



# Surface water distribution challenges and elephant impacts on woody species in Mana Pools National Park, Zimbabwe

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## Abstract

This study assessed the relationship between surface water distribution and elephant impacts on the Zambezi River flood plain, Mana Pools National Park woody species ecosystem. Water availability and forage are major requirements for African elephant distribution within an ecosystem landscape in Zimbabwe. Surface water unavailability reduce elephant home range to around peripheries of water bodies and this is intensifying the destruction of wood species around these water bodies. The study adopted a mixed methods research design which combined qualitative and quantitative methods. Field data were collected between 10 January 2017 and 14 February 2019. Questionnaires, interviews and field observations were the major tools used to collect data in Mana Pools National Park. Data were analysed using the Statistical Package for Social Sciences version 20.0. Inferential statistics were employed to determine the relationship between elephant activity and damage of woody species. Chi square test results revealed that there is a significant relationship ( $P < 0.05$ ;  $P = 0.001$ ) between elephant activity and woody species damage. This means that woody species damage in the Mana Pools National Park Zambezi Valley flood plain can be attributed to elephant activity. This study recommends that Government and Zimbabwe Parks and Wildlife Management Authority (ZPWMA) should formulate effective elephant population analysis through periodic surveys in order to continuously update the national data base of elephant population trends in areas such as Mana Pools National Park.

**Keywords** African elephant · Dry season · Ecosystem · Vegetation · Woody species

## Introduction

In the savanna ecosystem, water availability poses a major constraint on elephants and their habitat utilization in the dry season (Chamailles-James et al. 2007; Chomba and Bonda 2016). African elephants (*Loxondonta africana*) depend on water and their impact on woody vegetation is most significant close to water sources especially during dry seasons when available surface water is limited (Wienand 2013). There is noticeable overgrazing and degradation of landscape in areas close to water bodies (Gara 2014; Dzinotizei 2019). Therefore, understanding elephant behaviour and habitat utilization within an ecosystem landscape is crucial for conservation of vegetation and sustainable use of water sources.

The higher concentration of elephants around perennial water holes during the dry season results in development of various land use patterns around water points (Cumming and Jones 2009; Craigie et al. 2010; Ndoro et al. 2013; Wienand 2013). Elephant species affect ecological processes by altering the vegetation structure (Naidoo et al. 2020). This results in biodiversity loss, negatively affecting ecosystem resilience (Chomba and Bonda 2016). Loss of biodiversity under high elephant densities has significant implications on the role of game reserves in conservation biodiversity (Dzinotizei 2019). Zimbabwe is one of the key elephant range states and home to the second largest estimated elephant population with more than 80,000 elephants (ZPWMA 2019). This population is growing at an exponential rate with 40% of the African continental elephant population found in Zimbabwe, Namibia, South Africa and Botswana. Of this population, about 50% is found in Botswana, 40% in Zimbabwe and 10% in Namibia and South Africa (Chatofa 2014).

The increase in the African elephant population, is known to have profound effects on vegetation and biodiversity in general (Alvgren 2009; Mwambula et al. 2014). Elephants

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