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معهد بوسـتـيرـتي



CSO
Network



AI FOR NATURE

SAFEGUARDING UAE'S BIODIVERSITY

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FOREWORD

The intersection of technology and sustainability defines the future of societies. Artificial intelligence, once considered the preserve of laboratories and high-tech industries, has now emerged as a transformative force in safeguarding our natural world. This report, *AI for Nature: Safeguarding UAE's Biodiversity*, captures the pioneering spirit of the United Arab Emirates in applying innovation to some of the most urgent environmental challenges of our time.

The case studies presented here demonstrate more than technical ingenuity. They illustrate the power of partnerships, between government agencies, research institutions, non-profits, and private sector innovators, to accelerate progress toward shared goals. Whether through AI-driven monitoring of wetlands, drones dispersing millions of native seeds, or advanced models protecting coral reefs and mangroves, the UAE is showing the world that technology can serve as a bridge between ambition and action.

What is particularly inspiring is that these efforts do not view nature as an afterthought to development. Instead, they recognize biodiversity as the foundation of resilience, sustainability, and human well-being. By harnessing AI, the UAE is not only protecting ecosystems but also building capacity, fostering citizen science, and setting new standards for efficiency and accountability.

As you read through this report, I invite you to reflect on the opportunities and responsibilities that AI presents. The lessons from the UAE's biodiversity initiatives offer a blueprint that others can adapt, scale, and replicate across diverse geographies. This is not just a story about technology, it is a story about leadership, vision, and the unwavering belief that innovation can and must serve the planet.

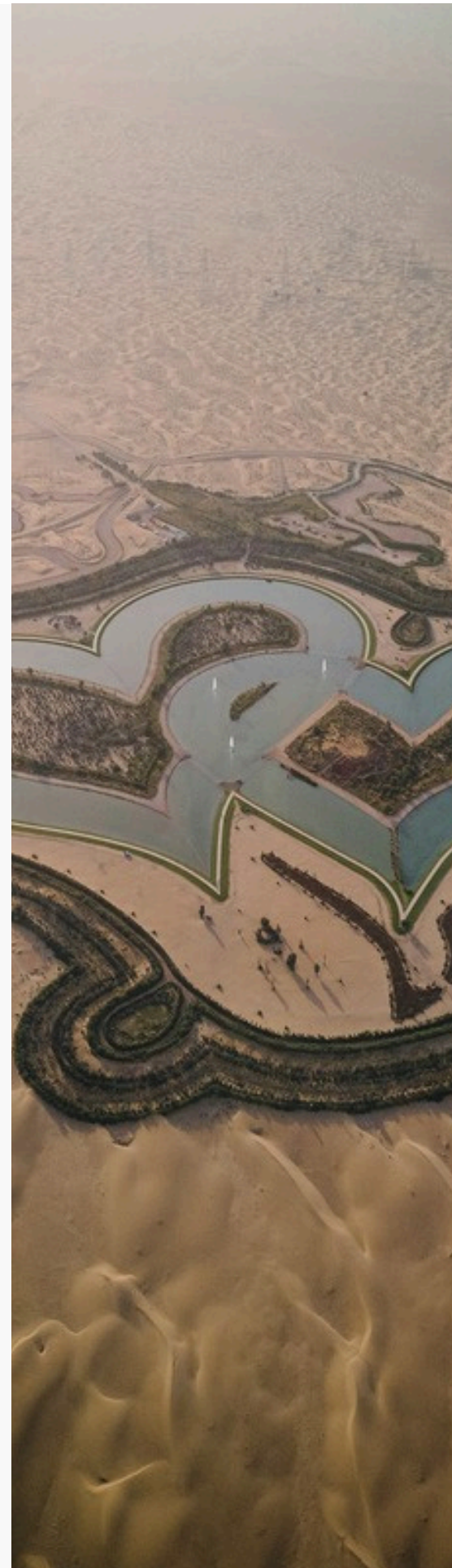
Dr. Yasar Jarrar
Secretary General, CSO Network

OVERVIEW

Over the past decade, the United Arab Emirates has positioned itself at the forefront of leveraging innovation to address the twin crises of climate change and biodiversity loss. From desert ecosystems to coastal habitats, the UAE is home to unique natural assets that play a critical role in sustaining life, supporting communities, and enhancing resilience. This report, *AI for Nature: Safeguarding UAE's Biodiversity*, presents the flagship findings of the Biodiversity Forum, highlighting how artificial intelligence is transforming conservation practice, accelerating ecological restoration, and strengthening the science-policy interface.

