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**Valuation of groundwater-dependent ecosystems: a functional methodology incorporating ecosystem services**

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**Abstract**

Groundwater-dependent ecosystems (GDEs) are ecosystems that must have access to groundwater to maintain their ecological structure and function. Rapidly expanding numbers of humans are placing increased demands on groundwater for consumption, industry and agriculture. These demands alter groundwater regimes of GDEs that have evolved over millennia, resulting in the degradation of ecosystem health. As a consequence, the goods and services (ecosystem services) that GDEs provide for humans, which include food production and water purification, are at serious risk of being lost. Effective management of GDEs and their ecosystem services requires prioritisation of the most valuable ecosystems, given that increasing human demands and limited time and money preclude complete protection of all GDEs. Here, we provide an eight-step method for the valuation and initial prioritisation of GDEs. The proposed methodology improves on previous, primarily subjective methods for the valuation of GDEs by employing both economic valuation of the ecosystem services provided by GDEs, and ecological valuation of significant environmental attributes of GDEs. We apply the eight-step method to a hypothetical case study in order to demonstrate its applicability to a catchment containing a range of GDEs of different sizes, each possessing its own suite of threatened taxa. The major benefit of the valuation methodology presented here is that it can be used at three levels of complexity: (1) a full-desktop study, (2) a semi-desktop study requiring stakeholder consultation, and (3) a full field-based study, according to the time and money available for initial prioritisation efforts.

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