

THE LEVEL OF POLLUTION FROM NUTRIENTS AND HUMAN EFFECTS ON DURRES BAY

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Abstract

The aim of this study is to assess the pollution of the water in the Bay of Durres from wastewater discharges, including the one generated from livestock units. Monitoring expeditions were carried out in the coast line of Durres Bay. There were appointed 2 sampling points, The first point named Currila is located in the north suburb of the city of Durres and the second point named Plepa in the estuary of the wastewater and livestock water discharges, in the south of Durres city and were analysed physic-chemical indicators in May and August 2011.

The results of the analysis showed evident differences compared to the reference parameters of EU for the bathing water quality. Specifically *Streptococcus Faecalis* resulted 3.1×10^3 and 9.3×10^3 MPN/100 ml water (May/August) in the Currila point, versus 3.5×10^4 and 9.8×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 2×10^3 MPN/100 ml water.

Specifically *Escherichia coli* resulted 1.5×10^3 and 3.4×10^3 MPN/100 ml water (May/August) in the Currila point, versus 2.3×10^5 and 9.3×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 1×10^4 MPN/100 ml water. As observed, among others, the seasonal and livestock units effects are evident. It can be concluded that, to control pollution, is important to treated wastewater and the water that is generated from the livestock units before discharge them in the sea water, because they are a risk factor of pollution.

Key-words: water, quality, pollution, analysis, samples, treatment

Introduction

The control of water quality characteristics is an essential element for the solution of various problems related to water resources management, because the water is a natural resource, so its quality must be protected, managed and treated.

The urban growth and industrialization of these areas is accompanied with increasing the pollution in aquatic environments. The development of human society has constantly an extensive use of water in its various fields like industry, agriculture, trade and transport, electricity, sanitation and potable water primarily.

Studies conducted in recent years show that pollution of bays, deltas and lagoons are in a concerning level. (Valdas D & Real E: *India Journal of Marine Science* 2004, 33(4): 338-345)

Because of limited hydrodynamic as the relatively limited environments communication with the seas, those accumulate for a long time with pollutants with different origin and cause problems in: biota, food chain, tourist activities, in other economic activities (as navigation).

(Apitez S, Barbanti A, Bernstein A, Bocci M, Delaney E and Montobbio L: 2007 Vol. 24: 128-141)

In the multi-functional bays (as is Durres bay) pollution problem becomes even more concerning because, for various purposes, are required physical, chemical and biological parameters of the water.

In the Durres Bay have been identified 3 main sources of pollution:

1. the port activity, although complete with an aquarium, has relations with the whole beach, due to the mixing of the water column, contributing mainly to contamination with heavy metals and hydrocarbon
2. The beach through sewage
3. Agricultural activities carried out especially in the field of Kavaja.

The Durres bay is very dynamic due to the activities that take place in it. It contains the largest port and the largest beach in the country.

In summer the population reaches about 300 000 inhabitants.

In the beach area there are more than 1300 buildings, which serve as a summer house, with a very complicated urban problem.

Given the concentration of buildings and contributions of all categories in the ecological balance of the Bay, we see that the parameters are almost in every case higher than are definite in the legislative package. Chemical-physical qualities and especially microbiological the Durres bay waters are so aggravated as any investment in the control of contaminants would have a high "efficiency" and will improve a sufficient water quality.

The purpose of the study is the assessment of water pollution in the Bay of Durres from urban wastewater discharges and livestock, with the aim of identifying risk factors and improving water quality.

The treatment of used water (wastewater) is a process of improvement and / or purification, eliminating some or all pollutants and discharging it almost clean, in the surroundings. In many countries of the planet health problems and diseases caused by wastewater discharges as are either not addressed in the current accepted rate. (*Livingston JR: 2001: 319.*)

To realize this purpose and to assess the pollution of the water in the Bay of Durres from wastewater discharges, including the one generated from livestock units. Monitoring expeditions were carried out in the coast line of Durres Bay. It was appointed 2 sampling points: the first point named Currila in the north suburb of the city of Durres and the second point named Plepa in the estuary of the wastewater and livestock water discharges, in the south of Durres city and was analysed physic-chemical indicators in May and August 2011.

Material and methods

In the context of environmental protection, control of natural water quality and wastewater discharges, takes primary importance. There are a number of methods for sampling, sample processing and measurement of their quality characteristics. In order to physic-chemical analysis data for the quality of the water was carried out in Albania, to be comparable with international ones, a special importance is the approximation of the sampling methods and physical and chemical analysis, and international ones. (*Kennish MJ: 997: 524.*)

When should be characterized a water volume, a bottom sediment or sludge, generally it is impossible to analyze all measures is therefore necessary to take samples. Samples collected should be as representative of the whole and must take all necessary measures to ensure, to the extent possible, that the samples do not undergo any change in the time interval between sampling and analysis. Sampling multistage systems, such as water containing solid matter suspended or organic liquids that do not mix, can pose special problems.

