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Sand Characteristics and Beach Profiles of the Coast of Gaza Strip, Palestine.

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Abstract: *SAND CHARACTERISTICS AND BEACH PROFILES OF THE COAST OF GAZA STRIP, PALESTINE*.- The Gaza Strip's coastline forms a small section of the south-eastern corner of the Levantine Basin. The Strip is 45 km long and from 6 to 12 km wide. Its coastal zone covers approximately 74 km^2, of which 2.7 km^2 is beach. This study first describes the coastal zone's profile from observations and the literature. This study also collected 36 sandy sediment samples from 12 sites along its beaches and performed a textural study and statistical analysis of grain-size distribution. The beach tends to be narrower in the north and center and wider in the south and its northernmost stretches and in some sites in the center. The narrower stretches tend to be due to the effects of the seaport and other human construction activity on the sedimentation and erosion rates. The beach profile's slope varies from a few degrees to 90 degrees. At some sites actions of the waves and tides have caused the sea cliff to erode and mix with the beach sands. Longshore currents bring sands to the beaches from the Nile delta and then northward along the shore. The sand grains become segregated as they move from south to north, being finer as they move north. In general, this study's analysis of the surface samples found medium-grained sands to predominate, and the sands at most beach sites to be moderately well sorted, mainly as a result of the actions of marine currents; waves, and tides.

Keywords: Sand, Textural Parameters, Longshore Sediment Transport, Mediterranean Coast, Gaza Beaches.

Introduction

Sedimentologists tend to use grain-size distribution to elucidate transport dynamics. Such diverse factors as waves, winds, longshore currents, and beach relief control littoral sediments' textural composition (Folk, 1974; Komar, 1976; Ibbeken and Schleyer, 1991; Caranza-Edwards, 2001; Kasper-Zubillaga and Carranza-Edwards, 2005; Caranza-Edwards *et al*., 2009). Coasts formed by non-consolidated sediments constitute approximately 40% of the world's sand and gravel beaches (Bird, 2000). Beaches are exposed to such marine, fluvial, and eolian processes as waves and tidal regimes, fluvial discharges, and wind transport, factors that control sand beaches' grain size and relief (Le Pera and Critelli, 1997).

Palestine's coastline is broadly concave, trending generally NNE-to-SSW. Figure 1A illustrates this. It lies between two parallel lineaments; the eastern, or onshore, lineament is an escarpment that is locally steeper than 45 degrees and rises as high as 50 m above mean sea level (MSL) (Neev *et al*., 1987). A sequence of late Pleistocene to Holocene sediments crops out along the cliff. The top of this sequence extends eastward to form Palestine's now-elevated alluvial coastal plain. The western, or offshore, lineament is a low submarine escarpment. It forms the western limit of a patchy abraded terrace that is a few hundred meters wide.

The coastal plain adjoins the coastline on the land and the continental shelf beneath the ocean. Both areas contain broadly curved subparallel sand ridges that are similar to each other. River valleys and ridge bifurcations provide smaller interruptions. The ridges necessarily are farther apart at the southwest and converge toward the north because the combined coastal plain and shelf narrows to the north, yet has relatively smooth slopes toward an approximately uniform

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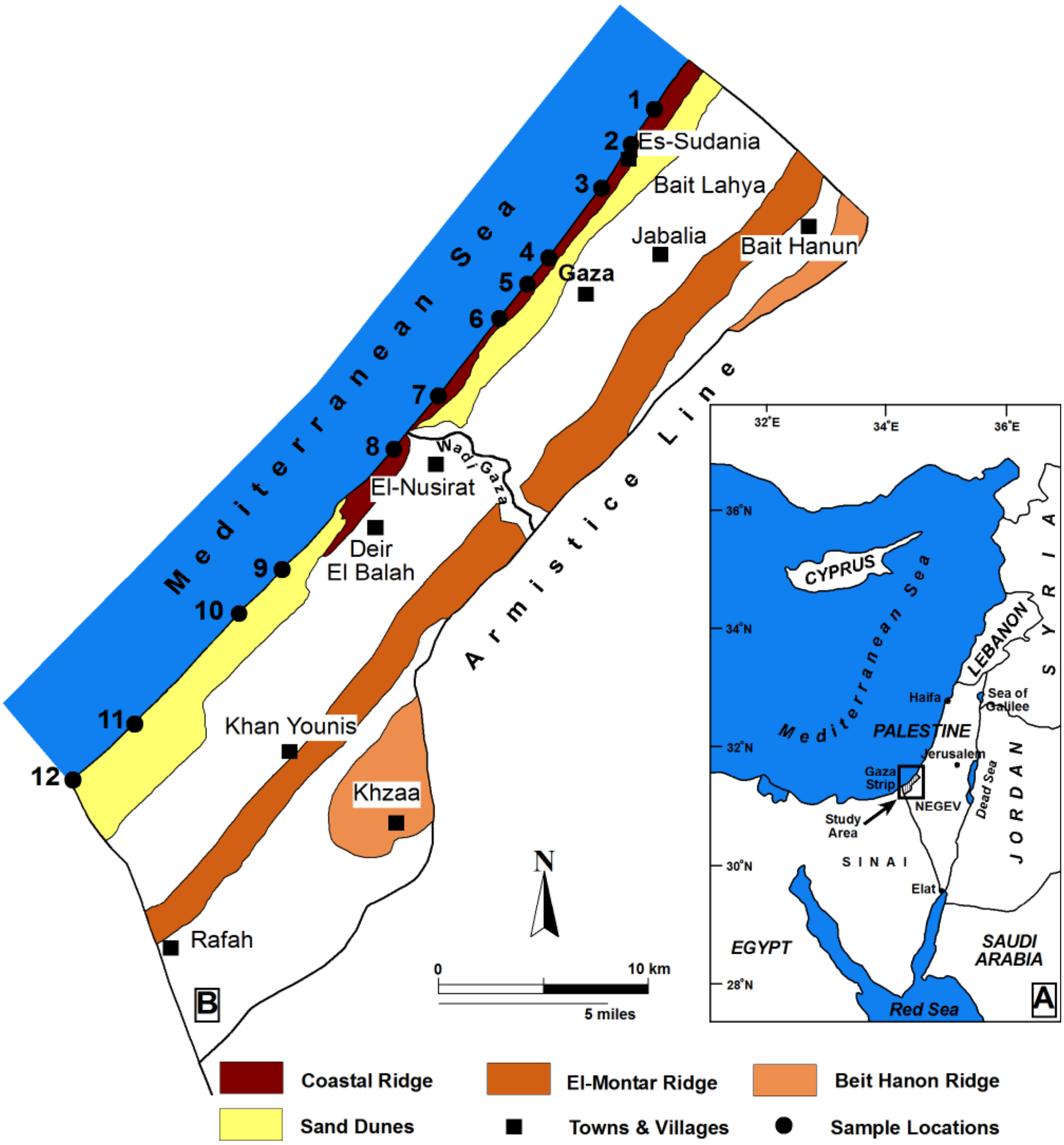

