Scientific Bulletin of Politehnica University of Timişoara

Transactions on HYDROTECHNICS

Volume 62(76), Issue 2, 2017

The improvement of monitoring water quality drinking in large cities

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Abstract: Water is a resource to be protected. This involves high costs, and managing the problem is a continuous activity with long-term results. At present, the battle is on two major fronts: on the one hand, the implementation of the Urban Waste Water Directive needs to be completed, and on the other hand the fight against water pollution must be continued more effectively. Nowadays monitoring water quality is a special challenge because of the large number of chemicals in our everyday lives and in commerce that can make their way into our waters. Drinking water quality monitoring programs aim to support provision of safe drinking water by informing water quality management. Access to safe drinking water can prevent disease outbreaks, and lower diarrheal and other disease burden.

Keywords: drinking water, drinking-water quality municipal water, safe water, resources, conservation.

1. INTRODUCTION

"Water is not a commercial good, but a patrimony that must be protected, protected and treated as such." (Directive 2000/60 / EC).

Approximately 768 million people across the world lack access to an “improved” drinking water source, though an even larger number use a water supply that is unsafe or has an elevated sanitary risk (3.06 billion). Delivering drinking water free of pathogens depends on hazard control, treatment, safe distribution, and monitoring. Water quality is defined as a measure of the physical, chemical, biological, and microbiological characteristics of water [1].

In Romania, the quality of drinking water is regulated by law, and reports on water quality are periodically made. However, our country is internationally indexed as the place where there is no drinking water anywhere other than bottled. We fit perfectly into the gloomy landscape, given that there are no countries with drinking water in the eastern half of Europe besides Greece and Macedonia, according to a study by the NeoMan agency. The same cannot be said about the western half of the continent, where all countries offer drinking water.

Drinking water for the population must be of high quality, safe and sufficient, as it is essential for everyday life, for drinking, cooking, washing or housekeeping. European Union policy ensures that water for human consumption can be safely drunk in the long run. The main pillars of regulation in this field are the following:

- Drinking water quality is controlled by standards based on the latest scientific evidence;
- Monitoring is made safe and efficient, permanently establishing the quality of water;
- Consumers need to be thoroughly informed about the quality of drinking water in the European Drinking Water Directive;

2. DRINKING WATER IN THE URBAN ZONE

Water uses in large urban areas include drinking, washing, cooking, and toileting. Internal tap water is distributed to consumers via the home networks of their homes. These networks have existed since Antiquity and were available to very few people until the second half of the 19th century. Tap water is largely absent among people living in poverty, especially in developing countries.

Diseases that can be contracted through water have been greatly reduced due to a proper sewerage system and the availability of fresh water. Indeed, over the course of history, contamination of wastewater by wastewater has killed most people.

Drinking water must be sanogenic and clean, i.e. free of micro-organisms, parasites or substances that by number or concentration can pose a potential hazard to human health

Water supply has several dimensions, such as water continuity, quality or water pressure:

- Continuity of water supply is seen as something normal and self-evident in the most developed countries, but it is a serious problem in many developing countries. There are cases where water is sometimes only provided for a few hours every day or a few days a week. Approximately half of the developing country population receives water intermittently [2];
- Drinking water quality has a microbiological and a physico-chemical component. There are thousands of water quality parameters. Water from public water supply systems should at least be disinfected - most commonly by using chlorination or ultra-violet light, or it may be necessary to undergo treatment, especially in the case of surface water;
- Water pressure varies in different locations in a

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distribution system. Street water pipes can operate at higher pressures with a pressure reducer located at each point where water enters a block or home. In poorly managed systems, the water pressure can be so small that it only results in a water droop or so great as to cause damage to sanitary facilities and waste water.

The chemical parameters analysed must be below the maximum permitted concentration provided by the Drinking Water Quality Act. The following substances are allowed in the drinking water supplied by the centralized system: acrylamide, arsenic, benzene, boron, bromate, cadmium, vinyl chloride, total cyanides, total chromium, copper, 1,2 dichloroethane, epichlorohydrin, fluorides , aromatic polycyclic aromatic hydrocarbons, mercury, nickel, nitrates, nitrites, pesticides, lead, selenium, antimony, trichloroethene,tetrachloroethene and trihalomethanes ",according to a study by the Association for Consumers Protection Romania [3].

The provision of tap water for large urban and suburban populations requires a complex and carefully designed collection, storage, treatment and distribution system that is typically the responsibility of an institution or state-owned company, often being the same entity responsible for the disposal and treatment of water clean.

Specific chemical compounds are often removed from tap water during the treatment process to adjust pH or to remove impurities, and chlorine can be added to kill biological toxins. Geological local conditions affecting groundwater are the determining factors for the presence of different metal ions, often making "soft" or "hard" water.

