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PEOPLE AND SYSTEMS FOR WATER, SANITATION AND HEALTH

Developing community supply groundwater protection guidelines SA

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THE DEPARTMENT OF Water Affairs and Forestry (DWAF) of South Africa has initiated a NORAD funded project entitled 'Sustainable development of groundwater sources under the community water and sanitation programme'. This programme is being implemented through seven projects, one of which relates to groundwater protection. The main aim of the groundwater protection project is to develop and implement a uniform approach to groundwater protection in the rural sector. In order to achieve this, the following objectives have been set:

- to assess the major human impacts threatening groundwater resource sustainability in the community water supply environment.
- to develop best practice guidelines for groundwater protection in the rural sector.
- to test the guidelines in selected pilot areas
- to integrate the guidelines into policy documents

In developing the guidelines, the following are being taken into consideration:

- The guidelines must be based on sound science
- The guidelines should take social factors, including customs into consideration
- The guidelines must be easy to implement

Approach

The project is being implemented by a team of hydrogeologists and social scientists. The hydrogeologists are mainly responsible for developing the technical guidelines while the social scientists are responsible for implementing these guidelines in three pilot areas.

The guidelines will be developed in stages as follows:

Stage 1:

At this stage, preliminary guidelines will be developed based on team members' experience/judgement and limited literature survey. The guidelines will be assessed by social scientists in terms of ease of implementation in community water and supply projects. The preliminary guidelines will be refined and implemented in three pilot areas.

Stage 2:

Based on lessons learned from implementation in pilot areas, final best practise guidelines will be developed and incorporated into policy documents.

Development of guidelines

Table 1 summarizes activities that are considered to be potential sources of groundwater contaminants in the rural sector.

Before best practise guidelines are developed, information packs on hazards and best practice for common contaminating activities in rural communities are currently being developed. These packs present the state of the art understanding in a relevant and uncomplicated way. They will be of value to planners, resource managers, practising hydrogeologists and environmental scientists with interest in groundwater pollution issues in the rural sector The information packs are structured as follows:

- An introduction to groundwater, its occurrence and vulnerability.
- A Summary of the rights and responsibilities of various role players in integrated water resources management.
- A description of typical contaminating activities in a rural community setting. For each potential contaminating activity:

o A description of the activity (typical contaminants and loadings, etc)
o The vulnerability of groundwater to this activity.
o Impacts on people and the environment from this type of groundwater contamination.

The focus of best practise guidelines will be towards influencing behaviour of people at three levels in rural settings:

1. The implementing agency, such as the local authority
2. Individuals with authority at a village level, such as teachers and health workers.
3. The lay members of the community.

Guidelines will be developed for each group, taking into account the level of complexity each group can handle. It is envisaged that the guidelines will be a page in length, at most two pages. For each of the 3 levels of role players, these guidelines will include:

o Their legal rights and responsibilities.
o What the hazards are
o What they can actively do at their level.
o What each role player can reasonably expect other role players to do.

Table 1. Sources of groundwater contamination in the rural sector

Source	Comments
On-site sanitation	This provides the highest risk of groundwater contamination in the rural sector. A number of case studies have been reported internationally of outbreaks which were caused by drinking faecal contaminated groundwater. Guidelines for siting, designing, and maintenance of sanitation facilities will be developed taking into account the fact that once in groundwater, micro-organisms can migrate beyond 1 km
Waste disposal	The disposal of household wastes in the environment can lead to contamination of groundwater. This can lead to the taste of water becoming objectionable. In addition there may be some odours. For groundwater contamination to occur, there must be water to leach undesirable substances in the refuse. Thus for groundwater protection, guidelines will be developed to discourage dumping of wastes into ponded water features. Deliberate disposal of liquids on wastes will also be discouraged.
Cemeteries	Groundwater may become contaminated by organic residues and organisms, due to the burial of corpses. Cases of contamination of aquifers by water percolating through graveyards have been reported worldwide. For groundwater protection, guidelines will be developed aimed at preventing drainage water from graveyards entering surface or groundwater supplies.
Animal breeding	The risk of infection of groundwater supplies by feacal bacteria from free ranging livestock is generally slight when livestock densities are low, as a result of the complete natural degradation when wastes are deposited in a disseminated manner. However, the problem is more serious where animals congregate in large numbers, for example around water holes or in kraals in which case large volumes of liquid and semi-solid feacal matter may readily infiltrate to the water table. Dipping tanks are also areas of concern. For groundwater protection, guidelines will be developed to ensure that there is sanitary protection around the well head to prevent ingress of contaminants from above. Guidelines for proper borehole construction to ensure protection will also be developed.
Subsistence agriculture	Groundwater contamination in rural areas can occur as a result of the widespread leaching of excess nutrients supplied to land as fertilizers. The principal contaminant is nitrate, which may cause illness in babies because the blood's ability to transport oxygen is reduced. Nitrate is also suspected of causing cancer. Guidelines will be developed for use of fertilizers, and advice on ploughing in areas prone to nitrogen leaching given.
Informal workshops	Informal workshops may handle toxic oil substances The presence of oil in groundwater can lead to problems with taste and odour. Oil may also contain substances that cause cancer. Guidelines for groundwater protection will be developed taking into account the migration characteristics of oils in the subsurface.

Concluding remarks

The direct outcome of information packs and best practice guidelines will be clear and relevant information to enable best practice at levels of responsibility from the implementing agency to the lay members of the community. If this information is effectively introduced and used by the role players this will result in reduced risk to groundwater from the sources of contamination addressed.

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