

3rd

**International
Scientific
Conference**

**31 May - 2 June, 2018
Vrnjačka Banja, Serbia**

2018

**TOURISM
IN FUNCTION OF DEVELOPMENT
OF THE REPUBLIC OF SERBIA**

Tourism in the Era of Digital Transformation



**THEMATIC
PROCEEDINGS**

II



**UNIVERSITY OF KRAGUJEVAC
FACULTY OF HOTEL MANAGEMENT
AND TOURISM IN VRNJAČKA BANJA**



A CURE AND HEALING FOREST OF GOČ MOUNTAIN – A NEW APPROACH TO HEALTH TOURISM IN SERBIA

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Abstract

Forest medicine is a type of healthcare movement which caused a real sensation within alternative therapeutic procedures. The concept of forest therapy is based on numerous health benefits that forests provide and the inherent capacity of organisms to be healed ('vis medicatrix naturae'). The research area belongs to the forest complex above the largest spa resort in Serbia, Vrnjačka Banja, and includes the management unit of 'Goč-Stanišinci' on Goč Mountain. This 30 ha area can be potentially turned into a type of therapeutic forest - 'Cure and Healing Forest'. We determined the site environmental conditions, conducted the site qualification, defined the basic elements of stand structure and assessed the health potential of the research area. Two footpaths and other specific forest amenities were designed. The results of the research point to favorable environmental factors, exceptional natural values and health effects of the investigated site. Finally, the paper presents the possibilities of the projected therapeutic forest as part of a tourism product in the field of health tourism and special interest tourism in Serbia.

Key Words: *Cure and Healing Forest, Goč Mountain*

JEL classification: Z32, I18, Q23, Q57

Introduction

A trip to a forest awakes human primordial sense of belonging to nature, reduces negative emotional states and improves their psychophysical health. Therefore there is a great number of worldwide studies that deal with the effects of forests on human health (Hansen et al., 2017).

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The health and sanitary-hygienic role of forest ecosystems is reflected in their ability to ionize air and produce 'air vitamins' called phytoncides. One hectare of forest releases about 3 kg of volatile organic matter with phytochemical effects a day into the atmosphere. These are antimicrobial organic compounds: terpenes, isoprenes, balsams, α -pinene, limonene and other essential oils which can be greatly beneficial to the respiratory system. Even very small concentrations of these volatile substances can generate lots of negative ions which are produced by UV radiation. Due to their effects on neural reflexes and humoral immunity of the human body, increased amounts of negative ions in the forest air facilitate the absorption of oxygen, restore and stimulate the exchange of matter and defense mechanism of human body, reduce the secretion of serotonin, cortisol and other stress hormones, regulate the flow of blood through capillaries, reduce heart rate, stimulate erythrocytosis and hypotensive action, increase blood pH levels, improve subjective well-being, reduce fatigue, *etc.* (Li et al., 2007; Živanović & Manojlović, 2016). The treatment of various human disorders and diseases has thus devised new approaches and concepts that integrate health and recreational functions of forest ecosystems with therapeutic procedures within a new branch of complementary and alternative medicine known as '*forest medicine*'. The 'forest medicine' program originated in ancient Japan. Today, forest medicine is a standard preventive healthcare procedure (the so-called '*Forest bathing*'; *Shinrin yoku*) and an inherent component of healthy lifestyles in this country. The development of this type of therapeutic procedures and health tourism has also been started in South Korea, China, USA, Finland, Sweden, Northern Ireland, England, Slovenia, Croatia, Montenegro and others. In 2007, *International Association for the Study of the Effects of Forests on Human Health* was established as the part of the international organization IUFRO, followed by *International Organization of Forest Medicine* (INFOM) which was founded in 2011. Forest medicine is becoming a worldwide trend (Clifford, 2016; Uehara, 2017). Forest medicine programs include walking through a forest, anti-stress exercises that stimulate all senses, visualization and other psychological techniques, music therapy, chromotherapy, climate therapy, heliotherapy, aromatherapy, organic food consumption, art therapy and workshops, massage techniques and various other activities that get us closer to the natural environment, culture and tradition of the area. In addition to the scientific evidence of the beneficial effects of the forest environment on the human body, forest medicine is based on the fact that its user needs the services of professionals who will plan and implement of therapeutic procedures. The

