Development of A spatial Model for Soil Quality Assessment under Arid and Semi-arid Conditions

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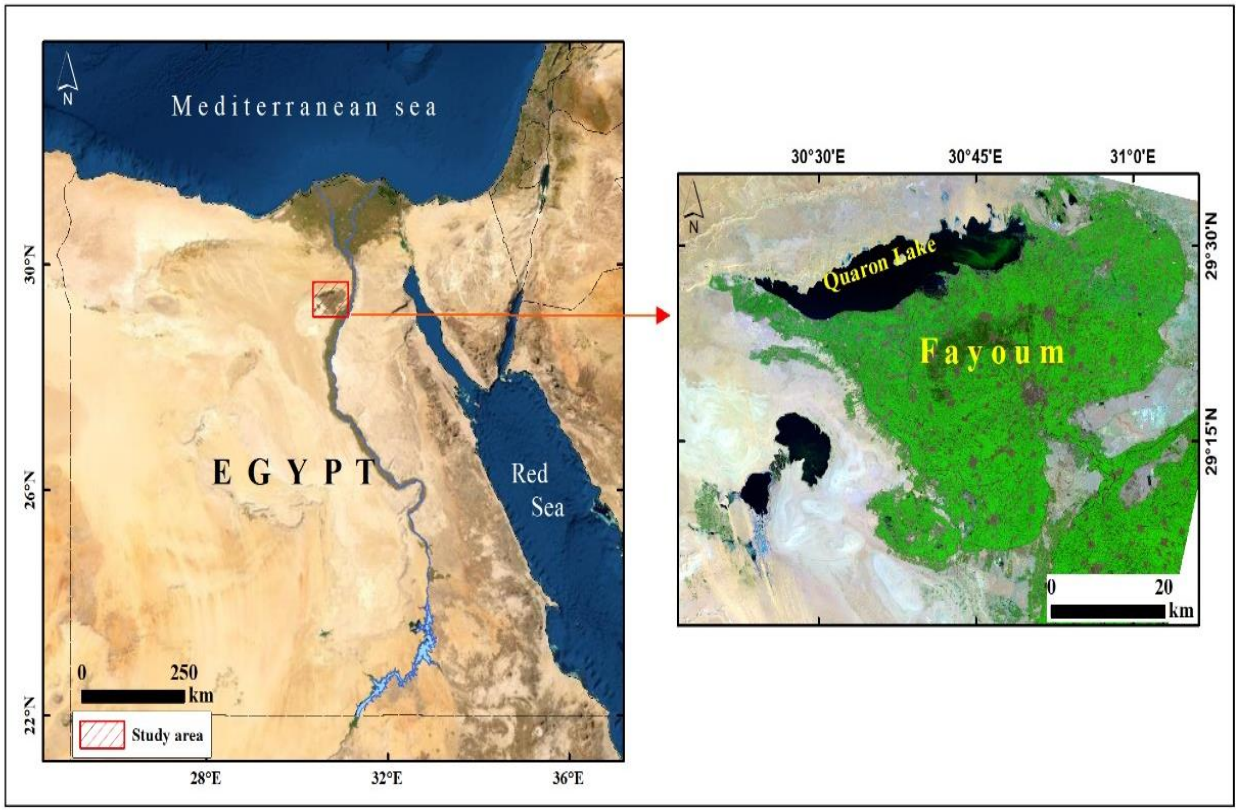

Figure S1. Egypt map (left) and the studied area (right).

