

## ➤ What are pathogens?

Pathogens are micro-organisms that cause illness in people and animals. Pathogens include bacteria (*Salmonella*, *Escherichia coli*, *Cholera*), protozoa (*Cryptosporidium*, *Giardia*), viruses (*Hepatitis*) and parasitic worms.



*Escherichia coli* on an agar plate and under the microscope  
(Source: Water Corporation, 2008)

## ➤ Where do they come from?

Pathogens occur naturally in the environment. Recreational activities can result in the transfer of pathogens from humans into the water body. The smallest amount of human waste (excreta or phlegm) can contain millions of pathogens that may contaminate a drinking-water source. Faecal material containing pathogens can also enter a water source from sewage spills, from waste of domestic animals in the catchment, and from stormwater flowing into a reservoir after rain.

## ➤ Do people carry them?

Yes, people can carry pathogens without their knowledge. Some people may be carriers of pathogens, but never exhibit any symptoms of illness. Pathogens can be transferred from person to person by the faecal-oral route, usually as a result of poor hygiene practices, or by ingesting contaminated food or water.

## ➤ Can they survive in the environment?

Yes, the survival of pathogens is dependent on several factors, including temperature, pH, solar radiation, media (i.e. soil, water, faeces), nutrient levels, competing micro-organisms and the availability of a carrier. Research has shown that *Escherichia coli* bacteria can survive months in water bodies. Viruses and protozoa can also survive for long periods in water. Unlike chemical contamination, low numbers of pathogens can quickly multiply to large numbers in the right conditions.

## How can you help?

- Follow the advice provided on the signs in public drinking-water source areas.
- Do not come in direct contact with water in a drinking-water reservoir (dam).
- Use the public toilet facilities provided in public access areas.
- Dispose of any rubbish either in collection bins or take it home for disposal.

## ➤ Further information

For further information on the protection of water sources please contact:



Department of Water  
Government of Western Australia

*Looking after all our water needs*

Department of Water  
Water Source Protection Branch  
168 St Georges Terrace Perth WA 6000  
Telephone: 08 6364 7600  
Facsimile: 08 6364 7601  
Website: [www.water.wa.gov.au](http://www.water.wa.gov.au)  
Email: [drinkingwater@water.wa.gov.au](mailto:drinkingwater@water.wa.gov.au)

This brochure was developed in collaboration with the Department of Health. For information on the health risks associated with pathogens please contact:



Department of Health  
Government of Western Australia

Department of Health  
Environmental Health Directorate  
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Department of Water  
Government of Western Australia

*Looking after all our water needs*

# Risks from pathogenic micro-organisms in public drinking water source areas

*Cryptosporidium parvum* under the microscope  
(Source: Russel Kightley Media, 2008)



**‘The greatest risks to consumers from drinking water are pathogenic micro-organisms. Protection of water sources and treatment are of paramount importance and must never be compromised.’**

*Australian drinking water guidelines 6, 2004*



# Protecting our drinking water

Drinking water is protected in Western Australia using a combination of catchment protection and water treatment, consistent with the *Australian drinking water guidelines 6, 2004*. Reliance on either of these approaches alone is not recommended.



Protecting the catchment area of surface-water sources and the recharge area of groundwater sources is the first and most cost-effective barrier to ensure that a safe drinking-water supply is available to consumers now and in future. Other barriers can occur at the water storage and treatment stages in the drinking-water supply system.

## ➤ Protecting drinking water reservoirs

A best management practice approach is adopted for drinking-water sources to prevent, minimise or manage the risk of physical, chemical and microbiological contamination.

Some land-use developments and recreational activities in drinking-water catchments may be prohibited or restricted to protect water quality and ultimately public health. This approach is applied to many of the drinking-water sources in Western Australia (e.g. Perth Hills catchments) and it is supported by the Department of Health and the Water Corporation.

