AQUATIC ENVIRONMENT POLLUTION

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ABSTRACT

From immemorial times people have been concerned with environment protection, certainly on a scale corresponding to the impact of human activities on it, taking into account, from the very beginning, the interest on the "health" of drinking water sources, where their animals drank and where their respective communities could drink clean water and use it in daily cooking, until nowadays, when the marine environment has turned into an international policy.

Taking into account that the natural environment represents the set of natural conditions and elements of the Earth: air, water, soil and subsoil, all atmospheric layers, all inorganic materials and all the living beings which can not live without water, their protection knows today a regulation by means of legal norms- which are carefully monitored and punished from a legal point of view, in each state.

Keywords: *Dobrogea, Danube, Black Sea, aquatic environment,*

1. INTRODUCTION:

The European Union published in December 2000 a framework directive on waters (Directive 2000/60/EC of the European Parliament) which considerably changes the aquatic environmental control [1].

Usually, the water is a liquid, a hydrogenated compound of oxygen (H2O). But it can exist in three different states of aggregation, changing with relative ease (on Earth) from one into another: liquid, gas (vapors) and solid (ice). Water has several specific (geographical) characteristics:

- it occupies intense volumes at the surface of the Earth;
- it creates a continuous circuit between oceans, atmosphere and dry land;
- it represents the most widely spread solvent;
- it has a great capacity of absorbing the heat, it warms and cools more slowly than any other liquid, having a regulatory influence on the temperature of the Earth;
- it boils at 100 degrees C and it freezes at 0 degrees C;
- it reaches its maximum density at +4 degrees C; at 0 degrees C it becomes by 10% more voluminous than at +4 degrees C, which makes ice float. When the water from the rocks freezes, it desegregates them.

The geographical units of the hydrosphere, respectively the territorial systems in which water is organized, are: oceans, seas, flowing waters, lakes and underground waters, glaciers. However, water is a compound of other layers of the Earth, with which the actual hydrosphere is in a permanent exchange (circuit). We are talking about the water in the atmosphere (in the form of vapors), in the biosphere (80% of living matter is made of water), in the rocks of the geosphere (as free or chemically bound water) and in the soil.

The limits of the hydrosphere itself are given by the limits of the space with free liquid water. In the geosphere it descends to 5-10 km and in the atmosphere 90% of the water is localized up to 5 km altitude. However, the wider limits reach the Moho discontinuity (as in the case of the relief-sphere) and it ascends into the atmosphere to around 80 km.

Its total volume is of almost 1.4 billion cubic km, 96.5% of which is to be found in the oceans; 2.46% is represented by the underground water and only 0,0002% is to be found in rivers and 0,017% in lakes etc.

2. THE AQUATIC ENVIRONMENT

The aquatic environment is much more complex than the terrestrial and air environments because the interdependence between the environment and the body is much closer in the case of the aquatic beings than in the case of the terrestrial ones. As a consequence, the action exercised by the environmental factors on the poisoning process is more powerful in the case of the aquatic organisms.

Knowledge of water quality is the starting point in determining the measures which are necessary to their protection and to the systematic verification and correction of the applied measures.

2.1. The Environment of Surface Waters

Surface waters are standing or flowing inland waters from the surface of the land, as well as transitional and coastal waters.

In what concerns the actual outcome of the EU environmental policies, Nicolae Sfăcăreanu believes that some problems have been improved. These include surface water quality, air quality in relation to certain substances (acid rain, for example), the progressive designation of areas for wildlife and nature protection etc. Some areas have experienced deterioration, remaining huge challenges, even if the EU has given them substantial attention. These include the decline of biodiversity, global warming, deterioration of fauna fisheries and air pollution problems related to an increasingly busy traffic.

It is clear that the environment has undergone

fundamental changes in recent decades. From an issue which has been ignored when designing the European project of integration and cooperation, it has become one of the most powerful and visible areas.

Special situations regarding the water from a geopolitical point of view are represented by the areas where the amount of water is insufficient and where it can become a weapon [2].

The inequitable use of natural resources affects the interests of some actors and it may lead to tensed states within the geopolitical area.

