Social Media-Based Conservation Initiatives to Reduce the Loss of Medicinal Plant Biodiversity in Chitrakoot – A Review

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***Abstract*—The Chitrakoot region, a sacred landscape straddling the border of Madhya Pradesh and Uttar Pradesh, represents a significant repository of tropical dry deciduous forest biodiversity and ancient ethnomedicinal heritage. For generations, indigenous Kol, Gond, Mawasi and Khairwar communities have relied on local flora as a living pharmacy. Yet this botanical legacy is now eroding under unprecedented pressure from habitat fragmentation, unscientific harvesting, and the gradual erosion of traditional ecological knowledge (TEK). A 2002–2005 ethnobotanical study across seven villages documented 28 plant species with unique medicinal applications previously unreported in literature, while a 2005–2009 survey in 20 villages identified 47 plant species used to treat conditions including malarial fever, jaundice, skin diseases, dysentery, pneumonia and urinary disorders. The crisis is compounded by a silent yet profound erosion of TEK, as younger generations show declining interest in knowledge transmitted orally across generations. This qualitative article synthesizes findings from these comprehensive reviews to explore a critical question: can social media-based conservation initiatives help reverse this loss? By weaving together botanical field data, digital communication frameworks, and successful Indian case studies, the analysis argues that while institutional efforts provide essential foundations, passive citizen science through platforms like Facebook, WhatsApp and Instagram can accelerate species documentation, raise awareness of illegal harvesting, and re-engage youth. A case in point is the 'One Rupee Per Day for Wildlife Conservation' WhatsApp group in Rajasthan, which has brought together nearly 1,300 contributors to fund plantation drives, wildlife watering holes and invasive species removal from sacred groves. Similarly, the Facebook-based SpiderIndia initiative has collected over 20,000 observations from 8,500 enthusiasts, with a curated dataset of over 15,000 records now accessible via the Global Biodiversity Information Facility. The narrative concludes that a hybrid socio-digital model one that respects TEK sovereignty while harnessing the networked power of mobile technology offers a replicable pathway for safeguarding Chitrakoot's botanical soul.**

***Index Terms*—Medicinal plants, Chitrakoot, social media conservation, citizen science, traditional ecological knowledge, ethnobotany**

I. INTRODUCTION: A LANDSCAPE OF HEALING UNDER THREAT

Chitrakoot is no ordinary forest. Celebrated in the Ramayana as a terrain where thousands of therapeutic herbs possess healing properties, this region occupies a distinct ecological and cultural niche within the Vindhyan hill range. Covering an area of 1,584 square kilometres at the intersection of 25°10′ to 25°52′ N latitude and 80°52′ to 80°73′ E longitude, the region features tropical dry mixed deciduous forest characterised by temperatures reaching 49.5°C in May and dropping to 5°C in January (Sikarwar, 2016). The forest supports a multi-tiered canopy of pharmacologically active species. The upper canopy features robust trees including *Terminalia arjuna* and *Aegle marmelos*, while the understory shelters shrubs such as *Vitex negundo*, and the herbaceous ground cover explodes with monsoon annuals including *Andrographis paniculata* and *Gymnema sylvestre*.

For centuries, this biodiversity has been more than a biological asset; it has been the cornerstone of primary healthcare for local tribal communities. Healers known as Vaidyas have developed sophisticated knowledge systems that interpret the wilderness as an open pharmacy. Sikarwar et al. (2008) documented that Kol, Gond and Mawasi tribal communities utilise a wide variety of plant resources for food, fodder, fibre and medicine, with traditional practitioners demonstrating knowledge of complex herbal formulations. A later survey (Tripathi & Sikarwar, 2013) recorded 47 plant species across 45 genera and 31 families used to treat diverse human ailments including malarial fever, jaundice, skin diseases, dysentery, pneumonia, bone fractures, respiratory infections and urinary disorders.