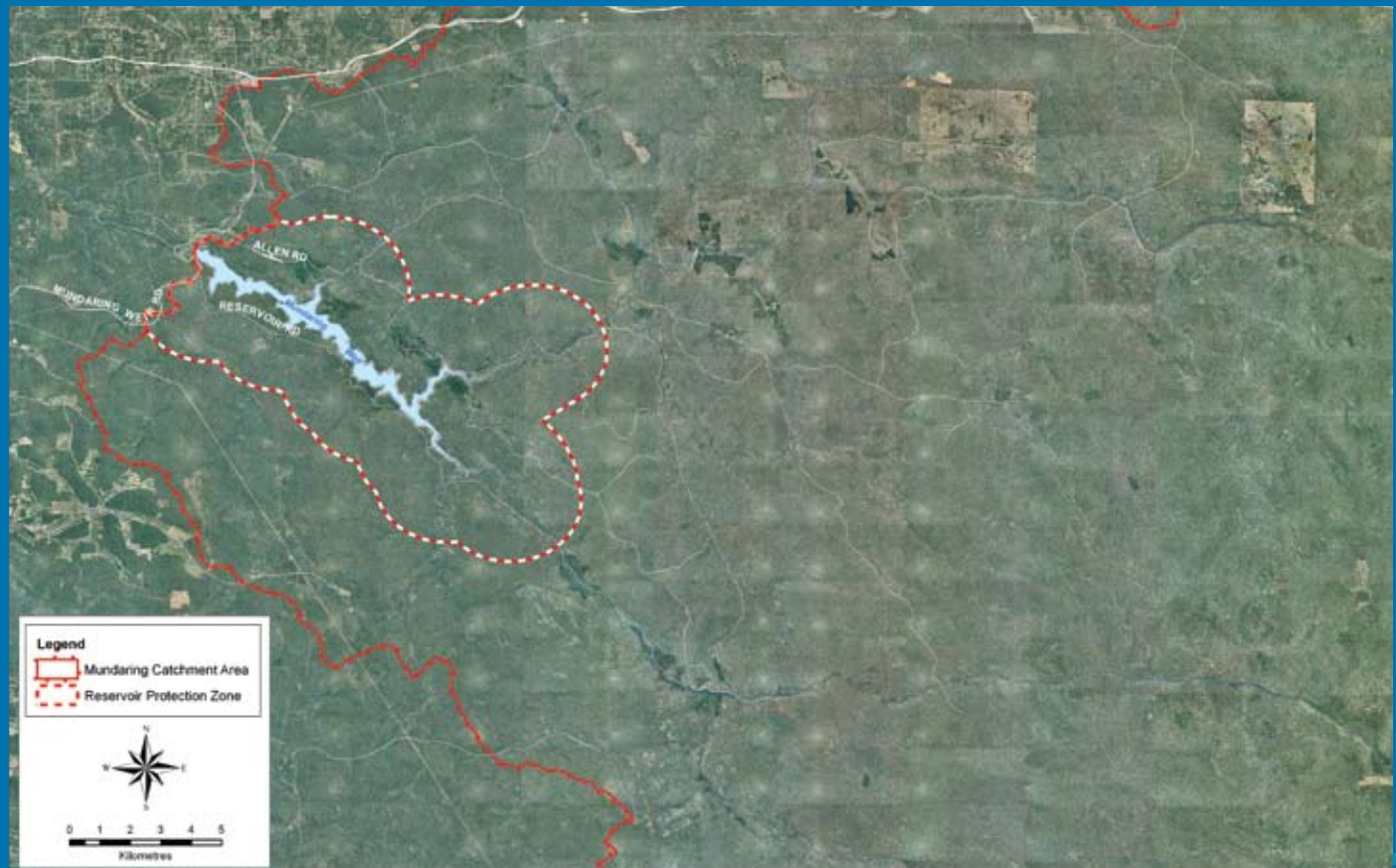
In surface catchments, legislation and policy can result in a reservoir-protection zone being established to protect drinking-water quality. The protection zone normally extends from the dam wall to a distance of two kilometres from the high-water level of the reservoir back into the catchment. Public access is not supported in a reservoir-protection zone but recreational access is allowed (subject to conditions) to the rest of a drinking-water catchment area consistent with Statewide Policy 13 *Policy and guidelines for recreation within PDWSA on crown land*.

In other Australian cities, such as Sydney, similar approaches to protect drinking-water quality are used. In Melbourne the whole area of a drinking-water catchment is protected and public access is prohibited. However, it is recognised that this approach is not applied uniformly across Australia. For example, in Brisbane some drinking-water catchments are open to the public. Nonetheless, in most states, recreational access is not supported in and around drinking-water reservoirs of strategic importance, but some recreational access is allowed in the broader catchment.



## ➤ Is swimming in the reservoir away from the dam wall acceptable?

No, research has shown that pathogens can be transported long distances in a water body depending on conditions such as temperature, salinity, turbidity and turbulence (wind and waves). Swimming away from the dam wall or off-take area does not remove the risk of pathogen contamination.



Mundaring Weir catchment area and reservoir protection zone, where the RPZ corresponds to 4.35% of the total catchment area

## ➤ Will water treatment alone provide a safe drinking water supply?

Reliance on water treatment alone is not recommended. Drinking water is expected to meet the health and aesthetic criteria of the *Australian drinking water guidelines 6, 2004*. These guidelines were developed by the National Health and Medical Research Council in collaboration with the Natural Resource Management Ministerial Council, and recommend a preventative risk-based approach to ensure safe drinking water is delivered to consumers. The guidelines also recognise that no single barrier will be effective against all sources of contamination. A combination of the protection of catchments, appropriate treatment methods, continuous monitoring of barriers (e.g. chlorine analyser) and regular water-quality analysis have ensured the supply of safe, good-quality drinking water to Western Australians for more than 100 years.