Figure 1. Location map of studied beach along Gaza Strip.

130 m shelf break, and because the base of each ridge has approximately the same elevation along its entire length.

These characteristics are to be expected for the deposition of coastal sand ridges, but they are unusual for purely tectonic features. Local people have mapped three accessible ridges on land and refer to them as kurkar ridges. People have used these ridges' hard sandstone, also called kurkar, extensively for construction since ancient times (Neev *et al.*, 1987).

The Gaza Strip is situated in the south-western part of Palestine on the Mediterranean Sea's southeast coastal plain, as Figure 1B illustrates. The three kurkar ridges define its topography. The coastal ridge is up to 50 m above MSL and extends up to the current coastline in the west. The Al-Montar and Beit Hanoun ridges run along its middle and the eastern parts, as Figure 1B depicts graphically. Stratigraphically, these ridges belong to the Pliocene-Pleistocene Kurkar Group. They consist of marine and continental calcareous sandstone (Bartov *et al.*, 1981; Frechen *et al.*, 2004; Galili *et al.*, 2007; Ubeid, 2010*a*), intercalated with red, sandy loam soils, called locally hamra, which is the Arabic word for red (Yaalon and Ganor, 1973; Ubeid, 2010*b*, 2011). Deep depressions separate the ridges 20 to 40 m above MSL with alluvial deposits.

The Gaza Strip is 45 km long, from 6 to 12 km wide, and 365 km^2 in area. Its coastal zone is a band of water and land along the marine shoreline in which different activities interact. It includes sand dunes in the south and north, coastal kurkar cliffs in the middle to the north, nonurban areas, and part of Gaza valley, which is also called Wadi Gaza. The coastal zone covers approximately 74 km^2, of which 2.7 km^2 are beaches.

The coastline has a straight and sandy shore. The near-coast continental shelf slopes down with a gradient of 1:100. The irregular and rocky seabed of the coastal shelf to the depth of 100 m is 28 km wide in the south and 14 km wide in the north. The seabed drops quickly beyond the depth of 100 m. Its sediments consist mainly of sand 25 m deep, with muddy places near the Wadi Gaza (Soghreah, 1996).

This paper's aim is to study the textural parameters of this location's sands in order to characterize their provenance and the beach profile along the coast.

Material and Methods

Field Procedure

I selected 12 locations along the Gaza Strip's beach, as indicated in Figure 1B, and identified them using landmarks and global positioning satellite (GPS) technology. Table 1 details this. This study then collected sand samples of at least 300 g from the uppermost cm of each location's inshore, foreshore, and backshore environments. This study surveyed the beach profiles using a tape measure and portable GPS technology.

Station number	Station	GPS Locations	
		N	**E**
1	Es-Sudania	31° 34` 30.0``	34° 28` 38.9``
2	Es-Sudania (El Nouras)	31° 33` 37.9	34° 27` 55``
3	North Beach Camp (Es-Safina Building)	31° 32` 48.4``	34° 27` 14.0``
4	Gaza Port	31° 31` 17.0``	34° 25` 44.1``
5	Esheikh Ejlein	31° 30` 35.2``	34° 25` 10.6``
6	Esheikh Ejlein	31° 29` 53.9``	34° 24` 32.4``
7	Esheikh Ejlein (Marina Resort)	31° 28` 10.4``	34° 22` 52.2``
8	South Wadi Gaza	31° 26` 55.1``	34° 21` 38.4``
9	Deir El Balah (Sonista Hotel)	31° 24` 18.3``	34° 18` 49.8``
10	Khan Younis	31° 23` 14.9``	34° 17` 33.3``
11	Khan Younis	31° 20` 53.4``	34° 14` 54.2``
12	Rafah Border	31° 19` 31.0``	34° 13` 15.8``

Table 1. Locations of beach sediment stations.

Laboratory and Statistical Analysis

This study determined particle sizes by sieving each sample, then processed the data using GRADISTAT software to obtain the grain-size distribution (Blott and Pye, 2001). Table 2 details this. This software uses the linear interpolation to calculate statistical parameters (Folk and Ward, 1957). Table 3 shows these. I used Grapher software to prepare the curves and plotted the stations' locations with ArcMap software.

