

Study of Sustainability Practices Ingrained in Indian Culture

Shraddha Mahore Manjrekar

Abstract—Culture has been an integral part of the civilizations in the world. Architecture is artistic expression of culture and civilization in material form of buildings and urban landscape. Author has observed and thought about the relation of Indian traditional cultural beliefs and their relation to the sustainable environment. There are some unwritten norms regarding the use of resources and environment in Indian continent, that have been commonly accepted by the people for building houses and settlements since the Vedic period. The research has been done on the chanting and prayers done in a number of houses and temples in Madhya Pradesh and Maharashtra. After doing some research, it was also found that resource assessment had also been done for entire country, and idea of conservation of these resources was imbibed in the common people by means of some traditions, customs and beliefs. The sensitization and gratefulness about natural resources has been observed in the major beliefs and customs. This paper describes about few of such beliefs and customs that are directly linked with the built environment and landscape.

Keywords—Indian culture, sacred groves, sustainability in built environment, sustainability practices

I. INTRODUCTION

Traditional Indian built environment has its deep association with culture. The cities and villages have some public spaces which are culturally important parts of lifestyle. On one side these spaces are occupied during certain calendar time and on other side these spaces follow some codes that have not been mentioned in a single code book, but are part of a number of beliefs and customs and also day to day livelihood requirements. Examples of these spaces are river ghats, holy forests, sacred groves, mountains, spaces around some distinguished trees, step wells water-bodies, temple tanks etc. These spaces are not just spaces, but are derived from deeply grounded research, done on climate, natural resources, and their sustainability in long run.

II. GLIMPSES OF NATURAL RESOURCE ASSESSMENT DONE IN ANCIENT INDIA

India is a rich country for natural resources. Indian national song ‘Vande Mataram’[1] has mention of the resourcefulness of the country through phrase “Sujalam Suphalam, Malayaja Sheetalam” . Word to word translation of this phrase is given

Author is an architect and planner by qualification, and has been working for sustainable built environment. She has knowledge of the various rating systems that are practiced Globally, and hands on experience of facilitation for rating and implementation of sustainability norms in construction projects. At present she is teaching in Brick School of Architecture and Brick School of Interior Designing, in Pune as an Associate Professor. In this paper she has given a thought on some Shlokas that are chanted in the morning and their relevance with sustainability and architecture.

here- **Sujalam** means Ample of potable water, **Sufalam** means Fertile Land, and **Malayaj Sheetalam** means hilly, picturesque with fresh and oxygen rich air quality.”

Security and sustainability becomes prime concern after realizing value of resources. It was well understood by the people of Ancient India that if the life of settlement is dependent on some natural resource, the next generations will also need it in the same form and quality. Perhaps this would have been the reason that the natural resources and ecosystem have been regarded in many forms and terminologies.

Example of Shiva, fits suitable for this topic. Shiva is the prime deity of all the Indians, and is also known as “Pashupatinath”[2]. Fragmentation of the three words in this name lies in three words, i.e., Pashu(Animals), Pati (Plants), and Nath (Owner, protector or God), hence Pashupatinath has been regarded as the Protector of whole ecosystem including organisms and plants.

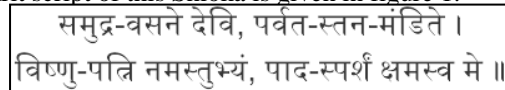
Kailasa, a part of Himalaya has been considered as the abode of Lord Shiva. Mansarovar lake (water body) is also of religious importance. Mythological belief is to give importance to the land, water, plants, and animals.

There are many instances where the importance of nature, resources, ecology have been associated with some customs, traditions, culture or beliefs. The further research on these instances indicates that this association is directly or indirectly linked with the health and sustainability of the ecosystem too. Any rich natural resource which was understood as valuable resource and considered to be preserved for consecutive next generations with the same quality, had been considered as holy and auspicious or connected with something on which common people have deep trust.

