CLIMATE AND WEATHER INFLUENCE OVER THE TOURIST SECTOR IN THE LAND OF DORNA

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ABSTRACT. Climate and Weather Influence over the Tourist Sector in the Land of Dorna. The Land of Dorna represents a region with a climate specific to intermountain depressions and mountain areas by its geographic position, the characteristics of active subjacent surfaces and of dominant air-masses,. Climatic factors and phenomena play an important part in outlining the whole features of the territorial system and development of some particular tourist activities in this geographic region. The Land of Dorna has a lot of natural and anthropic resources that have taken many different shapes under the influence of some internal and external elements over the time. Therefore, our main goal is to identify and analyze the way in which climate and weather work on tourist activities in this part of the country.

Keywords: climate, weather, tourist activities, development

1. INTRODUCTION

The relationship between the elements that influence the tourist activity and tourists' decision to pick a certain place to spend their free time has been a matter of discussion since the 1930s. This subject has been approached in many different ways, the first and most studied is the one related to the effects of economic sector over tourism and vice versa (Lim, C. et all. 2008; Wiston, A.R., Juan, G.B., 2009; Vellas, F., 2011 etc.), followed by social effects and the role of traditions (Brunet Sandra et. all. 2001; Ilieș, M. et. all. 2010; Chao, C.L., Hsu, P.H., 2011 etc.), and the relationship among climate factors, weather and tourism (Hu, Y., Ritchie, J., 1993; Gössling, S., Hall, M., 2006; Bigano et. all. 2007 etc.) etc.

In this paper we want to describe the relationship among climate elements, weather and tourism and the main tourist activities that have developed in the Land of Dorna over the years. Altogether, the climatic processes and phenomena form the climate of one region. In this way, the Land of Dorna represents a region with a climate specific to intermountain depressions and mountain areas leading to the development of some particular types of tourism. Meanwhile, weather can be defined as the state of the atmosphere at a given time and place, directly affecting outdoor tourist activities. Because of their characteristics, the climatic factors and

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weather with other components of the natural environment influence the touristic potential in the Land of Dorna.

According to Maddison, D., 2001, besides the climate elements, an important aspect when choosing a certain tourist destination is the safety of the place and the socio-economic and technical infrastructure. In 1997, Williams, P., Dossa, K., Hunt, J emphasized that climatic parameters constitute a major influence on tourists state of mind during recreation. They also insisted on the relationship between human behaviour and weather, the latter offering body comfort (e.g. relative humidity, mild wind) or discomfort (e.g. high speed wind, high temperature).

Others, like Becken, Sussane., Hay J., 2007, presented three different aspects of climate that have the greatest effect on tourist experience (Table 1). First of all, the aesthetic component affects the tourist experience, while the thermal element describes the way in which tourists feel comfortable. The physical component has an impact on the human body by exposing it to certain discomfort conditions, anticipating if some tourist activities could be made or not.

Table 1. Facets of climate and impact on tourists
(Source: Becken Sussane., Hay J., 2007, p. 21, after de Freitas, 2001)

Facet of climate	Impact on tourists
Aesthetic	
Sunshine/Cloudiness	Enjoyment, attractiveness of site
Visibility	Enjoyment, attractiveness of site
Day length	Hours of daylight available
Physical	
Wind	Blown belongings, sand, dust etc.
Rain	Wetting, reduced visibility
Snow	Participation in activities
Ice	Personal injury, damage to property
Severe weather	All of the above
Air quality	Health, physical well-being, allergies
Ultraviolet radiation	Health, suntan, sunburn
Thermal	
Integrated effects of air temperature, wind, solar radiation, humidity, long-wave radiation, metabolic rate	Environmental stress, heat stress Physiological strain, hypothermia Potential for therapeutic recuperation

A series of studies undertaken by Olcina Cantos and Vera Rebollo (1998), Becker, S. (2000), Renaudin, M. (2002) etc. attested that inhabitants from certain geographic regions used climatic peculiarities to develop particular types of tourist activities. By anthropic influence the climate and weather characteristics have become a *resource* of tourist product, allowing outdoor tourist activities (such as hiking, climbing, rafting, horse riding etc.).

