1st INTERNATIONAL FORESTRY & NATURE TOURISM E-CONGRESS "New Approaches and Trends in Forestry" November 25-27, 2020







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"New Approaches and Trends in Forestry

NOVEMBER 25-27, 2020, KASTAMONU / TURKEY

PROCEEDING BOOK

KASTAMONU UNIVERSITY
FACULTY OF FORESTRY
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FACULTY OF FORESTRY
2020

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Faculty of Forestry

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PREFACE

As one of the five universities that was declared within the scope of the "**Regional Development Oriented Mission Differentiation and Specialization Programme**" at the beginning of 2019 by the Council of Higher Education of the Republic of Turkey, Kastamonu University has been designated as one of the universities that shall specialize on "**Forestry and Nature Tourism**" across Turkey. As being entrusted with the mission of specializing in forestry across Turkey by the Council of Higher Education among 10 other universities, and as being in a position where it has the most optimal infrastructure in terms of academics, research studies, implementation and industry, Kastamonu University, in order to duly realize the task it was given, held the "**1st International Forestry and Nature Tourism E-Congress**" with the theme of "**New Approaches and Trends in Forestry**" to share and build upon the obtained scientific data, and to serve as a base for future studies.

It was an utmost pleasure and honor to welcome researchers from both home and away (USA, Romania, Philippines, Pakistan, Kyrgyzstan, Libya) to the e-congress during which a total of 64 academic papers were presented in Kastamonu, the city that is acknowledged as the center of Forestry in Turkey thanks to its forests that cover approximately 65% of the province, its 3 national parks, and its status as being host to the Regional Directorate where the most forest assets are produced.

Climate change is one of the biggest environmental, social and economic threats in today's world, and the importance of the role that forests play in the fight against climate change is evident. Furthermore, our forests need to meet the various needs of the society as a result of industrialization and population growth. Within the context of climate change, the recent pandemic and the different needs of society in an ever-changing world, natural resources and especially the forests are required to be handled with different approaches. Thus, we expect the e-congress held at our university with the aim of shedding light on the needs of society and science to make significant contributions to society, science and forestry with regards to developing new approaches in forestry applications.

For this very reason, I would like to extend my most sincere gratitude and appreciation to the organization committee of the **1st International Forestry and Ecotourism E-Congress** held in Kastamonu. I would also like to commend the valuable academic staff and the distinguished scientist from different institutions that participated in the congress for their great support and participation. We would like to thank and congratulate the valuable staff, the administrators and academics of the Faculty of Forestry at Kastamonu University for their efforts. Lastly, I would like to thank all the institutions and participants that supported and showed interest in our congress, with the hopes that it will prove beneficial and successful for both our university and our country.

Prof. Dr. Ahmet Hamdi TOPAL
Kastamonu University
Rector
Honorary Chair of INFONT 2020

PREFACE

Forests, besides their vital role in combating climate change, have to respond to the increasing and diversified needs of the society brought about by industrialization and population growth. Forestry activities carried out in forests, which are extremely important in terms of the continuity of the ecosystem, should be managed with a different perspective and understanding in this direction, and high value-added products obtained from the forest should also be offered to humanity with an effective, efficient and sustainable approach.

Approximately 67% of the surface area of Kastamonu province, which is regarded as the center of Forestry in Turkey, consists of forests. Kastamonu Regional Directorate of Forestry, with its annual production rate of 3.4 million m^3, is the regional directorate where the forest goods are produced by far the most in Turkey. Additionally, within the boundaries of the province where three national parks are located, the factories such as Kronospan, Kastamonu Entegre, Ekol Plywood, Çağ Plywood, and Dortek, there are also approximately 400 enterprises in the form of SMEs where forest products are processed. Kastamonu also has a significant share in the manufacturing of wood-based doors in the total production in Turkey.

Among the main themes addressed in the Ist International Forestry and Nature Tourism E-Congress were erosion, the adverse impacts of mining sites on forest ecosystems, the change of precipitation and temperatures within the scope of climate change, forest fires, possible effects of climate elements and solutions to ecological problems. In addition, the studies on the certification in forestry, on the carbon sequestration capacity of forests, which are the most important terrestrial ecosystems in reducing the negative effects of climate change, on the biomass estimation of different tree species in forests, as well as on the detection of large mammal species and some insect species that damage forest trees in Kastamonu region were presented.

As for the field of Forestry Industry, thermal processes applied to wood raw materials and their usage areas, the physical and mechanical properties of wood-based nanocomposites, and the importance of natural dyes in the paper industry were mentioned. In addition, the use of Industry 4.0, which becomes increasingly important today, in the forest industry and the situation of the forest products industries operating in Kastamonu during the Covid-19 pandemic were evaluated. Kastamonu University, which specializes in the field of Forestry and Nature Tourism, carried out an outstanding scientific activity within the scope of regional development and mission differentiation in the Ist International Forestry and Natural Tourism E-Congress, during which many different issues were covered.

I would like to express my sincere respect to Prof. Dr. Ahmet Hamdi TOPAL, the Rector of Kastamonu University for allowing this Congress to be organized. I would also like to extend my appreciation to my colleagues for their efforts during the organization of the congress, and to the scientists and participants who shared their knowledge by taking part in this special event.

I hope that the conclusions reached throughout the congress will be beneficial for the forestry of Kastamonu, Turkey, and the world in general, and offer an insight into future studies on forestry.

