Natural factors which attract tourists in the spa resorts of the contact sub-mountain area between Sucevița and Soveja-Vizantea

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ABSTRACT: The attraction of some spa resorts does not depend only on their accessibility, on built facilities or on the existence of the representative anthropic objectives, but also on several natural factors, as the air physical and chemical features, the bio-climatic features, the presence of mineral springs, of salt mines or of some really valuable landscape elements. This study aims to underline the importance of the natural factors of tourist attraction, especially on the balneary-climatic resources of the spa resorts in the East base of the Eastern Carpathians between Sucevița and Soveja-Vizantea. The analysis of the role played by the natural factors of cure, relaxation, treatment and recovery highlights their importance as potential attraction elements for the recreation, sportive or health tourism. The results obtained reinforce the fact that the contact sub-Carpathian area along the alignment between Sucevița and Soveja-Vizantea disposes of a very valuable saving bioclimate, mineral springs and salt mines which amplify the attraction and value of the stations that appeared and developed over the years at Sucevița, Solca, Cacica, Gura Humorului, Oglinzi, Bălțătești, Piatra Neamț, Sărata, Târgu Ocna, Slănic Moldova, Soveja and Vizantea.

KEY WORDS: submountain balneary-climatic stations, Moldova.

1. Introduction

The tourism has become in the last decades an important activity of the national economies, being able to revive and develop territories once very poor. The interest for the balneary tourism is thus justified by the benefits brought both to tourists and especially local communities. This type of tourism represents a chance for those localities which benefit from a valuable natural framework favouring such activities.

The recreation, sportive and health tourism disposes of valuable natural factors of cure and treatment on the East base of the Eastern Carpathians. In his doctoral thesis from 2004, Apostol thoroughly analysed the climatic particularities of the Moldavian Sub-Carpathians and surroundings (factors, elements, phenomena in their temporal evolution and spatial distribution).

The work also presents numerous references about the air quality of this geographic unit. Although severe meteorological phenomena are present in the climate of the researched territory (Ielenicz et al., 2005, Tănasă, 2011), Teleki et al. (1984) remarked rather the mildness of the climate and the shelter effect that the tourist stations in the researched space benefit.

Teodoreanu and Gaceu described in 2013 the entire Romanian balneary potential, often referring to the curative and therapeutic potential of the bio-climate, of the mineral waters and salt mines in the touristic stations in the East base of the Oriental Carpathians.

In 2014 Mihăilă brought arguments in favour of the tourism valorisation through different climatic and therapeutic procedures of the potential of the forest topoclimate and of some salt mines microclimate, among which Cacica salt mine. In his approach the author largely analysed the potential and the valence of Romania bioclimate, detailing the indifferent sedative one, specific to the area studied by us. Few years later, in 2019, Mihăilă et al., comparatively analysed the bioclimatic features of Cacica salt mine interior, by comparison with its exterior.

In 2016, Enache made a thorough analysis of the bioclimatic particularities of Romania territory, with numerous references to the bioclimatic level specific to the relief stage of Sub-Carpathian hills, seen through a medical doctor eyes.

In 2018, Bistricean studied in detail the climatic and bioclimatic features of the territory referred by us, the mineral springs and the two salt mines (Cacica and Târgu Ocna), providing inclusively his own chemical analysis concerning the chemical composition of the mineral waters in a series of stations along the alignment researched by us (Solca, Negulești, Slănic Moldova, Vizantea).

Bistricean et al. brought in a series of clarifications for the bioclimatic regionalization of Moldavia, framing the researched territory on the basis of the values provided by nine bioclimatic indices, at the contact between the sedative bioclimate and the tonic-stimulating one. In an ample study from 2020 named *Balneary climatology where to?*, the bioclimate of the stations on the alignment Sucevița – Soveja-Vizantea is appreciated in altimetry bases as belonging to the indifferent sedative level (Silișteanu et al., 2020).

In 2018 Mihăilă and Bistricean analysed the climate favourability for the outdoor tourist activities and for the balneary tourism at Bălțătești and Târgu Ocna-Slănic Moldova using TCI, and in 2019 Mihăilă et al. realised CTIS for the above mentioned stations.

The climatic and bioclimatic role of the forests was detailed by a lot of specialists: Barnea and Ursu, 1968, Ciulache, 2003, Farcaș et al., 2003, Teodoreanu and Gaceu, 2013, Mihăilă, 2014, Enache, 2016. The silvotherapy represents a valuable balneary procedure (Mihăilă, 2014) which will be very important in the future, and the mixed forests on the contact Oriental Carpathians-Suceava Plateau-Moldavian and Curvature Subcarpathians (Burduja, 1948, Doniță et al., 1960, 1961, Burduja, 1972, CLC, 2018) which own extended surfaces (6854 km^2) and covers 48 % of the researched territory (CLC, 2018) may become an ideal environment for its practice.

The hilly relief, the moderate climate, the broad-leaves and coniferous vegetation, the presence of mineral springs and salt mines, all this makes our study area to be an attractive region with a real development potential. The researched area presents thus numerous natural elements of balneary attraction which can be durably valorised according to the respect of the legal norms (Decision no. 1154 from July 23rd 2004).

2. Study area

The researched territory has the shape of an elongated strip situated in the central-eastern part of Romania, on the border between the Eastern Carpathians, in the West, on one hand, and Suceava Plateau and Moldavian Subcarpathians, in the East, on the other hand (Fig. 1).

