Reduction of Pollution Effect in Constanta through Sustainable Rehabilitation of Water Purification System and Related Management

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Abstract

At present human society is faced with a number of outstanding issues that require a quick and efficient fix, useful being the sustainable development concept and the application principles of management. Pollution returned, thereby, in the foreground, representing an issue of exceptional importance over time. Emissions of pollutants that end up in the Black Sea, from incompletely treated water discharge from treatment plants of Constanta, proven over time that are less spectacular than accidental oil pollution, lead to deterioration of quality and disruption of the natural balance (Biological Resources) of marine water. Being aware of this the management of Constanta develops and votes different local strategies for sustainable development and elimination of these issues of environmental pollution.

Key words: pollution source, treatment, rehabilitation, management, environment, urban-technical equipment.

JEL Classifications: Q 50, Q 54

Development of a human settlement, over time, imposes also the analysis of urban-technical aspects, because they are designed to ensure adequate standards of living, which should be designed also in order to protect the environment. Thereby, pollution becomes a real problem, consequences being visible, due to systems more or less modernized, which requires finding the best ways to combat it and restore, in this way, normal relations with the environment. For this reason specialists, appealing to the principles that support the sustainable development concept, confirms that should be developed and supported a useful system of relationships and responsibilities between man and environment. Also, for help, come the management principles, seeking to apply the strategic objectives of sustainable development. The urbanization process of Constanta is seen as a major source of environmental degradation, because after 1990, studies performed on the marine ecosystem confirmed the alteration of marine biotope through pollution due, mainly, to water purification activity and sewerage system. These activities alter the sea and lakes water, but also nearby beaches, by the pollution with dangerous bacteria and germs for human health, appearing, thereby, the discomfort of human organism.

Therefore, rehabilitation of sewerage infrastructure and wastewater treatment has become a necessity, a priority of local development strategies, the managerial appealing to financial resources of the work instrument I.S.P.A. 2000 / RO/16/P/PE/003, that would have allowed the reduction of pollutant emissions by reducing losses from canals and from discharging incomplete treated water from treatment plants. At present, existing treatment plants in Constanta and along the Romanian coast, are not operating at full capacity and are not fully equipped with modern monitoring, treatment and control technology.

Inventory executed by competent authorities regarding discharges of treated / untreated wastewater in the Black Sea, highlights the following wastewater origin: from sewage treatment plants (RAJAC - Constanta Autonomous County Water, discharging treated / insufficiently treated wastewater); port predominant activity units; the economic activities of processing, handling, storage, preparation and delivery of oil such as from Oilterminal through the deposit located in the northern city; from units producing electricity and heat; from tourism and recreation activity.

In the northern city, on the Tăbăcăriei Lake has been built Constanta North water treatment plant, the oldest station built in the municipality of Constanta, with the role to receive wastewater from Mamaia and from the northern city (lon Rațiu, Delfinariu, Ahile Mihail, Târgul de Vară, Suceava and Lăpuşneanu) (Foto 1). The station has, only, one mechanical treatment level and has a capacity of 1920 dm³/s - maximum daily flow, 675 1/s - hourly flow and about 415 1/s - daily flow. During the summer season, maximum hourly flow reaches values of 1.500 1/s. Thereby, managers concluded that the only viable solution is to reduce inflow and pumping of flow to the treatment plant located in Midia - Năvodari. Discharge of treated water is made by two pipelines in Black Sea in the Pescărie – Mamaia aria during the period of 1 October - 15 April and in the irrigation system during the summer season.



Foto 1 Constanța Nord water treatment plant – 2010 project completion informative panel and current status of the station (personal source, 2013)

In the southern city has been built another water treatment plant -Constanta South, possessing a mechanically and biologically wastewater treatment system. This water is coming from the central and southern part of the settlement, from collected rainwater from the sewer system unit and waters discharged during the summer season by the treatment plant in the north. Analyzing the data provided by the statistical service of Hall of Constanta, it is found, that the flowing

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wastewater in the station in a proportion of 60% are industrial wastewater, originating from economic agents, and the rest from domestic wastewater. Sewage treatment plant is sized for a capacity of 3.840 1/s - hourly flow and 3.200 1/s - maximum daily flow, since it was built with two identical production lines for a flow of 1.600 1/s each. Treated water is discharged into the Black Sea in the harbour area, in berth 86, by two metal pipes. At present, Constanta water treatment plant, is not working on design parameters, nor on the water line, or sludge line, mainly thanks to the underperforming machines, incomplete technological flux and the poor quality of execution of construction works.

In the vicinity of the industrial area, in the west of the city, was necessary to build another station, thereby, in 1993 Palas station was put into operation for treating the water captured at Galesu. The station is equipped with two laboratories for chemical and bacteriological analyzes. Following the treatment, products resulting from the settling and washing the filters, such as sludge, is discharged to Constanta South station.

National Institute of Research and Development for Biological Sciences Constanta, finalize in 2005 the new construction useful in water treatment, through the investment program of National Authority for Scientific Research. The management of the Institute found, that, the discharged substances do not present a hazardous organic load anymore for the city's sewer system and no source of environmental pollution.

In their turn people of *Administrația Porturilor Maritime S.A. Constanța* (A.P.M.) appealed to Siemens Industrial Solutions and Services Group (I&S) for the construction of two water treatment plants, one to treat leach ate discharges (7.300 m³ of water annually) and one for wastewater treatment (capacity of 81.5000 m³ annually). Stations were designed so that the chemical oxygen demand of the waste water to be reduced by 80%, thereby, treated wastewater to be within permitted emission to discharges into the sea.

To eliminate discomfort, the management team that deals with sustainable development of public water treatment in Constanta opted for rehabilitation of treatment plants. So, for the rehabilitation of Constanta North water treatment plant, the approved project target the demolition of the existing station and construction of a new station with a maximum capacity of 255.000 PE with extended aeration, with a system of removal of nitrogen and phosphorus, with aerobic stabilization program and sludge dewatering. The value of the work being estimated at approximately 28 million \in The same team continues to work like: rehabilitation of 35 pumping stations in areas as: Mamaia, Constanta North, Constanta South; capture wastewater discharged in Tăbăcăriei Lake and redirecting flows to Constanta North; rehabilitation of sewerage network in Peninsular Area; rehabilitation of spillways and discharge pipes from Constanta South. The value of the last projects being approximately 17.500.000 \in

Rehabilitation projects, of about 87 million \in started under normal conditions with the possibility of completing, were stopped by the European Commission (C.E.) after two years since their launch, due to complaints of

O.L.A.F. on suspicion of corruption, of false bills issued in the financing of I.S.P.A. programs from Constanta County. In this delicate situation the preaccession Romanian fund decided to take over funding and continuation of the project.

Due to the investment effort and loans that had to be returned in a certain time, it came to the occurrence of the technological gap between treatment – pumping systems and of water – sewage networks. For this reason are seeking, further, solutions and new funds for further rehabilitation projects, by contracting new loans by Constanta County Council thus being possible, the protection of the environment. Implementation of new technical assistance programs would support project management capacity on the assessment of flow of industrial and domestic wastewater and additional measures of their treatment would develop environmental management plans, a master plan for coastal waters of Constanta, mainly by eliminating of nutrients discharge into the Black Sea water.

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