However, contemporary pressures are dismantling this ancient pact. Sikarwar et al. (2008) noted that younger generations are not interested in holding the invaluable traditional knowledge transmitted orally from generation to generation. The Botanical Survey of India has listed *Alectra parasitica* var. *chitrakutensis* as an endangered endemic species. As reported by the Times of India (2014), this parasitic medicinal herb, used in the treatment of leprosy, tuberculosis, paralysis, intestinal worms and various other ailments, is on the verge of extinction due to excessive extraction by practitioners and clearance of land by cultivators. A 2002 survey of different possible habitats in Chitrakoot failed to locate even a single plant, with natural habitats having been destroyed and nirgundi bushes ruthlessly cut down (Times of India, 2002). The Times of India (2014) further documented that the plant, once common in the vicinity of Chitrakoot along the borders of Satna district of Madhya Pradesh and Banda in Uttar Pradesh, now faces critical endangerment.

II. THE BOTANICAL WEALTH AND ITS DRIVERS OF DECLINE

The Chitrakoot landscape occupies a unique position within the Vindhyan biogeographic zone and supports rich medicinal plant diversity, making it one of the important repositories of traditional ethnomedicinal knowledge in central India. Ethnobotanical investigations conducted between 2002 and 2025 have consistently documented the extensive utilization of local flora by indigenous Kol, Gond, Mawasi, and Khairwar communities for healthcare, livelihood, and cultural purposes. Among the earliest systematic studies, Sikarwar et al. (2008) recorded 28 medicinal plant species across seven villages and identified several unique ethnomedicinal applications that had not been previously reported in scientific literature. Further expanding the knowledge base, Tripathi and Sikarwar (2013) documented 47 medicinal plant species belonging to 45 genera and 31 families from 20 villages across the Chitrakoot region, highlighting their use in the treatment of ailments such as malarial fever, jaundice, skin diseases, dysentery, pneumonia, respiratory infections, and urinary disorders. Subsequent research has reinforced the remarkable medicinal wealth of the region. Mishra (2022) reported 84 ethnomedicinal plant species used for the treatment of diverse health conditions, including pyretic disorders, skin diseases, diabetes, ulcers, gastrointestinal ailments, diarrhoea, and dysentery. More recently, Gupta and Pandey (2025) documented 46 medicinal plant species and provided detailed information on vernacular names, therapeutic applications, plant parts utilized, and preparation methods employed for both human and livestock healthcare. Collectively, these studies demonstrate not only the rich biodiversity of medicinal plants in Chitrakoot but also the continued dependence of local communities on traditional plant-based healthcare systems. However, they simultaneously underscore the urgent need for conservation measures, as increasing anthropogenic pressures, habitat degradation, unsustainable harvesting practices, and the gradual erosion of traditional ecological knowledge threaten the long-term survival of both medicinal plant resources and the cultural heritage associated with them.

The reliance on medicinal plants is not unique to Chitrakoot. Globally, the World Health Organization (2023) estimates that nearly 80% of people in developing countries depend partly on traditional medicine, primarily plant-based, for their primary healthcare needs. India, as one of the world's mega-diverse nations, hosts approximately 7,500 medicinal plant species, many of which are endemic to specific biogeographic zones (National Medicinal Plants Board, n.d.). Despite this richness, the Convention on Biological Diversity (CBD, 2014) has repeatedly highlighted that medicinal plant resources are under unprecedented pressure from over-harvesting, habitat loss, and climate change. Alarmingly, around 90% of medicinal plants used by the Indian herbal industry are still harvested from the wild, with very limited commercial cultivation (National Medicinal Plants Board, n.d.). This places immense strain on natural populations, including those in Chitrakoot.

Among the most vulnerable species in Chitrakoot is *Plumbago zeylanica* (Chitrak). Although widely distributed across central and south Indian states, due to over-exploitation to meet increasing demand it has been placed under threatened status (Sikarwar et al., 2008; ENVIS,

n.d.). Gupta and Pandey (2025) similarly documented unsustainable harvesting practices affecting many species in the Chitrakoot region. The endangered parasitic species *Alectra parasitica* subsp. *chitrakutensis* (M.A.Rau) K.K.Khanna & An.Kumar is endemic to the Chitrakoot region of Madhya Pradesh, extending to parts of Rajasthan and Uttar Pradesh. As reported by the Times of India (2014), the plant is used in the treatment of leprosy, tuberculosis, paralysis, piles, intestinal worms, constipation, leucorrhoea, fever, spermatorrhoea and as a blood purifier, yet its survival is critically threatened. Gupta and Pandey (2025) identified deforestation, modernisation and declining intergenerational transfer as primary threats to traditional medicinal knowledge systems.