Results and Discussion

Beach Profile

During the field surveys for preparing the beach profile at each location I observed that the beach's width varied between 15 m and 80 m. It is narrower at its middle and northern stretches and wider at its southern stretch, where the coastal ridge dies out. Figures 1B and 2 illustrate this. In some locations in its northern and the middle stretches it is approximately 15 m wide, and the effects of waves have caused slumps in the coastal ridge at sites 3 and 8. Figure 2 depicts this graphically and Figures 3A through 3D and 4A illustrate this photographically. Site 4 was, however, an exceptional case, its beach being up to 130 m wide, as Figures 2, 4B, and 4C illustrate. The slopes of the profiles are just few degrees at sites 4, 5, and 6 in Gaza City and at sites 10, 11, and 12 in the coast's southern stretch, as Figures 1A and 2 illustrate. They reach up to 90 degrees, however at sites 2 and 3 in the northern part of the coastline and at site 8 in its middle part. Figures 1A, 2, and 3B through 3D illustrate this.

The cliff heights on the coastal ridge at the beach vary from a few meters to 15 m, as Figure 2 illustrates, and the ridge's height increases eastward to 50 m in the northern and middle stretches. In the southern stretch it dies away and becomes mostly covered by sand dunes, as Figure 1B illustrates. The rocky outcroppings at the beach are alternately kurkar and hamra (Ubeid, 2010*a*; Ubeid, 2011), in addition to beach rocks within the foreshore zone, as Figures 3A through 3E illustrate.

Such factors as the local tides, in association with the coastline's shape and the inner continental shelf's configuration, and the absence of a significant current sediment supply source are the origin of the limited beach width in the study area (Castilhos and Gre, 2006). The limited width of the sites, however, is associated with the presence of medium sand and greater wave energy (Wright and Short, 1984). The extreme nature of site 4 is likely due to its protection by the Gaza seaport to the north, with its resulting predominance of fine sand. Such human construction activities along this part of the coast as the Es-Safina building near site 3 have also provided protection, resulting in more sand deposits north of the Gaza seaport and high levels of erosion south of it, as Figure 4 illustrates. The kurkar ridge tends to have poor consistency and is therefore highly vulnerable to the effects of waves during high tide that reduce the size of its boulders.

Textural parameters

The Gaza Strip's sand beach tends to be light yellow in color. This study was unable to perform a chemical analysis of it due its lacking the necessary equipment, but my observations of its physical properties indicated that it was highly likely to be composed of a high percentage of a light yellow color to transparent sugary quartz and approximately 1% dark-coloured accessory minerals, especially the samples from the southern stretch of coastline. This is highly likely a result of the its receiving larger amounts of sediment composed of diverse minerals from the Nile delta than the northern stretch.

Many of the samples contained notably coarse-sized shell fragments that represented less than 1% of their total weight. At site 8 the crushed shells of pelecypods had accumulated in the foreshore zone, as Figure 3F illustrates, indicating high wave energy.

Sample no.	Very Fine sand (%)	Fine sand (%)	Medium sand (%)	Coarse sand (%)	Very coarse sand (%)
1S/1	0.6	18.8	58.8	22.7	0.1
2S/1	1.8	29.6	68.0	0.5	0.1
3S/1	0.9	7.6	85.3	6.2	0.0
1S/2	0.3	5.5	85.1	9.0	0.0
2S/2	1.6	22.8	74.4	1.2	0.0
3S/2	1.6	33.5	62.6	2.3	0.0
1S/3	0.9	3.8	72.6	22.2	0.6
2S/3	0.9	5.6	80.2	13.3	0.0
3S/3	2.2	28.4	64.5	4.9	0.0
1S/4	1.1	33.2	61.6	3.8	0.2
2S/4	2.0	96.8	1.1	0.2	0.0
3S/4	3.6	52.1	44.1	0.2	0.0
1S/5	0.6	23.0	68.2	7.2	0.1
2S/5	2.0	39.5	58.2	0.3	0.0
3S/5	2.7	44.7	52.4	0.3	0.0
1S/6	1.5	25.0	67.3	6.3	0.0
2S/6	2.1	24.6	71.9	1.4	0.0
3S/6	2.7	23.3	73.6	0.6	0.0
1S/7	1.6	33.7	61.2	3.5	0.0
2S/7	1.6	24.9	70.4	3.1	0.0
3S/7	1.5	13.3	70.6	14.4	0.3
1S/8	1.1	21.4	55.0	21.8	0.7
2S/8	1.7	28.6	67.0	2.6	0.0
3S/8	3.0	45.8	46.8	4.4	0.0
1S/9	1.3	33.1	55.7	9.8	0.1
2S/9	1.6	31.1	66.4	0.9	0.0
3S/9	2.7	40.3	55.2	1.9	0.0
1S/10	0.6	14.9	62.2	21.8	0.5
2S/10	1.5	14.0	57.2	26.9	0.5
3S/10	2.5	38.8	56.7	2.1	0.0
1S/11	0.2	9.2	57.5	32.9	0.2
2S/11	0.1	10.4	60.9	28.6	0.1
3S/11	0.9	16.4	78.3	4.4	0.0
1S/12	0.2	8.8	78.1	12.6	0.3
2S/12	0.6	9.4	78.2	11.7	0.2
3S/12	1.6	18.8	75.7	3.7	0.3

Table 2. Grain size distribution of beach-sands.

