

CHANGES OF THE EU AND POLISH LEGISLATION CONCERNING POLLUTION OF THE AQUATIC ENVIRONMENT IN 2010–2016

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Abstract

This paper discusses the changes to the legislation on pollution of the aquatic environment in 2010–2016, including priority and hazardous substances. Both EU regulations (Water Framework Directive 2000/60/EC, Directive 2008/105/EC, Directive 2013/39/EU) and Polish (Journal of Laws Ordinance of 2014 Item 1800) were discussed and evaluated. Additionally, an outlook for further changes concerning pollution of the aquatic environment is given.

Streszczenie

Opisano zmiany przepisów dotyczących zanieczyszczeń środowiska wodnego, w tym substancji niebezpiecznych i priorytetowych w latach 2010–2016. Omówiono zarówno poszczególne regulacje unijne (Ramowa Dyrektywa Wodna 2000/60/WE, Dyrektywa 2008/105/WE, Dyrektywa 2013/39/UE) jak i polskie (Rozporządzenie DZ.U. 2014 poz. 1800). Dokonano ich oceny. Przedstawiono także prognozę w zakresie dalszych zmian dotyczących zanieczyszczeń środowiska wodnego.

Keywords: Water environmental; Contaminants; UE Directives; Polish Regulations.

1. INTRODUCTION

A growing data set on multifaceted harmful effects of various chemicals on the environment, as well as increasing knowledge and awareness of the related threats resulted in the introduction of many new laws, among others, in the legislation of the European Union and thereby in Poland. Due to the importance of the aquatic environment, many of the legal acts were referring to this compartment of the environment. The desirability of the undertaken activities is documented through recent studies on the concentration of biologically active substances in waters of natural and artificial reservoirs, potable water, and in municipal and industrial wastewater and in sediment and sludge of various origin [1].

This paper discusses the changes to the legislation on pollution of the aquatic environment in 2010–2016, including priority and hazardous substances.

2. DANGEROUS AND PRIORITY SUBSTANCES – WATER FRAMEWORK DIRECTIVE

There are thousands of compounds that belong to the class of organic pollutants, which in turn are one of the groups within the category of chemical pollutants. The organic compounds that are of major importance are high molecular weight organic substances such as proteins, carbohydrates, oils and fats. In the case of municipal sewage treatment these compounds are

