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Site Climatic Features Survey of Urban Parks in the City of Isfahan

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ABSTRACT

The term climate is a little complex that affected the planning and designing urban parks. It refers to the long-standing weather conditions or weather situation in a certain district. Weather and climate features of the site, such as average maximum and minimum temperature, relative humidity, precipitation, Sunshine hours, clouds, wind speed and direction, Dew point, snow were investigate in urban parks of Isfahan. This information will also become more important for planning and designing the parks. This paper has been conducted on the basis of synoptic station raw information of Isfahan. We discuss the data of these features that affect the urban parks and green space of the city of Isfahan.

Keywords: Urban Park, humidity, Average temperature, Precipitation, Daylight hours, Clouds, Wind speed and Direction.

I. INTRODUCTION

Natural environmental factors that are mostly susceptible to variation are climate, geology, hydrology, soil, topography and vegetation. Although space and environment should be considered as interacting factors, in some places the location of certain resorts can be largely explained in terms of environmental factors, while in other places location can be mainly qualified to space, related to market availability and other concentrations of economic activity (Burkart and Medlik, 1986; Butler, 1986; Cazes, Lanquar and Raynouard, 1980; Defert, 1954; Pearce, 1981; Vera, Lo´ pez, Marchena and Anto´ n, 1997). Climate is one of the geophysical elements that make up geographical space, contributing to the environmental conditions that facilitate or hold back human settlement. People seek to settle in those spaces that offer the greatest comfort and possibilities of survival in terms of climate.

Climate is a basic resource for various activities, which depend on the climate and weather to use Smith's (1993) terminology which include urban parks visit, winter sports, health tourism, and water sports. As climatic conditions are significant in drawing up the school and work calendars, seasonal variation in the climate has generated a strong concentration of the tourism offer and demand, although it is not the only factor affecting seasonality (Ramo´ n and Abella´n, 1995).

At high latitudes, a substantial portion of precipitation falls in the form of snow. Measuring such precipitation has many applications, such as forecasting hazardous weather, understanding the hydrological water budget, and obtaining accurate estimates of precipitation on a global scale. The yearly precipitation average over the earth is about 690 mm (Mugnai et al., 2007), about 5% of which is in the form of snowfall. Although snowfall can be a significant portion of the total precipitation at high latitude continental regions and is thus the main driver of the regional water cycle process, an accurate large-scale estimation of the snowfall is not yet available. Ground based measurements are difficult to make because of strong wind effects on snow gauges, and observation sites are very sparse in remote regions. Therefore, polar orbiting satellite measurements could be a fundamental tool for snowfall observation for high-latitude regions because they observe both Polar Regions every 90min and provide an accurate radiometric mapping of those areas.

Although satellite data have been extensively used in many rainfall studies, existing satellite remote sensing techniques are not able to provide accurate snowfall retrievals in particular, on ice and snow-covered surfaces.

Observation of snowfall from satellites is in fact disadvantaged by the lack of contrast between the spectral signature of snowfall and of the surface, and for this reason snowfall recoveries over land or sea ice still represent a challenge. Numerous recent studies (Liu and Curry, 1997; Staelin and Chen, 2000; Katsumata et al., 2000; Ferraro et al., 2000; Ferraro and Grody, 2001; Bennartz and Petty, 2001; Wang et al., 2001; Liu and Katsumata, 2002) have confirmed the potential for more accurate precipitation retrievals, including snowfall, using higher-frequency microwave channels. The latter are in fact less susceptible to the high variability in land surface emissivity while still responding to the sprinkling signatures due to precipitation (Skofronick-Jackson et al., 2002).

The city of Isfahan is the capital of Isfahan Province, the capital of Isfahan Sub-province, and the center of the Isfahan comprehensive regional planning complex. According to the 2005 census, Isfahan Sub-province was comprised of eight cities, 19 rural districts, and 531 inhabited settlements. Of a total population of 1.71 million, 86.8 percent lived in urban areas. Furthermore, 90.5 percent of the urban population of Isfahan Sub-province was living in the city of Isfahan, with the remainder living in the other seven cities of the sub-province.

II. METHODS AND MATERIAL

The paper has been accompanied on the basis of synoptic station raw data. Internet, Various seminar papers, taskforce reports of research organization, journals and weather data have been surveyed for the purpose of accumulating information.

III. RESULTS AND DISCUSSION

1. Weather

Climate and atmospheric circumstances may affected site planning and design assessments. There are several elements that create the weather and climate of a place. The main of these elements are temperature, humidity, precipitation, snowfall, wind direction and speed, sun, clouds and dew point. These characteristics differ yearly, seasonally, and daily. Seasonal and monthly climate data are available from national weather service area. Local weather archives can deliver added data about the daily weather conditions can be predictable each season. Investigation of mentioned elements can make available the basis for site planning and design.

