

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/262285819>

Informational technology in bioclimate analysis of Višegrad for health spa tourism

Conference Paper · July 2010

CITATIONS

6

READS

107

6 authors, including:



Milica Pecelj

University of East Sarajevo

36 PUBLICATIONS 143 CITATIONS

[SEE PROFILE](#)



Danimir Mandić

University of Belgrade

46 PUBLICATIONS 138 CITATIONS

[SEE PROFILE](#)



Dejan Šabić

University of Belgrade

47 PUBLICATIONS 247 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Ethnocultural diversity and multiculturalism in Canada [View project](#)



Regionalization of Serbia [View project](#)

Informational Technology in Bioclimate analysis of Višegrad for health spa tourism

MILOVAN PECELJ

Faculty of Geography
University of Belgrade

MILICA PECELJ

Department of Geography
Faculty of Philosophy
University of East Sarajevo
milicapecelj@gmail.com

DANIMIR MANDIĆ

Teachers Training Faculty
University of Belgrade

SERBIA

JELENA PECELJ

Department of Geography
Faculty of Philosophy
University of East Sarajevo

BOSNIA AND HERZEGOVINA

BOGDAN LUKIĆ

Faculty of Geography
University of Belgrade

SERBIA

DEJAN ŠABIĆ

Faculty of Geography
University of Belgrade

Abstract: Previous studies of the health spa resorts have included just balneo analysis. Spas and health resorts have changed the concept of treatment. The earlier concept was included only long-term treatment and recovering older people and people with diseases. Today, spas and health resorts are based on prevention of illness. They promote service for people of all ages regardless of health status. Natural curative factors such as mineral water, healing mud, healing gases, healing climate (air bath) are important for the treatment of many diseases, recovery after injury or illness, stress, prevention and recreation. This paper try to give a biclimatic analysis of the Višegrad in order to point up recreational value of this therapeutic spa. The subject of this paper is analyses of equivalent temperature, comfort zones and zones of stuffiness that are processed on the basis of the meteorological data for thirty years (1961- 1990) observation in town of Višegrad. . We use software with related database created by authors.

Key Words: Bioclimatology, Informational Technology, , equivalent temperature, health spa,

1. Introduction

Višegrad is located in the central part of Dinaric Alps mountain system in Balkan Peninsula. It is administratively part of the Republika Srpska entity of Bosnia and Herzegovina. Drina River valley averages Dinaric Alps mountain system in the

meridional direction while the east side tributary Rzav opens Višegrad valley and makes natural connection with the Western Morava valley from the east (Serbia) and Sarajevo valley from the west. Within the Višegrad valley is town and municipality of Višegrad.

Bosnia and Herzegovina has several spa and health centers based on the thermal or mineral springs, with different development and different tourism affirmation. This paper present one of them belongs to the municipality of Višegrad called Višegrad's health spa resort and it is located 4 kilometers north from the town. It is situated in wooded mountain environment near hot spring and stream at altitude of 414m (Figure 1 and Figure 2.).

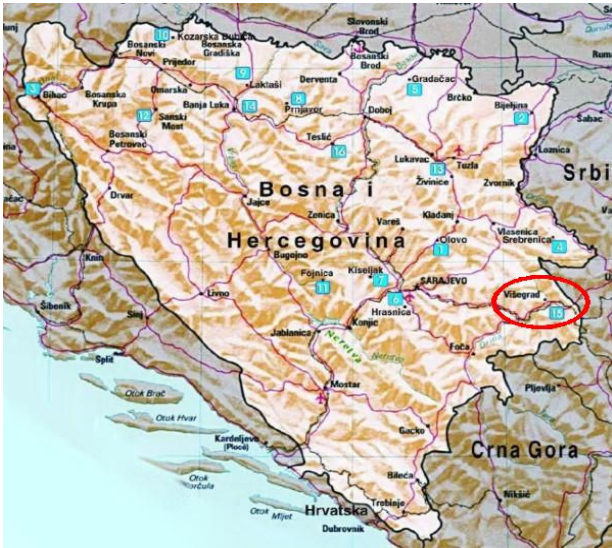


Figure 1. Geographical position of the Višegrad's health spa resort

There is a number of climatological factors influences on Visegrad climate. Drina valley, Veliki and Mali Rzav valleys, Višegrad lake are in the near environment of Višegrad. Also little futher there are Lim and Uvac valleys and Zlatar lake which affect the Visegrad climate



Figure 2. Geographical position of the Višegrad health spa resort

. Relief with 324 m of altitude particularly affect the air temperature and precipitation, while forest, lakes and river affect humidity. River valleys and the saddle with providing direction of the valley and mountain massif, influence direction and speed of air.

2. Bioclimatic analysis of Višegrad

Bioclimatology and its disciplines (climatophysiology, climatopatology and climatotherapy) use different combinations of climate elements (bioclimatic indices) whose results show some bioclimatic features of the place or area.