terms Healing Forest and Cure Forest have been defined. Healing forests are wooded areas which are suitable for the therapeutic use in specific medical indications. Treatments accompanied by trained therapists in the forest are able to positively affect the treatment of diseases as well as the extent of the disability caused by this illness (tertiary prevention). Cure forests are wooded areas which, due to their various properties, are suitable for promoting health and well-being across a broad spectrum. Spending time in cure forests helps prevent the aggravation, the recurrence and the chronicisation of diseases (secondary prevention). The first certified European forest in which forest medicine programs were implemented was the *Heringsdorf* coastal beech forest in the north of Germany. Since November 2016 Heringsdorf's coastal forest, Europe's first cure and healing forest, has become a huge outdoor health studio. Its restorative powers are consciously exploited on an area of 187 hectares. In our country, the programs of forest medicine are applied by the *Medical SPA Association of Serbia* (<http://mspaas.org/>; Isailović et al., 2015; Isailović et al., 2016; Vukin et al., 2017). As an area suitable for the implementation of forest medicine programs, Goč Mountain represents an important mountain massif of central Serbia, which together with the neighboring Stolovi and Željin, makes the northern Kopaonik mountain range within the Rhodope Mountains. The eastern slopes of the mountain are covered by rich and abundant forest communities. Although it belongs to three administrative units, better utilization of natural resources of Goč Mountain can be easily attained thanks to its closeness to Vrnjačka Banja as the most attractive tourist destination in Serbia after Belgrade (Mandarić et al., 2017; Vuković et al., 2010). Vrnjačka Banja is a spa resort with a very long tradition and a great international reputation which makes it a very busy place all the year round. The present tourist settlement of Goč, located 15 km from Vrnjačka Banja, is an essential part of its surroundings and its natural resources enhance the resources of the spa itself (Milićević & Đorđević, 2015). The forests of Mt. Goč act as a powerful regulator of important natural processes with strong effects on the environment and human health. Based on the above, we set the following study hypothesis: favorable environmental factors, natural and man-made values and health potentials allow the establishment of a therapeutic forest (Cure and Healing Forest) on the selected area of Mt. Goč. The aim of the study was to select the most suitable area for the future therapeutic forest on Mt. Goč, and it included the following study tasks:

- to study environmental conditions of the selected forest complex on Goč belonging to the Administrative Unit of Vrnjačka Banja;

- to select and estimate the area of the future therapeutic forest, to evaluate the health potential of the investigated forest complex and to propose the most important components and therapeutic techniques.

Materials and methods

Study area. The total area of forests and forest land of Mt. Goč within the administrative unit of Vrnjačka Banja, managed by SE 'Forests of Goč' Vrnjačka Banja (formerly SE 'Borjak') is 8,246.81 ha. 7,799.62 ha (94.58%) of that area is stocked. The study area belongs to the forest complex within the MU 'Goč-Stanišinci', special purpose unit 73: tourist-recreation center of category I (Figure 1). The total area of the MU 'Goč-Stanišinci' is 1,910.44 ha. The forest covered area is 1,770.00 ha and this value was used in the calculation of the basic sanitary-hygienic effects of the forest complex. The projected area is a zone selected for the purposes of the Cure and Healing Forest and it comprises forest stands within compartment 12 in the MU 'Goč-Stanišinci', a forest road and a viewpoint (Figure 2). The total projected area is 30 ha.

