

Conservation of Plant Biodiversity and Sustainable Utilization of Medicinal Plants

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ABSTRACT:

Medicinal plants grow throughout the nation in a wide range of ecosystems, so conservation measures are required. Any species' genetic variety can be preserved provided its healthy reproductive population is allowed to remain in the forest. Allowing a species to pursue its natural evolutionary path while protecting it in the forest is one method of species conservation. Since medicinal plant species are mostly found in forests, in-situ conservation must be encouraged. For the in-situ conservation of medicinal plants, a network of natural sites or forests that reflect the range of forest types must be constructed. This network is known as the Medicinal Plant Conservation Areas (MPCAs) network. The term "MPCAs" refers to natural areas with a healthy breeding population of local medicinal plant species that have been set aside expressly to use adaptive management techniques to preserve those species in their native environments. The following are the goals of creating MPCAs:

- To research the biological and ecological characteristics of medicinal plants to create suitable conservation strategies.
- To preserve viable populations of prioritized native medicinal plant species in their natural habitat.
- To raise awareness among the local populace and equip resource managers with the knowledge and resources necessary to properly oversee MPCAs for conservation.
- Creating plans and systems for the long-term preservation of therapeutic plants. It is well known that there is an unstopable demand for items made from medicinal herbs.

Conservation and sustainable use of these Globally Significant Medicinal Plants (GSMPs) is crucial since agriculture cannot supply the 95% of medicinal plants that are found in natural forests. Expanding the farming of species that are most likely to be sensitive to destructive harvesting is also the most challenging task. Therefore, it is essential to prioritize protecting the remaining viable populations of medicinal plants while they are in their natural habitat and ensuring that wild

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medicinal and aromatic plant collection is sustainable, particularly for Globally Significant Medicinal Plants (GSMPs) and species that are more susceptible to extinction.

Keywords: Medicinal Plants, Plant Biodiversity, Conservation, Sustainable Utilization

INTRODUCTION:

A resource that has been traditionally utilized by people in this country for many years is medicinal herbs. The socio-cultural role of medicinal plants in rural people's and tribes' lives as a means of disease prevention is significant. Most plants have therapeutic properties, medicinal plants are not unlike other commercial plants in this regard. When these plant species were used therapeutically, they turned into medicines. They also have a significant risk of going extinct since the majority of them are endangered as a result of overexploitation. For a better chance of surviving, they require protection and conservation. All of the well-known ayurvedic texts- Charka Samhita, Susruit Samhita, Rigveda, Atharvaveda, Skand Puran, Kalidas's Abhigyanashakuntalam, etc. as well as several contemporary text research books and journals that have been published recently by several research scholars mention the medicinal benefits of the plants that are described in the various texts. It is clear from this that the traditional preservation of medicinal plants is a noble and magnificent work of Indian religious rituals.

Many compounds in herbal medications remain preserved, and they have become increasingly important and popular today. The content and chemical makeup of medicinal plants' active ingredients add value, so the demand for plant-based therapies has surged much more in both developed and developing nations. This is because people are becoming more aware that plant-based therapies are natural, non-narcotic, easy to obtain, and reasonably priced. Herbal remedies from medicinal plants are still a valuable tool for treating human illnesses.

The world is beginning to accept and value India more and more. When modern synthetic drugs have failed to cure terrible and epidemic diseases like cancer, AIDS, diabetes, arthritis, asthmatic allergy, retinopathy, kidney, and hepatic diseases, and some other acute diseases, the potential for developing herbal medicines has taken on greater significance.

Since ancient times, people have utilized plants as a source of medicine. Originally, these comprised the majority of traditional ethnomedicine, which was used in India and a few other nations. Much of this traditional knowledge was later developed, recorded, and incorporated into organized medical systems including homoeopathy, Ayurveda, Unani, Siddha, and others that are not found in India. Plant active ingredients and secondary metabolites were later identified and became useful medications for use in contemporary medicine thanks to the advances in phytochemistry and pharmacology.

Because of the incredible connections that tribal people in India have with plants their products and customs are observed during festivals and ceremonies, and plants have been used for millennia conservation of plants and plant products is an integral part of their consciousness and way of life.

