



## water affairs

Department:  
Water Affairs  
REPUBLIC OF SOUTH AFRICA

MINISTRY OF WATER AND  
ENVIRONMENTAL AFFAIRS

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**MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS**

**NATIONAL ASSEMBLY: QUESTION 3406 FOR WRITTEN REPLY**

A draft reply to the above-mentioned question asked by Mr G R Morgan (DA); is attached for your consideration.

**ACTING DIRECTOR-GENERAL**

DATE: 18/12/2010.

**DRAFT REPLY APPROVED/AMENDED**

**MRS B E E MOLEWA, MP  
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS**

DATE: 2010/12/14

NATIONAL ASSEMBLY

FOR WRITTEN REPLY

QUESTION NO 3406

DATE OF PUBLICATION IN INTERNAL QUESTION PAPER: 19 NOVEMBER 2010  
(INTERNAL QUESTION PAPER NO. 38)

**3406. Mr G R Morgan (DA) to ask the Minister of Water and Environmental Affairs:**

- (1) Whether she will consider research by certain researchers on the link between neurotoxins generated by cyanobacteria and sporadic amyotrophic lateral sclerosis and Alzheimer's diseases (details furnished); if not, why not; if so, how will she disseminate this research to relevant role players in (a) her department and (b) any of its entities;
- (2) (a) what are the effects of cyanobacteria toxins on (i) humans, (ii) animals and (iii) water sources, (b) how many cases of (i) human and (ii) animal poisoning as a result of contact with cyanobacteria toxins have been recorded since 1 January 2008 and (c) where did each of these cases occur;
- (3) whether she has taken any steps since 1 January 2008 to prevent human contact with water contaminated by cyanobacteria; if not, why not; if so, what steps;
- (4) whether her department or any of its entities are conducting any research into cyanobacteria; if not, why not, in each case; if so, what are the relevant details in each case?

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**REPLY:**

- (1) The Department is aware of the research work funded by the Water Research Commission on the occurrence of beta-N-methylamino-L-alanine (BMAA) in our water bodies and is awaiting the report on this work. The Department is interested in any applicable local or international research, risk assessments or guideline development work and the outcomes of any of these studies will be used to assist us to establish management objectives for BMAA and any other cyanotoxins. Any development towards management objectives will be communicated at all the forums and with all stakeholders where water quality is being discussed.

It is well known that certain species of cyanobacteria produce certain neurotoxins. These toxins are known to cause malfunctioning of the nervous system. Although detailed knowledge on their occurrence in South Africa is limited largely due to analytical difficulties, the occurrence of neurotoxins internationally is much less than the hepatotoxic toxin (microcystin) for which the Department has data (see question 4, below). The Department is also aware of the growing concern internationally of the importance of beta-N-methylamino-L-alanine (BMAA) which is reputed to be produced by most cyanobacteria but is also found on certain cycad seeds. BMAA was thought to be the possible cause of Alzheimer's disease in the Chamorro people of Guam.

- (2)(a)(i) Effect on humans.

Cyanobacteria produce toxins that may be harmful to human health. Humans can be exposed to cyanotoxins by drinking untreated water containing cyanobacterial toxins and through skin contact by participating 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 rashes or skin irritation ("swimmers itch") and skin blisters on the lips. Inhalation can cause runny eyes and nose, allergic reactions or a sore throat.

Cyanobacterial blooms can also cause unpleasant odours which can have an impact on recreational activities.

(2)(a)(ii) Effect on animals.

Studies have shown that cyanotoxins can cause 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.

(2)(a)(iii) Effect on water sources.

Cyanobacteria toxins can be associated with other non-lethal compounds that cause taste and odours in drinking water.

(2)(b)(i) To date there is no confirmed evidence of human deaths due to cyanobacteria toxins in South Africa.

(2)(b)(ii) Since 1944 to present there have been numerous cases reported on livestock, other wildlife, fish and bird fatalities that were associated with cyanobacterial blooms and possibly cyanotoxins. Since 2005, cyanobacterial events and/or animal fatalities possibly linked to these have been reported to my Department. The actual numbers of cases are difficult to provide, as the links between the cyanobacterial bloom and fatalities have never been scientifically confirmed. These are also the areas that have had the highest number of hypertrophic impoundments.

(2)(c) Since 2005, most of the cases of animal deaths possibly due to cyanobacterial blooms were reported from the following Water Management Areas. The actual numbers of cases are difficult to provide, as the links between the cyanobacterial bloom and fatalities have never been scientifically confirmed.

