



UNIVERSITY OF VENDA

SCHOOL OF ENVIRONMENTAL SCIENCES

**ASSESSMENT OF THE IMPACTS OF SELECTED LIMPOPO PROVINCE
DAMS ON THEIR DOWNSTREAM RIVER ECOSYSTEMS USING REMOTE
SENSING TECHNIQUES**

By
Mokgoebo, Matjutla John
(Student number 11583238)

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Supervisor: Prof. T.A. Kabanda
Co-Supervisor: Dr. J. Gumbo

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Abstract

The impacts of dams on their downstream river ecosystems have been associated with a decrease in stream flow, species biodiversity, water quality, altered hydrology and colonization of the area by invasive alien plant species. The impacts normally interfere with the ecosystem functioning of riparian and aquatic environments, thereby leading to decreased biodiversity. In this study, the main aim was to assess the impacts of dams on downstream river ecosystems using aerial photography. Aerial photographs and orthophotos data were supplemented by field work. Aerial photographs and orthophotos data of different years were used to assess the impacts of the five selected dams (Albasini, Damani, Mambedi, Nandoni and Vondo) on their downstream catchments. The area devoid of tree species both downstream and upstream of the dams was calculated using grids of predetermined square-sizes on each available photograph. The nearest neighbour method was used in the field to determine tree density between identical tree species. Rainfall and discharge data were also used to determine whether the upstream presence of the dams altered streamflow, thus leading to a reduction in vegetation density downstream of the dams. The results from all studied dams indicated that vegetation density decreased downstream of the dam while rainfall remained constant over a period of more than twenty years. The presence of terrestrial vegetation (*Acacia Karroo*, *Acacia ataxacantha* and *Bauhinia galpinii*) along downstream riparian zones indicated that the environments downstream of the dams have been occupied by obligate terrestrial vegetation instead of obligate riparian vegetation. Results also revealed a shortage of water downstream of the dams in winter (May, June, July) and these dry conditions are worsened during low rainfall periods. Mambedi and Vondo dam areas showed bigger treeless areas, showing their low resilience and higher fragility than in all other studied dam areas (Albasini, Damani and Nandoni).