Participatory Design in All Design Stages Including Co-Living Ensures Sustainable Development of the Community Settlement

Author 1- Ar. Shree Lalitha, Assistant Professor, Impact school of architecture, Bengaluru
Author 2- Prof. Ar. Srishti Srivastava, Professor, Impact school of architecture, Bengaluru

Contact details

Shree Lalitha
#75, MAM house,
2nd main, 3rd stage ,
AECS layout,
Sanjay Nagar,
Bengaluru
shreelalitha09@gmail.com
Ph- 8792677791

Ar. Srishti Srivastava
Flat no 20016, Prestige Shantiniketan,
White Field, Bengaluru, KARNATAKA.
ar.srishti@gmail.com
Ph- 9866894995

Ar. Shree Lalitha has graduated bachelor's in Architecture from Sathyabama University, Chennai and masters from Anna University Chennai with a distinction in both of them. She has a flair towards sustainable architecture.

Ar. Srishti Srivastava is an academician, practicing architect and sustainability consultant with over 20 years of experience in Research, Practise and Teaching. She has won multiple national and international awards. She has mentored more than 500 students at Bachelors and Masters level in pursuit of their academic pursuits. She has been part of many international collaborations with schools of Architecture from countries like Japan, Korea, U.S. Canada etc.

Abstract

This research paper presents, through case studies of development projects incorporating community engagement for sustainable development, from the ISKCON (International society for Krishna consciousness).community. This community comprises groups of like-minded people having common faith and goals, with spirituality as the central focus. Devotees of this community share similar ideologies and are driven by a motto 'Simple living and high thinking'. Since modern life poses a serious impediment to their spiritual growth, they have adopted simple, traditional and cultural methods for the development of space that are self-sufficient. They cultivate intensively in the community , using clean and organic, chemical- free methods and use the harvest. Since the daily routines of all the devotees are similar, they gather together in the designated spaces to carry out common activities during different times of the day. They live a healthy, happy human life devoting the rest of their time to spirituality and are away from all chaos. They engage themselves right from the scratch in contributing towards community development. They work collaboratively in the planning of the space and address those issues that affect their well-being.

This paper will throw light on how these self-sustainable communities have evolved over time , through case studies and how community engagement can be embedded in the design process and doing so improves the design incrementally and establishes the fact that co-design paves way for place-making in architecture to create sustainable spaces. In addition to improving community and individual health, such a development acts as an effective tool for modifying the environment making it clean and sustainable and enhances the overall behavior of the community. This goes hand in hand with the design process. In Architecture, Community engagement acts as an avenue where users are an integral part of the design process.

Keywords- Community engagement, sustainable design & development, Co- design, Place-making

Introduction

ISKCON has around 40 sustainable villages and communities that are grounded on the morality of promoting sustainability and spirituality. Few of these villages sustain off grid depending entirely on renewable energy resources such as solar energy, adopt completely sustainable and traditional methods of construction and endorse a natural lifestyle based on sustainable living. Contrary to modern buildings whose materials contribute highly to the carbon foot-print and agricultural businesses that exploit cows and other animals for milk, meat, and eggs, a devoted ISKCON farm community uses sustainable methods of construction adopting participatory design and protects their cows throughout their lives, allowing them to live peacefully even after they have stopped producing milk emphasizing a cradle to cradle cyclic approach which is evident throughout the design processes. Whatever is generated on the site, is utilized on the site itself reducing the burden on the environment.

These farm communities adopt natural methods of constructing habitats using Lime, Bricks and mortar. Using Vernacular methods they even manufacture Lime Ghani that crushes the collected limestone for using it in construction. As these natural Lime Ghani machines are empowered by Bulls it eventually safeguards mother Earth and Cows .These communities

mainly use naturally available building materials that are found in the vicinity of the development . Material for building is also mostly generated on- site. Doing this further reduces the transportation costs, contributing to the reduction in carbon foot-print. They cautiously try to reduce the use of cement, whose production and life cycle is harmful to the environment and use other vernacular methods of construction. They as a community are assertive in developing a Daiva varnasrama system for cultivating a God conscious environment.