Prof. Dr. Ömer KÜÇÜK
Kastamonu University
Vice Rector
Chairman of INFONT 2020

KEYNOTE SPEAKERS

Sustainable Forest Operations in the United States Dr. Dalia ABBAS, American University, USA
Raw Materials for The Wood Industry Dr. Marius Catalin BARBU, Transilvania University, ROMANIA
Biodegredible Face Mask from Biofibers Dr. Salim HIZIROĞLU, Oklahoma State University, USA
Global Trends and Opportunities in Forestry Dr. Yusuf SERENGİL, İstanbul University-Cerrahpaşa, TURKEY

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New Trends in Ecotourism: Forest Bathing/Forest Therapy in the World and Turkey

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Abstract

Aim of study: The study aims to reveal the content of forest bathing, which is also recognized as an ecotourism activity, to evaluate the application areas in the world and to make suggestions for the locations where forest bathing sessions can be performed in Turkey.

Area of study: Certified and non-certified routes and bases where forest bathing is applied worldwide will be examined.

Material and methods: The first stage of the study consists of determining the areas where forest bathing and forest therapy are applied. Then, literature and internet research was done, and studies conducted within Turkey and abroad were examined. After obtaining sufficient information, the analysis phase started. It has been investigated and tried to present forest bathing activities to determine the current uses worldwide. Also, meetings were held with Turkey's first certified forest therapist.

Main results: The forest areas where the health effects of forest therapy are determined and the general characteristics of these forests were revealed. Recommendations were made for the forest areas in Turkey to gain and maintain trail designation for forest bathing.

Highlights: Forest therapy, which is considered as preventive medicine, is expected to be approved by the World Health Organization (WHO). Turkey will have a significant role in this context with the forest resources that it has. In this regard, planning studies to be carried out in cooperation with the major countries will increase the value of Turkey's forest resources.

Keywords: Forest Bathing, Forest Therapy, Ecotourism, Forests of Turkey

Introduction

From the beginning of 2020, all of the countries encountered with COVID-19 pandemic. As Jones (2020) stated, by having disturbing effects on human populations and seriously disrupt their activities, contagious diseases such as COVID-19 can be accepted as a social shock (Pinheiro & Luis, 2020). This kind of shocks causes physical and psychological harm to people in the short, medium and long term. Studies in which psychological damages are determined as well as the known physical effects of Covid-19 have started to take place in the literature. Wang et al. (2020) mentioned that more than half of the respondents (>652 participants) rated the psychological impacts (anxiety, depression, and stress) as moderate-to-severe, during the initial phase of the COVID-19 outbreak in China. Huang & Zao (2020) conducted a study with a total of 7236 participants and stated that the 1/3 participants showed anxiety disorders anxiety and nearly 1/5 participants had depressive symptoms and sleep problems. Most of these impacts are observed mostly according to quarantine and home isolation.

Quarantines have caused a break on the human-nature relationship, and being away from nature affects human psychology. Many scientific studies have shown the significant positive effects of natural environments on human physiology and psychology (Kaplan, 1992; Kaplan & Kaplan, 1995; Kellert et al., 2008; Souter-Brown, 2015; Frumkin et al., 2017; Hunter, 2019; Wyles et al., 2019; Olafsdottir et al., 2020).

An increasing number of diverse research disciplines are now immersed in understanding the nature-health connection. As a result, the growing body of scientific evidence is gradually nudging nature into the realm of public health and traditional

medicine as a tool healthcare providers can use to promote healthy living (PHS, 2020).

Nature-Based Tourism (NBT) and Ecotourism

'Nature-based' tourism is frequently described as one of the fastest-growing sectors of the world's largest industry and a significant justification for conservation (Balmford et al. 2012). It can also be defined as a segment in the tourism market in which people travel with the primary purpose of visiting a natural destination such as national parks, wilderness areas and developing countries where a large portion of the world's biodiversity is concentrated (Kuenzi & McNeely, 2008). Fennell (2015) defined NBT as a form of tourism that encompasses forms of tourism such as mass tourism, adventure tourism, low- impact tourism, ecotourism, which use natural resources in a wild or undeveloped form. "Nature-based" is one of the core criteria used to define ecotourism because the philosophy of ecotourism is deeply connected to nature. NBT and ecotourism can occur in the same environments, but they differ from each other at some points. Philosophically, ecotourism is a tourism field distinguished by its environmental concern and appreciation for nature (Fennell, 2015; Ramirez & Santana, 2019).

Ecotourism is sustainable tourism, which is based on the ecological principle and sustainable development theory. It aims to conserve resources, especially biological diversity, and maintain sustainable use of resources, which can bring ecological experience to travellers, conserve the ecological environment, and gain economic benefit. (Wang & Tong, 2012). Ecotourism, as a concept of sustainable tourism, is also used in the development of rural tourism (Indika & Vonika, 2016).

New demand of nature-based tourism increases worldwide (not only in protected but also in rural areas), and specific trends and megatrends in nature-based tourism can be identified in terms of experiential "themes" and resources for forest-based and nature-based experiences (Bori-Sanz & Niskanen, 2002; cited in Conti, 2019).

A forest is a multi-sense environment. It can be experienced with all senses, and it fits perfectly as an operational environment for a wellness service product for ecotourism because of its invigorating effects (Johanna & Sami, 2011).

Numerous interventions and programmes have been already created and developed in different countries to encourage populations to use forests for health and wellbeing. Some of these interventions focus on promoting health, while others target those who have some existing problem; either mental, physical, emotional or behavioural. Health benefits of forests can be divided into four categories such as;

- Forests for human health promotion and disease prevention,
- Forests for therapy and rehabilitation,
- Forests for education providing indirect health benefits and
- Forests for recreation and tourism (FOREST EUROPE, 2019).

New trends such as "forest therapy" and "forest bathing" have arisen through the health benefits of forests.

Forest Bathing and Forest Therapy

A forest bathing trip, called "Shinrin-yoku" in Japanese, involves a visit to a forest area for relaxation and recreation by breathing in volatile substances, called phytoncides, released from the trees (Li et al. 2008).

