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The role of wetlands in the hydrological cycle

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Abstract. It is widely accepted that wetlands have a significant influence on the hydrological cycle. Wetlands have therefore become important elements in water management policy at national, regional and international level. There are many examples where wetlands reduce floods, recharge groundwater or augment low flows. Less recognised are the many examples where wetlands increase floods, act as a barrier to recharge, or reduce low flows. This paper presents a database of 439 published statements on the water quantity functions of wetlands from 169 studies worldwide. This establishes a benchmark of the aggregated knowledge of wetland influences upon downstream river flows and groundwater aquifers. Emphasis is placed on hydrological functions relating to gross water balance, groundwater recharge, base flow and low flows, flood response and river flow variability. The functional statements are structured according to wetland hydrological type and the manner in which functional conclusions have been drawn. A synthesis of functional statements establishes the balance of scientific evidence for particular hydrological measures. The evidence reveals strong concurrence for some hydrological measures for certain wetland types. For other hydrological measures, there is diversity of functions for apparently similar wetlands. The balance of scientific evidence that emerges gives only limited support to the generalised model of flood control, recharge promotion and flow maintenance by wetlands portrayed throughout the 1990s as one component of the basis for wetland policy formulation. That support is confined largely to floodplain wetlands, while many other wetland types perform alternate functions – partly or fully. This paper provides the first step towards a more scientifically defensible functional assessment system.

Keywords: wetlands, hydrological functions, flood reduction, groundwater recharge, low flows, evaporation

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