Sustainable agriculture in the community

In the modern agricultural era, farming and dairying methods have caused havoc on the ecosystem. In today's world, agriculture, which is crucial to human survival, is heavily dependent on oil and chemical fertilizers. Although initially increasing yield, these chemicals have adversely impacted soil fertility, leaving it toxic and unproductive. Some food products are promoted or banned by one government but promoted by another due to ethical and health concerns associated with genetically modified crops. Soil, air, and water remain the foundation of all farming. Farming in harmony with nature provides long-term sustainability. In the alternative, experts tell us, we may be on the verge of a global food crisis.

Spiritual ecology is fundamental to ISKCON farm communities and sustainable developments, living in harmony with nature, ourselves, and the Divine. These rural communities promote sustainability and spirituality—based on the principle of respect for all living beings.

These sustainable developments are spiritually enriched where they adopt a very simple living and high thinking. Living amidst the nature, working towards land cultivation ,harvesting the produce and spiritual upliftment are the three major criteria that this sustainable development focuses on.

ENERGY EFFICIENT PRACTISES ADOPTED BY THE FARM COMMUNITIES

Following the footsteps of the founder acharya the devotees have adopted the method of ploughing land using Bulls which is an age old method that is natural and considered auspicious. By plowing, rocks and weeds are removed from cultivable land, and water and minerals are moved to the surface of the soil, making it easier for plants to use them. The movement of bulls' hooves over the land enriches the soil. Soil is enriched when the Bull's hooves move over the land.

During the construction phase, the energy efficient practices like using animal power (Bulls) instead of electric powered equipments there is significant reduction in energy load & cost.

Devotees living there collectively contributed to making a wooden oil expeller (ghani) which is empowered by Bull power. In comparison to oils extracted using heat and solvents, edible oils extracted by ghanis (traditional wooden structure) are more nutritious. They consume the food gained from the harvest that is cultivated on rich soil and naturally processed which are chemical free and healthy. Consuming such food which is naturally produced & processed keeps them in good health and prevents them from falling sick frequently. This in turn conserves energy and enhances the quality of the food products.

Teams of devotees are trying to revive the traditional cloth making in India. They identify and protect native heirloom seeds of fiber crops such as cotton through cultivation. They make

organic and natural cotton thread from native heirloom cotton using non-polluting traditional technologies. Their efforts have involved engaging weavers and cloth-makers to reintroduce hand-made clothing to India. Cow urine and plant extracts are used as dyes and mordants in their manufacturing process. Going forward, they are keenly interested in training future generation in learning this art.

Case studies

1. Sahayadri Goloka dhaam & Parasurama Gurukula - Hebri
2. Gokul Dhaam - Belgaum

Sahayadri Parasurama Gurukula and dhaam - Hebri

This Sustainable community is located in Hebri at the foothills of the famed Sahaydri mountains of the western Ghats of India, which is around 42 km away from Udupi ,a famous pilgrimage spot for devotees of Lord Krsna. This town is surrounded by lush and dense forests and is recognised as a global biodiversity spot by UNESCO. The climate of Hebri is hot and humid.

This Goloka dhama and Parasurama gurukula is the pilot project of a senior disciple of Iskcon HH Bhakti Raghava swami maharaj who has dedicated his life to the mission of re-establishing vedic Gurukulas utilizing his profound knowledge of using sustainable construction methodology in India.

This community is located in 11 acres of land in the town of Hebri. In addition to this sustainable gurukula, parallely two other projects were developed. The entire community of devotees residing in and around this place have contributed abundantly in molding this sustainable project.

- Sahayadri Sauravana
- Sahayadri yogashala

Throughout the construction of this eco- friendly and sustainable community special care has been taken to maintain an ecological balance by preserving the forest trees by using the local mud for constructing all the buildings and by using wood and stone pillars for the structural support system in addition to coconut leaves for the roofs.