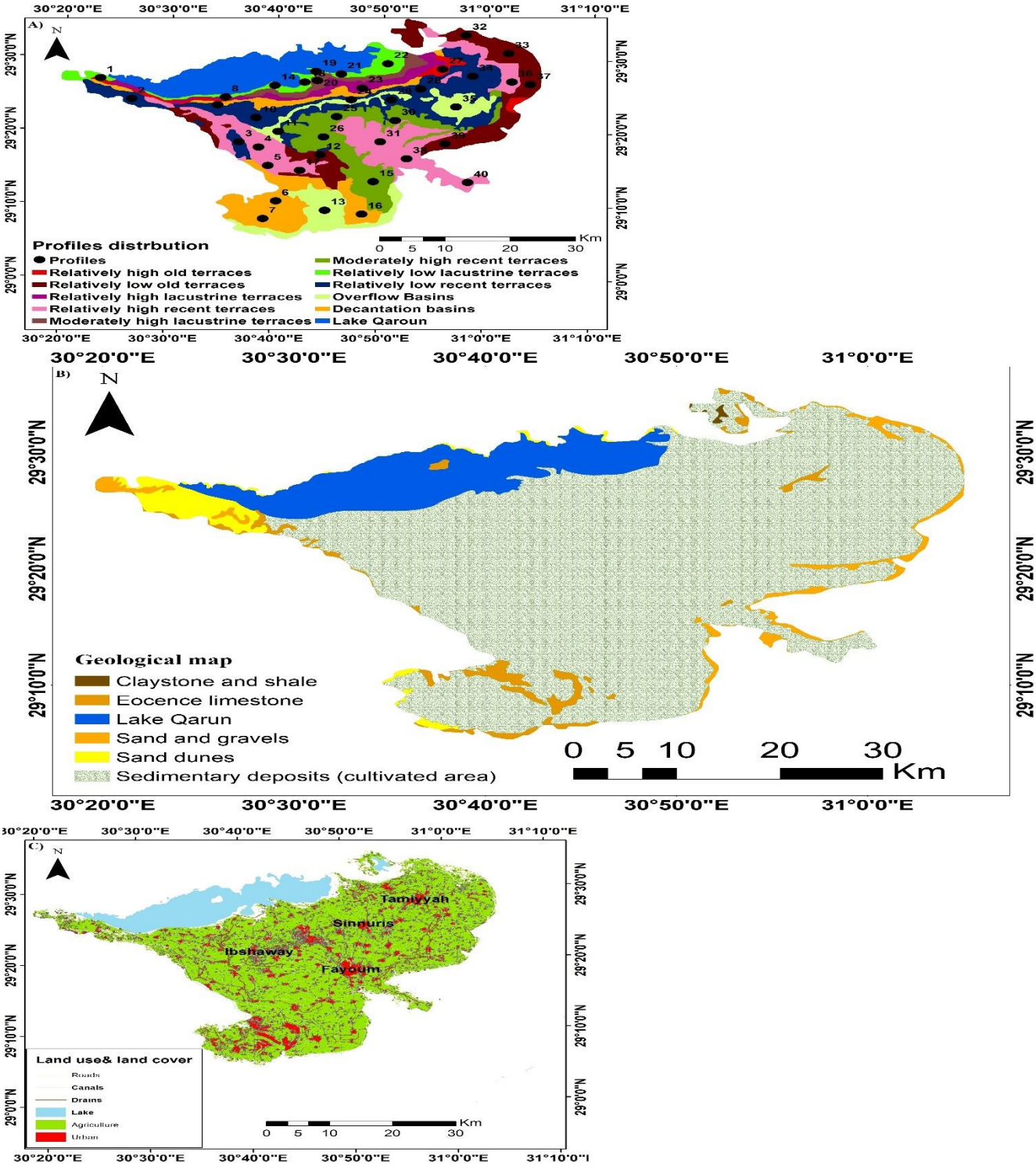

Figure S2. Map of sampling points to each landform (a), geological map (B), and land use map (C)