The hydrographic basin of Danube River includes almost the entire surface of the Romanian hydrographic network (97.8%), with the exception of a part of Dobrogea's rivers which flow into the Black Sea. Romania has a hydrographic network with a length of 78,905 km. The water resources from the interior rivers are of 40 billion m3, which represents 20% of the water resources of the Danube River [3].

2.2. Marine and Coastal Environment

The Black Sea has an area of 413,490 km2; its maximum depth is of 2245 m; its water volume- 529,955 km2; the length of its shores - 4020 kilometers. Many great rivers flow into the Black Sea, which causes a reduced salinity of 20-20%: Danube, Dniester, Bug, Dnepr and Kizil. 78% of the river intake (assessed at 346 km2) belongs to the rivers in the north-western part of the basin, and of these, of course, to Danube.

3. THE INDIVIDUALITY OF THE AQUATIC ENVIRONMENT OF DOBROGEA

Due to the favorable natural environment, Constanta city is developing on a calcareous promontory that goes forward into the sea with approximately 1,500 m. The first boats Greek were sheltered in the bay formed by this peninsula, towards the south. The documents of the time, from the VIth century BC, talk about a city named TOMIS, as one of the most important ports on the eastern shore of the Black Sea. Its settlement at the crossroad of the main circulation arteries has played an important role in the development of the city, becoming a major attraction point of the main commercial routes that linked the Mediterranean ports with those of Pontus Euxin.

The Tomis Port also served as a call for the ships that linked the commercial centers of Histria, Arganum, Halmiris with the Danubian ports [4].

The roads connecting the far Euro-Asian regions with the Mediterranean world can be also added to these ways of maritime communication. Furthermore, the link to the mountainous areas of the Carpathians and to the Romanian Plain was made on the line of the main valleys.

3.1. The Climate of Dobrogea

The air temperature in Dobrogea undergoes changes which depend on altitude, season and distance from the sea; there are differences between the coldest month and the warmest month of the year. This difference is due to water and land heating and cooling particularities. These features are determined by the absorption of sunlight and by the different caloric capacity of water and soil particles, and especially by the existence of vertical and horizontal currents in the sea, which cause a turbulent heat transport between the water layers.

Another difference between the thermal regime of the sea and that of the land lies in the fact that water areas are, on average, warmer than the surface of the land because its radiation balance is higher than the one of the land. The difference between the air temperature of the land and that of the sea leads to the formation of air currents that periodically change their direction, depending on water and land heating and cooling processes.

As we move away from the sea shore, in January, the degree of continentalism increases and air temperature decreases from positive to negative values. In July, due to the influences of day breezes, the air temperature changes with up to 1-2°C, compared to the one of the dry land.

Starting with March, due to the increase of the intensity of solar radiations, the air temperature becomes positive, marking the emergence of differences of about 3-4°C, compared to the previous month. Sensitive growths between 5-6°C are recorded in April. On the one hand, they are due to the increase in value of the thermal balance of the active underlying surface and, on the other hand, they are due to the influence of the atmospheric circulation which is largely south western. Due to all these, the air temperature slowly increases in May and in June, reaching its maximum in July; then it begins, at first slightly and then increasingly, to decline by the end of the year. The emphasis of the differences between September-October (about 4-5°C) is due to the decrease of the radiation balance, but also because the influence of the masses of colder air from the east begin to change, which is determined during the cold period.

Summarizing those stated in connection to the monthly average temperatures and to the seasons, one can see that during the winter and summer months the air temperature varies little from one month to another compared to the transition months of March-April and October-December.

3.2. Rainfalls in Dobrogea

In terms of precipitations, Dobrogea is the driest region of the country: the average precipitation limits is between 350 and 510 mm annually. The coastal area - between the sea shore and a line approximately parallel to this one, situated at about 30 -40 km inland - is characterized by the lowest amounts of precipitations – under 400 mm annually. The largest amounts of precipitations fall in the south-western part of Dobrogea - over 450 mm annually – as well as in the western part of the Babadag Plateau – where there are recorded over 600 mm annually, and in the area of Macin Mountains.

