

NATIONAL ASSEMBLY

FOR WRITTEN REPLY

QUESTION NO 541

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541. Mr G R Morgan (DA) to ask the Minister of Water Affairs and Forestry:

- (1) (a) What are the effects on (i) human, (ii) animal and (iii) water sources exposed to cyanobacteria toxins, (b) how many cases of poisoning of (i) human and (ii) animals have been recorded as a result of these entities coming into contact with cyanobacteria toxins and (c) where did it occur in each case since 1 January 2005 up to the latest specified date for which information is available;
- (2) whether her department has conducted any studies to determine the prevalence of cyanobacteria in South Africa's water sources; if not, why not; if so, (a) what water sources have a dangerous level of cyanobacteria and (b) what are the levels in each case;
- (3) whether any steps have been taken to prevent human contact with water contaminated by cyanobacteria; if not, why not; if so, what are the relevant details?

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REPLY:

(1)(a)(i) Human Effect

Cyanobacteria produce toxins that can be harmful to human health. Humans can be exposed to cyanotoxins by drinking untreated water that has cyanobacterial toxins in it; skin contact by engaging in recreational activities in waters with cyanotoxins and by inhalation of water droplets/aerosols. Drinking infected water can cause gastroenteritis, kidney and liver damage, as well as nerve damage with symptoms including numb lips, tingling fingers and toes or dizziness. Illness from skin contact includes rash or skin irritation ("swimmers itch") and skin blisters on the lips. Inhalation cause runny eyes and nose, allergic reactions or sore throat.

The cyanobacteria blooms can also cause unpleasant odours which can be disturbing for recreational activities.

(1)(a)(ii) Animals Effect

Studies have shown that cyanotoxins causes mortality of livestock, wildlife and aquatic animals. Animals drinking infected water can develop hepatotoxic, neurotoxic, carcinogenic, cytotoxic and respiratory failure illnesses and cyanobacterial toxins can promote tumour growth. The effects are usually fast with large numbers of animal fatalities.

(1)(a)(iii) Water sources

Cyanobacteria toxins can be associated with other non-lethal compounds that cause taste and odours in drinking water. However, the decaying cyanobacteria blooms cause noxious smells at recreational areas as is often found at Roodeplaats and Hartbeespoort Dams. There is also incidence of fish, crocodile and mammal mortality.

- (1)(b)(i) To date there is no confirmed incidence of human death due to cyanobacteria toxins in South Africa. However, no epidemiological studies have been done in South Africa, to determine long-term effects of exposure to cyanobacteria toxins, because of the difficulty to connect cause and effect, as well as the similarity of the symptoms to other water related diseases.
- (1)(b)(ii) Since 1944 to the present day there have been numerous cases reported on livestock, other wildlife, fish and bird fatalities. Since 2005 cyanobacterial events and/or animal fatalities have been reported to the Department of Water Affairs and Forestry (DWAF) from the following sites:
- (1)(c) Crocodile West/Marico Water Management Area (WMA) that has the highest incidence of severe eutrophication
- Hartbeespoort Dam (annually)
 - Roodeplaat Dam (annually)
 - Klipvoor Dam (annually)
 - Rietvlei Dam (annually)
 - Bospoort Dam (occasionally)
 - Bon Accord (occasionally)

Olifants River WMA

- Loskop Dam (2005 and 2007)
- The latest addition to these events is a number of large mammals in the vicinity of four small reservoirs in the Kruger National Park (2007).

Middle Vaal

- Erfenis Dam (occasionally)
- Allemanskraal Dam (occasionally)
- Koppies Dam (occasionally)

Lower Vaal WMA

- Spitskop Dam (occasionally)
- Krugersdrift Dam (occasionally)

Mvoti to Umzimkulu WMA

- EJ Smith Dam (2006)
- Shongweni Dam (annually)

Mzimvubu to Keiskamma WMA

- Laing Dam (occasionally)
- Bridledrift Dam (occasionally)
- Nahoon Dam (occasionally)
- Katriver Dam (occasionally)

Lower Orange WMA

- The Orange River (occasionally)

(2) Yes, since the 1990s the prevalence of cyanobacteria in South Africa has been investigated by the Directorate Resource Quality Service of DWAF. In addition to a number of surveys by DWAF (Quibell 1995; Van Ginkel and Conradie 2001; Van Ginkel 2004 and Van Ginkel 2008) and the regular National Eutrophication Monitoring Programme assessments (Van Ginkel 2004, 2005, 2006), the Water Research Commission (WRC) has also funded a number of research projects (Harding and Paxton 2001; Downing and Van Ginkel 2004, Downing 2007, etc) that included different aspects of the prevalence of cyanobacteria in South Africa. Another project on the occurrence of animal deaths in the Kruger National Park has recently been approved to be funded by the WRC.

(2)(a) Of the regularly monitored dams in South Africa 11% have shown significant to severe algal and cyanobacterial blooms. However, 58% show significant to serious potential to develop cyanobacterial blooms because of the nutrient enrichment.

(2)(b) The severity of the impacted dams is shown in the following list of dams:

Crocodile West/Marico WMA

- Hartbeespoort Dam (serious)
- Roodeplaat Dam (serious)
- Klipvoor Dam (serious)
- Rietvlei Dam (serious)
- Boskop Dam (serious)

Olifants River WMA

- Loskop Dam (significant)
- Small reservoirs in the Kruger National Park (to be determined).

Lower Vaal WMA

- Spitskop Dam (serious)
- Krugersdrift Dam (serious)

Mvoti to Umzimkulu WMA

- EJ Smith Dam (serious)
- Shongweni Dam (serious)

Mzimvubu to Keiskamma WMA

- Laing Dam (serious)
- Bridledrift Dam (serious)
- Nahoon Dam (significant)

Berg WMA

- Theewaterskloof Dam (significant)
- Voëlvlei Dam (significant)

(3) Yes, through the National Eutrophication Monitoring Programme (NEMP), the trophic status of the dams is established and presence of the incidence of toxic cyanobacterial blooms are detected. Measures are taken to warn potential users of the dam or water resource. The Directorate Resource Quality Services reports regularly on the cyanobacterial toxin content of the Roodeplaat and Hartbeespoort Dams to the water treatment works and relevant managements, respectively. This enable the early warning for management purposes e.g. implementing treatment options within the water treatment works to ensure safe drinking water and issue warnings to recreational users.

In a number of WMAs steps have been taken during cyanobacterial bloom conditions to warn impacted stakeholders, e.g.:

- The Lower Orange River Remediation Forum (Northern Cape) has a warning system in place in the event of cyanobacterial blooms.
- The Hartbeespoort Remediation Forum has a whole communication system in place to warn users.
- Swimming event venues have been moved (Roodeplaat Dam).
- Rowing South Africa events have been cancelled or postponed (Roodeplaat Dam).
- Dams have been closed for recreational or potable purposes (Bospoort, Hartbeespoort, Nahoon and Roodeplaat Dams).

Additionally, many treatment works are upgraded to include dissolved air flotation systems within the treatment works to prevent cyanobacteria entering the treatment works from breaking and releasing the cyanobacterial toxins in the water. This is to ensure safe drinking water, e.g. water treatment work improvements in the Eastern Cape that will be completed by September 2008.

The WRC has also funded research to develop a generic incident management framework for toxic cyanobacterial blooms, with especially the smaller water treatment works in mind. This project was completed in 2006 and the document is available from the WRC.

DWAF Regional Offices also do *ad hoc* investigations, where no regular sampling is done, to determine the extent of cyanobacteria and toxin development when cyanobacterial blooms do occur.