

Table S1. Species distribution in the Wadi Degla protected area (WD) and Cairo-Suez road unprotected area (SR), with their frequency values (f%) and life forms. Ch=chamaephytes, Ph=phanerophytes, G=geophytes, H=hemicryptophytes, Pa=parasites, Cr=cryptophytes. Species abbreviations are the first letter of the genus, and the first three letters of the species.

Species abbreviations	Species	Protected area (WD)	Unprotected area (SR)	Life forms
Total number of species (γ -diversity)		58	47	
Total number of sample plots		11	14	Life forms
% of annuals		8.6	27.6	
Mean species richness		28.8 $\pm$ 2.4	7.2 $\pm$ 4.9	
Mean Shannon-Wiener diversity index (H')		4.8 $\pm$ 0.12	2.4 $\pm$ 1.3	
β -diversity		2.01	6.53	
Dominant species (f>90% in one area)				
Z spi	<i>Zilla spinosa</i> (L.) Prantl	100	79	Ch
Z coc	<i>Zygophyllum coccineum</i> L.	100	57	Ch
F aeg	<i>Farsetia aegyptia</i> Turra	100	21	Ch
I muc	<i>Iphiona mucronata</i> (Forssk.) Asch. et Schweinf.	100	21	Ch
E ala	<i>Ephedra alata</i> Decne.	100	14	Ch
L sha	<i>Lycium shawii</i> Roem. et Sch.	100	7	Ph
D tor	<i>Deverra tortuosa</i> (Desf.) DC.	91	29	Ch
E spi	<i>Echinops spinosus</i> L.	91	29	H
D har	<i>Diploaxis harra</i> (Forssk.) Boiss.	91	14	H
H sal	<i>Haloxylon salicornicum</i> (Moq.) Bung ex Boiss.	9	79	Ch
A alo	<i>Agathophora alopecuroides</i> (Delile) Fenzl ex Bunge var. <i>alopecuroides</i>	100	0	Ch
A dim	<i>Atriplex dimorphostegia</i> Kar. & Kir.	100	0	Th
A hal	<i>Atriplex halimus</i> L.	100	0	Ph
A jud	<i>Artemisia judaica</i> L.	100	0	Ch
C dac	<i>Cynodon dactylon</i> (L.) Pers.	100	0	G
E oxy	<i>Erodium oxyrrhynchum</i> M. Bieb	100	0	H
A fra	<i>Achillea fragrantissima</i> (Forssk.) Sch. Bip.	91	0	Ch
H bac	<i>Heliotropium bacciferum</i> Forssk.	91	0	Ch
Co-dominant species (f> 50% in one area)				
L nud	<i>Launaea nudicaulis</i> (L.) Hook. f.	73	36	H
O bac	<i>Ochradenus baccatus</i> Del.	73	43	Ph
A art	<i>Anabasis articulata</i> (Forssk.) Moq.	64	36	Ch
R rae	<i>Retama raetam</i> (Forssk.) Webb & Berthel.	54	21	Ph
Z sim	<i>Zygophyllum simplex</i> L.	54	21	Th
C spi	<i>Capparis spinosa</i> L.	73	0	Ch
N gra	<i>Nauplius graveolens</i> (Forssk.) Wiklund	73	0	Ch
Z alb	<i>Zygophyllum album</i> L.f.	73	0	Ch
D tri	<i>Deverra triradiata</i> Hochst. ex Boiss.	64	0	Ch
F bru	<i>Fagonia brugieri</i> DC.	64	0	Ch
G cap	<i>Gypsophila capillaris</i> (Forssk.) C. Chr.	64	0	H
S aeg	<i>Stachys aegyptiaca</i> Pers.	64	0	Ch
S mon	<i>Suaeda monoica</i> Forssk. ex J.F.Gmel.	64	0	Ch

