

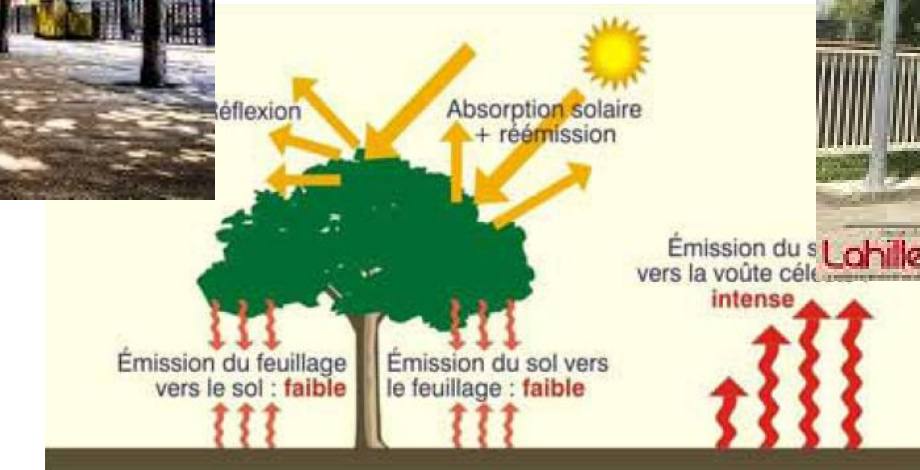
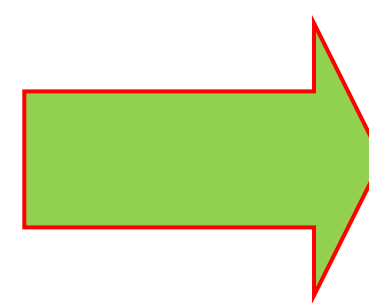
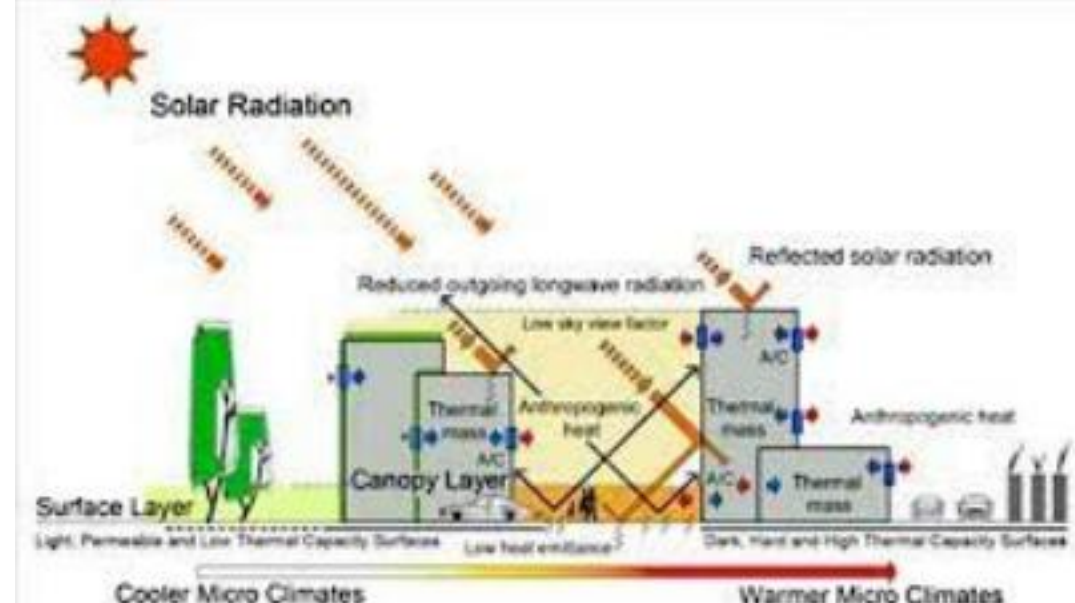
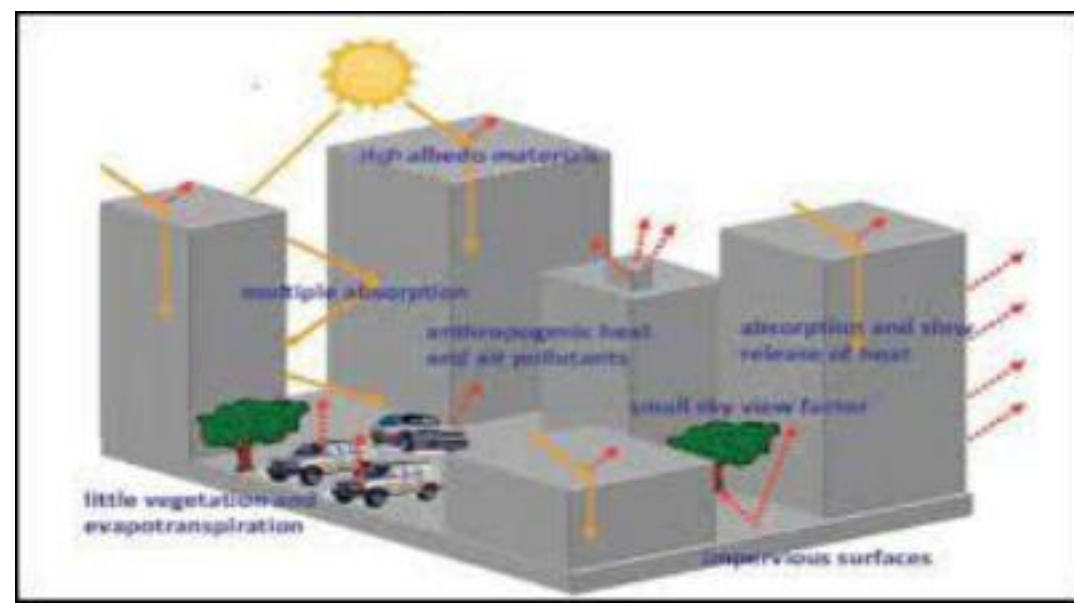
Thermal and visual comfort conditions under shaded outdoor spaces in hot and dry climate.

