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THE GROUNDWATER INTAKES PROTECTION ZONES IN POLICY AND LAW REGULATIONS OF UE

Groundwater is a very important and often the only source of drinking water for human supplies. Considering its usable quality and limited resources, it is treated usually as the national strategic good which should be a subject of special regulations relating to its use and protection. This conviction began to spread in the majority of European countries after the II world war and contributed to a quick development of modern hydrogeology, particularly of hydrogeological cartography, evaluation of the groundwater resources by mathematical modeling methods and evaluation of groundwater aquifers vulnerability to contamination. Every country created its own policy in the range of water management and protection, gaining various experience and achieving a lot of success in this field. Extension of the European Union in 2004 r. created a completely new situation in water management, changing in many countries the existing way of seeing the matter. The possibilities of experts' cooperation and the exchange of experience between the countries opened. Implementation of the Water Framework Directive 2000/60/EC (FWD) by the members' countries, standardized the principles of water management and the approach to water protection in the whole territory of the European Union.

One of the principal tasks of the common European policy in the domain of water management is to ensure effective qualitative and quantitative protection of water resources used, or intended to be used in the future, for humane consumption. Those resources should be preserved in a good chemical and quantitative state, similar to their natural state. General conception and the principles of this protection were introduced in the WFD, the basic document which regulates the matters of water management in the members' countries. However, in WFD, as well as in new Groundwater Directive 2006/118/EC (GWD) and WFD CIS —Guidance document No.16, „Groundwater in Drinking Water Protected Areas”, there are no detailed directions how to ensure the effective protection of groundwater intakes resources for human supply from their quantitative and qualitative degradation. Generally, we can say that WFD is set on the diagnosis of groundwater resources state, understood as a permanent control of their qualitative and quantitative state (monitoring) in delimited groundwater bodies (GWB). However, the matter of their protection in the form of specific prohibitions, orders and limitations in the use of the terrain is left to the decision of individual states. In accordance with the Directive, the object of protection is not a groundwater intake with its recharge area, but the so-called “*groundwater body*” (GWB) understood as a part of the groundwater used for human consumption or intended to be used in the future. According to art.6 of the WFD, the water resources of these objects must be properly protected. General recommendations concerning such protection are presented in the Guidance document No 16, „Groundwater in Drinking Water Protected Areas”. In this document it is stated that the protection of GWB should be realized by delineation and formal setting up the so-called “Drinking Water Protected Areas” (DWPA). For this purpose, the so-called “safeguard zones” (SZ) can be set up for the groundwater intakes used for the collective supply of the population. Protection measures proposed for DWPA and SZ should become a part of programs of measures taken for water protection for each river basin district. According to the conception presented in GWD (p. 15) , SZ can be a part of GWB or can cover fragments of several GWBs and even the whole territory of a country. It is incomprehensible and far from protective zones delineation practice applied in most of the countries. It should be underlined that the two terms, DWPA and SZ, are often incorrectly used in above-mentioned documents as

synonyms, although they have a different meaning. DWPA is a general notion meaning all the protective areas which are settled up by the members' countries for the protection of their groundwater resources for human consumption, whereas "safeguard zone" is a specific term relating to the protection of water intake recharge area. It would be much better to use the term „groundwater intake safeguard zone" (GISZ) instead of "safeguard zone" (SZ).

GROUNDWATER INTAKE SAFEGUARD ZONES IN THE EUROPEAN COUNTRIES — REQUIREMENTS AND PRACTICE OF THEIR ESTABLISHING

Although setting up of the safeguard zones for drinking water intakes is not required in European regulations, most of the EU countries protect their intakes in this way and the implementation of the WFD did not change anything in this area. In many countries safeguard zones are treated as a principal element of the programs of measures undertaken for protection of groundwater resources designed for human consumption. The principles of safeguard zones delineation and setting up, as well as the effectiveness of the protective measures often differ considerably in various countries. Setting up of those zones for water intakes is important, but often underestimated element of the groundwater resources protection. Therefore, the comparison and confrontation of the experience and regulations in various European countries can be interesting and important for the accomplishment of common European policy in this domain.

The object of the protection — In the European countries it is the rule that safeguard zones are settled up only for the collective supply water intakes. Some countries permit establishing protection zones also for other intakes, at the owner application and cost. Such possibility exists also in Poland for the intakes used by food production and pharmaceutical enterprises, which need water of a high quality.

The duty of setting up the zones — In majority of European countries safeguard zones setting up is obligatory and required for the water intakes for the collective supply with high vulnerability of their water resources to pollution. In Poland this duty was suppressed by the Water Law from 18.07.2001 and the decision in this matter is left to a user.

Criteria and the principles of delineation the safeguard zones — European countries are lacking a uniform approach to this question. Applied criteria are different and the size of established zones are considerably diverse. However, it is the rule that a zone consists of 3 or 4 protective terrains, called variously. In Poland, the Water Law of 2001 r. introduced the protective zone divided into 2 terrains only: the terrain of the direct protection (around the well) and terrain of indirect protection limited by the 25-year izochrone of the water flow to the well. However, there is no any particular reason for this izochrone or for any others.

