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Conference Abstract

Raw Water Transfers: unmasking a globally overlooked invasion pathway

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Abstract

Raw water transfer (RWT) schemes (engineered networks of pipelines, tunnels, and supply canals that move large volumes of freshwater between separate waterbodies) represent one of the most understudied invasion pathways in freshwater ecology. This is despite global prevalence and rapid expansion of RWTs driven by population growth, urbanisation, and climate-driven water scarcity. Environmental regulators in Britain have recently introduced requirements for stakeholders to risk assess and manage the RWT invasion pathway, yet critical assessment of the available literature reveals that few RWT studies have been conducted worldwide and pathway understanding remains limited.

Field investigations of three structurally distinct RWTs in northeast England revealed that RWTs disperse a taxonomically diverse range of aquatic taxa, under propagule pressure levels potentially exceeding those of any other freshwater pathway of unintentional spread. Sampling yielded viable specimens of 16 distinct species across all three RWT schemes, including fish, molluscs, and arthropods, with a further seven species sampled in non-viable form. Introduction risk was associated with the type of physical infrastructure barrier, particularly pumps, rather than transfer distance.

Reconstruction of historic invasive non-native species (INNS) dispersal using a network-distance analysis method confirmed RWTs as key drivers of INNS spread, particularly of small-bodied invertebrates and aquatic and riparian plants. Results also showed that

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RWT infrastructure has substantially restructured natural hydrological connectivity at a regional scale, consequently facilitating INNS dispersal.

Given the significant and growing threat RWTs pose to global freshwater biodiversity, this research calls for integration of RWT pathway management within broader INNS surveillance frameworks and accurate reclassification of RWTs within international pathway classification systems.

Keywords

raw water transfers, invasion pathway, propagule pressure, freshwater biodiversity, pathway management, aquatic species

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Conflicts of interest

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