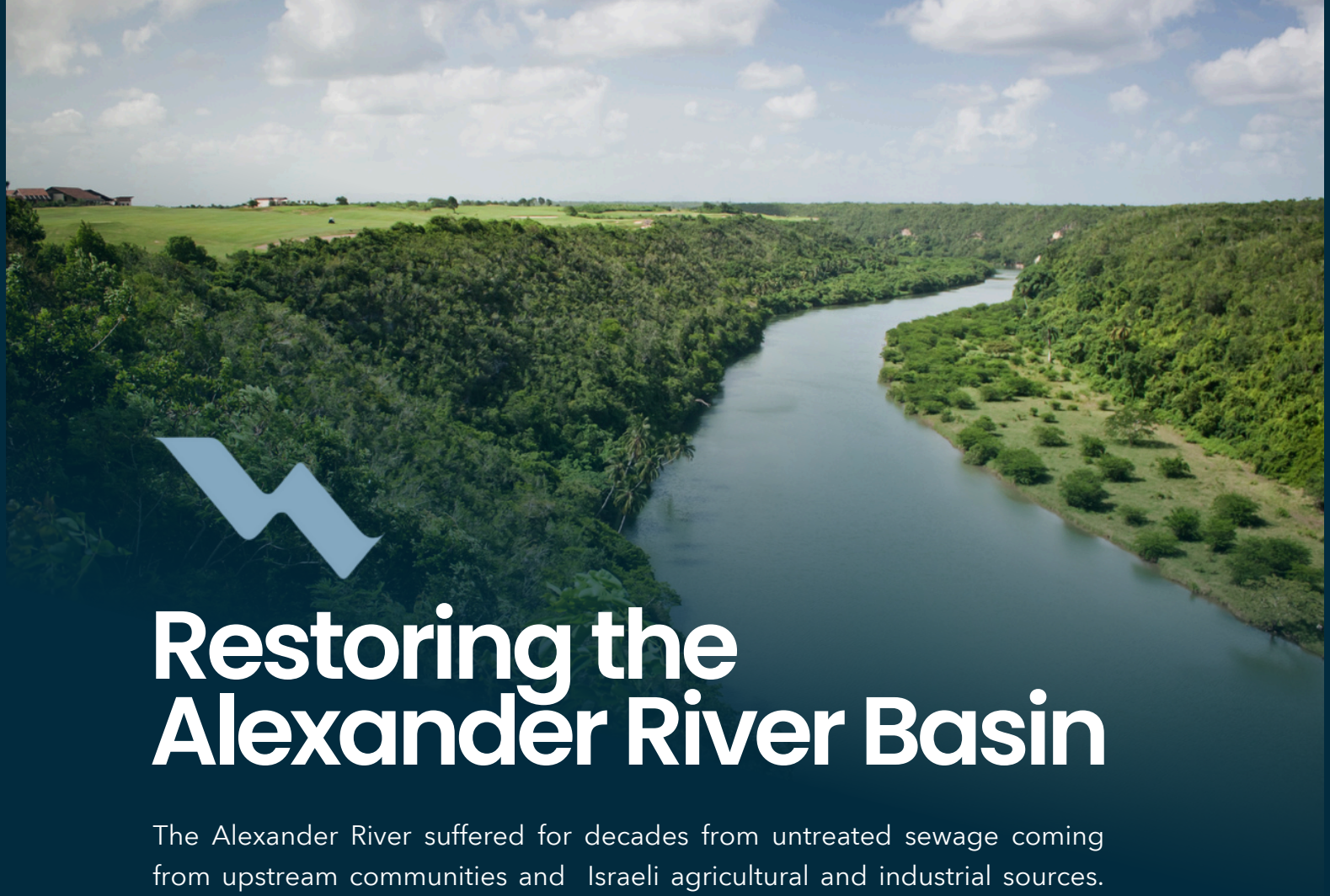

Restoring the Alexander River Basin

The Alexander River suffered for decades from untreated sewage coming from upstream communities and Israeli agricultural and industrial sources. These discharges led to severe pollution, eutrophication, habitat loss, and public health risks. Once a vibrant ecosystem, the river became degraded and hazardous to the nearby communities and the farmland.

Ayala Water & Ecology was commissioned to implement a Nature-Based Solution (NbS) to restore the river's health. The system intercepts polluted baseflow and treats it using natural biological processes to improve water quality, rehabilitate the ecosystem, and integrate into the surrounding landscape. The system is completely energy-free, without any electromechanical machinery involved. The solution demonstrates a circular approach to water management using natural systems to regenerate ecosystems.

REGENERATE

ALEXANDER RIVER, ISRAEL

WASTEWATER

STORMWATER

wef | CASE STUDY

CHALLENGES FACED

Challenges included managing seasonal variability in inflows, ensuring safe public access, and balancing ecological goals with regulatory requirements. Despite these hurdles, the project was successfully completed and now stands as a model for transboundary river restoration through nature-based infrastructure.

TECHNOLOGIES & SOLUTIONS USED

Ayala implemented NbS as a multi-stage, passive 2.5-hectare (2500 m^2) treatment system designed to treat 16000 m^3/d and wastewater from mixed sources under variable hydraulic and pollutant loads. The system features vegetated basins that support sedimentation, filtration, and biological degradation. Fully gravity-based and energy-free, it operates without chemicals or mechanical parts, ensuring robust, year-round performance with minimal maintenance. The design also creates a green corridor that enhances biodiversity and provides recreational and aesthetic value to the public.

IMPACT & INSIGHTS

The project treats up to 5,000 m^3/day of mixed wastewater, delivering significant environmental and economic benefits.

Key Benefits:

- Reduced Total Suspended Solids by 87.8% Biological Oxygen Demand by 86.4%, and Chemical Oxygen Demand by 58%, improving downstream water quality.
- After 7 years of operation, life cycle costs are 90% less compared to conventional ones.
- Increased local biodiversity by 60% in aquatic and avian species within three years.

LESSONS LEARNED

Early and continuous stakeholder engagement was essential to building alignment and trust. Designing with flexibility and modularity from the start allowed the system to adapt to changing conditions, while using local materials and plants supported long-term sustainability. Additionally, starting small but planning for scalability, integrating the system into local planning, and prioritizing resilience under climate change scenarios ensured lasting protection and adaptability.

> **It is important to view the system as a regenerative landscape, not just treatment infrastructure, and maximize co-benefits like biodiversity, cooling, and recreation.**

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