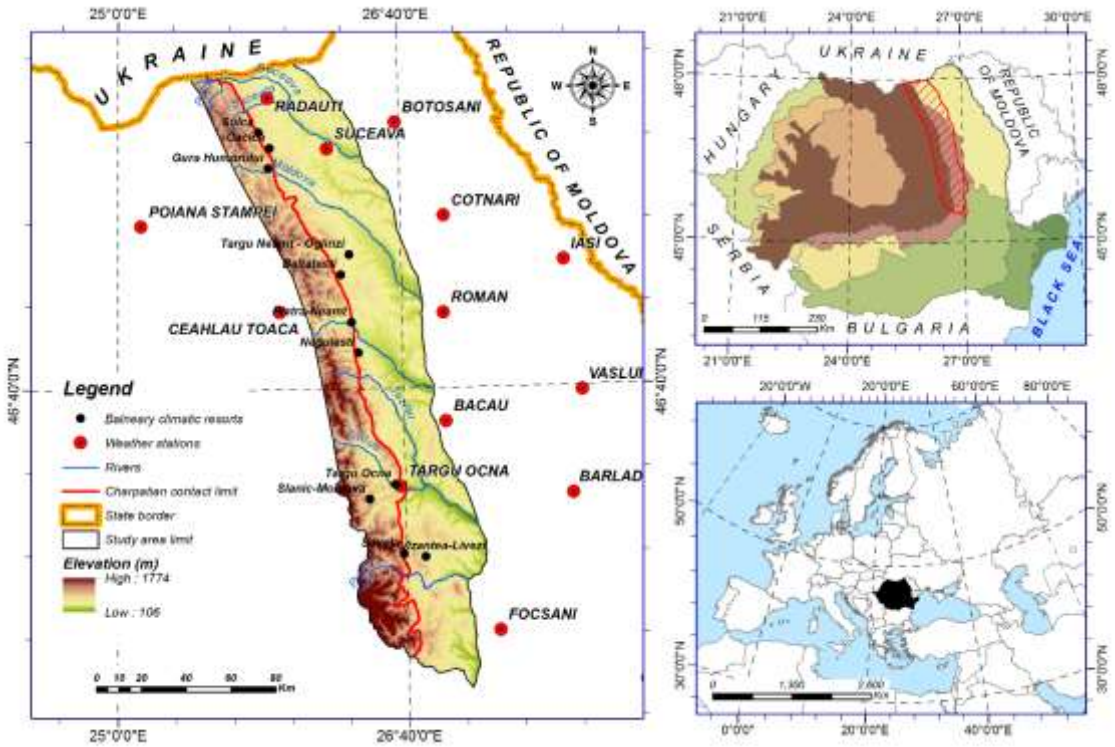

Figure 1 Study area; contact sub-mountain area between Sucevița and Soveja-Vizantea.

The relief is represented by hills and subcarpathic depressions with average altitudes between 250 - 800 m. The whole study area has the orientation N-S, from Sucevița (47°46´lat N; 25°43´long E) to Soveja-Vizantea (45°52´ lat N; 26°47´ long E), these localities being separated by a distance of 216 km (Fig. 2).

The climate of the researched territory is situated in the hills level, and the vegetation corresponds to the level of broad-leaf forests and of mixture of broad-leaf and conifer forests. From the substrate flow an important number of mineral springs (37, among which 23 are therapeutically valorised).

3. Methods

The research methods were based on highlighting the assets of the balneary stations along the alignment Sucevița – Soveja-Vizantea and which were remarked in several research works or studies which integrally or partially cover the stations concerned. The spatial distribution of the elements presenting a balneary potential was synthesized by specific cartographic methods using the ArcGis 10.4. software. The data introduced in the climatic models were provided by the National Meteorology Administration, and some of them were taken from the collective volume *Clima României (Romania Climate)*, 2008.

4. Results and discussion

4.1. Mathematic position and geographic situation. Their influence on the resources for the balneary tourism

The study area, by its mathematic position (47°46´ N, 25°43´ E in the North station, Sucevița and 45°52´ lat N; 26°47´ long E in the South station, Vizantea-Livezi) is situated in the transition temperate climate zone. The climate becomes milder from thermic point of view in the North-South direction. In the same direction are also improving the values of the bioclimatic indices and the bioclimate itself. The geographic position, on the outside the Eastern Carpathians, favours the foehnal processes in connection with the West air masses lineage after they overpass the Eastern Carpathians. The local foehnal circulation determines weak temperature inversions in the cold year season, and frosts are of reduced intensity. The cold waves coming from the East are alleviated. During the hot season the warm waves are tolerable and the dryness and drought phenomena do not have the magnitude and duration of those from the East plateau spaces. The springs and the autumns are mild. The bioclimate is marked by comfort and meteo-climatic extremes are easily tolerated and the human body does not suffer. The climatic and therapeutic procedures can be practiced all over a year without important restrictions from April-May until October-November. On this climatic background the water resources are rich and the board-leaf and mixture forest has ideal conditions to develop.

4.2. Geology and relief. Their role on the balneary tourism resources

The apparition in the geologic substrate of Miocene salt deposits represented a favourable premise for the existence of the two salt mines (Cacica and Târgu Ocna), but also of the numerous mineral springs situated from North, at Solca, to South, at Vizantea-Livezi.

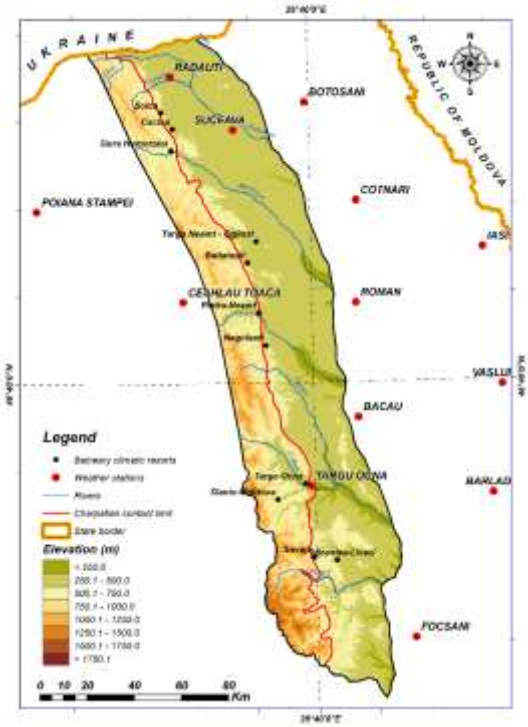

Figure 2 The altitudinal map of the contact territory Eastern Carpathians – Suceava Plateau – Moldavian Subcarpathians.