The Ministry of Agriculture coined the term 'shinrin-yoku, Forestry and Fisheries of Japan (MAFF) in 1982, which was introduced as a public health concept, primarily to reduce the staggeringly high suicide rates in the early 1980s. Then began to be introduced into Japanese clinical fields and has since become a worldwide trend (Kotte et al. 2019, Hansen, Jones & Tocchini, 2017; Garcia & Miralles, 2020). "Shinrin-yoku" is a process in which activities in forest environments are used to improve the mental and physical health of people. Given the Japanese origin and school of thoughts there, forest bathing is one foundation of Forest Therapy. In 2004, MAFF came out with the "Therapeutic Effects of Forests plan." This may be thought of like an advanced version of the "Shinrin-yoku plan," the significant difference being that it emphasizes the importance of evidence-based scientific investigation on the effects of forest

environments on human health (Park et al. 2007; Tsunetsugu et al., 2010).

At Europe, for exploring the relationships between health, natural environments in general, and forests in particular, COST (The European Cooperation in the field of Scientific and Technical Research) Action E39 "Forests, Trees, and Human Health and Well-Being" was started in 2004 and last in 2008. The Action aims specifically to set out the key health priorities identified within European countries and the possibility for forestry to contribute to meeting them, to engage health policy interests in the identification of information gaps in this field, and to develop a network of researchers and research institutions in forestry, health, environment and the social sciences (Nilsson et al., 2011).

International Union of Forest Research Organizations (IUFRO) launched a new task force on forests and human health in Finland in 2007 to foster cross-disciplinary dialogue between the different researchers in this field, especially forestry and health professionals. As part of this effort, the Japanese Society of Forest Medicine was established in 2007 under the Japanese Society for Hygiene, to promote research in the field of forest medicine, including the effects of forest bathing trips and the therapeutic effects of forests on human health (Park et al. 2010)

Forest therapy and forest bathing have various benefits not only based on health (physiological and psychological), but also on the host environment such as providing mandates for forest protection and economic diversification of existing nature-based tourism and recreation sectors (Gürbey et al., 2020).

Positive physiological effects of forest therapy have been reported by many researchers as;

- Reducing heart rate and blood pressure,
- Increase in natural killer cells/anti-cancer protein,
- Production and reducing blood-sugar levels,
- Stomach ulcer recovery and easing digestion,
- Allergies and respiratory diseases,
- Decreasing the level of cortisol and other stress hormones,

Positive psychological effects can be seen on mental health and emotional wellbeing by reducing;

- Stress,
- Depression,
- Anger,
- Fatigue,
- Confusion,
- Improving mood,
- Concentration and memory,

and increasing sense of relaxation and helping in the treatment of eating disorders (Gürbey et al., 2020).

Forest Therapy Bases and Roads in the World and Turkey

A "Forest Therapy Base" and a "Therapy Road" are scientifically approved locations with forests and urban environments where experiments were conducted analyzing the healing and preventive medical benefits due to the environment (FTS, 2020). When the therapeutic effects of an entire candidate area are designated, it is certified as a "base". In contrast, when those of only a roadside is established, it is certified as a "road". "Road" can be promoted to "base" when the therapeutic effects become area-wise rather than merely along a line (Ohe et al., 2017).

Discussion of the "Plan of the Forest Therapy Base" was begun in 2003 by the initiative of the Forest Agency, the national policymaker for forestry, and the Forest and Forest Products Research Institute, a national research institute for forestry. A research project to accumulate evidence on the benefits of forest therapy was also launched in 2004. Then, the "Forest Therapy Society (FTS)", which is specialized in dealing with forest therapy programs, was established in 2007. The first certification was established in 2006 (6 Therapy Bases and 4 Therapy Roads were designated). Today, 56 Forest Therapy Bases and nine therapy roads have been certified nationwide in Japan (Table 1). Forest therapy is considered preventive medicine rather than medical treatment as mentioned earlier, and the head of this FTS is a medical doctor (Ohe et al., 2017; FTS, 2020).

A certified forest-therapy base in Japan needs to have more than two trails, or 'forest-therapy roads' (Li, 2019). The base needs to be gratify five senses (sight, smell, touch,

hearing and taste), rich in biodiversity and have different types of water resources. There is also a need for systems and regulations that protect the natural environment and landscape, and control noise and air pollution, etc. The areas must be free of soil pollution and natural and artificial toxic pollutants. Trail slope, width, trail surface, walking distance and difficulty level must be well-planned. Also, safety (rockfall, cliff, drainage) is taken into consideration. The trails may differ in difficulty and length, and also at least one trail must be designed according to the universal design criterias. Rest facilities and toilets must be provided at appropriate and accessible places. Forests with plant species such as conifers which are capable of high emitting monoterpenes are preferable. Forest areas with high canopy cover should not be preferred in terms of feeling safe. Accessibility for visitors with private car or public transportation and parking lots are also factors to be considered (Adapted from FTS, 2020b).

In China, the concept and model of Japanese forest therapy was introduced in 2012 and the promotion and practice of forest therapy began in 2013 (Zhang et al., 2020). Since 2015, China has carried out various activities related to Forest Therapy. The respective provinces largely coordinated these activities. For example Sichuan Forestry Society for the first time announced two forest therapy routes, which are through Emei forests and Dujiangyan-Siguliang Mountain forests. According to the strategic plan, another 10 to 15 forest therapy corridors will be developed till 2022 in the province (URL-1). In Beijing, five forest therapy centers (Songshan, Badaling, Shichangyu, Baiwangshan & Xishan) are being built (Jinglan & Lanlan, 2017). By the end of 2020, it is expected that 500 Forest Recuperation Bases to be established in China (Liu et al., 2019). The number of designated Forest Therapy bases and roads in Asian countries such as Taiwan and Korea is also growing.

