Gen. Intro

CLIMATE IN RELATIONSHIP TO MAN.

Where the climate ~~of~~ of an area is extreme, either too hot or too cold, mans comfort, and directly related to that, his energy and ability to perform efficiently, are all greatly reduced. The ~~play~~ climatic environment consists of many elements in a complex relationship. They all act directly on the human body, which can either absorb them or try to counteract their effects.

In the climate of the Bahrain coast the most critical time of year occurs during the summer months, when air shown, there are both high temperatures and high relative humidity. The cooling effect of air movement over the skin surface is a major factor in creating a comfortable climatic environment. Physical coolness can be achieved in several ways, but here the principle factor is the heat conductance from the body to air below skin temperature, which can be hastened by air movement and evaporative cooling Air movement affects body cooling, ~~it does not decrease the temperature but~~ causes a cooling sensation due to heat loss by convection and due to increased evaporation from the body.

Basically the passage of air over the skin surface helps to remove moisture collecting on the body which in turn allows more moisture to come to the surface of the body, which ~~has a cooling effect on the body itself.~~ Normally this moisture can be absorbed direct into the atmosphere, but where the relative humidity is high, the moisture coming to the skin surface cannot readily be taken into the air, which is itself nearing saturation. At this point air movement becomes extremely important.

As the air movement increases, the upper level of the comfort zone is raised

Conversely, during periods of coolness, air movement will lower the body temperature more than is necessary, since the winter climate falls in or below the comfort zone. Hence air movement should be avoided and restricted as far as possible

Fig 3.? shows ~~the~~ this effect.

3·1·2 Climate

The Batinah coast has a climate directly effected by ~~the~~ its proximity to the sea. This relationship with the sea is further emphasised by the line of mountains running the whole length of the coastal plain and isolating it from the hot dry climate of the interior desert. The ~~moisture content of the air due to its~~ modifying effect on proximity to the sea ~~results in~~ has a ~~a modification of~~ the temperature pattern.

Maximum temperatures occur in July [40°c] and minimum in december [15°c] [daytime max. 25°c]

The annual temperature range is 25°c, which is less than it would be in areas away from the sea.

The diurnal range increases with distance from the sea. On the coast and in the cultivated belt it is ~~2~~ on average only 10°c. This low diurnal range is a result of the high humidity which keeps nighttime temperatures high. Inland the nights are colder and the days hotter. Relative humidity reaches 75% during summer and winter, but drops to 50% during spring and autumn. The combination of high humidity and temperature during the summer make it ~~or~~ a critical period of the year. Inland the effect of the sea decreases and winter temperatures are lower than on the beach front. ~~The winds in the are~~ The beach and the cultivated belt are both effected by the land/sea breezes ~~that occur on~~ These winds are a result of the unequal heating of land and water. Although the intensity of solar radiation is the same on ~~the~~ land and sea, the temperature of the land rises more quickly ~~than that~~ than the sea. ~~After sunset~~, the land cools ~~more~~ more quickly than the sea, which has a greater heat capacity.

Because during the day the land is hotter than the sea, a relative low pressure area is created and a convection system developes over the land. Hot air rising from the land is replaced by cool air drawn in from the sea, ~~where the air is cooler~~ causing a breeze blowing from sea to land at low level, while an upper air current blows the other way - see F.3. This sea breeze does not begin to blow until the sun has had time to

raise the temperature of the land above that of the sea. It begin gradually and increases as the heating continues. As solar radiation diminishes in the afternoon and the temperature of the land falls, the sea breeze dies away until the temperature of the land reaches that of the sea. Since the land continues to cool ~~more~~ faster than the sea, the sea becomes a low pressure area, being hotter than the land. A reverse circulation of air is set up, with low level air currents blowing from the land to the sea. The land/sea breeze is only felt when the sky is clear and solar radiation can heat up the land. These winds are strongest when the diurnal range is greatest – in other words when the differences between land and sea temperatures are most extreme.

The land/sea breeze effect is ~~local~~ a local or micro climate phenomena and only operates within 3 or 4 km from the shore ~~at the~~ most. It is ~~effected~~ affected by the prevailing winds ~~which~~ which is a macro-climate condition. Inland these winds take over from the land sea breeze, and ~~within the area effected by the is~~ even on the coast a prevailing onshore wind in one particular season will ~~strengthen~~ the daytime sea breeze and reduce the nightime land breeze, so that where the prevailing wind is strong, ~~it can negate the effect of the land or sea breeze,~~ depending upon ~~the~~ its direction ~~of the prevailing wind~~. it can negate the effect of the land or sea breeze, the two opposing forces resulting in no air movement or in some cases, an overriding prevailing wind causing an onshore breeze to be felt at night-time when the land breeze should be blowing.

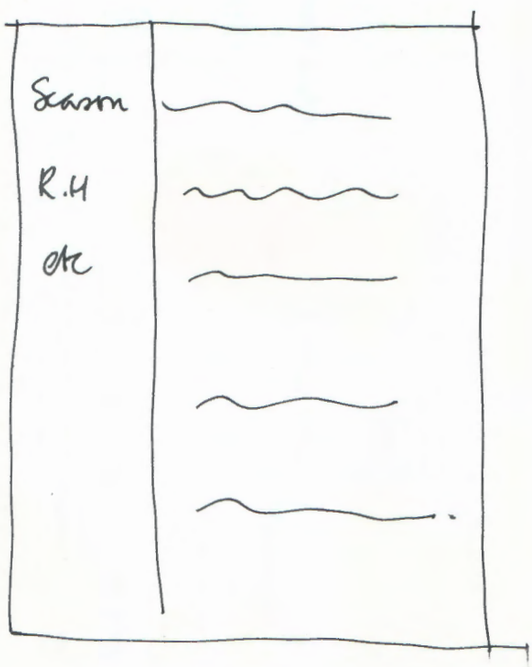
Inland of the cultivated belt the prevailing wind ~~with~~ takes over from the influence of the land/sea breezes.

Rainfall occurs intermittantly in ~~xxx~~ winter and * occasionally in ~~August July and~~ August, but in quantities that are so small as to be scarcely recordable. ~~Winter rain is common enough to be a d~~ There is enough rain in the winter to merit precautions ~~to~~ being taken in roof design, ~~but it is and it falls in short periods, and therefore may be quite concentr~~ but and rain, although falling only briefly, can be quite heavy for a short period of time.

The charts show the average air temperature ~~Hu~~ for the Batinah Coast, with a ~~daily maxi~~ monthly average maximum and minimum. Relative humidity is shown in the same way Rainfall shows average quantities ~~for the whole~~ for the complete month.

The comfort zone is related to effective temperature, which takes into account the effect of air movement.

[use of sun path diag ~ egypt report



In relationship to the actual climate of the Bathinah coast the effect of climatic elements fall into two zones - one period of over heating and one period of coolness. The buildings ~~& that are~~ and features that are presented in the following pages reflect the need to create a micro climate within the comfort zone, by making maximum use of materials, design and orientation.

On shore - off shore/sea - land breaze modified by prevailing wind conditions (ref. fig ... in Climate introduction) Most of year there is a prevailing on shore condition except for a couple months in the summer. The prevailing N or NW wind acts to strengthen the daytime on shore effect & hinder the night land breaze. This results in strong daytime wind most of the year and a weak or no resistant night time effect in parts of the year (esp spring & fall.) On the other hand in July & August due to shifting continental air mass pressure systems there is a prevailing off shore effect with a SW wind. This results in a strengthening of night-time land breaze as well.