In the Land of Dorna the inhabitants have exploited the characteristics of climate elements and phenomena specific to the cold season (low temperature, thick snow layer, mean wind speed etc.) and warm season (moderate temperature, high ozone levels, low humidity levels etc.) in their favour to develop two types of tourist activities: *winter sports and climatotherapy*. Therefore we can conclude that climate characteristics proper to dorna region have a huge influence on seasonal tourism in this area. All year round one can develop tourist activities both outdoor and indoor ones.

Hereinafter we will analyze two types of tourism developed in the Land of Dorna, such as the ones specific to cold season (*winter sports*) and summer season (*climatotherapy*), both of them relying on the interrelationship among various components of the environment (especially the climate component).

2. METHODOLOGY

Research methodology used in this paper consists of two parts. In the first one we have gathered pieces of information from on-line and written sources and articles, that have approached the main factors that influence the tourist activities. These sources have been chosen taking into consideration a series of criteria: their publication in accredited journals, books, official websites etc. from all over the world; authors affiliation with prestigious research institutions and the impact of their work on the area of interest. Web search engine has been used by typing key words as *geography, tourism, climate, weather etc.*. Next step has included the selection and analysis of those studies that strictly rely on the relationship among clime, weather and tourism. Primary, these facts have underlined the way in which climate and weather conditions could be favourable or unfavourable in developing some types of tourism. Secondary, these elements act on both tourist decision to pick a certain touristic destination and their experiences according to some climate elements.

After we finished the first part of the study we focused on a secondary analysis of the climate data used to calculate *thermal discomfort index ARAKAWA –DI ARAKAWA (units)* in the Land of Dorna. This index indicates the combined effect of temperature and air humidity on human body, underlining the state of thermal comfort or discomfort. DI Arakawa index has been counted on the basis of dry-bulb thermometer (T_{dry} in ^{0}C) and relative humidity of air (RU in %), according to equation:

$$\mathbf{DI_A = 0{,}81\ T_{dry} + 0{,}01 \times RU\ (0{,}99\ T_{dry} + 14{,}3) + 46{,}3^*}$$

The data were collected from the four weather stations located in the analysed territory: Cârlibaba, Călimani (Reţitiş), Poiana Stampei and Vatra Dornei. Both analyses helped us determine if previous results also coincided with Dorna Country and the way in which climate and weather component of the region had an

influence in the development of cold season activities and climatotherapeutic treatments.

3. CLIMAT-WEATHER-TOURISM INTERRELATIONSHIP

The Land of Dorna, located in the northern part of Romania, represents a naturally ”strong” region (Cocean, P., 2011, p. 186) and falls under the pattern of intramountainous types of ”lands”. The connection between the depressionary region (Dorna and Drăgoiasa-Glod Basins) and the surrounding mountain belt (eastern part of the Maramureş and Bârgău Mountains; whole mountain range Suhard and Giumalău; western part of Obcina Mestecăniş and northern flank of the Călimani Mountains) is made by soil erosion piedmonts (Naum, Tr., 1973, p. 41). Thus, the characteristics of active subjacent surface, geographic position, influence of atlantic, east european and scandinavian air masses, along with specific climate elements and phenomena in the studied region determine the development of some tourist activities. From these kind of activities that include weather and climate features we can distinguish the ones proper to cold season (*winter sports*) and warm season (*climatotherapy*).

In order to define the influence of climate elements on the human body (state of comfort/discomfort) and the bio-climatic potential of the region we had to calculate the *thermal discomfort index ARAKAWA –DI ARAKAWA (units)*, using the data we had received from the four weather stations in the Land of Dorna. Analyzing these data we came to the conclusion that in the case of three of these stations (Cârlibaba, Poiana Stampei and Vatra Dornei), situated between 825-930 m altitudes, the values were from 60 to 75 units, indicating *bioclimatic comfort*. On the other hand, the Reţitiş weather station (2100 m) registered values between 55-60 units that produce *thermal cooling discomfort*. Thereby, we can conclude that bio-climate goes far towards to maintaining and developing well-established tourist activities in the Land of Dorna (Table 2).

For the human body to maintain a state of comfort we must have a favourable weather. By favourable weather we mean average temperature from 17 to 19°C, relative humidity between 55-85%, wind speed at 3 m/s and an atmospheric pressure of 4 mb/day. These values have been obseved in the low parts of the Land of Dorna (Cârlibaba, Poiana Stampei and Vatra Dornei weather stations).