The early morning prayer of Hindus is called Pratah Smaran and part of it states

“Samudrasane devi, Parvata Stanya Mandite, Vishnupatnim Namastubhyam Padasparsham Khshamasvame”[3]

Sanskrit script of this Shloka is given in figure 1.



समुद्र-वसने देवि, पर्वत-स्तन-मंडिते ।
विष्णु-पत्नि नमस्तुभ्यं, पाद-स्पर्श क्षमस्व मे ॥

Fig. 1 Sanskrit script of morning prayer for motherland

This means “Oh Motherland Bharatmata, you are wearing the cloths of Samudra, i.e, ocean, you feed us by pure and mineral rich water flowing in auspicious rivers. These waters that originate from the mountains (Sahyadri and Vindhya) which are like your breasts. Oh wife of Vishnu (Laxmi- goddess of wealth), please accept my regards, and forgive me, because even after knowing that you are holy, I start my day by keeping my feet on you” . Figure 2 represents an image of Bharatmata. It

is an artist's imagination and representation that show country as resourceful motherland.



Fig.2 Bharat Mata [4]

The next part of the prayer the regard has been given to the rivers. It states **“Ganga Saraswati Sindhu Brahmaputrashch Gandaki, Kaveri Yamuna Reva Krishna Goda Mahanadi”** Sanskrit script of this shloka given in figure 3.

गंगा सरस्वती सिंधु ब्रह्मपुत्राश्च गंदकी
कावेरी यमुना रेवा कृष्णा गोदा महानदी ॥५॥

Fig.3 Sanskrit script of morning prayer for rivers

The rivers that have been mentioned here are Ganga, Saraswati, Sindhu, Brahmaputra, Gandaki, Kaveri, Yamuna, Reva, Krishna, Godavari, and Narmada. These are the main rivers of India, and main sources of water in throughout the country. Most of the Indian cities have been built over river fronts and rivers have been the cradle to civilizations. India is the only country where the Ghats have been built on river fronts, and have been regarded as auspicious places. Ghats have become a prominent feature of city or village's built environment. The household activities, farming and many small scale industries had been dependent on the river water, and hence these ghats had become multiple use spaces for the civilizations. These have been the gathering spaces, and ports too. People used to commute by boats through these ghats.

Maheshwar, Varanasi, Kashi, Haridwar, Hrishikesh, Ujjain, Nashik, Pandharpur, Rajmundri, Tryambakeshwara, Kushalnagar, Mysore, Srirangapatna, Tiruchirapalli, Thiruvaiyaru, Kumbakonam, Mayiladuthurai, Poompuhar are the cities where the Ghats are visited by the pilgrims all around the year even today. Figure 4 shows a brief map of ancient Indian rivers and regions along them.



Fig. 4 : Indian cities along river banks [2]

The river ghats were designed with architectural and civil engineering excellence. Nowadays many of them have become the attraction points of tourism. Few examples along Ganges river are in Hrishikesh, Haridwar and Varanasi, along Yamuna river there is Keshi Ghat in Vrindavan and along Narmada River there are Ghats in Omkareshwar and Maheshwar. Figure 5 represents the Keshi Ghat in Vrindavan. Figure 6 represents Sethani Ghat, of Hoshangabad. These Ghats act like the controlled approach points to the rivers.

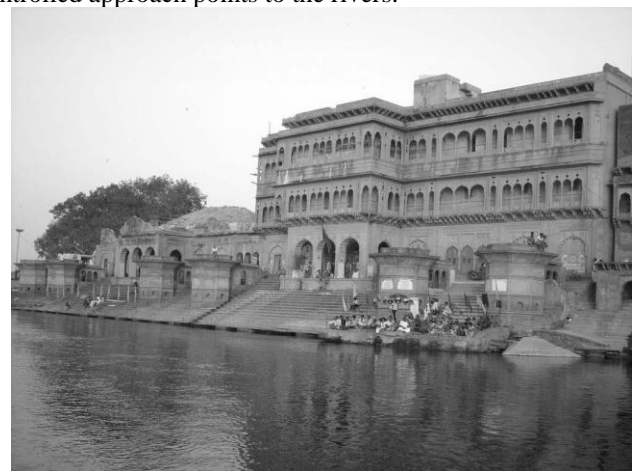


Fig. 5: Keshi Ghat of Vrindavan [i]