This report, *AI for Nature: Safeguarding UAE's Biodiversity* brings together case studies from across the UAE where AI has been deployed to monitor wetlands, map groundwater recharge zones, track species distribution, optimize irrigation, and safeguard fragile ecosystems such as mangroves, reefs, and arid landscapes. These examples demonstrate not only technological leadership but also the UAE's commitment to evidence-based management and the integration of nature into national climate strategies.

The development of this report was based on the collection of case studies from multiple sources, including research entities, contributions from members of the Chief Sustainability Officers Network, and desk research.



UAE CASE STUDIES: AI IN ACTION

The following examples illustrate practical uses of AI in safeguarding the UAE's natural heritage.

01 AI-enabled terrestrial habitat monitoring & native seed dispersal

The Environment Agency – Abu Dhabi (EAD) and Dendra operate an integrated programme with more than one complementary workstream, including [AI-based terrestrial habitat assessment](#) and [large-scale native seed restoration](#). The monitoring component uses drones, smart sensors, and AI analytics to map vegetation health and change over time. Over six months, teams surveyed **11,000 hectares** and consolidated results into a smart geographic database that produces instant analyses for managers, delivering up to **90% time and cost savings** versus traditional methods. Building on those diagnostics, the restoration component applies custom seeding drones to priority desert habitats identified by EAD.

In 2025, operations covered **320 hectares** across Jebel Hafit National Park and Qasr Al Sarab Nature Reserve, dispersing **6.5 million seeds** from native species, including Samar (*Vachellia tortilis*), Moringa (*Moringa peregrina*), Desert cotton (*Aerva javanica*), Fire Bush (*Calligonum polygonoides*), and Rimth (*Haloxylon salicornicum*). Drone seeding enabled rapid coverage of remote terrain with minimal disturbance, while AI tools for planning and AI-powered sensors and advanced monitoring track shrub and native plant growth over time to support adaptive management.



02 Groundwater Recharge Zone Mapping

The University of Sharjah is applying AI techniques to map artificial groundwater recharge (AGR) zones, an essential element for the UAE's water security. [Researchers](#) compared the Analytical Hierarchy Process (AHP) with a hybrid deep learning model (CNN-XGBoost), which showed improved predictive performance. Geology, geomorphology, rainfall, and groundwater levels were key contributing factors. The AI-based approach generated AGR zone maps across Sharjah, providing valuable insights to support site selection, water sustainability efforts, and groundwater management in the UAE.



03 AI-assisted eDNA Monitoring

One of the biggest challenges in nature recovery is obtaining an accurate picture of which species live where. As part of the UAE's Nature-based Solutions project, Emirates Nature–WWF deployed cutting-edge environmental DNA (eDNA) technology.

Water and sediment samples collected from lagoons are sequenced and analyzed with AI, which matches DNA fragments to global species libraries. This reveals which species are present, how they are distributed, and how populations shift over time.

Over 400 samples were collected from four lagoons, helping set ecological baselines, inform restoration, integrate biodiversity into climate and food security planning, and build local scientific capacity.



