Hydro-climatic variability impacts on algal blooms of fresh water resources

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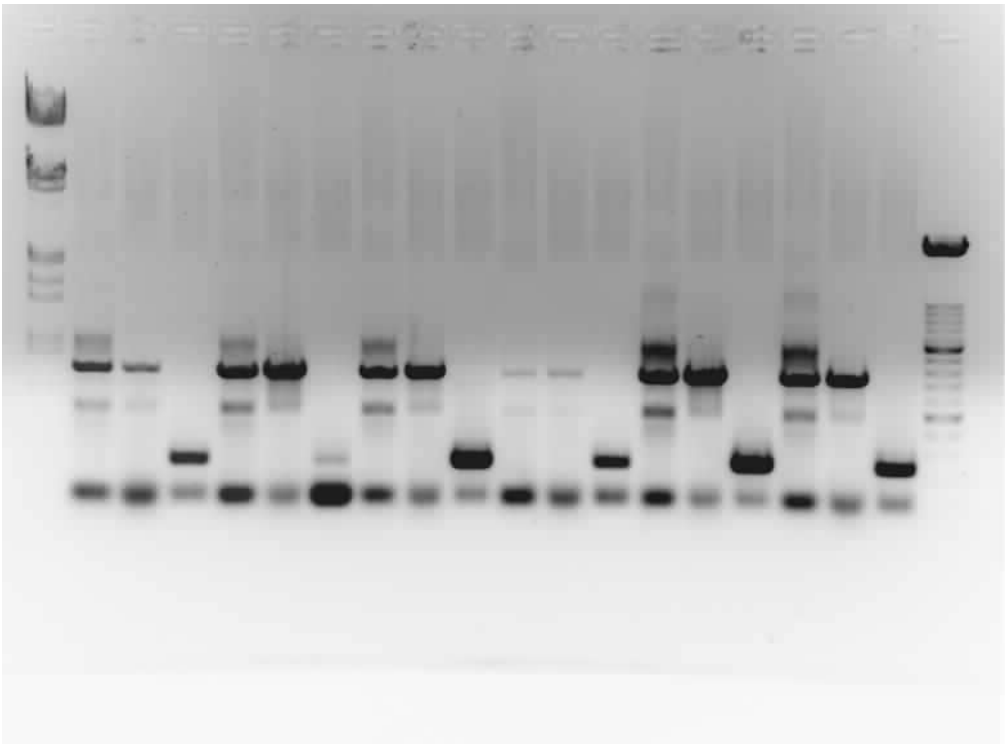
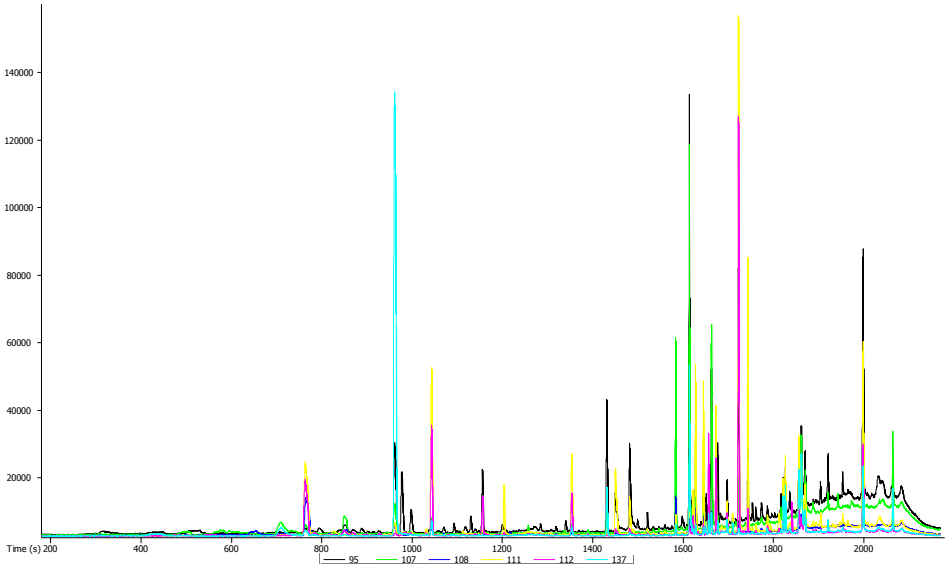
Since 1998 we have developed a research program in which we aim to contribute to and improve the drinking water quality of all South Africans. During the past years this research program on aquatic water ecology has developed through many stages form basic river ecology, ecophysiology, molecular ecology to ecological informatics. Our research efforts during the past years impacted mostly in two areas, namely the applied information that was made available to the local water industries and secondly delivering highly qualified post-graduate students whom, each still working within the water industry, is making a significant contribution to our shared field of interests. Our research is closely associated with the needs and problems of the waterboards and companies such as MidVaal Water Company and Rand Water.

