



water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA



Buffalo River Biomonitoring

Winter 2010

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Introduction

The River Health team conducted a Winter survey at the Buffalo River and its tributaries on the 14 and 21 June 2010. The survey forms part of the routine monitoring conducted by this team and the data collected will be entered on the rivers database and help on the production of the State of the Rivers report for the system. In the Buffalo River six sites were selected along this system and its tributaries, which are the sites at Yellow Woods, Nxamkwane and Pirrie Mission River.

Aim/ Objectives

The aim of this survey was to undertake a routine biomonitoring in order to determine the annual trends or the behavioral patterns of the river over the period of four years (from 2007 to 2010).

Materials and Methods

SASS 5 biomonitoring techniques were used to sample the invertebrates and the water quality parameters were measured using a water quality multimeter.

Team

A. Mgobozi, N. Nkuhlu, K. Ravele, M. Nduna, Z. Sishuba, L. Gaulana, S. Mzileni and E. Weni conducted the monitoring of the Buffalo River.

Observations and Results

Site 1: Buffalo River above Maiden dam



Plate 1a : Upstream



Plate 1b: Downstream

The river had low to medium flows and the riparian vegetation was intact. The species diversity at this site was high but low in abundance except for the Baetidae species that had highest abundance. The vegetation was absent at this site therefore, samples were collected only from two biotopes (Stones and GSM). The SASS 5 results show a desired good biodiversity and a natural condition.

Site 2: Pirrie Mission tributary



Plate 2a Up stream



Plate 2b Downstream

Samples were not collected due to low flows.

Site 3: Buffalo River at the Horseshoe Bend



Plate 3a Upstream



Plate 3b Downstream

The site had very low flows and due to that, sampling could not be done.

Site 4 Yellow Woods at Lonsdale Bridge



Plate 4: Illustrating high flows at Lonsdale Bridge

During the survey water was being released from the Wiggleswade Dam to Laing Dam, and that was a recommendation from the National Department of Water affairs and other stakeholders to use the Yellow Woods River as a channel, as our rivers are facing the crisis of drying up. Therefore, no samples were collected at this site due to high flows.

Site 5: Buffalo River above Ngqokweni confluence at Zwelitsha



Plate 5a Upstream



Plate 5b Downstream

The river had medium to high flows because some tributaries have already joined the main stem above. The species diversity and abundance at this site was high and the samples were mostly dominated by the Caenidae, Hydropsychidae and Simuliidae. Although this site had higher species abundances, the overall result obtained showed that this site is at a Poor condition. This is due to high abundance of low scoring species and the presence of Leeches at this site also show that there is contamination occurring at this site.

Site 6: Nxamkwane tributary



Plate 6 : Showing Nxamkwane sampling site

The river had medium flows and there were signs of pollution, which was evidenced by the algae coating the stones. Although there is a good invertebrate diversity, SASS 5 results showed that this site is at a Fair to Good condition, and the species abundances were high in all biotopes sampled.

Site 7: Buffalo River at Buffalo Pass



Plate 7: showing an illegal dumping site at the buffalo Pass.

There was no access to this site due to the garbage dumped at the entrance to the site.

Physical Parameters

Water samples were sent to the laboratory for further analysis only the physical parameters measured on site shown on the table below (Table1).

Table1. Summary of Physical parameters measured at Buffalo River (- indicate no sampling done due to very low flows).

Site	Temp	pH	DO	Conductivity
Above Maiden dam	12.5	8.69	0.01	0.03
Buffalo River above confluence at Zwelitsha	14.1	8.12	0.18	0.37
Nxamkwane	12.4	8.12	0.32	0.65
Mggakwebe	-	-	-	-
Lonsdale Bridge	-	-	-	-
At the band	-	-	-	-
Buffalo Pass	-	-	-	-

