Evidence Building and Support for Forest Healing Services in Italy

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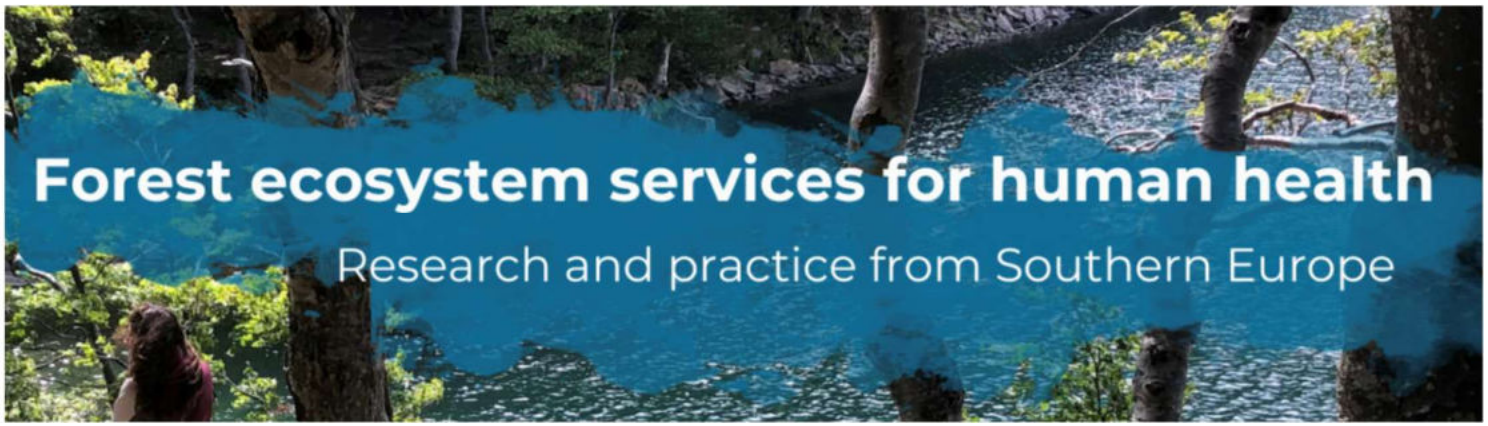

Healthy Parks Healthy People EUROPE

4/11/24

Forest Therapy: Nature and Spread

Numerous initiatives, in Italy and in other countries, aimed at promoting well-being through frequenting forest environments *("Forest Therapy", "Forest Bathing", "forest immersions", "forest baths", "Shinrin-Yoku").*

Institutional recognition:
2020, UN recognized the frequentation of forest environments as a preventive medicine practice, with wide-ranging effects on mental and physical health.

Exponential increase in recent years of scientific studies → new discipline

Most of local level initiatives are not embedded in a rigorous and scientific based framework.

Overall, the Forest Therapy service system is still immature, with **a lack of widely recognized standards** on how to effectively carry out forest therapy activities, which are the basis for the acceptance of forest therapy as a part of clinical medical treatments.

National Institutional Forest Therapy Network

AIMS

- **«Green Prescriptions»** → proposed bill to include Forest Therapy into the *Essential Levels of Assistance*;
- **Reference national standard** for criteria about sites, trails, therapists and support operators;
- Creating a **network of qualified Forest Therapy Stations** according to objective criteria.

https://www.reterurale.it/terapiaforestale

cerfit
Consiglio Nazionale delle Ricerche
mipaaf ministero delle politiche agricole alimentari e forestali
crea Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria
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Dipartimento di Biologia Ambientale Sapienza Università di Roma
Scuola di Psicoterapia Cognitiva
Servizio Sanitario Regionale Emilia-Romagna Azienda Ospedaliero - Universitaria di Parma

Forest Therapy: Nature and Basic Mechanisms

Forest therapy

A more structured approach with respect to *Forest bathing* (Immersion in a forest environment to promote physical, mental and emotional well-being, through various activities (meditation, walks).