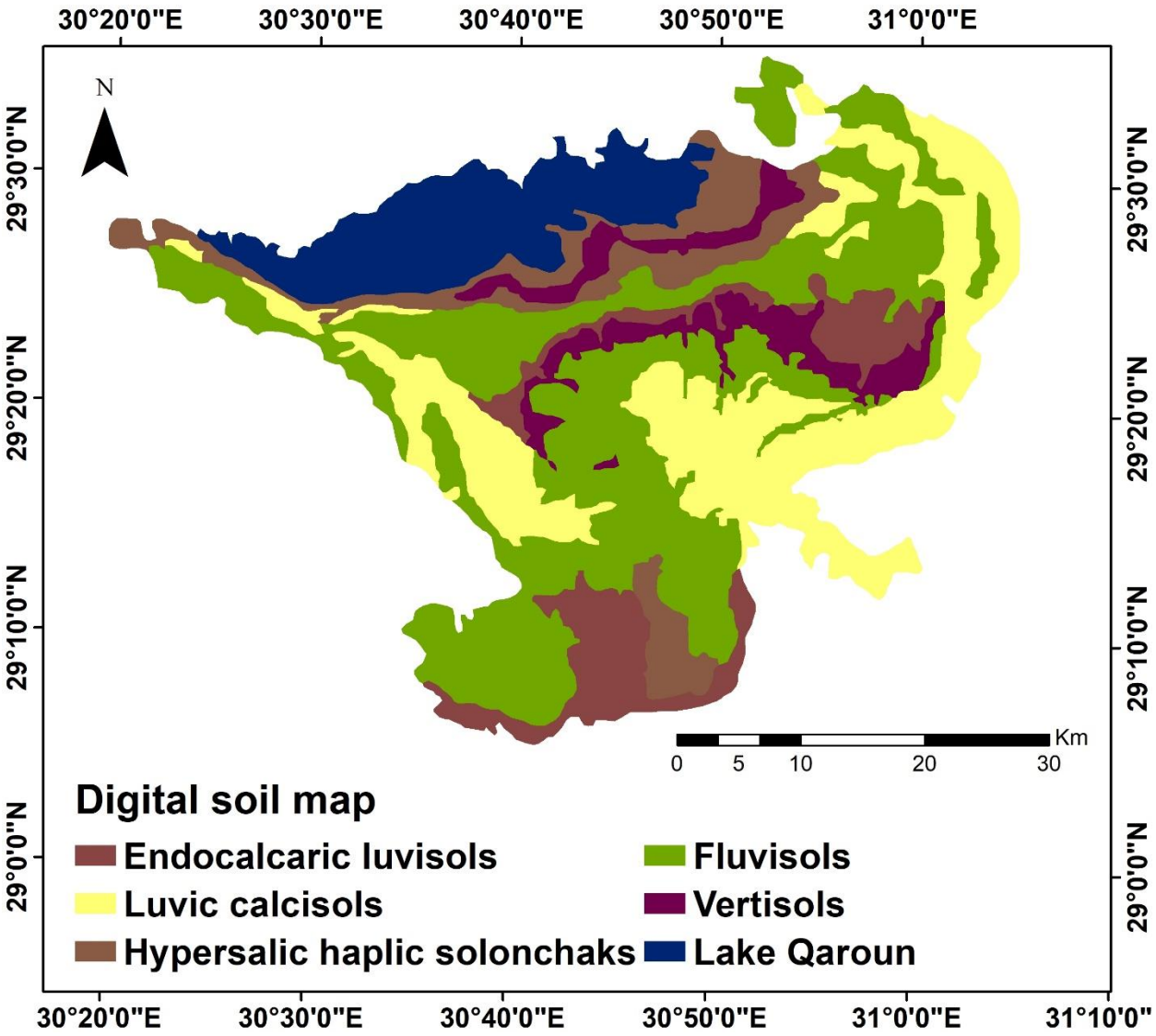

Figure S3. Digital soil map to show distribution of sub great groups of the study area based on WRB system.

Table S1. Classes and factors assigned weighting index affecting soil quality index in the study area according to MEDALUS methodology.

Indicator	Description	Classes (threshold)	Unit	Index
Soil texture	LS and SL	1		1.0
	LC, CS,SC	2		12
	C,CL	3		1.6
	S toVS	4		2.0
Slop	Gentle	<6	%	1.0
	Not very gentle	6-18		1.33
	Abrupt	19-35		1.66
	Very aburpt	>35		2.0
Soil depth	Very deep	>1	m	1.0
	Moderately deep	<1 to 0.5		1.33
	Shallow	<0.5 to 0.25		1.66
	Very shallow	<0.15		2.00
Drainage	Well	1		1.0
	Moderate	2		1.2
	Poor	3		2
CaCO3	Non- calcareous	<5	%	1.0
	Slightly	5-10		1.20
	Moderately	10-20		1.50
	Strongly	>20		2.00
OM	Very good	>3	%	1.00
	Good	2-3		1.02
	Moderate	1-2		1.50
	Poor	0.5-1		1.70
	Very poor	<1%		2
EC	Very low	<4	dS/m	1.00
	Low	4-8		1.20
	Moderately	8-16		1.50
	Moderately high	16-32		1.70
	High	>32		2.00

LS= Loamy sand, SL= Sandy loam, LC= Loamy clay, CS= Clayey sand, SC= Sandy clay, C=clay, CL= Clay loam, S= Sand and VS= Very sand, m = meter, dS/m =Decisemens per meter, % = percentage

Table S2. The rate of Soil quality index of study area extracted from developed spatial model in GIS.

Soil quality	Rating
Very high quality	0.7 – 1
High quality	1.1 - 1.25
Slightly moderate quality	1.26 - 1.46
Moderate quality	1.47 – 2
Low quality	2.1 - 2.44
Very low quality	2.45 – 3

Table S3. Physiographic units of study area.

Landscape	lithology	Relief	Landform	Area Km^2	%
Fluvial - lacustrine plain	Alluvial- lacustrine deposits	Gently undulating	Relatively low old terraces	264.94	15.51
		Flat to almost flat	Relatively low recent terraces	299.80	17.56
			Relatively high recent terraces	327.63	19.19
Lacustrine plain	Lacustrine deposits	Flat to almost flat	Relatively low lacustrine terraces	80.35	4.71
			Relatively high lacustrine terraces	68	3.98
			Moderately high lacustrine terraces	46.31	2.71
Alluvial plain	Alluvial deposits	Almost flat to gently undulating	Moderately high recent terraces	216	12.65
			Overflow Basins	185.59	10.87
			Decantation basins	218.54	12.80
Total				1707.16	100

Table S4. Areas of soil capability of the study area.

Land capability index	Areas km2	Areas %
C6	231.87	13.50%
C4	291.94	17%
C3	767.39	44.94%
C2	416.07	24.40%

Table S5. Areas of soil quality of the study area.

Classes	Areas km^2	% Areas
Very high quality	387.12	22.67
High quality	441.72	25.87
Moderate quality	208.57	12.21
Slightly moderate quality	231.10	13.50
Low quality	232.97	13.64
Very low quality	205.81	12.05