Fig. 6 Sethani Ghat, of Hoshangabad [ii]

The settlements, that are not close to any river fronts, had built tanks, and these tanks acted like water reservoirs for the non-rainy seasons. Example is Chennai city. The city has rich history of temple tanks, because they had tanks closed to the temple and it would have been expected that the way people regard god, they regard water bodies too and conserve their existence with purity.

Most of Hindus chant Ekatmata stotram too in Morning. This prayer narrates the united character of the nation. Author has tried to see these connections through geography, cities, and great historical characters. A part of 'Ekatmata Stotra' is about paying regards to the mountains of India.

As per this Mantra, the most regarded mountains are Mahendra (now part of Cambodia), Malay (in Orisa), Sahyadri (in Maharashtra), Himalaya, Raivatak (now known as Girnar in Gujarat), Vindhya (in Middle India), and Aravali (Rajasthan). Sanskrit script of this shloka is given in figure 7.

महेंद्रो मलयः सहयो देवतात्मा हिमालयः
ध्येयो वैवतको विन्ध्यो गिरिशचारावलिस्तथा

Fig.7 Sanskrit script of morning prayer for mountains

These mountains have dense forests and rich ecosystem. It is physically difficult to build the settlements over these mountains and they are habitat for endangered animal species too. These are the breathing spaces of the region and are also origins of some rivers. Paying regard to these mountains does indicate the responsibility towards the preservation of topography, flora, fauna and rivers on these mountains.

There is concept of sacred groves in India. These are ecological sensitive areas. People worship these groves and keep them untouched for any kind of human activities. Typically, such groves are associated with the concept of a "Presiding Deity". Most of these sacred deities are associated with local Hindu gods. There are some sacred groves of Islamic and Buddhist origins, and some are based on smaller local and folk religions (like the folk deities *Ayyanar* and *Amman*). The culture has been evolved for relating the deities with the forests. God Aiyappa has been considered as forest god, and by his name a number of forest had been preserved and conserved in Kerala and Karnataka states [5].

Forests are necessary parts of livelihoods of mankind. In ancient India there were concept of 'Sreevanam', 'Upavanam' and 'Tapovanam'. Conceptually these are the peripheral forests located around the village or village located at the certain distance from the forests. *Sreevanam*, which means, "forests of prosperity", consists of dense forests and groves. *Sreevanam* used to be in immediate surroundings from the village. People had right to use the forest products (e.g. limited amount of dead wood, fruits, flowers, leaves, forest produce etc.) required for the livelihood. The law of limited use of these products clearly indicated that one has guided to use forest without disturbing its eco-system. Enriching the existing ecosystem was also ingrained in the culture. This fact can be understood by the customs and religious rights that happen in groves. Many people had considered it their duty to planting and nurturing the trees in these groves. They had spent their time for recreation and celebration of festivals too in these groves [6].

Vrukshayurveda, is a branch of Ayurvedam. It describes the science of medicinal system for the benefit of plant life. This subject had been deeply studied to take care of the plants in these sacred forests [7].

After the Sreevanam the next peripheral layer of forest is called Mahavanam, which is a kind of reserved forest, and people do not have right to touch or cut the trees in this area. Tapovan and Mahavan are the forests are the safeguarded areas for flora and fauna. Hence there were no human interventions. Tapovanam are the densest forest, where only the great saints could go for doing meditation and austerity.

III. ANCIENT INDIAN CITIES

A part of Hindu morning prayer includes names of holy cities, i.e., Ayodhya (birth place of lord Rama in Uttarpradesh), Mathura (birth place of lord Krishan in Uttarpradesh), Maya (Combodia), Kashi, Kanchi, Avantika (Ujjain), Vaishali (nowadays known as Tirhut in Bihar, birth place of Gautam Buddha), Dwarika (Gujarat, the capital city of Krishna), Takshashila (an ancient university place, now is part of Ravalpindi district in Pakistan) and Jagannathpuri. The sanskrit script of this Shloka is given in figure 8.