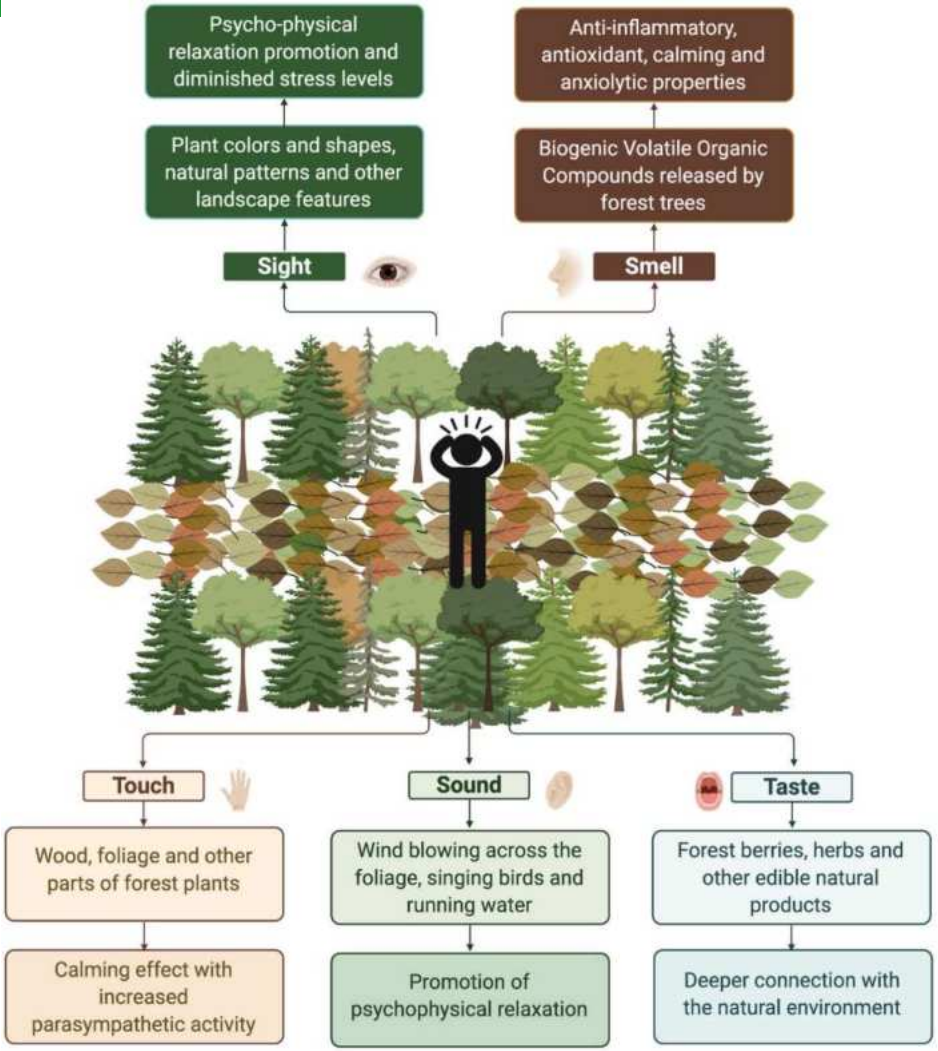
It always involves the guidance of **clinical staff** (psychologists - psychotherapists, ...).

- **Guided immersion** → minimal physical effort | maximum relaxation | maximum safety | clinical professional guide
- **Suitable sites** → forest environments, selected according to criteria based on logistical needs, (accessibility | security, …) and on the evidence of the effects produced (forest structure | natural features | air pollution and atmosphere
- **Focus on senses** → sighting | hearing | touching | smelling
- **Duration** → few hours to few days (special cohorts: up to a few weeks)

It is therapy if the **statistical significance of the effects** are known, also conditioned on environmental and personal parameters.