The first aim of our research program was to describe the ecophysiology of the Mid-Vaal River section including the Barrage and Loch Vaal.

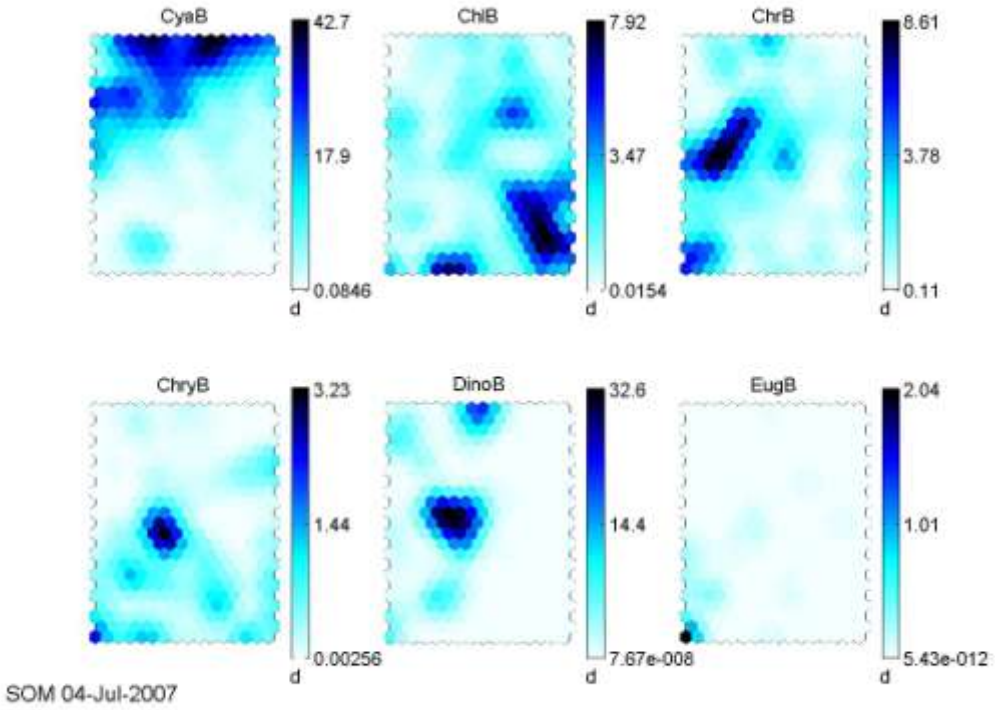
Secondly in order to explain harmful algal bloom (HAB) development, a more complete understanding of the physiological rationale for the occurrences of HABs is essential. In this second phase of the research program laboratory studies employing measuring techniques for chlorophyll fluorescence and enzyme activities were used.



The third aim of our research program was to investigate the toxicity of cyanobacterial strains as well as the environmental conditions triggering the toxic response through molecular ecology.



The fourth aim of our research program is an ongoing study to investigate the impact of the quality of the raw water from the river on different advance treatment processes in water purification plants. Our initial investigations involved the effect of ozone treatment and UV light of the raw water. All this knowledge will enable us to manage a healthy and sustainable ecosystem and also contribute to the development of an appropriate early warning system as well as the capacity to analyse and interpret freshwater variability and change.



We therefore launched the fifth aim and phase of the research program for the modulation of harmful algal blooms. In this regard a number of different types of models were tested to determine the applicability to South African conditions

CURRENT RESEARCH PROJECTS:

1. The applicability of advanced treatment processes in the management of ever-deteriorating water quality of the Midvaal river system. (Mrs Z Hudson, M Environmental Sciences)
2. Investigation into the occurrence of the dinoflagellate, *Ceratium* sp. In sourcewaters and the impact thereof on drinking water purification. (Ms N van der Walt, M Environmental Sciences)
3. An early warning system for the prediction of algal-related impacts on the drinking water purification process. (Ms A Swanepoel, PhD Botany).
4. Implementation of a rule based agent for the prediction pf *Microcystis* blooms in Rietvlei dam. (Mrs L Coetzee, PhD Botany)