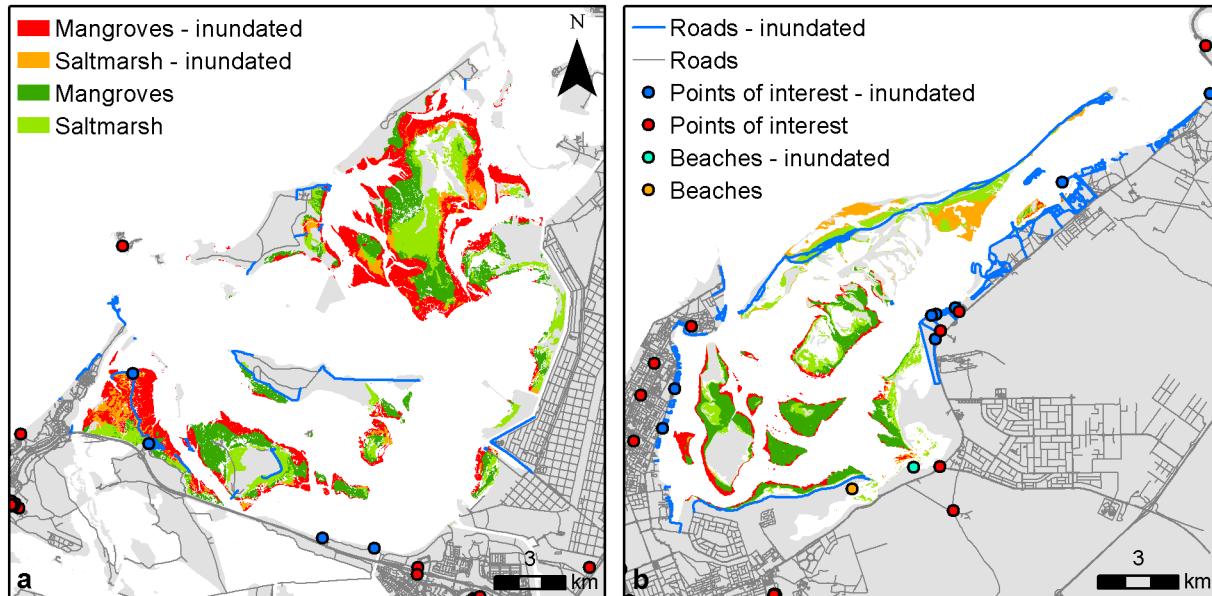
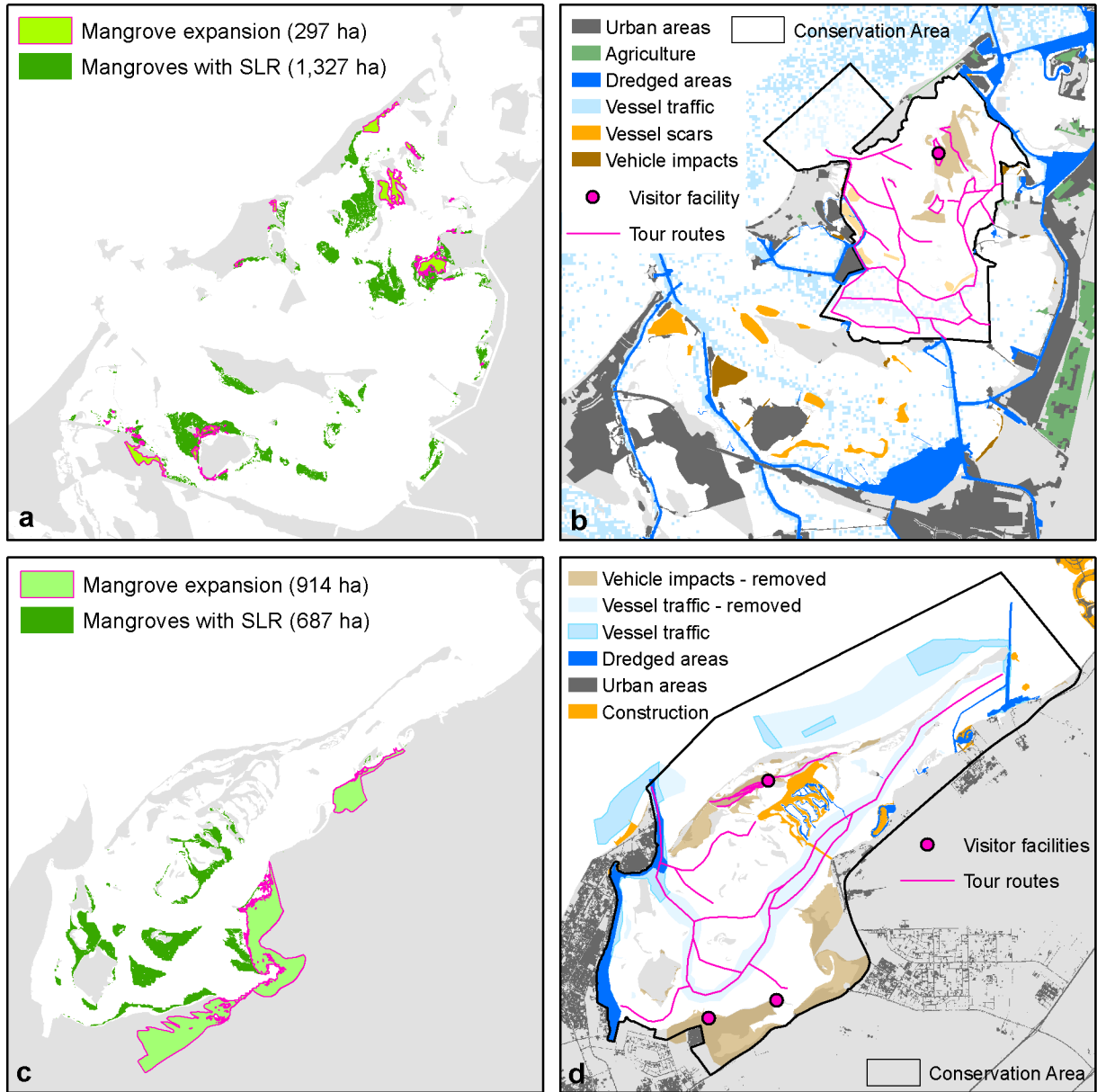