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REVIEW OF LITERATURE:

WHO estimates that 80% of the world's population lives in underdeveloped nations and relies on traditional medicines for primary healthcare; in addition, roughly 25% of the pharmaceuticals used today in modern medicine are derived from plants (Tripathi 2002). Tribal usage of herbal remedies is influenced by their unique sociocultural norms, religious convictions, and support for traditional knowledge and traditional medicine men's services. These people are very reliant on their environment for their primary healthcare system because of their intimate contact with it. However, due to rapid industrialization and urbanization, only a small number of elderly individuals in rural and tribal areas still possess knowledge of traditional skills and beliefs. Documentation and research on the medicinal usage of plants by rural people and tribes living in distant places are needed to close this gap. The indigenous populations are the source of acquired expertise and information regarding the conventional usage of medicinal herbs.

However, as modern civilization spreads into tribal places, knowledge of how to use traditional herbal wealth is quickly disappearing (Sharma *et al.* 2013). "Ethnobotany and the Sustainable Use of Biodiversity" was reported by (Ji 2013). According to the research paper's explanation, the creation of information/databanks containing traditional knowledge about plants for use in conservation and future development is just one way that ethnobotanical research can support modern development. Other ways include managing the landscape to best deliver conservation benefits of all kinds and boosting rural community engagement in rural development. The issues that biodiversity and sustainable usage face, the biocultural approach to biodiversity use and conservation, and ethnobotany's significance in contemporary development and biodiversity conservation are all covered in this study. "Trends in the marketing of some important medicinal plants in Uttarakhand, India" was reported by (Kuniyal *et al.* 2013).

"Conservation and Sustainable Use of Medicinal Plants: Problems, Progress, and Prospects" was documented by Chen *et al.* (2016), they described the world's most valuable sources of herbal goods are medicinal plants, which are rapidly disappearing. This article serves as a trustworthy resource for the conservation and sustainable use of medicinal plants by reviewing international trends, advancements, and opportunities in the fields of strategies and methodologies about these two topics. "Promoting Sustainable Use of Medicinal and Aromatic Plants for Livelihood Improvement and Biodiversity the Conservation The under The Global Change, through Capacity Building in the Himalaya Mountains, Swat District, Pakistan" They were documented by (Sher *et al.* 2017).

The author has critically gone through the Sanskrit version of the famous play Abhigyankuntalam and prepared a list of plants mentioned in this play. There are 36 species belonging to 33 genera and 19 families which are described in the present paper "Plants of Kalidas's Abhigyanshakuntalam" (Sikarwar 2018). Asia's medicinal plant research is still receiving a lot of interest on a national and worldwide level, especially in light of its many applications in promoting health and reducing poverty. Scientific data, however, is still somewhat dispersed about institutional setups, the potential of various systems for producing medicinal plants, and application techniques. The creation of a

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thorough research plan to enhance the corpus of current knowledge is hampered, at least in the context of Asia, by this incomplete body of information. "Asian Medicinal Plants Production and Utilization Potentials: A Review" was written by (Astutik *et al.* 2019). "Vital roles for ethnobotany in conservation and sustainable development" were documented by (Pei *et al.* 2020). A chapter "The Conservation and Utilization of Medicinal Plant Resources" was given by (Wani *et al.* 2021).

"Role of traditional ethnobotanical knowledge and indigenous communities in achieving Sustainable Development Goals" was reported by (Kumar *et al.* 2021). "Diversity, Distribution, and Sustainability of Traditional Medicinal Plants in Kaski District, Western Nepal" were reported by (Khakurel *et al.* 2022). They described There are 115 species of wild medicinal plants known to exist, spanning 106 genera and 71 families. Herbs were the most prevalent living form, and the main groups were Asteraceae and Rosaceae. The most often used plant portion was the root; the most popular preparation method was paste; and the majority of medicinal formulations were taken orally. The majority of therapeutic herbs were utilised to address digestive issues. "Medicinal Plant Use, Conservation, and the Associated Traditional Knowledge in Rural Communities in Eastern Uganda" were given by (Ssenku *et al.* 2022). They found 133 species that belonged to 34 families and 125 genera. The two most prevalent groups were Solanaceae (29%) and Fabaceae (65%). The most frequently utilised components in medicinal preparations were the leaves (80%) and the roots (15%); these were primarily taken orally as decoctions (34.6%) and infusions (16%). The most prevalent conditions treated were malaria (4.52%), stomach ulcers (7.42%), and cough (7.74%).

The natural forests of India are home to over 8000 medicinal plants, which provide the majority of the country's healthcare to 60-80% of its inhabitants, especially the impoverished in rural areas.

