	100	46	540	2,640	13.15	2*4,250

The noticed storage reservoirs operating effects upon the downstream daily mean levels include the low-flow channel erosions discharge-rating curve change effects.

Fig. 4 shows the distribution of the daily mean level differences frequency in Gruia section (the 851 km) in the following periods: 1961-1970 (natural regime), 1972-1983 (Iron Gate I), 1984-1990 (Iron Gate I and II)

The daily mean level differences distribution frequency analysis performed in Gruia (the 851 km), Calafat (the 795 km) and Giurgiu (the 493 km) sections indicates that a consecutive daily mean level difference frequency of +/-0.5 m between 1984 and 1990 was about 0.035 in Gruia, 0.025 in Calafat and 0.005 in Giurgiu section. From 1984 to 1990, in the Gruia section, about +/-0.3m difference between the natural regime and operating Iron Gate II and I one, occurred at the 0.035 frequency value.

Fluvial and maritime navigation traffic on the Danube and on the Sulina Channel is one of main non-water uses activity with a noticeably impact both upon the low-bed channel and water quality (especially in the Danube hydrological deficit periods)

The evolution of the general cabotage activity on the whole Danube River and the maritime transport of goods coming on the Danube from the Black Sea through the Sulina Channel to Braila port, reflected by the transported commodity quantities (10^6 tons/year) between 1950 and 1995 is pointed out in fig. 5.

The second part of its maximum development, (the period between 1985 and 1990), concurred with a period showing a relative hydrological deficit on the Danube lower reach. This fact is illustrated by fig.3 corroborated with fig.5 and fig.6. Fig 6 presents the ratio coefficient between the monthly mean liquid discharge value in Gruia section and the minimum discharge value (about 2500 m^3/s) for naval transport (base flow) down stream Gruia from 1953 to 2000.

In the official records of the Danubian Commission the following are to be noticed:

- A great number of fluvial ships with a transport mean capacity of about 3,500 tons/ship and a mean total power/ship up to 2.5 MW
- The goods traffic (including the maritime one between Sulina and Braila) through the downstream Bazias ports in 1970, 1980 and 1990 are the following: $34.717 \cdot 10^6$ tons in 1970 year, $55.098 \cdot 10^6$ tons in 1980 year and $52.127 \cdot 10^6$ tons in 1990
- The analysis of the transport activity expressed in goods quantities transported on Gruia-Silistra crossover shows the fact that in the last three decades of the last century, about 80 per cent of the whole goods quantity was directed towards the ports on the right bank of the Danube.

There are 106 pumping stations which collect water from the Danube for the Romanian irrigation systems. The total installed discharge of this pumping station is 1654.43 m^3/s. The total installed power in these pumping stations is about 630 MW and the total installed power in the whole these irrigation systems is about 2,700 MW.

Among the most important fixed pumping stations which are direct supplied with water from the Danube are the following: Tiganesti (Q=16.92 m^3/s, P=12 MW) at the 877 km, Pristol (Q=41.5 m^3/s, P=33 MW) at the 847 km, Basarabi (Q=47.5 m^3/s, P=22.25 MW) at the 799+900 km, SPL1 (Q=43.61 m^3/s, P=63.68 MW) at the 660+600 km, Celei (Q=30 m^3/s, P=15.95 MW) at the 633+150 km, Garla Iancului (Q=63.6 m^3/s, P=4.88 MW) at the 569+650 km, Pietrisul (Q=50.4 m^3/s, P=28.65 MW) at the 59+700 km, on the Borcea branch of the Danube river, Borcea (Q=22.5 m^3/s, P=2.8 MW) at the 63+300 km on the Borcea branch and Ghindaresti (Q=26 m^3/s, P=15.47 MW) at the 258+500 km on the Danube river.

Through their local suction current velocities, the bank erosions are the main local anthropic impact effect of the fixed pumping stations.

Ballast exploitations from the Danube low-flow channel The most important Romanian pits are placed in the Danube low-flow channel from the 600 km to 350 km, especially in the Giurgiu, Calarasi, Constanta and Tulcea countries. In the 80's the average ballast quantity exploited was about $4\text{-}5 \cdot 10^6$ m^3/year.

5. The anthropic impact upon the Danube low flow channel

One of the effects of the anthropic impact upon the low–flow channel could be seen is the decreasing of the levels corresponding to the discharges flowing through the low-flow channel (the low-flow channel transport capacity oscillates between 8,000 – 11,000 m^3/sec) and favoring the bank erosions sometimes followed by their collapse.

The decreasing level corresponding to 3,500 m^3/s discharge in few sections along the Romanian bank downstream the Iron Gate II section, between 1953 and 1995 are following: 0.5 m at Novo Selo (the 833+600 km), about 0.3 m at Svistov (the 554+300 km) from 1960 to 1995, 0.7 m at Giurgiu (the 493 km); 0.2 m at Oltenita (the 430 km) and 0.4 m at Silistra (the 375 km).