Supplementary Information

Conserving key coastal areas for mangrove expansion and eco-tourism secures ecosystem services under sea-level rise







Supplementary Fig. 1 Future-sea level rise with no management action showing inundated (lost) habitats (mangroves and saltmarsh) and infrastructure (roads, tourism points of interest, and beaches) for a) Abu Dhabi and b) Umm Al Quwain.






Supplementary Fig. 2 Mangrove expansion and conservation scenarios for Abu Dhabi (a,b) and Umm Al Quwain (c,d). Conservation scenarios show existing local human stressors and where they are removed as well as added tour routes and facilities.

Supplementary Table 1. Resilience criteria used in HRA models for key NbS target habitat types in the UAE.

Habitat type	Habitat resilience attributes			
	<i>Recruitment rate</i>	<i>Mortality rate</i>	<i>Connectivity rate</i>	<i>Recovery time</i>
 Corals	1-2 yrs	>80 %	10-100 km	1-10 yrs
 Mangrove	<1 yr	0-20 %	10-100 km	1-10 yrs
 Seagrass	<1 yr	20-50 %	<10 km	<1 yr
 Other halophytes	1-2 yrs	0-20 %	<10 km	1-10 yrs

Supplementary Table 2. Criteria scores used in HRA models for estimating risk to ecosystem services from exposure to stressors for key NbS target habitat types in Abu Dhabi.

Habitat type	Exposure and Consequence Ratings							
 Mangrove	Pressure	Temporal overlap	Management effectiveness	Intensity rating	Frequency of disturbance	Area change	Structure change	
	Urban areas	3	3	1	2	2	2	
	Agriculture	3	3	1	1	1	1	
	Dredging	2	2	2	2	1	1	
	Off-road vehicles	1	3	1	2	1	1	
	Vessel traffic	3	2	Mapped terciles		1	1	1
	Vessel impact	2	3	3	2	0	1	
 Seagrass	Pressure	Temporal overlap	Management effectiveness	Intensity rating	Frequency of disturbance	Area change	Structure change	
	Urban areas	3	3	1	2	2	2	
	Agriculture	3	3	1	1	1	1	
	Dredging	2	2	2	2	3	3	
	Off-road vehicles	0	0	0	0	0	0	
	Vessel traffic	3	2	Mapped terciles		1	2	2
	Vessel impact	2	3	3	2	1	1	
 Other halophytes	Pressure	Temporal overlap	Management effectiveness	Intensity rating	Frequency of disturbance	Area change	Structure change	
	Urban areas	3	1	1	2	1	1	
	Agriculture	3	3	1	1	1	1	
	Dredging	1	2	2	2	1	1	
	Off-road vehicles	1	3	2	2	1	2	
	Vessel traffic	3	2	Mapped terciles		1	1	1
	Vessel impact	2	3	3	2	0	1	