Forest Therapy: Nature and Basic Mechanisms

- **Benefits through senses**
  - ➢ All senses receive stimuli, translating into psychological or physiological benefits
- **Measurable determinants**
  - ➢ Sound
  - ➢ Air composition



Antonelli et al. (2021). Effects of forest bathing (shinrin-yoku) on individual well-being: an umbrella review. International Journal of Environmental Health Research, 1–26. https://doi.org/10.1080/09603123.2021.1919293

Evidence- and experience-based optimization criteria

Ecological-forestry characteristics

- **Natural** woodland/forest (no plantation) or re-naturalized (consistency)
- High **biodiversity**
- Tree species: good emitters of **BVOC**

  Conifers (black pine > stone pine > Scots pine > spruce, white).
  Mixed with conifers (e.g. beech-fir); holm oak (highest emitter in lower mid-latitudes).
  Among the deciduous: beech > chestnut > larch > birch > oak.
- **Open and bright** forest structures
- Presence of surface **water**
- Exposure: **sunshine** at least between 9 am and 3 pm
- Presence of **panoramic** points (e.g., views of peaks)
- Absence of **mosquitoes**, flies, horseflies (→ avoid grazing areas!), **allergens** (e.g., avoid hazelnuts)

Evidence-based Forest Therapy (intervention vs control)

Disorder	Cohort	Effect Size | Significance	No. of Studies
Anxiety* | Depression | Stress | Sleep	Anyone | (in)patients	Large | $p < 0.01$	Many
Hypercortisolism	Anyone	Large | $p < 0.05$	Many
Hypertension | Chronic hearth failure | Inflammation	Middle aged | Elderlies	Large, cumulative | $p < 0.05$	Sufficient
Cognitive decline | Depression	Elderlies	Medium to large | $p < 0.02$	Sufficient
Acute ischemic stroke (functional recovery)	Middle aged | Elderlies	Medium to large | $p < 0.05$	Few
Chronic Obstructive Pulmonary Disease	Elderlies	Medium to large | $p < 0.05$	Few
Psoriasis | Psoriatic arthritis | Atopic dermatitis	Children | Anyone	Medium to large | $p < 0.02$	Few
Chronic pain (Fibromyalgia)	Women	Large, cumulative | $p < 0.001$ (functional impairment and psychological)	Few
Asthma*	Children | Adolescents	Large | $p < 0.01$ to $p < 0.04$	Few

** Field evidence first found with our research*

Most effects – either psychological or physiological – show similar persistence (e.g., 3 hours → 1 week; 3 days → 1 month)

Mental health challenge and cost saving

The spread of forest immersion practices responds to the opportunity for prevention and treatment complementary to consolidated health solutions, determined by the decline of public resources and incomes, and by the increase in costs for families.

nature COMMUNICATIONS 2019

PERSPECTIVE

Corrected: Author correction

https://doi.org/10.1038/s41467-019-12631-6 OPEN

Economic value of protected areas via visitor mental health

Ralf Buckley[1*], Paula Brough[1], Leah Hague[1], Alienor Chauvenet[1], Chris Fleming[1], Elisha Roche[1], Ernesta Sofija[1] & Neil Harris[1]

the global value of protected areas, taking into account only the effects on the mental health of visitors, amounts to approximately 8% of global GDP in industrialized countries

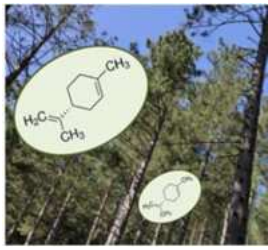
Anxiety → 52% increase in CVD risk, regardless of other risk factors (smoking, sedentary lifestyle, diet).
(Wu et al., 2022, cohort of 0.5 million).

