A Survey on climatological elements (temperature, precipitation and relative humidity) impact on climatological changes in Big city of Tehran and formation of heat islands in the last two decades.

Dr. Azadeh Arbabi

A faculty member of Islamic azad university, islamshahr branch, PhD holder in climatology.
E-Mail: aarbay@yahoo.com telephone: 09122772923 - 021- 88254710

Dr. Azam Yousefi Tanha

A faculty member of Islamic azad university Saveh branch PhD holder in geopolitic

Abstract

Urban climate is a one of the most important isuues which nowadays is mooted Human influences directly in their environment and the environment is controlled by the climate process. Investigation of temperature and humidity parameters in local climate changes such as urban climate is too important. Climate conditions of this metropolis is influenced by role of human and physical geographic elements such as topographic, city physical extend, population growth and city development, high rate of fossil consumption.

In this article trend of climate elements (temperature, precipitation and relative humidity) in the last 20 years 3 statistic periods (7, 7 and 6) are investigated by taking statistic from 5 synoptic stations climatology organization and 3 pluviometers stations of ministry of energy and the rate of relationship and regression between precipitation is measured by relative humidity elements, temperature and pollutant. The destination of this research is climate elements effects on their relationship with the degree of pollution and Tehran climate changes.

The investigations show that the lowest average and degree of temperature average in Tehran in six years third id significantly mire than the other periods and there is on significant different between the highest temperature average in those 3 periods. The lowest and medium temperature average is increased but average of the highest trend had done constant, which is caused of many factors that we are going to examine.

Between rate of and precipitation relative humidity in Tehran in 3 statistic periods there is no significant different in 3 recent year. Precipitation and relative humidity and allotment rate of temperature in precipitation is more than rate of relative humidity and allotment rate of temperature in precipitation is more than rate of relative humidity.

Also temperature increase is caused of making heat islands in Tehran and it causes increase of pollution in this city.

Climate change that causing of change in trend of climate elements is result to pollution of city and making the new microclimates.

Key words: *Relative Humidity, Temperature, environment, Pollution, Microclimate, Heat island.*

Introduction

Characteristics and types of big climate (Macro climate), medium (Ferro climate) and small (micro climate) in Tehran determine three factors: Geographical position, being in the exposure of damp wind blowing and western rain making winds, uneven units position in Tehran region.

Urban environments are the most important life beds far a great part of growing population in the world. Population growth, urbanization development and style and attitude change in peoples lives have caused numerous problems in big cities. Nowadays metropolises have encountered problems like air pollution, green space scarcity, increase of automobiles, irregular population growth, etc. Tehran city having a special ecological and geographical conditions, aggravates the seriousness of above mentioned issues. Urbanization development, unsuitable relationship between different usages and increased environmental quality in Tehran arise from pollutant resources over this metropolis's climate which lead to heat islands. Natural properties of the city have much impacts on it's pollution and the most important climatic factor effective in air pollution in Tehran is temperature inversion. Which is one of the main characteristics of a cold season in a year. Population growth among human factors is also considered ad the most important pollution factor. Population growth trend is not compatible with the green space increase and it is so much lower than the per capita international standard of space (Makhdom, 1368, page 61). Industrial activities and transportation network in this city have arised much difficulties. It is our advantage to guard Tehran as a national capital with determinant social and economical backgrounds and we should focus only on contral and decentralization to remove it's problems (Shokuee, 1378, page 47).

Population growth in Tehran has a direct effect on it's climate factors leading to temperature rise, low precipitation value and humidity. And scarcity of green space and vegetation covering has intensified the situation. Hanse and John can ducted a research in 1969. They measured heat island effects at the air parts of five American cities. Diter wiler (1974) investigated heat islands effect of the city on precipitation value in Paris. After colrins and wolum (1964) and Eki (1990) studied the heat island effect in Washington, DC. Idsu et.al (1989) and Buchedahi (1999)studied global warming under the influence of increasing greenhouse gases. Dri Daian and colleagues studied pollutants impacts and there were so many articles in 2006. In Iran we can mention the researches by Mohseni in 1987, Khalili in 1989, Makhdum in 1989, parvazi in 1991, Shokuee in 1992, Zanian Pour and Bahriny in 1992, Bahrini in 1997, Arefi in 1997, Safari and Alijani in 2004, meeghi and Rostami in 2005, Alvai Panah in 2005, Sanee and colleagues in 2006, Safari in 2007, Nazarian and colleagues in 2008, Arbabi in 2008, etc that either one has investigated climate condition and pollutions arised from it in Tehran.

