



The Water Protection Trends in the Industrial Landscape

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Summary

To protect water against the effects of natural and anthropogenic influences events is a complicated and economically challenging task. Its protection in the industrial landscape makes the issue more urgent and complex several times. Without the aquatic ecosystems protection and, more broadly, the entire environment cannot be permanently ensured by acceptable living conditions for humans, fauna and flora of any country.

If there was an extremely negative factor by human activity during the 20th century in Europe, as shown in international studies, it will be endanger the environment especially climate change in this century. Water shortages in some regions almost certainly affect not only the type of flora present, but it must be a stimulus change concerning people's access to water, its general use and industrial surface use or underground waters using. The protection of aquatic ecosystems in the Czech Republic and neighboring states, which follow the Czech basin, these systems can protect a variety of active and passive combinations.

The passive protection works in most cases for the long term. If it is appropriate and implemented on the hydrological knowledge, it minimizes the formation of difficult-to-resolve incidents of anthropogenic origin, which occurs mainly in the industrial landscape and industrial areas. The acquisition is indeed economically challenging not only for producers in terms of water management of hazardous and extremely hazardous substances but also for national authorities responsible for the continuous improvement of water quality. In this case, however, it must be the safety and water outweigh protection, the short-term economic cost of production of harmful substances acting on the environment.

An active aquatic ecosystems protection has also an irreplaceable importance in many cases, especially addressing the potential risks of accidents and water contamination. In which cases and which of two basic ways to use must result from a risk analysis for each source of danger. When selecting various ways for water protection it must be also always taken into account the evolution of scientific knowledge in the field and the technical possibilities of individual countries.

The following article suggests the basic scope of means and ways you can protect aquatic ecosystems in industrial agglomeration in the Czech Republic and what developments can be expected in the area during the 21st century.

Keywords: environment, aquatic ecosystem, water protection and resources, old ecological burdens, monitoring

Introduction

Aquatic ecosystems are particularly vulnerable part of nature and the environment in any part of the world. If there is a natural and balanced natural environment which can be only affected by natural phenomena and events, in built-up areas and especially in industrial areas, there are natural phenomena and since 20th century anthropogenic events as well. After the transition, but extremely negative environmental disasters, there was a turnover in the first half of the last century. Protecting the environment carried out in a number of territorial units of the world and especially in the EU 28 countries, there is a fundamental priority and the trend to improve the current state into a form that will be at least partially closer to the original natural environment.

The basis of successful recovery is to protect the natural balance of aquatic ecosystems as the primary chain maintaining fauna and flora in a state that guarantees uninterrupted recovery. This is a very difficult task whose solution must be based on scientific knowledge and risk analysis for the purpose of subsequent use in practice. In the searching of new paths and directions of research, especially in the old ecological burdens correction in the industrial landscape, it is appropriate to target different steps in the areas described in the following article.

Materials and methods

Aquatic ecosystems in the industrial landscape

Aquatic ecosystems in the industrial landscape, especially in industrial areas, are the most vulnerable part of the natural environment. Despite the gradual improvement of water quality, especially surface in recent years, it is still the basic raw material for the development of human society life and other fauna, there are a number of dangers. Due to differences in short-term or long-term impact on water systems, there is given the Langer wick can be divided into two basic groups.

Surface waters

In assessing the threat and risk of surface water in the industrial landscape at least following factors must be taken into account :

- classification of individual sections monitoring the recipient, solved in the region to cleanliness class according to Czech State Standard 75 7221 (unpolluted water to heavily polluted water),
- flow importance for further water use (water supply , recreation , energy , etc.),
- water flow fluctuations in the recipient during seasons,
- pollution point sources of flowing or accumulated water
- accidental water pollution risk from industrial and business traffic accidents

The above-mentioned basics and according to local conditions extended indicators have usually a dominant influ-

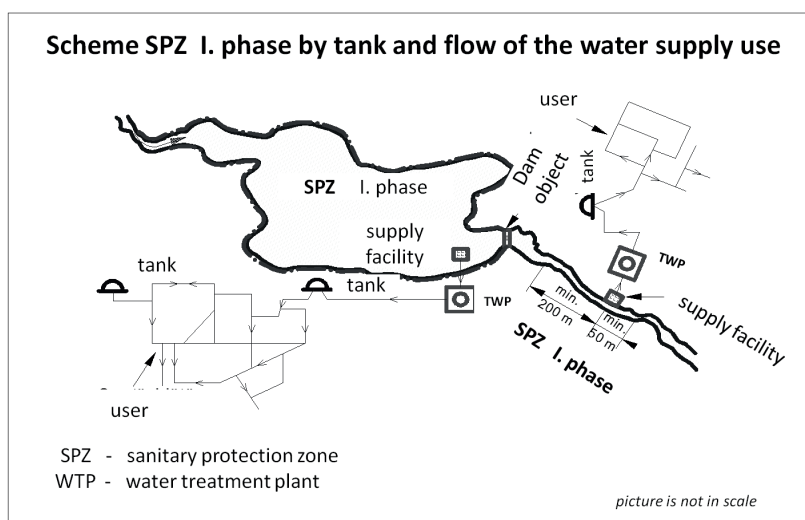


Fig. 1 The water tank showing zones of water resources protection

Rys. 1 Zbiornik wodny ze strefami ochrony zasobów wodnych

ence not only on the immediate water quality, but especially suggest to researchers the task of the state administration, self-government of cities and municipalities, access to various risks and help which ones classifies to critical issues and subsequently to contingency plans.