In Europe and continent of America, forest therapy roads have begun to certificated by some institutions and associations of forest therapy.

Despite having rich forest resources, there isn't any Forest Therapy bases or Roads designated with proven health effects in Turkey.

All forests of Turkey and many national parks in the country are suitable for forest bathing and therapy in terms of proximity to cities (Doğaner, 2019). Especially Samanlı, Mountain, Mount Uludağ, Bozdağlar, Mount Ida, Istranca, Bolu, Kaçkar, Taurus and Küre Mountains are the best examples in this regard.

Table 1. Forest Therapy Bases (FTBs) and Forest Therapy Roads (FTRs) in Japan (FTS,2020c; URL-2; URL-3)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Length (km)	Attitude/Elevation (m)
NAGANO	Saku-Shi	FTB/ October 2006	***Betula dahurica***, *Larix sp.*, *Pinus densiflora*, *Quercus serrata*, *Castanea sp.*	Fabre's small diameter	2.6	830-851 (21 m)
				Waterside's small diameter	0.7	890-945 (55 m)
				Small diameter of the piece	1.6	1154-1250 (96 m)
				Small diameter of larch valley	1.6	1053-1151 (98 m)
				Small diameter of deer	1.3	1150-1171 (97 m)
	Minamiminowa-Mura	FTR/ April 2006	(Broad-leaved forest) *Chamaecyparis obtusa*, *Pinus densiflora*	Mizunashi Pond	4.3	1379-1487 (108 m)
				Nature exploration	3.7	1482-1648 (166 m)
				Pond tour course	9.2	1560-1920 (360 m)
			Quercus crispula, *Fagus sp.*	Okushiga Shirakabaen Road	3.3	1461-1506 (45 m)
	Matsukawa-Machi	FTB/ March 2013	(Mixed Forest) *Chamaecyparis obtusa*, *Cryptomeria japonica*	Oyote no Mori	2.2	800
				Rindo	2	1400
	Heavens Sonohara (Achi Village)	FTR/ April 2010	*Larix sp.* *Chamaecyparis obtusa* *Malus sieboldii*, *Pterocarya rhoifolia* *Acer sp.*	Iwana no Mori Promenade	2.2	800
	Agematsu Town	FTB/ April 2006	*Chamaecyparis obtusa* *Chamaecyparis pisifera* *Thujopsis dolabrata*	Fureai no Michi	2.8	1080-1130 (50 m)
				Robin	2.7	1080-1160 (80 m)
				Mukaiyama	2.1	1080-1170 (90 m)
				Cold swamp	3.3	1080-1150 (70 m)
				Neutral course	2.1	1080-1170 (90 m)
			(50% natural broad-leaved forest and 50% *Chamaecyparis obtusa* plantations)	Kamiakazawa	2.2	1080-1200 (120 m)

(Table 1 Continued) (FTS 2020c; URL-4)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
NAGANO	Otari-Mura	FTB/ March 2007	*Fagus sp.* *Abies mariesii* *Betula sp.* *Larix sp.*	Mountain stream	1.5	1080-1100 (20 m)
				Mountain stream Himemiya	3.5	1080-1100 (20 m)
				Kamaike Pond	2	1190
				Tsugaike Nature Park	1-2	1600-1900(300 m)
				Tsugaike / Cortina Woodchip Road	0.7	-
				Shionomichi	5.7	-
	Shinano-Machi (2 star base)	FTB/ April 2006	*Quercus crispula, Cryptomeria japonica* *Larix sp.* Betula sp. *Fraxinus mandshurica*	Seismic waterfall (Nainotaki)	7	-
				Goshikachi	1.2	-
				Zounokomichi	2.5	-
	Iiyama-Shi	FTB/ April 2006	(Deciduous broad-leaved forest) *Fagus sp.* *Cryptomeria japonica* *Quercus crispula*	Beech Satoyama Komichi	1.2	529- 537 (8 m)
				Chayaike Forest Bath	2.3	1074-1106 (32 m)
				Shinetsu	80	563-1382 (819 m)
				Madarao Kogen	7.3	862-969 (107 m)
	Yamanouchi-Machi Shiga Kogen	FTB/ April 2008	*Cryptomeria japonica* (300 years old) *Tsuga diversifolia, Abies mariesii* *Thuja standishi Quercus crispula*	Kami no Mori Kosuge no Sato, Hokuryu Lake	3.8	514- 910 (396 m)
				Mizunashi Pond	4.3	1370-1470 (100 m)
				Okushiga Shirakabaen Road	3.7	1410-1460 (50 m)
				Pond tour	10.3	1550-1910 (360 m)
				Seseragi	3.2	1580-1670 (90 m)
				Nature exploration	4	1480-1640 (160 m)
	Kijimadaira-Mura	FTR/ March 2007	*Fagus sp.* *Betula sp.* + *Larix sp* + *Quercus sp.*	North Dove	4.9	1460-1600 (140 m)
				South Dove	0.6	1450-1600 (150 m)
				Osawa	1	1460-1470 (10 m)
				Takappyoyama	3.6	1460-1740 (280 m)
				Hakkenzan	3.8	1390-1560 (170 m)

