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Regionalization and Evaluation of Seasonal Human Bioclimate of Semnan Province

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ABSTRACT

All human activities for the purpose of health and peace is effected by climatically conditions, too.In research I used Terjung Method due to evaluation of seasonal human bioclimatic of Semnan Province using average of maximum and minimum temperature, average of sun shine hours, average of wind speed in four synoptic stations and fourteen climatologically stations in a 15- year course (1994-2008) and I also used AutoCAD map and Arc map software's based buffering and altitudinal gradient to prepare map of regions in different seasons. The result of research indicates that bioclimatic maps of Semnan Province have remarkable differences in formation of dominant types quantities in summer and winter. Generally mentioned types are restricted to three types in winter and seven types in summer. K_1, K_2 and K_4 types are formed because of outward climatical factors in winter. For the purpose of C_2, M_2, M_3, W_3 and W_4 are five types effected by both outside and local factors in spring. Seven types (H_3, H_4, H_5, M_1, M_3, W_3, W_4) are formed solely on the basis of local factors (outside and local) three bioclimatical types (M_3, M_1, C_2) dominate in fall.
Key words: Bioclimatic, Terjung, Peace coefficient, Wind-chill, Regionalization, Semnan Province.

INTRODUCTION

Study of atmospheric and climatical conditions as effective factors on human's life, comfort and health has been resulted in a new scientific branch called human bioclimeteorology or human biometeorology. Effect of climatic and atmospheric condition on people, plants and animals is studies in above-mentioned branch. So today, it is important to study and identify climatic limitations and threatening hazards and being informed of covert attractions and potentials in geographical properties in Semnan Province during different seasons due to profitability in different urban and provincial plans. So regionalization and potential evaluation of human bioclimatic with climatic factors in different courses and sites can lead us to achieve comfortable environment that results in pleasant or fairly pleasant human's livelihood and biological activities. Therefore it is significant to discuss comfort for the purpose of human's permanence of effort and psychic and physical evolution. To identify human bioclimatic and effect of every single climatic factor on human's physiological structure in every season is the motivation of this research. As regarding the importance of climatic factors and its effect on human's comfort many studies related to human bioclimatic have been done worldwide and in Iran. And so it has drawn many researcher's attention as follows :Tam(1959)has studied comfort temperature and its role in the climatical regionalization and comfort area (Taghizadeh , 1988 , 165). Terjung (1966)posed bioclimatic distribution and examined human in large quantity and represented result of his research in chart (Terjung, 1966, 119-123). Zanker (1967) classified Baltic coast bioclimaticaly (Zanker,1967,8-565).Gregorczuk and Cena (1967) used effective temperature index that is a compound temperature and relative humidity factor ,they computed world distribution of Average effective temperature for both January and July (Gregorczuk & Cena,1967,2). Clarke and Bach (1971) using effective temperature, reformed effective temperature and nerve pressure indices and studied climatical comfort conditions on "sin sinati" in Ohio and its suburb and observed that the suburb is more comfortable than downtown (Clarke & Bach,1971, 311-318).Gonzalez and his colleagues (1974) have represented the standard effective temperature (SET) based on a reliable physiologic perception to study human thermal comfort(Gonzalez.et all,1974,1). Barradas (1991) chose five parks in Mexico City to discover the difference between thermal comfort of inner part of the parks and their surroundings. He found that the difference of temperature is more in the early afternoon rather than other hours, so that maximum thermal difference , water vapor pressure and water vapor deficiency pressure are 5.6$^{\circ C}$, 0.6 and 103mb in order (Barradas,1991,1) . Akram and zuhairy (1993) proposed compound of Mahani, MYCM, CMY and using all the factors related to climate designed building in Saudi Arabia .It is worthy to mention Saudi Arabia has four climatic regions (Akram & Zuhairy,1993, 531-533). Rezjouyan (1997) in his book named "Peace by Architecture Harmonious with Climate" considered effective factors on peace using Mahani Method and effective temperature (Rezjouyan,1997,285). Ramesht (1997) in an article named "Human and climatic alteration" considered the role of climate in human health (Ramesht,1997, 69-73). Zain-Ahmad and his colleagues (1998) using Mahani chart and schrometric table in Klang Vally in Malaysia considered staffs' thermal comfort to find comfort in the building of humid areas (Zain-Ahmad.et all,1998, 437-440).). Jahanbakhsh (1998) in an article named "Assessment of human bioclimatic in Tabriz and thermal need of building" has approached bioclimatic provocations ranges in