LOUAFI ep BELLARA Samira et ABDOU Saliha
ABE Laboratory, Department of Architecture and Urbanism,
University Constantine3 (Algeria)
Email: samira.louafi@univ-constantine3.dz



1-Introduction

The energy balance of urban surface paving materials is the main contributor to the phenomenon of the urban heat island effect. It develops, in summer, more and more problems related to microclimatic phenomena.



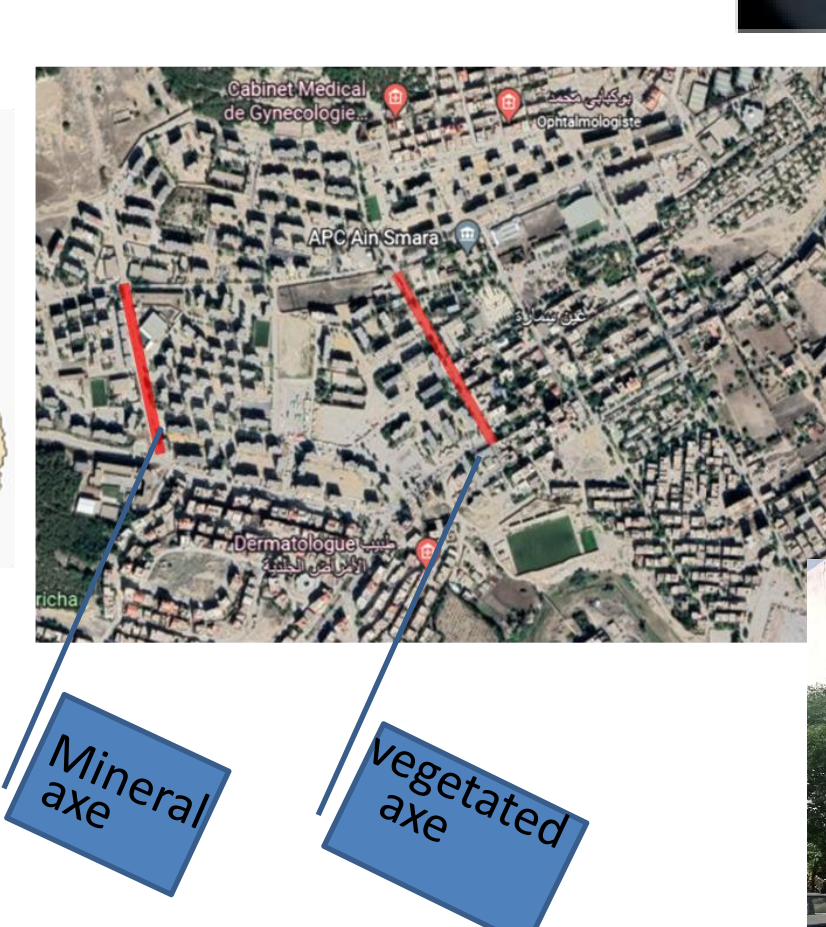
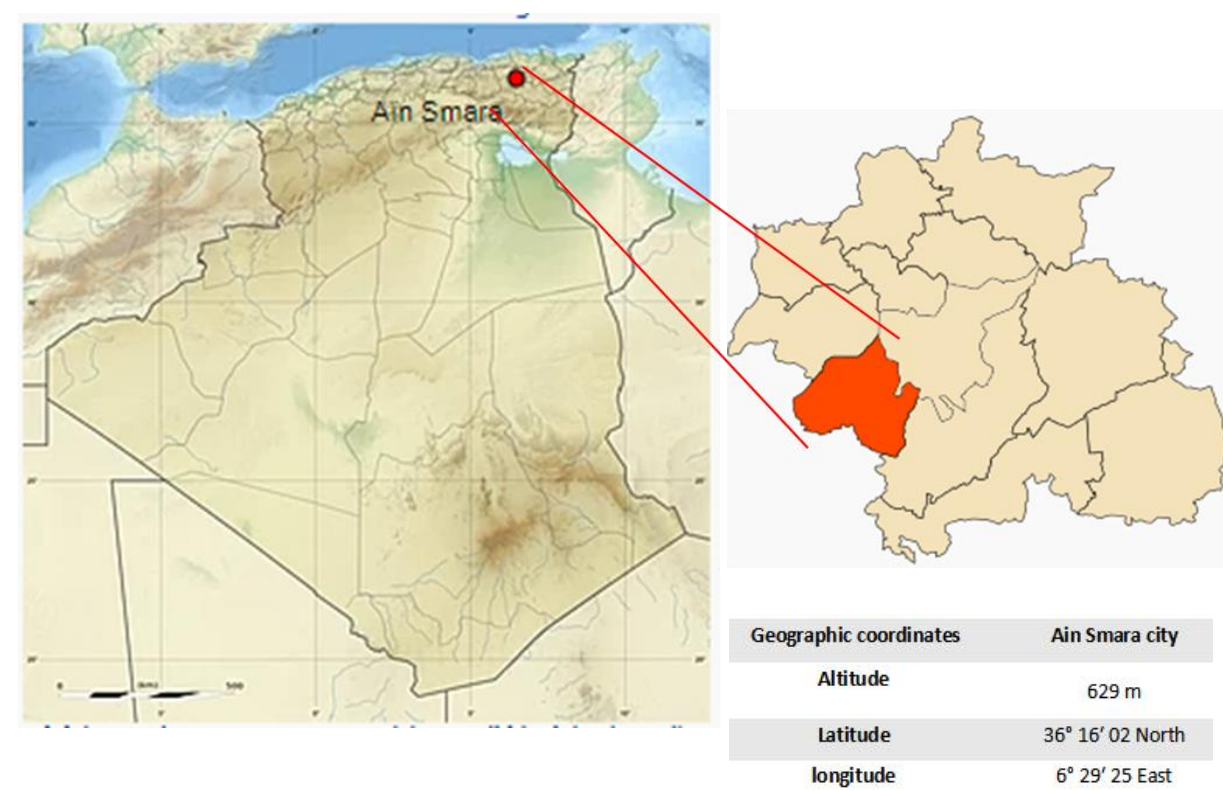
The shade is in general the outside required principal effect on the period of overheating for the areas with hot and dry climate.

