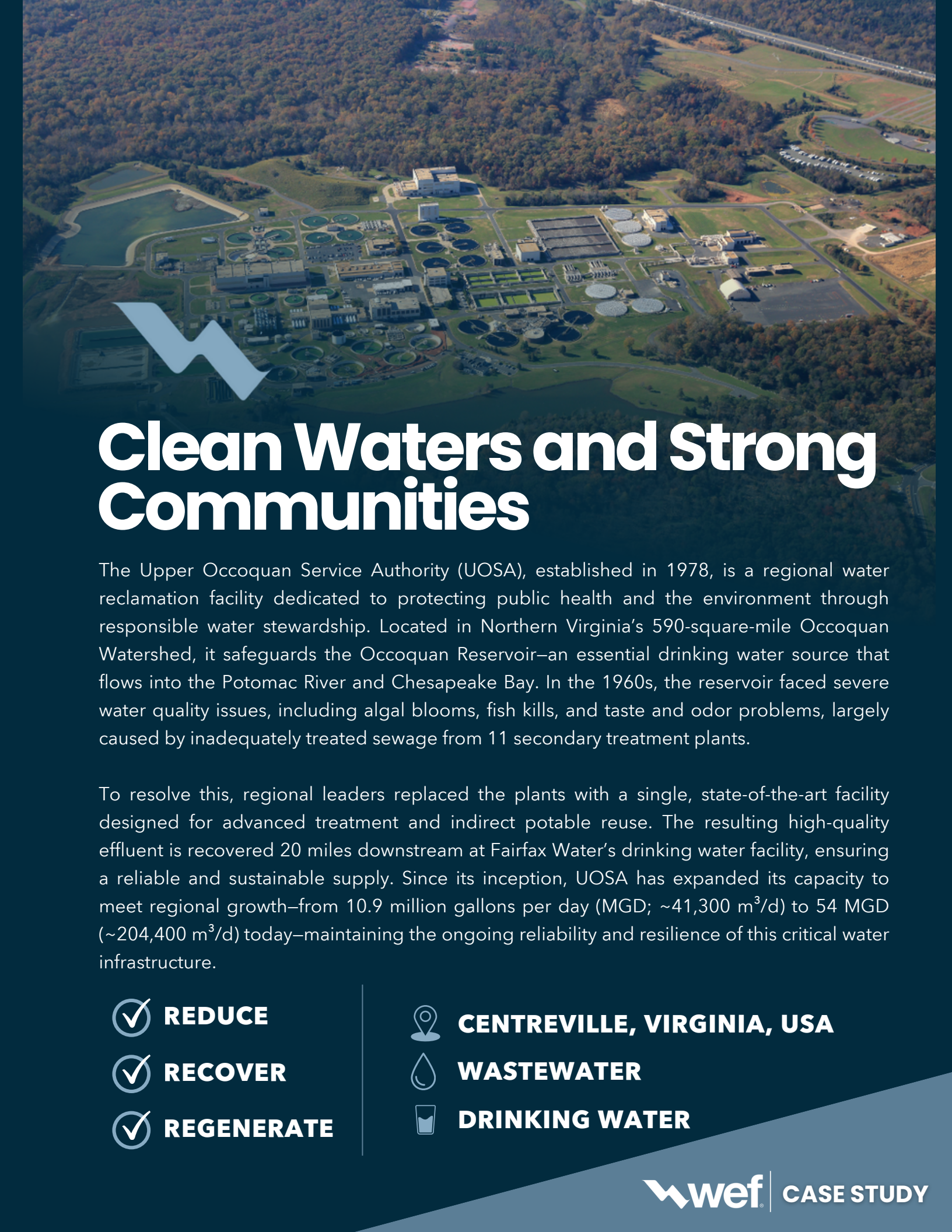




Clean Waters and Strong Communities

The Upper Occoquan Service Authority (UOSA), established in 1978, is a regional water reclamation facility dedicated to protecting public health and the environment through responsible water stewardship. Located in Northern Virginia's 590-square-mile Occoquan Watershed, it safeguards the Occoquan Reservoir—an essential drinking water source that flows into the Potomac River and Chesapeake Bay. In the 1960s, the reservoir faced severe water quality issues, including algal blooms, fish kills, and taste and odor problems, largely caused by inadequately treated sewage from 11 secondary treatment plants.

To resolve this, regional leaders replaced the plants with a single, state-of-the-art facility designed for advanced treatment and indirect potable reuse. The resulting high-quality effluent is recovered 20 miles downstream at Fairfax Water's drinking water facility, ensuring a reliable and sustainable supply. Since its inception, UOSA has expanded its capacity to meet regional growth—from 10.9 million gallons per day (MGD; $\sim 41,300 \text{ m}^3/\text{d}$) to 54 MGD ($\sim 204,400 \text{ m}^3/\text{d}$) today—maintaining the ongoing reliability and resilience of this critical water infrastructure.



REDUCE



RECOVER



REGENERATE



CENTREVILLE, VIRGINIA, USA



WASTEWATER



DRINKING WATER



CHALLENGES FACED

Fairfax Water raised concerns about potential viral contaminants, which were resolved through technical evaluation and establishing the Occoquan Watershed Monitoring Laboratory. Financial pressures added tension as costs soared, jurisdictions debated allocations, and funding shortfalls emerged. Limited state support (~USD \$4 million) left the federal government and local partners to cover most of the \$80+ million project, while segmented construction caused delays and \$15 million in added costs.

TECHNOLOGIES & SOLUTIONS USED

At the core of UOSA's innovation is a multistage treatment system that purifies water to near-drinking standards through high-lime treatment, chemical clarification, two-stage recarbonation, filtration, granular activated carbon adsorption, and chlorination/dechlorination. The Upper Occoquan Service Authority also advances resource recovery by converting activated sludge into high-quality biosolids, applied as fertilizer on about 100 000 acres (~40,500 hectares) of farmland each year.

IMPACT & INSIGHTS



The National Pollutant Discharge Elimination System permit issued to UOSA by Virginia and the U.S. EPA imposed some of the nation's most stringent limits, which UOSA has consistently met or exceeded. As a result, wastewater is no longer a major source of pollution in the Occoquan Watershed. Phosphorus levels dropped from pre-UOSA concentrations of 0.05–0.26 mg/L to below 0.05 mg/L, while chlorophyll-a levels have remained under 31 µg/L, once peaking at 64 µg/L. Beyond improving quality, UOSA also enhances water supply, providing 90% of inflow during drought, which ensures reliable resources for Fairfax Water downstream.

LESSONS LEARNED



- Ensure effective interjurisdictional cooperation with clear governance, equitable cost-sharing, and conflict resolution mechanisms.
- Align shared goals early so partners remain committed despite financial or political pressures.
- Design facilities for scalability and adaptability, not just short-term needs.
- Prioritize public outreach and education to strengthen community and political support for water reuse.
- Pair technical excellence with strategic planning, communication, and collaboration to achieve sustainable, trusted, and resilient wastewater solutions.

“

UOSA's regional water reclamation facility demonstrates how integrated water management can meet both environmental and community needs for current and future generations.

”