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The interplay between farmer identity and nature-based solution adoption in groundwater management

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Abstract

This study investigates how farmer identity influences the adoption of nature-based solutions (NbS) for groundwater management in Iran's Qazvin Plain, using identity theory and the perceptual control model as theoretical frameworks. The research addresses Iran's acute water crisis, where groundwater serves as the primary agricultural water source due to scarce surface water resources. Globally, unsustainable extraction rates have rendered groundwater non-renewable in most agricultural areas, creating severe long-term water stress risks that endanger food security. In this context, NbS - defined as approaches leveraging natural processes to address environmental and socioeconomic challenges - present viable alternatives to conventional water management. However, despite their demonstrated technical benefits, NbS implementation faces a critical barrier: the overlooked sociocultural dimensions of adoption, particularly farmers' professional identities and belief systems. Through in-depth interviews with 35 farmers, selected via purposive sampling until theoretical saturation was achieved, we identified a critical tension between traditional farmer identities (e.g., maximising producer") and emerging sustainability expectations (e.g., resource steward"). This identity mismatch, consistent with Burke's perceptual control model, initially creates resistance to NbS adoption, as documented in agricultural behavioural studies. However, our findings reveal a gradual three-phase identity adaptation process: farmers first reassess conventional notions of agricultural success, then develop new role meanings aligned with sustainable practices, and ultimately forge hybrid identities that reconcile productivity and conservation values. The study highlights that effective NbS programmes must address both technical and identity-related dimensions. Successful implementation requires policymakers to engage with farmers' existing meaning systems while creating supportive environments for identity evolution. These insights contribute to a more nuanced understanding of sustainable agriculture transitions, emphasising the need for interventions that are not only ecologically sound but also identity-congruent.

Keywords: Groundwater management, identity theory, nature-based solutions, perceptual control model