Methods. The method of work includes a parametric, empirical and descriptive representation of the state of the selected area that makes the potential therapeutic forest. It was based on the planning documentation of SE 'Forests of Goč' ((2008): *Special forest management plan of MU 'Goč-Stanišinci' (2008-2017)*). The method included four research stages. The first stage of the research included the forest inventory and the study of basic ecological conditions, including orographic, geological, edaphic and climatic factors, determination of vegetation characteristics and typological classification of the selected stand. Climate data, based on the observation of the regime of climate parameters at different altitudes, were obtained from annual reports of meteorological stations of Kraljevo, Kruševac and Jošanička Banja, in the 30-year period from 1981 to 2010. (<http://www.hidmet.gov.rs>). The data were statistically processed by the method of interpolation. Further processing of climate data was carried out using the indirect method for determining the water balance and climate after *Thorntweite* (1948), which is used for ecoclimatological research in forestry. The calculated parameter of pedoclimate - climate index (I_k) was used to determine the climate type of the investigated area for the specified period. This stage further included the study of the most important characteristics of vegetation. The stand type was defined according to the standard classification system applied in Serbia (Jović et al., 2009). The second stage of the research included spatial identification

and qualification of the locality, along with the assessment of its natural values and basic components of its structure (natural suitability) including stand structure, stand quality, the composition of trees, the edge of the forest and the configuration of the terrain. A six-point system according to Rupert (1971) was used. The evaluation process was based on the following evaluation factors or values: structure (FW); mixture and number of tree species (FB), edge of the forest (FR), configuration of the terrain (FO) and the common factor of the natural elements (N).

An analysis of the infrastructure of the allocated space was also performed. In the third stage of the research, the current state was recorded and the basic health potentials of the research area were determined by calculating the ratio between the forest-covered area and the quantitatively expressed sanitary and hygienic effects of the forest per unit area. In the fourth stage, the proposal of the content elements of the therapeutic forest is given, along with the graphic representation of the Healing Forest design concept. *Arc GIS 10.5* and *Corell DrawX4* software packages were used.

Figure 1: *The purposes of the areas within the Forest Complex on Mt. Goč managed by SE 'Forests of Goč' Vrnjačka Banja*



Source: (2008). *Special forest management plan of MU 'Goč-Stanišinci' (2008-2017)*, Belgrade.

Research results

Geographical position and topography. The selected forest area is located within the forest complex of 'Goč-Stanišinci' management unit. This complex stretches along the middle part of the Goč massif and lies between 43° 30' and 43° 34' of the northern latitude and between 20° 50' and 20° 57' of the eastern longitude (east of Greenwich). The terrain is mostly wide and flat with steep and sharp slopes. The altitude ranges from 910 to 1.120 m a.s.l. The inclination is uniform, steep to very steep (11-25°). The aspect is southern, southeastern and eastern.

Bedrock and soil characteristics. The bedrock consists of serpentized peridotites and serpentinites. Serpentinization processes are very common in the wider region. They are epimagmatic which means that they were strongly affected by the presence of large amounts of water and water vapor in the last stages of cooling and solidification of peridotite. As bedrocks, these metamorphic rocks give rise to certain soil categories and specific vegetation. The soil is characterized as very skeletal, organogenic, initial phase in the formation of soil on serpentinite. This soil was afforested with Austrian pine seedlings, which has subsequently led to the development of the soil on serpentinite with the morphogenetic structure Ao-Ah/S-S1.

