



## XV WORLD FORESTRY CONGRESS

Building a Green, Healthy and Resilient Future with Forests

2–6 May 2022 | Coex, Seoul, Republic of Korea

### Forest and Human health with special reference to India

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#### Abstract

Forests are intricately linked with human health for physical, mental, and social wellbeing. India has traditionally followed culture of living in and around forests. Atmospheric pollution in urban areas (due to industrialization) increases the risk of various respiratory and heart diseases. Trees not only mitigate the greenhouse effect but also absorb toxic chemicals and particulate matter, thus acting like human liver in this way. A visit to green urban areas acts like a stress buster and recharges the batteries. This has resulted in development of urban forestry hubs, creating small areas of trees: herbs and shrubs under various names such as city forest, parks, *smriti/rashi/nakshatra van* etc. Planting of species which may create problems as pollen pollution/wind damage/ lowering groundwater table /other kind, needs to be avoided.

Forests are the largest repositories of a large variety of medicinal plants. Various medicinal systems such as Ayurveda, Allopathy, homeopathy, Unani, tribal, alternative medicine use raw material from forest. Importance of Medicinal plants has increased over the last few decades with environmental restrictions on felling of trees. Herbal remedies in India are now the responsibility of Ayush Ministry, Government of India. National Medicine Plants Board coordinates overall conservation, cultivation, trade and export of medicinal plant sector in India. A referenced digital data base from published sources is now in place. Demand and supply of medicinal plants along with list of suitable species for various ago -climatic zones has been prepared.

Medicinal plants now find a proper place in the management plans of various forest divisions. To boost the cultivation of medicinal plants, a lot of grey areas have to be addressed. Government of India is already exploring possibility of long-term Public Private partnerships in degraded forests for this purpose also.

*Keywords: One Health, Human health and well-being, Genetic resources, Innovation, Knowledge management.*

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#### Introduction, scope and main objectives

Human health is essential for happiness. It has been observed that forests and human health have a positive correlation. Various authors have highlighted various aspects of contribution of forests to human health ranging from environmental and ecological services to food, nutrition, healthcare and source of medicines in various systems.

An attempt has been made in this article to briefly highlight the salient features of forests for human health citing case studies, examples from India as illustration.

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## **Methodology/approach**

Apart from consulting available literature on the subject, distinguished medical practitioners, foresters, social workers, senior citizens were interviewed to elicit their opinion and views. A section of people residing in rural-urban areas, in addition to people living in and around forests were consulted. Special attention was given to people having knowledge of medicine (tribal, Allopathic, ayurvedic, homeopathic, unani, alternate, neurotherapy) working in Government as well as private hospitals, or their own clinics.

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## **Results**

A perusal of the literature on the subject, interaction with various medical practitioners, unanimously prove a positive correlation between Forest and human health. To maximize the benefits even in urban areas, attempts are being made to create wood lots under various schemes of urban forestry as well as involve people based on their religious- social beliefs.

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## **Discussion**

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity as per World Health Organisation (WHO) (WHO, 1946).

In India, *Vedic* scriptures mention

*Sarve bhawantu sukhinah*

*Sarve santu niramaya*

Meaning that let everyone be happy, let everyone be free from diseases.

For population living in close proximity of forest apart from environmental services, many direct roles are observed for human health. Millions of rural women, men and children obtain both macro and micronutrients from wild forest food such as fruits, seeds, ferns, leave, honey, mushrooms, wild meat, fish, insects, roots, and tuber. They also get Forest employment and income in various timber-firewood-non-timber forest products concerned activities. These income and employment opportunities at their doorstep are very crucial for these people who are not highly educated many a times.

During recent decades with development, pace of urbanisation has also increased at a rapid rate. According to a report (UN DESA, 2018), urban population which was 55% in 2018 is expected to increase to 68% by 2050. These urban populations are exposed to various stresses such as noise, air and water pollution, often unhealthy living conditions, reduced access to healthy food options (more dependence on Fast food-preserved food instead of healthy fresh homemade food). Air pollution in cities causes respiratory diseases resulting in mortality and morbidity in children, cognitive impairment in both children and adults, especially in areas devoid of trees and green vegetation.

Humans innate draw to nature (Biophilia) is well known. Forests provide a wide range of eco-system services. Some of them are as following:

### Cultural and Religious Context

In order to provide health benefits of trees to urban population, trees are being planted along roads, canals railway lines, blank spaces, parks-gardens under various schemes and names of urban forestry. Since forests play an important role in numerous cultures and religions, especially in India, many initiatives have been taken to create urbane forests capitalising on religious inclination of people. *Rashi Van* and *Nakshatra Van* (Forest plants suitable for Zodiac signs and 27 Moon Constellations) have been created in many cities in India. Just to cite an example, people in India are concerned about their welfare based on Zodiac signs, so schemes of *Rashi Van* and *Nakshatra Van* were launched so that they get benefitted by plant mentioned in Astrology.