Even just for the anxiolytic effect, exposure to the forest environment helps to reduce the risk of developing cardiovascular diseases such as hypertension and stroke

Research led by CNR with CAI (2021-2024)

- **About 50 sites** → Across Italy, many sites on the Apennines.
- **Control sites** → Urban parks.
- **Methods** → About 2,000 participants | 3-hours Forest Therapy sessions guided by psychologists.
- **Environmental monitoring** → Air quality | Air volatiles composition.
- **Personal monitoring** → Socio-demographic and personal traits | State-Trait Anxiety Inventory (STAI) | Profile of Mood States (POMS)

Main results of CNR-CAI research (with partners)



Significant, dose-dependent effects of exposure to forest air Monoterpenes, with regards to:

ANXIETY

International Journal of Environmental Research and Public Health

10.3390/ijerph20042773

MDPI

Article

Effects of Plant-Emitted Monoterpenes on Anxiety Symptoms: A Propensity-Matched Observational Cohort Study

Davide Donelli [1,2], Francesco Meneguzzo [3,4,*], Michele Antonelli [5], Diego Ardissino [1,2], Giampaolo Niccoli [1,2], Giorgio Gronchi [6], Rita Baraldi [3], Luisa Neri [3] and Federica Zabini [3]

- Significant, intense and dose-dependent effect.
- About **30% of reduction of anxiety symptoms** was due to the **exposure to monoterpenes above a certain threshold alone**

505 participants (selected from 1500+) to 39 sessions
27 covariate intervention/control couples

ASTHMA

forests

10.3390/f14102012

MDPI

Article

Exposure to Forest Air Monoterpenes with Pulmonary Function Tests in Adolescents with Asthma: A Cohort Study

Davide Donelli [1,2], Michele Antonelli [3], Rita Baraldi [4], Anna Corli [4], Franco Finelli [5], Federica Gardini [6], Giovanni Margheritini [7], Francesco Meneguzzo [7,8,*], Luisa Neri [4], Davide Lazzeroni [9], Diego Ardissino [1,2], Giorgio Piacentini [6,10], Federica Zabini [8,*] and Annalisa Cogo [6,11]

Significant and dose-dependent effects of **exposure to monoterpenes** on the **improvement of respiratory spirometry and lung oscillometry parameters** of young asthmatic patients

42 asthmatic children/adolescents
14-days stay (July-September 2022) at Misurina Lake, 1800 m a.s.l.
Robust results: vs simple exposure and vs actual (assessed) inhalation

Authoritative clarification and interpretation of Forest Monoterpenes (MTs) as anti-inflammatory and immunostimulant agents

Signal Transduction and Targeted Therapy www.nature.com/sigtrans

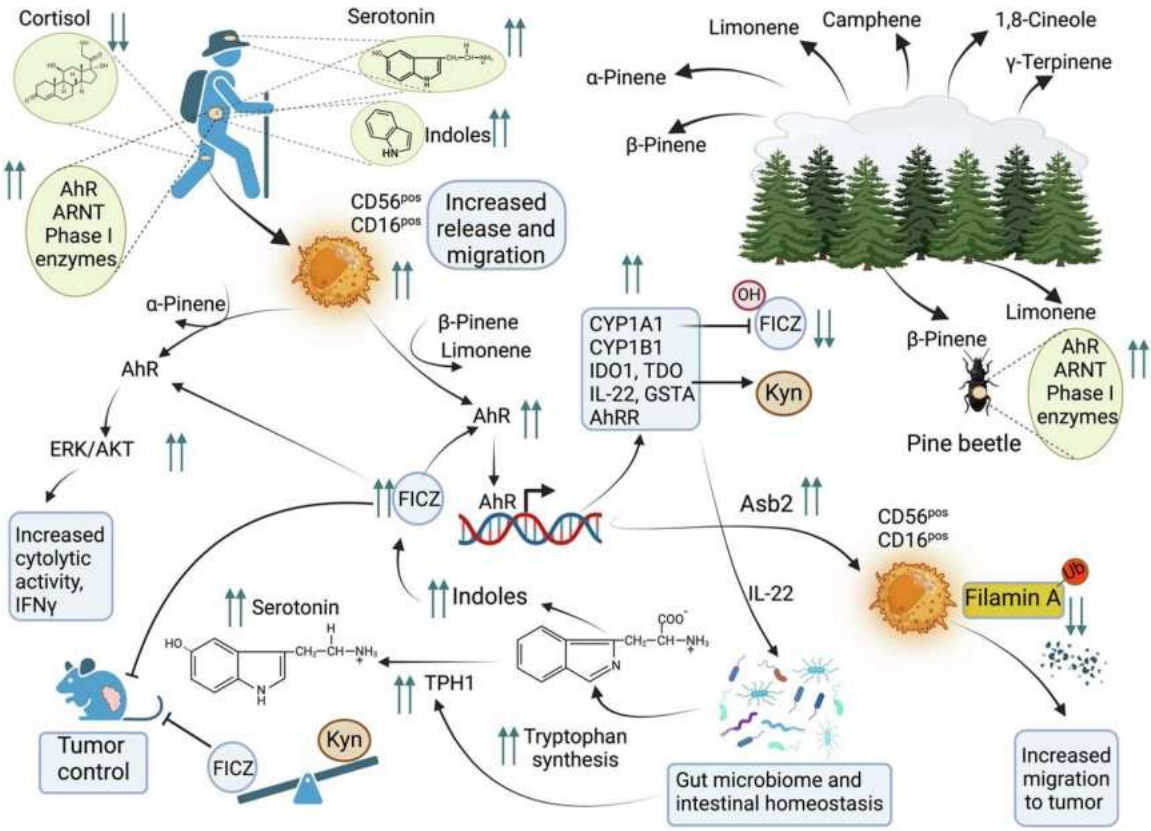
NATURE, 2024 – https://doi.org/10.1038/s41392-024-02005-w

