Groundwater resource-directed measures software

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Abstract

Sustainability, equity and efficiency are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. These principles recognise the basic human needs of present and future generations, the need to protect water resources, the need to share some water resources with other countries, the need to promote social and economic development through the use of water, and the need to establish suitable institutions in order to achieve the purpose of the National Water Act (Act No. 36 of 1998). To be able to implement the National Water Act (NWA), the Minister needs to ensure that the tools and expertise required to implement the Act are available. The Department of Water Affairs and Forestry (DWAF) set about developing the required methods and procedures to comply with the provisions set out in the Act. The classification of a resource is the starting point of the process.

The Reserve, a provision in the Act that requires water to be set aside for basic human needs and aquatic ecosystems before allocation to other users, is based on classification. Protection measures that cannot be accommodated in the Reserve are accommodated in resource quality objectives which are based on both the classification and the Reserve. This approach is particularly relevant to groundwater, since the Reserve only relates to basic human needs and aquatic ecosystems and does not make provision for the protection of resources that are not linked to these uses. As part of addressing this issue, software was developed to assist in resource assessments, with the focus on all three components that need to be assessed. A case study is used to demonstrate how the software can be used to assist in resource assessments.

Keywords: resource units, classification, reserve, resource quality objectives

Introduction

To be able to implement the National Water Act (Act No. 36 of 1998), the Minister needs to ensure that the tools and expertise required to implement the Act are available. There is a dire need for training in groundwater resource assessment, with emphasis on resource-directed measures. This was addressed in 2004 and 2005 by Roger Parsons and Johan Wentzel who compiled a training manual (funded by the Water Research Commission, FETWATER and DWAF). To assist in training and assessment, DWAF: Resource Directed Measure Directorate requested the Institute for Groundwater Studies to develop Groundwater Resource Directed Measures (GRDM) software. In this paper the methods developed for the GRDM together with the software package developed for groundwater resource-directed measures are discussed in detail. The software together with the manual can be obtained from the following DWAF user support website: www.usersupport.co.za.

NWA and GRDM

The objective of GRDM is to facilitate the proactive protection of the country's groundwater resources in line with sustainability and equity principles as the NWA recognises the need to develop and use water resources to grow. However, the NWA also recognises that the water resources should not be used to the detriment of future users. GRDM hence strives to ensure that groundwater resources are afforded a level of protection that will assure a sustainable level of development for the future. To this end, GRDM comprises four main interrelated components, namely:

Delineation of resource units

The NWA states that the Minister must determine the Reserve for all or part of every significant water resource. The basic unit of any Reserve-related assessment is the quaternary catchment. It may, however, be necessary divide a quaternary catchment further into resource units (RUs), which are areas of similar physical (for example geology) or ecological (for example groundwater dependence) properties, grouped or typed to simplify the Reserve determination process.

Classification

The key outcome of this phase is to classify each RU in terms of the desired management class (excellent, good, fair). In essence, the classification process aims to define a resource in its natural state, assess its current state and levels of its development and use, and define the future desired state of the resource. A range of factors can be considered, including recharge, groundwater use, contamination, or potential contamination status. The classification of a resource therefore includes (amongst others) the following aspects:

- Ecological Reserve
- Basic human need Reserve
- Other water use requirements
- Stakeholder engagement.

The Reserve

By definition, only part of the groundwater system is included

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