Figure 7 shows the evolution of the level corresponding to the discharge value of 3,500 m^3/s in the Giugiu section from 1953 to 2000

Taking in account the relative stability of the entire cross-section at Giugiu gauge (see fig. 8), one of the feasible explanations of the thalweg erosion phenomenon have to be related to the ballast exploitation in the last three or four decades (see the 1-m Giurgiu cross section gradual thalweg drop from 1974-1981 to 1994 and its effect upon the stability of Ruse-Giurgiu bridge).

The total length of the erosion phenomenon on the Romanian riverbanks between Gruia and Braila (the 170 km) is about of 100 km (including the ones on the downstream Calarasi, Danube's branches)

The erosion speed of the dike-riverbank area may reach 10 -12 m/year.

Fig. 9 presents the total erosion lengths distribution along the Romanian bank downstream Gruia to Vadul Oii section (the 239 km) without the erosions on the Danube secondary branches downstream Calarasi-Silistra section.

Pressures upon the Danube water quality

Significant improvement of the water quality downstream Bazias was recorded after 1989 due to a drastic decrease of the economic activity in industry and agriculture in the entire central and southeastern European ex-communist riverside countries.

Fig. 10 shows the evolution of the annual evacuated waste water volume coming from the Romanian territory from 1989 to 2000 (the total evacuated used waters volume and the used water volume which needed to be purified), coming from the Romanian territory. The main remarks that can be made regarding the already mentioned framework are the following:

- At the end of the 80's years and at the beginning of the 90's in Bazias section the water coming from upstream even in accordance with the Romanian quality standards, was included into the second global category. This global water quality category includes the water that can be used in the fish breeding pools for the fish less vulnerable to pollution than trout, in town planning and entertainment activities. By the quality indicators for substances such as phosphorus (P), zinc (Zn) and phenols, the values registered are corresponding to the third category. The third category includes the water that can be used for crop irrigation, electricity generation by the hydropower stations, industrial cooling equipment, in laundries and other uses bearing such a quality. From the point of view of fish breeding this waters coming from upstream Bazias belongd to the "degraded" category.
- At the end of the 1980 years, about $6*10^6$ tons/year pollutants used to come from the Romanian territory, but only 8% from the existing sources on the Danube bank. The biggest pollutants quantities were transported by the tributaries like Jiu river (47%), Siret (14%) and Arges (12%). In that situation, in accordance with the measured parameters at those 12 water quality automatic monitoring stations placed on the Danube, downstream Bazias on the Romanian territory, the water quality on the Danube belonged to the second global category.
- Among the toxic substances existing at the beginning of the 1990 years, the exceeding of the admissible quantities for the third category can be found as follows: Zinc (Bazias – the 1072 km, Gruia – the 851 km, Chiciu-Silistra the 375 km and Vilcov –Periprava the 18 km on the Chilia Danube Delta branch), Cadmium (Gruia, Reni-the 130 km and Vilcov-Periprava), Iron (Reni and Vilcov-Periprava), Phosphorus (at the confluence with Arges river –the 431 km and Vilcov-Periprava)
- At the end of the 1990 years and at the beginning of the 2000 years, the water quality of the Danube, downstream Bazias, can be included in the second quality global category at 50% of the monitoring stations, and in the first category at the rest of them.
- At the beginning of the 2000 years from the waste water volume of about $2.6*10^9$ m^3/year evacuated in the Danube (see fig. 10), about 20% is properly purified, 50% is partially purified and the rest isn't at all purified.
- From the saprobic point of view, the Danube belongs to the beta-mezosaprobic category (Galasiu & Zglogiu – 1999)

6. Pressures upon the Danube aquatic ecosystems

The main pressures upon the aquatic ecosystems including the ichtyofauna, on the Danube, are caused by the storage reservoirs, the existing of the polluting factors and the flood plain disappearance as a result of intensive embankments on the Danube and in the Danube Delta after 1960. From this point of view it is important to remind the fact that the Iron Gates dams and the whole Danube flood plain embankment threatened with the disappearance of some precious fish species such as the sturgeon (Acipenser sturio), sevruga (Accipenser stellatus) and Danubian mackerel which cannot migrate upstream in order to reproduce their species. At present, in the Iron Gates storage reservoirs, still can be found about 90 of the invertebrates species from about 500 which used to populate the aria of the Iron Gate actual lakes. For the moment, the Iron Gate storage reservoir is considered to be an anthropical ecosystem, which differs a lot from the initial one, saving only several residual aquatic ecosystem components coming from the tributaries. This new system favored the development of several rare species, such as the bream (Abramis ballerus) and the snub-nosed bream (Abramis sapa) and Pelicus cultratus and allows the assisted populating with some species of the economic and sport interest.

Decreasing of the quantities of the fish capture downstream Iron Gate as effect of the Danube flood plain embankment accompanied by the disappearance of the fish reproduction sites like the natural lakes and marshes, as Potelu (ca. 18,000 ha), Suhaia (ca. 15,000 ha), Greaca (ca. 40,000 ha) etc. and the Iron Gate hydro-power stations exploitations downstream anthropic impact

7. Some anthropic impacts upon the Danube boundary territories

The main pressures exerted upon the Danube boundary territories refer among others to the drought, ground water level and quality regime modification, soil quality modification and radical modifications, for some ecosystems in certain areas (former lakes and marshes) and the deforestation.