REVIEW ARTICLE OPEN

Comprehensive snapshots of natural killer cells functions, signaling, molecular mechanisms and clinical utilization

Sumei Chen[1✉], Haitao Zhu[2] and Youssef Jounaidi[3✉]

- **Direct anti-inflammatory activity** → modulation of the production of pro-inflammatory cytokines.
- **α-pinene and other MTs** (synergistically) **enhance number and activity of Natural Killer (NK) cells**, also via the gut microbiota and the gut-brain axis.
- **NK cells** → innate immunity, against microbial infections and cancer.
- **Cortisol reduction** → synergistic to NK cells activation (cortisol is immunosuppressive).



Special project: natural Asthma treatment

The evidence

Century-long evidence of benefits to pediatric asthma patients from at least 14-days stay at middle-high altitude alpine sites.

The problem

The only remaining alpine Centre for diagnosis, treatment and rehabilitation of pediatric asthma in Italy, at Misurina Lake (eastern Dolomites, 1800 m a.s.l.), closed at the end of 2022.

The opportunity

Identification of an isolated, significant determinant of the health effects (plant-emitted monoterpenes) allows screening other sites for suitability, complying with altitude requirements and possibly endowed with milder climate.

Asthma: Italian Apennines deliver!

Volatile compounds	
Pollutants (BTEX) *90th percentile*	**Monoterpenes (MTs, Biogenic)** *50th percentile*
50 ng/m³	35 ng/m³
30 ng/m³	65 ng/m³
30 ng/m³	90 ng/m³

