Abstract

Arid and Semi-Arid Lands (ASALs) in Africa, covering 66 % of the continent and are home to around 200 million people, face significant water scarcity challenges due to harsh climatic conditions. This systematic review assesses the effectiveness, socio-economic impacts, and implementation challenges of Nature-based Solutions (NbS) for water resource management in these regions. Analysing 9906 research articles narrowed to 143 studies, the review identified critical NbS interventions, including water conservation, soil moisture and conservation, water harvesting, conservation agriculture, agroforestry, and afforestation. The studies focused on biophysical aspects (31 %), socio-economic issues (39 %), or both (30 %), with an emphasis on water quantity (96 %) over quality (3 %). These interventions' direct (43 %) and indirect (55 %) impacts were examined. Findings show that 52 % of the studies meet all effectiveness criteria: socio-economic benefits, sustainable resource use, resource enhancement and conservation, and infrastructure sustainability. Stakeholder engagement in co-designing NbS significantly enhances their effectiveness and the integration of indigenous knowledge. Geographic distribution highlights concentrated research in eastern, southern, and western Africa, particularly in Ethiopia, Kenya, and South Africa, with underrepresentation in northern and central regions. The review identifies gaps in water quality interventions and calls for more comprehensive approaches. The review highlights NbS' potential to improve water availability, ecosystem resilience, and socio-economic development in ASALs. However, challenges such as limited stakeholder involvement, inadequate integration of indigenous knowledge, and regional research disparities need addressing. The study recommends prioritising the participation of local communities and stakeholders from the planning stages to implementation to enhance the effectiveness and sustainability of future NbS projects.