Climate characteristics. The basic climate characteristics of this area are:

- The mean annual air temperature is 7.68 °C, which is about 28% higher than the mean of the altitudes over 1,000 m a.s.l. in Serbia (6.0°C). The annual air temperature values range from 5.9 °C at 1200 m. a.s.l. to 7.9 °C at 800 m. a.s.l., and from 11.9 °C at 1200 m. a.s.l. to 14.3°C at 800 m a.s.l. during the growing period. The mean annual maximum temperature at 1,000 m. a.s.l. amounts to 10.7 °C, and 13.0 °C at 700 m a.s.l., while during the growing period it amounts to 17.2 °C at 1.000 m a.s.l. and 20.0 °C at 700 m. a.s.l.;
- the mean number of frost days is 118, with the last spring frosts occurring in mid-May and the first autumn in mid-September. The average number of days with a snow cover is 112;
- the average annual cloudiness is 5.8, and the deviations depending on the altitude are negligible;
- the average annual air humidity is 77%, with no significant deviations in the values with the altitude. It has the highest values in winter and the smallest in August. In the growing season, the relative air

humidity ranges from 71.7% to 73.1% and has a tendency to increase slightly with an increase in altitude;

- the average annual rainfall ranges from 816 mm at 800 m a.s.l. to 835 mm at 1,200 m. a.s.l. During the growing season, it is in the range of 481 mm at 800 m a.s.l. and 497 mm at 1,200 m a.s.l., which is approximately 58% of the total annual precipitation.

The water balance (Table 1) calculated for the observed period shows that the soil loses an average of 623-580 mm of moisture a year through evapotranspiration, which means that depending on the altitude an average surplus of 212-255 mm remains in the soil. The excess moisture occurs at all altitudes, while the deficit of moisture occurs only at an altitude of 700 m and not at higher altitudes. The climate index (I_k) has a value of 20-40 up to the altitude of 820 m and classifies the climate into the mild humid (B_1) type. The higher parts of this management unit (> 820 m above sea level) have a climate index value (I_k) of 40-60 which classifies the climate into the moderately humid climate (B_2) type. The water balance points to the high humidity of the climate, which means that forest communities have sufficient amounts of affordable moisture throughout the year. The climate of this area belongs to the humid continental climate with cold winters and cool and humid summers.

Table 1: *Water balance by Thorntweite for the Forest Complex of the MU 'Goč-Stanišinci' for the period between 1981 and 2010*

h (m)	t	PE	P	SE	M (mm)	V (mm)	I_k	designation	Climate type
700	8,9	624	835	623	1	212	33,86	V ₁	Mild humid climate (B ₁) type
800	8,4	596	816	596	-	220	36,91	V ₁	Mild humid climate (B ₁) type
900	7,8	587	826	587	-	239	40,71	V ₂	Moderately humid climate (B ₂) type
1000	7,4	580	835	580	-	255	43,96	V ₂	Moderately humid climate (B ₂) type

h - altitude (m); *P* - potential evapotranspiration; *SE* - actual evapotranspiration; *M* - deficit of moisture (mm); *V* - excess moisture (mm)

Source: *Original*

Flora and vegetation. There are about 850 plant species growing at Mt. Goč. The vegetation of the study site belongs to the complex of mesophyllous beech and beech-conifer forest types. It makes a forest of

Goč Austrian pine (ass. *Potentillo-Pinetum gočensis*). Austrian pine is an indigenous evergreen conifer species. Its variety *Pinus nigra* var. *gočensis* is an endemic rarity in this area. According to its bioecological characteristics, Austrian pine is a heliophyte (sun-loving species) and a xerophile with low requirements for atmospheric humidity and precipitation. The stands of the investigated area are typologically classified into the type of Goč Austria pine forest (*Potentillo – Pinetum nigrae gočensis* Jov.) on the evolutionary-genetic soil series on peridotites and serpentinites. Their flora is distinguished by a series of characteristic species of the *Erico-Pinetalia* order, alliances of *Orno-Ericion serpeticum*: *Pinus nigra* var. *gočensis*, *Erica carnea*, *Galium lucidum*, *Daphne blagayana*, *Laserpitium silar*, *Vicia villosa*, *Chamaecytisus hrisutus*, *Lembotropis nigricans*, *Potentilla heptaphylla*, *Stachys scardica*, *Bromus pannonica*, *Sesleria rigida* and others.