2. Temperature

Temperature is a very important factor in determining the weather, because it influences or controls other elements of the weather, such as precipitation, humidity, clouds and atmospheric pressure. Air temperature is a unit for measuring the warmth of the air, or, technically speaking, a unit for measuring the energy of gas molecules, nitrogen and oxygen. When air takes on heat energy, the air temperature rises. Air temperature is measured in a sheltered field at a height of just about 1.2 m above the ground. Maximum and minimum temperatures for the earlier 24 hours are technically recorded at 9 am local clock time.

According to Figure 1 and 2 the average maximum temperature during the year was 38°C on July and the average minimum temperature was -5°C on January.

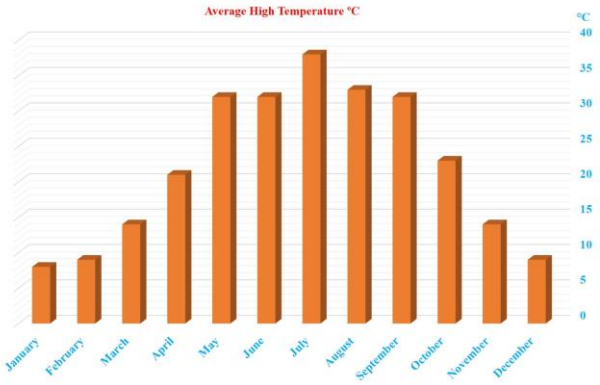

Figure 1: Average high temperature of study area

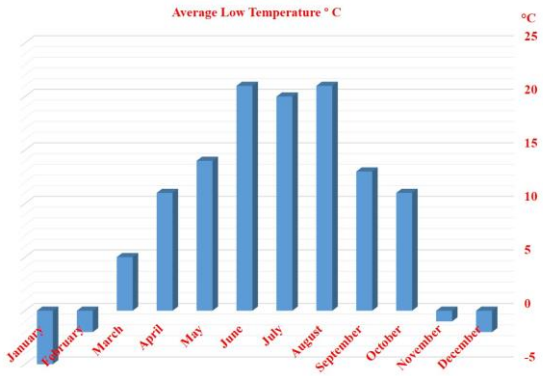

Figure 2: Average low temperature of study area

3. Precipitation

Precipitation is any form of water from the atmosphere. It is a term in climatology, and contains rain, frozen rain, morning dew, ice, and storm. These form from atmospheric water vapor, and fall by gravity. Monthly changes shows that most rainfall occurs in winter and in summer rainfall is minimum. Humid air flows from the Mediterranean and South Atlantic Ocean from the North and North West of this region.

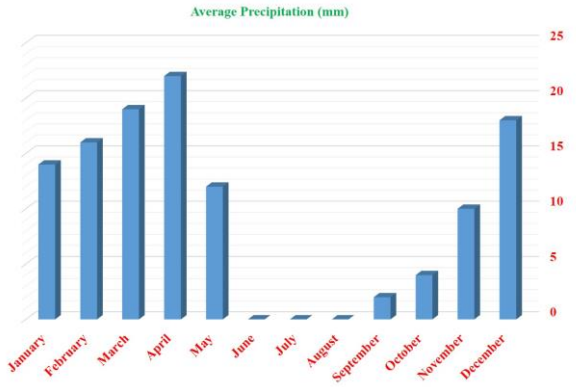

Figure 3: Average precipitation of study area

According to Figure 3 the highest precipitation occurs in April and the lowest was on August June and July. 35% of rainfall in storm, light rain33% and intermediate precipitation is 29 percent.

4. Wind direction and speed

The measurement of wind speed is one of the most significant features in weather forecast. Wind is the movement of air affected by irregular heating of the earth's external. In Isfahan the prevailing wind is west direction. In the months of July, August and September the prevailing wind direction is east (6%), and in November is south-west (9%) and in the other months of the year the prevailing wind is west (19%) direction.

Figure 4: Wind Speed

The lowest wind direction is north (4%) and the highest is west (19%). The average major wind speed is 4 m/s around the year and in May the maximum wind speed is 8 m/s. in the months of February, March and April Wind speed from the West about 6 m/s occurs. The highest wind speed is 8 m/s in May and the lowest is 4 m/s in January (Figure 4).

5. Snow

The procedure of precipitation snow is termed snowfall. Snowfall volume and its related liquid the same precipitation quantity are measured using a diversity of different rain meters.

Figure 5: Probability of Snow Fall

According to Figure 3.5 the lowest precipitation snow amount in Isfahan occurs in April, May, June, July and August. The highest precipitation snow occurs in 8 January about seven percent (Figure 5).