**Table 1: Zodiac Signs and affiliated tree species for *Rashi Vans*: from Display Board at Forest Research Center, Haldwani, Uttarakhand, India**

Botanical name	Local Name	Zodiac sign
<i>Emblica officinalis</i>	<i>Aonla</i>	Aries
<i>Syzygium cumini</i>	<i>Jamun</i>	Taurus
<i>Acacia catechu</i>	<i>Khair</i>	Gemini
<i>Ficus religiose</i>	<i>Peepul</i>	Cancer
<i>Butea monosperma</i>	<i>Dhaak</i>	Leo
<i>Aegle marmelos</i>	<i>Bel</i>	Virgo
<i>Terminalia arjuna</i>	<i>Arjun</i>	Libra
<i>Bombax malabaricum</i>	<i>Semal</i>	Scorpio
<i>Calamus rotang</i>	<i>Bainth</i>	Sagittarius
<i>Prosopis cineraria</i>	<i>Khejri</i>	Capricorn
<i>Anthocephalus cadamba</i>	<i>Kadamb</i>	Aquarius
<i>Mangifera indica</i>	<i>Aam</i>	Pisces

Similarly, creation of *Smriti Vans* (The concept of planting in the memory of martyrs/deceased persons) have also been carried out during last half century in India. There is another benefit as the watch and ward may be done by the person planting or on his behest by the organisation concerned on payment of token money.

## Food Security

United Nations Sustainable development goals which include achieving global food security and ending hunger by 2030 has become even more challenging as drought affects land productivity. Leveraging the traditional knowledge of forest dwellers, combining it with scientific knowledge, and promoting through marketing channels will help reduce the burden on traditional avenues. The Kondh community of India's Odisha state has proved that forests can play a crucial role as the basis of sustainable food system, for millennia (Mahapatra, 2017).

Forests are a major store house of pure organic food in the form of leaf, flower, stem, fruit, tuber, ferns, etc. In ancient times human beings were food gatherers and hunters (Yumkham et al. 2016). These have been well documented in various studies of researchers, foresters, authors. It is a common practice among various ethnic tribal and nomadic communities to collect them for livelihood and subsistence even today (Pandey & Pande). Many of these are also being cultivated and various cultivars being made from them. Folk songs mention some of forest fruits exhibiting a deep knowledge of local people about these plants, their fruiting and collection time. An example is the famous folk song of Kumaon (India) - "*Bedu pako bara masa, kafal pako chaita*", meaning that *Ficus palmate* fruits throughout the year but *Myrica esculenta* fruits during hot summer month of April (Bisht).

People who visit hills of Uttarakhand during hot summer months invariably taste forest fruits like *Hisalu* (*Rubus ellipticus*), *Kilmora* (*Berberis asiatica*), *Kafal* (*Myrica esculenta*), *Jamun* (*Syzygium cumini*), *Bel* (*Aegle marmelos*), *Ber* (*Ziziphus mauritiana*) and quench their thirst with red burans (*Rhododendron arboreum*) syrup. They also try the red meat like preparation of fern *Linguna* (*Diplazium esculentum*), vegetable of *shishuna* (stinging nettles-*Urtica dioica* and *Gerardiana heterophylla*). Since times immemorial wild edibles like ferns, berries, shoots, tubers and more have played an important role in regional cuisines specially in the tribal belt of India. An extensive study, Wild Edible Plants of India (Niveditha, 2017) , estimates that about 800 species are consumed as wild edible plants, chiefly by the tribes and play a vital role in food security particularly during famine and similar scarcity situations (Sharma, 2000) .

## Health and Environment

Various countries have well developed Forest Therapy Initiatives. These include Korea, Japan, New Zealand, Denmark, Sweden, Finland, Germany (FAO 2020) . in other countries, there is a lot of traditional knowledge, which is now seeing a resurgence, particularly in areas related to health and environment.

**Medicinal/Therapeutic usage:** people in India have traditionally used many natural immune system boosters like *Giloy* (*Tinospora cordifolia*), Honey, *Shilajeet*, *Aonla* (*Emblica officinalis*), Cinnamon etc. (Personal communication with Dr R.B.S. Rawat, former Director National Medicine Plant Board, Government of India). As per comprehensive list of plants in the data base of Indian Medicinal Plant Board (National Medicinal Plants Board, Ministry of AYUSH, Government of India, n.d.) , the number of

botanical names for each medicinal system are as mentioned: - Ayurveda (2559), Homeopathy (460), Unani (1049), Sidha (2267), Sowa rigpa (671), and Folk (6403). All these systems make use of plant and animal-based preparations and are thus dependent on forests for raw material supply. The board is working under the Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH), and Government of India.

Depending on the carrying capacity of forests and considering the overall gene pool resources strict and effective control measures are needed. In this context two case studies from Uttarakhand, India regarding non-timber forest products of substantial medicinal properties are worth mentioning. The first one relates to *Kilmora* (*Berberis* species) which was so badly exploited during seventies and eighties that it became almost extinct in many of the areas in hills. Forest Department research wing had to grow this in their nurseries. The second example is of *Keera Jari/Yartsagunbu*, (*Cordyceps sinensis*) which was fetching a price of more than its weight in gold leading to its over exploitation.