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Tabriz. Then he evaluated temperature condition according to effective temperature (Jahanbakhsh,1998,67-78). Khalili(1999) in an article named "Assessment of human bioclimatic in Tabriz and thermal need of building" has approached bioclimatic provocations rates in Tabriz and has mentioned $6^{\circ C}$-$12^{\circ C}$ as maximum comfort rates (Khalili ,1999,5-17). Ghasemi (2000) in an research named "Effect of climate on human" studied the effect of meteorologic factors on human activities (Ghasemi, 2000,25). Baghbani (2002) did regionalization of educational areas, using Biker and Gioni methods and 6-year data (1986-2001) of 16 meteorological stations in Ardabil and Azarbayjan e Sharqi and Azarbayjan Gharbi . His thesis was named "Climatic regionalization related to educational areas design" in above-mentioned provinces (Baghbani,2002,5). Asgari and Moeini (2002) introduced climatic comfort bounds for many provinces of Iran in their research named "Climate and peace"(Asgari & Moeini,2002,8). Ataei and Basatzadeh (2004) provided bioclimatic map of a 40-year course using Terjung Method of 8 synoptic stations in an article named "Analysis of seasonal bioclimatic of Chaharmahal O Bakhtiary"(Ataei & Basatzadeh,2004, 46-51). Mohammadi and Saeidi (2004) have studied comfort and discomfort using Terjung and Biker, nerve pressure , and termohigrometric as bioclimatic factors in an article named "Bioclimate indices effective on assessment of human comfort in Qom (Mohammadi and Saeidi,2004,72). David Morllon and his colleagues (2004) classified Mexico using Olgi and Gioni method and fenger equation during a year all twelve months. But there is a limitation in use of above-mentioned cases , because they can't be used the entire year (David morllon.et all,2004, 311-318). Khoshhal and his colleagues (2006) classified bioclimate of Esfahan using Mahani, Olgi and Terjung methods in an article named "Using cluster classification for human bioclimate regionalization in Esfahan".Among above-mentioned methods Gioni has proposed the best one. E'temad sheikholeslam and his colleagues have studied climate properties and climatic need of an area considering human comfort in the life space based on Gioni factor in an article named "Techniques of building design harmonious with Hamedan climate" (Khoshhal.et.all,2006,171-186). Ghasemzadeh and his colleagues (2006) have determined construction bioclimate chart. It's followed by introduction of effective factors on institutes and students' thermal comfort bound in various seasons considering covering and activities in an article named "Determination of thermal comfort bound in the closed educational area in Yazd"(Ghasemzadeh.et.all,2006) . Zeitounli (2006) has evaluated effective, Olgi and Terjung as climatic comfort indices while considering climatical factors of Golestan Province in his thesis named "Evaluation of climatic comfort factors emphasizing on the role of tourism in Golestan Province". Oeheir and colleagues have studied bases of biometrology for tourism industry. They analysed biometrologyical conditions by thermal perception frequency and identified equal temperature of human's physiology during ten specific days. Then they determined comfort areas for tourism compounding this factor with other metrological factors such as temperature, sun shine and rate and number of days with precipitation and storm (Oehier, 2007, 234).Tplin and his colleagues (2007) have stated: tourism industry is effected by possible alteration of world climate in a research named "Bioclimate and tourism potential in Taiwan National Park."They also have analysed temperature and rain factors first separately and then simultaneously. Finally the comfort temperature and tolerable temperature for tourism were discovered (T plin, 2007, 146). Mahmoudi (2008) has used effective temperature and accumulative tension indices in an article named "Tourism and evaluation of its comfort area in Marivan". It's represented by a conclusion that Marivan isn't in comfort area, nor isn't in approximate comfort area at no hours of a day in January, February, March, April, November and December (Mahmoudi,2008,44-49). Bazrpash and his colleagues (2008) have evaluated Mahani, Biker and Terjung methods as climatic comfort indices in an article named "Evaluation of climatic comfort in outdoors for the purpose of echotourism in Babolsar." During the research they discovered that nature and outdoors in Babolsar have the best conditions as thermal comfort since second month of spring to second month of fall for tourism (Bazrpash.et.all,2008, 93-108). Zengin and his colleagues (2009) using meteorological date of 9 stations in summer in an article named " Determinatiom of bioclimatical comfort along the road of Turkey using GIS" concluted that topography have been an effective factor in Turkey and an area in south of Meseit Mount is out of comfort (Zengin.et.all,2009, 158-164). Ping Lin and his colligues (2010) in an article named "Shading effect on long-term outdoor thermal comfort in Taiwan." Using PET index (physiological Equal temperature) and SVF (sky vastness factor) considered 10-years meteorological data. First they determined climatical comfort area for the Taiwanese during a particular year. Then using SVF rates displayed that high SVF rates in summer and low ones in winter causes discomfort. After that they stated that shading effect of building and trees should be fitted with climate of area so that provide comfort (Ping Lin.et.all,2010, 213–221). Zolfaqari (2010) following assessment of indices, stated that climatic comfort course is restricted to 45 days from early third month of spring to the middle of first month of summer in an article named "Evaluation of appropriate time to tour in Tabriz using physiologic equal temperature (PET) and predicted men view (PMV) (Zolfaqari,2010, 141-139). Pinglin and his colleagues (2011) in an article named "Tourism and climatic information based on human thermal perception in Taiwan and Easter China" Studied the area using PET index and TPS (thermal peace classifications). According to the conclusion, Taiwan and Eastern China are pleasant for people in the humid area in spring and north of subtropical area in summer (Ping Lin.et.all,2011, 492-500).

AREA AND DISCUSSION

Semnan province has 4 cities (Semnan, Damgan, Shahroud and Garmsar) 12 districts, 28 collection of villages, 16 towns and 829 villages. Its total area is approximately 97491 km^2 that is located between $51^{\circ}51'$ to $57^{\circ}3'$ E and

13°37′ to37°20′ N. Khorasan e Shomali, Golestan and Mazandaran from north, Yazd and Esfahan from south, Khorasan e Razavi from east and Tehran and Qom from west have limited Semnan Province.

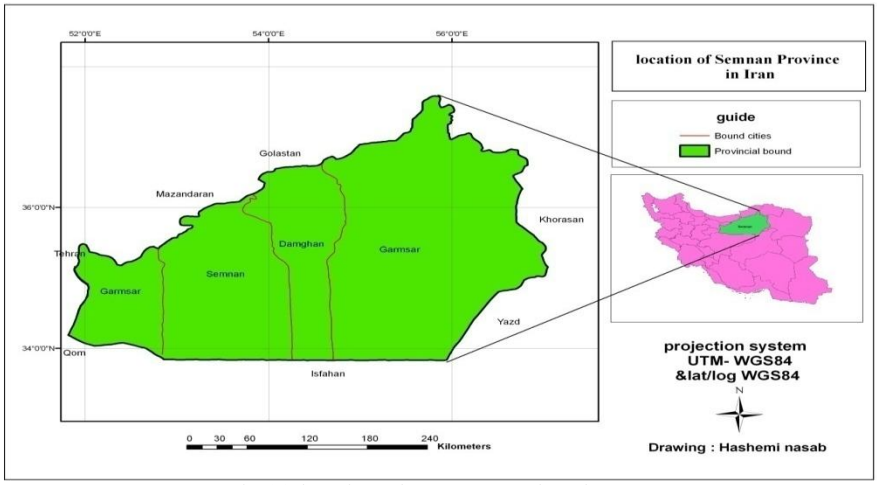

Fig (1) location of Semnan Province in Iran

MATERIALS AND METHODS

The 15-years data (1994-2008) of 4 synoptic stations and 14 climatological stations and average of maximum and minimum temperature in Fahrenheit, average of maximum and minimum relative humidity in percent, average of sunshine hours (real and possible and average of wind speed in m/s, for chronological and locality analysis and to provide map of human biochimate regions of Semnan Province based on Terjung index have been used. Following analysis of factor and computing comfort and wind-child coefficient of regions were determined by using Autocad map software based on altitudinal gradiant and the output was transmitted to Arcmap and finally it was turned into map.

-Terjung Method

To classify United State in 1966, Terjung used his method.

He used all significant climatic factors that control body's thermal condition including temperature, radiation, relative humidity and wind altogether.that's the privilege of this method.

Classification is based on comfort and wind-child indices following various examinations on people. The result has been displayed in Figure (2), (3) in the shape of monograph. Figure (2) is used to determine comfort coefficient. The monograph shows human's sense in various temperature and humidity and normal condition of ordinal covering, without physical activity. X-axis represents temperature in fahrenheit and curves represent relative humidity in percent in the diagram. These two climatic factors meet each other in different sites in various situations. They have been shown by numbers and samples.