By its characteristics, altitude, slope, form, exposition of slopes in relation to the sun position and to air mass movements, the relief is the most important factor to influence the climatic parameters distribution. The relief of the study area includes the Moldavia Subcarpathians and he contact strip between Suceava Plateau and the Eastern Carpathians, known as the Piedmont Plateau between Suceava and Moldova rivers. The studied area has the shape of a strip attached to the exterior of the Eastern Carpathians, in N-S direction and is composed of hills and depressions. At the contact zone between the Piedmont Plateau and Great Peak is unfolded the depressions alignment: Sucevița, Solca, Cacica.

The Moldavian Subcarpathians are remarked by an alignment of subcarpathic depressions (Ozana –Topolița, Cracău – Bistrița and Tazlău - Cașin) closed by several hills making the transition towards Moldavia Plateau (Pleșului

Peak, Corni Hills, Mărgineni).

From an *altitudinal* point of view, the study area is situated in the hills level, with values ranging from 250 m in the low depressions or in the valley corridors to 800 m towards the contact with the Carpathians. The altitude is slightly increased from East to West which also gives the clime a wetter and cooler nuance on the same direction. *The concave and convex forms* generate particular climatic and bioclimatic effects. Thus, the depressions and the valley corridors provide shelter against the air masses circulation and diminish the solar radiation, favour the accumulation of the cold air on their bottom, creating the phenomenon of thermic inversion, and on the slopes the stratification of the climatic elements is present: the temperature decreases together with the altitude (the value of the local vertical gradient is of 0.57°C at 100 m), and the precipitations increase quantitatively. *The orientation and the inclination of the slopes* represent relief particularities which contribute to diversifying the heat quantity in connection with the incidence angle of the solar rays. Because of this, the southern slopes receive bigger quantities of solar energy all over the year, but especially during the warm season. The Carpathians layout in the West of the studied area is very important in contouring the shelter topoclimates in the depressions where the climatic and balneary stations developed. The favourable climate, the strong slope aspect, the fertile soils for the forest broad-leaf and mixture forest vegetation represented the premises for the forest development, which occupy 48 % of the researched territory. The inclined slopes and the profile breakings of the riverbeds make the flow to be fast, the waters to be oxygenated, and the production of negative aeroions along them to be important.

4.3. Climate and climatic parameters. Their influence on balneary resources

As other climatologists remarked, we can reinforce the fact that on the East contact of the Eastern Carpathians with the plateau territory or with the subcarpathic one, the climate is temperate continental, with rather mild winters and cool summers, with moderate precipitations and with a reduced air dynamic which create special shelter conditions.

The air temperature, from tourist perspective, represents the essential meteo-climatic element in choosing a destination. Thus people are interested in the average value but also in the extreme variations correlated with the other climatic elements, as cloud covering, precipitations or winds. In heliotherapy for example a big importance have the big duration of sunshine, low cloud covering and of course a temperature situated in and above the comfort interval.

In the study area the air temperature has annual average values ranging from 8 to 9 °C for the most part. In North the temperature decreases to 6.7°C (Gura Humorului, 500 m altitude), and in South it reaches 9.3°C (Sărata, 233 m average altitude) (Figure 3).

The air relative humidity (%) is influenced by the damping degree of the underlying surface, by the relief and by the features of the local evapotranspiration. This parameter of atmospheric humidity has annual average values of 70-80 % at the level of the study area (77 % Piatra Neamț, 78 % Târgu Ocna, 80 % Târgu Neamț) (Figure 4).

The complex air temperature-humidity influences the comfort/discomfort state of the human body. Thus, when the air temperature is bigger and the air is humid, then the warmth sensation is bigger and the discomfort degree stronger. But if the air is dryer, the warmth is better supported by the organism. Obviously, if the air is cold, the bigger the coldness sensation, the more humidity the air contains, and the dry air makes the cold more bearable. The thermo-hygrometric complex in the alignment of stations situated between Sucevița and Vizantea-Livezi is maintained almost all over the year (April – October) in the limits of being favourable for touristic activities and for the comfort of the human organism.

The cloud covering plays an important role by the reduction of the direct element of the solar radiation and by the modification of the radiation review parameters. There is also a direct

correlation between cloud covering and precipitations as well as between cloud covering and duration and intensity of solar radiation. In our study area the cloud covering presents annual average values of 5 - 6 tenths, with a maximum during cold season (6.4 - 6.9 tenths) and a minimum at the end of the summer and at the beginning of the autumn (under 5 tenths). As far as the cloud covering is concerned, there exists an important indicator in tourism, *the number of days with clear sky (daily average cloud covering ≤ 2 tenths).* On the East base of the Eastern Carpathians this indicator has annual values ranging from 40 to 55 days (Sandu et al., 2008).

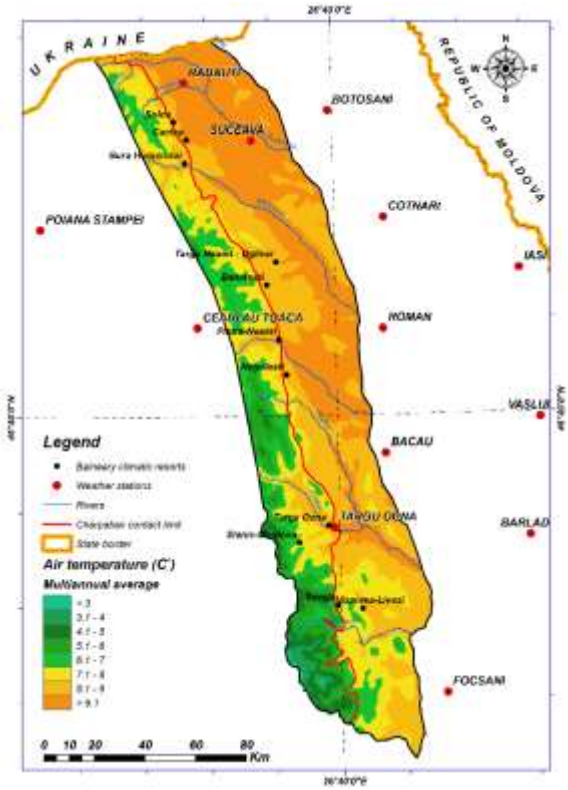

Figure 3 Distribution of air temperature over the contact territory Eastern Carpathians – Suceava Plateau – Moldavian Subcarpathians.

