سامية محمد مصطفى

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

سامية محمد مصطفى

شبكة المعلومات الجامعية

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التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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بعض الوثائق الأصلية تالفة

سامية محمد مصطفى

بالرسالة صفحات لم ترد بالأصل

GEOLOGY OF COASTAL AREA OF WADI MAWR RED SEA, REPUPLIC OF YEMEN

A Thesis

Submitted to the Faculty of Science,
Cairo University

By

Aref Ali Abdullah Sagheer
B.Sc. Geology-chemistry
Sana'a University

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NOTE

The present thesis is submitted to the Faculty of Science, Cairo University in partial of the requirements for the degree of Master of science in geology.

Beside the research work materialized in this thesis, the author has attended ten post-graduate courses for one year and successfully passed the final examinations in the following topics.

1- Clastic sediments

2- Non-clastic sediments

3- Sedimentation

4- Diagenesis

5- Structural geology

6- Stratigraphy.

7- Geochemistry of the sedimentary rocks

8-Sedimentary ore deposits

9-Sedimentation and Geotectonic

10-Statistics

*** All the referred figures in the text are located at the end of each chapters of this thesis.**

ABSTRACT

One of the main aim of the present work is to study the sedimentological characteristics of the Quaternary coastal sediments (soil) of one of the major Tihama wadi in the Red Sea of Yemen; called Wadi Mawr. The main other aim is land use evaluation of the study area based on: 1) the geomorphological and geological factors that affecting the coastal sediment,, 2) the environmental site characteristics, 3) the impacts of natural and socio-economic hazards. To achieve these goals different laboratory analyses e.g. grain size heavy minerals, petrographic, X-ray diffraction and chemical analyses, were carried out in addition to the field investigation including the samples. One hundred and thirty six samples were collected from ninety three selected sites representing the different geomorphological units allover the study area.

The study area was divided into sixteen geomorphological units. These units which include the mountainous and coastal regions are namely from east to west: foothills, alluvial fans, plateaus, wadi plain, terraces, wadi channels, delta, evaporite hills, sabkhas, coastal dunes, beach, mangrove, lagoons, spit, bars and coral reef. The last eight units are located within the tidal area around the Al-Luhayyah district. Each unit is characterized by certain geomorphological and geological features. It seems that these units represent direct reflection of the integrating action of the tectonic, structures, lithology and sedimentary processes. These features of the units are summarized as follows:

The distribution of **heavy mineral** and light minerals of the study sand fractions is mainly factors of which are 1) Petrographic nature of source rocks 2) Weathering of the parent rocks. 3) Differential mechanical destruction during transportation. 4) Hydraulic processes discussed by means of grain size, shape and density. 5) Chemical decomposition of the heavy minerals. This distribution shows that the study area is receiving sediments derived at least from two important provenances. The first one is dominated by granitic rocks and dolerites that contain abundance in green hornblende, biotite, epidote and monazite. The second provenance is dominated by metamorphic

rocks where the fine sand sized grains of hornblende, pyroxene and biotite are derived from the metavolcanic and metagabbro rocks.

The concentration of **organic carbon** contents of the study sediments is mainly related to three factors; namely: the oxide rate of the sediments (negative correlation), the mud fraction content (positive correlation) and biogenic debris (positive correlation) which are derived from mangrove, seagrass and coral reef areas as well as the possible biological fragments derived from the flooding water of the Wadi Mawr. The distribution of the **major elements** e.g. Na, K, Mg, Fe, and Mn is mainly related to the concentration of feldspars, and ferromagnesiam minerals, while the Al is related to the clay fraction content in study tidal sediments.

The study of the morphometric parameters, the rate of the rainfall, the infiltration rate and the slope gradient in both the Wadi Mawr channels and in the basement catchment area shows that the study area could be divided (not sharp) into three **flash flood hazard** zones. These zones are high, moderate and low hazard zones which are concentrated in the wadi channel, the delta and the wadi plain respectively. The suggested mitigation measures include construction of dames in a certain studied sits, drilling ponds and channels (trenches) which lead to reduction the water flow velocity and consequently to increase the recharging of the groundwater in the Quaternary shallow aquifer. The **wind hazard** in the study area is mainly represented by the sand dune migration and sand drift accumulation against the farms and buildings as well as the wind erosion of the surface soil particularly in the downstream. This wind hazard can be mitigated by encounter of citizens to plant several rows of trees as windbreaks along and around their farms and their villages. Furthermore, certain grasses, shrubs and trees are recommended for sand dune stabilization. Also, the leaving of roots in the cultivated lands may lead to restraint the soil movement and reducing their erodibility. The study of the **earthquake hazard** in and around the study area shows that the Wadi Mawr area may be shocked by earthquake of low magnitude. However, earthquake hazards have been detected directly in the study area. The hazard effects of the **sabkha** in the tidal area include land subsidence and corrosion of the iron construction material. It is preferable to avoid the construction in the sabkha region; however, if it is necessary to use this land it must be choosing an area away from the most hazardous central zone and use suitable type of cement that resists the acid and salinity effects. The **human induced hazards** in the study area are mainly

represented by carelessly breaking the hard coral reefs or crushing the marine organisms during the fishing, construction of jetties and marina required for tourism activities, and camels grazing of the mangrove trees particularly during the low tidal period. General awareness program should be applied to avoid these hazards. According to the international standard levels the study area is considered to be nonpolluted area by, at least, the analyzed heavy toxic elements e.g. Cd, Cu, Cr, Pb, Ni and Zn.

Based on all the study geomorphological, geological, mineralogical, chemical characteristics as well as the environmental hazard assessment and availability of the water recourse the study soils of the wadi plain and delta are considered according to Sys and Verheye classification (1978) as moderately suitable for **agriculture** (class S2). The Alluvial fan and coastal dune are evaluated as marginally suitable class (S3). However, the sabkha unit is not suitable for agriculture. Other land uses which can be recommended in addition to the agriculture purposes are tourism, urbanization and quarrying for the building materials gypsum and salt rock.

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