6. Sunshine hours

Sunshine hours are a meteorological sign, measuring duration of sunshine in given era for a given location on Earth, typically stated as an average of several years. It is a general indicator of cloudiness of a location, which measures the total energy delivered by sunlight over a given period. Sunshine duration is usually stated in hours per year, or in hours per day.

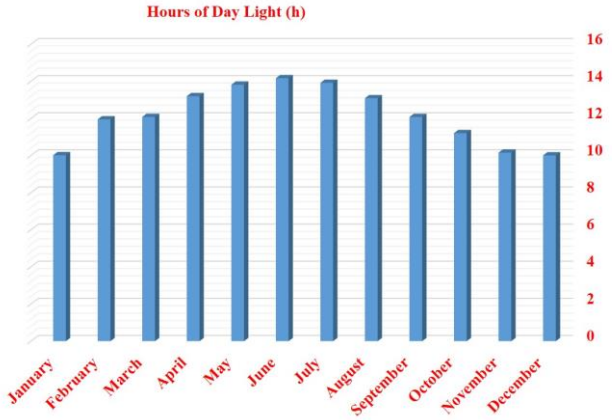

Figure 6: Daily Hours of Daylight

According to Figure 6 maximum hours of day light exist in June with 14.18 hours and the minimum hours of day light occurs in December with 10 hours.

7. Humidity

Air always contains a certain amount of humidity in the form of vapor. There are two types of air humidity: absolute moisture content and relative humidity. At a given temperature, air can contain only a specific amount of moisture in the form of vapor. The higher the temperature, the more moisture it can absorb. The relative humidity an air-water mixture is defined as the ratio of the partial pressure of water vapor in the mixture to the soaked vapor pressure of water at a given temperature. Thus the relative humidity of air is a role of both water content and temperature. Humidity shows the probability of rainfall, morning dew, or mist. Higher humidity reduces the efficiency of sweating in cooling the body by reducing the rate of evaporation of moisture from the skin. Relative humidity, expressed as a percent, measures the current absolute humidity relative to the maximum for that temperature. The highest relative humidity occurs in December about 88 percent and the lowest relative humidity related to June about 10 percent (Figure 7).

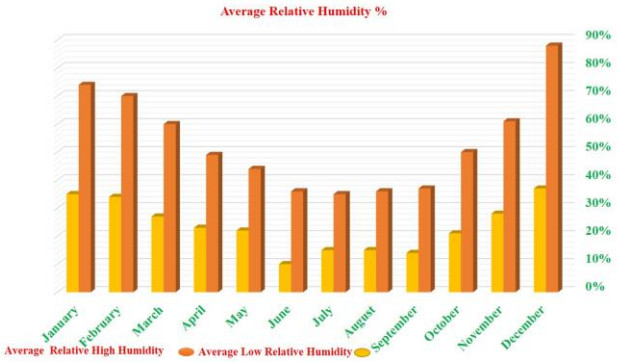

Figure 7: Relative Humidity

8. Clouds

Cloud cover explain the portion of the sky roofed by clouds when observed from a particular location. Okta is the usual unit of measurement of the cloud cover. In meteorology, an okta is a unit of measurement used to describe the amount of cloud cover at any given location such as a weather station. The cloud cover is related to the sunshine duration as the least cloudy areas are the sunlit ones while the overcast areas are the least sunshiny location. The highest cloud cover of Isfahan occurs in April with 43% and the lowest cloud cover observe in September with 8% cover (Figure 8).

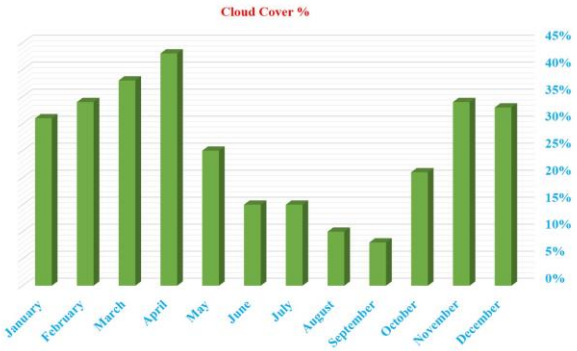

Figure8: Cloud Cover percent

9. Dew point

Dew Point is a quantity of atmospheric humidity. It is the temperature to which air must be cooled in order to reach wetness. A higher dew point indicates more vapor present in the air. According to the chart, the highest daily average dew point is in July with 8°C and the lowest daily average in January with -11°C (Figure 9).