In the Land of Dorna, because of favourable climate conditions, there had been developed and practiced *climatotherapeutic tourism* from ancient times. This type of tourism has been associated with balneotherapy and is mainly specific to Vatra Dornei balneo-climateric resort. Inside the resort there are recorded the highest values of ozone concentrations (1500 ions + and - /cm³) in the region (Ţăranu, P., 1999, vol. 3, p. 173). To this important feature we could also add some moderate climate elements specific to Dorna Basin (moderate mean annual temperature, low values of daily thermal amplitude, low humidity levels in summer etc.) and the presence of coniferous forests whose resin oil become volatile under

the influence of solar radiation in summer. All these conditions give this climate a curative character, healing or ameliorating some nervous system diseases, respiratory, glandular or metabolic disorders etc. (Ţăranu, P., 1999, vol. 3, p. 171)

Table 2. Levels of bio-climatic discomfort according to DI Arakawa units in the Land of Dorna

DI Arakawa (units)	DI Arakawa (units) in the Land of Dorna	Bio-climatic discomfort
$DI_A < 55$		Unbearable freezing bio-climate
DI_A = 55-60	**Călimani (Reţitiş) 58,56**	**Thermal cooling discomfort**
DI_A = 60-75	**Cârlibaba 71,62**	**Bio-climatic comfort**
	Poiana Stampei 65,42	
	Vatra Dornei 66,64	
DI_A = 75-80		Thermal warming discomfort
$DI_A > 80$		Unbearable heat bio-climate

Climatotherapeutic tourism had been practiced on a large scale before the downfall of balneary tourism in 1989 (q.v. Mihalca, Izabela, Amalia; Alexe, M., 2013). Nowadays, on a large and small scale, both local people enjoy the benefits of climate effects on human body and the tourists that come in these four accommodation units that still provide balneary services. As a rule, these types of tourists are usually formed by elder people.

According to Besancenot, J. 1986, 1991, senior people are more interested in favourable climate conditions because their body is no longer adapted to certain climate changes as in the case of young ones. Some climate aspects could aggravate pre-existing illnesses (e.g. increased rate of cerebrovascular accidents in warm season, embolism caused by low air pressure) and provoke even death in certain circumstances.

The second type of tourism is the one for *winter sports* and has developed and practiced in the two mountain resorts in the Land of Dorna: Cârlibaba and Vatra Dornei. Generally, this kind of tourism is undertaken by people of different ages. In accordance with Scott, D. et. all, 2006, p. 381, winter sports are practiced in good conditions if snowpack depth exceeded 30 cm and temperature remained under 10°C more than two days in a row.

In the case of the Land of Dorna these conditions are to be accomplished if we take into consideration the following aspects:

- snow cover varying from 11,3 cm to over 35 cm in the months of October-March, with average values between 30-50 cm;
- mean number of days per year with snowpack around 110-120 days, with a maximum in January (approximately 28-29 days);
- mean temperature of cold season -1,4°C;
- mean number of days per year with solid precipitation being over 60 days;
- average wind speed below 2,2 m/s.

Thus, the thickness and duration of snow-cover represent the strength of a mountain resort for winter sports, to which we can add the rest of climate features and morphometric characters of the relief.

The two resorts are fitted with six ski slopes with different levels of difficulty for skiing, sledging, snowboarding etc. and an ice skating rink is installed in the city of Vatra Dornei. Mountain rescue activities are provided by Public Mountain Rescue Service and Tourism in Vatra Dornei.

In compliance with the data received from National Statistics Institute (Tempo on-line) the Land of Dorna was organized in 71 accomodation units and divided into hotels, villas, cottage houses, agrotouristic pensions with a total accomodation capacity of 2878 places in 2013. The city of Vatra Dornei has the most accomodation units (41) and a number of 2219 rooms, as well as five of the six ski slopes and climato-balneological resort in the area under study.

4. CONCLUSIONS

This article highlights the close relationship among climate, weather and tourism in the Land of Dorna. Climate parameters are the key element in the development and amenity of the two types of tourism above mentioned: winter and climatotherapy ones. All in all, the Land of Dorna has an important climate potential and the anthropic and weather influence represent the basis of tourist flows and development of different sports (skiing, skating, hiking, climbing etc.).

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