The application of ecohydrology techniques in defining wetland functioning planning: where science meets regulations.

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Wetlands are renowned for their biodiversity and ecosystem services, including flood control, water flow regulation, carbon storage, and filtration. South African legislation, rooted in the Constitution, mandates the protection of the environment for current and future generations. The National Environmental Management Act (NEMA) and the National Water Act (NWA) provide for the commissioning of independent specialists to assess wetlands in development applications, and largely inform the decision-making of government authorities. However, poor-quality wetland specialist reports that overlook all relevant factors and the precautionary principle are increasingly informing Environmental Impact Assessments (EIAs), leading to detrimental authorizations. This issue is exacerbated by a lack of capacity and political will among authorities to reject substandard work and enforce compliance. Efforts to build capacity in wetland science through short courses and postgraduate modules at the Centre for Environmental Management (CEM) have largely focused on basic hydrology and ecology, without integrating the complex interaction of abiotic processes that drive wetland functioning. Consequently, early warning signs in the EIA process are frequently overlooked, and the precautionary principle is not adequately applied. Recent PhD research at the (CEM) has employed an ecohydrological approach to understand wetland functioning better. This approach includes a combination of physical hydrology, groundwater chemistry, and stable isotopes with stratigraphy and hydraulic properties to explain wetland functioning, understand vulnerability, inform rehabilitation and caution against future developments. This presentation will demonstrate how these techniques can meet regulatory requirements and support risk-averse decision-making to ensure sustainable ecological development.