<b>Water management Area</b>	<b>Names of dams</b>	<b>Frequency of occurrence of cases</b>
Crocodile West/Marico	Hartbeespoort Dam	Annually
	Roodeplaat Dam	Annually
	Klipvoor Dam	Annually
	Rietvlei Dam	Annually
	Bospoort Dam	Occasionally
	Bon Accord Dam	Occasionally
Olifants River	Loskop Dam	In 2005 and 2007
Middle Vaal	Erfenis Dam	Occasionally
	Allemanskraal Dam	Occasionally
	Koppies Dam	Occasionally
Lower Vaal	Spitskop Dam	Occasionally
	Krugersdrift Dam	Occasionally
Mvoti to Umzimkulu	EJ Smith Dam	In 2006
	Shongweni Dam	Annually
Mzimvubu to Keiskamma	Laing Dam	Occasionally
	Bridledrift Dam	Occasionally
	Nahoon Dam	Occasionally
	Katriver Dam	Occasionally
Lower Orange	Orange River itself	Occasionally

The latest addition to these events is a number of large mammals in the vicinity of four small reservoirs in the Kruger National Park.

- (3) Yes, through the National Eutrophication Monitoring Programme (NEMP), the trophic status of the dams is monitored and incidences of toxic cyanobacterial blooms are detected. Measures are then taken to warn potential users of the dam or water resource. On request from certain municipalities, my Department reports regularly on the cyanobacterial toxin of dams to enable the water treatment works to implement relevant management interventions (such as depth of withdrawal, dosing concentrations and warnings to recreational users).

In a number of WMA's 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 SA events have been cancelled or postponed once in Roodeplaat dam
- Dams have been closed for recreational or potable purposes (in the Bospoort, Hartbeespoort, Nahoon & Roodeplaat Dams)

Additionally, many treatment works are currently being upgraded to include dissolved air flotation systems within the treatment works to prevent cyanobacteria entering the treatment works from releasing the cyanobacterial toxins in the water.

The WRC has also funded research to develop a generic incident management framework for toxic cyanobacterial blooms, with a focus on the smaller water treatment works. This project was completed in 2006 and the document is available from the WRC. My Department encourages the owners of smaller water treatment works to implement this management framework, where cyanobacterial blooms is more often expected.

The Department's regional offices also do *ad hoc* investigations at sites where no regular sampling is done, to determine the extent of cyanobacteria and toxin development when cyanobacterial blooms do occur.

- (4) Yes, since the 1990's the Department and the Water Research Commission have conducted research and surveys into the prevalence of cyanobacteria in South Africa. In addition to a number of surveys by my Department; (Quibell 1995; Van Ginkel & Conradie 2001; Van Ginkel 2004 & Van Ginkel 2008) and the regular National Eutrophication Monitoring Programme assessments (Van Ginkel 2004, 2005, 2006), the WRC has also funded a number of research projects (Harding & Paxton 2001; Downing & 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.

In view of the above, listed below are various research reports and colloquial contributions that have been published by the WRC on cyanobacteria. These reports are available from the Water Research Commission. These include, amongst others:

1. *Investigating the applicability of ecological informatics modelling algal blooms in hypertrophic reservoirs of South Africa*  
Authors: van Ginkel CE; du Plessis S; Bezuidenhout JJ; 2010/04/19; Research Report
2. *Eutrophication cyanobacteria – detecting toxin-producing strains*  
2009/10/30; Brief - Technical Brief
3. *An overview of cyanobacterial research and management in South Africa post-2000*  
Authors: Harding WR; Downing TG; van Ginkel CE; Moolman APM; 2009/07/30; Water SA Manuscript

4. Exposure of rural households to toxic cyanobacteria in container-stored water  
Authors: Fosso-Kankeu E; Jagals P; du Preez H; 2008/10/01; Water SA  
Manuscript
5. *PCR based markers for detection and identification of toxic Cyanobacteria*  
Authors: Botha-Oberholster A-M; Oberholster PJ; 2008/03/01; Research Report  
No.1502/1/08
6. *Condensed laboratory methods for monitoring phytoplankton, including cyanobacteria, in South African freshwaters*  
Authors: Swanepoel A; du Preez H; Schoeman C; Janse van Vuuren S; Sundram A;  
2008/02/01; Research Report No.T 323/08
7. *Cyanobacterial Incident Management Frameworks (CIMFs) for application by drinking water suppliers*  
Authors: du Preez H; Swanepoel A; van Baalen L; Oldewage A; 2007/10/01; Water SA  
Manuscript
8. *Toxin production by cyanobacteria*  
Authors: Botes E; Grobbelaar JU; Oberholster AM; Oberholster PJ; van den Heever JA;  
2004/08/01; Research Report No.1029/1/04
9. *Cyanobacterial monitoring 1990-2000: Evaluation of SA data*  
Authors: Downing TG; van Ginkel CE; 2004/01/03; Research Report No.1288/1/04
10. *Development of a membrane photobioreactor for the study of microcystin production by cyanobacteria*  
Authors: Leukes WD; Strong J; Downing TC; 2003/01/10; Research Report No.1103/1/03
11. *Cyanobacteria monitoring getting sophisticated*  
2002/01/11; Water Wheel Article