

# **Cataloging India's Living Tree Heritage- A Foundation Resource for Conservation of a Unique National Treasure**

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## **1. ABSTRACT**

India is the location of many individual trees remarkable for their cultural, historical, or natural heritage values. However, no systematic national catalog of these trees is available, and therefore conservation and appreciation of this resource can only be done in piecemeal fashion. In this paper, we discuss the methods, results, and future applications of a project conducted 2008-2010 to discover, categorize, visit, photograph, and study India's tree heritage. During almost two years of travel throughout India on a US-India Fulbright-Nehru Scholarship, the author has attempted to visit as many of India's landmark, noteworthy, remarkable, interesting, giant, sacred, and weird trees as possible. A database organizing almost five hundred individual trees in relation to their species, location, and category is described, and the methods used to share and utilize this material are briefly presented. A small selection of trees is tabulated and compared for their heritage value, and finally, suggestions for INTACH's proposed Heritage Tree program are offered. The database, online via [www.treeoctopus.net/india.htm](http://www.treeoctopus.net/india.htm) is offered to readers, scholars, managers, and others as a foundation resource and as a platform for future initiatives to conserve India's natural tree heritage.

## **2. INTRODUCTION**

Like no other country in the world, India is the custodian of countless treasures of living heritage: individual trees noted for their cultural, historical, or natural heritage value. These organisms combine natural and human values in such a way as to be perfect ambassadors for India's environment and people. The Landmark Trees of India project is an environmental documentation, education and outreach project performed using cartography, photography, and travel skills. It was designed to produce resources that could be used for the management, appreciation, and discovery of individual trees throughout India. Until this project, no attempt at a national catalog of these trees was known to exist, and therefore conservation and appreciation could only be done in piecemeal, subnational fashion. With the aid of modern tools, this catalog can now be generated and distributed in many new and exciting ways. Landmark Trees of India aimed to conduct this documentation effort, and the results can be used as a foundation resource for conservation of India's arboreal heritage. Indian National Trust on Art and Cultural Heritage (INTACH) has proposed the idea of conducting this sort of work. In this paper, we discuss the methods, results, and future applications of the Landmark Trees project, conducted 2008-2010, to discover, categorize, visit, photograph, and study India's tree heritage. We present this paper to the readers to encourage and aid the implementation of a Heritage Trees Conservation program.

Conservation of trees is a microcosm of conservation of the natural world. Landmark Trees of India was proposed and performed primarily for environmental conservation. Like INTACH, the author recognizes that individual trees are important and irreplaceable living heritage. Like countless environmental agencies, activists, and institutions, the author also asserts that the forests, landscapes, and wildlife of India and the world are supremely important and absolutely critical natural heritage. It

is beyond the scope of this article to detail some of the threats to the natural world, but it is universally recognized that environmental issues are of paramount significance. It is believed that some of the lessons from India about preserving individual trees can be applied worldwide in preserving the natural landscapes and treasures of Earth. Throughout history trees have been used as an analog for a vast array of conceptual thoughts. The taxonomic relationships of all living things are represented by a branching "Tree of Life" structure (Tree of Life, 2009). To some cultures, the world was understood to literally exist in the branches of a tree (Anonymous, 1890). These trees are a microcosm of Nature.

## **2.1 Project inspirations**

The project originated in ecological work performed in Australia and the USA climbing, measuring, and surveying biodiversity in some of the world's largest and tallest trees (Bar-Ness, 2005). To a scientist climbing trees, it is very apparent that each tree is an individual. To the tourist, specific trees may form an attractive destination. In all walks of life, people use trees as navigational landmarks. It was noted that the vast majority of books on Indian trees were focused on the tree as a category, at a species level, and never on individuals (e.g. Mukherjee, 1983)

