EXECUTIVE SUMMARY

This tool enables assessment of the effects on wetland functionality of the cumulative impacts of human activities at a landscape scale. It uses two metrics – the **land cover change impact metric** and the **loss of function metric** to produce a functional effectiveness score that is translated to functional hectare equivalents (Figure E.1). The difference between the functional hectare equivalents of an unimpacted catchment is compared with the current state to assess the cumulative impacts of human activities on wetland functionality.

Figure E1**:** Summary of the relationships between different components of this study

A range of land cover classes based on the National Land Cover database for South Africa have been identified with respect to their impacts on water inputs to, and retention of water within, wetlands. If present in the catchment, these land cover classes can either 1) increase or 2) decrease water inputs to a wetland, OR if present in a wetland itself, they can 3) increase direct water losses from the wetland, 4) reduce surface roughness, 5) impede the flow of water in a wetland or 6) enhance the flow of water in a wetland. The effect of each category of land cover change from the natural condition on each of these parameters has been assigned an intensity of impact score.

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The method considers the impact of land cover change on wetland health using a **land cover change impact metric**. This metric is based on the recognition that wetland structure and function are fundamentally affected by the hydrological regime. The land cover change impact metric requires that the extent of each land cover category is determined as a proportion of the catchment and wetland area, and that this is multiplied by the intensity of impact score, to produce a magnitude of impact score.

The manner of entry into and pattern of water flow through a wetland affects the extent to which a wetland is able to deliver particular ecosystem services. Therefore, for purposes of this assessment, floodplain wetlands have been distinguished from valley-bottom wetlands. For wetlands other than these two hydrogeomorphic (HGM) types, the method applicable to valley-bottom wetlands should be used.

A second metric, the **loss of function metric**, describes the relationship between the magnitude of impact score and wetland functionality for a total of 6 ecosystem services: A) flood attenuation, B) streamflow regulation, C) sediment trapping, D) nitrogen removal, E) phosphate removal or F) toxicant removal. These relationships have been developed based on limited field testing, and there is a need to verify their applicability.

The land cover change impact metric and the loss of function metric are combined in a structured way to produce a functional effectiveness score for each ecosystem service. When scaled for the area of each wetland, the functional hectare equivalents for each wetland function can be calculated, which, when compared to the functional hectare equivalents of an unimpacted catchment, is translated to an assessment of cumulative impacts.