(Table 1 Continued) (FTS 2020c)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
NAGANO	Kijimadaira-Mura continues		*Larix sp., Betula sp., Cryptomeria japonica*	Large beech	1.5	1380-1440 (60 m)
				Dogo flat	1.3	1380-1440 (60 m)
				Dob flat	1	1300-1400 (100 m)
IWATE	Iwate-Machi	FTB/ March 2015	(Mixed forest) *Quercus crispula, Cryptomeria japonica, Fagus sp., Larix sp.,*	Ishigami-no-Oka	2	270-326 (56 m)
				Kodaki Course	1.06	291-335 (44 m.)
				Arashiyama	2.84	291-332m (41 m.)
				Ishigami Hill	1.5	270-326 (56 m.)
				Ishigami no Oka	1	270-315 (45 m.)
	Iwaizumi-Cho	FTR/ April 2006	*Fagus sp. Pinus densiflora, Betula ermanii, Quercus crispula, Picea abies*	Beech forest	2	916 (Flat)
				Yamano grass	2	916-960 (44 m.)
AKITA	Kazuno-Shi	FTB/ April 2008	*Cryptomeria japonica, Fagus sp., Larix sp., Betula sp.*	Yuze Ravine	4.7	174-213 (39 m.)
				Onuma	2	945-960 (15m.)
				Steamed hot water	6	802-1110 (308 m.)
				Goshogake	2.3	990-1150(160 m.)
				Higashiyama	8.8	235-317 (82 m.)
				Kuromoriyama	5.7	219-412 (193 m.)
				Nakataki	1.2	330-360 (30 m.)
GUNMA	Ueno-Mura	FTB/ March 2006	(Deciduous broad-leaved forest centered on *Fagus sp.)* *Aesculus hippocastanum, Quercus crispula, Tsuga diversifolia, Abies veitchii, Abies mariesii, Rhododendron chinensis, Carpinus laxiflora, Fraxinus lanuginosa, Hydrangea hirta, Abies mariesii, Cotinus coggygria*	"Nakanozawa Headwaters Nature Walk" has 4 courses	12.6	-

(Table 1 Continued) (FTS 2020c; URL-5)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
			(Mixed forest) *Larix sp.,*	Royal	1.3	-
	Kusatsu-Machi	FTB/ April 2010	*Quercus crispula, Castanea crenata, Acer sp., Chamaecyparis obtusa*	Cycling road	3.4	-
				Peaceful Forest	1.3	-
GUNMA	Kanra-Machi	FTB/ April 2014	-	-	-	-
	Shibukawa –Shi Akagi Nature Park	FTB/ March 2014	(Mixed forest) *Quercus serrata Acer sp.*	Saison garden area	2	100
				Four seasons forest area	3.5	100
				Natural ecological garden area	4	100
TOKYO	Okutama-Machi	FTB/ April 2008	(Coniferous forest, natural forest) *Quercus serrata, Prunus avium, Cryptomeria japonica, Chamaecyparis obtusa, Pinus densiflora*	Lake Okutama Ikoi	12	530-561 (31 m)
				Aroma Road "Tokei Trail"	1.3	400-450 (50 m)
				Okutama old road	9	341-605 (264 m)
				Hatonosu Canyon Promenade	2.5	270-338 (68 m)
				River Moss Valley, Hyakuhiro no Taki Exploration Road	1.8	663-833 (170 m)
	Hinohara-Mura	FTR/ March 2007	(Mixed forest) *Cryptomeria japonica, Chamaecyparis obtusa*	Otaki Road	1	1040-1100 (60 m)
GIFU	Motosu-Shi	FTB/ March 2015	(Coniferous forest) *Cryptomeria japonica Chamaecyparis obtusa*, *Quercus sp., Prunus serrulata*	NEO Sakura Exchange Land Shikisai no Oka"	1.5	250 (50m) 10% slope
				Usuzumi Zakura Roman no Michi"	3	200 (30 m) 1,6 % slope
			(Broad-leaved species)	Bunshu no Mori Sasayuri no Michi"	3.1	180m, 13% slope

(Table 1 Continued) (FTS 2020c; URL-6)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
TOKAI	Tsu-Shi, Mie	FTB/ April 2008	*Cryptomeria japonica* *Chamaecyparis obtusa*	Kimigano Dam Lakeside	10.7	180-200 (20m)
				Takatsukayama	8.6	180-480 8300m)
				Kiriyama	3.4	340-540 (200m)
				Mitake Zao	5.4	320-720 (500m)
				Mitake Mt. Obora	7.9	320-990 (670m)
				Nisshin Nishiura	10.5	310-820 (510m)
				Obora cobblestone	5.6	660-1020 (360m)
				Hirakura course	9.2	320-440 (120m)
				Tsukahara History	4.4	210-300 (90m)
				Ise Honkaido	11.6	220-560 (340m)
				Kitahata History Exploration	10	315-350 (35m)
				Hinotani Onsen	11.6	140-270 (130m)
HYOGO	Shiso-Shi	FTB/ March 2015	(Mixed forest) *Cryptomeria japonica* *Zelkova serrata* *Acer sp.*	Akanishi	0.8	635-665 (30m)
				Kunimi no Mori	2.3	425-467 (42m)
TOTTORI	Chizu-Cyo	FTB/ April 2010	*Cryptomeria japonica* *Acer sp., Castanea crenata, Carpinus sp., Prunus serrulata, Fraxinus sp. Magnolia obovata, Quercus mongolica, Juglans sp. Cercidiphyllum japonicum, Betula sp.*	China Nature Trail – Ashizu Valley	2.3	Flat
				Mitaki Dam- Ashizu Valley	1.3	-
				Headwaters- Ashizu Valley	2	-
			Komorebi forest	Komorebi no Mori	1.5	-
				Amagi Forest Park	2	-
				Yokoze Valley	1.7	-