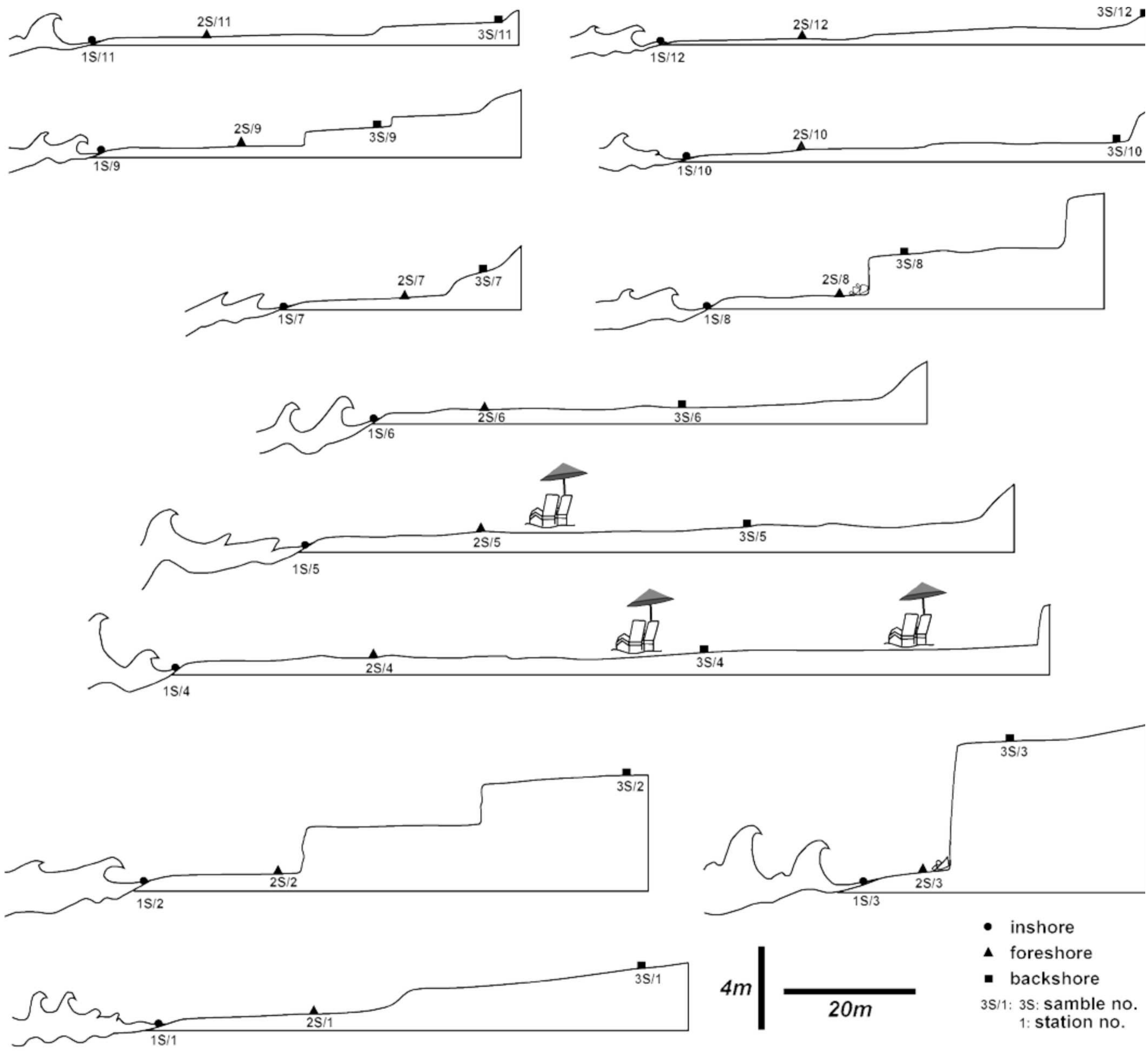

Figure 2. Beach profiles, for beach sample stations.

Table 3 lists the parameters of the grain sizes of the sands from all 12 sites. An analysis of the surface sediment samples for each site revealed that the mean grain size of all the samples except samples 2 and 3 at site 4 tended to be medium, the exceptions' sizes being fine. Figure 5A illustrates this. This finding that the grain sizes were predominantly medium is likely to be the result of such factors responsible for the sediment transport processes and the settling of beach sand as the different beach sectors' degrees of exposure to hydrodynamic agents and the longshore gradients of wave energy. The exception at site 4 is high likely to be due to the construction of the Es-Safina building on the foreshore at site 3, illustrated in Figure 4D, and the Gaza seaport, which is located approximately 100 m to north of site 4, as Figure 4B illustrates, and which protects the site from the sea agents' influence.

Most of the samples had moderately good sorting, as Figure 5B illustrates, except the samples from sites 2, 3, 11, and 12, which had good to very good sorting. Table 3 presents the figures in regard to this. This is due to these sites being exposed to sea-wave abrasion that has improved their sands' sorting. Well-sorted medium sand is mainly associated with the effects of the marine, fluvial, and eolian selectiveness that produces it due to the hydraulic action of waves in beach sedimentary environments and wind in dune ones (Carranza-Edwards *et al.*, 1996; Carranza-Edwards, 2001; Kasper-Zubillaga and Carranza-Edwards, 2005).