अयोध्या मथुरा माया काशी कांची अवंतिका
वैशाली द्वारका ध्येया पुरी तक्षशिला गया ॥६॥

Fig.8 Sanskrit script of morning prayer for holy Indian cities

These are several thousand years old shlokas and are chanted in throughout the India. Other places that have got religious importance are Chaardham, and twelve Jyotirlingams [8] and Nine Shaktipeetham [9]. Geographically these are uniformly spread prominent locations on map of India. Putting all these names in the prayer means that the authors knew the geography and history of India very well, and wished that Indians shall respect all these rivers, and places wherever they stay or travel through throughout their lives.

Indian mythology has been acting like building codes of these days, and would have guided people to do the development with due consideration of preservation and conservation of these natural resources. There are ancient cities

and these have been mentioned in many scriptures. There had been a planned approach in planning of these cities. The examples of the planned cities are Jaipur, Indraprastha, Sonipat, Vijaywada, Mysore, etc.

The above mentioned is about the places of geographical importance and people regarded these rivers, mountains and cities and have been regarding these from wherever they stay.

IV. PLANT ELEMENTS IN BUILT ENVIRONMENT

There are some plant elements which are symbols of some belief and have become of part of the houses and settlements too. These are 'Plant elements' and are called as 'Vanaspati' in Sanskrit language. These have been associated with some typical open spaces in the houses or towns. There are some traditional names of these open spaces in Sanskrit Language. These are Aangan, Mukhtangan, Kridangana, Vatika, Upavan, Prangan etc. Aangan is a courtyard or front yard in houses. Mukhtangan is an open space receiving pleasant breeze. Kridangan is a space in city or town where people play. Vatika or Baug is a garden space near temples, houses and palaces too. Upavan is the revered forest in city or town. Prangan is the playground and is a generally part of school or educational campuses. These had been spaces where the royal family kids used to get training for war. Right from ground covers, to shrubs to small trees, and the huge trees, there are variety of plants that have got religious importance and have become part of these open spaces, or buildings and landscape. These species are native species; hence they grow well in tropical climate without much maintenance and watering demand. These have environmental benefits too. Having these trees in surroundings is economical and sustainable option for landscape in built environment. Other than this there are health benefits too attached with these plants. Following is the association of the respective plant species with various beliefs and customs [10].

Ganesha is regarded as the first god and is worshiped in the beginning of any auspicious work. Durva, is a type of grass, or land cover that is offered to Ganesha. It is very indigenous grass, can be grown in almost parts of India.

Other than Durva grass there are some indigenous flowers that have been associated with the various deities. Shoe flower, (Jasvant), is an ornamental, red color flower and is considered as a favorite flower of Ganesha. Goddesses are worshiped by flowers of fragrance, Jasmin, Mogra, Kunda, Shevanti are the flowers that are offered to the goddess.

Shiva is offered white flowers and Belapatra, and Krishna is offered Tulsi leaf seeds and Yellow flowers. Parijat is also a flower that is favorite to Krishna.

Some of the plant species have some great importance in buildings or as a space element. Planting these plant species in the surroundings have been generally accepted by many people in the country. Unique example is Tulsi Plant. This is a medicinal plant and has become an essential part of the traditional Hindu houses. In many of the houses there is dedicated open space, which is a breathing space for house (generally a central courtyard or front yard) around this plant. In most of the cases Tulsi planter and courtyard supplement each other. Figure 9 shows a picture of Tulsi seeds that are offered to Krishna. Figure 10 shows an example of Tulsi Planter that is part of most of Hindu houses in India.