Spatial identification and natural values. Favorable environmental conditions, bioecological characteristics of Austrian pine, the forest air rich in pinenes and other phytoncides, as well as the existence of a special purpose unit designed for tourism and recreation, are the main criteria for the selection of the study area for the future Cure and Healing Forest (Figure 2). In order to determine the natural values of the investigated forest complex, the following basic components were evaluated according to the stated methodology: the state, structure, and quality of the stands, the composition of trees, the edge of the forest and the configuration of the terrain.

The state, structure and quality of stands. The investigated stands are even-aged (medium-aged) well-preserved Austrian pine cultures, with a small share of Scots pine and spruce cultures and a beech high stand. The trees are distributed in diameter degrees of 12.5-37.5 cm. The mean stand diameter of Austrian pine ranges from 15.0 to 20.0 cm. The mean stand height of Austrian pine is in the range from 10.8 to 14.4 m. The number of trees per hectare is 1,207 to 1,229. The total wood volume amounts to 2,478,0 m³, and the volume increment is 114.6 m³ or 10.2 m³/ha. The wood volume per hectare ranges from 286.6 to 309.3 m³ / ha. The stand is 30-50 years old. The stand quality, as one of the most significant stand characteristics, was determined on the basis of tree phenotypic characteristics. Austrian pine trees are straight and medium tapered, with long crowns (1/2 to 1/3 of tree height), normally developed, and with a small share of damaged (10%) and dead trees (10%). The crown density ranges from very thin (0.4) to very dense (1.0). Regarding recreation and

health benefits, the most suitable stands are the ones with the canopy of 0.3-0.6 because they provide, in a hygienic sense, a suitable aeration rate of $1.0-1.5 \text{ m} \cdot \text{sec}^{-1}$. The general health state of the trees and the stands is good. The value of the structure in the zone of use (FW), which depends on the vertical structure of individual parts of the zone (W1c) and the change in the shape of the structure (W2c) is 3.00. This is a moderate and relatively favorable value of the observed parameter, since the stands are even-aged, in the stage of maturation, without significant changes of the age categories, that is, without the participation of higher age categories.

Figure 2: *The area of the Cure and Healing Forest within compartment 12 of the MU 'Goč-Stanišinci'*



Source: <https://earth.google.com/web>

The composition of tree species. The factor of the mixture and the number of species (FB), as an element that contributes to the contrast in the landscape, depends on the value of the stand composition (W1b) and the value of the changes in tree species in certain parts of the zone of use. Since the stand is largely composed of Austrian pine monocultures, FB factor is 2.50. This value is low and it is below the limit of an acceptable value.

The edge of the forest. The length of the outer and inner edge of the forest in the zone of use (Figure 2) is 7.5 km. The edge of the forest factor (FR) depends on the absolute length of the edge of the forest (W1a), the

qualitative representation of the form of the outer (W2a) and the inner edge of the forest (W3a). From the aspect of tourist-recreational and health benefits of the selected forest area or the zone of use, the complex is characterized by an open forest edge due to a relatively thin stand canopy and medium stocking, plenty of open and unstocked areas and an outer openness towards the adjoining forest complexes. Based on the above, the edge of the forest factor (FR) is 5.10. The configuration of the terrain. The value of the upper surface or terrain configuration (F0) depends on its sensory (W1d) and tonic effects (W2d) on humans. These effects depend on the relative altitude differences, i.e. the absolute altitude position. Due to the markedly cone-shaped form of the terrain, relatively large altitude differences (so-called relief energy) of over 200 m at a distance of 3.5 km, visual contrasts of the landscape and a great number of other sensory and tonic effects, the terrain configuration factor (F0) is also high. It amounts to 5.30.

Natural values. The total natural factor (N) is 5.30, which is significantly higher compared to the values of the same factor for individual study areas (river basins) of the neighboring forest complex Goč-Gvozdac (Milovanović et al., 2004).