04 AI and Robotics for Mangrove Restoration

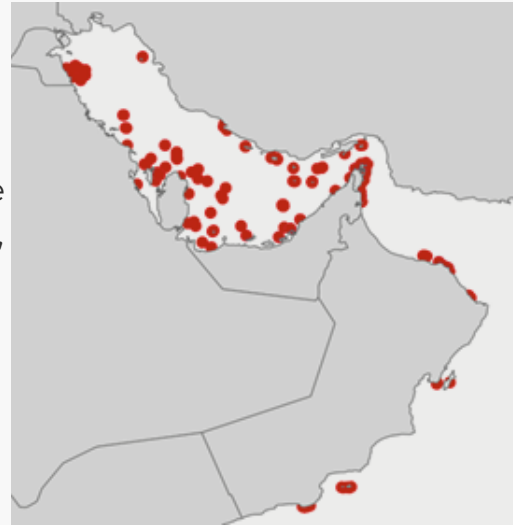
The Environment Agency – Abu Dhabi (EAD) has partnered with climate-tech venture Nabat to advance [mangrove restoration](#) through the use of artificial intelligence and autonomous robotics, marking a significant step in applying cutting-edge technologies to protect and restore vital ecosystems. The collaboration combines EAD's ecological expertise with Nabat's technical capabilities, creating a model where science and technology work hand in hand. AI models developed by Nabat map coastal habitats, analyze soil and hydrology, and identify priority planting zones, ensuring that seeds are deployed with maximum precision and impact.

Autonomous systems and robotics then disperse mangrove seeds in optimized patterns, significantly reducing the need for manual labor while improving survival and establishment rates. The partnership extends beyond planting to include continuous monitoring, where smart sensors and drone-based technologies track the growth and health of mangroves, detect threats such as pests or disease, and generate valuable datasets on biodiversity gains and carbon sequestration. This data-driven approach enhances efficiency, provides measurable outcomes, and strengthens the resilience of restored ecosystems.



05 NYU Abu Dhabi enhances regional coral reef monitoring using AI tools and training

The Mubadala Arabian Center for Climate and Environmental Sciences (Mubadala ACCESS) at NYU Abu Dhabi is deploying AI-assisted image analysis to accelerate and standardize coral reef monitoring across the UAE and the wider region. Using ReefCloud, a machine-learning platform, ACCESS researchers convert reef photos from national and regional reef monitoring surveys into quality-controlled metrics within minutes, enabling rapid reporting and cross-border comparability.



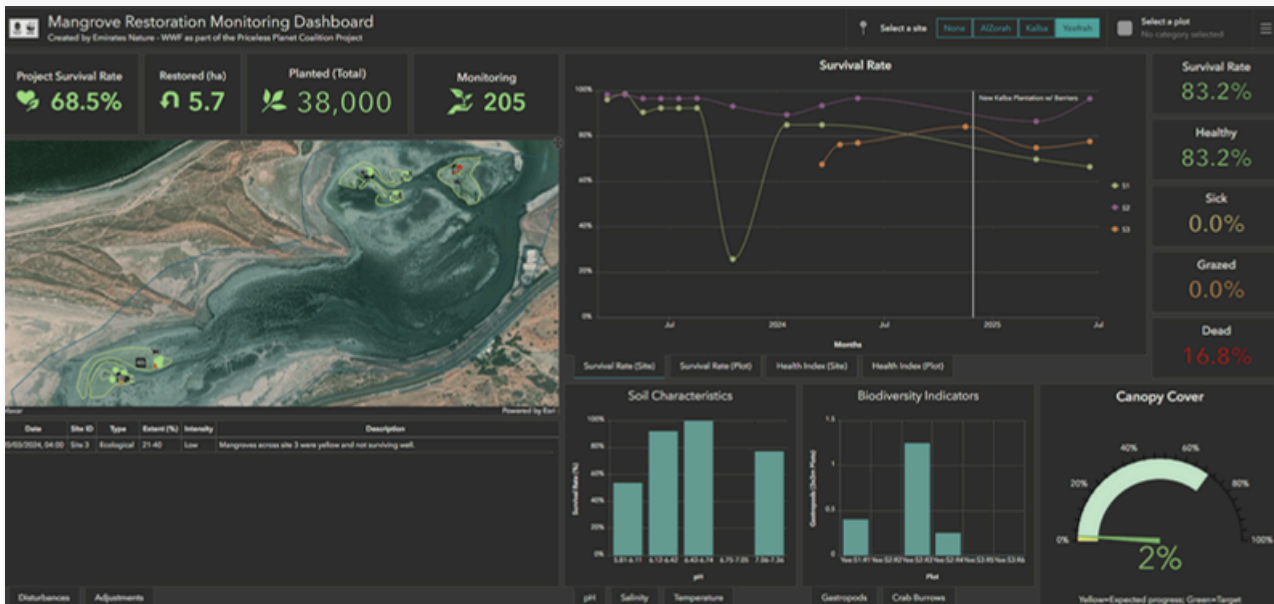
Trials show ReefCloud delivers 90% classification accuracy and processes images roughly 700 times faster than human annotation, freeing scarce taxonomic capacity and reducing costs for partners. Mubadala ACCESS convened multi-nation workshops at NYU Abu Dhabi in 2023 and 2024 to harmonize regional methods, onboard practitioners to AI-enabled workflows, and streamline data pipelines for global reporting. This program lowers barriers to participation for agencies with limited specialist staff, expanding spatial and temporal coverage of reef condition in one of the world's least studied reef regions.