This effort was primarily to promote the Varnasrama dharma targeting the youth of today. Where, young students are encouraged to learn the 4 ancient vedic sciences, known as Chaturvidya based on Kautilya's Artha- shastra. Chatur Vidya involves the science of philosophy, The science of education, The science of politics and the science of economics. These are the standard subjects to be learnt by all human beings. The Suvarna River flows adjacent to this community for a period of 9 months of the year, which makes availability of water for Farming and day to day activities much easier

The Sahayadri Saura Vana - These forests serve the purpose of influencing the micro-climate positively and parallely serve multifarious functions. This features 3 scientifically designed circular and symmetrical forests having a diversity of medicinal herbs, plants and trees. The first circle comprises of trees representing the 9 planets as described in ancient vedic texts named as Navagraha forests. The second forest features the 12 zodiac related trees and are referred to as

dwadasharasi vana. The third circle features 27 star related trees and is known Saptavimashati nakshatra vana.

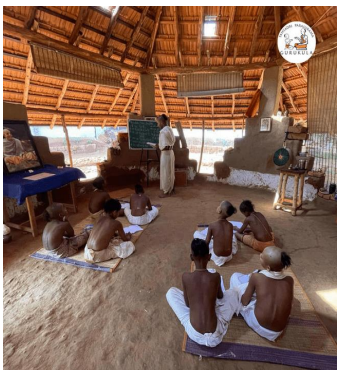
Community engagement

The below chart indicates the timely day-day activities of the devotees

ACTIVITY	DURATION	TIME OF THE DAY	SPATIAL ORGANIZATION
Yoga	1 hr	Early morning	Semi-open gazebo
Cooking	2 hr	Morning, noon, evening	enclosed
dining	1 hr	Morning, noon, evening	Semi open/ enclosed
Learning(Gurukula)	4 hrs	Morning	Semi-open
Gardening- (includes collecting wood, cowdung)	2 hrs	evening	open
Worship	2 hrs	Morning, noon , evening	enclosed/ semi open
Rest & accommodation	12 hrs	Night, early morning	enclosed

Table 1 Daily activity chart of a gurukula inhabitant

Early mornings are well spent together, by the gurukula boys performing Yoga under the guidance of a well trained Yoga teacher in a gazebo designed by the devotees for the same. This keeps them healthy and gets their day started and keeps them fresh and active throughout. All the students of the gurukula are trained from the very beginning to lead a God conscious life under the guidance of many well read brahmacharis.



The classrooms are made of compressed stabilized mud blocks manufactured at the site using the locally available materials. They are designed with a semi-open concept, where they are able to communicate with the nature, get natural light and ventilation and yet remain sheltered from harsh solar radiation during summers or torrential rains during monsoons. A well learned teacher imparts them vedic knowledge and mantras during the first half of the day where their minds are in best capacity to absorb the knowledge.

Amongst the activities that are carried outdoors carrying cut Elephant grass and cow dung by Gurukula boys to feed the cows are a few. These activities happen after their learning hours. They collect the cow dung from around 50 cows and use the same to prepare good manure for the gardens, fruit bearing trees, and other plants and nourish them, thus keeping the surroundings clean as well. By using cow manure

They are served sumptuous satvik food prepared from the organic Harvest of their gardens. These are grown without pesticides and are naturally nutritious. This saves them money from paying more for transportation of vegetables from the cities and makes it sustainable. harvest mind nourished. Their evenings are peacefully spent by doing Kirtan (Hymns glorifying the lord) and remembering the lord.

Wells have been dug up manually by the senior inhabitants. Alternative zones of highly porous, permeable dense rocks facilitate storage of ground water. Such activities throw light on participatory architectural design where users are directly involved in designing their buildings.