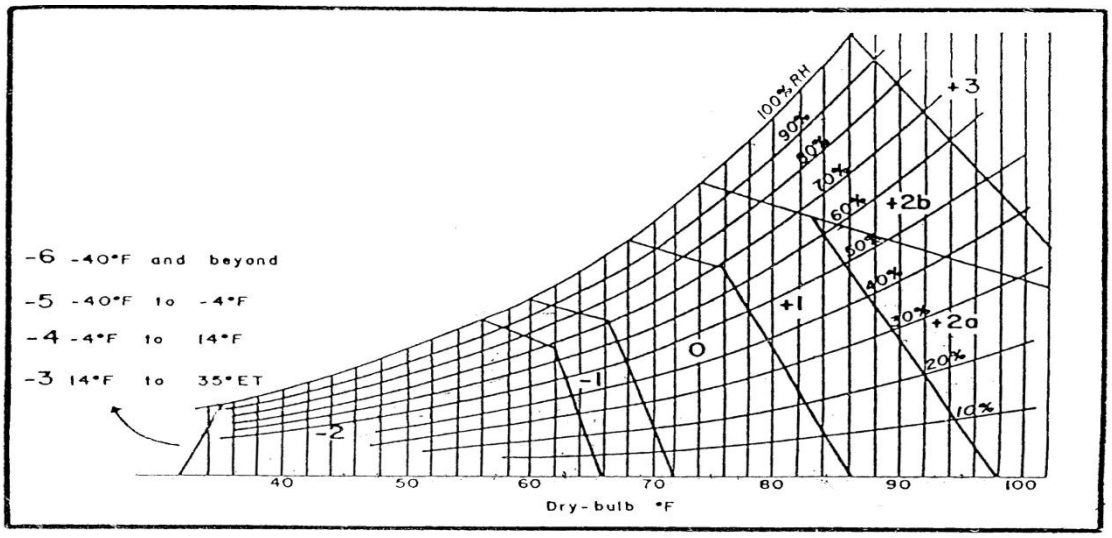

Fig (2) Comfort area based on Terjuing method (1966)
Source: Kaviani: 1993

Table (1) comfort concepts symbols and monographic signs based on Terjuing method

Dominant sense	group	symbol	Dominant sense	group	symbol	Dominant sense	group	symbol
very cold / very cold	VC1	-4/-4	pleasant / pleasant	M1	0/0	very / extremely hot	EH1	3/+2b
extremely / very cold cold	VC2	-4/-5	cool / pleasant	M2	0/-1	hot / extremely	EH2	+3/+2a
beyond / very cold coldness	VC3	-4/-6	very cool / pleasant	M3	0/-2	warm / extremely	EH3	+3/+1
–	–	–	cold / pleasant	M4	0/-3	/ extremely pleasant	EH4	+3/0
–	–	–	very cold / pleasant	M5	0/-4	cool / extremely	EH5	+3/−1
/ extremely cold extremely cold	EC1	-5/-5	cool /cool	C1	-1/-1	very hot / very hot	S1	+2b/+2b
beyond / extremely cold coldness	EC2	-5/-6	very cool /cool	C2	-1/-2	hot / very hot	S2	+2b/+2a
–	–	–	cold /cool	C3	-1/-3	warm / very hot	S3	+2b/+1
–	–	–	very cold /cool	C4	-1/-4	pleasant / very hot	S4	+2b/0
–	–	–	extremely cold /cool	C5	-1/-5	cool / very hot	S5	+2b/-1
/ beyond coldness beyond coldness	UC1	-6/-6	very cool /very cool	K1	-2/-2	hot / hot	H1	+2a/+2a
–	–	–	cold /very cool	K2	-2/-3	warm / hot	H2	+2a/+1
–	–	–	very cold /very cool	K3	-2/-4	pleasant / hot	H3	+2a/0
–	–	–	extremely /very cool cold	K4	-2/-5	cool / hot	H4	+2a/-1
–	–	–	beyond /very cool coldness	K5	-2/-6	very cool / hot	H5	+2a/-2
–	–	–	cold / cold	CD1	-3/-3	warm / warm	W1	+1/+1
–	–	–	very cold / cold	CD2	-3/-4	pleasant / warm	W2	+1/0
–	–	–	extremely cold / cold	CD3	-3/-5	cool / warm	W3	+1/-1
–	–	–	beyond / cold coldness	CD4	-3/-6	very cool / warm	W4	+1/-2
–	–	–	–	–	–	cold / warm	W5	+1/-3

Source: Kaviani: 1993

Second factor is related to effect of wind-child.
Paul Saiple used this term for the first time in 1939.
After that wind-child got an important factor in bioclimatic evaluation.
It represents amount of heat extrusion in kcal $h^{-1}m^{-2}$ under standard condition (without physical activity and in ordinal temperature equal $33^{\circ C}$ or $91/4^{\circ F}$)

$$H= (10/45+10\sqrt{r-v}) \times (33-T) \qquad (1)$$

H: heat extrusion in kcal /m^2/h
V: speed of wind in m/s
T: Average temperature (˚c)
It can be understood easier in Fig (3)

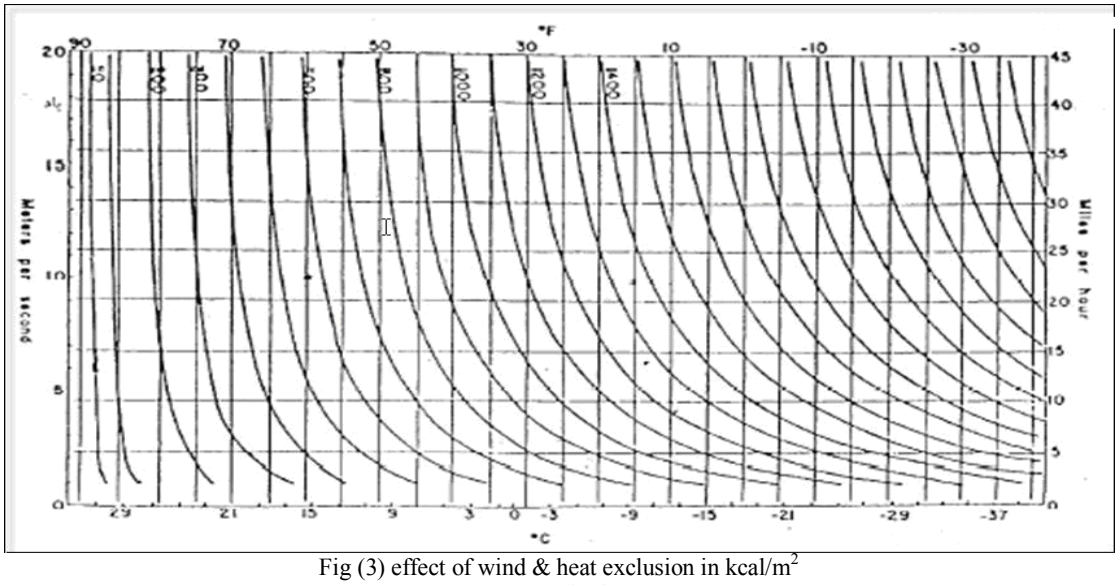

Fig (3) effect of wind & heat exclusion in kcal/m^2
Source: Kaviani: 1993

Chart (2) effects of wind

Dominant sense end state	heat exclusion rate	symble
Meat is frozen exposed to this temperature and wind	1400 and beyond	-h
extremely cold	1200 to 1400	-g
very cold	-1000 to 1400	-f
cold	-800 to -1000	-e
very cool	-600 to -800	-d
cool	-300 to -600	-c
pleasant	-200 to -300	-b
not cold not warm (ordinary)	-50 to -200	-a
warm	+80 to -50	n
heat sense on the skin	+80 to +160	a
over unpleasant heat sense	+80 to 160 *	b
too over unpleasant heat sense	+160 and beyond **	c