Groundwaters

To evaluate the threats and hazards that can affect the yield and quality of groundwater in the industrial landscape, it is appropriate to monitor at least following factors:

- long-term trend of groundwater quality and quantity on the basis of hydrogeological survey layers and operational tests of their abundance,
- effect of old environmental burdens from landfills or contaminated sites of former and current industrial enterprises,
- passive and active protection way of groundwater against harmful pollution, dangerous or particularly hazardous substances,
- suitable type of monitoring in identified areas with increased risk of natural emergencies or anthropogenic character,
- effects of industrial land use on groundwater (undermining).

In the hazard groundwaters evaluation it is necessary to strictly distinguish between short-term and long-term risks. If any contamination of surface waters subsides relatively quickly, it may take months to years in groundwater system. In the article there is shown the sample protection case of drinking water sources in the industrial landscape so we can see how to reduce the risk of contamination of aquatic ecosystems.

Risks and threats to drinking water sources

Drinking water cannot be produced in the Czech Republic or in other countries of EU 28 from any surface water or groundwater, but only from the water which fulfills the criteria A1, A2, A3. Based on these criteria treatment plants are designed. As the eco-load area keeps the quality of raw

water without much trouble in the industrial landscape it is usually necessary to make a wide range of technical and operational measures to maintain water quality. Threats and dangers for analysis and their solution are suitable for alternatively usable water (for water supply purposes) and can be divided into two categories.

Natural threats and hazards

- lack of natural water sources in relation to the public and private infrastructure needs, industrial agglomeration,
- reduced possibility of rainwater infiltration into watered layers,
- flood events disabling active water service for several days to weeks,
- climate change - reduction in the yields of surface and groundwater sources of drinking water including the chemical water composition due to the action of natural minerals at reduced flow rates.

Anthropogenic threats and hazards

- increased risk degree of surface and groundwater inorganic pollutants contamination from industrial facilities,
- high oil leakage risk during accidents in aquatic ecosystems,
- absence or lack of an inventory of emergency and contingency plans to deal with emergency situations,
- frequent absence of monitoring high-risk sectors affecting water quality and their long-term sustainability.

To reduce these and other natural and anthropogenic hazards and threats to water resources in the industrial landscape, it is necessary to take preventive measures already in the process of spatial planning, the buildings location and building complexes, referred to the following article.

Water resources protection

The basic preventive safety measures for surface water or groundwater long-term sustainability for water supply

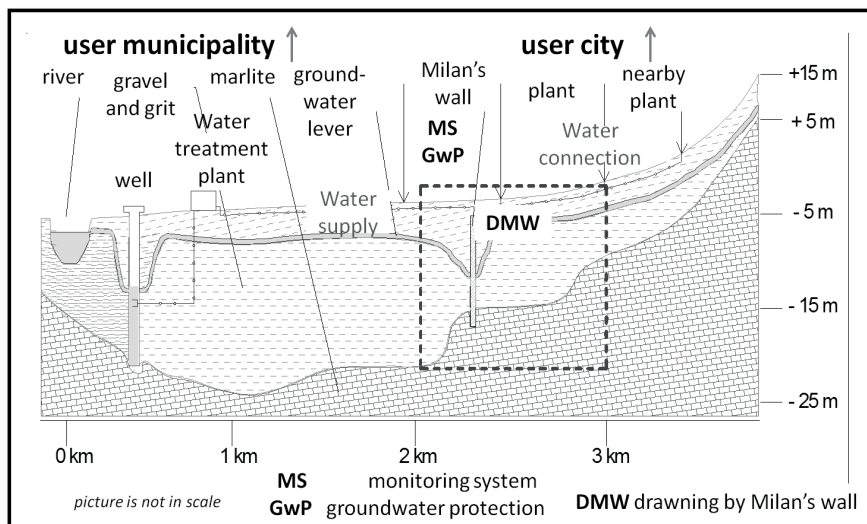


Fig. 2 The diagram of Milan's wall at the source of groundwater contamination

Rys. 2 Schemat murów Mediolanu ze źródłem zanieczyszczenia wód podziemnych

applications, especially in the industrial landscape, the publication of sufficiently large protective zones (PZ), originally sanitary protection zones (SPZ), see Figure 1.

An optimally renowned real extent feasible water source protection zone gives the drinking water source water for high risk minimization and its decommissioning as a result of anthropogenic emergencies, emergency nature. But if the water source is threatened by old ecological burdens or surface contamination from a significant part of the industrial agglomeration, it is necessary to protect the water quality in the water resource by using some alternatives shown in Figure 2.