The Requirement for Medicinal Plant Conservation

To meet the demands of the growing population as well as the growing regional and global healthcare market for products, enormous volumes of medicinal plants are being collected from the forests. To meet the increasing demand for raw materials needed for both home and export use, many medicinal plants in India are being exploited from the forest, leading to a rapid depletion of the country's natural resources. Agroforestry, health security, income, cultural identity, and health are all impacted by medicinal plants. Therefore, to preserve, conserve, cultivate, and assess germplasm for use in the future, is necessary.

The preservation, restoration, and enhancement of biodiversity within the region are all included in biodiversity conservation, as this ensures that the variety and quantity of local species and communities support sustainable growth. The ultimate goal of biodiversity conservation is to preserve natural levels of diversity that are critical to species and populations to respond to both short- and long-term environmental changes and overcome factors that can cause extinction.

METHODS OF CONSERVATION STRATEGIES:

There are two ways of conservation of plant biodiversity:

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I. The traditional methods for the conservation of plants

II. Modern methods for conservation of Medicinal plants and other plants

I. THE TRADITIONAL METHODS FOR CONSERVATION OF PLANTS:

Because tribal people believed, based on Indian mythology, that God is pleased when people worship the plants Tribals began worshipping the plants to obtain the blessings and specific requests related to God and Goddess.

Among the plants that tribal people in commonly and frequently worship are Tulsi (*Ocimum sanctum*), Durva (*Cyanodon dactylon*), Vatvraksh (*Ficus bengalensis*), Peepal (*Ficus religiosa*), Banana (*Musa paradisiaca*), Neem (*Azadiracta indica*), Kadamba (*Anthocephalus kadamba*), Khejari (*Prosopis cineraria*), Rudraksha (*Eleiocarpus* spp.), Amla (*Emblica officinalis*), Bilva (*Aegle marmelos*), Ashoka (*Saraca indica*), Chandan (*Santalum album*), Baans/ Bamboo (*Dendrocalamus strictus*), and several other plants. As a result, religious belief has helped to preserve these plants. These plants receive watering and tributes in the form of flowers, leaves, and other decorations during acts of devotion, which gives them the extra nourishment and support they need to survive. In this sense, the custom originated in antiquity and is still followed by tribe members today. Because people have strong emotional attachments to these plants, they are terrified to cut, destroy, exploit, or otherwise damage them.

Indirect methods of plant conservation: There are some indirect means adopted by tribal and other people for the conservation of plants and plant products:

1. Use of plants in worshipping the God and Goddess:

Calotropis procera (Aakda), *Thevetia peruviana* (Kaner), *Michelia champaca* (Champa), *Datura* spp., *Clitorea ternatea* (Aparajita), *Crocus sativus* (Kesar), *Anthocephalus kadamba* (Kadamba), *Elaeocarpus ganitrus* (Rudraksh), and a few other fragrant flowering plants and flowers are offered to Lord Shiva in the same manner as flowers and other plant parts are offered to Goddess Gouri. Red flowers like Gudhal (*Hibiscus rosa sinensis*) are most beloved by Goddess Gouri.

The following flowers are offered to Lord Vishnu during worship: *Acacia catechu* (Khair), *Prosopis specigera* (Shami), *Thevetia peruviana* (Kaner), *Jasminum grandiflorum* (Chameli), *Andropogon nordiates* (Kush), *Michelia champaca* (Champa), *Saraca indica* (Ashok), *Mangifera indica* (Aam), *Echito corophyllata* (Malati), *Nelumbo nucifera* (Kamal), *Nymphaea* spp. (Kamodani), *Musa paradisiaca* (Kela), and *Ocimum* spp. (Tulsi). The significance of adoring Lord Vishnu is stated in Skund Puran Tulsi (*Ocimum* spp.). God Vishnu is the one who loves Tulsi leaves the most.

Ganesh especially loves the blossoms of *Cyanodon dactylon* (Durva) and *Hibiscus rosa-sinensis* (Red Gudhal).

Tribal people worship the Sun using the flower of *Thevetia peruviana* (Kaner), often known as the Kaner.

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Hindu mythology is believed by the majority of tribal and non-tribal people in India, who regard Ganesh, Gouri, Vishnu, Shiva, and Sun as the five Devas. Humans have long revered the five devatas- Ganesh, Gouri, Shiva, Vishnu, and the sun and present flowers to them in remembrance of them.

