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# Integral approach to drinking water protection zones

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Drinking water protection zones play important role in providing safe and good drinking water. In establishing these zones several problems can appear. In Slovenia nearly all drinking water comes from groundwater and around 20% of the country is covered with the legally accepted drinking water protection zones. New trends in drinking water supply and present chemical status of groundwater will in future probably cause greater share of surface water in the Slovenian drinking water.

Based on the new trends of drinking water supply and legislation demands that are connected with the implementation of Water Framework Directive of European Union in 2004 new legislation basis for drinking water protection zone delineation were established. At present Water Act gives general framework of drinking water protection zones.

In the ordinances that define criteria for drinking water protection zones an integral approach to drinking water resources was adopted. Drinking water resources are divided into groundwater resources and surface water resources. Groundwater resources have been divided into intergranular, karstic and fissured aquifers. Surface waters have been divided into flowing waters and still waters.

In general all drinking water protection zones are divided into three zones and the capture zone. The last is defined as the zone of physical protection of wells or other objects that are important for drinking water capturing. The approach for the delineation of protection zones is based on three methods; arrival time calculation, intervention times estimation and fixed distance method. The arrival time calculation is used for intergranular aquifers. The arrival time calculation or intervention times estimations are used for karstic aquifer protection. For fissured aquifers the method depends on the

groundwater flow velocities. For slow flowing water arrival time calculation is used, for fast flowing waters the method of intervention times is used. In the delineation of surface water protection zones all three methods are used.

Drinking water protection zones represent restrictions for the urban and agricultural development in the environment. These restrictions are defined as prohibitions, limitations and measures. For each of the protection zones special restrictions are developed and defined in the ordinances. Together with these preventive activities legislation defines also risk analysis that helps to establish proper protection and at the same time it is also a tool for the impact assessment of construction activities on water protection zones.