(Table 1 Continued) (FTS, 2020c; URL-7)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
KOCHI	Tsuno-Cho	FTB/ April 2008	Broad-leaved forest *Acer sp., Fagus sp., Zelkova serrata, Aesculus hippocastanum, Quercus crispula, Larix sp. Stewartia monadelpha*	Tengu Himeshara	4,5	1087-1355 (268m)
				Tengu no Mori	3.7	1270-1484 (214m)
				Karst Plateau Observation Road	1-3	1355-1437 (82m)
				Shimanto headwaters non-entry valley road	1.2	525-535 (10m)
	Yusuhara-Cho	FTB/ March 2007		Kubotani Therapy Road Walk	3	(10 m) 0.6%
KAGOSHIMA	Kirishima-shi	FTB/ March 2007	*Abies sp., Tabebuia sp., Quercus sp.*	Yanagidaira Walking Path	2.5	490-530 (40m)
				Hand wash walking path	0.9	600-690 (90m)
				Maruo Nature Exploration Road	2.3	560-700 (140m)
				Kirishima Shinsuikyo	1.8	348-395 (47m)
MIYAZAKI	Nichinan-Shi Kitago	FTB/2008	*Quercus sp. Castanopsis sp. Laurus sp.* (300 species of moss)	Inohae valley	6	200-250 (50 m)
				Hachinosu Valley	1.6	51,5-70 (18,5 m)
	Aya-cho	FTB/ March 2007	*Persea thunbergii Quercus gilva, Laurus sp.*	Relaxing course	1.5	121-215 (94 m)
				Many courses	3.5	-
				Machinaka Course	1.5	-
	Hinokage-cho	FTB/ April 2006	*Cryptomeria japonica Chamaecyparis obtusa Quercus sp. Castanopsis sp.*	Ishigaki	2.5	175-194 (19 m)
				TR railway ruins	4	68-88 (20 m)
				Yakedake dolly r.	7	200-300 (100 m)
				Mitate promenade	3.2	570-580 (10 m)
				Kyushu Nature Trail	4	-
				Tansuke / Yahazudake Healing Forest Sports Park	3	450-550 (100 m)

(Table 1 Continued) (FTS, 2020c)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
HOKKAIDO	Tsubetsu-cho, Nonno no Mori	FTB/ April 2011	-	Clear stream road	1.8	-
				Miharashi Road	2.4	-
				Komorebi Road	1.4	-
	Yamasaki Forest	FTB CLOSED	-	-	-	-
YAMAGATA	Oguni-Machi	FTB/ April 2006	(Deciduous broad-leaved forest centered on *Fagus sp*.) *Quercus crispula, Fraxinus mandsch, Aesculus hippocastanum Pterocarya rhoifolia*	Main road	2.2	410-500 (90m)
				Kemono sidewalk	1.4	430-450 (20m)
				Hanareyama promenade	0.4	450-460 (10m)
MIYAGI	Tome-Shi	FTB/ April 2008	*Cryptomeria japonica, Pinus sp. Quercus serrata, Castanea crenata Styrax japonicus, Weigela hortensis,*	Ponpo Kotanuki no Michi	0.28	346-348 (22m)
				Kotori no Michi	0.55	242-362 (120m)
				Azalea Road	0.86	217-362 (145m)
				Ochiba no Michi	0.88	337-378 (41m)
				Road of peace	0.44	302-369 (67m)
				Pinecone road	0.15	342-369 (27m)
				Conifer Road	0.37	342-372 (30m)
				Toyoashihara no Michi	0.44	348- 410 (62m)
AOMORI	Fukaura-Machi	FTB/ March 2013	(Deciduous broad-leaved forest centered on *Fagus sp.*/mixed forest) *Quercus crispula, Acer sp., Aesculus turbinata, Cotinus coggygria, Cupressaceae*	Aoike / Boiling Pond Course	2.8	200-259 (59m)
				Kanayama Pond Short Course	2.1	220-230(10m)
				Kanayama Pond Long Course	3.6	220-230(10m)
				Oike course	1.8	180-200 (20m)

(Table 1 Continued) (FTS, 2020c; URL-8)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
IBARAKI	Daigo-Machi	FTB/ March 2016	*Cryptomeria japonica* *Chamaecyparis obtusa* *Quercus sp.* *Prunus avium,* *Carpinus sp.*	Forest bath model course	1.6	385,7- 430 (44,3)
				1km circuit course	1	385,7-400 (14,3)
				Showa Emperor's Trajectory Tour Course	1.7	385,7-430 (44,3)
CHIBA	Minamiboso-Shi	FTB/ March 2014		Toyama Fushihime / Hakkenden no Michi	-	-
				Cape Daibusa	-	-
				Many Fudo waterfall roads	-	-
				Shiroyama road	-	-
				Ondara mountain road	-	-
				Anbaya Satoyama road	-	-
				Bride Road / Kurotaki Road	-	-
KANAGAWA	Atsugi-Shi	FTB/ March 2007	*Cryptomeria japonica* *Chamaecyparis obtusa*	D foot forest road	3.5	123-427 (304m)
				Hakusan Junrei Pass	3.5	80-284 (204m)
				Kanegatake	3.7	94-561(467m)
	Yamakita-Machi	FTB/2011	*Cryptomeria japonica* *Chamaecyparis obtusa* *Quercus serrata,* *Quercus acutissima*	Kawamura Castle Ruins / Shasui Falls	6	110-225 (115m)
				Nishitanzawa Prefectural Forest	4.2	540-740 (200m)
				Yozuku Forest	3.8	333- 436 103m)
				Onoyama	2.5	360-723 363m)
	Hakone-Machi	FTB/ March 2016	*Cryptomeria japonica, Chamaecyparis obtusa, Zelkova serrata, Quercus rubra, Fagus sp, Acer sp., Magnolia obovata, Stewartia monadelpha*	Hakone Yasuragi no Mori	1	730-770 (40m)
				Kuzuryu no Mori	3	720-730(10m)