2. Role of tribals in traditional conservation of Forests:

Tribals are social groupings that act as a bridge between more developed modern communities and prehistoric cultures. The indigenous people prefer living in isolated places such as hills, valleys, and forests. For all of their basic needs, including food, fuel, shelter, and medical supplies, they are entirely reliant on nature. There are several tribal areas in India, and these places are home to numerous tribal communities that are highly respected for their genuine love of the natural world and their understanding of its preservation.

In addition to making use of plant-based products, these tribal societies also preserve and safeguard plants by planting, dispersing seeds and other propagative materials, cultivating sections of medicinally significant plants, and planting such materials so they have a steady supply of materials for everyday needs. Because they relied on these other vegetative technologies for their subsistence, tribes adopted them.

1. In the forest, where there is the least disturbance, live the tribes. They don't disturb the forest as a result.
2. They don't utilise any contemporary pollutants, thus they aren't contaminating the environment.
3. They protect certain animals and plants because they worship these plants and animals.
4. They also shield these creatures from other threats.
5. External individuals avoid these locations due to the presence of indigenous people. As a result, it guards against poaching of the native plants and animals.
6. It's common for most tribal people to practise animal and plant conservation.
7. A lot of the government's programmes are supported by tribes.
8. They also shield these creatures from outside influences.
9. Tribals provide important information, such as whether endemic flora is present in the forest.
10. A significant portion of manpower for various afforestation projects comes from tribes. If not, it is challenging to reforest within the forest.
11. Some tribe members assist the forest department by providing accurate and timely information regarding the encroachment of non-forest people.
12. Tribalism is also a significant factor in putting out forest fires.

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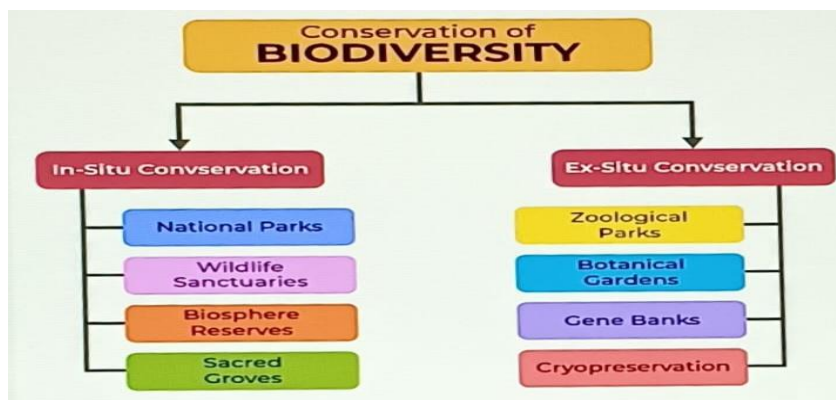
II. MODERN METHODS FOR CONSERVATION OF MEDICINAL PLANTS AND OTHER PLANTS:

The extinction of therapeutic plant species raises serious ethical, social, and cultural issues in addition to being a financial catastrophe. Scientific approaches for the conservation of medicinal plants that fall into these categories should be followed to effectively conserve endangered and other species of medicinal plants.

Conservation Strategies for Medicinal Plants

Effective conservation methods for medicinal plants should be implemented in two domains: in-situ and ex-situ conservation. Integrated conservation efforts are necessary in light of these initiatives. More data is needed for the cultivation, utilisation, and trade of medical plants, identification of medicinal plant stocks, creation of sustainable harvesting techniques, intellectual property rights protection, and The Conservation and Utilisation of medical Plant Resources.

By safeguarding and utilising biodiversity resources in a way that does not reduce biodiversity or harm significant ecosystems, conservation aims to promote sustainable development. In general, it involves tasks like dissemination, characterisation, assessment, indexing of diseases, propagation and storage, removal, and distribution. Genetic resource conservation has long been seen as a crucial component of biodiversity conservation. Plant genetic resources can be preserved in two ways: in situ and ex-situ.



IN SITU CONSERVATION:

The preservation of plant populations or species in their native environments is known as "in situ conservation," or "on-site conservation." Since the majority of medicinal plant species are endemic, the existence of secondary metabolites-which are responsive to their surroundings and might not show up under culture conditions- is primarily responsible for their medicinal qualities. We can conserve native plants, natural communities, and their intricate web of interrelationships by

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practising in situ conservation of all communities. Furthermore, in situ conservation reinforces the connection between resource conservation and sustainable use and expands the range of biodiversity that can be preserved. Around the world, in situ conservation has focused more on creating protected areas and using an ecosystem-based strategy than it has on individual species. Successful in situ conservation depends on developing habitat regulations, rules, and potential compliance from medicinal plants.