Precipitations are more abundant during the warm period of the year - from April to October - when there are recorded about 60% of them. Heavy rains fall in late spring and in early summer; a second rainy period is

recorded in November. Sometimes these rains are torrential.

In what concerns the precipitations under the form of snow, they are also quantitatively reduced. The average annual number of snowy days is of 8-15 in the sea coastal area. The number of days with a continuous snow layer is of around 14 days on the sea shore and of 20-40 days towards the inland of Dobrogea; the thickness of the snow layer reaches the maximum values in the northern and north-western parts - 20- 40 cm, compared to only 5-7 cm in the southern part of the coast and in the Danube Delta.

4. THE POLLUTION OF THE AQUATIC ENVIRONMENT IN DOBROGEA

The existence of toxic substances in the environment, particularly in aquatic environments, as a result of municipal activities and developed industries, became an issue of major concern. Therefore, in many countries, a large number of organic substances are monitorized and this action is governed by international organizations (WHO, EPA, EU).

Environmental pollution has, at present, a general character, including the geosphere, the hydrosphere, the atmosphere and the biosphere. Inner seas and their continental shelves are the most ecologically affected.

The Black Sea is in a very unfavorable ecological situation; various polluting, natural and technogenic agents are being accumulated in the Black Sea, coming from a huge area of over two million kilometers from Europe and Asia.

The area which is the most affected by the intake of Danube is the one where water rivers are flowing into and mixing with the marine waters; this area is called "pre-delta" and here the content of pesticides and of polycyclic aromatic hydrocarbons (PAHs) depends on the great river flow and on the characteristics of maritime currents. In these circumstances, some of the content of the pollutants is considerably reduced, as a result of sedimentation processes, and another quantity is moved in the littoral area.

Polluting agents are brought mainly by the rivers tributary to the sea: Danube, Dniester, South Bug, Dnepr, Don, Cuban, amounting to a total flow of over 300 Km3/year; about 65% of this quantity flows into Danube (200 Km3/year) [5].

In what concerns the development of the macro-zoo-benthos, Black Sea waters show the gradual worsening of the ecological conditions in the area.

The hypoxia (low oxygen) and the anoxia (total disappearance of oxygen) became permanent phenomena (summer months) on the continental shelf located at the north of the Danube Delta, which leads to a decrease of the biomass and even to the total disappearance of the macro-zoo-benthos.

The determination of the organic compounds in Danube and Black Sea waters presents a major importance due to wastewaters (industrial and household wastewaters) with a high content of pollutants, which can affect physical, chemical and biological processes. The rivers which flow into the sea are carrying various pollutants and introduce them into the marine environment (including organochlorinated pesticides and polycyclic aromatic hydrocarbons used in order to combat agricultural and forest pests). The destruction of the ecosystems is due to the great number of activities such as shipping, intensive agriculture, fisheries, tourism; it is also due to the existence of metallurgical industrial centers, to the discharge of industrial and household wastewaters, to the discharge of petroleum products from cargo ships and from petroleum storage tanks. The atmospheric depositions, the global distribution and transport of these compounds, as well as their remanence and their long life cycle are also important, and they lead to the spread of contaminants in Black Sea waters. Due to the accumulation capacity and to the toxicity of these pollutants, there is an overall increased interest in determining and reducing them from the environment.

Knowing that Danube is the general collector of the waters from its entire hydrographic basin, protection measures must be taken within an international collaboration with the participation of all Danubian countries.

5. REFERENCES

[1] This new Directive requires to Member States to determine the ecological status of the aquatic environments, their classification into quality categories, the objectives and the strategies in order to achieve a good water quality by 2015, imposing the measurement of toxic substances, the preparation of lists of substances and of permissible concentrations according to biological criteria. This revolutionary directive recognizes the importance of the biological and ecological character in establishing the classical criteria of water quality, requiring the development of methods for determining the ecological quality, starting from different species: benthonic invertebrates, fish etc. and involving a cross-border scientific cooperation between all EU Member States in order to standardize these methods.

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