III. TRADITIONAL CONSERVATION AND ITS GAPS

Institutional frameworks do exist. The Deendayal Research Institute's Arogyadham maintains an extensive ex-situ germplasm collection and validates traditional Ayurvedic formulations. Sikarwar (2016) documented that Arogyadham's herbarium preserves voucher specimens of medicinal plants collected during ethnobotanical surveys. The Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya conducts systematic ethnobotanical mapping. However, these efforts face persistent challenges. Gupta and Pandey (2025) noted that information sharing between the Madhya Pradesh and Uttar Pradesh forest departments is often slow, complicating the regulation of illegal herb trading across state lines. Formal botanical inventories require significant time and resources, making it difficult to detect sudden population declines or localised weed invasions in real time. Most critically, Sikarwar et al. (2008) observed that before traditional knowledge is lost forever it must be documented properly, as the young generation is not interested to hold this invaluable oral tradition.

The gap is not one of intent but of agility, scale and youth engagement. This is precisely where social media begins to offer a complementary pathway.

IV. THE EMERGENCE OF PASSIVE CITIZEN SCIENCE

Across rural India, the rapid expansion of affordable mobile data has transformed social media platforms into vast, distributed repositories of opportunistic ecological data. This practice, known as passive citizen science, allows nature photographers, hikers, forest dwellers and pilgrims to upload geotagged images of flora and fauna to public feeds, creating a continuous stream of biodiversity observations. Basu Roy et al. (2024) demonstrated that the SpiderIndia Facebook group collected over 20,000 observations from 8,500 spider enthusiasts, and after curation produced a final dataset encompassing over 15,000 verified records. These records were made publicly available on the Global Biodiversity Information Facility, facilitating further research on Indian biodiversity. The study concluded that major social media sites report many more species sightings than citizen science platforms, showcasing the capacity of social media-based citizen

science to generate extensive datasets that significantly contribute to scientific knowledge (Basu Roy et al., 2024).

For Chitrakoot, this approach holds particular promise. A dedicated Facebook group could allow local youth, students and pilgrims to upload plant pictures encountered along forest pathways. Group administrators, working alongside professional botanists from local institutions, could verify identifications, effectively tracking the locations of rare species without expensive field surveys.

V. LEARNING FROM INDIAN CASE STUDIES

The potential is not merely theoretical. In Rajasthan's Thar Desert, Sharvan Patel launched a WhatsApp group called 'One Rupee Per Day for Wildlife Conservation', bringing together nearly 1,300 members who contribute small amounts to fund plantation drives, refill wildlife watering holes and remove invasive species from sacred groves known as orans. The collected amount of Rs 80,000 has funded plantation drives, refilled wildlife watering holes and helped remove invasive plant species from the orans. This model is directly transferable to Chitrakoot, where similar sacred groves harbour rare medicinal plants.

In Delhi, an Instagram page called @delhitrees grew into a community of nearly 5,000 people documenting urban trees, cultivating what researchers call a 'tree lens' that equips ordinary citizens to see and record botanical diversity (The Hindu, 2024). In Kashmir, eight to ten active birdwatching groups now operate through social media, organising field visits and documenting species. Even the Beach Please India movement, which started with a single social media post, once attracted 6,000 volunteers for a cleanup drive. These examples share common success factors: small recurring financial contributions, community volunteer networks, viral content strategies, low-cost monitoring infrastructure and making engagement feel relatable rather than burdensome.