Complementing field surveys, Mubadala ACCESS leads the UAE's national reef monitoring effort and synthesizes regional datasets to inform policy and climate-risk assessments. Next steps include integrating near-real-time dashboards, and aligning AI outputs with standardized indicators for future regional assessments, building a durable, inclusive evidence base for management across the Arabian Gulf.

06 Technology-Enabled Mangrove Monitoring

Emirates Nature-WWF has developed a digital monitoring dashboard that centralises restoration data into a single, structured platform. Field measurements, including tree survival, canopy cover and biodiversity recovery, are entered into the system, which transforms raw data into clear and accessible insights. In Kalba, protective barriers boosted mangrove survival from 39% to 96%, while in Umm Al Quwain, hydrological fixes raised survival rates to 80%.



The dashboard improves accountability, demonstrates robust monitoring, and supports adaptive management.





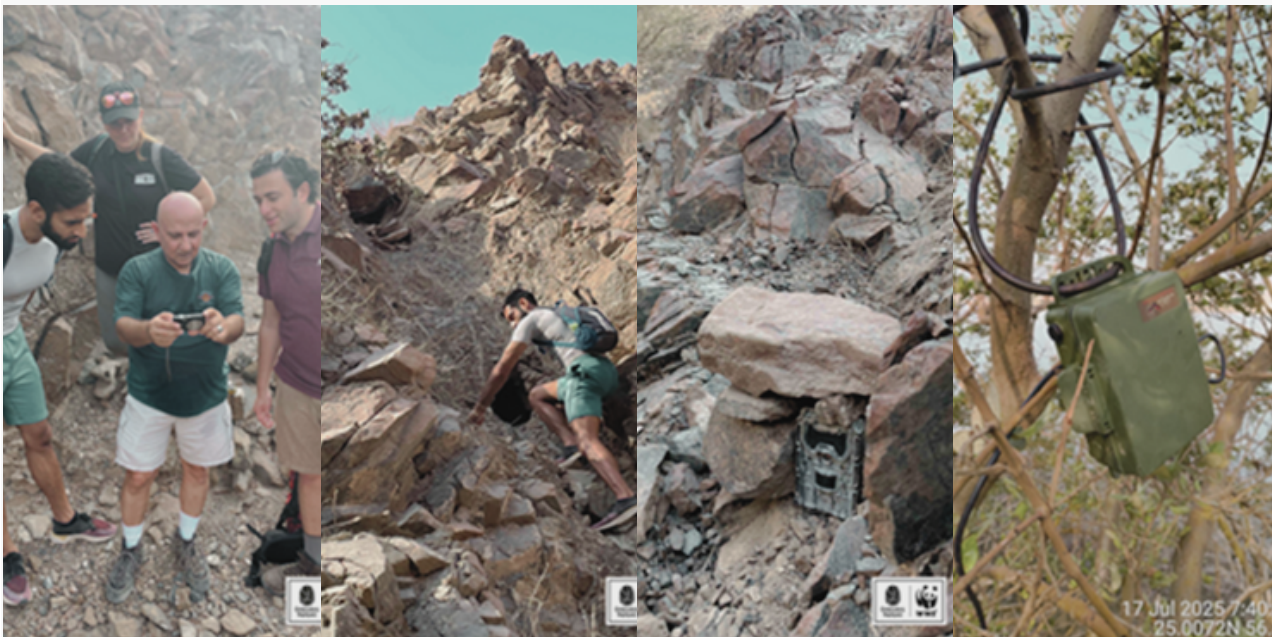
07 AI Innovation in Mangrove Restoration