T afr	<i>Trichodesma africanum</i> (L.) R.Br.	54	0	Ch
Occasional species (f<50% in the two areas)				
F ara	<i>Fagonia arabica</i> L.	45	21	Ch
T nil	<i>Tamarix nilotica</i> (Ehrenb.) Bge	18	21	Ph
H dig	<i>Heliotropium digynum</i> (Forssk.) Asch.ex C.Chr.	18	7	Ch
P tom	<i>Pergularia tomentosa</i> L.	18	7	Ch
R ves	<i>Rumex vesicarius</i> L.	9	7	Th
L sci	<i>Lasiurus scindicus</i> Henrad	45	0	Cr
G dec	<i>Gymnocarpus decandrum</i> Forssk.	36	0	Ch
A set	<i>Anabasis setifera</i> Moq.	27	0	Ch
C pen	<i>Cocculus pendulus</i> (J.R &G.Forst.) Diels	27	0	Ch
F mol	<i>Fagonia mollis</i> Delile	27	0	Ch
L pru	<i>Limonium pruinsum</i> (L.) Chaz.	27	0	H
R hir	<i>Reaumuria hirtella</i> Jaub. & Spach	27	0	Ch
S des	<i>Scrophularia deserti</i> Delile	27	0	Ch
C phe	<i>Cistanche phelypaea</i> (L.) Cout.	18	0	Pa
N ret	<i>Nitraria retusa</i> (Forssk.) Asch.	18	0	Ph
O cer	<i>Orobancha cernua</i> Loefl.	18	0	Pa
Z dec	<i>Zygophyllum decumbens</i> Del.	18	0	Ch
A tor	<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>raddiana</i> (Savi) Brenan	0	29	Ph
P tur	<i>Panicum turgidum</i> Forssk.	0	29	H
L spi	<i>Launaea spinosa</i> (Forssk.) Sch.Bip.	0	21	Ch
P dio	<i>Pluchea dioscoridis</i> (L.) DC.	0	21	Ph
C pro	<i>Calotropis procera</i> (Ait.) Ait. f.	0	14	Ph
P aus	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	0	14	Cr
P und	<i>Pulicaria undulata</i> (L.) Kostel	0	14	Ch
Singletons (species recorded in one stand with very low f%)				
	<i>Alhagi graecorum</i> Boiss.	9	0	H
	<i>Capparis cartilaginea</i> Decne.	9	0	H
	<i>Capparis decidua</i> (Forssk.) Edgew.	9	0	Ch
	<i>Centaurea aegyptiaca</i> L.	9	0	Th
	<i>Cuscuta pedicellata</i> Ledeb.	9	0	Pa
	<i>Cynanchum acutum</i> L.	9	0	H
	<i>Diploaxis acris</i> (Forssk.) Boiss.	9	0	Th
	<i>Erodium glaucophyllum</i> (L.) L'Hér.	9	0	H
	<i>Forsskaolea tenacissima</i> L.	9	0	H
	<i>Aerva javanica</i> (Burm. f.) Juss.	0	7	Ch
	<i>Anagallis arvensis</i> L. var. <i>Arvensis</i>	0	7	Th
	<i>Astragalus alexandrinus</i> Boiss.	0	7	Ch
	<i>Astragalus trigonus</i> DC.	0	7	Ch
	<i>Calligonum polygonoides</i> L.	0	7	Ph
	<i>Cleome droserifolia</i> (Forssk.) Delile	0	7	Ch
	<i>Crotalaria aegyptiaca</i> Benth.	0	7	Ch
	<i>Emex spinosa</i> (L.) Campd.	0	7	Th
	<i>Erodium laciniatum</i> (Cav.) Wild.	0	7	Th

<i>Euphorbia retusa</i> Forssk.	0	7	H
<i>Hyoscyamus muticus</i> L.	0	7	Ch
<i>Ifloga spicata</i> (Forssk.) Sch. Bip.	0	7	Th
<i>Launaea cassiniana</i> (Jaub. & Sp.) Kuntze	0	7	Th
<i>Pelargoniam radula</i> (Cav.) L'Her.	0	7	Ch
<i>Polypogon monspeliensis</i> (L.) Desf.	0	7	Th
<i>Reichardia tingitana</i> (L.) Roth.	0	7	Th
<i>Senecio glaucus</i> L.	0	7	Th
<i>Solanum lycopersicum</i> L. var. <i>Lycopersicum</i>	0	7	Th
<i>Trigonella stellata</i> Forssk.	0	7	Th
<i>Triticum aestivum</i> L.	0	7	Th

Table S2. Multiple pairwise comparisons of the MRPP statistics for the vegetation groups (I-VIII) based on Bray-Curtis distance. *A*=change-corrected within group agreement, *T*=difference between the observed and expected deltas.

Group compared	<i>T</i>	<i>A</i>	<i>p</i>
I vs. II	-2.499	0.266	0.025
I vs. III	-3.064	0.170	0.009
I vs. IV	-3.36	0.178	0.009
I vs. V	-2.928	0.301	0.022
I vs. VI	-2.197	0.331	0.000
I vs. VII	-3.672	0.336	0.009
I vs. VIII	-2.189	0.316	0.000
II vs. III	-3.376	0.245	0.009
II vs. IV	-3.454	0.281	0.009
II vs. V	-2.939	0.459	0.022
II vs. VI	-2.199	0.518	0.014
II vs. VII	-3.697	0.479	0.009
II vs. VIII	-2.198	0.494	0.000
III vs. IV	-3.760	0.152	0.006
III vs. V	-3.688	0.345	0.009
III vs. VI	-2.990	0.388	0.016
III vs. VII	-4.435	0.384	0.006
III vs. VIII	-2.979	0.357	0.016
IV vs. V	-3.578	0.246	0.009
IV vs. VI	-2.932	0.293	0.016
IV vs. VII	-4.406	0.288	0.005
IV vs. VIII	-2.928	0.253	0.016
V vs. VI	-1.162	0.057	0.000
V vs. VII	-2.670	0.078	0.008
VI vs. VII	-1.716	0.051	0.050
VI vs. VIII	-1.149	0.074	0.033
VII vs. VIII	-1.729	0.039	0.039