In natural regime, of the Danube flood plain (without embankments and irrigation systems), a characteristic element of the ground waters was the fact that these ones could be found at a relatively small depth of 2-5 m. (in the Danube flood plain) and dipper one in the terraces area. Another characteristic element was a great mineralization degree and a rich iron content (Gistescu, 1967).

The ground water mineralization degree gradually increased when the water deficit in soil increase and the natural flood plain drainage got worse along the Danube from upstream to downstream. Downstream Bazias, the ground waters in the flood plain area placed under the terrace due to the phreatic-saline contribution from terraces or high plains, had a mineralization degree higher than the ones in the central flood plain or the river hills area due to the Danube influence and the effect of the phreatic reserves supply during the Danube flooding periods.

With respect to the initial situation, as a result of the social and economic development of territory there occurred severe anthropic impact phenomenon upon the environment such as:

- Ground water mineralization degree increasing as a result of the climate aridity and of the Danube flood plain embankments;
- Pollution of many ground waters reserves with pesticides, fixed residue, organic substances, antimonium, nitrates, phosphates and metals such Fe, Mn. These pollutant substances present value exceeding the admissible ones for domestic and drinking purposes. The nitrates quantities exceeding the admissible values are recorded along the Danube adjacent territory between Calafat and Giurgiu. Other nitrate ground waters reserves polluted area can be found in the Moldavian southeast. These types of affected areas are placed on the Covurlui Plain irrigation system or in the northern of the Baragan Plain and in the Ialomita river corridor between Urziceni and Tandarei. It is worth mentioning the area between the river Olt and river Vedea and the area between the river Vedea and river Arges strongly affected by the hardly biodegradable pesticides. All these

affected ground waters are placed on the irrigation systems area and in the vicinity of the great industrial objectives like SIDEX – Galati, Giurgiu, Turnu Magurele, Drobeta-Turnu Severin etc. The most serious problem is that 90 per cent of villages are supplied with drinking water by this contaminated ground water reserves and lack drinkable water purification systems;

- The ground water level rises particularly at the end of the 1970 years and the beginning of the 80's one. This phenomenon visible especially in the areas in which, in natural regime, the ground water levels was situated at depth of 1-3 m. The maximum registered levels rising in some places reached 10-11 m. The main causes of this phenomenon are the big water losses in the irrigation systems transport open channels and the precipitation excess periods in the 1970 years. The effects of the ground waters level raising caused humidity excess on a large surfaces, salification of important soil surfaces, hydrological changes on several local water courses which became drainage channels and the damage of many rural residences such as those ones in the Sadova-Corabia irrigation system. The climatic regime mitigation after 1982 in the sense of reducing of precipitation didn't produce a sensitive mitigation in the ground water levels until the 1990 years when irrigation surfaces was up to 20 per cent of the initial ones.
- Soil pollution with ferric oxides and non – ferrous metal powders coming from the big industrial centers like Galati, Calarasi, Giurgiu, Turnu Magurele and Drobeta-Turnu Severin.
- Rise of the soil salification and alkalization degree in different areas as a result of the Danube flood plain embankments and natural alluvium elimination and excessive use of the chemicals in agriculture.
- Acid rains as a result of the atmosphere release of Chlorine, phenols, sulphurate hydrogen, nitrogen dioxide, and heavy metals, especially in the area of the big industrial platforms.

8. Conclusions

- The Danube river downstream Bazaias and its boundary territory (33,250 sq. km and over 1,600,000 inhabitants) are strongly anthropized areas. The pressures upon the Danube River watercourse and its boundary territories increased quickly in the context of the boom of the economic and demographic development of the 70's and 80's. Especially for these territories placed on the Danube lower reach, in the Romanian south and southeast it must add the general component of the climatic trend changing to an arid one. The effects manifest upon both surface and groundwater hydrological and qualitative parameters, the Danube low-flow channel morphology and the ecosystems.
- Decreasing of some types of anthropic pressures upon the Danube lower reaches downstream Bazias and its boundary territory (especially upon the surface water quality, ground water level and acid rains frequency) was recorded after 1989 due to a drastic decrease of the economic activity in industry and agriculture in the entire central and southeastern European ex-communist riverside countries.
- Still there are important pressures upon the Danube River downstream Bazias and its boundary territory. Severe drought, irrigation activity decreasing, navigation, the lack of water treatment plants, the Danube and its tributaries fitting out, insufficient security means and measures to prevent accidental pollution, insufficient waste water treatment plants and villages insufficient sewage water centralized systems, no efforts to reduce the underground massive losses from the irrigation channel networks big water losses, drinking and waste water centralized networks are the main factors still generating pressures upon the Danube and its boundary territory. Still there are a great number of important accidental pollution sources at the great industrial objectives placed along the Danube River and its tributaries. In this framework it must be noticed that one of the most important activity generating accidental pollution and the Danube river low-bed morphological change is the navigation

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