



Urban Subsurface Planning and Management Week, SUB-URBAN 2017, 13-16 March 2017,
Bucharest, Romania

The integration of groundwater protection into land-use planning, certification and standardization of quality of urban supply systems

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Abstract

Groundwater is an essential resource for water supply. For this reason, it is necessary to integrate and harmonise efforts to protect groundwater quality with socio-economic activities and existing land-use patterns in any given region, as well as complying with the requirements of the EU Water Framework Directive. In addition, land management seeks to coordinate and harmonise policies with regional impacts. Water—as a public good and an essential resource for the development of life and the evolution of populations—needs to become one of the main pillars of management for a variety of regional policies. Therefore, water resources planning does not make sense without firstly considering forecasted land management patterns. The objective of this work is to standardize the process of managing the supply systems and prove their quality by certification. This will require guaranteeing the sustainable management and obtaining the certificate. During this long process, there may be complications that prevent achievement of the ultimate objective. For this, it is necessary to promote a standardization tool, which will value the efforts of the various agencies involved in the protection and management of groundwater used for human consumption in achieving sustainable management of water resources.

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Peer-review under responsibility of the scientific committee of the Urban Subsurface Planning and Management Week.

Keywords: Groundwater Protection; Land-Use Planning; Water Quality; Urban Supply Systems

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1. Introduction

The total population of the 27 European Union countries has increased from 400 to 497 million between 1960 and 2007. Rapid population growth, socio-economic progress and development of tourism, all have led to an increase in groundwater usage and the in the pressures that affect their quality.

Groundwater is an important resource, especially in the Mediterranean countries where surface water cannot, by itself, meet the demands of agriculture, industry and human consumption. Southern Europe is climatically characterized as a semi-arid region where there is a significant difference in rainfall due to seasons cycle and topography.

The sustainable use of groundwater for human consumption is critical in countries of the Mediterranean area, especially during periods of drought that occur cyclically. The various models proposed for different climate change scenarios also show that these droughts will become more frequent and intense, augmenting the necessity of a smart use of groundwater. The same effect is posed to ecosystems since in the Mediterranean most of them (especially wetlands), are linked to groundwater, so any condition affecting them, both in quality and quantity, will be reflected in the quality of these ecosystems.

Europe needs a sustainable groundwater management strategy to allow its preservation and use in a more efficient way. This need for a sustainable and integrated management is reflected in current policies and legislations. The Water Framework Directive is imposing Member States of the European Union to make Water Basin Plans with the requirement of active public participation in the planning and development process thereof.

The implementation of these measures in policies with territorial impact must be accompanied by an assessment of socio-economic effects that may occur in both populations and associated ecosystems.

2. Environmental problem

Groundwater constitutes a basic resource for urban water supply in Europe. In countries such as Austria, Germany, Italy or Denmark, more than 70% of the population's water supply comes from groundwater [1], while the vast geological diversity and consequently the hydrogeological one, along with the specific socio-economic characteristics of each country, generates different proportion of surface and groundwater usage for human consumption [2].

The protection of groundwater has become one of the high-priority environmental objectives in European policies entering into force in 2000, through the Water Framework Directive (WFD), Directive 2000/60/CE of the European Parliament and the Council [3], and more specifically in 2006 through the Directive 2006/118/CE of the European Parliament and the Council, dealing with the protection of groundwater against pollution and deterioration [4]. It promotes cooperation through coordination between the different responsible authorities, the different levels of decision making, the different social agents and society, in general, as the ultimate user. The last phase of the integration process must be the consideration of new strategies in water management policies with a positive impact on the territory.

In Article 6, the WFD requires that all water bodies used for the abstraction of water intended for human consumption providing more than an average of 10 m³ per day or serving more than 50 persons and bodies of water intended for such future use are included in a register of protected areas, constituting the so-called Drinking Water Protected Areas (DWPAs). Because of these stringent requirements, in many states the majority of groundwater bodies must be considered under such protection thus covering a large part of its territory. Water intended for human consumption includes the quantity supplied to the population (both public and private), and the quantity used directly in food processing (canning). This article also includes the register of protected areas for the conservation of habitats or species.

It is important to mention that, although protected areas for drinking water must be analyzed at the level of the entire groundwater body in which they are located, this does not imply that measures to achieve the objectives of Article 7.2 must be applied to the full extent of the DWPAs. The requirements of Directive 98/83/EC, drinking water, must be met at the point where the water is supplied to the consumer.

Article 7.3 of the WFD requires that states must ensure the necessary protection of DWPAs "in order to prevent deterioration of their quality, to reduce the level of purification treatment required for the production of drinking

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