Source: Kaviani: 1993

* temperature : beyond 33°C
** temperature : beyond 36°C

Table (3) common effect of wind during day and night based on Terjung assessment

symbol	group	symbol	group	symbol	group
-d /-d	$-d_1$	n /-d	n_4	C /-a	c_1
-d /-e	d_2-	-a /-a	$-a_1$	C /-b	c_2
-d /-f	d_3-	-a /-b	$-a_2$	C /-c	c_3
-d /-g	d_4-	-a /-c	$-a_3$	B /-a	b_1
-e /-e	e_1	-a /-d	$-a_4$	B /-b	b_2
-e /-f	e_2	-a /-e	$-a_5$	B /-c	b_3
-e /-g	e_3	-b/-b	$-b_1$	B /-d	b_4
-e /-h	e_4	-b /-c	$-b_2$	A /-a	a_1
-f /-f	f_1	-b /-d	$-b_3$	A /-b	a_2
-f /-g	f_2	-b /-e	$-b_4$	A /-c	a_3
-f /-h	f_3	-c /-c	$-c_1$	A /-d	a_4
-g /-g	g_1	-c /-d	$-c_2$	N /-a	n_1
-h /-h	h_1	-c /-e	$-c_3$	N /-b	n_2
–	–	-c /-f	$-c_4$	N /-c	n_3

Source: Kaviani: 1993

X-axis represents temperature in Fahrenhit and Celsius. Y-axis represents speed of wind (in m/s and mile/h). To evaluate heat extrusion in various temperature and speed of wind, It's needed to determine two above-mentioned factors meet and pay attention to the number written on the line that is passing meet point Discussion:

DISCUSSION

Seasonal human bioclimate in Semnan Province was searched using Terjung Method as follows:

Spring bioclimate

Five physiological Climatic types is observed in Semnan (Fig 4).C_2 type with cool days and very cool nights includes Sodaqlen and Mojen (-1/-2).M_2 type with pleasant days and cool nights is observed solely in Damqan station (0/-1).M_3 type with pleasant day and very cool nights includes Froumad, Biarjmand, Mayamey, Shahroud, Bastam, Cheheldokhtar, Nardin, Shahmirzad, Mehdishahr and Garmsar Stations **(0/-2).**W_3 type with warm days and cool nights is observed in Hosseinian and Toroud stations (+1/-1). W_4 with warm days and very cool night includes Kouhan, Semnan and Ivankey stations (+1/-2).

Wind causes warm days and cool nights in Ivankey and Garmsar, Semnan, Hosseinian, Toroud, Biarjmand, Froumad, Mayamey, Shahroud and Kouhan stations during summer (n_3) ordinary days and very cool nights is followed by wind in Nardin, Shahmirzad and Mehdishahr stations ($-a_4$). Pleasant and desirable sense during days and very cool at nights are felt Sodaqlen and Cheheldokhtar stations ($-b_3$). Pleasant days and cool nights is effect of wind in Mojen station ($-b_2$).Ordinary days and cool nights is result of wind in Bastam and Damqan stations ($-a_3$).

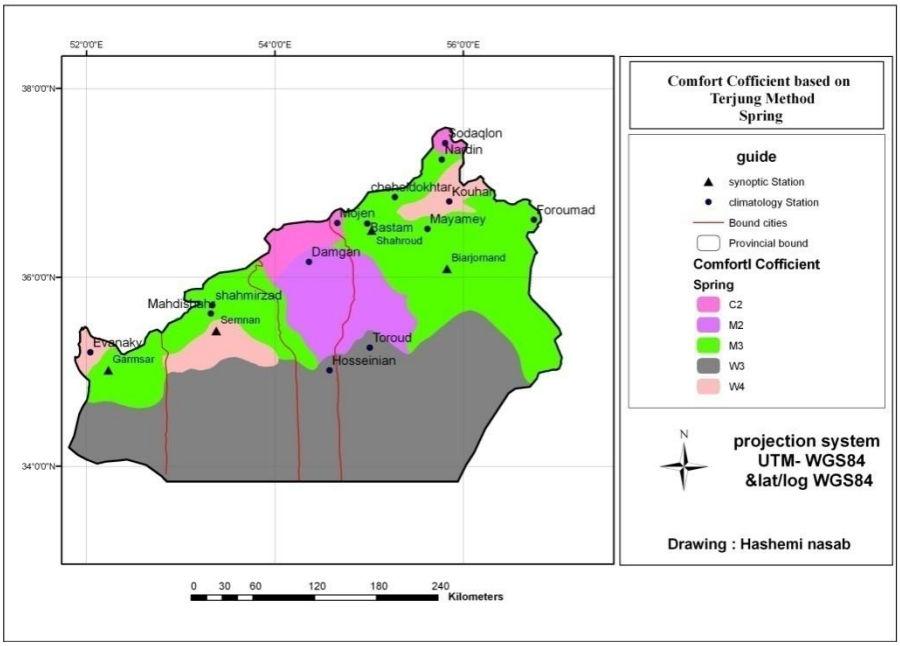

Fig (4) regionalization of comfort coefficient in spring

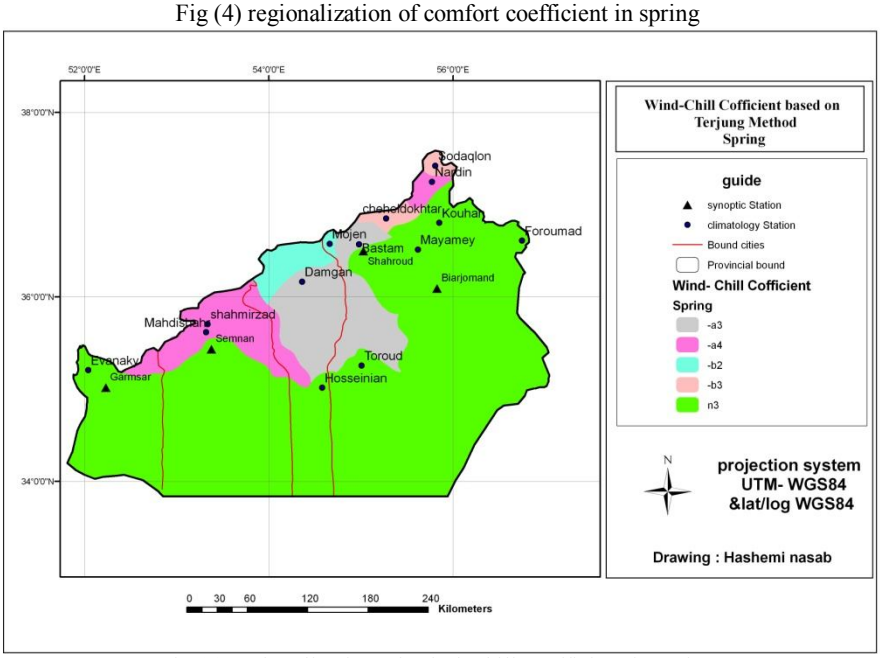

Fig (5) regionalization of Wind-Chill coefficient in spring

Summer bioclimate

Withdrawal of outward factors and domination of local factors in summer, seven physiologic bioclimatic types in Semnan are forming. Fig (6).