Sample	M		σ		Sk_I	K_G	Description			
no.	φ	mµ	φ	mµ			Mean	Sorting	Skewness	Kurtosis
1S/1	1.472	360.6	0.663	1.583	0.093	1.068	Medium Sand	Moderately Well Sorted	Symmetrical	Mesokurtic
2S/1	1.826	282.1	0.600	1.516	0.252	0.873	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
3S/1	1.513	350.3	0.435	1.352	0.105	1.090	Medium Sand	Well Sorted	Fine Skewed	Mesokurtic
1S/2	1.482	358.0	0.411	1.330	-0.014	0.974	Medium Sand	Well Sorted	Fine Skewed	Mesokurtic
2S/2	1.741	299.1	0.565	1.480	0.273	1.097	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
3S/2	1.851	277.2	0.619	1.536	0.211	0.810	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
1S/3	1.348	392.9	0.478	1.392	-0.119	0.872	Medium Sand	Well Sorted	Coarse Skewed	Platykurtic
2S/3	1.457	364.2	0.454	1.370	0.004	1.051	Medium Sand	Well Sorted	Symmetrical	Mesokurtic
3S/3	1.795	288.2	0.624	1.541	0.240	0.880	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
1S/4	1.831	281.1	0.623	1.540	0.203	0.814	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
2S/4	2.504	176.3	0.317	1.245	0.000	0.738	Fine Sand	Very Well Sorted	Symmetrical	Platykurtic
3S/4	2.076	237.1	0.633	1.551	-0.071	0.744	Fine Sand	Moderately Well Sorted	Symmetrical	Platykurtic
1S/5	1.709	305.8	0.618	1.535	0.203	1.133	Medium Sand	Moderately Well Sorted	Fine Skewed	Leptokurtic
2S/5	1.923	263.8	0.623	1.540	0.156	0.761	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
3S/5	1.983	252.9	0.632	1.549	0.075	0.741	Medium Sand	Moderately Well Sorted	Symmetrical	Platykurtic
1S/6	1.738	299.7	0.617	1.534	0.218	1.033	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
2S/6	1.772	292.8	0.585	1.501	0.275	1.013	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
3S/6	1.769	293.3	0.582	1.497	0.287	1.067	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
1S/7	1.845	278.3	0.626	1.543	0.202	0.805	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
2S/7	1.758	295.7	0.588	1.503	0.262	1.003	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
3S/7	1.501	353.3	0.560	1.475	0.086	1.220	Medium Sand	Moderately Well Sorted	Symmetrical	Leptokurtic
1S/8	1.541	343.7	0.722	1.650	0.111	1.042	Medium Sand	Moderately Sorted	Fine Skewed	Mesokurtic
2S/8	1.802	286.7	0.605	1.521	0.247	0.889	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
3S/8	1.981	253.4	0.662	1.582	0.010	0.738	Medium Sand	Moderately Well Sorted	Symmetrical	Platykurtic
1S/9	1.796	287.9	0.696	1.621	0.107	0.893	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
2S/9	1.836	280.1	0.605	1.521	0.239	0.846	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
3S/9	1.932	264.1	0.639	1.557	0.132	0.753	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
1S/10	1.423	373.1	0.620	1.537	0.050	1.108	Medium Sand	Moderately Well Sorted	Symmetrical	Mesokurtic
2S/10	1.385	382.9	0.641	1.559	0.098	1.027	Medium Sand	Moderately Well Sorted	Symmetrical	Mesokurtic
3S/10	1.914	265.3	0.637	1.555	0.152	0.761	Medium Sand	Moderately Well Sorted	Fine Skewed	Platykurtic
1S/11	1.300	406.2	0.585	1.500	0.117	0.923	Medium Sand	Moderately Well Sorted	Fine Skewed	Mesokurtic
2S/11	1.343	394.2	0.582	1.497	0.089	0.970	Medium Sand	Moderately Well Sorted	Symmetrical	Mesokurtic
3S/11	1.603	329.1	0.497	1.411	0.204	1.118	Medium Sand	Well Sorted	Fine Skewed	Leptokurtic
1S/12	1.475	359.7	0.492	1.407	0.040	1.161	Medium Sand	Well Sorted	Symmetrical	Leptokurtic
2S/12	1.488	356.4	0.496	1.411	0.069	1.179	Medium Sand	Well Sorted	Symmetrical	Leptokurtic
3S/12	1.668	314.7	0.543	1.457	0.253	1.121	Medium Sand	Moderately Well Sorted	Fine Skewed	Leptokurtic

M = mean grain size; σ = sorting; Sk_I = skewness; K_G = kurtosis; 1S/4: 1S = inshore sample; 2S = foreshore sample and 3S = backshore sample at station number 4.

Table 3. Textural parameters of beach sands.

