

Supplementary materials: Year of plantation, hydrological parameters, slope, and elevation profiles of mangrove sites in Qatar

Table S1. Year of plantation for afforested (planted) mangrove in Qatar.

Site Name	Status	Tree Height range (m)	Planted year
Al Khor	Natural	1-5	Natural forest
Al Dhakhira	Natural	1-5	Natural forest
Semaisma	Planted	1-2.7	1983
Al Mafyar	Planted	1-3	1981
Fuwairit	Planted	1.5-3	1981
Ras Laffan	Planted	1-3	1993
Al Wakra	Planted	1-3	1989
Umm Al Hul	Planted	1-3	1981
Zekreet	Planted	0.5-0.70 m	1990
Khor Al Adaid	Planted	0.5-0.70 m	1993

Table S2. Hydrological parameters for the sampled mangrove sites in Qatar

SITE	Season	Month	Air Temp. (°C)	sea Temp. (°C)	SALINTY ‰	pH	Dissolved Oxygen (mg/L)
Al Dhakhira	Summer	August	44.1	33.3	44.2	8.24	5.21
Al Khor	Summer	August	43.5	33.2	44.8	8.25	5.22
Semaisma	Summer	August	43.3	33.3	44.2	8.3	5
Fuwairit	Summer	August	42.8	33.3	44.1	8.23	5.03
Al Mafyar	Summer	August	43.2	33.2	44.5	8.2	5.16
Zekreet	Summer	August	43.4	35.5	59.1	8.31	4.54
Ras Laffan	Summer	August	43	33.5	43.6	8.2	4.85
Al Wakra	Summer	August	43.5	33	44.5	8.2	4.52
Umm AlHul	Summer	August	43.8	33.5	44.2	8.2	4.62
Khor Al Adaid	Summer	August	44.5	33.57	54.83	8.04	5.27
SITE	Season	Month	Air Temp. (°C)	sea Temp. (°C)	SALINTY ‰	pH	Dissolved Oxygen (mg/L)
Al Dhakhira	Autumn	October	36.9	29.6	44.91	8.23	5.34
Al Khor	Autumn	October	37.2	29.4	44.82	8.24	5.36
Semaisma	Autumn	October	36.7	29.4	44.5	8.31	5.28
Fuwairit	Autumn	October	35.4	30.4	44.11	8.25	6.28
Al Mafyar	Autumn	October	34.8	30.42	45.1	8.27	5.34
Zekreet	Autumn	October	35.4	34.8	49.3	8.37	5.1
Ras Laffan	Autumn	October	34.5	30.2	43.5	8.11	5.2
Al Wakra	Autumn	October	35.5	30.1	43.6	8.2	5
Umm Al Hul	Autumn	October	35.8	30.25	43.6	8.2	5.1
Khor Al Adaid	Autumn	October	36.5	29.3	50.34	8.29	5.03
SITE	Season	Month	Air Temp. (°C)	sea Temp. (°C)	SALINTY ‰	pH	Dissolved Oxygen (mg/L)
Al Dhakhira	Winter	January	25.6	21.81	41.56	8.21	6.14
Al Khor	Winter	January	24.8	22.62	41.44	8.23	6.31
Semaisma	Winter	January	25.2	22.45	42.32	8.23	6.12
Fuwairit	Winter	January	25.1	21.81	42.64	8.23	6.01
Al Mafyar	Winter	January	24.5	22.12	42.41	8.21	6.21
Zekreet	Winter	January	23.6	20.91	51.77	8.2	5.41
Ras Laffan	Winter	January	24.2	22.22	50.13	8.12	6.54
Al Wakra	Winter	January	25.6	22.1	43.5	8.22	6.61
Umm Al Hul	Winter	January	26.05	22.5	43.25	8.2	6.6
Khor Al Adaid	Winter	January	26.5	22.2	50.13	8.12	6.52

