A study on soil taxonomy and land fvaluation for specific utilization of some promising areas in sinai

Mohammed K, Sadek

An image mosaic of Landsat 5 thematic mapper (TM) was used for visual analysis to find the promising areas in Sinai through an overall view. Two of these areas were selected for modelling their soil-landscape characteristics, being of prior utilization (El-Kantara-Pelusium and Ayun Musa areas). For These two areas, the physigraphic units were delineated with the aid of the images of Landsat 7 2002 and SPOT 1998.Twenty three soil pits were studied for the ground truth and were physically and chemically analyzed. The taxa output were processed and sorted for ”Soil Taxonomy” and ”Land Evaluaion”.1- Promising areas in Sinai:The promising areas were identified in Sinai in the following physiographic units: Alluvial Plains, Alluvial Terraces, Braid Delta Terraces, Flat Delta Plain, Wadis with eyots, Fluvio-Marine Plain, Fluvio-Aeolian Plain, Back-shores with marine sediments, Lacustrine sediments, Piedmonts and Pediments, Aeolian Plains and finally Aeolian Dunes.For these lands, the bordering flooding hazards under seasonal pluvio-fluvial action is expected to occur in some of them according to their sites These hazards are catastrophic hazards via V-shaped vallies having parallel and sub-parallel drainage patterns. They flow in the escarpments of the basement complex horst from the eastern and the western fronts of this elevated block. In the areas bordering the sedimentary rock structures, this hazard occurs as ephemeral flush floodingnortheast and northwards via U-shaped wadis and rivens with dentritic and sup-dentritic drainage patterns. II-Modelling of soil-landscape charecteristics for areas of prior utilizationTwo of those promising areas of prior utilization were selected for modelling their soil-landscape characteristics as follows: (a) Physiographic unit of the study areas:In El-Kantara-Pelusium study area, the physiographic units were identified as Deltaic Plain transported and deposited by the ancient silted-up River Nile branch, which was called ”the Pelusium branch”. This unit was subdivided into Delta Basins, Delta Outskirt, and Infilled Old River Bed. Fluvio-Marine Plain is adjacent to the Delta Plain, separating it from the Marine Sediments. It can be alternatively named ”prodelta”. These sediments are low-lying and poorly drained. The Fluvio-Lacustrine Plain were deposited by the fresh water that flew previously through the ancient River Nile branches, covering the somewhat depressed areas. These sediments are considered as back-swamps. The Marine sdiments were deposited by the action of wind and sea. They were located south of the shoreline and north of the Fluvio-Marine Plain. The Aeolian Deposits were subdivided as Aeolian Plains and Aeolian Dunes. Some minor units are also distributed as Back-shore and Lagoons, Logged Marine Sediments, and Bay Bar.In Ayun Musa area the landscape is characterized by the Alluvial Terraces, which are differentiated according to thematurity of their soils as old or young terraces. The Alluvial Plains, Sabkhas, and Wadis are also occur in this area. Some minor areas have rock structures as rock outcrops. (b) Soil Taxonomy of the study areas:Soils were classified according to the Soil Taxonomy System (USDA, 1975 and 1999), using the Taxonomy key manual (USDA, 2001). They were Aridisols, Vertisols and Entisols. Taxonomic units were as folows:(i)Aridisols in El-Kantara-Pelusium area are Aquisalids and Haplosalids, Typic as well Gypsic. They include a wide range of soil families: sandy, coarse loamy, fine loamy and clayey. Aridisols in Ayun Musa area are Typic Clacigypsids, fine loamy, partly, sandy; and Typic Haplogypsids, fine

