

TRACES OF ANTHROPIC ACTIVITY INFLUENCE ON THE BLACK SEA COAST WATER QUALITY

T. NEGREANU-PIRJOL^{a*}, R. SIRBU^a, B. NEGREANU-PIRJOL^b

^a*Faculty of Medical Dentistry and Pharmacy, 'Ovidius' University, 7 Ilarie Voronca Street, Constantza, Romania*

E-mail: ticutza@alpha.rmri.ro

^b*R.A.J.A. Constantza, 22-24 Calarasi Street, Constantza, Romania*

Abstract. Our study proposes a physicochemical parameters comparison of the water from the Black sea coast in area Navodari–Mamaia–Constantza, made in purpose of evaluating the human activity influence on these coastal waters involved in touring potential. The study was made between 2000–2003 to determine in time the water quality dynamics and pollution level. Specific physicochemical parameters were determined regarding the actual Romanian standard for coastal waters. Instrumental, volumetric and gravimetric methods were used. Analytical characterisation was supplemented with microbiological studies which shown a different bacteriological charge with respect to seasons and coastal area. The obtained results were compared with the existent published data and they contribute to the completion of database information regarding the ecosystem state of the Black sea coast.

Keywords: water quality, anthropic activity, physicochemical composition, pollution indicators, the Black sea coast.

AIMS AND BACKGROUND

It is known from the literature the influence of human activities on the coastal waters involved in touring potential. This work presents a comparison between the physicochemical and microbiological parameters of the Black sea water in the area Navodari–Mamaia–Constantza, during last four years (period 2000–2003) with the purpose to mark out the water composition dynamics and to append our results to the existing literature data.

EXPERIMENTAL

Water samples were collected from four different stations, distinctly influenced by human activities and environmental factors: Midia Navodari, Mamaia resort, Pescarie – Constantza, Tomis harbour – Constantza. In all observation period the samples were analysed in period September–October, every year, after the summer season's anthropic impact for the environmental.

* For correspondence.

All the physicochemical analyses for water samples were based on the Romanian standard methods, as following: evaluation of pH, potential, conductivity, temperature (instrumental method), dissolved O₂, total alkalinity, fixed residue (gravimetric methods), organic substances as COD-Mn (titrimetric methods), chlorides, sulphates, calcium (gravimetric and titrimetric methods), nitrates, nitrites, phosphates, ammonia, silica, total iron, copper, lead and aluminium by UV-vis. molecular absorption spectrometry¹.

Apparatus. Multichannel Analyser WTW, molecular absorption spectrophotometer UV-vis. Cecil 3021-Super Aurius.

Microbiological samples were collected from the same stations. Total coliformes, excrement coliformes, excrement *Streptococcus* was determined using classical methods on solid and liquid medium, fermentation, biochemical identification and for *Giardia intestinalis* cysts, microscopic determination after concentration and colouration with Lugol solution.

RESULTS AND DISCUSSION

Our results show that the determined physicochemical parameters correspond to the Romanian standard limits for the Black sea water samples (Table 1, Figs 1 and 2).

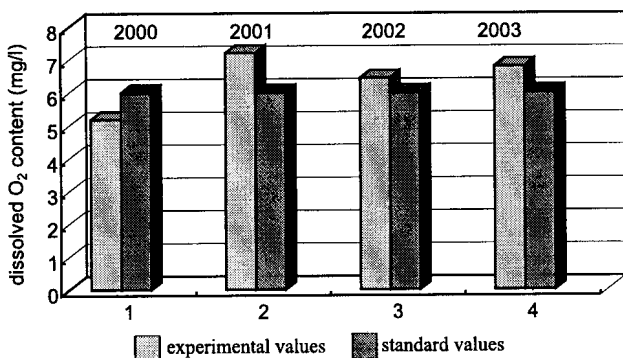
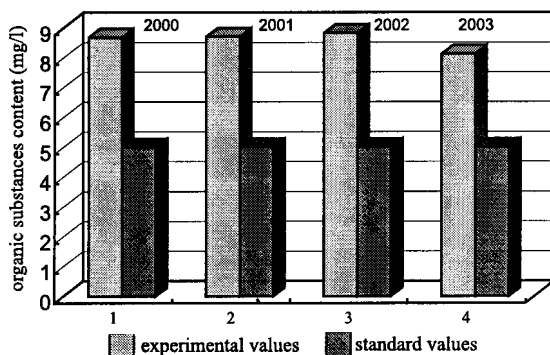