There were 2 sampling points predefined:

- 1st point named Currila in the north suburb of the city of Durres 2 points in the estuary of sewage discharge; Plepa and Golem
 - 2nd point named Plepa in the estuary of the wastewater and livestock water discharges, in the south of Durres city
- Sampling was carried out in in May and August 2011, taking into account the seasonal effects,
- Were analyzed bacteriologic, physical and chemical indicators such as: Streptococcus Faecalis, Escherichia coli temperature, pH, conductivity, salinity, dissolved oxygen (DO), N-NH₄, N-NO₂, N-NO₃, P-PO₄, and COD, BOD5 (only for samples in the estuary of sewage discharge), according to standards and methods based primarily on modern methods of book "Selection and development of methods of sampling and analysis of environmental contaminant elements the sampling of waters" prepared by the Institute of Environment and the manual "Sampling and analysis methodologies for the Monitoring of eutrophication strategy of MED POL", in the Laboratory of the Department of Agro-Environment and Ecology, Faculty of Agriculture and Agro-Environment, University of Agriculture in Tirana.

Results and discussion

The results of bacteriologic, physic-chemical analysis in the estuaries of the waste water discharges showed evident differences regarding the EU normative, specifically the bacteriologic analysis.

The level of *Streptococcus Faecalis* resulted 3.1×10^3 and 9.3×10^3 MPN/100 ml water (May/August) in the Currila point, versus 3.5×10^4 and 9.8×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 2×10^3 MPN/100 ml water.

The level of *Escherichia coli* resulted 1.5×10^3 and 3.4×10^3 MPN/100 ml water (May/August) in the Currila point, versus 2.3×10^5 and 9.3×10^6 MPN/100 ml water (May/August) in the estuary of the wastewater discharges (Plepa point), while the reference parameters of EU for the bathing water quality is 1×10^4 MPN/100 ml water.

Table 1. Currila point Results

Currila point	<i>Streptococcus Faecalis</i> MPN/100 ml		Classification	<i>Escherichia coli</i> MPN/100 ml		Classification
	EU normative	Result		EU normative	Result	
May 2011	2×10^3	3.5×10^3	Outside norm	100	1.5×10^3	Outside norm
August 2011	2000	9.3×10^3	Outside norm	100	3.4×10^3	Outside norm

Table 2. Plepa Point Results

Plepa point	<i>Streptococcus Faecalis</i> MPN/100 ml		Classification	<i>Escherichia coli</i> MPN/100 ml		Classification
	EU normative	Result		EU normative	Result	
May 2011	2×10^3	3.1×10^4	Outside norm	100	2.3×10^5	Outside norm
August 2011	2000	9.8×10^6	Outside norm	100	9.3×10^6	Outside norm

As seen in the following graphs (Table Currila point Results and Table Plepa Point Results) the seasonal influence is evident. Also we concluded that the showed difference from Currila waste water discharge in the Plepa discharge is because the south of Durres city (Plepa point) is closer to rural areas, so the wastewater generated from livestock units has a big influence the pollution of the sea water in the Durres Bay.

According to the negative effects of excessive amounts of the bacterial elements cast in Superficial coastal waters are considerable; they cause increased total biomass of algae, often, toxic algae, reduce herbaceous layers last sea coral habitats, significantly reduce marine biodiversity and worsen the fishing trade.

Biodegradable organic substance and nutrients (fecal, food waste, manure, food industry waste) are subject of the decomposition processes, releasing chemical elements, generally feeder for phytoplankton and the process of aerobic decomposition consume O₂ in water (*Thornton JA, McComb J, and Ryding SO: 1995: 205-224.*)

The Bacterial, Chemical-Physical qualities of Durres bay waters are aggravated and any investment in the control of contaminants would be a high "efficiency" and will improve sufficiently the water quality.

Discharge of wastewater, including the one generated from livestock units, without any preliminary treatment in surface waters in the Bay of Durres and in all the beaches of Albania has high impact pollution.

We conclude that, to control the pollution is a necessary the treatment of wastewater before discharging in the sea, as a risk factor in the level of contamination the Durres bay.

Even studies in recent years that have been carried out on the beaches of Durres Bay pollution testify to their very high. Results show that 85% of beaches are classified in D Category - very polluted, where urgent action to improve the situation, 14% in C Category - sufficient quality, and only 4% in B Category - good quality.

Even under the EU Bathing Directive, in some areas should be established tables that prohibit bathing, because the results are alarming.

This assessment requires urgent measures to improve the situation because the risk of public health and biodiversity in Durres Bay is very high.

Conclusions

- For the Water protection, the effects of urban wastewater discharges and livestock must be controlled in continued among others.
- To check this contamination, definitely, it's should be carried out the wastewater treatment before discharge into the sea.
- Sewage spill into the sea untreated constitutes a risk factor in Durres Bay pollution level.

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