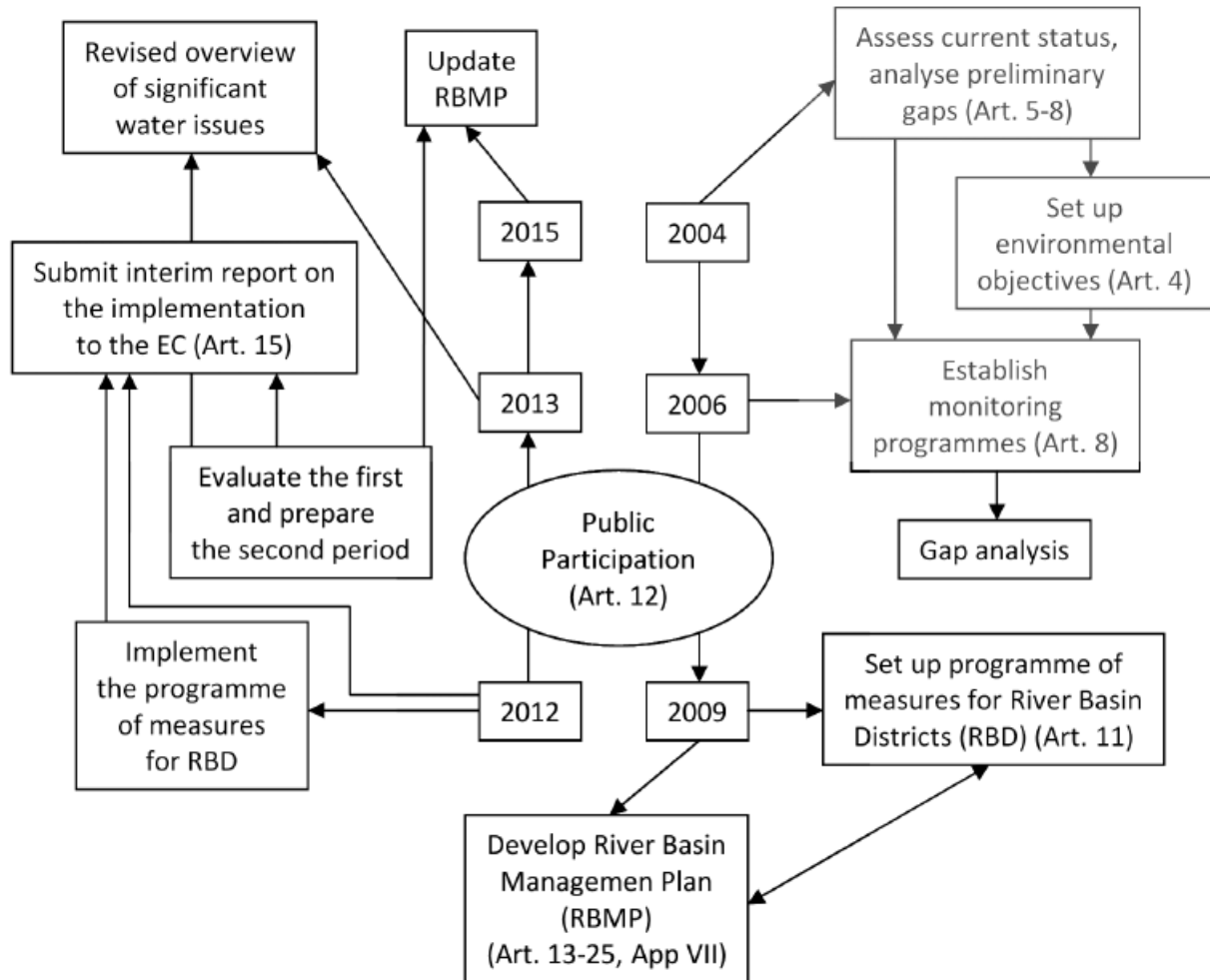


Figure 1. Planning processes and common implementation strategy for the Water Framework Directive [4]

usually biodegradable. For the determination of these organic compounds mainly such collective analyses are used: biochemical oxygen demand, chemical oxygen demand and total organic carbon.

Biodegradable organic substances which have an unfavorable influence on the oxygen balance of waters were, however, put at the very bottom on the indicative list of major pollutants in Annex VIII of the Water Framework Directive – commonly referred to as WFD (2000/60/EC of 23 October 2010) [2]. It is a directive, which established a framework for Community action in the field of water policy (Fig. 1).

It can be assumed that such position of these substances in the list was caused by the fact that the problem of treating municipal sewage has been resolved. It should be noted, however, that the substances contributing to eutrophication were put on the list as the

penultimate record, which was probably for the same reason. The carbon, nitrogen and phosphorus compounds present in municipal wastewater are removed in biological wastewater treatment systems, constructed in accordance with the Directive on Wastewater Treatment, commonly called Wastewater Directive (91/271/EEC of 21 May 1991 [3]), which resulted in a significant improvement in their removal from wastewater.

Technological progress causes, however, that the natural waters receive hazardous low molecular weight organic compounds, among others, of industrial origin, which represent an important form of threat. This group of compounds includes endocrine disruptors (ED) and substances exhibiting acute and chronic toxicity [4-9]. An important condition for the achievement of good water status, and especially good ecological status is the elimination or reduction

of discharges of hazardous organic substances. Refractory organic contaminants are the most relevant contaminants taking into account the associated threat. These compounds are poorly- or non-biodegradable and therefore they pass intact through biological treatment step in industrial and municipal wastewater treatment plants. This is a challenge for wastewater treatment and water treatment technologies [1].

Toxic substances are particularly dangerous group of water contaminants as they pose threat to human health and life. WFD has placed particular emphasis on this type of threat to waters by setting out a list of priority hazardous substances and priority substances. Hazardous substances are defined as substances (or groups of substances) that are toxic, persistent and bioaccumulative and other substances (or groups of substances), which reach the level that causes concern. The WFD also listed priority substances, including priority hazardous substances. However, it can only be inferred in terms of the definition that the priority substances are a special class of substances that are particularly harmful to the aquatic environment.