Materials and Methods

Spatial frame of Tehran with the approximate calculation of extent was about 4 square kilometers but now it's extent with calculation of district 22 and two municipality has increased to 733. 77957 square kilometers, at the same time it's population concentration has amounted to 9211 person per kilometer or 92.11 person per hector.

Climate elements of temperature, precipitation value and relative humidity during the last 20 years of statistic period (1364- 1384) in 5 selected synoptic stations in addition to Tehran's pollutants rate, population and their relevance have been investigated. These five selected stations in clue Chitgar, Doshan Tapeh, Geophysic, Tehran north and Mahabad.

First yearly precipitation value of these selected stations in Tehran has been taken then their statistics by 20 years common average methods of the stations along with statistical indexes in

the diagram (diagram 1- 5, page 140 of dissertation) were corrected and yearly average precipitation of stations have been provided. The map 5- 2 at page 144 shows the precipitation value of Tehran.

Precipitation value was investigated in 3 statistical periods of 6, 7 and 7 years in whole the stations from data recorded in all the stations in Tehran.

It was concluded that there wore some variations among precipitation values in 3 statistical period in Tehran in away that the average precipitation value in six years third (1378- 1383) is more and in seven years third (1371- 1377) is less than other periods. By analysis, precipitation value has been growing in 20 last years (1364- 1384) in Tehran and the most precipitation value is recorded in north Tehran station.

By studying the relative humidity in those selected stations in 20 last years (1364- 1384), the most relative humidity observed in north Tehran station and there is some variations a many these statistical periods. The average relative humidity in six years third (1377- 1383) is more and it's less than other periods in seven years third (1364- 1370).

It is clear that the relative humidity value during the 20 last statistical period is increased.

In relation to temperature climate elements that is considered as the most important climate element in Tehran and in increasing for different reasons mentioned above (population growth, high rate of fossil consumption, green space scarcity).

Precipitation value in six years third of statistical period in all the stations is more than other stations. Map number 5- 3 (page 166), shows the temperature of Tehran and diagram number 6- 22 (page 261) shows the descriptive indexes related to maximum mean temperature at all the stations. To invest tigays the average pollutants difference in selected stations localized by synaptic stations, recorded data have been used and the most average pollutants are in north Tehran station.

Diagram 5- 46 (page 184) shows the monthly variations of PSI in Gholhak station.