This shade reduces solar flows considerably, by limiting the heating of surfaces which normally should be sunny, also reduces thermal radiative flows..

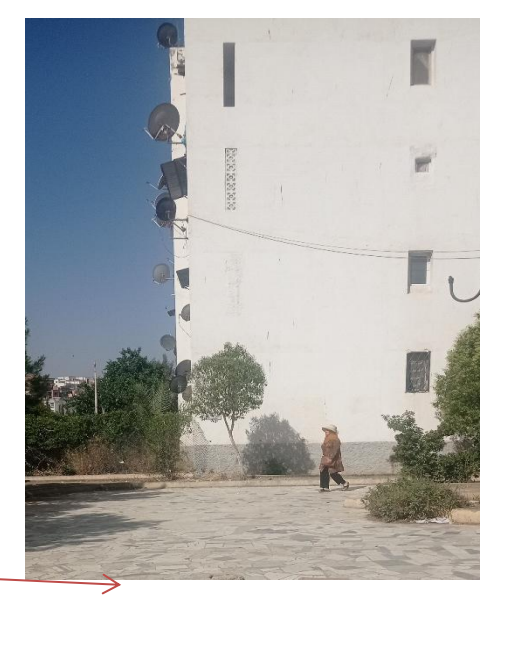
Quality urban spaces = climate in urban planning

In the present article, the aim is to assess whether people located under shade spaces experience thermal and visual comfort or stress in outdoor spaces during hot-dry season.

2-Site Investigation



Measured point station



3-Results & Discussion

Survey results

Climatic factor is the factor for feeling comfort, attendance and planning can participate in the sensation of comfort. Perception of comfort in the different localizations of shaded by building, trees or structures are neutral than ones in full insulation which are uncomfortable. The survey results show that with tree coverage, the sun's radiation is perceived as neutral by 75% to 100% of the interviewees, whereas with no tree cover, 60% to 90% think there is too much sun.