Health potentials. Given the proximity of the spa resort, the priority functions of Mt. Goč forests include their sanitary and hygienic effects which are as important as the health, climate protection, hydrological, water protection and erosion control functions. Thus the forests of the study area have an important role as a modifier of climate and microclimate conditions of the wider region. They align temperature, increase the rate of condensation of absolute and relative humidity, retain atmospheric deposits, increase cloudiness, reduce wind speed and intensity and regulate air composition and oxygen balance in it. The annual amplitude of fluctuations in the temperature and relative humidity of air and soil in the forest is significantly lower than in the surrounding area. In summer, the air temperature is lower than in the open, while it is the other way around in winter. The sanitary and hygienic effects of forest ecosystems are also reflected in the fact that 1 hectare of forest can filter 50-70 tons of dust and various harmful gases from the air annually, with the filtration area being composed of leaves, branches and trunks. During the growing season, 1 hectare of forest complexes can absorb up to 100 kg of sulfur-dioxide and significant amounts of carbon monoxide and nitrogen oxides. Forests release an annual average of 11 tons of oxygen and bind 15 tons of carbon dioxide per hectare, which shows their

important role in regulating the balance of oxygen and carbon dioxide in the atmosphere and in the global reduction of greenhouse effects and air pollution (Isajev et al., 2007; Živanović & Vukin, 2017). In addition to hydrological richness, physical and geographical features and favorable climate conditions, natural values of the investigated area also include complex beneficial effects of the existing forest vegetation. The effects of the existing forest ecosystems on the environment are reflected, above all, in the efficient production of oxygen and absorption of carbon dioxide in the air and in the emission of 'air vitamins' - phytoncides. Based on stated data about the forest and forest land area within the forest complex of the MU 'Goč-Stanišinci' (1,770.00 ha of forest covered land), the following basic health potentials of the forest ecosystems in the study area were calculated. They include:

- filtration of about 88,500 tons of dust a year;
- absorption of 177,000 kg of sulfur dioxide during the growing season;
- production of 19.470,00 tons of oxygen a year;
- binding of 26.550,00 tons of carbon dioxide a year;
- daily production and emission of more than 5,310.00 kg of volatile organic matter with the effects of phytocinides.

Elements of the therapeutic forest. The defined areas of the Cure Forest and the Healing Forest are shown in Figure 2. The elements of the Healing Forest are shown in Figure 3.

Figure 3: *Elements of the Healing Forest*



Source: *Original*

Thematic footpaths. There are two footpaths (Figures 2 and 4) designed through the whole complex of the therapeutic forest. They include the area of meadows and ski tracks. The length, walking speed and walking time are recommended depending on the user category. Footpath 1 is 3.5 km long. It takes 2.5 hours to walk the path. The elevation gain is 210 m. The starting point is the entrance to the Cure Forest from the asphalt road (INFO 1) at 910 m above sea level and the end point is the viewpoint at 1,120 m above sea level in the Healing Forest area. The path is graded medium strenuous to strenuous, so certain user categories can reach the top point by electric vehicles or the future forest rail. The walking distance of Footpath 2 is 4.0 km. It takes 1.5 hours to do it. The starting point is the viewpoint and the end point is the asphalt road (INFO 7).