H_3 type covers southern, central, eastern and western areas including Garmsar, Semnan, Hosseinian, Toroud, Biarjand, Damgan, Froumad stations because of this comfort coefficient shows hot days and Pleasant nights (+2a/0). W_4 type results in hot days and very cool nights. It often covers northern stations including Sodaqlen, Nardin, Cheheldokhtar, Bastam, Shahmirzad, Mehdishahr stations except Mojen (+1/-2).

M_1 type with pleasant days and nights includes solely Ivankey station in northwest of Semnan Province (0/0). M_3 type with pleasant days and very cool nights is observed solely in Mojen station (0/-2). H_5 type with hot days and very cool nights dominates just in Kouhan station (+2a/0).H_4 type with hot days and cool nights is seen solely in Mayamey (+2a/-1).

Wind has more various effect in Summer. So that too over unpleasant heat during day and pleasant one at night is felt in Ivankey, Garmsar, Semnan stations (c_2). Too over unpleasant heat during day and cool wind at night is felt in Froumad, Biarjmand, Kouhan, Mayamey and Damgan stations (b_3). Warm wind during days and cool wind at nights is felt in Sodaglen, Nardin, Cheheldokhtar , Mojen and Shahmirzad stations (n_3). Days with too over unpleasant heat and ordinary night is effect of wind in Hosseinian and Toroud stations (c_1). Heat is felt on the skin by wind during days and cool wind is sensed at nights in Shahroud station (a_2).Ordinary wind during day and pleasant wind at night is felt in Bastam ($-a_3$).Wind blowing is accompanied by heat sense during days and cool sense at nights in Mehdishahr (a_3).Fig(7).

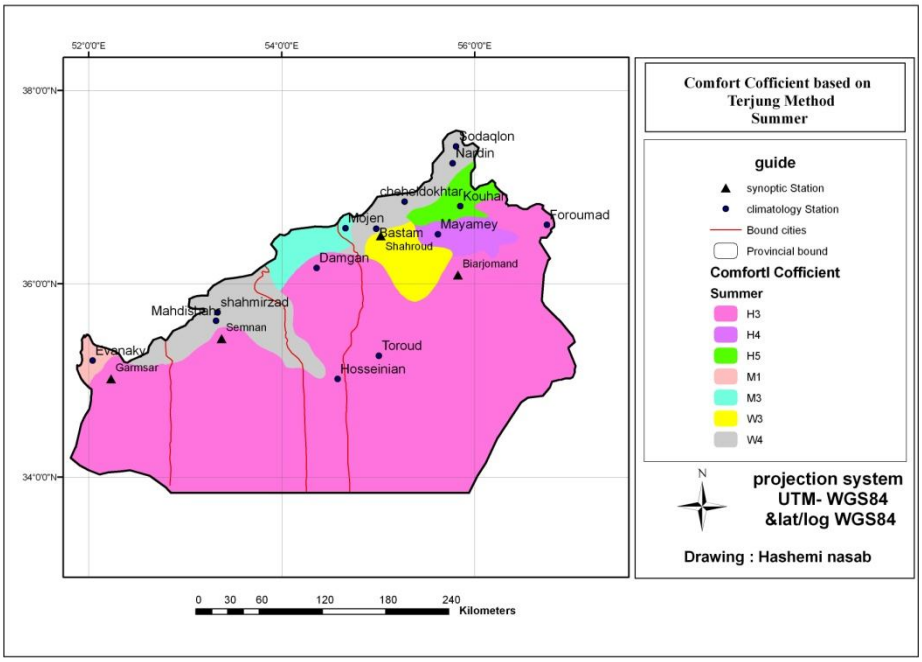

Fig (6) regionalization of comfort coefficient in Summer

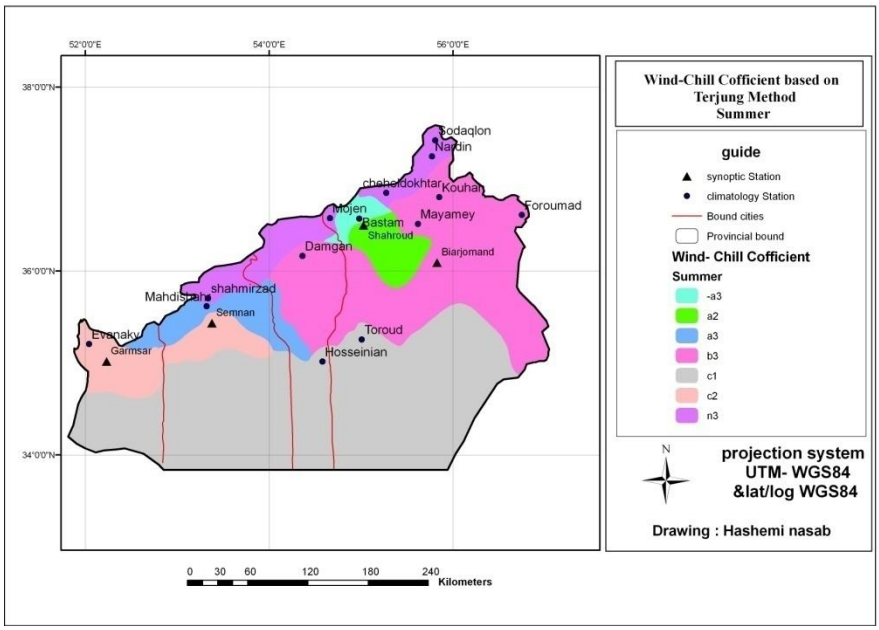

Fig (7) regionalization of Wind-Chill coefficient in Summer

Fall bioclimate

Three physiologic climatice types are observed in fall in Semnan Fig (8).