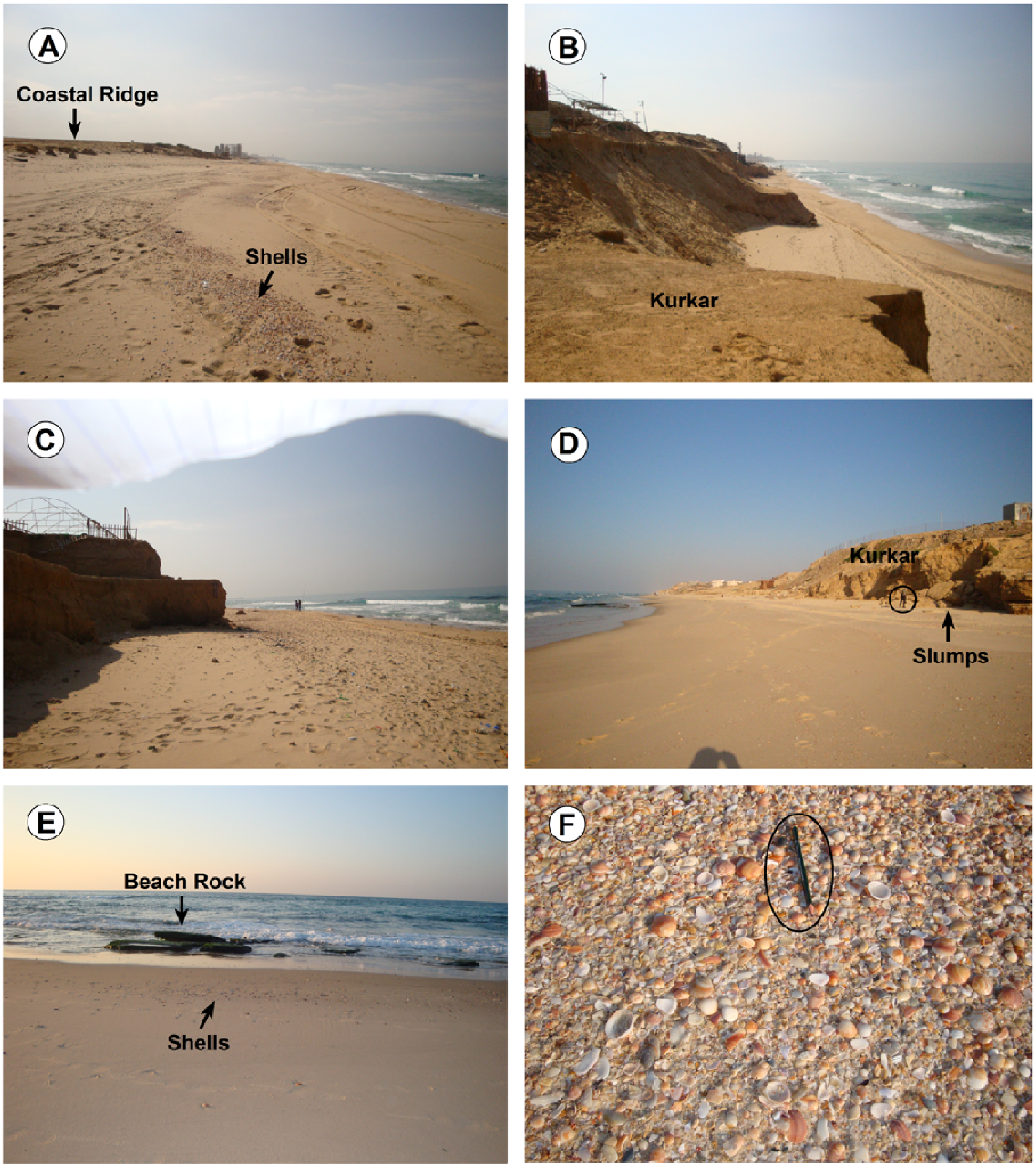

Figure 3. Visually identified beach features at low tide: (**A**) Wide sandy beach with some shells of pelecepods. Northern part of Gaza Strip, at site no. 1. (**B & C**) Narrow sandy beach bounded from the east by sharp cliff of the coastal kurkar ridge. Northern part of Gaza Strip, at site no. 2. (**D**) Slumps of coastal kurkar ridge due to waves effect during high tide. Middle part of Gaza Strip, at site no. 8. (**E**) Exposed beach rock. Middle part of Gaza Strip, at site no. 9. (**F**) Accumulation of crushed and shells of pelecepods, around the site 9. Man and pencil scales in D& F are 175 and 15 cm respectively.

Most of samples were finely skewed and some of them were symmetrical, as Figure 5C illustrates. Site 3 was an exception. Skewness generally tends to be closely related to environmental energy, with high-energy environments producing finely skewed sand (Duane, 1964). Its particularly finely skewed sand was

a product of the higher-energy environment resulting from the construction on the foreshore and a particularly narrow beach.

Most of the samples were mesokurtic to platykurtic, and some of them were leptokurtic, as Figure 5D illustrates. The mesokurtic and platykurtic results indicate the presence of more than one population, and those in unequal amounts (Jaquet and Vernet, 1976).

The beaches' medium-grain sediments, therefore, are attributable to open-sea influences, with the waves being moderately well sorted. The skewness findings, furthermore, indicate a high-energy environment, the exceptions occurring due to human construction activity.

Figure 4. Illustrates the effects of the seaport and the buildings in the foreshore zone. (**A**) Shows the results of erosion by the waves in the coastal ridge. Direct to north of the Es-Safina building, north of Gaza Strip, site 3. (**B**) Shows the results of high rate of sands deposition, directly to south of seaport, Gaza city, site 4. Compare sites 3 & 4 in Fig. 2. (**C**) Shows the wide beach to north of seaport. Beach of Gaza city. (**D**) Es-Safina building bounded by the barriers, increasing the erosion in its northern side (see also A).

Longshore Sediment Transport

Gaza's beach sand comes primarily from the marine environment because no significant onshore sources of beach-quality sand are available. Longshore currents generated by approaching breaking waves transport it to the Gaza Strip's coastline from the Nile delta. These currents appear to affect the transport of sediment more strongly than other mechanisms. Its transportation northward along the Mediterranean coast results from larger waves approaching from the WSW and SW than those from the WNW and NW (Zviely *et al.*, 2007).

Before the construction of the High Dam at Aswan in Egypt, the Nile littoral cell, which runs 650 km along the south-eastern Mediterranean from Abu Quir Bay near Alexandria, Egypt, to Haifa Bay on the northern Palestinian coast, as Figure 6 depicts, Gaza's primary source of sand was the Nile River. The dam's completion in 1964, however, effectively blocked this flow and forced the longshore currents to take sands from the Nile delta's coast and its seabed instead (Frihy, 1988; Smith and Abdel Kader, 1988; Fanos, 1995; Stanly, 1998; El-Raey *et al.*, 1999; White and El Asmar, 1999; Zviely *et al.*, 2007).

Despite erosion in some sectors of the Nile delta's coast, sand has continued to reach the up-drift beaches and inner continental shelf of northern Sinai as well as the Palestinian coast up to Haifa Bay, the final depositional sink (Horowitz, 1979; Carmel *et al.*, 1985; Perlin and Kit, 1999; Den-Dor *et al.*, 2006; Zviely *et al.*, 2007; Ubeid, 2010; Nir, 1980; Zviely *et al.*, 2006). The volume of sand that the longshore currents carry depends largely on the radiation stress caused by breaking waves (Nir, 1989; Ben-Dor *et al.*, 2006; Zviely *et al.*, 2007). Approximately 400,000 m^3 of sand reaches the Gaza Strip annually (Ben-Dor *et al.*, 2006), as Figure 6 indicates.