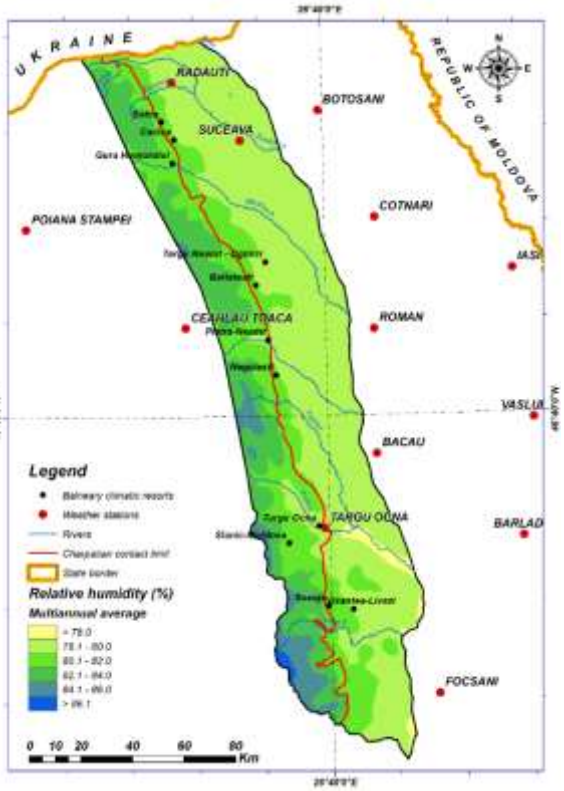

Figure 4 Distribution of air relative humidity over the contact territory Eastern Carpathians – Suceava Plateau – Moldavian Subcarpathians.

The Sunshine duration varies between 2100-2000 hours at bigger altitudes (500-800 m) and reaches 1800-1900 hours in depressions.

The precipitations do not negatively influence the tourist activities except when they fall in big amounts, either solid or liquid. A rainfall or a snowfall purifies the air, washes the atmosphere and trains the chemical pollutants in soil, surface waters or underground waters. Still, there is a psychological discomfort created by the long periods of rainfall, by the big quantities of snow, by the risk of appearing some severe as flood. On the alignment of the stations Sucevița – Soveja - Vizantea, the precipitations are no bigger than 650-850 mm/year in the high area and 500-650 mm/year in the lower area (Târgu Ocna 612 mm/year, Piatra Neamț 629 mm/year, Târgu Neamț 654 mm/year, Slănic Moldova 716 mm/year, Gura Humorului 679 mm/year) (Fig. 5).

On the other hand, the presence of snow, beside its landscape aesthetic role, presents interest especially when there are specific fittings for winter sports: ski slopes (Slănic Moldova, Piatra Neamț, Gura Humorului). From this point of view it is worth reminding also the number of days

with snow layer, which increases from South to North: from 55 at Târgu Ocna, to more than 80 at Sucevița.

The winds contribute to the redistribution of the physical properties of the air masses from the terrestrial surface and in the low atmosphere. The features of the climate floors depend on the wind which influences directly the tourists comfort and discomfort. At the level of the study area prevail the winds from the direction NV, and the speed varies between 3 and 4 m/s (Fig. 6).

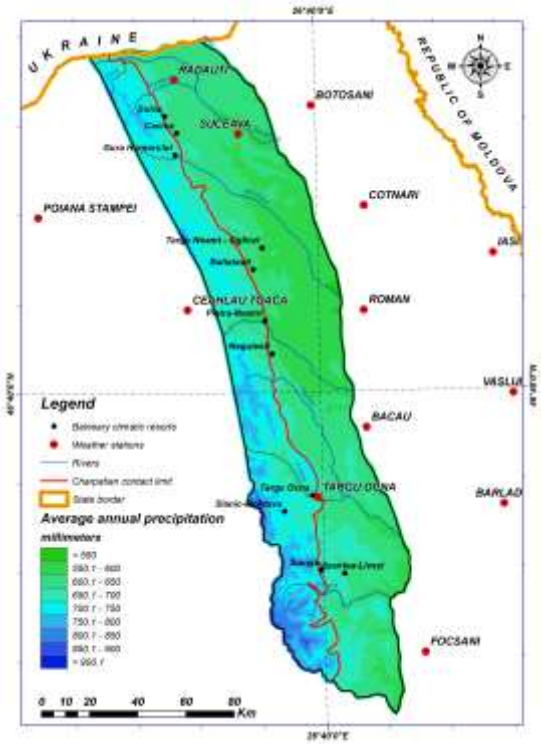

Figure 5 Territorial distribution of annual average amounts of atmospheric precipitations over the contact territory Eastern Carpathians – Suceava Plateau – Moldavian Subcarpathians.

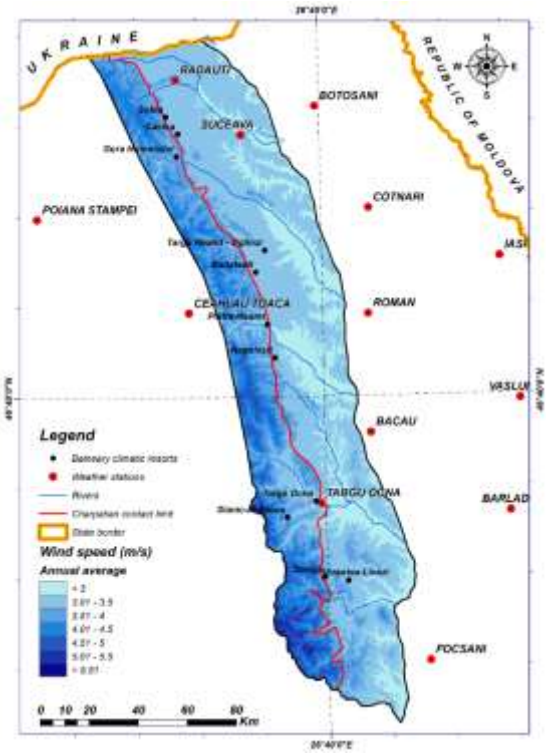

Figure 6 Territorial distribution of annual wind speed over the contact territory Eastern Carpathians – Suceava Plateau – Moldavian Subcarpathians.