In the original project proposal it was noted that the conservation and appreciation of individual trees is vastly different between India and the USA. For example, American forests in the Pacific coastal region contain many superlatively large, tall, and old trees. Many of these are known by name (Van Pelt, 2001) and some are major tourist attractions- e.g. the world's largest tree, a giant Sequoia in the California mountains. Almost all are contained within forested areas, often wild lands owned and managed by the federal government. Few can be found in city or rural areas. Many trees are unnamed but recognized for their wildlife or biological value, and protected by the government as a natural, public resource. (Bhuller and Majer, 2000) Urban forestry and arboriculture concentrate on the maintenance of a city's tree cover and the health of individual trees, respectively. (Green 2002). Trees are sometimes valued for their spiritual value, but overwhelmingly they are seen as practical ecological elements, or impressive tourist attractions. Discussion of the spiritual, religious, and emotional values of trees is often only had in the immediate vicinity of these trees, and rarely considered a rational factor in management.

By contrast, Indian trees are usually endowed with spiritual values and informally managed. Almost uniformly, they are located in urban or rural areas, and very rarely in wild lands. Very often, for no specific reason, individual peepal (*Ficus religiosa*) or banyan (*Ficus benghalensis*) trees are worshiped or recognized, recognizing their intrinsic holiness. Elsewhere, individual trees are directly involved or used as memorials to important religious or historical events. These are often the centerpieces of important temples and the destination for popular pilgrimages. Temples and communities are more often responsible for the maintenance and management of these trees than is the government. The trees are almost never recognized for their ecological or wildlife habitat values, but only for their religious, historical, and emotional aspects.

## **2.2 Heritage trees and INTACH goals**

As a Heritage-oriented trust, INTACH has a different, but overlapping set of goals than the Landmark Trees. Heritage is a word implying familial and public ownership, stewardship, treasures, historical values, and the family home. Landmark is a word implying navigation, exploration, identification, and traveling to new locations.

The Landmark trees project was first connected with INTACH at an initial meeting to discuss a

Heritage Trees project for Delhi and India-wide. During that collaborative meeting, a presentation was given on the work done so far on the Landmark Trees project and how it could be used for the INTACH Heritage Trees endeavor. (Bar-Ness, 2009) Similarly, in this paper, we direct our description and utility of the Landmark Trees project towards the fulfillment of five specific mission goals listed by INTACH (INTACH, 2009). These are:

- Heritage awareness
- Document
- Strategic partnership
- Training and capacity building
- Protect and conserve

The first three are directly addressed by the Landmark Trees project and the outreach performed by the author, and the last three are the basis of the suggested future applications of the Landmark Trees and any potential Heritage Tree program.

### **2.3 Unique difficulties of living heritage**

Protecting living heritage is intrinsically different than protecting other heritage treasures such as manuscripts or architecture. Most importantly, all living things must inevitably die. While trees are amongst the hardiest and rugged of all living organisms, they are not immortal. India includes some of the world's oldest documented living trees (Rau, 1967), but these cannot last forever. Disease, weather, senescence, parasites, climate change, pollution, herbivory, and human disturbance are all factors that can lead to the death of a tree.

In Australia, giant eucalyptus trees in the wild forests of Tasmania are managed and protected based on their exceptional size (Hickey, *et al*, 2000). However, these individuals are almost invariably at the later stages of their 4-500 year life span. Much of the tree is dead wood, and the tree will possibly continue to senesce and die within the course of a human life span. The trees listed and managed for will need to be monitored and remeasured often. Difficult questions can arise: what happens if a tall tree breaks and becomes therefore, a shorter tree? Should it be removed from the list? In the USA, the tallest and largest living trees often have a much longer life span, and this problem occurs less often.

In the Indian context, human pressures and environmental changes are accelerating rapidly. While economic pressures to cut or harvest trees directly may be strong in some areas, many landmark and heritage trees of India are immune to this by their very sanctity. Some others, especially those in remote forested areas, are more vulnerable to direct damage for exploitative purposes. Some of the oldest trees have survived immense changes in their immediate environment. Cement buildings and automobiles may now surround trees that stood in the forest. Sacred trees that received a handful of visitors in the forest may now have a constant flow of pilgrims driving to a large stonework temple. Environmental changes, such as climate change, water scarcity, or air pollution, can all add to the stress and danger to a living tree.