The importance of equivalent temperature (a combination of temperature and pressure of water vapor) is sampling of different heat feeling with healthy and sick people. Equivalent temperature was introduced by German physicist and meteorologist J. F. Bezold. According to deffinition, equivalent temperatures is the temperature that an air parcel would have if all water vapor were condensed out at constant pressure, the latent heat released being used to heat the air. The important role played latent heat that is released during the phase of the process (condensation and sublimation). German physicist and climatologist E. Kruger present classification of equivalent temperature with seven different types of weather.

In order to identify Krüger's bioclimatic types for Višegrad, supplemented scale with two other class was used which is adapted for the Balkan region (Milosavljevic 1983). Analyzing equivalent temperature and comfort zone for the thirty-year period of observation (1961-1990) may be present the following results. They are three types of weather and six physiological heat sensation registered in Višegrad.

Cold weather type ($5^{\circ}\text{C} < \text{Tek} < 22^{\circ}\text{C}$) is present from November to March inclusive. Physiological feeling of heat that occurs as a **cold** ($\text{Tek} = 5-18^{\circ}\text{C}$) coincides with the winter period. Physiological feeling of heat that occur as **very chilly** heat type ($\text{Tek} = 18-22,0^{\circ}\text{C}$) is characterized by the first spring month of March and last autumn month November ($\text{Tek} = 20,0^{\circ}\text{C}$). Physiological feeling of heat that

occur as **very cold** heat type ($T_{ek} < 5^{\circ}\text{C}$) is not present, but temperature in January is approaching ($T_{ek} = 6,0^{\circ}\text{C}$). During winter period is the minimum latent heat accumulated..

Pleasant weather type ($22.0^{\circ}\text{C} < T_{ek} < 50.0^{\circ}\text{C}$) is present during the spring (April and May), autumn (September and October) and the beginning of summer (July). They are two classes present pleasant weather type. Physiological feeling of heat that occurs as **fresh** ($T_{ek} = 22.0$ to 30.0°C) is represented only in April ($T_{ek} = 28.5^{\circ}\text{C}$). Then, physiological feeling of heat that occurs as **pleasant** represented in May ($T_{ek} = 39.0^{\circ}\text{C}$) and October ($T_{ek} = 30.3^{\circ}\text{C}$) where is close to physiological feeling of heat that occurs as fresh. Finally, physiological feeling of heat that occurs as **warm** ($T_{ek} = 40.0$ to 50.0°C) is present in June ($T_{ek} = 47.1^{\circ}\text{C}$) and September ($T_{ek} = 41^{\circ}\text{C}$) and is close to the physiological feeling of heat that occurs as pleasant.

Overheated weather type ($50.0^{\circ}\text{C} < T_{ek} < 70.0^{\circ}\text{C}$) occurs in the two hottest months, July ($T_{ek} = 50.7^{\circ}\text{C}$) and August ($T_{ek} = 51.3^{\circ}\text{C}$) and represent physiological feeling of heat that occurs as **small sultriness**. Physiological feeling of heat that occurs as **sultriness** and **very sultriness** are not represented.

Weather types and classes that determine the equivalent temperature are presented in Figure 1.

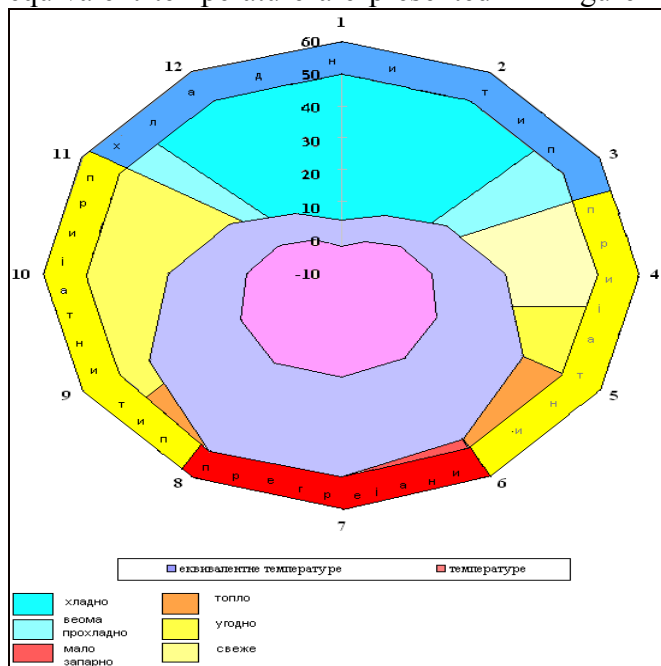


Figure 3. Weather types and physiological feeling of heat

Combination of Relative humidity and air temperature can defined sultriness and comfort zone. Heat transfer is the most easier if the air is dry and windy than if it is wet and without wind. In addition to heat, wind is an important bioclimatic element, because it has a rapid impact on the capacity of thermal characteristics, which is particularly reflected in bioclimatic effects on humans. Figure 2 shows sultriness and comfort zones. There is a closed climogram chart which is far from the boundary line separating the sultriness and comfort zone shows dominant comfort zone. There are certain days with sultriness in July and August.