Taking into account the relief features and the climatic parameters presented, at the level of the study area we can distinguish a climate of low (300-500 m) and high (500-800 m) hills as well as several local topoclimates: depression (shelter like), forests, corridors, meadow and valley. On the whole, the specific climate is sedative-indifferent or saving. In several stations the bioclimate bears the print of some tonic-stimulating nuances, due to higher altitudes as at Slănic Moldova. In other stations the tonic nuance is due to a more northern position and of more intense air ventilation along the valley corridors (for example at Sucevița on the valley of the homonymous river or at Gura Humorului on Moldova Valley). These two last stations are also exposed to continental advections from East, which introduces in the context of East circulations some bioclimatic exciting-soliciting nuances.

On the 2017 bioclimatic map of Moldavian region (Bistricean et al.), realized by cartographic algebra in the ArcGIS 10.4 soft after having calculated the territory bioclimatic features, resulted from processing some specific bioclimatic indices (four principal: THI, Pr, Tpr, ISH and five

secondary: TEE, DI THOM, HI, SSI and ISE) the alignment of stations between Sucevița and Soveja-Vizantea is partially framed at the low East limit of the tonic-stimulating bioclimate, partially at the high sedative-indifferent bioclimatic limit (Fig. 7).

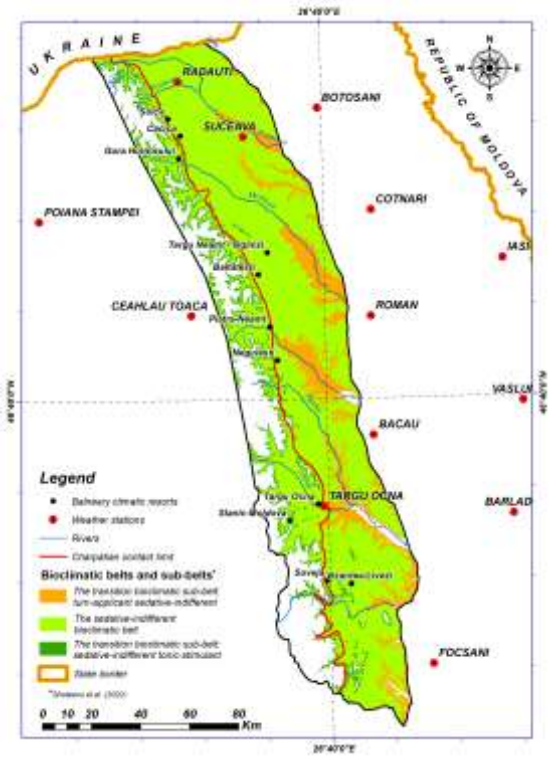

Figure 7 Distribution along the alignment Sucevița – Soveja - Vizantea of the surfaces with sedative-indifferent bioclimate and of those of transition from this bioclimate to those in the neighbourhood – after Silișteanu et al. (2020).

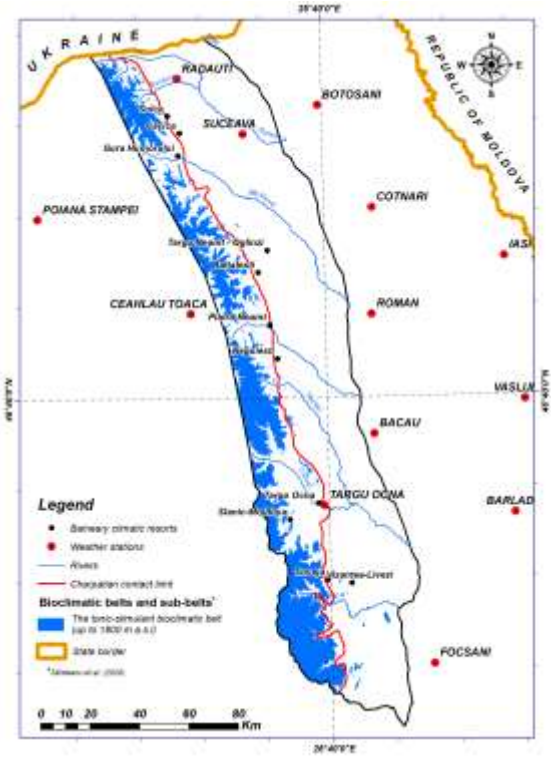

Figure 8 Distribution along the alignment Sucevița – Soveja - Vizantea of the surfaces with tonic-stimulating bioclimate – after Silișteanu et al. (2020).

On the bioclimatic maps from 2000 (Silișteanu et al.), the authors placed, after mostly altimetry criteria, the studied stations alignment in the sedative bioclimate, at its limit from the mountains and outside the external limit, from the hills in the tonic and stimulating bioclimate. Between the results of the two studies there are many congruent conclusions but also some belonging differences of the researched stations to a bioclimate or another (Fig. 8). This little difference of results can be solved by future research at the level of hour details concerning the evolution and value distribution of the bioclimatic indices in these stations.

4.4. Waters as balneary tourism resources

At the level of the study area the hydrographic network is rich and various: rivers, lakes, and mineral springs. From the tourist point of view, the hydrographic network represents an attraction by the beauty of the slopes near the valleys, wild valleys, sportive fishing, relaxing ambience created by the water flow, fresh air atmosphere etc. For the balneary tourism, a particular importance play the mineral springs the water of which we can use in all the climatic and balneary stations in our area of interest (Fig. 9).