From a management and documentation point of view, it is difficult to either know what to expect from these pressures or what can be done to buffer the living organism from the harsher aspects. Trees, by their very age, can serve as an excellent reminder of distant times and environments. Spreading awareness about the value of a tree, through education and signposting, and creating economic value, via ecotourism or punitive fines, can aid greatly in minimizing the risks posed by humans to the heritage trees.

### **3. METHODS:INPUT**

#### **3.1 Leads and field trips:**

Landmark Trees was very flexible in including trees into the project. Internet searches, book research, and most of all, constant inquiries to knowledgeable parties were used to plan field visits. Site visits for the Landmark Trees project were conducted during several journeys out of Delhi and Bangalore. These trips were simultaneously aimed at targeting special trees and visiting new regions of the country. Geological, cultural, and metropolitan points of attraction were visited and usually an appropriate tree would be encountered.

#### **3.2 Criteria for Landmark Trees**

Not all trees landmarked had been considered noteworthy previously. Three levels of tree landmark prominence can be distinguished. First, there are famous, well-known trees, often named, that were known to the general public in a region. Second, there are non-famous & recognized unnamed trees that had obviously been identified as significant, such as the many *Ficus religiosa* associated with shrines. Third, there are unrecognized, unnamed trees unknown to the general public that were first identified on this project as significant in their location or specific growth form. This last category was included to connect various locations to the project, to call attention to previously anonymous trees, and to increase the utility of the project material.

The quality of note, or the significance, required to include a tree, was varied and flexible. This inclusiveness is one element that differentiates Landmark Trees from the numerous scholarly treatments of India's sacred trees (Anonymous, 1890). A non-exhaustive list of significant qualities is presented:

- Ancient
- Historical
- Giant
- Exotic tree
- Rare species
- Prominent tree in a forest area
- Religious
- Flag – (prominently visible)
- Strange growth pattern or disease
- Associated with sacred grove
- Unexpected usage (postbox, signage, electrical pole)
- Notable nonliving object resembling a tree

#### **3.3 Site visits**

Each tree was encountered, photographed, mapped, and observed. A digital camera was one of the primary tools used. As much time as possible was spent taking pictures of each tree, its details, and its surroundings. When possible, local caretakers and pedestrians were approached and their knowledge and opinions solicited. Specific attention was paid to factors such as tree health, wildlife and human utility, noticeable threats, growth patterns, and any other noteworthy observations.

#### **3.4 Geographic determination**

During site visits, the specific location of the tree was determined using either GPS or dead reckoning

of the environment. When the GPS was not used, special care was given to imagining the tree's location as viewed from space. At the first opportunity, the virtual globe software Google Earth (Google, 2009) was used to view satellite imagery and determine the exact latitude and longitude of the tree. These values could later be used to determine exact altitude above mean sea level.

### **3.5 Non-field research**

After fieldwork is completed, the tree and its surroundings will be researched via library and Internet searches. For famous trees, there is material directly available about its significance, but for non-famous and unrecognized this research will address the location and environment

### **3.6 Databasing**

Using OpenOffice Base Database software (OpenOffice, 2009), a computer database was generated. All data was linked to an identification code representing a single tree. Attributes associated with each tree include:

- Unique identification code (e.g. A004, J005, or D045. Letters indicate field trips to regions out of Delhi or Bangalore, numbers are sequential)
- Tree name
- Genus-Species binomial (e.g. *Mangifera indica* for mango trees)
- Latitude, longitude, and altitude
- State, nearest city, and location
- Significance categories (Is this tree a giant? ancient? Religious?)
- Snippet (A single sentence description)
- Detailed texts (Travel directions, personal experiences, mythology, description of tree health, etc) Photograph file names (JPG files)

## **4. METHODS:OUTPUT**

### **4.1 Print and Web paradigms**

The database and photographs from the Landmark Trees of India project were and continue to be used in a variety of print and web outputs. It is hoped that the positive conservation of this work will be realized by its dissemination throughout various audiences in India and abroad. With additional help, the original material can be translated from English into Hindi and other regional languages. Web resources can be produced at minimal cost, but are sometimes complex. While they can reach a potentially broad audience, in practice, web resources are usually limited in their reach. Print resources can be expensive and difficult to produce in large quantities (although the opposite can be true for small amounts), but are often more accessible. When possible, all print material is made available in electronic format, and conversely, electronic material is sometimes printable into hard copies.