Table S3. Pearson's correlation coefficients between soil variables and anthropogenic variables in Cairo-Suez road unprotected area. Abbreviations of soil factors: OM= Organic matter, EC=Electric conductivity; diversity indices: H'=Shannon-Wiener index; anthropogenic variables: OC=Over-collection, OG=Over-grazing, IS=Introduced species, LD=Land degradation, UR=Urbanization, SW=Solid wastes, MA=Military activities. *= Significant values at $p < 0.05$, **= Significant values at $p < 0.01$.

Soil variables	Anthropogenic variables							Diversity indices	
	OC	OG	IS	LD	UR	SW	MA	α -diversity	H'
Soil factors									
Sand	-0.377	-0.29	-0.26	0.36	-0.38	0.24	0.53	-0.62*	-0.55*
Silt	0.471	0.06	0.23	-0.22	-0.09	-0.24	-0.23	0.53	0.63*
Clay	0.31	0.29	0.23	-0.34	0.41	-0.21	-0.5	0.55*	0.46
OM	-0.23	0.239	-0.69**	0.53	-0.39	0.18	0.16	-0.45	-0.52
pH	-0.68**	-0.65*	0.16	0.34	0.11	0.41	0.24	-0.59*	-0.57*
EC	-0.56*	-0.31	-0.33	0.28	-0.05	0.34	0.27	-0.71**	-0.69**
Na	-0.55*	-0.28	-0.42	0.27	-0.09	0.36	0.24	-0.70**	-0.70**
K	-0.4	-0.07	-0.13	0.25	-0.003	0.13	0.36	-0.48	-0.44
Ca	-0.57*	-0.35	-0.25	0.28	-0.04	0.37	0.19	-0.67**	-0.65*
Mg	-0.52	-0.35	-0.26	0.24	-0.05	0.32	0.27	-0.66*	-0.64*
Cl	-0.55*	-0.25	-0.44	0.32	-0.13	0.31	0.32	-0.74**	-0.75**
HCO ₃	-0.61*	-0.25	-0.25	0.24	0.002	0.38	0.26	-0.67**	-0.64*
CO ₃	-0.46	-0.24	-0.08	0.03	0.22	0.16	0.54*	-0.54*	-0.63*
SO ₄	-0.32	-0.47	0.07	0.13	0.06	0.34	-0.1	-0.31	-0.26
Anthropogenic variables									
OC								-0.75**	-0.76**
OG	0.04							0.44	0.35
IS	-0.09	-0.4						0.31	0.3
LD	-0.022	0.18	-0.13					-0.29	-0.33*
UR	-0.41	-0.3	0.72**	-0.16				0.05	-0.03
SW	-0.61*	-0.07	-0.13	0.19	0.11			-0.25*	-0.36*
MA	-0.43	0.15	-0.06	0.25	0.15	0.09		-0.39	-0.46*

Table S4. Comparison of the inter-set correlations along the first two axes of CCA and RDA with soil variables in both areas, together with anthropogenic factors. NI=Not included. Abbreviations of soil variables: OM=Organic matter, anthropogenic variables: OC=Over-collection, OG=Over-grazing, IS=Introduced species, LD=Land degradation, UR=Urbanization, SW=Solid wastes, MA=Military activities.

Axes	Cairo-Suez road unprotected area (SR)		Wadi Degla protected area (WD)	
	CCA		RDA	
	1	2	1	2
Eigenvalues	0.475	0.274	0.191	0.149
Species-environment correlations	0.994	0.964	0.973	0.945
% variance of species	26.1	15.0	19.1	14.9
% variance species-environment relation	27.6	16.0	26.9	21.1
Soil variables				
Sand	-0.213	-0.146	0.487	-0.076
Silt	0.469	0.159	-0.095	0.333
Clay	0.157	0.128	-0.542	-0.122
OM	-0.128	0.234	-0.14	-0.163
pH	0.269	-0.052	-0.183	-0.071
K ⁺	-0.251	-0.218	0.279	-0.296
Cl ⁻	NI	NI	0.647	-0.422
Mg	NI	NI	-0.154	-0.336
CO ₃ ⁻²	0.047	-0.189	NI	NI
SO ₄ ⁻²	0.189	-0.036	NI	NI
Anthropogenic factors				
OC	-0.348	0.156		
OG	-0.448	-0.071		
IS	0.215	-0.077		
LD	-0.274	0.163		
UR	0.279	-0.070		
SW	0.443	-0.015		
MA	-0.517	-0.178		