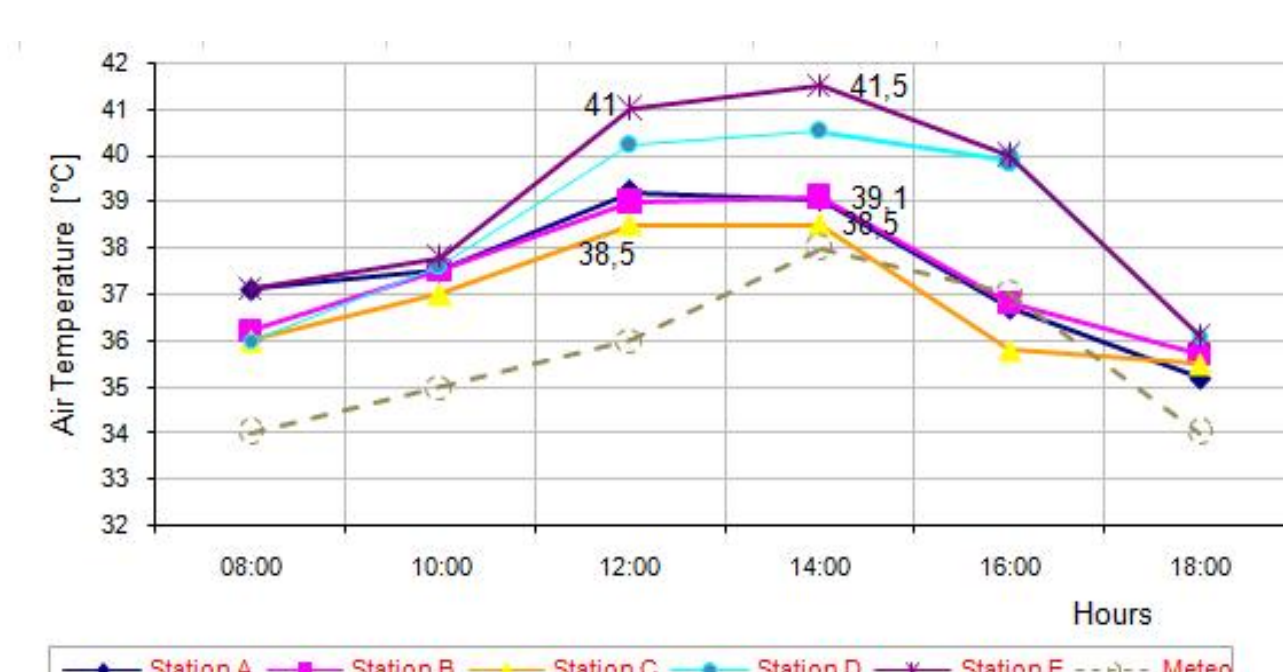
Perception

SCALE OF APPRECIATION OF THE DIFFERENTS PSYCHOPHYSICAL STATION (Q-TH, Q-VI, Q-AC ET Q-OL)

Scale	Appreciation
0	Very uncomfortable
25	Uncomfortable
50	Neutral
75	Pleasant
100	Very pleasant