Through the project web page, at <http://www.treeoctopus.net/india.htm>, a portal was created to access the print and map resources, and also to link to more advanced geographic resources. Materials are available here at no cost.

### **4.2 Web resources**

The Internet offers an excellent and multidimensional tool to share information about individual trees. Additionally, web resources can sometimes be recorded to other media (CD, flash drive) and distributed materially. Online, several resources are available: an online Delhi tree-tour guide; several Google Earth and Google Map files for online geographic exploration; photo collections; educational

resources; and slideshows from seminars. Of special note is an automated form by which visitors to the web page can contribute information about trees not yet in the project.

### **4.3 Print Resources**

A major goal of the project is to produce at least one book. The primary focus will be an ecotourism and environmental education travel guidebook for visiting the trees throughout India. Care will be made that each page could be printed separately and serve as an information sign at the tree. Additionally, a photo essay or travelogue book could be composed. At the time of writing an illustrated poster map has been designed and printed with the World Wide Fund for Nature-India and is being distributed to schools through their environmental education project. Online, a calendar for the year 2010 is downloadable and printable. With the aid of government or NGO's such as INTACH, it is hoped that signs can be posted at the trees themselves, in appropriate languages.

## **5. RESULTS**

### **5.1 Overview of trees documented**

As of November 2009, 524 trees of approximately 90 species had been visited, identified, photographed, and geotagged, representing all of the mainland Indian states except Orissa and Chattisgarh. Included so far are several trees with the world's largest canopy covers (The Great Banyan of Calcutta, The Chennai Theosophical Banyan, Kabir Vad), two of the world's oldest historically documented living trees (The Bodhi Tree, in Gaya Bihar, and Shankaracharya's Mulberry in Joshimath, Uttarakhand), and the fruit tree with the most grafted varieties on one stem (Kaleemullah's Mango, near Lucknow, Uttar Pradesh).

### **5.2 Seven Notable Heritage Trees of India**

Seven trees, and a selection of their associated attribute data, are briefly presented here. Photographs of the seven trees are provided with a locator map as Figure 1. The database output is collected in Table 1. These trees are only a small subsample of the documented trees (which is only a subsample of India's remarkable tree heritage). A complete listing, and associated data and photographs, is available at <http://www.treeoctopus.net/india.htm> .



Figure 1. Seven documented Heritage Trees within India A, Jageshwar Monarchs; B, Mallanimli Baobab; C, Sri Maha Bodhi; D, The Great Banyan; E, Kamakshi Ekambaram; F, The Malabar Hill Flag; G, Hathion Baobab

