

# **EXPLORING THE SUITABILITY OF CAUSAL LOOP DIAGRAMS TO ASSESS THE VALUE CHAINS OF AQUATIC ECOSYSTEM SERVICES: A CASE STUDY OF THE BAVIAANSKLOOF, SOUTH AFRICA.**

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Healthy, functioning aquatic ecosystems and adequate water supplies are fundamental to the survival and development of any nation, particularly so for water-stressed countries like South Africa. Aquatic ecosystem services (AESs) are becoming increasingly recognised for their importance to society with regards to the ecological goods and services they provide in terms of health, social, cultural and economic benefits. The development of markets for AESs begins with a clear understanding of the nature and extent of the goods and services provided by aquatic ecosystems. However, an inclusive understanding of AESs and their associated values is currently lacking in South Africa.

Although flows of ecosystem services provide a nearly limitless set of valuable properties, a large proportion of their services remain unpriced or inaccurately priced through traditional neo-classical markets. Often resulting in market failure as these markets do not reflect the full social costs and/or benefits of ecosystem services. This provides incentive to identify/develop a tool to bridge the gap between ecosystem service valuation and practical recommendations to improve the provision of ecosystem services and their associated markets.

This study explores the suitability of causal loop diagrams (CLDs) to assess the value chains of AESs in South Africa within the context of a case study. AESs do not usually have finite market values nor are they traded in formal markets, thus a traditional approach to value chain analysis was unsuitable. A professional workshop environment was used to facilitate a transdisciplinary approach towards identifying relevant AESs, their complex inputs, interactions and trade-offs. A CLD was developed to map the complex relationships between the AESs and their associated inputs, which formed the basis of the value chain analysis. CLDs have the potential to identify challenges and opportunities for existing markets of AESs and thus facilitate the development of recommendations for improving AES value chains.

**Keywords:** Aquatic Ecosystem Service, Value Chain Analysis, Causal Loop Diagram.