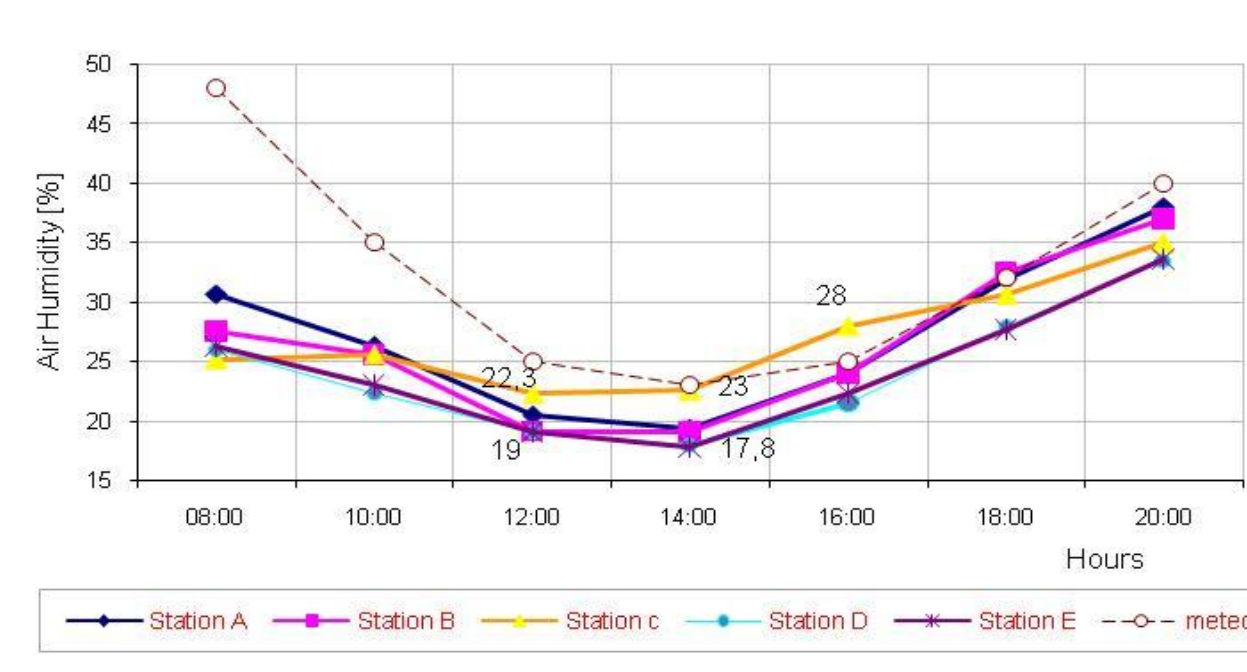
Investigation results

Impact of shade on the Air Temperature



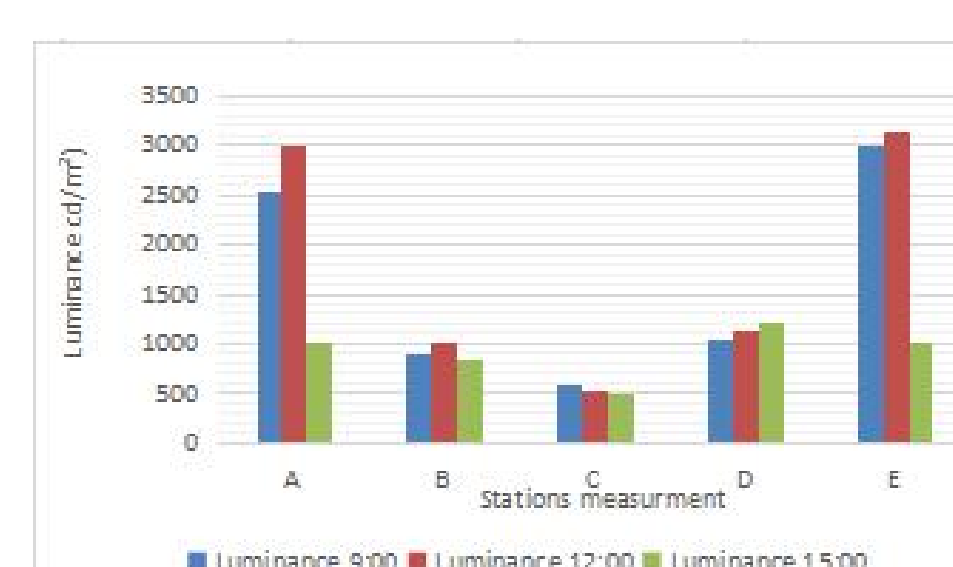
- We note a difference of 2 °C and 4°C between a space with vegetation cover and others without coverage in the street. Shade reduces the air temperatures and increases the relative humidity of air. These conditions make these spaces more perceptive for grouping or passing through space.
- Street spaces without trees or structure cover are warmer from 10am to 6pm, than the vegetal street.

Impact of shade on the Air Humidity



Impact of shade on Luminance (visual comfort)

- shade filters the solar radiation and minimize the glare in the outdoor space
- shade can participate in visual comfort



Thermal Comfort Analysis



PET and UTCI varies according to the importance of the solar radiations received and reflected by surfaces. Its maximum value reached 55°C in station D and E. And its minimum with presence of shade.

4-Conclusion

The shade can affect the microclimate in many ways, in particular reducing the air temperature, air humidity compared to station without shade, while getting shade.

- We can note a variation in the air temperature of 2.5°C to 3°C in open spaces according to the quantity of the shadow, the duration of sunning, and an increase in the air relative humidity about 2.7% to 4.4% what supports the bioclimatic effect of the shade by the vegetation. The percentage of tree coverage of a space is a highly important metric to assess outdoor comfort in a hot-dry climate and that it influences mainly the use of outdoor recreational areas. Dense vegetation cover optimizes the microclimatic environment for pedestrians' thermal comfort in urban spaces, under these climatic conditions.

Shade under trees increase the well-being perception of external space and thermal comfort felt on period of heat stress in Mediterranean climate, hot and dry.