**Pollution:** In today's era, pollution borne diseases have dramatically increased and are an increasing cause of substantial mortality and morbidity in fact they lead to a significant loss of working man days opines Dr Joshi (personal communication with Dr Arun Joshi MD, Medical Superintendent, Dr Susheela Tewari government medical college and hospital, Haldwani, Uttarakhand, India).

Proximity to forest areas improves physical health, improve mental health-mood, mitigate attention deficit/hyperactivity disorder, and reduce stress hormone Cortisol. In earlier times for the treatment of chronic infectious diseases patients were lodged in the salubrious environs of high altitudes surrounded by thick forests, where they were exposed to many hours of sunlight, fresh air and adequate rest to recuperate. The authors suggest repurposing some of the now defunct/underutilized centers to house people who might benefit from such locations as they recuperate from psychological/health issues. Even today many centers are advancing such therapy In Japan "Forest Bathing" (*shinrin-yoku*) is encouraged to relieve stress and improve health (Li, n.d.) . WHO in its World Health Report 2002 estimated that climate change was responsible for approximately 2.4% of worldwide diarrhoea, and 6% of malaria in some middle-income countries (WHO, 2002).

Forests and trees play a vital role in directly removing pollutants from the air including particulate matter in two ways. The first one is dispersion-concentrated clouds of minuscule particles get dispersed by crashing into trees and thus get dispersed and diluted by the air. The second one is by deposition in the hairy, waxy leaves.

Attenuation of noise pollution in urbane areas by acting as noise barriers by absorption, deflection, refraction and masking. Noise pollution in urban areas may lead to hearing loss, sleep disruption, cardiovascular diseases, social handicaps, negative social behaviour, annoying reactions and even accidents (Conserve Energy Future, n.d.)

Forests are a free source of Oxygen for lungs resulting in blood purification. Trees renew our air supply by absorbing carbon di oxide and producing oxygen. One tree produces nearly 260 pounds of Oxygen each year One acre of trees removes up to 2.6 tons of Carbon Di Oxide The amount of Oxygen produced by an acre of trees per year equals the amount consumed by 18 people annually (Growing Air, n.d.).

Woodlots and forest areas in cities offer opportunities for various physical activities which in turn reduce obesity, coronary heart diseases, type2 diabetes, certain cancers and depressions. These green exercises provide greater psychological benefits than indoor physical activity. The Ministry of

Environment, Forest and Climate Change, Government of India has started a scheme of (*Nagar Van Yojna*) for creation of 200 city forest (of area 10-50 hectares) in July 2020 for areas having Municipal Corporation with a grant of up to Rs 2crores. This is likely to give a big boost towards health of city dwellers. The objectives clearly mention of “extend health benefits to residents of the city” (GOI NAEB, 2020). The authors propose that building codes also be modified whereas there is a minimum number of trees per unit area of the building/house. There should be a list of specified trees that people can choose from (this is done at a certain level by some homeowner bylaws in the United States).

Forests have a micro climatic effect Trees lower atmospheric temperature by evaporating water through their leaves. They purify and provide clean water for consumption. Trees improve water quality by reducing runoff, slowly filtering and percolating rainwater, protecting aquifers and watersheds. The authors propose that the Government should implement a system of “Green Belts’ surrounding all towns. The location of the tree cover should be dictated by the topography and watershed.

A trend observed in India is that majority of people visit hill stations during summers when schools and colleges are closed in plains. Most of the hill stations have salubrious climate, are situated amongst lush green forests, verdant vales, singing streams, enchanting lakes, alluring waterfalls, colourful landscape, fauna-flora, natural features. These provide change from routine, add to health, happiness and recharge the batteries. During recent years eco-tourism activities have increased many folds, in addition to wildlife tourism which is a year-round activity now. The recreation and entertainment in these forest areas also contributes favourably to human health.

Proximity to forests is as all else, a mixed blessing. In case of uncontrolled forest fires not only tremendous loss is caused to life and property but the smoke and smog results in many health hazards due to environment pollution. While planting trees proper caution is needed to avoid species which cause pollen pollution (Richmond, n.d.), or are otherwise unsuitable due to spread of thorns (e.g. *Prosopis juliflora*), or which cause severe lowering of water table or are prone to wind damage easily (e.g. *Eucalyptus* species).

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## Conclusions/ wider implications of findings

Forests constitute the basic life support system for all living organisms including human beings and animals. Work done in different countries prove that frequently visiting forests improves the overall health, physical fitness, mental state of mind. To improve the area under trees in urban areas various innovative ideas to involve people in tree planting and after care are being evolved. While choosing the species for planting due care & precautions are needed. Conservation, development of forests in the vicinity of human habitation needs to be done on a priority basis to provide maximum health benefits & better quality of life to the population. This must be a continuous dynamic process.

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## Acknowledgements

Dr Arun Joshi MD, Medical Superintendent, Dr Susheela Tewari government medical college and hospital, Haldwani, Uttarakhand, India.

Dr R.B.S. Rawat, former Director National Medicine Plant Board, Government of India.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

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