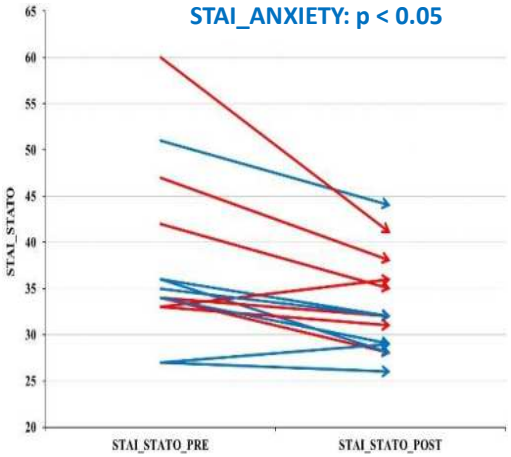
Extremely pure forest atmosphere

Higher monoterpenes

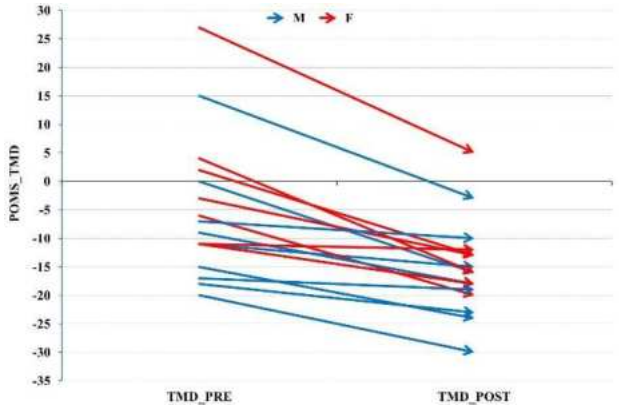
Direct functionality for mental health

Doganaccia, Tuscany Apennines

STAI_ANXIETY: p < 0.05



POMS – Total Mood Disturbance: p < 0.01



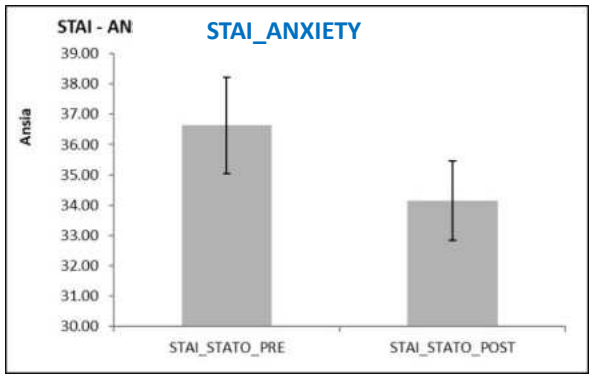
Strong reduction of negative mood states (anxiety; total mood disturbance)

+

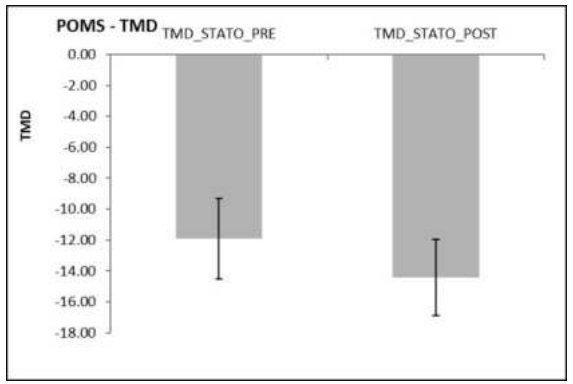
Significant reduction of variance

Evidence for "homeostatic" effect

Montescuro, Calabrian Apennines



POMS – total mood disturbance



Good reduction of negative mood states (anxiety; total mood disturbance)

Recommended for longer stays

Special project: Asthma Health Campus in Tuscany and Calabrian Apennines

Doganaccia,
Tuscany Apennines

Montescuro,
Calabrian Apennines

Meyer

Doganaccia 2000

Bambino Gesù
OSPEDALE PEDIATRICO

Health Campus

for young and adult asthma patients

will be launched in spring 2025

RESPIRIAMO INSIEME

https://respiriamoinsieme.org/

Special Forest Therapy Community Project: FOR.SA project

Leaded by Florence Mountains Model Forest; 20 partners involved .

Creation of innovative services connected to the practice of Forest Therapy, aimed also at boosting the social and economic development of the internal and mountain areas in Tuscany.

- Involvement of local communities in the design of new ways of using forest environments.
- Revitalization of local economies in rural areas.
- Direct involvement of educators, psychologists, environmental guides.

FOR.SA

The main objective of the project, was the identification and characterization of 4 suitable trails for Forest Therapy and training the professionals that can engage in the related service.