Because of alteration in out ward and local factors dominating in fall, the number of types in this season is lower than summer. C_2 type often covers central areas of province like Semnan, Damgan, Ivankey, Biarjmand and some areas of west like Froumad, Kouhan and Mayamey. Evaluation of comfort coefficient represents cool days and very cool nights (-1/-2). K_1 type with very cool days and nights includes all northern stations (Sodaglon, Nardin, Cheheldokhtar, Bastam, Mojen, Shahmirzad, Mahdishahr and Shahroud) (-2/-2). M_3 type with pleasant days and very cool nights has just covered south stations (Hosseinian and Toroud) and Garmsar (0/-2).Ordinary days and cool nights in Evankey, Semnan, Toroud, Biarjmand, Froumad, Meyamey, Shahroud and Bastam in fall is effect of wind-chill ($-a_3$). Effect of wind is pleasant during days and very cool at nights in Shahmirzad, Mehdishahr and Damgan stations ($-b_3$).Warm days and cool nights is felt by wind in Garmsar, Hosseinian and Kouhan (n_3). Cool days and very cool nights is effect of wind in Nardin and Cheheldokhtar ($-c_2$).Cool wind during days and cold wind at night is felt in Sodaglen and Mojen stations ($-c_3$).Fig (9).

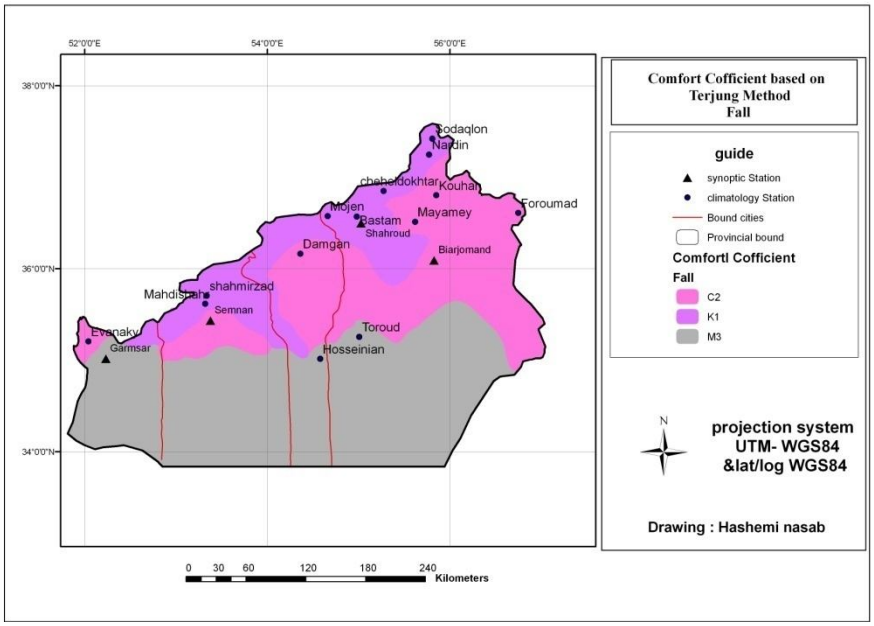

Fig (8) regionalization of comfort coefficient in Fall

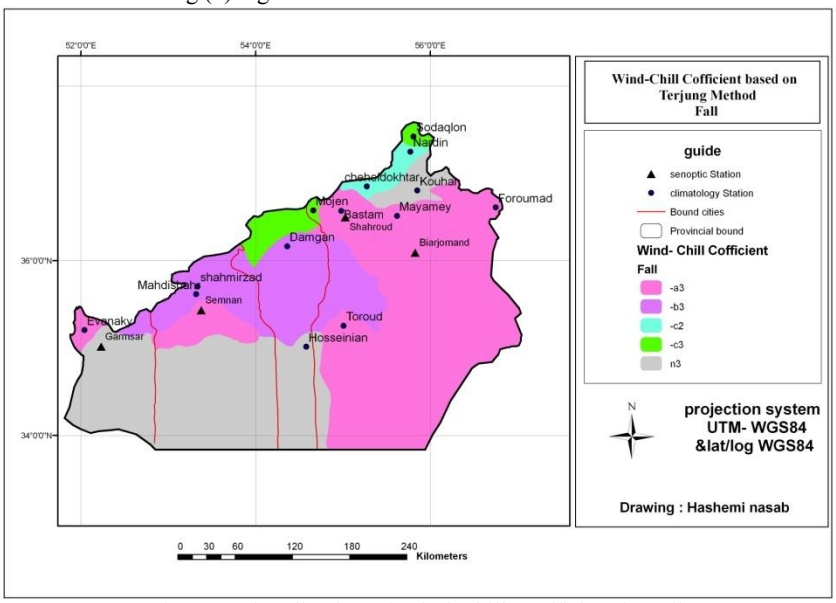

Fig (9) regionalization of Wind-Chill coefficient in Fall

Winter bioclimate:

Three physiologic climatic types are available in Semnan in wintwr. Fig (10)

Evankey, Garmsar, hosseinian, Toroud, Biarjmand, Kouhan, shahmirzad and Mehdishar stations are covered by K_1 type, so they are very cool during days and night (-2/-2).K_2 type with very cool days and cold night has surrounded Froumad, Shahroud, Sodaqlen and Semnan stations (-2/-3).K_4 type with very cool days and extremely cold nights has covered Nardin, Cheheldokhtar, Mayamey, Bastam, Mojen and Damqan station (-2/-5)

Cool days and very cool nights are followed by wind-chill index in Ivankey, Garmsar, Semnan, Hosseinian, Toroud, Mayamey, Bastam, Kouhan and Biarjmand in winter ($-c_2$). Cool days and cold nights is effect of wind in Shahmirzad, Mehdishahr and Damqan ($-c_3$). Wind couses very cool days and cold nights in Nardin and cheheldokhtar ($-d_2$) and its effect in Shahroud and Froumad is cool days and very cool night ($-c_2$), in Sodaqlon is very cool days and very cold nights ($-d_3$).Cool wind during days and very cold wind at night is blowing in Mojen ($-c_4$).Fig(11).