The climatorium. As a very significant and specific therapeutic medium, a climatorium is planned to be set in the southeastern area of the Healing Forest (Figure 3) where it would be sufficiently exposed to the sun, especially in the afternoon hours. It would be designed in such a way that it can simultaneously implement climate therapy, aero-ionic and heliotherapy procedures to a large number of users. It would occupy an area of 150 m². It is necessary to locate an outpatient health service nearby. Apart from the main board at the entrance, it is necessary to set up a sufficient number of boards with information related to the procedures applied in that part of the forest, bioclimatic characteristics of the microlocality and the best time to use the natural climate factor. The regime of use should be formed on the basis of continuous measurements of the most important microclimate factors during a whole year (especially concentrations of negative ions in the air, etc.), which can be achieved by establishing a mobile meteorological station. The area of the climatorium should be designed exclusively for therapeutic purposes and other forest visitors should not be allowed entrance. There should be an area with conditions suitable for sitting or lying, which means that its users should be completely or at least partially protected against overhead sun, strong winds and light rain. It is recommended to fence the selected area with hedge species (*Juniperus* sp., *Erica carnea* a, etc.) that do not attain great heights and do not give deep shade but provide a satisfactory level of privacy to users. The substrate should be made of flat stone slabs or any other material that reduces or stops the occurrence of mud after rain. Deckchairs and chairs should be properly spaced according to the prescribed procedure and regime. The users should have enough space to relax in silence. On the other hand, the distance shouldn't be too long. Otherwise, they wouldn't be able to communicate with each other.

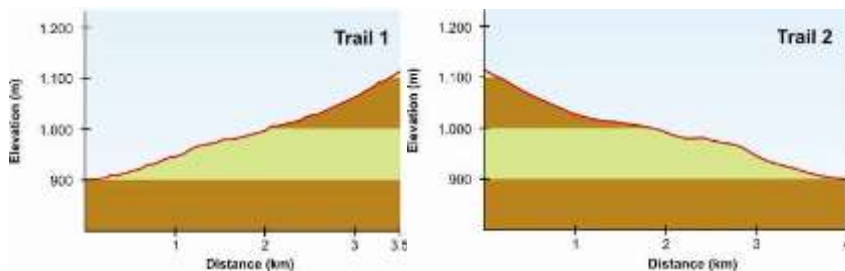
Figure 4: *Footpath 1 within the Cure Forest and the viewpoint within the Healing Forest*



Source: *Vukin, 2017*

This path is graded medium strenuous to low strenuous. The paths meet in the Healing Forest area and they are used for walking and physical training. They are covered with an appropriate substrate that allows them to be used in bad weather. The accompanying info boards provide information about the length and the gradient (Figure 5), the purpose of the path and instructions for appropriate physical activities (depending on the category of the therapeutic forest), which act as a strong motivational factor. Besides info boards, there are recreational areas with simple equipment (balance beam, parallel and horizontal bars, etc.). These areas should also serve for rest, so there are sitting benches at the edges.

Figure 5: *Graphic representation of the cross-sectional profile of forest paths*



Source: *Original*

The forest amphitheater. This landscape-architectural element is designed as another separate spatial solution in the southwestern part of the Healing Forest, on an area of 80.0 m² (Figure 3). The topography of the terrain enables a dynamic arrangement of semicircular wooden elements of the construction so that the amphitheater enables the performance of various activities and serves as a theater for lectures and projections, as well as a place where users, especially patients, can work or relax.

The viewpoint. At the point where the two footpaths meet in the Healing Forest area, a viewpoint with a landmark of a smaller archaeological site was set up (Figure 4). The geographical position of the projected Healing Forest with a viewpoint gives this spatial entity a special attraction, due to its magnificent view of all four sides of the world. From here, you can see Rtanj, Rudnik, Zeljin, Kopaonik, Koznik, Stara Planina, even parts of the Carpathian Mountains, towards Romania. Other facilities include information boards, recreational facilities and equipment, facilities for art therapy, music therapy, spiritual techniques and other therapeutic procedures (Figure 6).