Indicative list of major pollutants, among which the largest group is represented by toxic substances is given in Annex VIII of the WFD [2]. The list includes pollutants such as organohalogen compounds, organophosphorus compounds, organotin compounds, substances with proven carcinogenic or mutagenic properties, persistent hydrocarbons, bioaccumulative toxic organic substances, cyanides, metals and their compounds, arsenic and its compounds, biocides and plant protection products, and others.

WFD clearly indicates that specific actions are needed to reduce the occurrence of pollutants posing a threat to the aquatic environment or via the aquatic environment, particularly to drinking water intakes. The occurrence of these pollutants should be progressively reduced, while their discharges, emissions and losses should be discontinued or phased out. The important suggestions in this regard are: a) a list of priority substances that pose significant risk to the aquatic environment or via the aquatic environment, taking into account the ecotoxicological and toxicological threat posed to humans through various routes of exposure to water, as well as b) the identification of priority hazardous substances.

3. CHANGES IN LEGAL REGULATIONS IN 2010–2016

Elimination or reduction of emissions of the most dangerous substances produced by, among others industry is one of the conditions to achieve good water status.

The primary goal of the WFD [2] was to ensure good ecological potential and good chemical and quantitative status of waters by the end of 2015. The directive classified 13 types of pollutants as hazardous substances of priority significance, and 20 as priority substances. In total, the directive listed 33 individual pollutants. The subsequently issued Directive 2008/105/EC (16 December 2008 [10]) of the European Parliament and the Council on environmental quality standards in the field of water policy, which, among others, amended the WFD, established limits on concentrations of the priority substances in surface waters for 33 priority substances and 8 more pollutants. On the other hand, Directive 2013/39/EU of 12 August 2013 [11] added 12 further substances to Annex X of the WFD as well as required the Commission to establish an additional watch list of substances to be monitored in all Member States to support future revisions of the lists of priority substances. The Annex to the Directive [11] presented EQS (Environmental Quality Standards) for priority substances in the form of annual average concentrations at a level providing protection against long-term exposure, and maximum allowable concentrations at a level providing protection against short term exposure.

It is highly probable that the list of priority substances will continue to expand with a more accurate insight into the situation in this regard in various European Union countries.

The legal basis for the national regulations imposing the need to assess the priority substances are included in the Water Act (Prawo wodne) of 18 July 2001 (Journal of Laws of 2012 Item 145 with further amendments) [12]. Pursuant to Art. 45 Section 1 Point 1 of this binding statute, Minister of the Environment issued the Ordinance on the conditions to be met when introducing sewage into water or soil and on substances particularly harmful to the aquatic environment (Journal of Laws. Item 1800 of 18 November 2014. [13]) containing among others, a list of substances that are particularly harmful to the aquatic environment (Appendix 1).

Most Member States have started working on the preparation of inventories of emissions of priority substances, in accordance with the requirements of

the Directive on environmental quality standards. They use these efforts and their analysis of pressures and impacts to identify sources of pollution. The percentage of water bodies identified as vulnerable to the adverse impact of individual or diffuse sources varies considerably between Member States. For the purpose of this inventory most Member States have not yet applied the quantitative determination of diffuse emissions from various sources. The number of pollutants identified by Member States as a major national problem, is also remarkably diverse. Therefore most of the measures defined by Member States in relation to chemical contaminants are rather too general in nature, their results are not quantified and measures are not directed at materials and sources [14].

With the adoption of the Water Framework Directive European water policy has undergone a process of restructuring. It creates a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater to prevent contamination and reduce it, to promote sustainable use of water, protect the aquatic environment, improve the status of aquatic ecosystems and mitigate the effects of floods and droughts. With the exception of specific derogations, good environmental status for all waters is to be achieved by plans for river basin management. The three previously published reports on the implementation of action taken in this respect (COM (2007) 128 [15] COM (2009) 156 [16] and COM (2012) 670 [17]) show that there has been significant progress in achieving this objective for a substantial part of the waters by the agreed deadline, which is the end of 2015. Furthermore, in 2007 the European Commission has launched WISE (Water Information System for Europe), constituting an instrument for collecting and exchanging data and information at the EU level and monitoring of pollutants discharged to surface waters and in the aquatic environment.