International Model Forest Network

https://forsa-terapiaforestale.com/

FOR.SA project

4 presentation meetings

3 workshops for psychologists, psychotherapists, environmental guides and the third sector

3 co-design workshop

52 professionals involved

7 Forest therapy sessions (4 open to the public, 2 with reception and community centers and 1 corporate)

175 people involved

12 interviews were carried out with beneficiaries and professionals who participated in the experimental sessions:

- Acquaintance with any difficulties/obstacles to use
- Collection of suggestions to improve the experience

FOR.SA project

Therapy sessions were guided by psychologists according to a simple protocol involving slow walking and stops to focus on the senses:

- Sight
- Hearing
- Touching
- Smelling
- Free step with senses of choice

Definition of protocols for the professional management of FT sessions, based on:

- **user groups** (age, socio-economic-cultural, health,…)
- **health objectives** (preventive/therapeutic; psycho/physical pathologies) and **social** ones.

Protocols must include the **duration** and **frequency** of the sessions (based on the evidence on the persistence of the effects over time, with respect to the specific objectives).

FOR.SA project

The Forest Therapy trails were equipped with signposts identifying the steps to be performed along the trails:

Case study: towards a path of recognition of suitable sites

CREA, Italian research organization dedicated to the agri-food supply chains supervised by the Ministry of Agriculture, and Forests is defining a **standard procedure** for the recognition of Forest Therapy (FT) suitable locations and related FT activities:

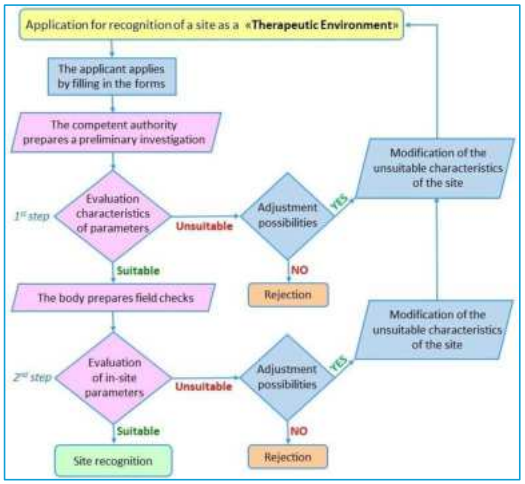
- A standard procedure (“iter”) for the validation of a Forest Therapy and Urban forest therapy (UFT) site by the competent authority to obtain the official "environmental recognition" of site suitability;

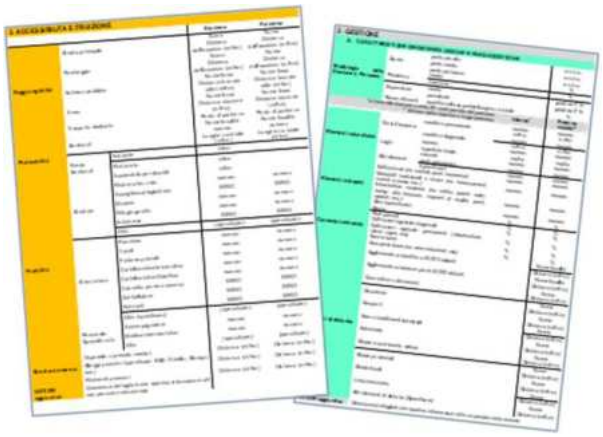
- The technical and objective criteria to assess the stationary and environmental parameters of a site in order to be qualified as a FT/UFT site.

crea
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

Case study: Guidelines and procedure for eligible sites

- Definition of the **validation process** for the suitability of a TF site.
- Definition of **significant characteristics** (geomorphological, ecological, constraints, etc.), based on national regulations, scientific evidences, expertise of scientists and technicians.
- **Forms** for requesting suitability of TF sites.
- Definition of classes and **evaluation parameters**.





regulation would also facilitate the recognition of “green prescriptions” for the prevention and treatment of certain health problems.

Further ongoing and future special projects in Italy

- A 10-months long intervention with oncology patients in follow-up
- A 12-weeks intervention with patients affected by chronic pain
- *Other projects involving patients with different pathologies – under discussion*

- Established evidence for benefits to mental health, hypercortisolism and pediatric asthma
- Sufficient evidence for hypertension, inflammation and cognitive decline

Evidence to be enhanced and finalized for other specific cohorts of patients and pathologies

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THANK YOU