Fig. 9 Tulsi Seeds and leaf that is offered to God Krishna [iii]



Fig. 10 Tulsi Planter [iv]

Similar to Tulsi, Champa (*Pulmeria Alba*)¹ tree is considered as 'Temple tree' in Indian Mythology, and it also considered as an essential part of temples and houses. The flowers of this tree blossom throughout the year and its fragrance makes environment pleasant. As this is a small tree, it is even planted in a small court. One may observe this tree has been part of landscape design of many of the housing clusters and also in the commercial buildings.

Gandhi Memorial Museum in Ahmedabad, designed by Ar. Charles Corea has courtyards that are landscaped with these trees. Figure 11 represents a picture from Gandhi Smarak Sangrahalaya or Gandhi Memorial Museum in Ahmedabad.



Fig. 11 Use of Plumeria Alba in Gandhi Samarak Sangrahalaya, Ahmedabad

V. DAY TO DAY CUSTOMS

The next hierarchy of Plant elements, which are connected with Indian culture are Banana, Coconut, Mango, Neem, Banyan, Peepal etc. These trees are planted near houses and their products are used for many purposes in day to day life. People used to dine over Banana leaf and later keep these leaf as for food for cattle. Banana stems are essential part of many rituals. Mango tree's fresh leaf and marigold garlands are very common type of door decoration. These are also called as Toran. These are very eco- friendly customs and have accepted countrywide. Figure 12 represents a picture of a conventional Toran, i.e., door decoration comprised of mango and neem leaf and marigold flowers. Figure 13 represents a picture of a *South Indian* traditional meal served on banana leaf.



Fig. 12 Conventional Toran [v]

Hindus have a convention ritual called as "Vaastu Pujan" at the time of housewarming. A ritual that is directly connected to built environment during this is -the worship of Sun, Moon and nine Planets, Waters collected from the seven rivers, Soil samples collected from seven sources, nine types of food grains, five types of fruits, etc. This all is done for getting the blessings from the resources from where these samples have been collected. The worshiper prays for sustainability of these resources so that he and his family shall get ample *Sunlight, Breeze, Water, Material and Food* throughout their stay in the premises. In this way, the ownership of the premises is also linked with the responsibility to sustain the resources.



Fig. 13 South Indian traditional meal served on banana leaf [vi]

There were times when all the bi-products of farming, kitchens and other household activities were reused for some other purpose. And eventually there was no solid waste generated through kitchen and dining.

VI. HEALTH BENEFITS OF THE BELIEFS AND TEACHING ECOLOGY THROUGH MYTHOLOGY

The beliefs are connected also with some health benefits and also with ecological balance. Ecologically important tree in settlements is Banyan tree. This tree is occasionally worshiped and has been a part of outdoor areas in cluster of houses. Combination of Neem, Banyan and Peepal tree is called *Triveni*, and is considered as a very holy combination in landscaping near buildings. People have planted these three trees together. Scientifically it has been proven that banyan trees produce more oxygen and purifies air. Fruits of this tree are eaten by multiple birds and insects, and it is also habitat for many birds. Hence having one banyan tree in vicinity is like having a complete ecosystem in the surroundings. People have been worshiping banyan tree. The intention was there to have this tree in the surrounding, to preserve it and also to remain closed to it for breathing more oxygen. Planting of Banyan tree is believed as equivalent of getting abode of Siva. Similar beliefs have been linked with plantation of Tulsi in house, *Mango* trees in garden or in farms, *Neem, Bilva, and Audumbar* etc. trees in anywhere.

Plantation of these trees is not only restricted till the botanical gardens or villages of India but has been accepted by landscape designers of many of the university campuses, industrial campuses and mass housing projects throughout the country.

There are many other ecologically important trees that have got cultural significance and also have been related with god. For example, Kadamba (*Neolamarckia Cadamba*) tree was a very dear tree to Krinsha. This tree has been a part of many paintings portraying stories of Krishna, and there is mention of this tree in scriptures too.