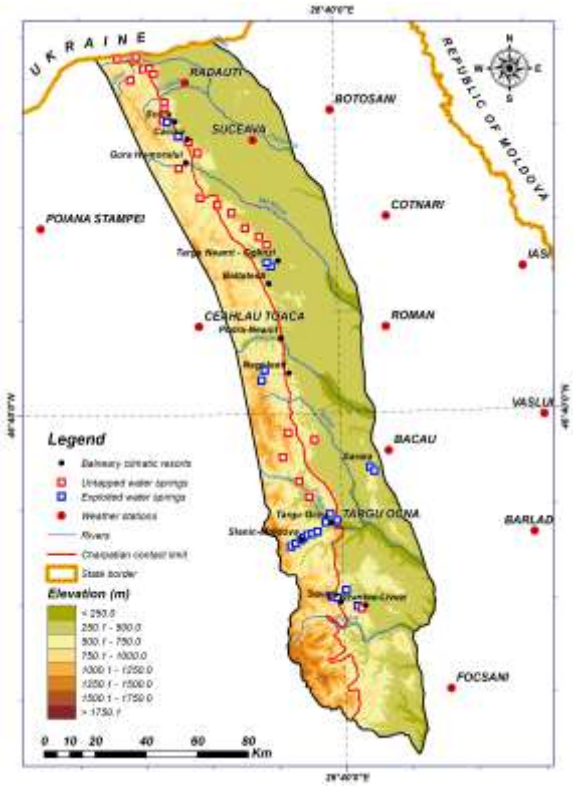

Figure 9 Distribution of mineral waters along the border line Eastern Carpathians-Suceava Plateau-Moldavian Subcarpathians.

Most of these springs belong to the sulphurous and chlorosodic category. The curative properties of the mineral springs are valued in several stations as Slănic Moldova, Târgu Ocna or Bălțătești. There are interior pools with salt water but also exterior salt water pools, as those at Cacica, Târgu Ocna or Sărata. Hydrotherapy and heliotherapy can be practiced all over the year or during the warm season.

4.5. Vegetation and its bioclimatic and therapeutic attractiveness

The vegetation has a particular economic, ecological and landscape role. The vegetation is a consequence of the environmental conditions and in its turn influences all the elements of the geographic environment. For example, between vegetation and climate there is a mutual influence: the vegetation is developed in certain climatic conditions (temperature, precipitations), and the vegetation on its turn can generate specific microclimates and topoclimates (pastures, forests etc.). The vegetal coating is represented by the broad-leaf forests: the oak tree and the sessile oak occupy the lowest parts and the beech dominates the highest parts.

On Pleșului peak and on the West frame of the depressions there are developed mixed forests beech-conifers and in some sectors the fir tree is very present. The great richness of these places which fully influences their climate and bioclimate is the forest which in the field of balneary tourism really represents the “green gold”. The forest is still very present within the Agricultural real estate (Figs. 10 and 11). The forest vegetation produces significant modifications to all the climatic elements. The forest reduces under its canopy the values of the direct solar radiation and contributes to the increasing of the values of the diffuse radiation depending on the forest structure (components, density, season etc.). Under the forest’ canopy, through evapotranspiration, the air humidity increases. In the forest, the average temperature has smaller values in summer and bigger in winter, the thermic amplitudes (daily, monthly, annually) are smaller than at the edge of the forest. The forest captures and uses better the precipitation water. The forest provides itself an additional quantity of water out of fog, dew, frost. The forest reduces the climatic extremes concerning the humidity, the temperature, the pressure, contributing to the creation of an environment favourable to human health. We must not forget the role of filter for pollutants the forest has, determining a great air purity, a small quantity of chemical pollutants and dust. In exchange, the forest provides a big amount of oxygen. The forest is also an antibacterial filter through the phyntocide substances it generates. In the forest and in the green areas the thermic balance of the human body is realized with smaller efforts, the external heat amount is low, as well as the heat issued by the organism in nature. In the green spaces the humans are almost permanently in a thermic, bioclimatic and psychological comfort state.