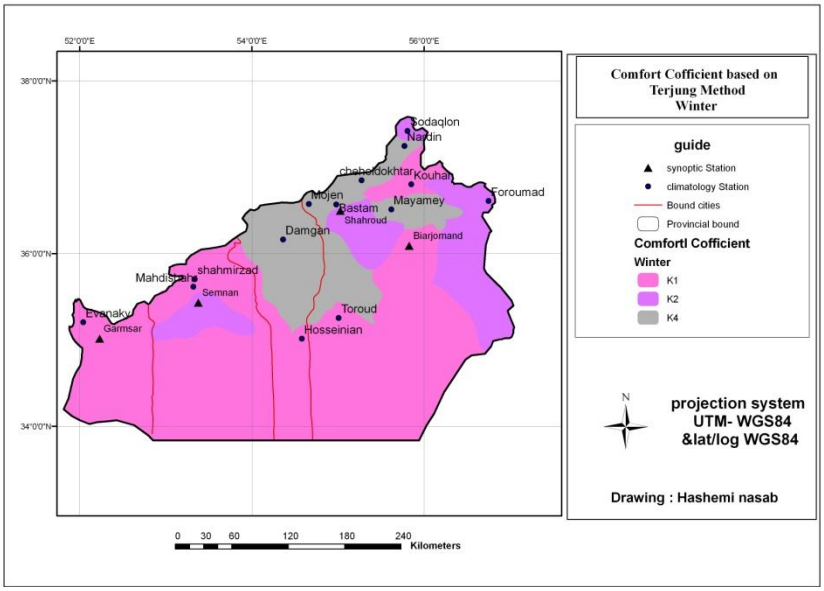

Fig (10) regionalization of comfort coefficient in Winter

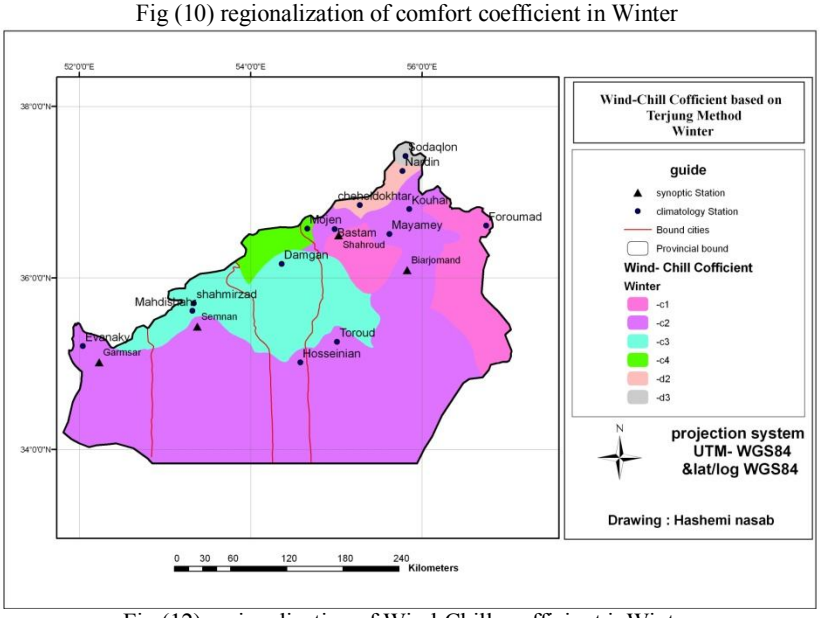

Fig (12) regionalization of Wind-Chill coefficient inWinter

Table (4) wind chill end comfort coefficient of Semnan Province in different seasons

winter		Fall		Summer		Spring		Seasons
Comfort coeffiecient	Wind-chill coefficient	Comfort coeffiecient	Wind-chill coefficient	Comfort coeffiecient	Wind-chill coefficient	Comfort coeffiecient	Wind-chill coefficient	Station
K_2	$-c_2$	C_2	$-a_3$	H_3	c_2	W_4	n_3	**Semnan**
K_2	$-c_1$	K_1	$-a_3$	W_3	a_2	M_3	n_3	**Shahroud**
K_1	$-c_2$	M_3	n_3	H_3	c_2	M_3	n_3	**Garmsar**
K_4	$-c_3$	C_2	$-b_3$	H_3	b_3	M_2	$-a_3$	**Damqan**
K_1	$-c_2$	C_2	$-a_3$	H_3	c_2	W_4	n_3	**Evankey**
K_1	$-c_2$	M_3	n_3	H_3	c_1	W_3	n_3	**Hossinian**
K_4	$-d_2$	K_1	$-c_2$	W_4	n_3	M_3	$-b_3$	**Cheheldokhtar**
K_1	$-c_2$	C_2	n_3	H_5	b_3	W_4	n_3	**Kouhan**
K_1	$-c_3$	K_1	$-b_3$	W_4	n_3	M_3	$-a_4$	**Shahmirzad**
K_1	$-c_3$	K_1	$-b_3$	W_4	a_3	M_3	$-a_4$	**Mehdishahr**
K_2	$-d_3$	K_1	$-c_3$	W_4	n_3	C_2	$-b_3$	**Sudaqlon**
K_4	$-c_2$	K_1	$-a_3$	W_4	$-a_3$	M_3	$-a_3$	**Bastam**
K_1	$-c_2$	C_2	$-a_3$	H_3	b_3	M_3	n_3	**Biarjmand**
K_2	$-c_1$	C_2	$-a_3$	H_3	b_3	M_3	n_3	**Foroumad**
K_4	$-c_4$	K_1	$-c_3$	M_3	n_3	C_2	$-b_2$	**Mojen**
K_1	$-c_2$	M_3	$-a_3$	H_3	c_1	W_3	n_3	**Toroud**
K_4	$-c_2$	C_2	$-a_3$	H_4	b_3	M_3	n_3	**Mayamay**
K_4	$-d_2$	K_1	$-c_2$	W_4	n_3	M_3	$-a_4$	**Nardin**

According to classification of stations in Semnan province based on comfort and wind-chill coefficients in spring (chart (4)) these are resulted:
Semnan, Ivankey and Kouhan in (W_4/n_3) group, Mehdishahr, Nardin and Shahmirzad in ($M_3/-a_4$) group,
Biarjmand, Froumad, Shahroud, Garmsar and Mayamey in (M_3/n_3) group.
Hosseinian and Toroud in (W_3/n_3) group.
In summer:
Semnan and Garmsar are in (H_3/c_2) group, Cheheldokhtar, Shahmirzad, Sodaqlen and Nardin are in (W_4/n_3) group.Damqan, Biarjmand and Froumad are in (H_3/b_3) group. Hosseinian and Toroud are in (H_3/c_1) group.
In fall:
Ivankey, Semnan, Biarjmand, Froumad and Mayamey are in ($c_2/-a_3$) group.
Sodaqlen and Mojen are in ($K_1/-c_3$) group.
Shahmirzad and Mehdishahr are in ($K_1/-b_3$) group.
Bastam and Shahroud are in ($K_1/-a_3$) group.
Hosseinian and Garmsar are in (M_3/n_3) group.
In winter:
Garmsar, Ivankey, Hosseinian, Kouhan, Biarjmand and Toroud are in ($K_1/-c_2$) group.
Shahroud and Froumad are in ($K_2/-c_1$) group. Mehdishahr and Sahmirzad are in ($K_1/ -c_3$)
Cheheldokhtar and Nardin are in ($K_4/-d_2$) group.
Bastam and Mayamey are in ($K_4/-c_2$) group.
Result:

In spite of this fact that Semnan is a vast province and it has various topography and different ranges of biochimate.