Exposure criteria

Temporal overlap: (3) co-occur 8-12 months/yr; (2) 4-8 months/yr; (1) 0-4 month/yr

Management effectiveness: (3) not effective; (2) somewhat effective; (1) very effective

Intensity rating: (3) high; (2) medium; (1) low

Consequence criteria

Frequency of disturbance: (3) ≤ Annually; (2) Several times per year; (1) ≥ Weekly

Change in area: (3) 50-100% loss; (2) 20-50% loss; (1) 0-20% loss

Change in structure: (3) 50-100% loss; (2) 20-50% loss; (1) 0-20% loss

Supplementary Table 3. Criteria scores used in HRA models for estimating risk to ecosystem services from exposure to stressors for key NbS target habitat types in Umm Al Quwain.

Habitat type	Exposure and Consequence Ratings						
 Corals	Pressure	<i>Temporal overlap</i>	<i>Management effectiveness</i>	<i>Intensity rating</i>	<i>Frequency of disturbance</i>	<i>Area change</i>	<i>Structural change</i>
	Urban areas	3	2	2	2	1	1
	Dredging	1	2	2	1	1	2
	Off-road vehicles	0	0	0	0	0	0
	Vessel impacts	3	2	2	1	1	1
	Marine construction	3	2	3	1	2	3
 Mangrove	Pressure	<i>Temporal overlap</i>	<i>Management effectiveness</i>	<i>Intensity rating</i>	<i>Frequency of disturbance</i>	<i>Area change</i>	<i>Structure change</i>
	Urban areas	3	2	2	2	2	2
	Dredging	2	2	2	2	1	1
	Off-road vehicles	1	2	1	3	1	2
	Vessel impacts	1	2	2	1	1	1
	Marine construction	3	2	3	1	2	3
 Seagrass	Pressure	<i>Temporal overlap</i>	<i>Management effectiveness</i>	<i>Intensity rating</i>	<i>Frequency of disturbance</i>	<i>Area change</i>	<i>Structure change</i>
	Urban areas	3	3	2	2	2	2
	Dredging	2	2	2	2	3	3
	Off-road vehicles	0	0	0	0	0	0
	Vessel impacts	3	2	2	1	2	2
	Marine construction	3	2	3	1	2	3
 Other halophytes	Pressure	<i>Temporal overlap</i>	<i>Management effectiveness</i>	<i>Intensity rating</i>	<i>Frequency of disturbance</i>	<i>Area change</i>	<i>Structure change</i>
	Urban areas	3	2	2	2	2	2
	Dredging	2	2	2	2	1	1
	Off-road vehicles	1	2	1	3	1	2
	Vessel impacts	1	2	2	1	1	1
	Marine construction	3	2	3	1	2	3

Exposure criteria

Temporal overlap: (3) co-occur 8-12 months/yr; (2) 4-8 months/yr; (1) 0-4 month/yr

Management effectiveness: (3) not effective; (2) somewhat effective; (1) very effective

Intensity rating: (3) high; (2) medium; (1) low

Consequence criteria

Frequency of disturbance: (3) ≤ Annually; (2) Several times per year; (1) ≥ Weekly

Change in area: (3) 50-100% loss; (2) 20-50% loss; (1) 0-20% loss

Change in structure: (3) 50-100% loss; (2) 20-50% loss; (1) 0-20% loss

Supplementary Table 4. Habitat rankings and protection distances used as inputs to the CV model for estimating coastal protection in UAE.

Habitat/ risk level	Rank	Protection distance (m)
Coral - low risk	1	2,000
Coral - medium risk	2	2,000
Coral - high risk	3	2,000
Mangrove - low risk	1	2,000
Mangrove - medium risk	2	2,000
Mangrove - high risk	3	2,000
Saltmarsh - low risk	2	1,500
Saltmarsh - medium risk	3	1,500
Saltmarsh - high risk	4	1,500
Seagrass - low risk	4	500
Seagrass - medium risk	4.2	500
Seagrass - high risk	4.5	500