Drinking water is, however, sensitive to chemical or biological contamination. In the case of a contamination that can be considered hazardous to public health, a warning on water consumption is usually issued. In the case of biological contamination, residents are usually advised to boil water before consumption or to use bottled water as an alternative. In the case of chemical contamination, residents can be advised to refrain from drinking tap water altogether until the problem is resolved [4].

The monitoring of the quality of the drinking water is ensured by the producer, the distributor and the county public health authority. Centralized drinking water producers have the obligation to publish their water analysis bulletins monthly to their site. Sources of drinking water in the countryside, such as fountains, shallow wells and water catchments, operated locally, will be controlled within 1-3 months by sampling water and laboratory analysis. According to EU directives, these upgrades should be implemented and functional in all localities with more than 2,000 inhabitants.

3. WATER QUALITY

One way to improve the quality of waters and the physical aspect of rivers is to promote and active river rehabilitation program. The ecological rehabilitation of rivers is an essential part of water management. Ecological rehabilitation targets both the water ways and its neighbouring areas (banks, flood areas, etc.), which play an important role in the development of the flora and fauna. This rehabilitation is planned at basin level, from upstream to downstream. The new river management concept, “More space for rivers”, involves balancing social, economic and ecological needs. For this purpose, the National River Rehabilitation Center was set up, in order to facilitate the exchange of information in the field and to promote the issue of ecological rehabilitation in Romania.

National monitoring system for water quality (observation, operational, investigation) Water quality monitoring is within responsibility of NAAR and is performed through the national water monitoring system implemented at basin level (via the 11 water directorates) based on 3 types of monitoring:

• Surveillance monitoring – with the role of evaluating the status of all water bodies

• Operational monitoring – for bodies of water that are at risk of not meeting the water protection objectives

• Investigation monitoring- for identification of causes for not meeting quality standards, for bodies of water that cannot achieve environmental objectives or for the impact assessment for accidental pollution.

The water quality monitoring system is divided into 7 sub-systems: rivers, lakes, ground water, protected areas, coastal waters, transitory waters, used waters. Each directorate must monitor all 7 sub-systems, or the sub-systems that are geographically available. The monitoring network for surface waters combines:

•The daily and weekly rapid flow monitoring network;

•The base monitoring network (for those sites with less than 10% human influence);

•The drinking water capture points monitoring network

•The border monitoring rivers network;

•The surveillance monitoring network (each trimester);

•The operational monitoring network (each month);

The used water sub-system also monitors pollution sources with direct evacuation in natural receivers. The monitored indicators are: evacuated volumes, dangerous quantities, and the operational status of purification stations [3].

- Water consumption in industry

Globally, agriculture consumes about 92% of the total amount of freshwater; almost a third of this amount is used in the production of food of animal origin. Specifically, about 29% of the water used in agriculture is used to raise feed for animals, to mix them, to maintain farms and to feed those animals, which means that the products of animal origin we consume use a large amount of water

According to a study, rising global consumption of meat and the intensification of livestock production systems will put additional pressure on freshwater resources worldwide over the coming decades, despite the fact that it is more efficient in terms of water consumption to we get calories, proteins and fats from products of plant origin rather than from animal origin [4] .

This research shows the great impact that food we consume on nature in general and on freshwater resources, in particular.

4. MONITORING THE QUALITY OF DRINKING WATER

The monitoring of the drinking water quality is carried out both by the County Public Health and the Bucharest Municipality Directions, through the Audit Monitoring, as well as by the drinking water producers / distributors, which perform the Control Monitoring.

A. Monitoring control:

The purpose of this monitoring is to periodically produce information on the organoleptic and microbiological quality of potable water, produced and distributed, on the efficiency of treatment technologies, with a focus on disinfection technology, to determine whether drinking water is appropriate; or not from the point of view of the values of the relevant parameters established by Law 458/2002 republished. The following parameters are required for monitoring:

• Aluminum (only where it is used as coagulant);

• Ammonium;

• Coliform bacteria;

• Color;

• Concentration of hydrogen ions (pH);

• Conductivity;

• Free residual chlorine (where chlorine or chlorinated substances are used for disinfection);

• Clostridium perfringens (when the water source is surface or mixed);

• Escherichia coli;

• Iron (only where it is used as a coagulant; ferrobacteria are determined at treatment plants where water is deferred);

•Taste;

• Odor;

•Nitrites (where chlorine or chlorinated substances are used for disinfection);

• Oxidability (determined in the case when the technical equipment does not allow the determination of COT);

• Sulphides and hydrogen sulfide (where water desulphurisation is practiced);

• Turbidity;

• Number of colonies developed at 22 ° C and 37 ° C;

• Determination of COT (total organic carbon) - only for supply systems that supply more than 10,000 cubic meters per day [3] .