SITE	Season	Month	Air Temp. (°C)	sea Temp. (°C)	SALINTY ‰	pH	Dissolved Oxygen (mg/L)
Al Dhakhira	Spring	April	28.5	31.21	43.54	8.12	6.43
Al Khor	Spring	April	27.9	31.34	44.21	8.21	5.76
Semaisma	Spring	April	33.12	31.1	44.32	8.23	5.11
Fuwairit	Spring	April	32	30.2	43.33	8.12	5.01
Al Mafyar	Spring	April	33.1	31.2	44.54	8.24	5.04
Zekreet	Spring	April	33.4	30.3	55.81	8.34	5.01
Ras Laffan	Spring	April	32.5	28.5	44	8.1	5.8
Al Wakra	Spring	April	33.52	29.1	43.5	8.2	5.5
Umm Al Hul	Spring	April	33.2	29.5	43.2	8.15	5.45
Khor Al Adaid	Spring	April	31.5	24.6	49.06	8.04	6.52

Fig. S1. Google Earth images showing the occurrence of *Avicennia marina* mangroves at Al Khor, Al Dhakhira, Semaisma, Al Mafyar, Fuwairit, Zekreet, Ras Laffan, Al-Wakra, Umm Al Hul, and Khor Al Adidm, in Qatar. The mangroves appear in dark green in the true color images. The topography at the mangrove occurrences shows a gradient decreasing from high land elevation to low elevation towards the sea. Measured elevation at the mangrove sites suggested that they are distributed at less than 3 m elevation.



Fig S2. Photos of mangrove in Qatar

A. Stunted mangrove in Zeekret



B. Natural mangrove in Al Dhakhira

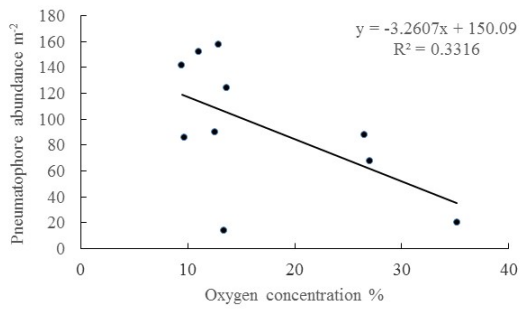


C. Stilt roots and pneumatophores

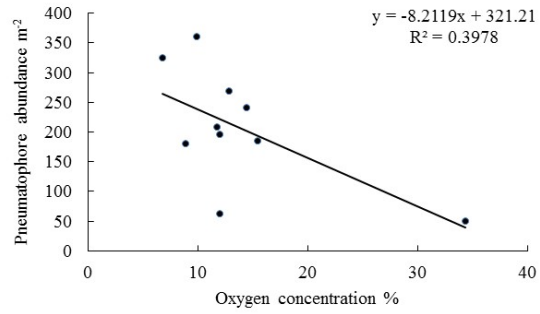


D. Natural mangrove in Al Dhakhira

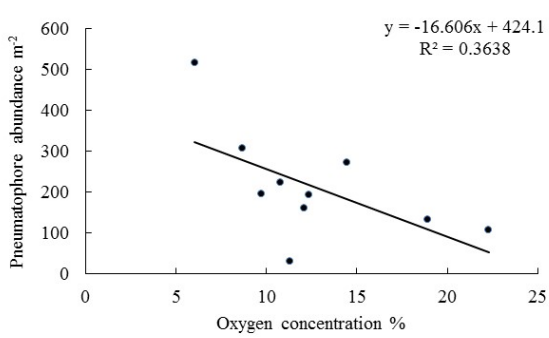
A)



B)



C)



D)

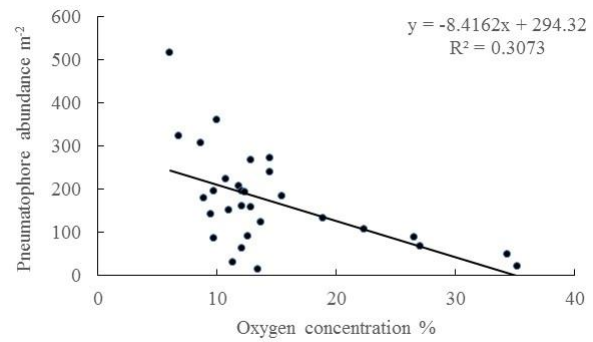


Fig. S3. Relationship between pneumatophore abundance and oxygen concentration in the A) upper tidal level, B) middle tidal level, C) lower tidal level, and D) all tidal levels combined.