

Wastewater innovation lowers environmental and health risks for children and communities

Climate change is making water shortages worse in Iraq, putting millions of children at risk. Droughts, unpredictable rainfall and extreme heat limit access to safe water, leading to more disease and malnutrition. Urgent action is needed, as Iraq's temperatures are rising seven times faster than the global average, and rainfall is expected to decrease by 9 per cent by 2050, further straining water supplies.¹

UNICEF is expanding access to safe water in Iraq while addressing climate-related challenges. Between 2021 and 2024, UNICEF partnered with government ministries, United Nations agencies and local partners to install 25 Moving Bed Biofilm Reactor (MBBR) wastewater treatment systems across seven of Iraq's governorates. The systems ensure safe, treated wastewater, benefiting 144,000 people, including 66,300 children. The systems also improve water quality downstream, reducing river pollution and benefiting an additional 3.5 million people, including 1.5 million children.

UNICEF selected MBBR technology for its compact and energy-efficient design. It is well-suited for treating wastewater with varying concentrations of organic pollutants, particularly in areas facing water scarcity and extreme weather conditions. Removing hazardous pollutants and chemicals from wastewater is critical to protecting children's health, as waterborne diseases remain among the leading causes of morbidity and mortality among young children in Iraq.²

The MBBR wastewater treatment process helps reduce the risk of infections such as diarrhoea, cholera and dysentery, and lowers the likelihood of acute poisoning and respiratory problems.

MBBR systems are effective in both hot and cold climates, support solar power and enable water reuse by removing pollutants, reducing reliance on freshwater sources. Their modular design allows for rapid recovery after floods. Treated wastewater meets national safety standards for irrigation, while biosolids – a by-product of the treatment process – can be used as a fertilizer. By recycling water for farming, such as through agricultural drip irrigation in arid regions, MBBR systems help enhance water efficiency in a changing climate.



Global Action

UNICEF Iraq's environmentally friendly wastewater treatment initiatives are part of global efforts to make sanitation more climate resilient. Read the [Call to Action on Climate-resilient sanitation services for 3.6 billion people by 2030](#) developed by UNICEF and partners.



UNICEF and the United Nations Assistance Mission for Iraq (UNAMI) collaborated to install a Moving Bed Biofilm Reactor wastewater treatment system at the UNAMI office building.³ MBBR systems installed across Iraq help reduce water shortages worsened by climate change. ©UNICEF Iraq

The MBBR systems also offer flexible wastewater treatment solutions that can be installed in diverse locations. In Iraq, the 25 systems are currently connected to 17 hospitals, two academic institutions, a residential building for displaced people and refugees, four United Nations offices and a public park in Erbil. Their compact design supports long-term sustainability, with each unit expected to last 15 years and requiring minimal maintenance.

Beginning in 2025, UNICEF will transfer the operation and maintenance of the systems to Iraqi government authorities, universities and private companies, which plan to scale the technology to additional locations.

Sami Abdulrahman Park in Erbil is one of the 25 sites where an MBBR system has been installed to meet a specific environmental need. Prior to 2024, the park relied on the city's limited water supply to meet its daily irrigation requirement of 8,000 cubic metres – necessary to keep its trees healthy. Over time, this demand led to the depletion of 5 of its 20 groundwater wells. To address the issue, the Kurdistan Regional Government and UNICEF introduced an MBBR system at the park to promote more sustainable water use and engage young people in the initiative.

In collaboration with the Hasar Organization, youth volunteers managed the wastewater treatment system and gained valuable green skills. The wastewater treatment system now generates enough recycled water to irrigate the 310,000 trees that populate the park.⁴ The park's green spaces also benefit children's physical, mental and social development.⁵



Sustainable wastewater solutions improve children's lives



25 MBBR waste water treatment systems installed across 7 governorates



66,300 children (144,000 people) with improved access to safe water



1.5 million children (3.5 million people) with improved downstream water quality



310,000 trees in a public park sustained with treated wastewater



More than 1,000 young volunteers across the Kurdistan Region of Iraq, including many from the Hasar Organization, worked together to help reduce water scarcity at Sami Abdulrahman Park in Erbil. Among them are Abdulbari Abdulkhaliq and Sana Quabad, who gained hands-on experience in water conservation and sustainability.

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- 1 UNICEF, 2023, [Climate Landscape Analysis for Children and Young People in Iraq](#).
- 2 Iraq Ministry of Health, 2022, [Annual Report](#).
- 3 UNICEF, 2024, [Recycling to boost water security in climate-vulnerable Iraq](#).
- 4 UNICEF, 2024, [Empowering youth to tackle water scarcity in Iraq](#).
- 5 UNICEF, 2021, [The Necessity of Urban Green Space for Children's Optimal Development](#).