

CONTENTS

	Page
1. INTRODUCTION.....	1
2. REVIEW OF LITERATURE.....	3
2.1.1 The site and situation.....	3
2.1.2 Unique potentiality of generating energy.....	3
2.1.2.1 Wind energy.....	3
2.1.2.2 Tidal power.....	7
2.2 Meteorological characteristics of the study areas....	7
2.3 Flora of the study area.....	10
2.4 Geological history and lithology.....	11
2.4.1 The genesis of the Gulf of	11
2.4.2 Geology of the study	13
2.5 Hydrological attributes in the region of	14
2.5.1 Flash flooding mode.....	14
2.5.2 Locating meteoric groundwater reservoirs.....	16
2.5.2.1The areas of fractured basement rocks.....	16
2.5.2.2 The areas of alluvial reservoirs recharged by aquifer round water.....	17 17
2.6 Aspects of Soil Series.....	19
3. MATERIALS AND METHODS.....	20
3.1 The specifications of remote sensing data.....	20
3.1.1 Landsat (ETM7).....	20

3.1.2 EgyptSat-1 data.....	20
3.1.3 Geometric correction of the remote sensing data....	20
3.2 Visual interpretation of remote sensing data.....	20
3.3 Field work.....	23
3.4 Laboratory analyses.....	23
3.5 Soil classification.....	25
3.6 Land cover classes and flora .taxonomy.....	25
3.7 Land evaluation.....	26
3.8 Terminology and etymology contemplation.....	26
4. RESULTS AND DISCUSSION.....	27
4.1 Digital Elevation Models (DEM).....	27
4.2 physigraphic units.....	29
4.2.1 Dissected highlands of elevated mountains.....	29
4.2.2 Piedmonts.....	31
4.2.3 Bajada.....	31
4.2.4 Alluvial terraces.....	31
4.2.5 Wadis.....	32
4.2.5.1 Wadis that have their alluvium from	32
4.2.5.2 Wadis that have their alluvium from igneous	33
4.2.6 Deltaic plain.....	33
4.2.7 Marine sediments.....	34
4.3 Soil Taxonomy.....	34

4.3.1 Categorization to the family level.....	34
4.3.1.1 <i>Aridisols</i>	53
4.3.1.2 <i>Entisols</i>	56
4.3.2 Formulating tentative soil series.....	58
4.3.2.1 Defined soil series within the Order <i>Aridisols</i>	59
4.3.2.2 Defined soil series within the Order <i>Entisols</i>	64
4.4 Spatial distribution of flora habitats within the land cover units.....	69
4.4.1 Terrestrial vegetated areas.....	70
4.4.1.1 <i>Xerophyte</i> communities.....	70
4.4.1.2 <i>Halophyte</i> communities.....	71
4.4.2 Terrestrial non vegetated areas.....	78
4.4.2.1 Bare areas.....	78
4.4.2.2 Artificial surfaces	79
4.5 Land evaluation.....	79
4.5.1 Gross current land suitability.....	82
4.5.2 Gross potential land suitability.....	86
4.5.3 Profitable potential land suitability.....	86
4.5.3.1 Highly suitable (S1) adaptations.....	86
4.5.3.2 Moderately suitable (S2) adaptations.....	87
4.5.4 Supreme profitable potential land suitability.....	87
5. SUMMARY	93
6. REFERENCES	99

APPENDIX.....	104
----------------------	------------

ARABIC SUMMARY

List of Tables

Table1	Some climatic elements representing the study Area.....	9
Table 2	Soil Taxonomy within the topo- sequence in the Physiographic units from basement complex parent rock.....	35
Table 3	Soil Taxonomy within the topo- sequence in the Physiographic units of basement complex parent rocks.....	36
Table 4	Soil Taxonomy within the topo- sequence in the Physiographic units of mixed parent materials (marine sediments).....	37
Table 5	Physical properties of the soils in the physiographic units of limestone parent rocks...	38
Table 6	Physical properties of the soils in the physiographic units of basement parent rocks....	40
Table 7	Physical properties of the soils in physiographic units of mixed parent materials.....	42
Table 8	Chemical properties of the soils in the physiographic units of limestone parent rocks.....	43
Table 9	Chemical properties of the soils in Physiographic units of basement complex parent rocks.....	45

Table10	Chemical properties of the soils in physiographic units of mixed parent materials.....	47
Table 11	Cation exchange capacity and exchangeable cations of the soils in the physiographic units of limestone parent rocks.....	48
Table 12	Cation exchange capacity and exchangeable cations of the soils in the physiographic units of basement complex parent rocks.....	50
Table 13	Cation exchange capacity and exchangeable cations of the soils in the physiographic units of mixed parent materials.....	52
Table 14	Spatial distribution of flora diversity in their Habitats.....	73
Table 15	Gross current land suitability of the different physiographic units for certain crop cultivations.....	83
Table 16	Supreme current land suitability of the study area for the different crop cultivations.....	84
Table 17	Gross potential land suitability of the different physiographic units for certain crop cultivations.....	88
Table18	Profitable potential land suitability in the Study area for different crop cultivations.....	89

List of Figures

Figure 1	Map of Egypt and the area of current study.....	4
Figure 2	The study area within the Eastern Desert region and the development corridors.....	5
Figure 3	The predicted wind climate of Egypt determined by mesoscale modeling.....	8
Figure 4	The constructed wind farm south of Zafarana for renewable wind energy.....	8
Figure 5	Geological map of the study area.....	1
Figure 6	A well location in a shear zone of a ground water reservoir from the stream lines.....	17
Figure 7	Selected well locations for fossil groundwater in shallow alluvial aquifers near the Gulf of Suez.....	18
Figure 8	Mosaic index of ETM7 Satellite imageries, covering Egypt and the selected images for the study areas.....	21
Figure 9	The spectral signatures of EgyptSat-1 sub scene, reflecting the landscape features in part of Wadi Araba area.....	22
Figure10	The spectral signatures of EgyptSat-1 sub scene, reflecting the landscape features in parts of inland and coastal zones west of the Gulf of Suez.....	22
Figure11	Location map of the soil profiles taken in the study area.....	24

Figure 12 Digital Elevation Model (DEM).....	28
Figure 13 Physiographic units of the study area.....	30
Figure 14 Flora habitats within the land covers units in the study area.....	80
Figure 15 Supreme current land suitability in the study area for different crop cultivation.....	85
Figure 16 Profitable potential land suitability in the study area for different crop cultivation.....	90
Figure 17 Supreme profitable potential land suitability in the study area for different crop cultivation (canola and olive belt).....	92

List of plates

Plate 1 Very open striped grassland of tall forbs (<i>Zygophyllum coccineum</i>) in Wadi Had.....	74
Plate 2 Very open striped grassland of tall forbs (<i>Zilla spinosa</i>) in Wadi Had.....	74
Plate 3 Very open striped grassland of tall forbs (<i>Suaeda vera</i>) in Wadi Had.....	75
Plate 4 Very open striped grassland of medium tall of forbs (<i>Hyosysamus muticus</i>) in Wadi Araba....	75
Plate 5 Spars Scattered high shrubs (<i>Accacia tortilis</i>) in Wadi Araba.....	76
Plate 6 Sparse Park like patches grassland of short forbs (<i>Zygophyllum coccineum</i>) in Bajada.....	76

Plate 7	Very open striped grassland of tall forbs (<i>Haloxylon sariconicum</i>) in Marine sediments...	77
Plate 8	Sparse park like patches grassland of medium tall forbs (<i>Nitraria retusa</i>) in Marine sediments.	77