Map Label	Tree Name	Alternate Name	Unique Identification Code	Species	Family	Latitude	Longitude	State	Locality	Spot	Date of Visit	Snippet
A	Jageshwar Monarchs		B025	<i>Cedrus deodara</i>	Pinaceae	29.63803068	79.85559281	Uttarakhand	Jageshwar	In the temple complex of Jageshwar	01-Oct-08	Two immense deodar cedars- amongst the world's largest- grow about a complex and dense cluster of Shiva temples, nestled in a cool valley in the pine lands of the Kumaon Himalaya.
B	Mallanimli Baobab		C043	<i>Adansonia digitata</i>	Bombaceae	25.36415746	78.84217138	Madhya Pradesh	Orchha	1km north of Orchha, on the left hand side of the road to Jhansi	30-Nov-08	One of the most spectacular trees in India, a monstrously proportioned giant African Baobab standing in a field near Orchha, reputedly planted by the Maharaja Bir Singh Deo almost 500 years ago.
C	Sri Maha Bodhi	The Bodhi Tree	C004	<i>Ficus religiosa</i>	Moraceae	24.69602104	84.99118166	Bihar	Bodhi Gaya	Sri Mahabodhi Temple, Bodhi Gaya	09-Nov-08	The world's most famous tree, it marks the location where the Buddha attained enlightenment, and is the destination for the Buddhism's most important pilgrimage.
D	The Great Banyan	Howrah Botanical Gardens Banyan	E001	<i>Ficus benghalensis</i>	Moraceae	22.56075278	88.28677778	West Bengal	Calcutta	Calcutta Botanical Gardens in Howrah	10-Mar-09	One of the world's largest trees, the Great Banyan of Calcutta's Howrah Botanical Gardens is a famous landmark and tourist attraction. It has a circumference of almost 1 kilometer.
E	Kamakshi Ekambaram	The One Mango Tree	D078	<i>Mangifera indica</i>	Anacardiaceae	12.84743268	79.69924193	Tamil Nadu	Kanchipuram	Center of the temple complex	05-Feb-09	When the purportedly 3500 year old One (Ek) Mango (Ambaram) at Kanchipuram died, a new one was planted and worship continues where Kamakshi was ceremoniously married to Lord Shiva
F	The Malabar Hill Flag	(Mislabelled <i>Albigia amara</i> )	D003	<i>Enterolobium cyclocarpum</i>	Fabaceae	18.95443777	72.80492578	Maharashtra	Mumbai	Standing visible above the stairway from Chowpatty Beach to Hanging Gardens on Malabar Hill	03-Jan-09	Perhaps the biggest tree in Mumbai, this huge South American tree is very visible from Chowpatty Beach and Marine Drive.
G	Hathion Baobab	Elephant's Tree, Hathion ka per	D050	<i>Adansonia digitata</i>	Bombaceae	17.39292277	78.41080173	Andhra Pradesh	Hyderabad	Within the Northeast corner of the outer walls of Golconda Fort	21-Jan-09	A most magnificent, immense African baobab tree, approximately 500 years old, stands alone in a field within Golconda Fort in Hyderabad

Table 1. Seven Indian Heritage Trees with a selection of associated database elements

## **6. SUGGESTIONS FOR A HERITAGE TREE PROGRAM**

### **6.1 Initiating a Heritage Tree Project**

The Indian National Trust on Art and Cultural Heritage hosted a meeting exploring the idea of a Heritage Tree project in August 2009. While the direct focus of the Landmark Trees differs from the Heritage Trees proposal, there are many overlapping uses and lessons.

### **6.2 Different Criteria**

As addressed above, the core concepts of Landmark vs. Heritage are slightly different. Landmark Trees of India is notable for its inclusiveness- any tree in any interesting place can be included for any notable characteristic. This is possible in the context of the negligible cost to include the tree in the database: only the use of a digital camera, location of the tree via aerial photos, and the time required to input the results. INTACH's ability to implement resources for active management and monitoring will require another level of discrimination: to which trees should resources be allocated? We strongly recommend that INTACH follow a policy of inclusiveness in listing trees, and save the exclusiveness for resource allocation. Because the marginal cost of adding another tree to the list is minimal, we encourage INTACH to distinguish between the resources required to list a tree, as opposed to the resources required to continually monitor, promote, and actively manage a tree. In other words, not all trees would require an equivalent commitment of resources.

### **6.3 Data structure**

We suggest the creation of a proper database, using software such as Microsoft Access or OpenOffice Base. This can be used to not only manage information at a tree scale (i.e. Attributes associated with each individual trees, such as latitude and longitude), but will also flexibility in managing information about trees by state, region, species, caretaker, or project status. While a simple listing by trees is the root for the database, the use of a database software can allow for more flexible access to the information contained therein.