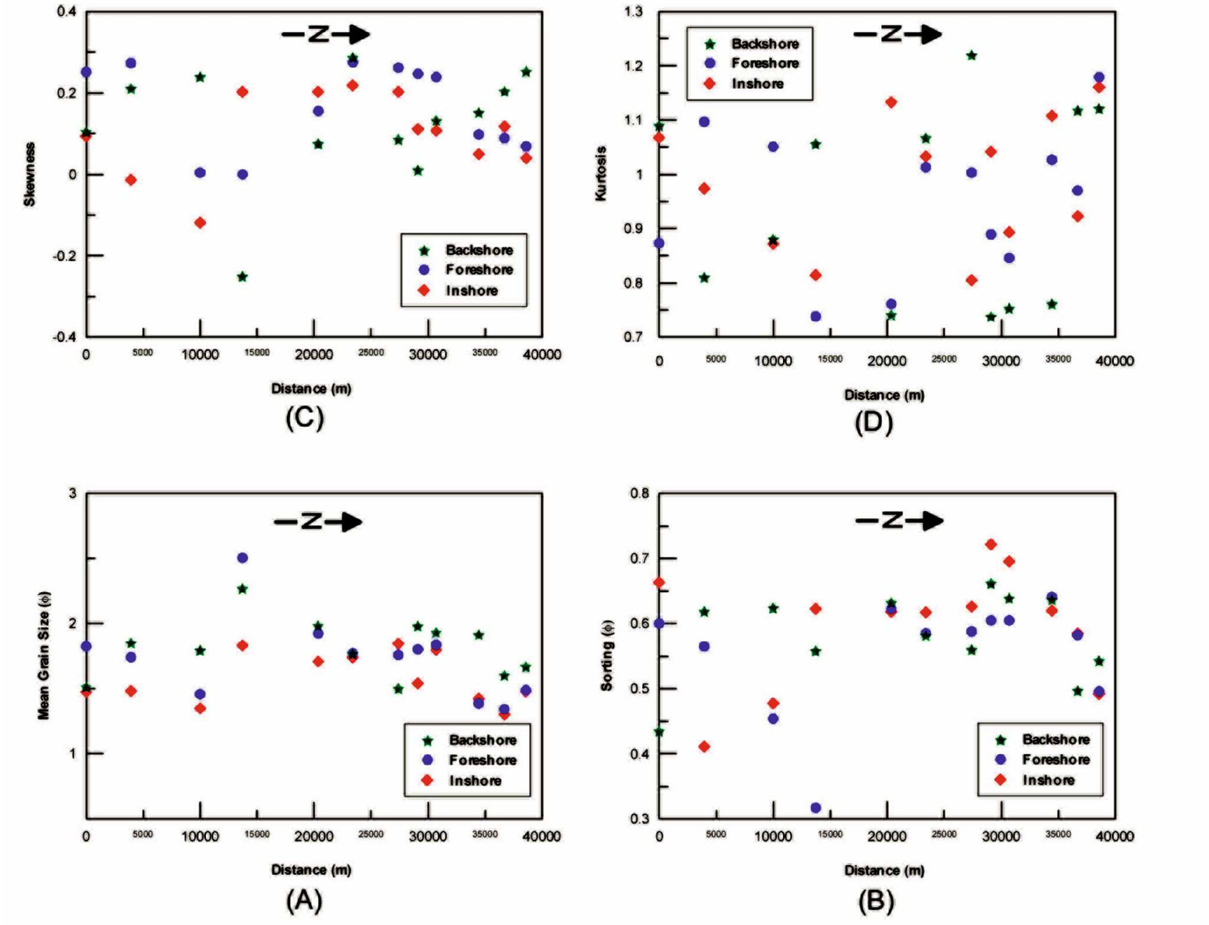

Figure 5. Textural patterns along the beach sands.

This study's data analysis showed further that the percentage of fine and medium-grain sand increased toward the north and the percentage of coarse-grained sand increased toward the south, as Figure 7 depicts graphically. This indicates that the sand grains become segregated due to their size as they move northward.