4. OUTLOOK

The development of civilization causes the formation of new types of pollutants that enter the waters. In particular, there is a growing threat posed by pharmacological substances that enter sewer systems. The sources of pharmaceuticals in wastewater are (among others): the pharmaceutical industry, hospitals and dental clinics, veterinary facilities, as well as households [18, 19]. In the households, unused or expired pharmaceuticals are often disposed of directly into the sewage system.

Many medicinal products are not removed in the existing wastewater treatment plants and pass to both groundwater and surface water. The substances that may reach surface waters include nonsteroidal anti-inflammatory drug and estrogens (female hormones), which are components of contraceptives. This constitutes a threat to the sustainability of aquatic ecosystems. In Poland, the presence of pharmacological agents was found not only in the waters of large rivers such as the Vistula and Oder, but also in medium rivers, such as the Warta, as well as in small rivers [18, 19].

This may pose a serious risk to human health. For example, estrogens accumulated in aquatic organisms may be transferred to humans through fish consumption. An excess of these substances leads to damage to the crops and may contribute to increased incidence rate of breast cancer and testicular cancer. Equally harmful is the presence of pharmacological substances in drinking water, especially to children. The threat is posed by chemotherapy drugs occurring in natural waters or drinking water because they are mutagenic, teratogenic, embryotoxic and genotoxic [18, 19].

Major threat is associated with the presence of antibiotics in various types of wastewater, which enter the water environment. These include antibiotics used to treat both humans and used for the treatment of animals in livestock farms, for example in pig farms and fish breeding ponds, which cause many serious consequences [18, 19].

The presence of the substance in the water does not need to explicitly indicate their recent discharge into the waters. Most of them are characterized by their ability to accumulate in the environment. Thus, even substances that have not been used for many years, and thus are not released into the environment are still circulating in the ecosystem. The examples of such substances can be dichlorodiphenyltrichloroethane, this is, DDT. This substance was banned decades ago, e.g. a ban on the use of DDT in Poland has been introduced in 1975, and still its presence is detected, among others, in surface waters [20].

Often, because of their persistence, biologically active substances are transported over long distances with air or water, as well as ingredients in products. Therefore, generally it is difficult to clearly identify the origin of the substance and the time of its introduction into the environment, but often it is possible to determine the industries responsible for its emissions [21].

5. CONCLUSION

Article 8b section 1 Directive 2008/105/EC [10] provides for the establishment of a watch list originally consisting of a maximum of 10 substances or groups of substances, for which monitoring data are to be collected covering the entire European Union, in order to support future classifications according to Article 16 Section 2 of Directive 2000/60/EC of the European Parliament and of the Council [2]. This list should indicate, for each substance, matrices for monitoring and possible methods of analysis, which are not associated with excessive costs.

The substances to be put on the watch list should be selected from among those for which the available information indicates that at the EU level they may present a significant risk to or via the aquatic environment, but for which the monitoring data are insufficient to determine the actual risk. The candidate substances to be put on the watch list should be highly toxic, commonly used in many Member States and discharged into the aquatic environment, but not monitored or monitored infrequently.

The monitoring of the substances on the watch list should generate high-quality data on concentrations of these substances in the aquatic environment. These data should be usable as a separate inventory in accordance with Art. 16 Section 4 of Directive 2000/60/EC [2], for the risk assessment used to determine priority substances. Substances that as part of this interview were considered as posing a significant risk, should be taken into account when updating the list of priority substances. It should also specify the Environmental Quality Standard, with which Member States will have to comply. The proposal to include substances on the list of priority substances would require an impact assessment.

The European Commission by implementing Decision No. 2015/495 of 20 March 2015 [22] established a watch list of substances for purposes of EU-wide monitoring within water policy based on a directive of the European Parliament and of the Council 2008/105/EC [10]. According to the decision, the substances to be put on the watch list, initially containing 10 substances or groups of substances, should be selected from among those for which the available information indicates that at the EU level they may present a significant risk to or via the aquatic environment, but for which the monitoring data are insufficient to determine the actual risk.

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