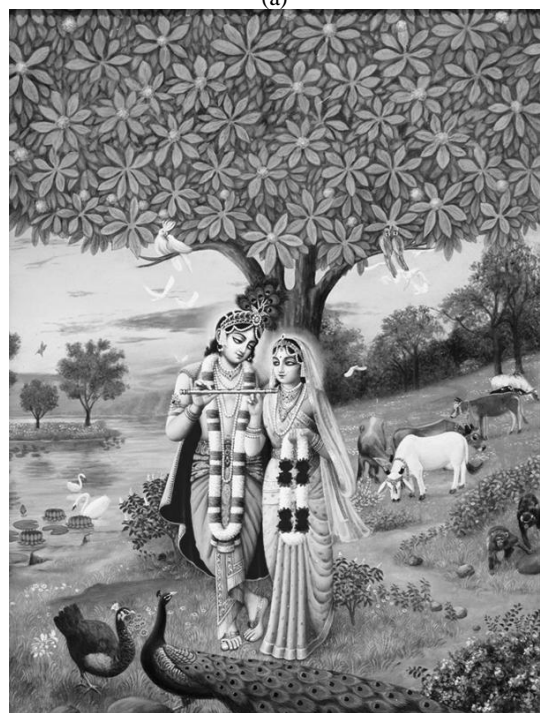
VII. RELATION OF INDIAN ARTS AND CRAFTS WITH ECOLOGY

Love for nature and ecosystem has been reflected in the arts and crafts of India. Example is a style of paintings, called Madhubani paintings. These are the paintings done with natural colors and fine brush. Most of the Madhubani paintings, in

which Krishan's stories are depicted, include clean and beautiful river (Yamuna river), Peacocks, Cows, birds, monkeys, flowering plants, Kadamb trees and mountains (Govardhan Parvat). These all facts represent a culture to pay respect to nature.



(a)



(b)

Figure 13 (a): Kadamb Tree, (b): A Madhubani Painting showing Krishna and Radha under Kadamb Tree

Figure 13 (a) represents picture of Kadamb tree and figure 13 (b) shows its artistic expression in form of a scene in Krishna's life. This style is Madhubani style of painting. Painting also shows monkeys, cows, peacock, peahens. It is believed that Krishna was associated with all these plants and animals. Similar instances are seen in God Dattatrya's picture. Tree of *Ficus racemosa* (syn. *Ficus glomerata* Roxb.), i.e., Audumbar is a tree under which god Datta used to sit. God Datta's painting are also full of Cows, dogs, deer and birds similar to God Krishna's paintings.

Warli style painting is an art originated in tribal areas of Maharashtra. Bagh is a style of painting originated in tribal areas of Madhya Pradesh state of India. In both these paintings, folk life is painted. Folk dances are painted with backdrop of

plants, and animals are necessary elements. The plants are generally parts of these paintings are Tulsi, marigold etc., the trees that are painted are mango, banyan etc. The animals that are included in these paintings are tiger, lion, deer, elephant, cows etc. Once can see deep association of the nature and ecosystem with human life and architecture in these paintings.

These paintings have become popular and also have got importance in art galleries, museums and also in architecture. The prints of these paintings are accepted by the fashion designers and there are traditional fabrics printed on these themes.

VIII. CONCLUSION

Sustainable architecture worldwide emphasizes on preservation the topography and vegetation. Whereas in Indian mythology topography (mountains, i.e., Govardhan Parvat, Kailas Parvat or sacred groves) is worshiped. Sustainable architecture gives importance for consideration for conservation of ecosystem, and similarly mythological stories beautifully portray the birds, flowers and plants.

There are a number of beliefs and customs in the various cultures. It is difficult to understand the logic behind all of them, but the ones that are mentioned in this paper have direct or indirect relation with conservation and optimal use of resources, and maintaining balance of ecology and enhancement of bio-diversity too. The traditional social interactive and recreational spaces act as breathing spaces for the built environment bonding of society and also for cultural sustainability.