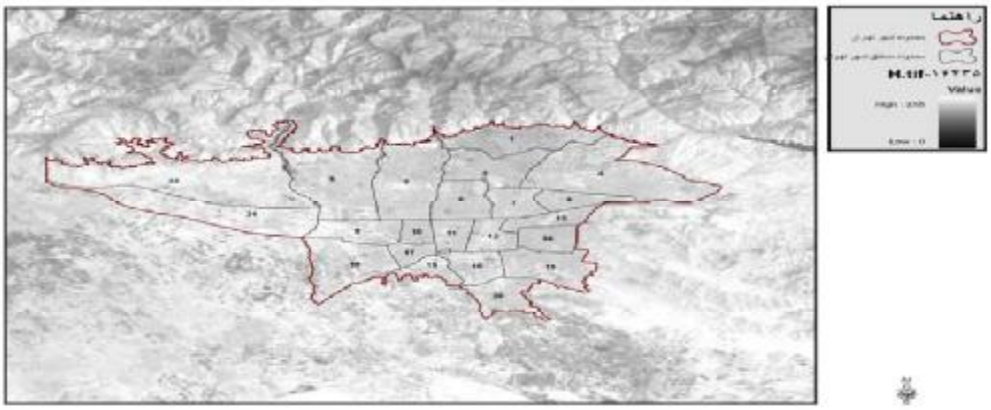
Results

Natural bed, climate and environment of Tehran is the basis of opportunities and threats for this metropolis. Maximum exploitation of opportunities and natural legacy (heights, weather conditions, green halo, city ecology, etc...) and lowering natural threat (earthquake, high potential for air inversion heat island formation, etc...) are evidently the guidelines orientation of Tehran space organization. Temperature is one of the most important and effective climate elements over urban climate that it's impact on precipitation value and humidity is completely clear.

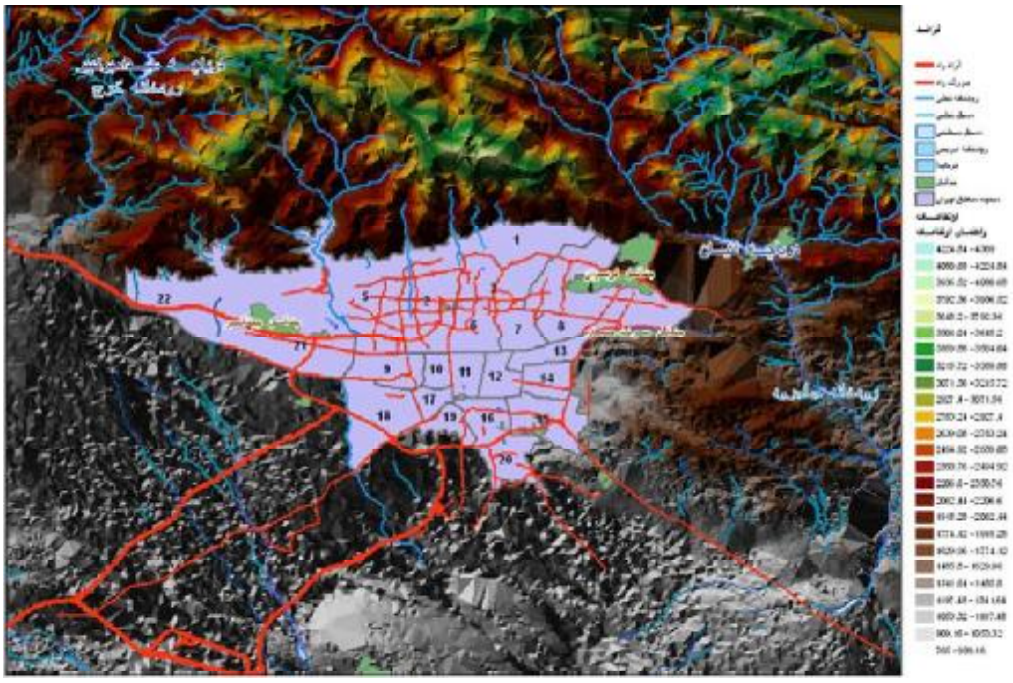
By researches done during the 20 last statistical period, average degree of humidity in Tehran has not a meaningful difference and it has continued a constant trend. There is imperfect positive relationship between the degree of humidity and temperature. It means that by increasing temperature, humidity rate is reduced. Constancy of humidity rate could be the result of green space and vegetating covering expansion around Tehran injecting more humidity to the environment. There has been on meaningful variation in precipitation value, and the rainfall had nearly constant trend. There is imperfect positive relationship between precipitation value. Due to the research results.

Allotment of temperature rate in prediction of precipitation value is more than humidity and based on allotment regression, temperature degree in precipitation prediction is more than humidity rate.

Average minimum and medium temperatures rate in Tehran during statistical period were increasing but average maximum had nearly constant trend. Due to the high temperature, heat islands are famed at different parts of Tehran leading to appearance of new microclimates.



Tehran city limits (Arbabi 1387)



Tehran geography area (IRI. NGO 1378)