(Table 1 Continued) (FTS, 2020c; URL-9)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
KANAGAWA	Me-Byo Valley Biotopia	FTR/ April 2018	*Ginkgo Biloba*	Healing Forest	20 minutes	-
				Satoyama / Power Spot	30 minutes	-
				Ginkgo tree lined course	72 minutes	-
	Hadano-Shi	FTB/ 2020		Hadano Tokawa Park / Wind Suspension Bridge	2.7	(65 m)
				Omote Tanzawa Outdoor Activity Center / Kuzunoha Izumi Course	1.3	(153 m)
				Minoge / Harutake spring water course	2.3	(240 m)
				Kuzuha Gorge	1.9	(41m)
				Koboyama Park	3.2	(169 m)
SAIMATA	Kitamoto-Shi	FTB/2020		Saitama Prefecture Nature Learning Center	-	-
				Sun Amenity Kitamoto Campfield	-	-
NIIGATA	Tsunan-Machi	FTB/ April 2008	*Fagus sp.* *Quercus sp., Larix sp.* *Betula sp., Cryptomeria japonica*	River terrace superb view road	1.1-6.4	550-730 (180m)
				Yamabushiyama Healing Road	1-7	700-900 (200m)
	Myoko-Shi	FTB/ April 2008	*Fagus sp., Betula sp.* *Quercus crispula* *Picea abies*	Myoko Kogen Nature Trail	15.7	731-1247 (516m)
				Sasagamine	10	1224-1410 (186m)
				Sasagamine Yumemidaira Promenade	9.6	1227-1348 (121m)
				Akaike	6.9	906-1138 (232m)
				Sota History Village	4.3	40-180 (140m)
				Hiramaru Fureai no Mori	2	812-897 (85m)

(Table 1 Continued) (FTS, 2020c; URL-10)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
YAMANASHI	Yamanashi-Shi	FTB/ March 2007	*Acer sp.*, *Aesculus turbinata*, *Quercus crispula*	Nishizawa Valley	10	
				Mie waterfall	5	
				Hirose Lake Opposite Bank	5	
				Kyoho Hill Road	1	
				Manyo Road	1	
	Takeda-No-Mori	FTB/ March 2013	*Pinus densiflora*, *Quercus sp.*	Flat course in a small diameter of healing	1.4	Around 610m
				Healing small diameter Nishinodaira course	2.2	Around 610m
				Five senses forest	2.3	520-610 (90m)
				Outer course	5	460-610 (150m)
TOYAMA	Toyama-Shi	FTB/March 2009	*Quercus crispula* *Quercus serrata* *Prunus grayana* *Magnolia obovata* *Betula platyphylla* *Acer sieboldianum*	6 courses		780 (230m)
	Kamiıchi-Machi	FTR/2012		Sakka Toga Tree-lined	1.1	90- 120 (30m)
				Sakka Kushigatayama	1.8	90-210 (120m)
				Oiwa Flower House	5.2	130-420 (290m)
				Babajima trekking course	5	710-1255 (545m)
				Babajima Family Forest	0.8	720-730m (10m)

(Table 1 Continued) (FTS, 2020c)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
ISHIKAWA	Tsubata-Machi	FTR/2013	*Quercus serrata* *Pinus densiflora* *Acer sp.* *Cryptomeria japonica* *Chamaecyparis obtusa*	Gentiana view course	2.3	69-85 (16m)
				MISIA Forest Course	3.8	31- 87 (56m)
				Lakeside cycling course	5.4	31-80 (49 m)
				Mikado Pond Lakeside	1.7	30- 85 (55m)
				Mikuniyama Observation	1	224-324 (100m)
SHIZUOKA	Kawazu-Machi	FTR/ March 2007	*Cryptomeria japonica* *Chamaecyparis obtusa*	Izu Genki Waku Forest	6	375-619 (244m)
SHIGA	Takashima-Shi	FTB/ April 2008	*Quercus serrata, Magnolia obovata,* *Magnolia salicifolia,* *Prunus avium* *Cryptomeria japonica* *Castanea crenata*	Higashiyama circuit course	3.8	190-255 (65m)
				Hiraike course	2.8	About 550m
				Tone Waterfall	1.3	About 350m
WAKAYAMA	Koya-Cho	FTB/ March 2007	*Cryptomeria japonica* *Chamaecyparis obtusa* *Pinus densiflora* *Tsuga sp.* *Sciadopitys verticillata*	Koyasan-cho Ishimichi Fetal World Route	5.8	500-850 (300m)
				Koyasancho Ishimichi Kongokai	3.2	825-850 (25m)
				Kohechi	7.5	738-1000 (262m)
				Nyoninmichi	16	566-1000 (434m)
				Fudozaka	3.8	566-850 (284m)
				Koyasan Koyamaki Plant Community Conservation Forest	2.5	837-880 (43m)
				Rolling axis mountain tour	5.5	668- 830 (162m)
				Masayo Tenji	6.1	800- 900 (100m)
NARA	Yoshino-Cho	FTB/2012	*Cryptomeria japonica* *Chamaecyparis obtusa*	Shinsenkyo Ryumon no Sato Course	6	250- 372 (122m)
				Yoshino / Miyataki Manyo Course	7	200- 491 (291m)