National Parks

India has 106 national parks that span 44,402.95 km², or 1.35% of the nation's total land area (National Wildlife Database Centre, Nov. 2023). National parks are places that are solely designated for the welfare of animals and are off-limits to forestry and farming. In these parks, private property ownership is prohibited. Their borders are clearly defined and useful. Typically, these are modest reserves that range in size from 100 to 500 square kilometres. In these parks, the preservation of a particular plant or animal species is prioritised.

Wildlife Sanctuaries

Currently, India has 573 wildlife sanctuaries spanning 123,762.56 km², or 3.76% of the nation's total land area (National Wildlife Database Centre, Nov. 2023). The sanctuary is a protected area that can only be used for human uses and animal conservation. Examples of these uses include harvesting timber, gathering small forest products, and permitting private ownership as long as it doesn't negatively impact the animals' well-being. Because sanctuaries' borders are not well defined, controlled biotic interferences like tourism are permitted.

Biosphere Reserves

India is home to eighteen different biosphere reserves. They often consist of one or more national parks or reserves, buffer zones that are accessible to some commercial activities, and bigger tracts of natural habitat protection than a regular national park or animal sanctuary. Not only do the human populations living in these places and their customs enjoy protection, but the protected area's flora and fauna are as well. 18 biosphere reserves are located in India altogether. The purpose of these reserves, which safeguard and replenish biodiversity, is to provide significant habitat for wildlife. Evaluating the role that specific habitats and ecosystem functions have in plant conservation is necessary for the protection of natural habitats.

There are different kinds of protected areas where human populations are included in the system. Often, these are enormous protected regions that span more than 5000 square kilometres. Biosphere reserves function as "biological laboratories for sustainable development" and as educational facilities for environmental and human compliance. Examples of how humans and the environment respect one another's requirements and how they are distinct institutions (sites) are found in biosphere reserves. The genetic components found in these reserves have evolved over millions of years and provide the means for continued survival and adaptability. These locations are globally significant and have a great deal of potential for future economic growth, especially in light of emerging biotechnology trends (Ministry of Environment and Forests, Government of India).

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Sacred Groves

The Wild Life (Protection) Amendment Act of 2002 created laws for community-held properties, which may include sacred groves, to be preserved by the government. This legislation established the protected area category of community reserves. Sacred groves serve as repositories for uncommon wildlife, and frequently, uncommon vegetation, amidst rural and urban environments. Around 100,000 sacred groves may exist worldwide, according to experts. Urbanisation and resource overuse pose threats to the groves. Temples, monasteries, and pilgrimage destinations are frequently linked to Indian holy woods. Sacred tree groves in Hinduism, sacred bamboo groves and sacred deer parks in Buddhism, for example, are among the historical references to sacred groves found in books written by the Jain, Buddhist, and Hindu communities.



Sacred Grove in “Tapka ki khoh” in Karauli, Rajasthan (India)



A unique view: around of “Tapka ki khoh” protected forest area

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The deities of sacred groves are the subject of numerous unique local art forms and folktales, which are an important part of the culture intimately related to sacred customs. Sacred groves were traditionally used for many purposes, chief among them being to store a variety of Ayurvedic medicines. Additional applications included a source of regenerative materials, such as honey and fruits. It was forbidden to cut wood in most sacred groves. As in Rajasthan, the forest cover helps stop desertification and lessen soil erosion. The groves satisfy the local communities' water needs and are frequently connected to ponds and streams.

Sacred groves have become hotspots for biodiversity in contemporary times as a result of species seeking sanctuary there from ongoing habitat degradation and poaching elsewhere. Sacred groves frequently harbour animal and plant species that are extinct in nearby regions. As a result, they have a wide genetic variety. Aside from this, holy groves in near urban areas serve as the city's "lungs" by offering much-needed greenery.

EX SITU CONSERVATION:

The preservation or protection of biologically diverse species away from their native habitats is known as ex-situ conservation. These encompass the planting of woods and the upkeep of farmland collections, private gardens, and botanical gardens situated outside their native habitats. The mainstay of ex-situ conservation is the quick creation of substitute sources of medical plants by cultivating them in large enough quantities to rival the earnings obtained by collectors of wild medicinal stock.

Zoological parks

These establishments- also known as zoological gardens, zoos, or zoological parks- house animals in enclosures or seminatural, open spaces, show them to the public, and, in certain situations, allow them to breed. Many international thinkers and environmentalists view zoological parks as crucial tools for conserving biodiversity.