VI. A STRATIFIED FRAMEWORK FOR CHITRAKOOT

Drawing on these lessons, a stratified intervention model for Chitrakoot can be envisioned. The first level focuses on awareness and education, leveraging Instagram, Facebook and YouTube to create engaging content about the region's medicinal plants, their therapeutic uses and the cultural heritage associated with them. The second level establishes citizen science documentation, using WhatsApp-based or iNaturalist-enabled networks for community members to upload photographs, report sightings, document flowering and fruiting seasons and flag threats such as illegal harvesting. The third level mobilises collective action, organising community planting events, sacred grove restoration activities and anti-poaching patrols, potentially funded through the Rajasthan-style micro-donation model. The fourth level builds a digital repository or e-herbarium specifically for Chitrakoot, documenting both taxonomic information and the

associated ethnobotanical knowledge of Kol, Gond and Mawasi communities, thus serving as a resource for intergenerational knowledge transfer.

Crucially, this framework does not require sophisticated technology. WhatsApp serves for coordination and rapid threat reporting. Instagram and YouTube host awareness content and healer stories. iNaturalist or Pl@ntNet provides scientific documentation and species identification.

VII. ETHICAL SAFEGUARDS AND THE RISK OF EXPLOITATION

Yet the digital path is fraught with ethical perils. The most immediate risk is that sharing images of rare medicinal plants on public platforms may unintentionally expose their exact geographic locations through embedded GPS metadata. Illegal wildlife traders and commercial poachers could exploit this information. Mitigation requires strict content moderation rules, instructing members to strip metadata from images of high-value species and share exact coordinates only through secure private channels with verified experts.

A deeper concern is the protection of traditional knowledge itself. TEK is a form of intellectual property with commercial value, and open social media platforms may not provide adequate protection against biopiracy or unauthorised commercial use. Sikarwar et al. (2008) emphasised the urgency of documenting traditional knowledge before it is lost forever, but such documentation must respect the rights of knowledge holders.

Data quality presents another challenge. Citizen-generated observations often include blurry photos or incorrect identifications. Basu Roy et al. (2024) addressed this by developing a systematic workflow that enabled taxonomic experts to verify records before publication. A similar multi-tiered validation process would be essential for Chitrakoot, with experienced regional botanists serving as group moderators and AI image-recognition tools helping to filter low-quality submissions.

Demographic biases also persist, as social media data naturally skews toward younger, tech-literate individuals, leaving elder tribal healers who hold the deepest knowledge digitally invisible. Hybrid programmes that organise youth-led field exercises to visit tribal areas and upload knowledge on behalf of elders can help bridge this gap.

VIII. CONCLUSION AND A STRATEGIC ROADMAP

Safeguarding the medicinal plant biodiversity of Chitrakoot requires neither a rejection of tradition nor an uncritical embrace of technology but rather a deliberate integration of both. Traditional institutional frameworks like Arogyadham provide a solid foundation for ex-situ preservation and scientific validation. Social media-based passive citizen science offers a scalable, cost-effective way to improve real-time environmental monitoring and public engagement. The path forward can be structured in three phases. During the first six months, a foundation should be laid by launching a ‘Flora of Chitrakoot’ presence on Facebook and

WhatsApp, recruiting botanists from local universities and research institutes as technical moderators. In the following six months, integration and security protocols should be implemented, including strict metadata handling rules for threatened plants and youth-led digital documentation workshops in tribal areas. Beyond the first year, the framework should be institutionalised by linking validated social media data pools directly into national biodiversity information systems and using crowd-sourced distribution maps to adjust forest zoning policies. Chitrakoot stands at a critical juncture. Its remarkable medicinal plant heritage, documented across nearly two decades of ethnobotanical research, faces accelerating threats. Yet the same digital networks that often distract young people from nature can be repurposed as tools for documentation, vigilance and cultural transmission. When a pilgrim uploads a photo of a flowering *Gymnema* to a Facebook group, when a Vaidya records a remedy on a smartphone, when a student identifies an invasive weed through a WhatsApp alert, each act becomes a small but meaningful stitch in the fabric of conservation. The sacred groves of Chitrakoot have survived for centuries through reverence and restraint. With thoughtful application of modern digital tools, they may endure for centuries more.

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