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How are multifunctional landscape impacts evaluated? A systematic review of approaches, indicators, and evaluation gaps

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Abstract

Scholars and practitioners promote Multifunctional Landscapes (MFL) as an integrated framework for reconciling agricultural production, biodiversity conservation, restoration, and thriving equitable livelihoods. Despite research efforts, there is limited systematic understanding of how multifunctionality is actually defined, measured, and evaluated in empirical research. Furthermore, a consensual definition of MFL is not found in the current literature. This paper presents findings from a systematic literature review examining the state of the art on assessing multifunctionality in landscapes.

Following the PRISMA 2020 protocol, we searched the Web of Science and Scopus databases using three complementary search strings combining terms for landscape multifunctionality, assessment, and agriculture, yielding 234 eligible documents after deduplication and filtering. Title and abstract screening by four independent reviewers, supported by AI-assisted classification, resulted in 36 papers retained for full-text extraction. Inclusion required papers to explicitly operationalize multifunctionality, empirically measure landscape functions, and conduct some form of assessment based on past or current empirical data (modelling studies were excluded).

Analysis of the corpus, with studies from 2006 to 2025, spanning Europe, Sub-Saharan Africa, Asia, Latin America, and Oceania, reveals three main patterns. First, spatial analysis dominates the methodologies employed, with GIS-based mapping present in nearly half of all studies; participatory and social methods appear in 25 % of studies in the corpus. Second, biodiversity and ecosystem services are the most frequently measured functional dimensions, while social, institutional and governance dimensions are underrepresented. Third, and critically, robust impact assessment is almost entirely absent: counterfactual designs are absent, and most papers characterise landscape states at a single point in time without isolating the effect of any intervention. A recurring pattern across the corpus is the normative invocation of MFL as a framing concept without operationalisation or measurement that clearly relates to a definition of functions. We discuss implications for impact assessment of interventions aiming at increasing multifunctionality in landscapes, policy implications, and future research priorities.

Keywords: Impact assessment, landscape approaches, multifunctionality, performance