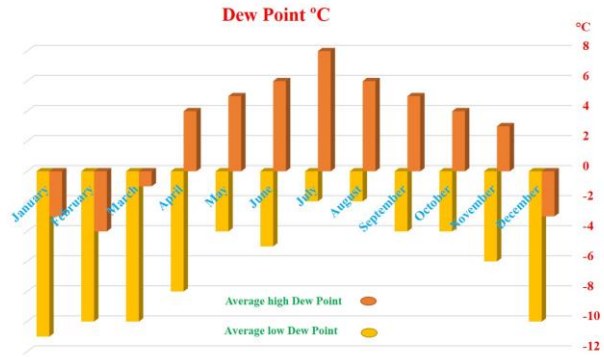

Figure 9: Dew Point

10. Sun Diagram

A Sun path Diagram is a very simple tool to illustrate the continuous changes in solar geometry for a location through a two dimensional graph. In a Sun path, Diagram the solar position is directly defined, at every time of the day and day of the year, by the reading of its azimuth and altitude angles. The azimuth show the horizontal angle that the estimate of the Sun's position makes with North; the altitude explains the straight up angle that the Sun makes with the horizon. Sun path diagrams constitute therefore a suitable way for designers to determine solar access and shading necessities for a given location and for a specific time of the year. Variety of Sun path charts are accessible for a given location (latitude and longitude) **(**Figure 10, and Figure 11).

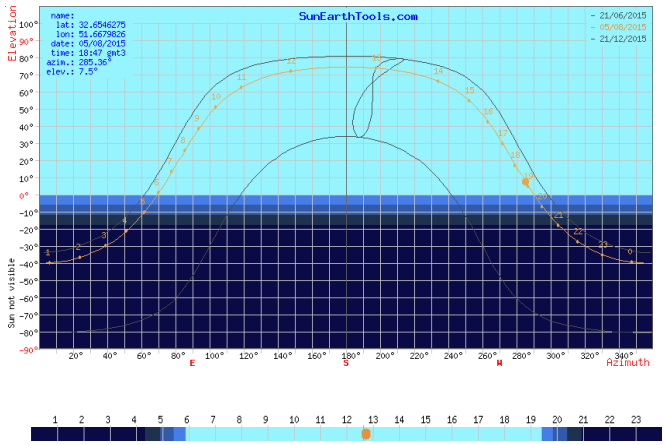

Figure 10: Sun position Diagram of Isfahan (sunearthtools.com, 2015)

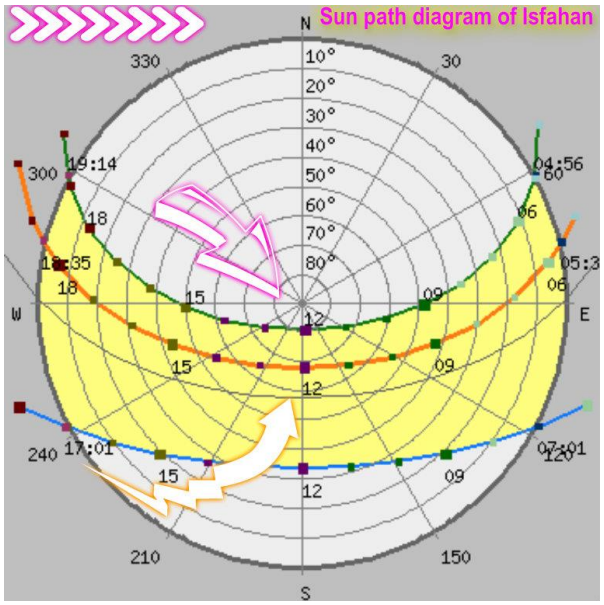

Figure 12: Sun path diagram of Isfahan (sunearthtools.com, 2015)

IV. CONCLUSION

The important outcomes from this paper for Isfahan city climatic features have shown as below:

- Average maximum temperature during the year was 38°C on July and the average minimum temperature was -5°C on January.
- The highest precipitation occurs in April and the lowest was on August June and July. 35% of rainfall in storm, light rain33% and intermediate precipitation is 29 percent.
- In Isfahan the prevailing wind is west direction. In the months of July, August and September the prevailing wind direction is east (6%), and in November is south-west (9%) and in the other months of the year the prevailing wind is west (19%) direction.
- Lowest precipitation snow amount in Isfahan occurs in April, May, June, July and August. The highest precipitation snow occurs in 8 January about seven percent
- Maximum hours of day light exist in June with 14.18 hours and the minimum hours of day light occurs in December with 10 hours.
- Highest relative humidity occurs in December about 88 percent and the lowest relative humidity related to June about 10 percent.
- The highest cloud cover of Isfahan occurs in April with 43% and the lowest cloud cover observe in September with 8% cover.
- The highest daily average dew point is in July with 8°C and the lowest daily average in January with -11°C.

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