Botanical Gardens

Living plants are grown in botanical gardens, either outdoors or under glass in greenhouses and conservatories, with the primary goal being scientific and educational plant display. It may consist of native plants, fragrant, medicinal plants, or it may be a taxonomic collection of a particular family, genus, or group of species. Botanical gardens are important for ex-situ conservation, but they can also preserve the ecology and help rare and endangered plant species survive. Together with variety breeding and domestication of plants programmes, the creation of cultivation and propagation methods in botanic gardens is crucial to the preservation of medicinal plants.

Gene Banks and Cryopreservation

Genome resource banking is another management strategy used to conserve biodiversity. A variety of gene banks, which are solely dependent on the kind of materials being conserved, have been

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developed in response to the decline in biodiversity. In vitro, gene banks, live plants, seed banks, sperm, chromosomes, eggs, tissues, and DNA banks for pollen, chromosomes, and deoxyribonucleic acid (DNA) are examples of these.

They are typically freeze-dried or cryopreserved. The primary goals of gene bank conservation are to preserve the rich genetic diversity for as long as possible and to reduce the frequency of global regeneration, which could lead to the loss of genetic diversity. Cryopreservation is a further method for conserving genomes, wherein living tissues are kept at extremely low temperatures (-196° C) in liquid nitrogen to stop metabolic mitotic activity.

BENEFITS OF IN SITU AND EX SITU CONSERVATION:

Some major benefits of in situ and ex-situ conservation are as follows:

Benefits of In-Situ Conservation

1. Without human interference, flora and fauna exist in their natural environments.
2. The natural course of life and growth for all living things.
3. It provides our environment with the essential green cover and related convenience.
4. It is less costly and requires less upkeep.
5. The indigenous people's interests are also safeguarded.

Benefits of Ex Situ Protection

1. It helps increase the species' declining population.
2. When an endangered species is about to go extinct, successful breeding occurs.
3. After being housed in captivity, endangered species are eventually returned to their native environments.
4. Wildlife observation is made possible by ex-situ centres; otherwise, it would not be feasible.
5. It is highly helpful for scientific studies on many animals.

DIFFERENCE BETWEEN IN SITU AND EX SITU CONSERVATION

Some major differences between in-situ and ex-situ conservation are as follows:

In Situ Conservation

1. It is the preservation of threatened species' natural habitats.
2. Predators are kept away from endangered species.
3. There is an increase in the diminishing resources.

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4. In its native habitat, the population recovers.

Ex Situ Conservation

1. It is conservation done outside the native ranges of threatened or endangered animals.
2. All detrimental elements are shielded from endangered animals.
3. All required supplies are given to them, and they are placed under human supervision.
4. To allow them to acclimatise, offspring raised in captivity are released and stored in natural environments.

Plants require sustainable usage and production in addition to conservation and protection.

Precise and organised data on the historical and contemporary distribution, population density, and contemporary commercially required data collection methods are extremely sensitive and significant matters. Thus, several actions have been taken by the Indian government and state governments, including-

- **Indian Forest Act-1927**
- **Wildlife Protection Act 1972**
- **Forest Conservation Act-1980 (Amendments of Forest Conservation Act-1988)**
- **National Forest Policy-1988**
- **Tribal Act- 2006 or Scheduled Tribes and Other Traditional Dwellers (Recognition of Forest Rights) Act, 2006**
- **Applicability of the Indian Penal Code in Forest Offences**

CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY:

1. Acknowledge the importance of customary knowledge and associated methods in determining how to enhance the conservation of natural resources and preserve biodiversity. Be mindful that development strategies that exclusively rely on contemporary science and technology have all too frequently ignored traditional knowledge.
2. Make ethnobotanical inventories as a starting point to discover how to manage natural resources more effectively for conservation and sustainable development. To make sure that the data is preserved and accessible to support future development, enter the data that has been gathered in digital information systems.
3. When assessing how to use and manage plant resources, as well as when creating new goods, combine traditional and scientific knowledge.

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4. Encourage community involvement in biodiversity management for preservation and sustainable usage. The creation of appropriate community structures, the design of sustainable harvesting methods, and equitable benefit sharing from biodiversity exploitation are some of the major concerns.
5. Consider the benefits of local plant diversity as well as the way it provides ecosystem services.
6. Encourage neighbourhood associations and nearby governmental organisations to recognise and value the biocultural approach to development and conservation. Analyse how higher-level regulations affect local institutions and, if required, make an attempt to change laws to better assist local employees in their work.