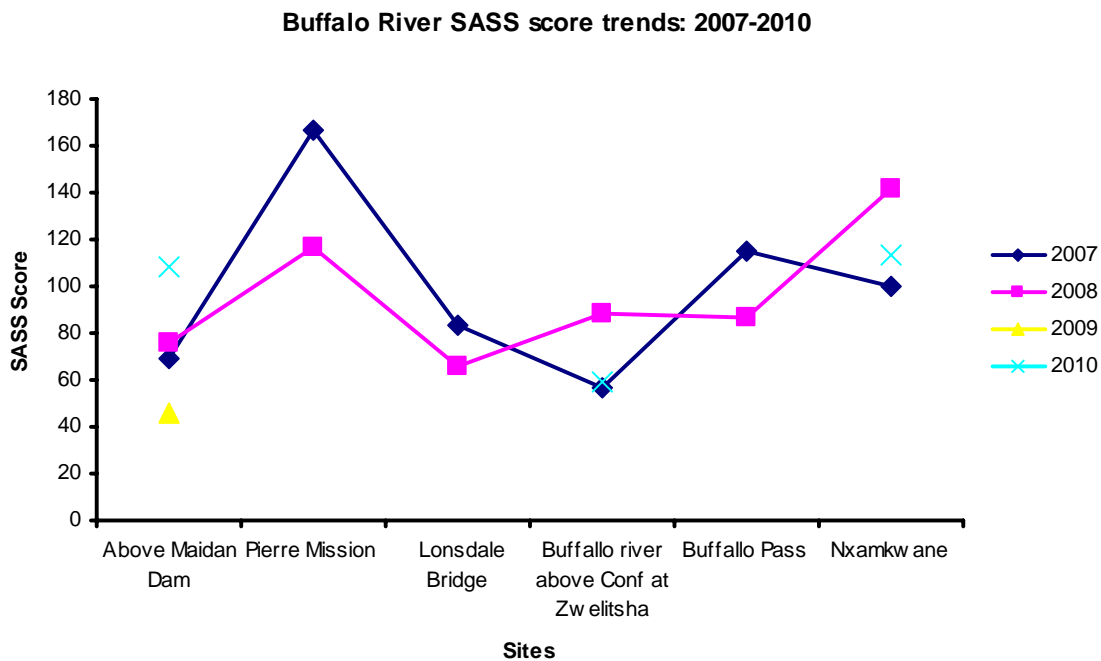


Fig 1. Graph showing the SASS 5 annual scores at the Buffalo River (2007-2010).

The results at Buffalo River above maiden Dam show that there is an improvement in SASS 5 scores to date compared with the previous years. In 2010, 2009, 2008 and 2007 SASS 5 scores were 108, 46, 76 and 69, respectively. Year 2007 and 2008 surveys have complete data which indicate a consistent increase in trends. Both at Pirrie Mission and Nxamkwane, which are tributaries of the Buffalo River, the scores were high during 2007 and 2008 surveys.

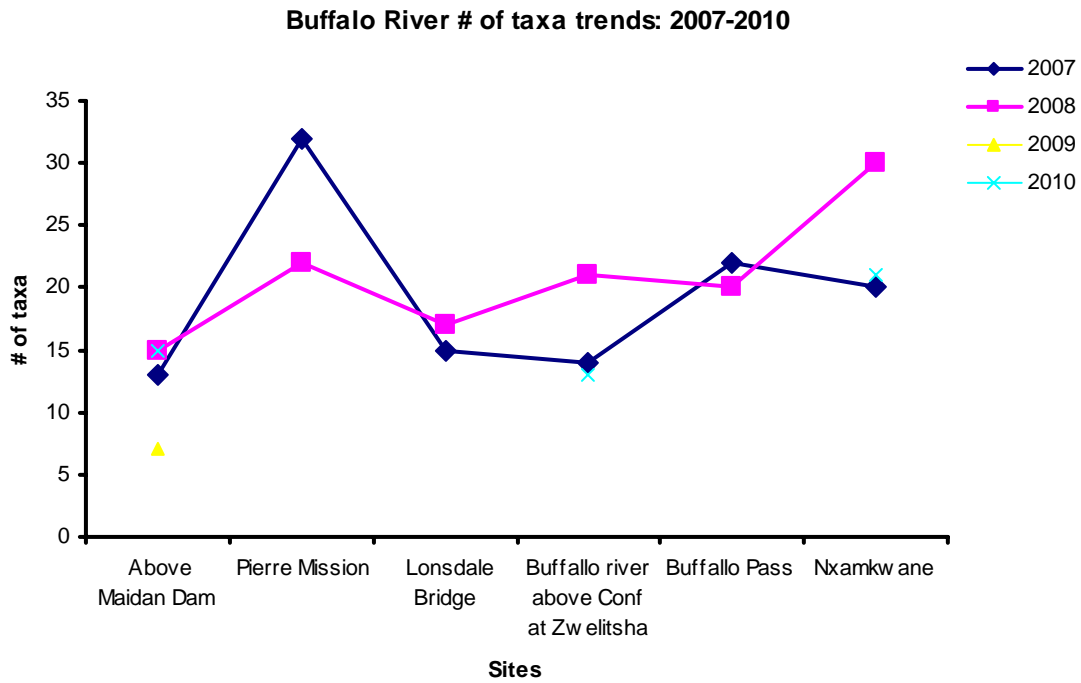


Fig 2. Graph showing the SASS 5 annual number of taxa at the Buffalo River (2007-2010).