The buildings are made of mud walls , the roofs are made of terracotta clay tile, and the plinth is made of rubble masonry. The Gurukula boys patch up portions of the wall with cow dung and mud, and carry out any other repair or constructions on Sundays, being a holiday. They engage themselves in organic farming, by adopting chemical free methods.

INFERENCES

- Most of the activities involve participation of all the members of the ISKCON community in all the phases of design. Hence the spaces are also co-designed based on their requirements ,therefore it is well utilized.
- The Resting spaces or Kutirs are enclosed spaces so that there is privacy. They are constructed using the locally available laterite blocks which are porous and help in retaining the indoor temperature.
- The activities that take place during the day like yoga, worship, dining, learning, gardening are semi-open spaces where the small boys and other members of the community are able to freely connect with nature. There is good cross ventilation & good movement of air yet the spaces are shielded from harsh solar radiation.
- The Vegetables used for cooking and the grains are locally grown in the community itself, as the primary occupation of the inhabitants is agriculture, which makes it sustainable, reducing transportation costs thus promoting the sustainable living concept.

Figure 8 The Kutir/ residences made of locally sourced laterite stone

CASE STUDY 2 - GOKUL DHAAM ,BELGAUM

Nestled at the base of the Sahyadri mountain ranges, Gokul Dham is located amidst dense forest area, having very rich bio-diversity. Farming here is a traditional and communal affair. Grains, vegetables, and dairy products are produced locally by the devotees. Gokul Dham is a vedic village community, situated at a short distance of 30 kilometres from Belgaum, Karnataka. One can easily commute to it because of the good infrastructure.

What's special about the Vedic village?

This 13 acre site, is completely sustainable. There are around 9 devotee families currently residing there. Right from the commencement of this project, they were clear about the idea that huge machines are not always necessary to build good houses. The devotees themselves have been directly involved in constructing their houses right from scratch. The materials used for construction are locally available in and around the site. The devotees have dug out a large man-made pond which can reserve around 1 lakh litres of water. This was done to harvest the rain water during the monsoon seasons so that it can be utilized for day to day needs, and for periods of draught, which helps them grow crops throughout the year, so that they can rely on irrigation particularly during the dry season At the initial stages of construction, the devotees collect wood from the near-by forests, and with the knowledge gathered from the local people , and have tried to revive the ancient vernacular methods of construction. Here, the roof is Birch-Bark roof.(Ref fig 8,10) When the wood is added in several layers it acts as a water efficient and damp-proof course. The composite method of construction known as wattle- daub is used here.(Refer fig 11)

Typical houses in the vedic village community

Few of the houses are simple and made from Wattle- daub walls and Birch-bark roof whereas a few other recently developed ones are made from laterite stones and sloping timber roof. Both of these are built by the devotees themselves sourcing materials that are locally available.

Figure 8 Mud house made with wattle daub walls

Figure 9 Recent houses made with laterite stones

Construction of Birch- bark roof

The top layer of the roof is comprises of birch bark , apart from various other locally sourced materials. The building's main horizontal roof poles are placed after the main log (using the trunk of a tree)frame has been built, and then thin timber slats are positioned at right angles to the base roof poles. The layers of birch bark, each row overlapping the next, are then placed on top of these. Then, long, heavy wooden poles (typically from young trees that are de-barked) were positioned on top of the layers of birch bark. At the roof ridge, the poles along both sides of the pitched roof would be interlocked(Ref fig 10)

Wattle – Daub Walls

Building walls with wattle and daub involves weaving wooden strips called wattle and daubing them with a sticky material that is usually a mixture of wet soil, twigs, straw, sand, clay and cow dung.

Since this wood is not plastered, it is commonly washed with lime during the spring as it acts as a disinfectant and a mild biocide. This also fills in small cracks caused by seasonal movement. The clay holds the mixture together, the soil gives it bulk and dimensional stability, and the stiffeners, which are twigs act as reinforcement which holds everything together, control shrinkage, and provide long-standing flexibility.