loamy and sandy.(ii)Vertisols are found only in El-Kantara-Pelusium area. They are Salitorrerts: Aquic, Typic or Entic. Such soils are associated with Typic Gypsitorrerts. All soils of these Vertisols are clayey, semectitic.(iii)Entisols are dominated by Typic Torripsamments, mixed. They are partly siliceous in El-Kantara-Pelusium area and partly calcareous in Ayun Musa area. Typic Torrifluvents, loamy skeletal and Typic Torriorthents, sandy skeletal characterize some parts of Ayun Musa area.All the soils of Aridisols and Entisols are mixed except the siliceous Entisols. The soils are thermic in El-Kantara-Pelusium area, but are hvperthermic in Ayun Musa area. (c) Land evaluation of the study areas:Such classification was done according to Sys and Verheye (1991) and Sys et al (1993). The physiographic unitswere evaluated for proposed land utilization types. In El-Kantara-Pelusium area, these specific utilizations are as follows:(i)Cotton, sugar beet and rice, using surface irrigation.(ii)Alfalfa, barley, maize, potato, sesame, sorghum (fodder), soya, sunflower, wheat and pea, using surface irrigation, but sprinkling irrigation in the Aeolian Plains.(iii)Cabbage, green pepper, tomato, watermelon, using surface irrigation, but drip irrigation in the Aeolian Plains.(iv)Banana, date-palm, citrus, guava, mango and olives ,using surface irrigation, but drip irrigation in the Aeolian Plains. Utilizations similar to those mentioned above were also proposed for Ayun Musa area except for cotton, sugar beet and rice. The surface irrigation were excluded in this area.The virgin lands were also evaluated. Their suitability classification were delineated in maps. As the virgin lands are not economically yielding well, the potential land suitability had the prior interest after the major land improvement (drainage salinity and alkalinity). Evaluation was done on the basis of supreme potential suitability; and subsequent prior potential suitability. It were adapted as follows : First: Supreme potential suitability for specific utilizations A: El-Kantara-Pelusium area(i) Highly suitable (S1):-The Basin of the Pelusium Deltaic Plain: for cotton, sesame date-palm, guava and olives, using the surface irrigation. -Outskirts of the Pelusium Deltaic Plain: for alfalfa, barley, cotton, sesame, sugar beet, cabbage , watermelon, date palm, guava and olives, using the surface irrigation.-Infilled Old River Bed: for barley, cotton, sesame, sugar beet, watermelon, date-palm, guava and olives, using the surface irrigation.-Fluvio-Marine Plain: for sesame, sugar beet, watermelon, guava and olives, using the surface irrigation.-Fluvio-Lacustrine Plain: for sesame, sugar beet, watermelon, guava and olives, using the surface irrigation.-Aeolian Plain of very gently undulating complex slopes: for watermelon and olives, using the drip irrigation.(ii)Moderately suitable (S2):-Aeolian Plain of undulating complex slopes: for alfalfa and sorghum, using the sprinkling irrigation. The same plain has the same suitability for cabbage, green pepper, watermelon and olives, using the drip irrigation.(iii)Marginally suitable (S3):-The Marine Sediments: for alfalfa, cotton, maize, sesame, sorghum, sugar beet, sunflower, cabbage, pea, watermelon and date- palm, using the surface irrigation.B: Ayun Musa area(i) Highly suitable (S1):-Alluvial Plain of very gently undulating slopes with natural vegetation: for alfalfa, using the sprinkling irrigation. The plain has the same suitability for olives, but under drip irrigation. -Other Alluvial Plains and the gently undulating Aeolian Plain: for olives, using the drip irrigation.Improved Sabkhas: for sesame, using the sprinklingirrigation.The same suitability for watermelon and olives, but under drip irrigation.-Wadis: for sorghum, using the sprinkling irrigation also the same for olives, but under drip irrigation.(ii) Moderately suitable (S2):-Old and Young Terraces: for olives, using drip irrigation. -Aeolian Plain of undulating complex slopes: for alfalfa, sorghum, using the sprinkling irrigation. The same sui ability forcabbage, green pepper, watermelon, citrus, mango nd olives, but under drip irrigation. Second: Subsequent prior potential suitability for specific utilizationsA: El-Kantara-Pelusium area (i) Moderately suitable (S2): -Basin of the Pelusium Deltaic Plain: for alfalfa, barl y, maize, potato, rice, sorghum, sunflower, wheat, cabbage pea and watermelon, using the surface irrigation.-Outskirt of the Pelusium Deltaic Plain: for maize, potato, rice,sunflower, wheat, green pepper and pea, using th-surface irrigation.-Infilled Old River Bed of the Pelusium Deltaic Plain: .r alfalfa,maize, rice, potato, sorghum, sunflower, wheat, cabbag, , pea and citrus, using the surface irrigation.-Fluvio-Marine Plain: for alfalfa, potato, cabbage a d citrus under the surface irrigation.-Fluvio-Lacustrine Plain: for alfalfa, cotton, maize, potato, sorghum, cabbage and date-palm, using the surface irrigation.SUMMARY-Aeolian Plain of very gently undulating slope: for sorghum, using sprinkling irrigation. The same suitability for cabbage and green pepper, using the drip irrigation.(ii) Marginally suitable (S3):-Mrine Sediments: for alfalfa, cotton, maize, sesame, sorghum, sugar beet, sunflower,

cabbage, pea, watermelon and date-palm, using the surface irrigation.-Aeolian Plain of undulating complex slopes: for maize, soya, sunflower, sesame and pea, using sprinkling irrigation. The same suitability for potato, cabbage, tomato, citrus date-palm, and mango, using drip irrigation.B: Ayun Musa area(i) Moderately suitable (S2):-Alluvial Plain of very gently undulating slope with natural vegetation: for barley, maize, potato, sesame, sorghum, sunflower, wheat and pea, using sprinkling irrigation. The same suitability for cabbage, watermelon and guava, using drip irrigation.-The alluvial Pplain of gently to very gently undulating slopes: for alfalfa, maize, sesame, sorghum and pea, using sprinkling irrigation the same suitability for cabbage, watermelon and guava, but under the drip irrigation.-Alluvial Plain of very gently.undulating slopes and gravelly surface: for alfalfa, maize, sesame, sunflower and pea, using sprinkling irrigation. The same suitability for cabbage and watermelon, using the drip irrigation-Wadis: for alfalfa, sesame, sorghum, sunflowe, usingsprinkling irrigation. The same suitability for cabbage and watermelon, using the drip irrigation.-Aeolian Plain of gently undulating complex slopes: or alfalfa, sesame, sorghum, sunflower, and pea, using sprinklin irrigation. The same suitability for cabbage and watermelon, usi g the drip irrigation.(ii) Marginally suitable (S3) : -Old Terraces of undulating complex slopes: for alfa fa, maize, sesame, sorghum, sunflower and wheat, using sprinkling irrigation. The same suitability for cabbage, watermelon, citrus and guava, using the drip irrigation -Young Terraces of gently undulating complex slopes: for alfalfa, maize, sesame, sorghum, sunflower and ea, using sprinkling irrigation. The same suitability for cabbage, green pepper, tomato, watermelon, citrus and guava, usin the drip irrigation. -Aeolian Plain of undulating complex slopes: for mai?e, potato, sesame, soya, sunflower and pea, using sprinkling irri ation. The same suitability for cabbage, tomato, citrus, date-palm, using the drip irrigation.