The methodology of delineation safeguard zones — In Poland, like in all countries, the limits of protected zones are established on the basis of hydrogeological recognition. Differences appear in the range of this recognition and applied computational methods. Simple analytic methods are usually applied only to small, isolated intakes. In case of larger ones or groups of intakes mathematical model investigations are commonly used. In many countries, when a safeguard zone for a groundwater intake is established, they prepare the so-called "vulnerability map" for the whole recharge area. That map becomes the basic element of the risk analysis, necessary for the establishing effective measures aimed at eliminating or reducing the anthropogenic influence on groundwater quality. Modeling methods and the vulnerability maps are still too rarely

used in Poland for the delineation of groundwater safeguard zones. The necessity of taking into account the natural resistance of aquifers to the pollution from the surface of the terrain while establishing the groundwater protected areas is unquestionable. The controversial matter is still the way of this analysis and applied methods. In different countries it looks variously what causes that the results of the analysis are incomparable. Some countries apply rang methods (e.g. DRASTIC, EPIK) and other ones apply methods based on calculation of groundwater flow time or pollution migration time.

The principles for establishing protective measures for safeguard zones

Effectiveness of the protection of groundwater resources mainly depends on the range of introduced limitations in the use of the terrain and their execution. The approach to that matter and experience of different EU countries vary a lot. In some countries (e.g. Germany, Holland) the protective zones delineation is strictly regulated by law, which means that it is based on prohibitions, orders and limitations in the use of the terrain. Other countries (e.g. France, Belgium, Denmark, Poland) do not have strict regulations in this domain and proposed protective measures are based on the analysis of the pollution threat to groundwater in the whole intake recharge area. The social and the economical sides are also taken into account. That approach is recommended in the Guidance document No 16, „Groundwater in Drinking Water Protected Areas”, although the European Union does not impose the way in which the problem should be solved.

Institutions setting up the groundwater intake safeguard zone

In most countries the decision about setting up a safeguard zone is taken by local administration. In Poland since 2002 such decisions have been taken by the directors of Regional Water Management Board.

State contribution to the protection of groundwater intakes

In a lot of countries the governments are strongly involved in the protection of groundwater intakes for human consumption. They create national programs and organize financial support for that purpose. France and Hungary are the best example of this approach. Local societies are not able to deal with the problem on their own, so it is the state's role to help them.

Society contribution to the process of setting up safeguard zones

That contribution looks different in particular countries. In those ones where there are strict law regulations in the use of terrains, the citizens' participation in the process of setting up the zones is relatively small (e.g. Germany). In the countries with less strict law in this range (e.g. France, Denmark) this participation is much more significant and really contributes to the success of the whole process. WFD lays stress on inducing societies to be active in the area of water management, so we can expect that in the future societies of EU countries will contribute to it in a higher degree. Polish society has not taken part in the process of setting up safeguard zones since 2002 and there are no any special law regulations concerning the matter in our country.

PRESENT STATE OF THE PROTECTION OF GROUNDWATER INTAKES IN POLAND

Quite a lot of decisions setting up safeguard zones for groundwater intakes have been taken in Poland for last eighteen years. It is estimated that only 14% out of about 11 000 those intakes for humane supplies have a safeguard zone. Even if we accept that not all of them need such preventive protection, because they are not vulnerable to pollution, the number of intakes without protection is still significant. We should also remember that the formal establishment of a zone itself does not assure the proper protection of the water intake resources. The most important is the effective execution of the set up protective measures. The report prepared in 2009 r. on the Minister's of Environment order showed low effectiveness of actions in the area of the protection of groundwater intakes for collective supply and established the „weak points” of the whole process of delineation and setting up zones. On the basis of the report there was then prepared the National Program of the protection of the groundwater intakes resources for the drinking water collective human supply, within which a complex solution of the problem was proposed. It supplements currently realized National Program for setting up protection areas of major groundwater basin (MGB), delineated in Poland in 1990, which are not identical with groundwater bodies (GWB) set up on the basis of FWD criteria. Protection areas MGB and the safeguard zones of groundwater intakes will fulfill FWD requirements in the range of the protection of groundwater resources designed for human consumption.

RECAPITULATION

In the author's opinion, the protection of the groundwater resources from their quantitative and qualitative degradation should begin with the protection of groundwater intakes recharge areas and then spread to the areas which can be used for this purpose in the future (strategic). In all countries, where this matter is treated really seriously, the protection of the groundwater intakes for collective supply makes the most important element of the nationwide programs for drinking water resources protection. Unfortunately, in EU countries the problem is seen in different ways and sometimes belittled. Although the European Union law regulations, expressed in Directives 2000/60/EC (WFD) and 2006/118/EC (GWD), dedicate special attention to the protection of water used for human consumption, they do not require (only recommend) setting up special protective zones for the groundwater intakes.

To sum up, a wider cooperation of EU countries is necessary to deal with the problem. Such cooperation should bring real effects like a uniform methodology of delineation and setting up safeguard zones for groundwater intakes for the collective human supply and also common policy in this range. It should be underlined that in the new GWD text it is stated that the studies for assuring more effective underground water protection have to be continued. In GWD they assume further development and the changes in the Directive so that it could fulfill its task better.

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