### **6.4 Sign posting**

At many archeological sites throughout India, stone or metal signs are an integral part of the visitor's experience and appreciation. Indeed, this signposting can be seen as a critical role for the manager. Without these signs, efforts to restore and preserve these sites would be appreciated far less. Similarly, Heritage Trees can promote and educate effectively by signposting trees throughout India. The identification, promotion, and conservation of heritage trees can be aided greatly by simple signs labeling the tree as an individual of note. These signs should be of a permanent character (plastic, stone, or metal) and include interpretation as well as the name and species of the tree.

### **6.5 Conducting project within an organization**

The resources and time available to a single person limited the Landmark Trees project. A similar project, conducted by a national organization such as INTACH, could delegate authority by geographic region for cataloging and monitoring heritage trees. Local branches could maintain a list and submit it to the central office. From the central office, management and project priorities could be coordinated.

### **6.6 Monitoring**

Key to the conservation of these trees is a monitoring program. Within the recorded data structure for the Heritage Trees program should be an ability to record separate site visits and checks. A digital

camera photograph and a simple checklist can be performed periodically. A collection of status checks and photographs can be a key tool in tracking changes (for the better or worse) in the condition of these trees and their surroundings. The periodicity of these records can be calibrated to the levels of resources available. The key concept is that listing of these trees is merely the initial data point on a monitoring scheme with a commitment to the future.

### **6.7 Legal protections and ownerships**

There exists a suite of legal protections for trees at all levels from national to local. It is beyond the scope of this article to address these, however, it is notable that at least three major metro cities (Delhi, Bangalore, and Pune) have tree-preservation societies formed in response to illegal cutting of trees for infrastructure projects. While enforcement of these laws can be irregular, the identification of a heritage tree should consequently include a survey of the legal protections surrounding it. It is possible that an important tree could be sacrificed either arbitrarily or willfully. Enforcement and monitoring could also be done in collaboration with these citizen groups.

Besides the legal ownerships and responsibilities of these trees, many have been adopted, sometimes extra-legally, by caretakers. Temple stewards and chai-walle alike may feel a strong sense of ownership or connection to a specific tree, and these relationships must be navigated carefully. While it is unknown what legal force. INTACH's projects carry, it may be that there is active resistance, or active delight, at their implementation. This may add an additional layer of complication to the Heritage Trees project, and a strong knowledge of the legal situation will benefit INTACH's work.

### **6.8 Outreach**

Like the archeological heritage that INTACH manages and promotes, the living Heritage Tree listing offers an excellent tool for teaching people about the natural and human history and issues of India. While a single person compiles Landmark Trees of India, the Heritage Trees project can be performed using the additional infrastructures for printing, publicity, and information dissemination. In such a manner, Heritage Trees can allow INTACH to branch out into the promotion of environmental education and ecotourism.

### **6.9 Ecotourism**

Ecotourism deserves a special specific mention, as it implies both the public knowledge of natural resources, and the possibility for communities to make financial income from these resources. Ultimately, the promotion of ecotourism offers a solid opportunity for INTACH to both achieve its missions and increase its profile. Individual trees, and associated jungles, are invaluable for their intrinsic heritage values, but not always appreciated as such by the local community. Selecting a subset of the listed Heritage Trees for specific projects encouraging local ecotourism may allow for a self-sustaining culture of appreciation.

## **7. CONCLUSIONS**

India's trees have provided the author with an amazing experience as a yatri pilgrim, and the resources compiled for the Landmark Trees project are gratefully offered to INTACH as the root database to begin their Heritage Trees listing. It is hoped that this strategic partnering will help INTACH in beginning its own efforts to document, preserve, and share India's trees with the people of this country and the world. We additionally believe that this will have a strong positive effect on the protection of the world's natural resources. Conservation of individual trees is a microcosm for conservation of the natural world, and INTACH is in a strong position to contribute to these efforts.

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## 9. KEY WORDS

Tree conservation, heritage documentation, environmental education, India, ecological geography

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