B. Audit monitoring:

The purpose of audit monitoring is to provide the information needed to determine whether or not the values are consistent with all the parameters set by the drinking water quality law (458/2002). For audit monitoring it is mandatory to monitor all the parameters provided in art. 5 of the Drinking Water Act, except for cases where the County Public Health Authority, respectively Bucharest Municipality, established on a documented basis that for a period determined by the DSP a certain parameter from a certain drinking water supply system it cannot be present in such concentrations as to cause its established value to change. This point does not apply to radioactivity parameters. 54 According to the National Center for Risk Monitoring in the Romanian Community Environment, in the future, it is expected to amend the Drinking Water Quality Directive, taking into account the presentation of aspects that are part of the Water Framework Directive. Thus, it was useful to specify some of the details of the Ministry of Environment regarding the development of the water resource system [5].

These are the following:

• the sustainability of physical aspects - which means maintaining the natural water and nutrient circuit;

• environmental sustainability - "zero tolerance" for pollution beyond the self-cleaning capacity of the environment. There are no long-term effects or irreversible effects on the environment;

• social sustainability - maintaining water requirements as well as willingness to pay water services;

• economic sustainability - economic support for measures that ensure a high living standard for water for all citizens;

• institutional sustainability - maintaining the ability to plan, manage and operate the water resource system [7]. .

Sustainable management of water resources is based on integrated management that ensures that water body system services meet the company's current goals without compromising the ability of the system to meet the goals of future generations while preserving a clean environment.

5. INTEGRATED WATER RESOURCE

Integrated water resource management involves:

1) Integration of the natural water resource system:

• The system of natural water resources that is represented by the hydrological cycle and its components: precipitation, evaporation, surface leakage and underground drainage.

• Maintaining the hydrological balance and the relationships between its components is based on the biophysical links between forests, soil and water resources in a river basin, and is essential for the sustainable use of the natural water resource system.

2) Integration of the water resource management infrastructure into the natural capital

• Achieving an environmentally friendly "water management" infrastructure that ensures both optimal water supply and reduction of the risk of floods and the conservation and enhancement of biodiversity of ecosystems water [6] .

3) Integration of water use

• Water supply to the population, industry and agriculture and the conservation of aquatic ecosystems are traditionally addressed in the sector. Most water uses require water resources in increasing quantities and very good quality. Solving the resource-water requirements equation and water resource protection requires a baseline hydrographic use analysis.

• Water resource management requires the involvement of all stakeholders - public and private - at all levels and at the time of poring. Decisions and actions in the field of integrated water resource management must be taken by all those who may be affected at the most appropriate level (the principle of subsidiarity).

4) Upstream - downstream integration

• Upstream uses must recognize the rights of downstream use for the use of good quality water resources in sufficient quantity.

• All this requires dialogue to reconcile the needs of upstream and downstream uses.

5) Integration of Water Resources in Planning Policies.

• Water is one of the fundamental elements of life and, at the same time, a factor that determines social and economic development and is often a limiting factor. Society and the economy will be able to develop only to the extent that water management will develop and this conditioning marks the role and importance of activity in the context of sustainable development [6].

• Integrated water resource management is based on the Basin River Basin Management Plan, in accordance with the provisions of the EU Framework Directive 2000/60. Based on knowledge of the status of water bodies, this Plan sets out the targets for a six-year period and proposes measures at river basin level to achieve good water status for their sustainable use [6].

6. CONCLUSIONS

Progress has been made in many areas lately, but the following issues and challenges have also been identified:

• Drinking water supply with quality parameters in accordance with the rules laid down by law (adherence to maximum permitted levels), especially in rural areas and those where economic status is low, should be improved, notably by accessing European funds carrying out and/or improving the drinking water treatment and distribution system. Also, specific supply side approaches are required for the management of specific risk-based information (e.g. the microbiological and physico-chemical profile of the drinking water source, the local economic and financial capacity, the geological history of the future catchment area etc.).

• Risk-based approaches to the management of water supplies would allow monitoring and analysis of cost-effective parameters in relation to the risks identified and provides better guarantees for the protection of the health of the population supplied;

•Monitoring and analysis methodologies should reflect the latest scientific and technological progress in the field;

•New scientific information on chemical parameters and other parameters in relation to the list of drinking water parameters in current legislation should be taken into account in line with the on-going review of WHO drinking water quality guidelines, including emerging pollutants;

•The modern information circuit technology and easier access to environmental information should be used consistently and uniformly to provide consumers with real-time data updates as well as a water quality analysis - www.apafaraplastic.com to explore how to correlate the different raw water and drinking water quality monitoring data with correct reporting and information to consumers.

Water pollution prevention can be provided starting from a rough surveillance and control system. Water quality protection is a permanent action, in which every member of the society has to make a contribution, a conscious and responsible contribution.

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