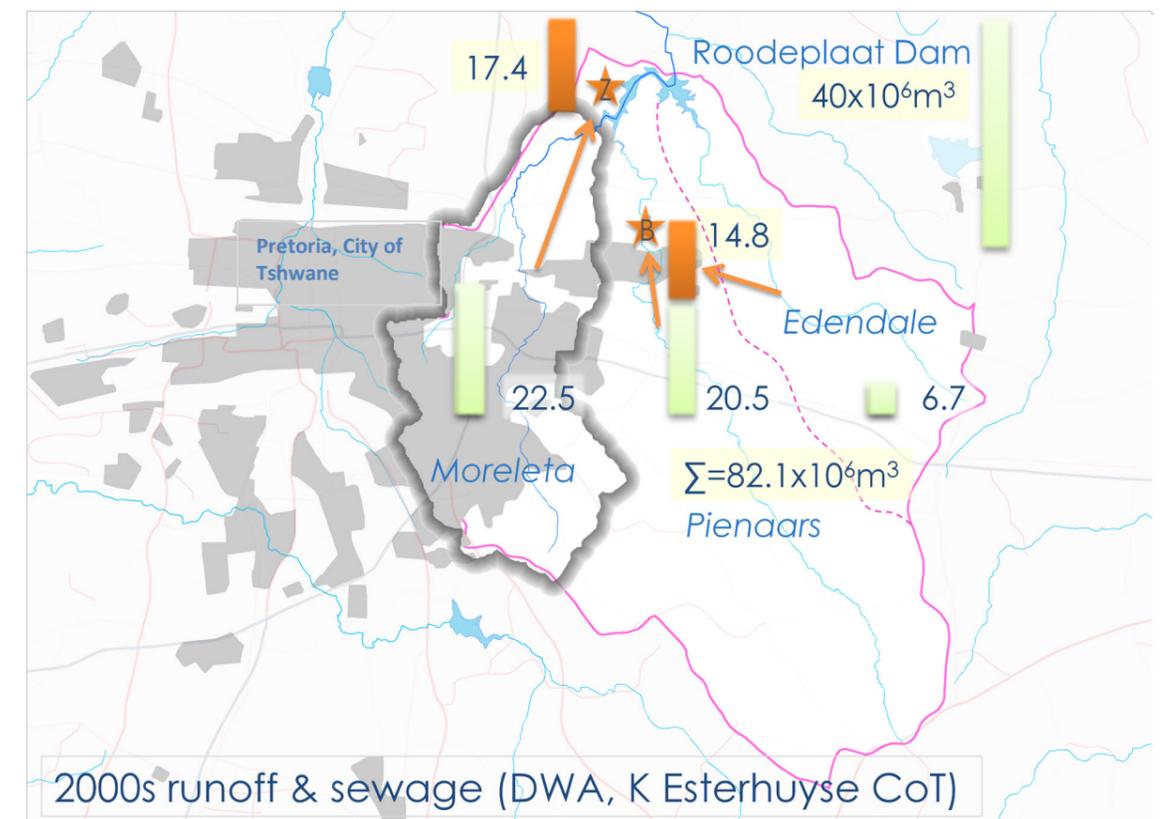


Historical aerial photographs trace the urbanisation of the Moreleta Spruit catchment of Roodeplaas Dam

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Geometric processing of 32 digitised aerial photographs taken in 1939 of the Moreleta-Hartbees headwater catchments feeding into Roodeplaas Dam near Pretoria yielded a continuous monochrome image of the land cover. Georeferencing of the image allowed direct comparison with other data sources, such as orthophotos from 2001 and Google Earth images dated 2000 to 2013. The state of the Moreleta-Hartbees catchment is important because it contributes up to half of the riverine inflow to Roodeplaas Dam, which supplies water to the north-east of the City of Tshwane.



The inflow to Roodeplaas Dam is complex, and this diagram shows a simplified picture. The annual inflow of treated effluent from Zeekoegat (Z) and Baviaanspoort (B) makes up as much as three-quarters of the full supply volume of the dam. Horizontal dotted lines show the estimated natural flow. Missing from this diagram are inflows of water from other catchments. Please consult the original sources for detailed data.

Sources

2004-2013: Water Affairs hydrology database, City of Tshwane water & sanitation data; "natural": WR90.

What do the photographs show?

The historical aerial photographs provide a snapshot of the catchment at the outbreak of the Second World War. Draping the images over a digital elevation model adds a striking landscape dimension to the landcover information. The photos show that much of the catchment had already undergone transformation to agriculture by 1939, and less than 4% was urban. Within twenty years, suburban housing was extending across the catchment and by 2001 a large proportion of the catchment was under low density housing, with areas of commerce and light industry.

The images suggest that, despite the loss of habitat, large pockets have survived, especially along river courses. With the continued efforts of the residents, municipal managers and businesses, these areas of terrestrial and aquatic habitat within the urban area will become ever more valuable for the biodiversity, health and aesthetics of South Africa's administrative capital.

What next?

Historical aerial photographs are a valuable source of information—a worthwhile project would be to merge them into continuous, high-quality digital overlays for general use in spatial applications. They are almost always in stereographic pairs, so the opportunity for recreating landscapes in 3D also exists.



Acknowledgements

National Geo-spatial Information (NGI), a chief directorate in the Department of Rural Development and Land Reform, has archived the early aerial photography of South Africa, and kindly made digital copies of these and the recent orthophotos available. K Esterhuysen of the City of Tshwane provided the flow data for the Baviaanspoort and Zeekoegat sewage works and the flow data are from Water Affairs' Hydrological Services. C Todd provided invertebrate habitat assessments. The perspective views would not have been possible without the extraordinary technical wizardry of Google Earth and the pioneering work of aviators and cartographers in the 1930s. Parts of the original habitat in the Moreleta catchment still exist thanks to the generosity of land-owners, the foresight of the City of Tshwane and its predecessors, and the dedication of Friends groups along the river course.



Moreleta and Hartbees catchment at Derdepoort, from 1939 aerial photography provided by AOC through NGI.

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<!-- Once the assembled images are georeferenced, overlaying them in a GIS
or Google Earth is fairly simple, as in this KML code snippet -->
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  </Icon>
</GroundOverlay>

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Moreleta and Hartbees catchment at Derdepoort, from 2014 images provided by AfrGIS through Google. Despite protection of a narrow riparian zone, invertebrate habitat assessments show that both rivers are in a poor state (C Todd, personal communication).

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