MEDICINAL PLANT RESOURCES: THEIR UTILIZATION

The history of aromatic and therapeutic plants begins with our ancestors, who employed organic substances from the natural world to heal their wounds, illnesses, and agony. Not only are medical plants frequently utilised in national health systems, but they are also commonly used for self-medication. As a valuable component of our natural resources, medicinal plants can be used as both therapeutic agents and raw materials to make a wide range of goods. Likewise, their goods derived from aromatic and medicinal plants multiply numerous times over. Both conventional and contemporary medications comprise goods utilised in the food industry (everyday culinary applications), cosmetics, and medicine (health care).

With novel ideas like cosmeceuticals, nutraceuticals, aromatherapy, phytotherapy, etc., medicinal plants have made their way into the global market as industrial products for the first time. Their usage in functional foods and animal husbandry is also growing into new areas. Legislative and regulatory bodies at the national and international levels appear to be taking an ambitious stance when it comes to the growing use of aromatic and medicinal plants in traditional medicine.

Traditional Medicine

Traditional medicine consists of all the information, methods, and abilities derived from the values, convictions, and life experiences of different civilizations. Herbal goods, phytopharmaceuticals, herbal medicines, and herbal cures are other names for herbal medications. Using herbal remedies as a scientifically or empirically supported means of treating and preventing illness is known as phytotherapy. This method is not the same as traditional medical herbalism because it is primarily based on the traditional and empirical applications of herbal remedies. Medicinal and aromatic plants are most commonly used for therapeutic purposes in aromatherapy, homoeopathy, phytotherapy, and traditional medicine.

Phytomedicine or Phytotherapy

Simply said, the idea behind phytotherapy is the use of different plant-derived medications (herbal

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medicines) for medical purposes. It incorporates components of both contemporary and traditional ethnomedical treatments, even though interpretations vary throughout nations. Using natural plant extracts or dried plant matter, as well as agents that promote health, as medications to alleviate symptoms, is known as phytotherapy (herbal medicine). In the latter instance, it is comparable to conventional medicine.

Aromatherapy

Aromatherapy has been used as a therapeutic method for ages. It's a natural therapy method based on the benefits of aromatic plants and plant extracts to enhance a person's mood, mental clarity, or overall health. In addition to practitioners like chiropractors, massage therapists, doctors, and nurses, it is utilised by makers of personal care, hygiene products, and wellness items. Because most essential oils are potent antimicrobials, they are also helpful in the treatment of infectious disorders. It is possible to combine aromatherapy with other complementary and alternative therapy modalities. A growing body of scientific research supports the pharmacological effects of aroma compounds and essential oils, including their antimicrobial, sedative, and anti-inflammatory properties.

Animal Welfare and Veterinary Medicine

Almost as old as human medicine, there is a lengthy history of using medicinal and aromatic plants to cure or treat a wide range of animal illnesses. Globally, there has been a noticeable rise in interest in herbal products. Numerous studies on this subject have examined the value of aromatic and medicinal plants for animal husbandry, veterinary medicine, and animal welfare. As a result, the usefulness of these plants has been acknowledged in a growing number of scientific papers.

RESULTS:

THE FUSION OF TRADITIONAL KNOWLEDGE AND MODERN SCIENCE IN THE FIELD OF PEOPLE'S HEALTH AND WELL-BEING

For the approximately 80% of the world's population that lives in underdeveloped countries, medicinal plants are essential to their primary health care. Not only do natural products and drugs derived from them benefit developing nations, but the 20 per cent of the population that lives in developed nations also benefits greatly from the natural products and drugs derived from them. (Bussmann 2002).

Many thousands of plants, many of which are not even botanically recognized, are used medicinally by indigenous and tribal people; many plant-derived medications are just waiting for modern science to discover them. In rural locations, especially in poor nations, proper identification, use, and conservation of medicinal plants might help provide better alternative healthcare services.

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The upward trend of dependency on plant-based medicines especially in the past few decades suggests that the role of plant-based drugs will continue to grow in the coming years which may put pressure on the available medicinal plant resources. With the growing burden of diseases coupled with issues such as population growth and climate change, the discovery of plant-based medicines needs to be hastened using leads from indigenous communities in collaboration with experts from multiple disciplines.