The water resources protection through the Milan's wall is needed in the industrial landscape, especially in cases where water supply is only one real source of drinking water for the location or backup important source of water in industrial agglomeration connection to the water system of group and regional water supply. Due to the fact that the Czech Republic as a major industrial country in Europe carries a relatively wide range of different problems negatively affecting the environment, it is appropriate and often necessary to know what developments can be expected in different time horizons. For the section of water, it is convenient to divide upcoming tasks into two spheres.

Results and discussion

Water protection trends in the industrial landscape

To suppose the climate evolution over longer time periods is extremely difficult. It works for a large number of scientifically unexplored effects yet, for the action we reasonably do not have really long observation period. According to many studies, the human activity may have some of them. To reduce the industrial landscape negative effect on the aquatic ecosystems and increased protection of both surface and groundwater, it can be expected a huge development especially in the area of water protection during 21st century.

Passive trends protection of surface and groundwater

- legislation improvement designed to protect water and aquatic ecosystems,
- international cooperation expansion in border protection of water catchments,
- thorough inspections of state administration in the area of water protection,
- stricter emission limits discharges of treated municipal and industrial water into surface water depending on the receiving water flow capacity,
- hydrogeological survey extension for groundwater, the amount of such waters and their long-term quality.

Active trends protection of surface and groundwater

- water management permit optimization for water use, agricultural and energy use,
- significant reduction of raw water abstraction for water supply purposes as a result of an increase in hydraulic efficiency of water supply systems by about 30-40%,
- widespread dissemination and monitoring of its focus on on-line data transfer monitoring the surface water or groundwater quality,
- finding and developing new tools and substances reducing chemical pollution of surface and groundwater from wastewater, including these substances removal.

Conclusion

To sum up, the allowance of the water importance and risks in the industrial landscape can add that the maintaining acceptable water environment prospect in the coming years in the Czech Republic is favorable. It can be said that it has been stopped working decadence in the second half of the 20th century, a number of legislative measures and development of new technologies for improving water quality. It follows that the industrial landscape may not be a threat only to aquatic ecosystems, but also from the scientific and technical potential draw resources and knowledge for environmental protection.

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Trendy w ochronie wody w środowisku przemysłowym

Ochrona wody przed wpływem naturalnych i antropogenicznych czynników jest zadaniem skomplikowanym i trudnym pod względem ekonomicznym. Jej ochrona w otoczeniu przemysłowym sprawia, że kwestia ta jest jeszcze bardziej pilna i wielokrotnie bardziej skomplikowana. Bez ochrony ekosystemów wodnych, i szerzej, całego środowiska, nie jest możliwe trwałe zapewnienie akceptowalnych warunków życia dla ludzi, flory i fauny w jakimkolwiek państwie. Jeśli, jak wskazują międzynarodowe badania, ludzka aktywność była ekstremalnie negatywnym czynnikiem w XX wieku w Europie, to w tym wieku będzie nadal stanowić zagrożenie dla środowiska, szczególnie wpływając na zmiany klimatyczne. Niedobór wody, w niektórych regionach prawie na pewno wpływa nie tylko na typ występującej w nich roślinności, ale z pewnością stanowi bodziec do zmian odnośnie dostępu ludności do wody, jej powszechnego stosowania i wykorzystania powierzchni przemysłowej lub korzystania z wód podziemnych. Ekosystemy wodne w Republice Czeskiej i państwach sąsiadujących, które należą do czeskiego dorzecza, mogą być chronione za pomocą kombinacji różnych mechanizmów aktywnych i biernych.

Bierna ochrona działa w większości przypadków w perspektywie długoterminowej. Jeśli jest ona odpowiednia i zaimplementowana w wiedzy hydrologicznej, minimalizuje tworzenie się trudnych do rozwiązania incydentów pochodzenia antropogenicznego, które występują głównie w środowisku przemysłowym i na terenach przemysłowych. Zastosowanie wiedzy jest wyzwaniem ekonomicznym nie tylko dla producentów, pod względem zarządzania ciekłymi odpadami niebezpiecznymi i bardzo groźnymi, ale także dla władz państwowych odpowiedzialnych za ciągle polepszanie jakości wody. Jednakże, w tym przypadku, najważniejsze musi być bezpieczeństwo i ochrona wody, zaś krótkoterminowo koszt ekonomiczny produkcji szkodliwych substancji oddziałujących na środowisko.

Również aktywna ochrona ekosystemów wodnych ma w wielu przypadkach niezastąpioną wagę, szczególnie w przypadki potencjalnego ryzyka przypadkami skażenia wody. W tych przypadkach należy zastosować analizę ryzyka dla każdego źródła zagrożenia. Podczas wybierania różnych metod ochrony wody, musi być wzięty pod uwagę rozwój wiedzy naukowej w tej dziedzinie oraz możliwości techniczne poszczególnych państw.

Przedstawiony artykuł sugeruje podstawowy zakres środków i sposobów, jakie mogą zostać użyte do ochrony ekosystemów wodnych w aglomeracjach przemysłowych Republiki Czech, i opisuje jakich zmian można spodziewać się w tym obszarze w ciągu XXI wieku.

Słowa kluczowe: środowisko, ekosystem wodny, ochrona i źródła wody, stare obciążenia ekologiczne, monitoring