

Planktonic algae and cyanoprokaryotes as indicators of ecosystem quality in the Mooi River system in the North-West Province, South Africa

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ABSTRACT

An ecologically healthy Mooi River system is important for maintaining the quality of potable water of Potchefstroom and surrounding areas. However, this system is under constant threat from anthropogenic pollution arising from both agricultural and mining activities in its catchment. A survey of planktonic algal and cyanoprokaryote assemblages in Klerkskraal, Boskop and Potchefstroom reservoirs was undertaken during 1999–2000 and 2010–2011. In all three dams, total algal and cyanoprokaryote concentrations were lower during the second survey (2010–2011), suggesting an improvement in ecosystem health. However, results also show a change from a Chrysophyceae-dominated community to one dominated by Bacillariophyceae. Increased numbers of diatom species that usually occur in eutrophic impoundments (*Melosira varians*, *Cyclotella meneghiniana* and *Aulacoseira granulata*) indicate an increase in the trophic status of the reservoirs, especially that of Boskop Dam, a trend mirrored by increases in conductivity as well as phosphorus and ammonium concentrations in all three reservoirs. It can therefore be concluded that although the ecosystem health of the Mooi River system is currently still good, further increases in nutrients such as phosphorus can cause proliferation of problem species (detected in enrichment cultures) and a deterioration of its water quality.

Keywords: Mooi River reservoirs, algal communities, cyanoprokaryotes, water quality

INTRODUCTION

The Mooi River originates in the Boons area and flows southwards through agricultural land into the Klerkskraal Dam, Boskop Dam and Potchefstroom Dam from where it meanders until it joins the Vaal River (Fig. 1). Other dams in the catchment of the Mooi River include Klipdrift Dam in the Loopspruit and Donaldson Dam in the Wonderfonteinspruit (Currie, 2001). The city of Potchefstroom gathers its potable water from surface- and groundwater in the Mooi River catchment. The water is collected and stored in the Boskop Dam from where it is transported in a 12-km long uncovered cement canal to the water purification plant of the city (Annandale and Nealer, 2011).

Surface water quality in a region is largely determined both by natural processes and anthropogenic inputs (Kazi et al., 2009) and, in the case of the Mooi River system, anthropogenic inputs include agricultural as well as mining pollutants. The Mooi River is situated downstream of the current environmental crises on the West Rand and far West Rand regarding aspects such as acid mine drainage, closure of mines, and naturally rewatered gold mines which have negative effects on the Wonderfonteinspruit, as well as the underground located groundwater aquifers and

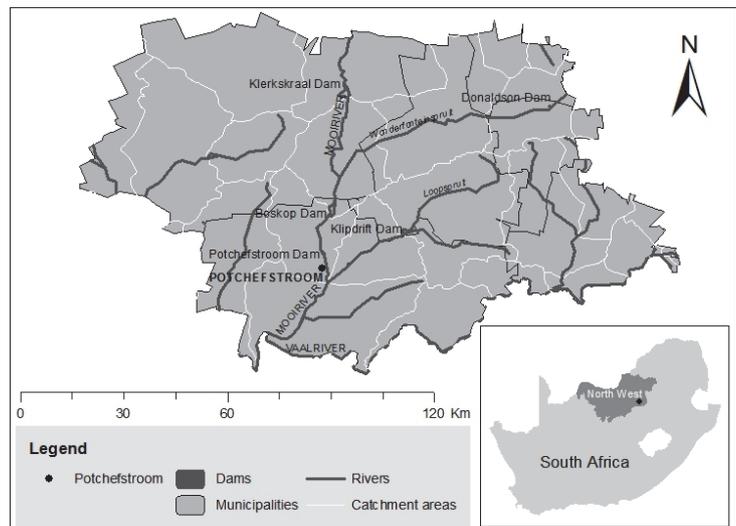


Figure 1
A map of the Mooi River System

springs in the karst landscape (Annandale and Nealer, 2011). During high rainfall conditions, Boskop and Potchefstroom dams receive water from the Mooirivierloop that is fed by water from the highly-polluted Wonderfonteinspruit. Although Klerkskraal Dam has no direct waterborne impacts from mining activity, windblown contamination from tailing storage facilities in the catchment is possible (Coetzee et al., 2006). The area surrounding the Mooi River, especially in the Boskop Dam area, has also been extensively surveyed for minerals, metals

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