Homegrown UAE company, Distant Imagery Solutions has engineered AI-integrated drone systems for mangrove restoration and monitoring. Beyond planting, drones process multispectral data in real time, feeding into an AI platform for monitoring, reporting, and verification (MRV). In Abu Dhabi, more than 12.5 million mangrove seeds have been planted with ENGIE and other partners, validated with AI-driven monitoring of survival and biomass growth. The platform is expanding globally with partners in Kenya, Brazil, Madagascar, Timor Leste, Indonesia, and Tonga.



08 AI-powered Biodiversity Monitoring

Emirates Nature–WWF harnesses AI and technology to accelerate biodiversity monitoring in the UAE and foster a culture of citizen science. Through the Leaders of Change programme, volunteers have collected over 100,000 biodiversity data points in four years using the iNaturalist app, where AI helps identify species from photos. Thousands of camera trap images are also AI-analyzed, including sightings of the elusive Blanford's Fox, while specialized software has identified 60 bat species from their calls. These datasets inform UAE conservation policies and IUCN listings.



09 AI Early-Warning & Management for Abu Dhabi's Reefs



The Environment Agency – Abu Dhabi is pioneering the use of artificial intelligence to safeguard coral reefs, vital habitats for biodiversity and coastal protection. A digital platform applies machine learning and recognition algorithms to survey images, analyzing up to [seven million parameters](#) on coral colour, shape, and size. By automatically identifying coral types and tracking reef health, the system delivers insights that once required months of manual analysis. This enables EAD to detect early signs of stress, bleaching, or recovery and respond swiftly with targeted conservation measures. The AI programme complements EAD's broader coral initiatives, including the region's largest rehabilitation project to restore 1 million coral fragments, positioning Abu Dhabi as a living "climate change lab" and offering global lessons on reef resilience.

10 Global UAE Impact: Raptor-Safe Wind Power with AI (Uzbekistan)

Beyond its borders, the UAE is exporting its environmental leadership through AI-enabled renewable energy projects such as Masdar's Zarafshan wind farm in Uzbekistan. While located abroad, the initiative exemplifies how UAE institutions are applying AI safeguards internationally to ensure biodiversity protection in renewable energy deployment. Zarafshan, one of Central Asia's largest onshore wind farms, will power about **500,000 homes** and avoid **over one million tonnes of CO₂** a year.



The site lies on routes used by five threatened raptors (e.g., Golden and Eastern Imperial eagles, Saker falcon), so Masdar installed IdentiFlight, an AI system that spots birds and temporarily stops nearby turbines. It is the world's largest deployment of this AI safeguard and the most advanced in Asia, setting a new standard for wildlife protection in wind energy. Oversight goes beyond technology: independent international ornithologists monitor outcomes, and a Scientific Advisory Board, including leading species experts and BirdLife International, has full access to data and recommends improvements. The project shows how a UAE entity can deliver major renewables outside the UAE while protecting biodiversity.



The Posterity Institute (PI) is a social enterprise dedicated to advancing sustainable and inclusive development across growth markets. Serving as a catalyst for strategic collaboration and innovation, PI operates through two key platforms: the Irth Institute and the CSO Network. The Irth Institute focuses on enabling governments through research, tailored training programs, and publications. Meanwhile, the CSO Network advances sustainability by nurturing partnerships, and convening meaningful, impactful events and networking opportunities among Chief Sustainability Officers. Together, these complementary initiatives drive PI's commitment to global sustainability and systemic change



Operating under The Posterity Institute, the Chief Sustainability Officers (CSO) Network serves as a platform for sustainability leaders to collaborate, exchange knowledge, and drive innovation. With a focus on the Middle East and Africa, the Network empowers organizations to integrate sustainability into their core strategies and achieve transformative results.