The Lower Wonderfontein Spruit: an exposé
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Abstract During the nineteenth century the Wonderfontein Valley and Spruit were described as a ‘natural jewel’ by adventurers. The valley underlain by dolomitic aquifers contained copious volumes of water and partly overlies gold-mining excavations, which were under a threat of flooding. For safety and economic reasons, large-scale dewatering of some of the dolomitic aquifers was decided upon as a matter of policy. This led to the lowering of the water table, which accelerated the formation of sinkholes and dolines in geologically sensitive areas. The streambed along approximately the first 30 km of the Lower Wonderfontein Spruit is particularly vulnerable. The mining sector attempted to rehabilitate the affected parts of the streambed by filling the sinkholes with various materials. Unfortunately, many of the treated sinkholes were reactivated by storm flow.

Keywords Caves · Dewatering · Dolomite · Sinkhole · Streambed · South Africa

Introduction

This report is an overview of the current state of knowledge of the Lower Wonderfontein Spruit, from the ‘former glory’ of the Spruit when it was in a pristine state, through hydrogeological appraisals of the impact of mining on ground stability, to various attempts at improving the situation. Due mainly to mining activities which commenced in the 1930s, part of the Wonderfontein Spruit was gradually transformed into a barren streambed populated by numerous sinkholes and four dried-up springs. Flow along this section of the streambed is currently diverted into a 1-m-diameter pipeline of limited capacity. This portion of the valley, situated approximately 50 km west of Johannesburg, was well known to early adventurers and settled there in the 1800s (Fig. 1). Numerous stone implements were found in the vicinity of the springs (De Kock 1964). The stream derived its name from a succession of ‘wonderful’ springs, some of which still flow. These springs were crucial to settlement as the economy depended almost entirely on agriculture, especially as the area is classified as semi-arid grassland (Louw 1969).

Since the 1870s spring water was diverted into irrigation canals (Enslin, unpublished data, 1971). A large section of the Lower Wonderfontein Spruit was consequently reduced to an intermittent stream (Government Mining Engineer, unpublished data, 1958; Quilliam, unpublished data, 1966). The irrigation system was substantially upgraded in the 1920s [Government Gazette (South Africa) 1924]. Signs of habitation of the Wonderfontein Valley, dating back to the early nineteenth century, are found in caves along the Wonderfontein Valley (Breutz 1953).

From about 1836 to 1877, William Cornwallis Harris, Thomas Baines, Karl Mauch, Emil Holub and the Rev. T.F. Burgers were pioneers who left graphic descriptions of the Wonderfontein Spruit (Holub 1881; Burgers 1934; Baines 1964; Mauch 1969; Ramsden 1985). They were all impressed with the verdant vegetation of the area. Holub, during a 3-day visit to the area, described houses with lush gardens and well-kept orchards, myriads of flowers, fig trees, pomegranate and other fruit trees. The region exported corn, meal, tobacco, skins, ostrich feathers and meat. Holub related how the river water disappeared entirely in places, only to re-emerge downstream. Rev. Burgers, who described the same phenomenon, concluded that water disappearing into the ground was an indication of underground rock that had been ‘mined out’ through chemical dissolution.

The banks of the Spruit, swampy and overgrown with reeds in places, created a perfect habitat for a large variety of bird species. The Wonderfontein Spruit was home to eagle owls, darters and sedge-warblers, as well as various...
finch species. Other varieties of water birds lived in the Spruit as swimmers and waders. The abundance of insects was the main food source for the various insectivorous birds living in the valley.

Unfortunately, the early settlers had exterminated most of the larger animal species approximately 15 years prior to Holub’s visit to the area. At the time of his visit, however, jackals, striped hyenas, porcupines, springhares, short-tailed pangolins and genets were still in abundance. Otters and reedbuck could also be seen on the banks of the river. On the plains, further to the north, great herds of Blesbok, Springbok, Gemsbok and Wildebeest continued with their migrations.

The dolomite of the Wonderfontein Valley is characterized by numerous well-developed cave systems. Apocalypse Cave, with a surveyed length of approximately 13 km, is considered to be the longest cave system in southern Africa (Fig. 2). The Wonderfontein Cave is situated approximately 2.5 km west of the Oberholzer Spring and is, horizontally, extensively developed at a depth of some 15 m below the Wonderfontein Spruit (Kent and others 1978; Fig. 2). In the early years the farm owners were quick to capitalize on this attraction and entry fees were charged to visit the cave. Karl Mauch’s party was charged an entry fee of five shillings per head, while Emil Holub’s party was charged the exorbitant sum of one pound sterling per head (Kent and others 1978). The tunnels vary in size from 3-m-high caverns below the bed of the Wonderfontein Spruit to mere open joints further away from the Spruit.

With the discovery of gold on the West Rand in the late nineteenth century, Johannesburg came into existence when the first tents in Ferreira’s Camp were pitched. News of the discovery spread like wildfire and soon Johannesburg was a thriving community of prospectors, adventurers and entrepreneurs. From the early days the residents of Johannesburg were dependent on water from local sources, such as small streams and wells, for their household and industrial requirements. As gold digging expanded, the residents began to experience severe water shortages. The Wonderfontein Valley was renowned for such vast quantities of water that the local government approved plans to construct a pipeline to convey water all the way from the Wonderfontein Spruit to supply Johannesburg with water. The Health Committee rejected this plan in 1896. They found that the water scheme would adversely affect the residents and farmers of the Wonderfontein Valley, as well as the communities that depended on the water further downstream (Tullius 1984). According to Ramsden (1985) the decision not to implement the ‘Wonderfontein Water Scheme’ was based on cost, on the one hand, and that it was deemed to be a threat to the Waterworks Company, on the other. On the 8th May 1899 various water schemes were still under consideration. This process was interrupted by the outbreak of the Anglo-Boer War.

When mining operations extended to the Far West Rand in the early twentieth century, the groundwater of the Wonderfontein Valley proved to be a deterrent to development. In 1910 the Pullinger brothers attempted to sink a shaft just north of the Wonderfontein Spruit (Fig. 2). At a depth of approximately 30 m the imported pumps could no longer cope with the ingress of water and the shaft had to be abandoned (Allen and Crawhall 1937). In the course of time, mining technology improved. By 1934 the Venterpost Gold Mining Company could successfully sink a shaft through the dolomite of the Venterpost Compartment. 

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**Fig. 1**

General locality plan