Most of the Green buildings rating systems talk about prevention and conservation of existing natural features of the site, optimization of water use, use of native landscape species in design, use of local materials, thermal, visual and audibility comfort, indoor environment quality etc. This sensitivity has been there in the culture since the ages. These are very similar points between the sustainability and the beliefs. These beliefs incorporate sensitivity towards existing natural resources on site. Considering these points development is possible without touching or causing minimal harm to the nature. Though the lifestyle is changing, but still there is scope of use of conventional construction methods and landscape design concepts. Traditional ideology to respect the natural resources may remain unchanged even with the development in society.

ACKNOWLEDGMENT

The environment of Saraswati Vidya Mandir school's morning prayers where shlokas are chanted every day.

Sincere thanks to Brick School of Architecture, where teaching is based on research. This paper is outcome of the research done for teaching some curricular subjects in graduate course of Architecture designed by Savitribai Phule Pune University.

REFERENCES

- [1] Chatergi B., "Anandmath", Orient Paperbacks, 2006, first published, 1882
- [2] Swami P. Anand, Swami Parmeshwaranand, "Encyclopaedia of Saivism", Sarup & Sons, ISBN 8176254274, ISBN 9788176254274, pp 206

- [3] Unknown, Skandapuram, (an Indian mythological script), Pratahsmaranam, Ekamatastotram
- [4] K. Roop, : Babulal Bhargav Publicaions, 1930, Courtesy: Urvashi Butalia
- [5] Kumar B.M., “Forestry in Ancient India: Some Literary Evidences of Productive and Protective Aspects” Paper published in Asian Agri-History Vol-12 No 4, 2008
- [6] Ranchor P., Vedic Ecology: Practical Wisdom for Surviving the 21st Century, Mandala Publishing, Novato, CA, 2002
- [7] Surapala, “Vrukshayurveda”, translated by Nalini Sadhale, Agri-History Bulletin No.1, Asian Agri-History Foundation, Secunderabad, 1997
- [8] Nair Shantha N, “The Lord Shiva”, Hindoology Books, 2009
- [9] Kinsley D., “Hindu Goddesses: Vision of the Divine Feminine in the Hindu Religious Traditions” (ISBN 81-208-0379-5), Motilal Banarsidass Publ., Delhi, 1986
- [10] Gupta Shakti M. “Plant Myths & Traditions in India” published in <http://vidyaonline.org/dl/shaktigupta.pdf> accessed on 06/11/2016

ONLINE REFERENCES

- [i] <http://radhanathswamiyatras.com/yamuna/keshi-ghat/> accessed on 06/11/2016
- [ii] <http://keralaandayurveda.blogspot.in/2014/03/krishna-tulasi.html> accessed on 28/03/2014
- [iii] <https://lapazgroup.net/2012/03/06/holy-basil-ocimum-sanctum-queen-of-herbs/> accessed on 06/11/2016
- [iv] <http://allindiaroundup.com/news/happy-ugadi-photos-images-wallpapers-hd-facebook-download/> accessed on 06/11/2016
- [v] <https://challenges.openideo.com/challenge/healthy-lives/ideas/food-culture-health-culture> accessed on 06/11/2016 Curtesy: Avani Arora, accessed on 06/11/2016



Shradha Mahore Manjrekar (born in Indore on July 19th 1980) is a multidisciplinary professional engaged in teaching with more than eleven years of research and professional experience in the area of Sustainability in Built Environment. She has done Masters in Urban and Rural Planning from IIT Roorkee, India in 2006, B.Arch. from SOA, IEPT Indore in 2003 and Diploma in Civil Engineering in year 1998.

She had been Research Associate at The Energy and Resources Institute, Delhi, Manager (Architecture) in Ecofirst, Mumbai, and Associate of Environmental Division with Lunkad Realty, Pune. At present, she is Associate Professor in Brick School of Architecture and Research Driven Interior Design in Pune.

Associate Professor Shradha Mahore Manjrekar is a member of Council of Architecture, India. She is a co-author of design manuals entitled “Design guidelines for energy efficient buildings” and “Home owners information brochure”, published by Ministry of New and Renewable Energy, India. She is also a writer of blog called Right Choice Ashiyana, which is a set of user friendly guidelines for home owners and home hunters.