CONCEPTS AND OBJECTIVES OF MEDICINAL PLANT CONSERVATION AREAS (MPCAs): CONSERVATION OF MEDICINAL PLANTS:

Medicinal plants grow throughout the nation in a wide range of ecosystems, so conservation measures are required. Any species' genetic variety can be preserved provided its healthy reproductive population is allowed to remain in the forest. Allowing a species to pursue its natural evolutionary path while protecting it in the forest is one method of species conservation. Since medicinal plant species are mostly found in forests, in-situ conservation must be encouraged. For the in-situ conservation of medicinal plants, a network of natural sites or forests that reflect the range of forest types must be constructed. This network is known as the **Medicinal Plant Conservation Areas (MPCAs) network**.

The term "MPCAs" refers to natural areas with a healthy breeding population of local medicinal plant species that will be set aside expressly to use adaptive management techniques to preserve those species in their native environments. The following are the goals of creating MPCAs:

- To research the biological and ecological characteristics of medicinal plants to create suitable conservation strategies.
- To preserve viable populations of prioritized native medicinal plant species in their natural habitat.
- To increase local populations' awareness and provide resource managers with the tools they need to effectively manage MPCAs for conservation.
- Creating plans and systems for the long-term preservation of therapeutic plants.

GLOBALLY SIGNIFICANT MEDICINAL PLANTS (GSMPs):

It is well known that there is an unstoppable demand for items made from medicinal herbs. Since 95% of all medical plants are found in natural forests and agriculture has limited capacity to meet this demand, conservation and sustainable use of these GSMPs are essential. Expanding the farming of species that are most likely to be sensitive to destructive harvesting is also the most challenging task. Therefore, it is essential to prioritize protecting the remaining viable populations of medicinal plants while they are in their natural habitat and ensuring that wild medicinal and aromatic plant collection is sustainable, particularly for Globally Significant Medicinal Plants (GSMPs) and species

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that are more susceptible to extinction.

Although it is severely lacking as a result of human activity, biodiversity is crucial to both human life and the proper operation of natural systems. Depending on the level of conservation and the goal, biodiversity must be preserved either in situ, ex-situ, or through a combination of both methods. Ex-situ conservation is advised since it is complemented by a variety of technologies such as gene banks, zoos, and botanical gardens, even if in-situ conservation is being employed more and more for biodiversity conservation. Despite the abundance of biodiversity resources in India, an increasing number of people rely on it directly or indirectly for their livelihood.

Though there have been positive developments in gene bank protection, there is still room for improvement. The creation of a National Zoological Park and Botanical Garden should also be considered. The increasing demand for plants- the majority of which are still suited for forest procurement- puts a constant strain on the available resources, which causes some species in the forests to continue degrading. In addition, the natural flora of the forest land is disappearing at a rate that makes forests vulnerable.

CONCLUSION:

Both a vital component of the healthcare system and a significant national resource are medicinal plants. It is crucial to start and promote the in situ and sustainable utilisation of medicinal plants both domestically and globally, as well as to encourage the conservation, management, and use of these plants for the health of people and animals. Using sustainable breeding techniques to preserve wild medicinal plants based on different conservation approaches, promotes the protection of endangered species of medicinal plants and their environment for the security of livelihoods. Though many recommendations exist for the sustainable use and preservation of medicinal plants, very few of them have been successful in adequately preserving medicinal plant resources through conventional conservation in botanical gardens or natural reserves.

Recognizing the critical role that indigenous communities, ethnobotanists, and ethnobotanical knowledge play in achieving Sustainable Development Goals must happen now. To take advantage of traditional ethnobotanical knowledge to reduce poverty, end hunger, improve healthcare, fight climate change, conserve biodiversity, and address biodiversity-related issues, an international collaboration consortium comprising individuals from different nations and fields can be established.

To share information on ethnobotanically significant plants and the knowledge associated with them, digitization and the development of worldwide common databases on the use of plants for diverse purposes might be started. These hints can help modern scientists develop their logical reasoning. For instance, which substance might be responsible for curing a specific disease? What is the plant's nutritional makeup? if it may be suggested as a nutritional source and, if so, in what amount? To achieve the sustainable development goal (SDGs), we thus demand that ethnobotanical studies be

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strengthened and that adequate funds be directed towards fostering research in this area.

This applies to traditional knowledge in a variety of areas, including food plants, sustainable agriculture, climate change, biodiversity conservation, and traditional medicines. Modern scientific discoveries can be added to conventional wisdom. If correctly planned and executed, this integrated strategy that combines modern scientific discoveries with ancient knowledge can help attain the SDGs.

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