Figure 6: *Therapeutic techniques of the forest medicine*



Source: Isailović, 2017

Therapeutic procedures and techniques. Forest therapy guides and facilitators take part in the implementation of forest medicine programs of the Cure Forest, while healthcare workers and doctors participate in the programs organized in the Healing Forest. A Forest Therapy Guide facilitates safe gentle walks, providing instructions - referred to as “invitations” - for sensory opening activities along the way. Each walk begins with establishing embodied contact with the present moment and place. Next comes a series of connective invitations, often improvised at the moment and adapted to the needs of participants. The walks end with a ceremony of sharing tea made from foraged local plants. Forest therapy walks are not hikes in the traditional sense. An entire walk is typically 4 to 6 hours long. In that distance, most people experience contact with nature in a much deeper way than they ever have prior to the walk. On Forest Therapy walks, people have a wide range of experiences, some of which they feel are significant, even profound. Guides are trained in the skills and perspectives needed to be supportive witnesses of these experiences. During these walks, people experience the therapeutic power of the forest. The forest itself is the therapist. By slowing people down and facilitating sensory experiencing, guides open the doorways through which the forest can accomplish its healing work. The practice of forest medicine at a particular site, as a kind of ecotherapy, is integrated with other sets of healthcare procedures and therapeutic techniques, recreation,

professional and creative skills such as climate therapy, aromatherapy, heliotherapy, art therapy and expressive art, music therapy and gong therapy (acoustic ecology), bibliotherapy, various forms of psychotherapy (Technique of '*Visual Walk*', '*Active imagination*'), life coaching, meditation and other spiritual techniques, nature education and many others.

Conclusions

The concept of forest therapy is based on numerous health benefits that forests provide and the inherent capacity of organisms to be healed ('*vis medicatrix naturae*'). The development of modern alternative forms of medical programs related to forests and the time spent in forests is a new approach to the strategic sustainable development of the wider area of Vrnjačka Banja. According to the described natural values, the forest complex 'Goč–Stanišinci', located above Vrnjačka Banja, has characteristics of an air and climate health resort and potentials for the implementation of the forest medicine program. Goč has characteristics of temperate continental climate which is particularly suitable for the implementation of climate therapy and heliotherapy.

It should be noted that, according to regional climate change projections based on the average annual air temperature increase of 0.3°C per decade, current climate zones are expected to move towards higher altitudes for about 150 m to 200 m by 2050, so in the near future the study area might have a warmer and somewhat drier climate. Significant climate change in the Mediterranean region, accompanied by long-lasting heat waves, increasingly frequent droughts and forest fires during the summer season, as well as a significant reduction in the snow cover and duration in the Alps, can increase the attractiveness of Serbian spa and mountain areas. In this area, there is no evidence of excessive human impact on the environment. The boundaries of the forest complex are not endangered and will not be reduced because this area has an adequate treatment as a forest land in planning documents. The immediate surroundings don't have any potential for rapid demographic development and creation of incompatible contents. It is necessary to select and according to a special program integrate different parts of the forest complex into a coherent health and recreational center in the form of a park-forest with all elements of a Cure and Healing Forest. The edge parts of the forest complex should be special a focus of forest regeneration, restoration and tending measures. It is necessary to landscape the inner edges of the

forest, trails, meadows, pastures and the viewpoint. It is also necessary to implement a harmonious silvicultural system with an appropriate spatial distribution that will achieve a successful alternation of old and young stands, forest plantations and clearings and form two-storey or multi-storey stands with a very thin to medium thin crown canopy (0.3-0.6) in order to fulfill health-recreational functions. The designated Cure and Healing forest at Goč Mountain can be used both by patients from rehab clinics and by members of the general public to promote their own health and personal well-being. Given the existing natural values and infrastructure, climate-therapeutic and other procedures of the forest medicine program can be carried out all the year round, except in extremely unfavorable weather conditions. These procedures should be applied in a planned and professional manner and they should be harmonized with other methods of healing and recreation so that the cumulative effect of 'forest bathing' is as effective and beneficial as possible both to patients and to other users. These benefits, in view of the expected mild effects of the ongoing climate change, indicate that the local climate potential, together with other natural values, will be an important factor in the development of health tourism and special interest tourism of the investigated area. In this sense, the establishment of the Cure and Healing Forests will represent a new and attractive part of the overall tourism product of the wider spa and mountain area.

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