Generally, the invertebrate species diversity is consistently increasing over these years (2007-2010). Both at Pirrie Mission and Nxamkwane, which are tributaries of the Buffalo River, the species diversity and abundances were high during 2007 and 2008 surveys.

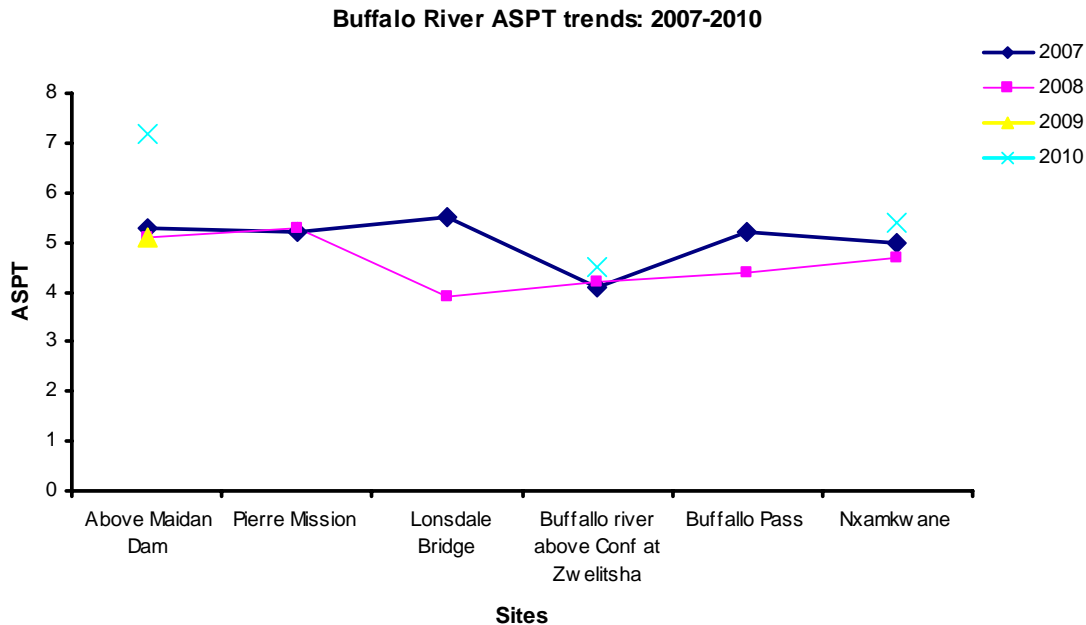


Fig 3. Graph showing the SASS 5 ASPT's at the Buffalo River (2007-2010).

In 2010, only Buffalo River above Maiden Dam improved and was in natural condition. Other sites varied from poor to fair conditions.

Discussion

This survey was conducted during a dry season in the Eastern Cape and this was evident in the results of this study. Out of the seven sites that were selected along the Buffalo River and its tributaries, only three sites were done and this is due to flows factor which proves the statement above. The condition of this system regarding the flows was better during the previous survey comparing with the present survey. At Buffalo River above Maiden Dam, Baetidae abundance was high and this can be attributed to good water quality, conducive habitat and absence of predation from fish (which are absent). Little or no developments at the vicinity of this site contributed to good aquatic environment, hence natural condition.

Although there was high species diversity at Buffalo River above the confluence with Ngqokweni at Zwelitsha, the site was in poor condition due to presence of resistant-to-pollution low scorers, such as leeches, earthworms and simuliids, which are indicative of a polluted environment, although they can be found also in pristine environment. The

nearby workshops discharge their untreated waste water directly into the river, hence pollution.

SASS 5 scores and invertebrate species diversity and abundance at Pirrie Mission and Nxamkwane were always higher than other sites during 2007 to 2008. The reason for this is that these two sites are tributaries and have minimal impacting developments to the aquatic environment. Generally, the flows varied from low to very low, hence some sites results dropped and others could not be worked upon.

On-site water quality data indicate that the parameters are not in critical range. Electric conductivity, which is a sign of dissolved salts in the water, was high at Nxamkwane. It increases as you go down the catchment towards lower reaches, due to activities taking place in middle reaches, accumulating dissolved salts towards lower reaches.

Conclusion

The overall interpretation of the data based on invertebrates' results, shows that the Buffalo River system is in FAIR condition. This is due to developments, such as discharges, settlements, and livestock nearby the system. However, it is difficult to conclude because there is a missing year data (2009) due to unforeseen reasons.