So that summer is more various than winter and it represents that local and outward factors don't have the same effect on formation of regions in different seasons.
Just three of above-mentioned types are observed in winter and seven different types in summer.
Three types (k_1, k_2, k_4) are appeared in winter because of domination of outward factors.
Both of local and out ward factors cause five types (C_2, M_2, M_3, W_3, W_4) in spring.
Seven types (H_3, H_4, H_5, M_1, M_3, W_3, W_4) are formed solely by local factors in summer.
Effective factors (out ward and local) are changing in fall so three types (M_3, K_1, C_2) dominate in this season.
Bioclimate of Semnan Province is steady rather than other seasons because of lower temperature and receiving lower humidity. In lower temperature effect of humidity alteration depends less on humidity in human's sense alteration against thermal conditions.
Finally about classification of stations in Semnan Province based on comfort coefficient and wind-chill, these are resulted:
In spring:
Ivankey and Kouhan are in (W_4/n_3) group. Mehdishahr and Shahmirzad are in (M_3, $-a_4$) group.
In summer:
Semnan and Garmsar are in (H_3/C_2) group. Cheheldokhtar, Shahmirzad, Sodaqlen and Nardin are in (W_4/n_3) group.
Hosseinian and Toroud are in (H_3, C_1) group.
In fall:
Ivankey, Semnan, Biarjmand, Froumad and Mayamey are in ($c_2/-a_3$) group. Bastam and Mojen in ($K_1/-c_3$) group.
In winter:
Garmsar , Ivankey , Hosseinian , Kouhan and Toround are in ($K_1/-c_2$) group.
Shahroud and Froumad are in ($K_2/-c_1$) group.
Cheheldokhtar and Nardin are in ($K_4/-d_2$) group.
Bastam and Mayamey are in ($K_4/-c_2$) group.

RESOURCES

1- Akram, A.Zuhairy, A.A.M. (1993).The development of the bioclimatic concept in building design. Solar Enarges, Volume 3, pp531-533

2- Asgari, A, Moeini, M, (2002), Climate and comfort, Meteorology org. p 8

3- Ataei, H, Basatzadeh karandi, M, (2004) Analysis of seasonal bioclimatic of Chahamahal o bakhtiary, sepehr journal, Number 66, pp46-51, 17th edition

4- Baghbani, P, (2002), MA theses, Climatical regionalization of Azarbayjan related to educational sites design, Tabriz. Univ (human and social science). Natural geography group

5- Barradas,victor L.(1991). Air temperature and humidity and human comfort index of some city parks of Mexico City. International Journal of Biometeorology, volume 35, p 1.march.

6- Bazrpash, R.Maleki, H.Hosseini,E`, (2008) , Evaluation of climatic comfort in outdoors for the purpose of echotourism in Babolsar, Geographical research quarterly periodical journal,Fall, pp93-108

7- Clarke. j. F. and W. bach. (1971). Comparison of the comfort condition in different urban and suburban microenviroment. International jornal of biometeorology. Volume 15. Number 1. March

8- David morllon – Galvez Ricardo Saldana – flores and Adlberto tejeda – martinez. (2004). human bioclimatic atlas for Mexico Area. Solar Energies Vol70.No.3.PP 311-318

9- Ghasemi, Vaez, (2000), Research report about effect of climatic factors on man, Meteorology org.p25

10-Ghasem zadeh, M, Nouri, M, (2006), Determination of thermal comfort areas in close educational systems in Yazd, 5th congress of optimization of fuel consumption

11- Gonzalez. R. R. Y. Nishi and A. P.Gagge. (1974). Experimental evaluation of standard effective temperature a new biometeorologecal index of mans thermal discomfort.International Journal of Biometeorology.volum18.p 1.march.

12- Gregorczuk, M. and k. Cena. (1967). Distribution of effective temperature over the earth, International journal of biometeorology, volume 11, p 2,July.

13- Jahan bakhsh, s, (1998), Assessment of human bioclimate in Tabriz and thermal need of buildings, geograghical research quarterly peoriodical journal, number 48, pp 67-78

14- Kaviani, mohammad Reza, (1993), Determination and preparing human bioclimate map in Iran, geograghical research quarterly peoriodical journal, number 28

15- Khalili, E`, (1999), Tridimentional research-Heat and coldness in Iran, geograghical research quarterly peoriodical journal, 1378, number54, pp5-17

16- Khoshhal, j, Ghazi, A, Arvin, E`, (2006), Using cluster classification for human bioclimate regionalization in Esfahan, Esfahan research journal, (human science) vol 20, number 1, pp171-186

17- Mahmoudi, P, (2008), Tourism and evaluation of comfort area in Marivan using effective temperature and accumulative tension, geography train journal, 22nd edition, Number 44-49.

18- Mohammadi, H, Saeidi, E` (2004), Bioclimatic indices effective on assessment of human comfort in Qom, Inviormental peoriodical journal, Number 47, p72

19- Oehier, K. Matzarakis, A, (2007) Developments in tourism climatology-a Matzarakis,c.r. defreitas :d.scot.p234

20-Ping Lin, T. Matzarakis, A. Lung Hwang ,R.(2010). Shading effect on long-term outdoor thermal comfort, Building and Environment, volume45,pp 213–221.

21-Ping Lin, T. Matzarakis, A.(2011). Tourism climate information based on human thermal perception in Taiwan and Eastern China. Tourism Management,volume 32,pp 492-500.

22- Ramesht, M.H, (1997), Man and climatic alteration, Nivar journal, Fall and winter, pp 69-73

23- Razjuyan, M,(1997), Comfort harmonious with climate, Shahid beheshti publication, First edition, p285

24- Taghizadeh. H, (1988), climate of desert, geograghical research quarterly peoriodical journal, number 4 ,p165

25-Terjung ,W.H.(1968).World patterns of the monthly comfort index .International journal of bio meteorology ,Vol . ,12,n,pp.119-123,141

26- Tplin and Matzarakis, A , (2007) EnTwicklung einer Bewertungs methodic zur interation , von wetter- and klimabed ingungen in Tourismua. Ber . metero. inst. Univ.preiburgner. 16. 73-79

27- Zain-Ahmed, A. A. M. Sayigh, P. N. Surendran, M. Y .(1998).Othman The bioclimatic design approach to low-energy buildings in the Klang Valley, Malaysia. Solar Energies. Vol. 15,pp437-440

28- Zeitunli, E`, (2006), Evaluation of comfort factors by emphasis on role of tourism in Golestan Province, MA theses, sistan o baluchestan univ, (geo and geography)

29- Zengin Murat, Kopar Ibrahim, Karhan faris, (2009), Determination of bioclimatic comfort in Erzurm- Rize expressway corridor using GIS, Building and Environment , Vo1ume45, Lssuse1, pp158-164

30- Zenker .H (1967) ,The Bioclimatical Classification of the Baltic Coast in regard to the rapeutical possibilities National library Medicine ,Vol . 11, N.61,PP 565-8

31- Zolfaghari, H, (2010) Evaluation of appropriate time to tour in Tabriz using PETfactors and PMV, geograghical research journal, winter, pp 141-139