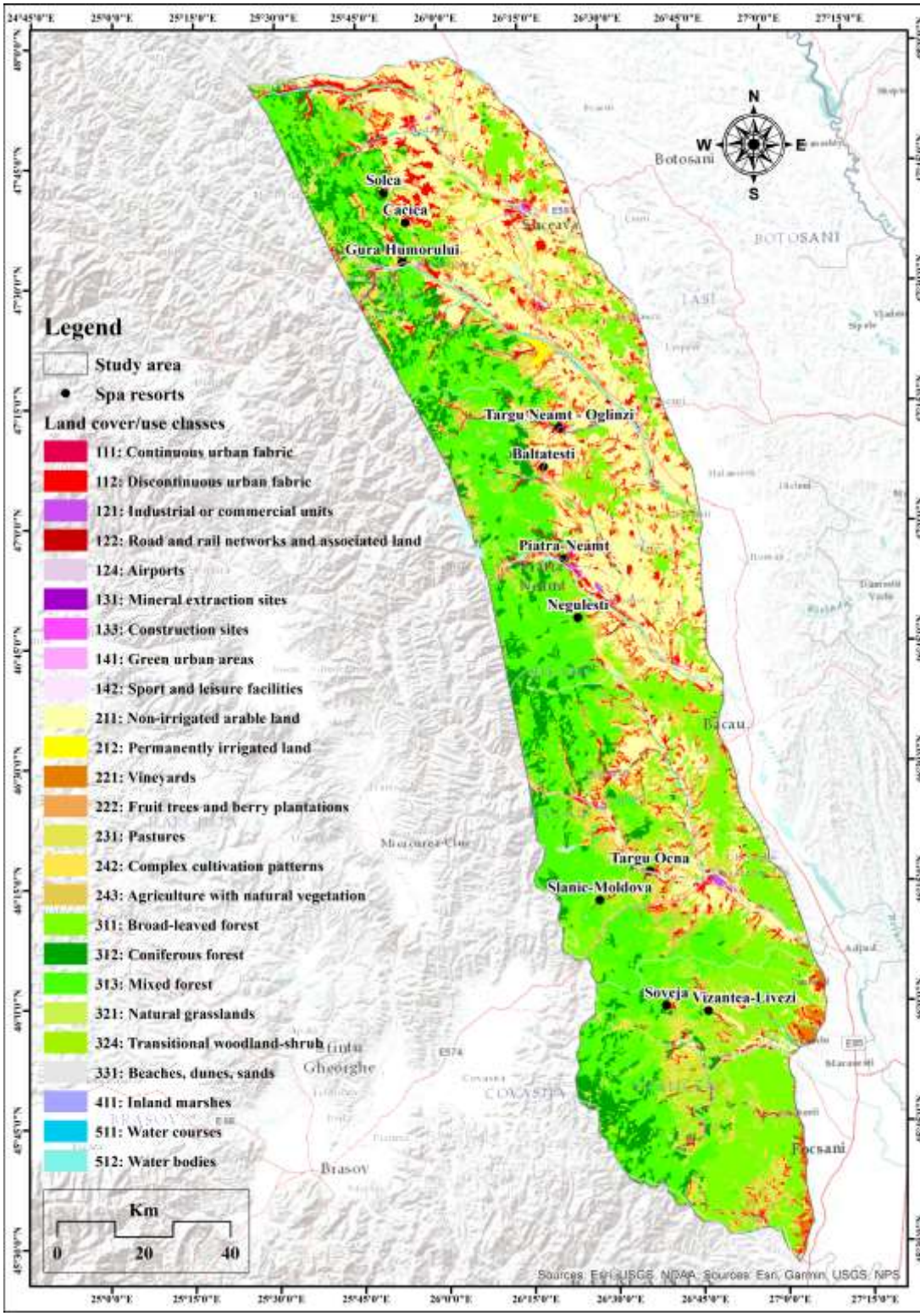

Figure 10 Land cover and use map in the proximity of the stations alignment.

Figure 11 The proportion (%) of main categories of land cover and use in the proximity of the stations alignment Sucevița - Soveja - Vizantea.

In the forest we may find procedures as field cure, aerotherapy, aeroionotherapy, aerosolotherapy, medical gymnastics, aromatherapy and others, all of them being of great efficacy and accessible to everyone.

4.6. Synthesis for each station of environmental natural factors which provide attractiveness for the balneary tourism carried out there

The tourist activities are representative for the economic profile of several localities.

Sucevița is a touristic station of national interest situated on the homonymous river at the foot of Great Peak at an average altitude of 530 m. It owns chlorosodic concentrated water resources, weakly sulphurous, and nearby there is placed a famous monastery, Sucevița (from 1582) included in UNESCO World Patrimony.

Solca is a station placed on the East base of Great Peak, in the submountain depression Solca-Cacica, on the contact between Suceava Plateau and the Eastern Carpathians. It is situated at an average altitude of 513 m and it is traversed by Solca river. The particular therapeutic properties of the atmospheric air are determined by the great charge of atmospheric air in oxygen and negative aeroions. The city is also known for its springs with concentrated chlorosodic mineral waters, in some areas weakly sulphurous and for its vitriolic sulphate, calcium, magnesium, hypotonic waters.

Cacica is a tourist station of local interest, being placed on the base of the Great Peak in the Depression Solca-Cacica, at an altitude of 428 m. It is famous for its concentrated chlorosodic waters, slightly sulphurous waters, oligomineral waters, but especially for its salt mine valued from a balneary point of view by the therapy of the respiratory diseases with salt aerosols.

Gura Humorului is a tourist station of national interest placed in South-East of Great Peak, at an altitude of 478 m, at the confluence of Moldova and Humor rivers. Gura Humorului has a moderate climate, with an annual average temperature of 6.7°C, annual average precipitations of 698 mm. The bioclimate is sedative with tonic stimulating nuances, the air is clean without

allergens and the negative aeroionisation is accentuated. Near the station we can find Voroneț Monastery (from 1488), called the "Sistine Chapel of the East".

Piatra Neamț is a climatic tourist station placed on Bistrița Valley on the contact between the Carpathian area and Cracău-Bistrița Depression in Modovian Subcarpathians. Being situated at an altitude of 310 m and being surrounded by hills with heights of 650-700 m, the station belongs to the sedative-indifferent area with some influences come from the environment of the stimulating bioclimate specific to the nearby Carpathian Mountains level. The average air temperature is of 8.4°C, and from dynamic point of view the station is sheltered by the nearby hilly peaks determining here the emergence of a shelter microclimate.

The balneary station *Oglinzi* presents a local interest. It is situated at the base of Pleșului Peak in a little depression (Dăscăliței Clearing) at an altitude of 390-430 m. The station is surrounded by secular beech and oak forests. The saving sedative is completed by several natural cure factors as the concentrated chloral-sulphate, salt water.

The balneary station *Bălțătești*, situated in Ozana-Topolița Depression, at the average altitude of 400 m is a station with closed circuit administrated by the Ministry of National Defence. The station is placed in a favourable natural frame, with a landscape presenting green hills. Nearby there are several attractive tourist objectives (Neamț Fortress, Memorial houses Ion Creangă, Veronica Micle, Mihail Sadoveanu, aurochs reservation "Dragoș Vodă", monasteries: Agapia, Neamț, Sihăstria, Secu). The station has a saving sedative bioclimate, with some stimulating exciting nuances, for the organic functions. An element of balneary attraction is represented by the concentrated chloral, sulphate, and some iodine and bromide waters, valued in the treatment basis for treating the rheumatic, post-trauma, periphery neurological affections.

The balneary station *Târgu Ocna* is situated at the contact between the Eastern Carpathians and Moldovian Subcarpathians and occupies the North-West part of Cașin Depression, at an altitude of 260-280 m, on Trotuș river and its affluent Slănic. The most valuable curative and health natural factors are the salt mine Trotuș with a specific microclimate, the air filled with aerosols, mineral waters (sulphurous, chlorosodic, slightly bicarbonate, hypotonic, isotonic and hypertonic), the fresh and ozone-rich air and the sedative-indifferent bioclimate, comforting with slight nuances of stimulating the organism.

The balneary station *Slănic Moldova* is situated at an average altitude of 530 m., on the East slope of Eastern Carpathians (Nemira Mountains), in a depression covered by broad-leaf and conifer forests, in the Slănic river valley, affluent of Trotuș river. At Slănic Moldova the sedative-indifferent bioclimate presents slightly tonic features and the presence of the 20 mineral springs (carbonated, slightly sulphurous, chlored, bicarbonate salt, hypotonic or oligominerals) represent an important touristic attraction.