(Table 1 Continued) (FTS, 2020c; URL-11)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
OKAYAMA	Shinjyo-Son	FTB/ April 2008	*Fagus sp.* *Cedrus sp.*	Small diameter of cradle	2	700-750 (50m)
				Lakeside small diameter	4.5	760-780 (20m)
				Healing path	1.3	500-540 (40m)
SHIMANE	Iınan-Cho (2 star base)	FTB/ March 2007	*Cryptomeria japonica* *Chamaecyparis obtusa*	Odagawa course	1.3	500-550 (50m)
				Yamano grass garden course	1.5	500-550 (50m)
HIROSHIMA	Akiota-Cho	FTB/ April 2012	*Fagus sp.* *Quercus sp.*	Mt. Shinnyu	3.2	800-965 (165m)
				Sandankyo	5.8	332-424 (92m)
				Osorakan	3.7	965-1164 (199m)
				Ryutokyo	3.7	335-490 (155m)
	Jinsekikogen-Cho	FTB/ April 2008	*Pinus densiflora* *Acer palmatum* *Quercus acutissima* *Cotınus coggygria*	Teishakukyo Scola Plateau	2.2	475- 500 (25m)
				Jinseki Plateau Tiergarden	3.9	684-716 (32m)
YAMAGUCHI	Yamaguchi-Shi	FTB/ March 2006	*Chamaecyparis obtusa* *Pinus densiflora* *Zelkova serrata* *Quercus acutissima* *Prunus serrulata* *Acer sp.* *Prunus avium*	Bird forest area	1.6	flat
				Lake Ohara area	5.1	Flat
				Chojagahara area	3.9	Up to 60m
FUKUOKA	Ukiha City	FTB/ April 2008	*Cryptomeria japonica* *Chamaecyparis obtusa*	The headwaters of Kose	2.2	-
				Tsuzura Rice Terrace Promenade	1.8-3-4	-
	Yame City	FTB/ April 2008	*Cryptomeria japonica* *Chamaecyparis obtusa* *Quercus sp.*	Acorn-picking path	1.77	417-481 (64m)
				Promenade to the fountain and islets	1.83	420-464 (44m)
				Kuma bamboo grass and lake path	2.26	433-441 (8 m)

(Table 1 Continued) (FTS, 2020c; URL-12)

PREFECTURE	Base/Road Name	Type & Certification Date	Highlighted Plant Species	Trails	Trail Length (km)	Attitude/Elevation (m)
FUKUOKA	Sasaguri-Machi	FTB/ March 2009	*Cryptomeria japonica* *Chamaecyparis obtusa*	Sunset Arata Tour Couple cedar Hydrangea (Suginami) Sasaguri Kyudai no Mori Jugeinomori	1.75 10 6.36 7.34 2 10.3	600 530 679 670 35 380
	Buzen-Shi	FTB/2013	*Laurus sp.,* *Cryptomeria japonica* *Chamaecyparis obtusa* *Quercus acuta* *Abies sp.*	Kuboteyama circuit Jirobo Tengu Bridge Course Toriihata Satoyama Osanpo Course Edakawauchi Hydrangea	3.4 3 3 4	550-800 (250m) 550-650 (100m) 270-340 (70m) 150- 280(130m)
OITA	Oita City	FTB/ March 2012	*Cryptomeria japonica* *Chamaecyparis obtusa* *Quercus serrata, Pinus sp.*	Takasakiyama Sacred Mountain Mandarin Duck Valley Usoyama Heisei Forest Park Yoroigadake Tenmenzan Honguyama Kakinokiyama	2 3 6 2.5 3.1 2.7 2 3.5 4.5	428-628 (200m) 50-610 (560m) 79- 372 (293m) 164- 644 (480m) 602- 682 (80m) 647- 847m (200m) 303-403m (200m) 393- 608 (215m) 54-484 (430m)
KUMAMOTO	Mizukami Village,	FTB/April 2010,	Cedrus sp.	3 courses	500m, 1.7, 4.1	
OKINAWA	Kunigami-Son	FTB/ March 2007	(Subtropical forest) *Schima Wallichii ssp. Liukiuensis, Alnus formosana*	Kunigami Village Forest Park Yanbaru Learning Forest Hiji Otaki Promenade Yonahadake mountain trail	3 700m -1.4 3 3	25-310m (285m) 150 (25m) 25 (30m) 310 (70m)

Conclusions

Forest therapy, which is considered as preventive medicine, is expected to be approved by the World Health Organization (WHO). The Society of Forest Medicine within the Japanese Society for Hygiene and The International Society of Nature and Forest Medicine (INFOM) point to the importance given to forest bathing and forest therapy both in Japan and internationally. Enforcement of forest therapies under insurance in Japan and as part of the medical system is a different indicator of this importance (Ergüven, 2019). After the COVID-19, the world focus on to find healing opportunities for people to restore mental and physical wellbeing through nature (Gürbey et al., 2020). Forest Therapy ranks first in this regard by its proven health effects.

Forest therapy tourism is classified under nature-based tourism, nature tourism, ecotourism, rural tourism, forest tourism, forest-based wellbeing tourism (Komppula & Konu, 2017).

Being at the centre of the junction joining Asia, Europe and Africa, Turkey has several unique ecosystems, with its unique geographic position, topographic features and climatic differences among regions. Nearly 30% of its total land area covered with forests (Terzioğlu et al., 2012). By having forest areas in regions with different climatic conditions offering forest therapy practises under the ecotourism activities throughout the year, is an advantage for Turkey.

Turkey is also rich in thermal sources. The total number of thermal waters is estimated to be 1300 in Turkey, where there are more than 600 thermal waters with a temperature of higher than 20 °C. In terms of these figures, Turkey ranks first in Europe and is one of the top five countries in the world (Özşahin & Kaymaz, 2013). In many certified Forest Therapy Bases come to the fore with hot springs or thermal waters. It will be more effective to start Forest Therapy studies in forest areas close to thermal waters such as the provinces of Yalova, Bursa, Bolu and İzmir.

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