Some portions of the wall has only the wattle portion of it devoid of the daub which makes it perform the functions of a window. (Ref fig 11)These houses are comparatively very cool inside during the summers and warm during the winters thus reducing the need for artificial heating or cooling. They are cost effective, have good temperature insulation, good sound- proofing and good resistance to fire.

The Goshala (Cow-Sheds)

The Cows are sheltered in structures built from locally available laterite stone, with a special filler comprising Lime, Jaggery & Harda(in local language). The quality of this mixture is that it hardens with time and further strengthens the walls. Laterite is a porous material and has very good thermal insulation properties, it easily adapts to the weather. The cows inside also feel comfortable and are sheltered from harmful solar radiation. The structural support for these Goshala's comes from the King post truss made from timber sourced locally. The walls are punctured with openings to allow cross ventilation.(Ref Fig 12 and Fig 13)

Kitchens in houses

Cooking is done in a traditional way using ancient clay firewood stoves. They avoid using Liquefied petroleum gas and Aluminium utensils, which are assumed to be poisonous when food stored in it is consumed. Rather, they use Brass vessels. They make use of natural daylight that is available through windows and small skylights. They usually finish their cooking early evening and therefore there isn't a need for artificial lighting, however there is a provision for the same. The grey water from the kitchen is directed towards the kitchen garden, and this gray water is absolutely chemical free as they use the naturally available shikakai (Acacia concinna) and reetha (Soapnut) to cleanse the vessels and clothes.

Vegetation

Figure 15 Rice cultivation in Gokul Dhaam

Figure 16 Vegetable garden- Gokul Dhaam

Over 50 varieties of saplings have been planted. They source their grains and vegetables for daily cooking from the farm which also has a good amount of green leafy vegetables amongst the numerous other fruits and vegetables. Bromegrass and little bluestem are also found everywhere, these two plants are used by the devotees to prepare fragrant, textured handmade paper. Paper making is an altogether different process and the devotees engage themselves in processing these handmade papers.

Temple

Figure 17 The altar made of Mud in the temple

Figure 18 A view showing the temple in the community

The temple is a building made from stabilized mud blocks plastered with lime and painted partially with red- oxide. An age old humble yet beautiful mud altar glorifies the space. There is a good crowd in the temple from 4.30 am until 8.30 am in the morning where devotees come together for Mangala Arati, followed by the scriptures reading session . (Ref fig 17, 18)

Early noon 12.00pm they perform Bhog arati and the temple is closed until 4pm. It remains open until 8pm , during which numerous activities take place in the temple. The temple holds a very important place as the lives of the devotees are centered around spiritual activities. They offer everything that they harvest and cook in the form of sumptuous prasadam to the lordships and honor the same.

Inferences

- Gokul Dhaam is a marvelous example of how one can live comfortably in a rural area and follow a sustainable lifestyle.
- Locally available mud and laterite stones are utilized for construction, this in turn reduces the carbon-footprint and makes the site a zero- energy one.
- Vernacular methods of construction that improves the microclimate of the area have been utilized in constructing the numerous built spaces in this Vedic farm community.
- Rural farming activities not only give them a good source of their daily food needs and also improves the micro-climate by reducing energy consumption.

Discussions

From the above mentioned case studies we arrive at an understanding of how efficiently both these farm communities have been designed by the users themselves who are all like-minded and traveling towards a common goal, which involves a great amount of participatory and co-design. Since a lot of effort goes into brainstorming ideas for designing and physical effort to re-creating those ideas on the site in the form of built-open spaces using sustainable eco-friendly techniques

the design is all the more sustainable. There is engagement of every person involved in the community throughout the day in practicing those sustainable farming techniques and living a completely sustainable life-style. The buildings themselves have very low embodied energy and the entire environment is green and pollution-free. This synergizes the social , economic and environmental benefits for the community. Place-making in architecture plays an important role here as the quality of the lives of devotees here is improved , prolonged and protected. It promotes their health, happiness and well-being.

Table 2 The sustainable development goals achieved in the above mentioned case studies

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