
Groundwater protection and drinking-water supply in the federal province of Burgenland (Austria)

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The federal province of Burgenland is located in the east of Austria. With its area of 3966 km² and a population of 270.000 it is a relatively small province. On the other hand 397 km of state-borderline touch the states Hungary, Slovakia und Slovenia.

The drinking water supply of Burgenland ensues to 100% from groundwater (appr. 85 % groundwater from porous aquifers and 15 % groundwater from springs). The most important shallow groundwater aquifers are built up by quaternary gravels and sands, which especially cover wide areas in the north of the country (region of Seewinkel, Parndorfer Platte, Heideboden). At the whole the quaternary sediments cover an area of appr. 40 % of Burgenland. Also important, but of less quantity are the aquifers in the fissures and the detritus of the prealpine regions. Especially in the mountainous regions of the Günser Gebirge and the Leithagebirge there are a lot of springs. The sediments of the tertiary basins build deep groundwater aquifers, which occur in several parts of the country. These deep groundwaters are especially important for water supply of the southern part and the middle part of Burgenland.

Burgenland has a mainly continental – pannonian climate, which implies extreme differences between the temperatures of summer and winter and relatively low precipitation rates, what is typically for the most parts of eastern Austria. In connection with high evaporation rates there occurs the problem of low groundwater regeneration rates in most parts of Burgenland.

Until the fifties of the 20th century private wells and a small amount off village water- supplying systems built the basis of the drinking-water supply of Burgenland. Based on the forced extension of the water supply in the southern part of Burgenland, which will be finished in the next few years, 88 % of the inhabitants will have the possibility to be supplied by larger water associations. 11 to 12 percent of the population will be supplied by village water-supplying systems and just less than one percent will still take their drinking water out of private wells (MAROSI et al., 2001).

The water supply of the northern Burgenland (districts of Eisenstadt, Mattersburg and Neusiedl), where 130.000 inhabitants are living and additional about 50.000 people are settling in their holidays, ensues to more than 96 % by the water-association Nördliches Burgenland. The two horizontal filter wells Neudörfel I and II are located at the random of the Mitterndorfer Senke and serve as the most important water sources of the northern Burgenland. It is possible to abstract 600 l/s best groundwater from these two wells. This is more than 50 % of the maximum need of the water association. The other wells (most of them exploit shallow groundwater aquifers) and springs of the association are widely spread over the northern Burgenland.

In the middle of Burgenland (district of Oberpullendorf) the drinking-water supply ensues to 80 % by the water associations Mittleres Burgenland (about 23000 inhabitants) and Lockenhaus und Umgebung (about 9000 inhabitants). The rest of the water supply ensues by village water supplying systems and some small water co-operatives.

The water association Mittleres Burgenland abstracts its water exclusively from deep groundwater aquifers, which are exploited in the well areas of Neckenmarkt and Lackendorf in 70 to 100 m under

surface. In contrast with that the water and waste water association Lockenhaus und Umgebung only uses springs from the Geschriebenstein (Günser Gebirge) for its drinking-water supply.

The drinking water supply of the southern part of Burgenland (districts of Oberwart, Güssing and Jennersdorf), where about 100 000 inhabitants are living, ensues today by four larger water associations, some village water supplying systems and about 150 small water co-operatives. A forced extension of regional water-supplying systems within the scope of EU-target-I projects is taking place. The extension-projects will be finished in the next few years. The yield of the springs and shallow wells of the southern Burgenland is not sufficient for the water supply of the whole region. So it is also necessary to use the (often artesian) deep groundwaters of the sediments of the tertiary basins (Styrian and Pannonian Basin).