Situated at the base of Vrancea Mountains in the depression with the same name, the station *Soveja* disposes of a particular natural frame: a relief with forest high hills, fresh air with aeroionisation of 1200 ions/cm³ (positive and negative ions), saving sedative bioclimate and mineral springs (sulphurous, chlored, salt, concentrated).

At 13 km East of Soveja, in the Vizantea – Vidra Depression, we can find the locality *Vizantea* which disposes of a sedative-indifferent bioclimate and sulphurous, chlored, salt, bicarbonate waters. Besides these favourable natural factors there is also a rich ethnographic patrimony which can bring Vizantea back into the touristic circuit (Ghinea, 2002).

5. Conclusion

The health tourism disposes of valuable balneary resources in the spa resorts situated on the East contact of the Eastern Carpathians. The main attraction for the balneary tourism is represented by

the mineral springs, along with the salt mines at Cacica and Târgu Ocna, both with a big development potential in the salt therapy domain. The sedative indifferent bioclimate does not impose restrictions for the health tourism. The meteo-climatic risks are at lower levels compared with other regions. The forest vegetation comes to complete the particular natural framework, with important surfaces covered with broad-leaf and mixture (broad-leaf and coniferous) forests. Practically 48 % of the study area surface is covered with forests, and these can be valued in a large rank of procedures specific to silvotherapy. We can say that the the submountain area from the East base of the Eastern Carpathians between Sucevița and Soveja-Vizantea disposes of the necessary, natural and anthropic resources to be one of the most important tourist destinations in general and health tourism in particular.

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References

Apostol. L. 2004. Clima Subcarpaţilor Moldovei, Editura Universităţii Suceava, 66-67.

Barnea, M., Ursu, P. 1969. Protecţia atmosferei împotriva impurificării cu pulberi şi gaze, Editura Tehnică, Bucureşti.

Bistricean, P.I., Mihăilă, D., Lazurca, G.-L. 2017. Bioclimatic regionalization of Moldova west of the Prut river, DOI 10.1515/pesd-2017-0004, PESD, VOL. 11, no. 1, 2017, 45 – 54.

Bistricean, P. 2020. Potențialul balneoclimatic al stațiunilor turistice din Moldova, Editura Universității „Ștefan cel Mare" Suceava.

Burduja, C. 1972. Material dendrologic și observații geobotanice referitoare la pădurile din Moldova, St. Cerc. Șt., Fil. Iași, Academia R. P. Române, VIII, 1.

Burduja, C. 1948. Contribution a la connaissance de la flore de la Depression de Cracău, district de Neamț (avec quelques remarques geobotaniques), ASUI, XXXI, 1948.

Ciulache, S. 2003. Meteorologie și climatologie, Universitatea București.

CORINE Land Cover 2018, European Environment Agency, https://land.copernicus.eu/pan-european/corine-land-cover/clc2018.

Doniţă, N., Leadru, V., Puşcaru-Soroceanu, E. et collab. 1961. Harta geobotanică a R.P.R. la scară 1:500.000, Ed. Academiei, Bucureşti.

Doniţă, N., Leandru, V., Puşcaru-Soroceanu, E. et collab. 1960. Harta geobotanică a R.P.R. la scară 1:1.500.000. În vol. "Monografia Geografică a R.P.R.", Ed. Academiei, Bucureşti.

Enache, L, 2016. Biometeorologie și bioclimatologie, Climatul și bioclimatul stațiunilor balneare din România, Craiova, 350-351.

Fărcaș, I., Holobâcă, I.H., Alexe, M. 2003. Clima locală şi microclima, Casa Cărţii de Ştiinţă, Cluj-Napoca.

Ghinea, D. 2002. Enciclopedia Geografică a României, Ediția a III-a, revăzută și adăugită, Editura Enciclopedică, București, 1417-1418.

Ielenicz, M., Pătru, I.-G., Clius, M. 2005. Subcarpații României, Editura Universitară, București, 59, 89-90.

Mihăilă, D. 2014. Atmosfera terestra. Elemente de favorabilitate si nefavorabilitate pentru organismul uman si activitatile turistice, Editura Sedcomlibris. Iasi, 65-70.

Mihăilă, D., Bistricean, P.I. 2018., The suitability of Moldova climate for balneary - climatic tourism and outdoor activities - a study based on the Tourism Climate Index*,* DOI 10.2478/pesd-2018-0021, PESD, VOL. 12, no. 1, 2018, 263 – 282.

Mihăilă, D., Bistricean, P.-I., Briciu, A.-E. 2019. Assessment of the climate potential for tourism. Case study: the North-East Development Region of Romania, Theoretical and Applied Climatology, Volume 137, Issue 1–2, 601–622.

Mihăilă, D., Briciu, A.-E., Costan (Briciu), L.-Al. 2019., Preliminary research on the thermo-hygrometric pec.uliarities of the Cacica salt mine microclimate, GEOREVIEW, Vol 29, No 1 (2019), pp. 60 – 69.

Sandu, I., Pescaru, V.I., Poiană, I., Geicu, A., Cândea, I., Ţâştea, D. 2008. Clima României, Editura Academiei Române, Bucureşti.

Silişteanu, S.C., Mihăilă, D., Dogaru, G., Bistricean, P.I. 2020. Balneoclimatology - where to?, GEOREVIEW: Scientific Annals of Stefan cel Mare University of Suceava. Geography Series, Vol 30, No 1, 42-64.

Tănasă, I. 2011. Studiu climatic în Podişul Sucevei, abstract of the PhD thesis, "Ştefan cel Mare" University of Suceava.

Teleki, N. et collab. 1984. Cura balneoclimatică în România, Editura Sport Turism, Bucureşti, 305-306, 326-327.

Teodoreanu, E., Gaceu, O. 2013. Turismul balneoclimatic în România, Publishing House of Oradea University, 186-187.

***Hotărâre Nr. 1154 din 23 iulie 2004 privind aprobarea Normelor tehnice unitare pentru realizarea documentaţiilor complexe de atestare a funcţionării staţiunilor balneare, climatice şi balneoclimatice şi de organizare a întregii activităţi de utilizare a factorilor naturali. Emitent: Guvernul României, publicată în: Monitorul Oficial nr. 752 din 18 august 2004.