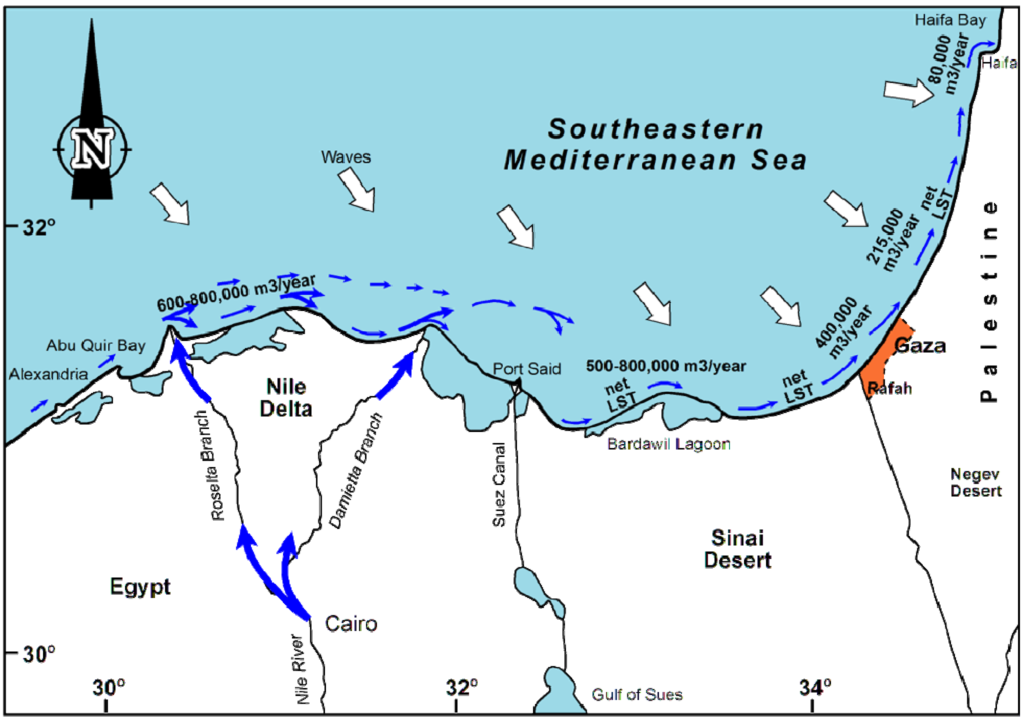

Figure 6. Longshore sand transport (LST) from the Nile delta coast towards Palestine; and yearly estimates of the amount of sand transported at various locations (following Nir, 1989; Ben-Dor *et al.*, 2006 & Zveily *et al.*, 2007).

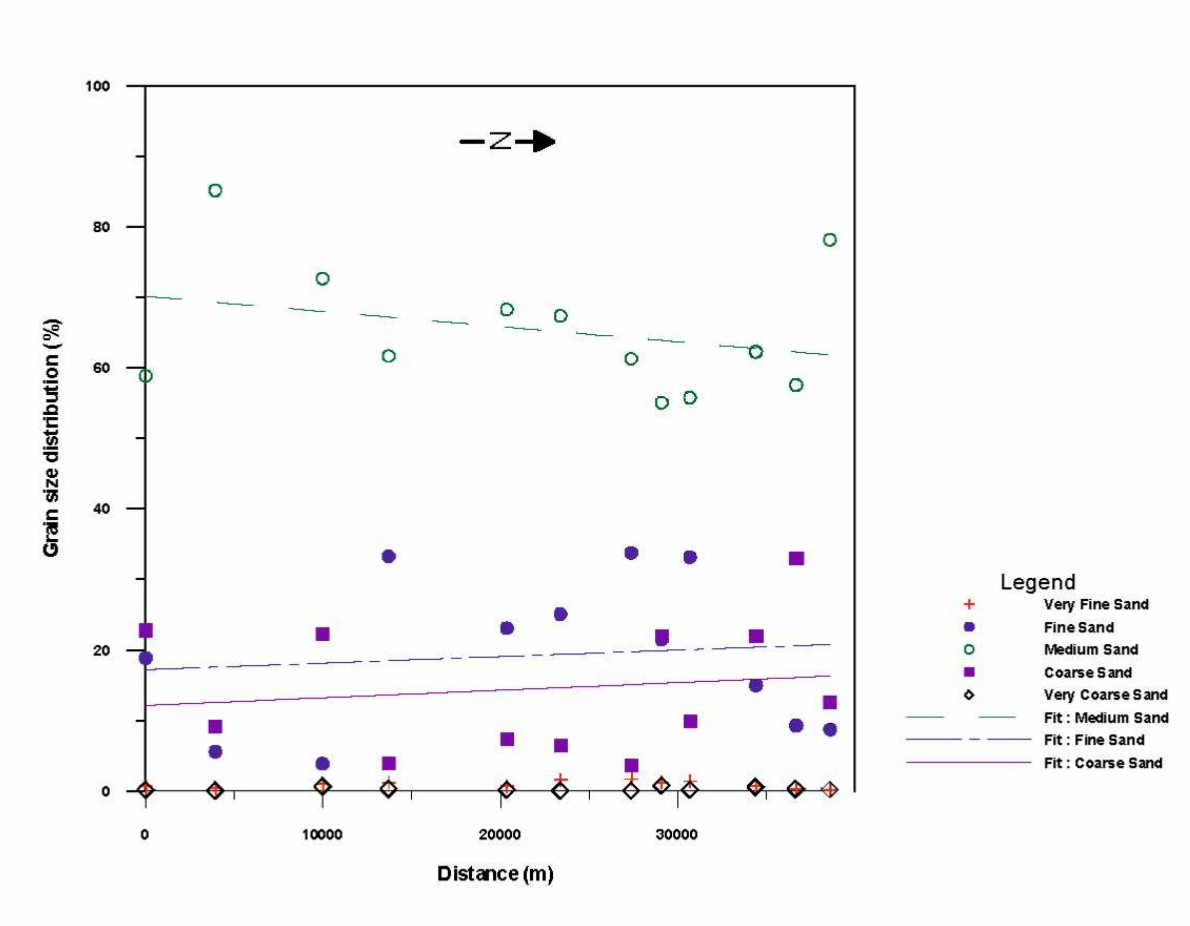

Figure 7. Significant correlations of grain size distributions along the beach sands.

Conclusions

This study's survey of the Gaza Strip's coastal zone found that its beaches tend to be narrower in its middle and north than in its south and its northernmost stretch. An exception is that the beach tends to be wide south of Gaza seaport in its middle stretch due an increase in the depositional rate and in the rate of erosion north of it.

The slope of the beach profile along the coastline varies from a few degrees to 90 degrees. The height of the sea cliffs of the coastal ridge is higher in its middle and northern stretches than in the south, where it dies out into sand dunes.

All of the Gaza Strip's beaches are sandy. Longshore currents transport these sands along the eastern shore of the Mediterranean Sea from the Nile delta. This study's analysis of 36 samples from 12 locations along these beaches found that the sand grains become segregated as they move from south to north, becoming increasingly fine as they go. They are in general predominantly medium grained. On most of the beaches they are moderately well sorted, due mainly to the actions of marine currents, waves, and tides.

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