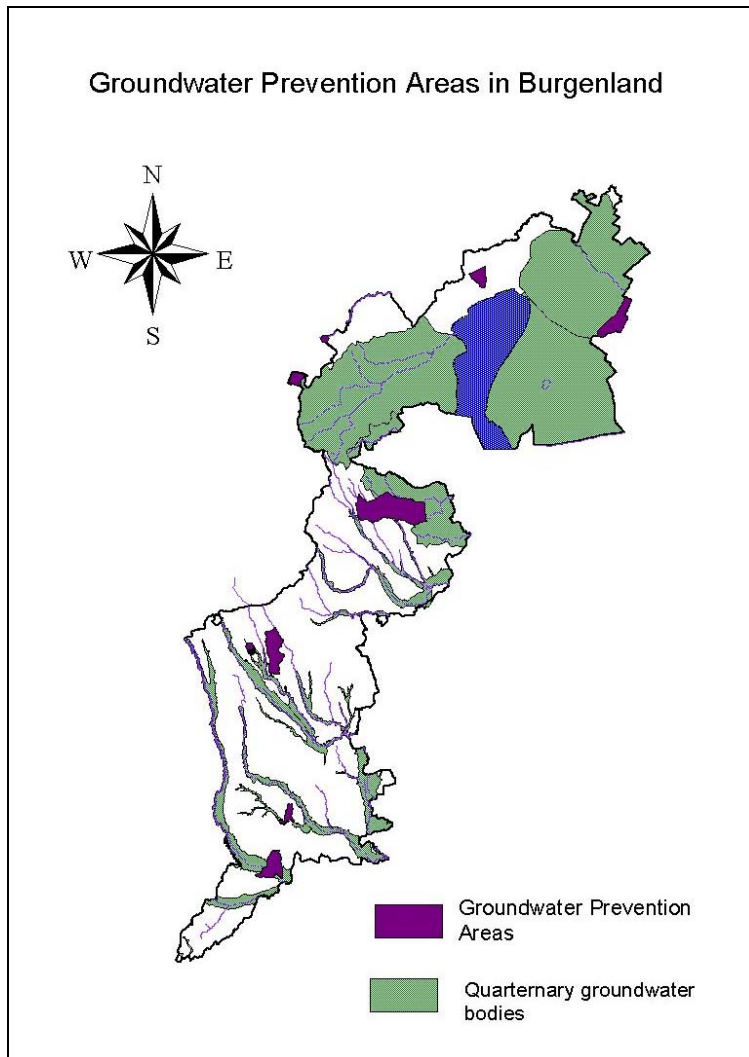


Figure 1: Groundwater Prevention Areas in Burgenland (GIS Burgenland – Division 9; Data - Quaternary groundwater bodies: Umweltbundesamt Wien)

The Federal Act on Water Law (WRG, 1959) builds the basis for groundwater protection in Austria. It regulates the principle that all groundwater must be kept so clean that it can be used for drinking-water supply. Directives concerning emissions and immissions, also as concerning groundwater protection zones and groundwater prevention areas are the basis for water protection. Together with the Federal Act on Water Law the Federal Act on Hydrography builds the basis for a countrywide (all

of Austria) water quality monitoring system for groundwaters and running waters. In Burgenland there are 120 groundwater samples collected and analysed of a broad list of chemical parameters four times per year. The rules concerning groundwater reconstruction, which are specially important concerning agricultural use, are amended at the present. The existing directives of the EU, where especially the nitrate directive and the water frame directive have to be named, are also essential for groundwater protection in Austria.

Agricultural use is one of the most important sources concerning the pollution of flat groundwaters. Qualitative problems, caused by increased amounts of nitrate in groundwater, occur especially in the quaternary groundwater bodies of the northern Burgenland. Although the nitrogen deposits per square units are not very high, there occur nitrate problems in some regions because of the former explained low groundwater regeneration rates. The Austrian Environmental Program for Agricultural Use (named ÖPUL in German) plays an important role on groundwater protection, whereby especially the regional groundwater projects are essential amongst groundwater protection zones and groundwater prevention areas. On the basis of these programs further improvement of groundwater quality in the problematic areas is expected in the next years. In some groundwater regions, e.g. the Seewinkel, there are to be seen decreasing nitrate concentrations in groundwater in the last years. Other important measures are agricultural advising projects to obtain groundwater preventing agricultural use. Appropriate use of fertilizers, demanding on the needs of the plants, and soil cover with plants in wintertime are the best measures to minimize the percolation of nitrate into the groundwater.

The technical basis for the delimitation and prescription of measures for groundwater protection zones and groundwater prevention areas in Austria is the directive W 72 "Schutz-, und Schongebiete" (ÖVGW, 1995). This directive defines 3 different types of protection zones, which are the basis for groundwater protection zones (prescribed as decree) or groundwater prevention areas (issued as ordinance). Groundwater prevention areas are issued when it is necessary to prevent large areas. It is also possible to issue prevention areas for future groundwater use.

The protection zone I serves as a small protection area directly for one special well or spring. This area should be owned by the drinking-water supplier. The protection zone II has to protect the groundwater against bacteriological contamination. The time of groundwater flow from the random of this zone to the well (or spring) has to be 60 days at the minimum. Whereas the protection zone III has the task to prevent the groundwater from persistent contaminants. The protection zone III can be a part of the catchment area, or the whole hydrographical catchment area. In groundwater protection areas and groundwater prevention areas it is obligate to issue measures, which have to be distinguished between prohibitions, orders, requirement of permissions and requirement of announcements of activities.

In Burgenland there are 9 groundwater prevention areas issued, which cover an area of more than 120 km². Five groundwater prevention areas are in preparation. Additional there are a lot of small groundwater protection zones prescribed, which protect single springs and wells.

Special attention in Burgenland is directed on the protection of deep groundwaters. Deep groundwater, however, is limited in quantity. As it is mostly protected by overlaying thick layers of widely impermeable sediments, it is usually very old and it has a good quality. Therefore it is particularly valuable in water management. Until today there is a lack of knowledge concerning the quantity and renewal of this resources. Too high pumping rates may lead to a decline of the groundwater hydraulic head and cause qualitative problems. To control the long-term tendencies of hydraulic head and to avoid overexploitation of deep groundwaters appropriate measuring systems for the continuous quantitative observation of deep wells are prescribed by the water authority. Abstraction rates and the hydraulic head have to be measured and data has to be stored continuous with electronic systems. On this basis it is possible to tune the abstraction rates if it is necessary. The

measuring systems enable a sustainable management of deep groundwaters in Burgenland (HERLICKSKA, 2000).

Summing up it may be said that the drinking water, which is made available from the public water supply to the people of Burgenland, is of a good quality. The supplying systems in the districts of Neusiedl am See, Eisenstadt, Mattersburg and Oberpullendorf, and the to a big extent finished investments in the infrastructure of the districts of Oberwart, Güssing and Jennersdorf ensure in combination with the providing groundwater protection measures a quantitative and qualitative unobjectionable drinking-water supply for the federal state of Burgenland at the present and in the future.

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