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Quality Protection of Ground Water

November 28, 2008

The objective is to promote the conservation and sustainable use of natural resource.

Introduction:

To support the National Water Quality Management Strategy, through the adoption of a package of market-based and regulatory measures including the establishment of appropriate water quality monitoring and catchments management policies and community consultation and awareness.

The COAG (1994), ARMCANZ (1996), ANZECC (1996), NWQMS (1995) refers to a number of approaches to groundwater protection, often expressed in broad terms, the degree to which these have been taken up by States¹ is very limited and inconsistent. Moreover, the Guidelines are focused mainly on the broad-scale protection of groundwater quality and make only limited reference to the management of groundwater near contaminated sites or to the remediation of contaminated groundwater.

There is concern among groundwater resource managers that groundwater quality protection is not being adequately addressed at the policy level. Therefore, here some works prepared with the aim of promoting improved protection, and where necessary enhancement, of groundwater quality.

Why Ground Water Quality must be protected:

There is growing concern throughout the world about the contamination of groundwater as a result of human activities. Causes of groundwater contamination include use, spillage, or disposal of pesticides, fertilizers, petroleum hydrocarbons, industrial chemicals, and waste products. Contamination can also result from changes in the existing land use. The importance of groundwater as a resource to the nation cannot be overstated. It is estimated that in the order of 30 000000 ML/yr of groundwater is available for use. Of this, about 5 600 000 ML/yr is used. There are approximately 500 cities and towns that depend upon groundwater for drinking purposes. Almost all of inland Australia is strongly dependent upon groundwater.

The contamination of groundwater can have adverse effects on these uses, ultimately leading, as water quality deteriorates, to the groundwater being unable to support or maintain these beneficial uses. In most cases this degradation is irreversible. Remediation is very expensive and is often unsuccessful. Consequently, adequate protection of groundwater quality must be a primary aim. Groundwater and surface water are often intimately linked, and changes to quality or quantity in one resource frequently impacts on the other. Groundwater contributes to streams, lakes and wetlands, and is particularly significant in maintaining these surface water ecosystems in dry periods. Furthermore, surface water quality can affect groundwater quality through seepage and where surface water directly enters groundwater. Protection of surface water quality is often considered to be of paramount importance because impacts of contamination or poor water quality are readily observed. However, given the value of groundwater to the nation and the connections between surface water and groundwater, protection of the quality of groundwater should be given at least equal prominence to that of surface water. Additionally, there is a need for a greater awareness of groundwater, its key role in supporting a range of economic, social and environmental values, its significance in the hydrological cycle, and the need to protect these valuable but invisible resources.

Fundamental Principles:

Groundwater quality protection should be pursued through an approach that is:

- Based on the beneficial use concept and
- Implemented through an integrated approach, utilizing a range of measures, including the key measures of:
 - Risk and vulnerability assessment;
 - Land use planning and management;
 - Regulatory measures (e.g. licensing)
 - Economic and market mechanisms (e.g. trading)
 - Education and awareness.

The approach should also account for managing interactions between water quality and quantity and between surface and groundwater.

Impediments to Implementation:

There is a need to identify impediments to implementation and enforcement of an effective groundwater quality protection program. Strategies to address the impediments and issues also need to be developed, considering the following:

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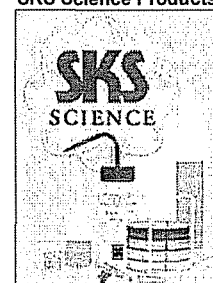


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- Human, financial and technical resourcing
- Compliance
- Institutional arrangements
- Availability of appropriate regulatory tools
- Appropriate economic and market mechanisms
- Community awareness and education.

Groundwater Management Plan:

The development of groundwater management plans has been encouraged by ARMCANZ (1996) and most States are now beginning to develop such plans for important and high use groundwater resources. These plans are generally quantity focused and are frequently dealing with over allocated systems. The 1998 NWQMS Implementation Guidelines propose a broad range of measures for inclusion in a groundwater quality management planning process. However, in many cases none of these activities is integrated or linked with the quantity focused groundwater management plans currently being developed by the States.

Remediation:

When groundwater becomes polluted, its potential beneficial use has by definition been adversely affected. Environmental protection agencies increasingly tend to adopt a risk-based approach when assessing point source remediation goals.

There is a need to integrate the Beneficial Use concept and risk based approaches in the remediation of polluted groundwater. When remediation polluted groundwater, due consideration should be given to the maintenance of existing and future beneficial uses. State level strategies need to be developed for dealing with long term management of polluted groundwater where remediation is not effective or practical.

Diffuse Contamination:

Diffuse sources of contamination are difficult to regulate since they are by their nature widespread. Unlike point sources which can be specifically targeted by regulations and licensing, the management of diffuse source contamination generally relies on a suite of large-scale planning and best practice approaches. Since the impact of diffuse sources can be widespread, specific pollutants can be hard to identify, and the groundwater contamination can be difficult or impractical to clean up, the beneficial use of groundwater over wide areas can be adversely affected. It is essential for the conservation of the groundwater resource that practices are implemented which seek to minimize the impact of diffuse sources.

To address diffuse source pollution, jurisdictions need to work with industry, local government and other stakeholders to develop a suite of approaches, including land use planning and management, codes of practice, load based application approaches, economic instruments, waste minimization, monitoring, and education. NRMCC should co-ordinate this at the National level.

Assessment to Ground water Quality Protection Outcomes:

The effectiveness of groundwater quality management and protection relies on enforcement and a comprehensive, targeted monitoring program. Since monitoring often must be undertaken over the long term, it often suffers budget cuts or is neglected due to lack of resources. However, if baseline trends are not known, early response to potentially adverse impacts is not possible. Monitoring is a key activity to enable identification and protection of groundwater beneficial use.

There is a growing trend for companies and individuals to self-monitor groundwater where there is a potential for contamination. This places the cost on the potential polluter, but will prove ineffective if the monitoring is poorly undertaken. It is considered essential that there be improved standards and quality control placed on self-monitoring, and that there be an adequate mix of government monitoring and self-monitoring.

Groundwater quality monitoring adequate to assess the achievement of water quality objectives set for designated Beneficial Uses need to be put into place in priority areas. Regular reporting should be at the groundwater management unit scale and capable of being collated at National and State levels and be publicly available.


Tools for Ground Water Protection:

There are a variety of means or tools that can be used in protection of groundwater quality. The application of each tool is one element of a larger whole, which can assist in groundwater quality protection. Groundwater protection in all States would be improved if these tools were better identified and implemented.

The following tools can be used to protect groundwater resources:

- Wellhead protection plans
- Vulnerability assessment
- Codes of practice
- Economic instruments
- Education, community awareness and involvement
- Land use planning.

In particular, there is a need for development of a National approach to the establishment and operation of artificial recharge schemes with respect to their potential impact on Beneficial Uses of groundwater.

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