Nature-based solution technologies — Wetlands for multiple benefits

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Abstract

Objective/Scope:
Wetlands have the capacity for delivering nature-based solutions for biodiversity conservation, wastewater treatment, and many other environmental co-benefits. To harness these multiple ‘ecosystem services’, Saudi Aramco is developing and deploying a range of wetlands initiatives. We outline the main purpose of this work and include a natural wetland case study from Aramco’s Biodiversity Protection Area (BPA) program.

Methods, Procedures, Process:
Aramco is increasingly aware of the ecological significance of wetlands, with many located on its land. Furthermore, the company produces considerable wastewater, and there are cost-effective, energy efficient and environmentally more benign approaches to treating this wastewater, using constructed wetlands. Accordingly, Aramco is developing and implementing a range of activities focusing on natural wetland restoration and protection, and wetland construction as nature-based solutions. Key activities include mapping and prioritizing natural wetlands, designating priority natural wetlands as BPAs, developing management guidelines for natural wetlands, exploring constructed wetland designs, and piloting constructed wetland creation.

Results, observations, conclusions:
Remote-sensed mapping indicates there are over 160 natural wetlands, including oases, swamps, lagoons and mangroves located on company land, covering over 75 km² across the Kingdom. Using Aramco’s biodiversity prioritization ‘heat map’ tool, natural wetlands were ranked for their predicted biodiversity value and their spatial area. Evaporation ponds (that could be transformed into, or augmented by, constructed wetlands) were mapped, with 1600 across the company, covering 39 km². A systematic review of wetland management is being undertaken, which will inform standardized wetland management guidelines. Meanwhile, artificial reedbed pilot project designs are being developed at multiple sites, with potential to test the effectiveness of wastewater treatment, but also the delivery of multiple other ecosystem services. The company has also designated a wetland at Abqaiq as one of its 14 BPAs. Located near the Saudi Aramco Abqaiq community, this protected area consists of 2.5 km² of restored wetlands. The wetlands support more than 90 species, of native plants, mammals, birds and reptiles, with facilities to provide recreational and educational opportunities for visitors to enjoy wetlands and their biodiversity.

Novel/Additive Information:
These wetland initiatives combine the need for more sustainable and efficient approaches to wastewater treatment and re-use, with increasing company, national and global concern regarding biodiversity declines, reliance on nature’s ecosystem services, and the urgent need for conservation.