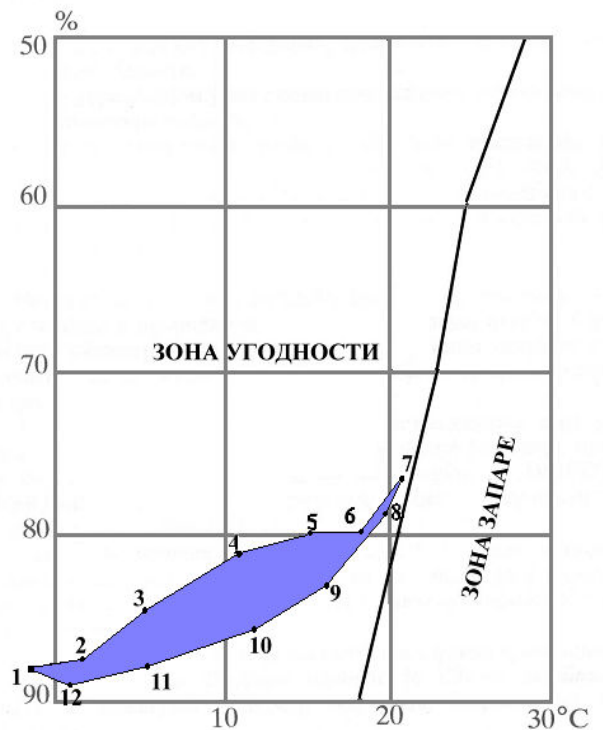


Figure 4. Climogram of comfort and sultriness zone

3. Conclusion

Bosnia and Herzegovina has several spa and health centers based on thermal or mineral springs. Based on the bioclimatic review and analysis the dominant type of weather is pleasant during six months, from April to October inclusive, where all physiological feeling of heat that occurs as fresh, pleasant and warm are presented. Other period from November

to March belongs to the type of cold weather. Most of the year comfort zone is dominant. Our software for measuring bioclimatic characteristics is very efficient for planning health spa tourism. We conclude that Visegrad is very famous town with great number of hystorical buildings, pleasant people and rather good bioclimatic characteristics.

References:

- [1] A. Matzarakis, B. Amelung: *Physiological Equivalent Temperature as Indicator for Impacts of Climate Change on Thermal Comfort of Humans*, Seasonal Forecasts, Climatic Change and Human Health, (2008) (161-172)
- [2] C R de Freitas: *Theory Concepts and Methods in Tourism Climate Research*, First International Workshop on Climate Tourism and Recreation, Int J Biometeorology (2001) WP01(5-20)
- [3] K. Blazejczyk: *Assessment of recreational potential of bioclimate based on the human heat balance*, First International Workshop on Climate Tourism and Recreation, Int J Biometeorology (2001) WP01 (133-152)
- [4] T.Koslovska-Szczesna, B. Krawczyk, K. Blazejczyk.: *The Main Featues of Bioclimatic conditions at Polish Health Resorts*, Gepgraphia Polonica, Spring (2004), 77 (1) (45-61)
- [5] M.R. Pecelj, M.Milinčić, M.Pecelj.: *Bioklimatska i ekoklimatska istraživanja-pravci razvoja*, Glasnik Srpskog geografskog društva (2007), 87 (2) (199-210).
- [6] Pecelj, M., Mandic, D, ,Milincic, M., Pecelj, M, Pecelj, J.: **Informational Technology in Teaching Geography and Exploring Orlovaca Cave**, , in the book of 6th WSEASTASME Intenational Conference. on EDUCATIONAL TECHNOLOGIES (EDUTE '10), University of Sfax, Souse, Tunisia, 2010, pp.53-58.
- [7] Mandic, D, Lalic, N., Bandjur, V.: **Managing Innovations in Education**, in the book 9th WSEAS Intenational Conference. on ARTIFICIAL INTELLIGENCE, KNOWLEDGE ENGINEERING AND DATA BASES (AIKED '10), ISBN: 978-960-474-154-0, ISSN: 1790-5109, University of Kmbridge, Cambridge, United Kingdom, 2010, pp.231-237

[8] Pogarcic, I, Ziljak – Vujic, J.: *Learning: Is Time for eTaxonomy?*, 6th WSEAS International Conference on EDUCATION and EDUCATIONAL TECHNOLOGY (EDU'07), Venice, 2007.

[9] Mandic, D, Lalic, N., Bandjur, V.: **Managing Innovations in Education**, in the book 9th WSEAS Intenational Conference. on ARTIFICIAL INTELLIGENCE, KNOWLEDGE ENGINEERING AND DATA BASES (AIKED '10), ISBN: 978-960-474-154-0, ISSN: 1790-5109, University of Kmbridge, Cambridge, United Kingdom, 2010, pp.231-237