Fig.1. Variation of the dissolved O₂ content

Table 1. The Black sea water parameters media values for stations (2000-2003)

Parameters	UM	Admissible values*	Experimental data			
			2000	2001	2002	2003
A. Organoleptics						
Colour	-	normal	normal	normal	normal	normal
Smell	-	normal	normal	normal	normal	normal
B. Physics						
pH	-	6-8.5	8.2	8.1	8.4	8.6
Temperature	°C	30	10	16.2	14	15
Electric conductivity	µS/cm	-	22500	21200	21500	22000
C. Chemical						
Ammonia	mg/dm ³	n.d.	1	1	1	0.5
Nitrates	mg/dm ³	n.d.	absent	absent	absent	10
Nitrites	mg/dm ³	n.d.	absent	absent	absent	0.5
Total phosphorous	mg/dm ³	n.d.	1	1	1	1
Silica	mg/dm ³	n.d.	5	5	5	5
Calcium	mg/dm ³	n.d.	152.3	150.9	151.9	154
Chlorides	mg/dm ³	n.d.	8564.8	8420.8	8572.5	8865
Total ionic iron	mg/dm ³	n.d.	0.1	0.1	0.1	0.1
Dissolved O ₂	mg/dm ³	6	5.2	7.21	6.44	6.8
Fixed residue	mg/dm ³	n.d.	16100	16093	16155	18280
Organic substances – KMnO ₄	mg/dm ³	5	8.69	8.71	8,83	8.13
Sulphates	mg/dm ³	n.d.	170.2	171.5	182.3	190.1
Temporal alkalinity	mg/dm ³	n.d.	237.9	236.9	239.7	230
Permanent alkalinity	mg/dm ³	n.d.	22.9	37.9	38,2	21.8
Copper	mg/dm ³	n.d.	—	—	—	0.2
Lead	mg/dm ³	n.d.	—	—	—	5.0
Al ³⁺	mg/dm ³	n.d.	—	—	—	0.1

* The Romanian Standard – STAS 4706-88 – Surface Water the III ctg.; n.d. – not defined.

**Fig. 2.** Variation of the organic substances content

In the period 2000-2003 were analysed over 150 sea water samples. The results show that 96 samples registered increased values of pollution microbiological indicators, especially in Mamaia resort and Pescarie – Constantza (Table 2). Here was identified *Giardia intestinalis* cysts in eight samples (in 2002) and six samples (in 2003), respectively was isolated *Candida albicans* in five samples (in 2002) and in three samples (in 2003).

Table 2. Microbiological indicators in the Black sea water (2000-2003)

Pollution indicators	2000	2001	2002	2003
No of total coliformes	1200	1620	1600	1683
No of excrement coliformes	114	130	124	139
No of excrement streptococcus / 100 cm ³	28	35	30	36

CONCLUSIONS

1. For the observation periods the results may be a reference panel in the future regarding the increased anthropic pression of the Black sea water quality.

2. The correlation between physicochemical and microbiological results suggests the necessity of a complex monitoring able to offer at any time the informations about water quality, considering the tourist importance of the Romanian Black sea coast.

REFERENCES

1. Romanian Standards for Surface Waters: 6953-81, 9187-84, 9887-74, 8900/1-70, 8900/2-70, 8663-70, 10064-75, 8601-70, 8683-80, 3662-62, 6674-77, 9411-83, 7795-80, 8634-70, 8314-87, 4706-88, 3001-91.
2. V. ROJANSCHI, F. BRAN, Gh. DIACONU: Environmental Protection and Engineering. Ed. Economica, Bucharest, 1997.

Received 5 July 2004
Revised 18 October 2004