

AVEI NEWSLETTER



Detail of a laterite temple in Bhubaneswar

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The bulk of the summer heat has passed and Auroville has been blessed with some much needed rainstorms, a tinge of the South West Monsoon which is now hitting the west coast of India.

Satprem and Ayyappan have returned to Sri Lanka for the next round of training courses for the "Homes not Houses" project. Lara reports back on some of her recent travels, including trips to Algiers and Bhubaneswar.

This newsletter also takes a frank look at the vital role of vernacular and appropriate technologies today, in the face of climate change and rapid rural and urban development. Among other articles, we have included a new editorial from Radhika and a book review of Suhasini Ayer-Guigan's publication about the visionary alternative energy technologies pioneer, Chamanlal Gupta.

Please feel free to share this newsletter with your friends and colleagues as we spread the knowledge of earth architecture to the world!

Earthily yours,
The AVEI Team

Archi'Terre Festival at Batimatec in Algiers

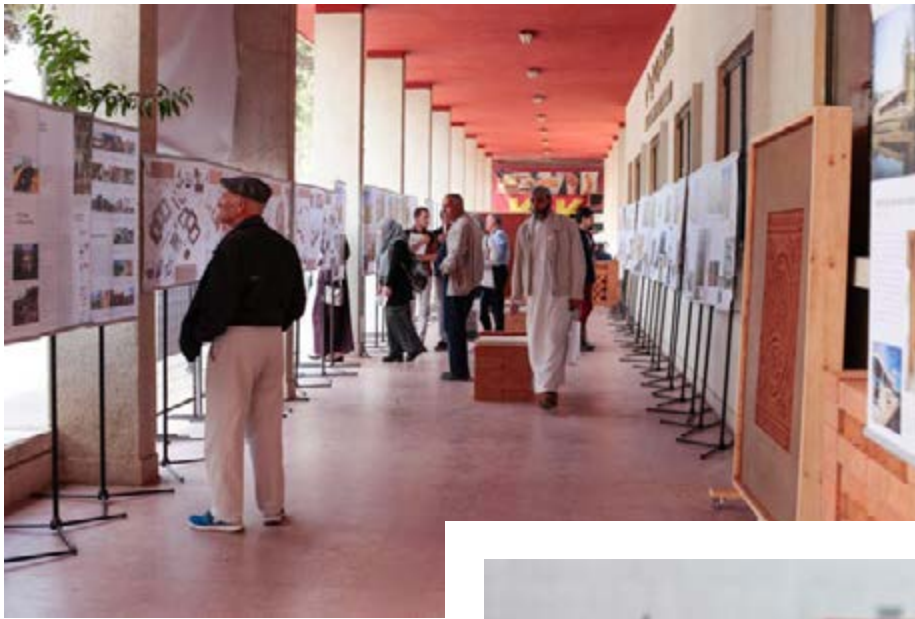
The 5th edition of the Festival for the Promotion of Earthen Architecture – Archi'Terre – took place in Algiers from the 23rd to 27th April 2017. While this year's festival was smaller-scaled than previous years, it was very interesting that it was held at the enormous international construction fair Bati-matheque, juxtaposing local materials and mainstream building industry. Lara and the CAPTerre team offered five days of hands-on demonstrations on CSEB and arches and domes for 1st year students and professionals.

The program was accompanied by the exhibition "Architecture en terre d'aujourd'hui" and a one day conference on the 26th. Lara gave a talk entitled "Culturally re-embedding technologies of earthen construction". Other speakers included Rachid Bessaoud (director of R20), Jean-Marie Le Tiec (Architect and research faculty of CRATerre), and Ilhem Belhatem (Architect and urbanist of Atelier D).

<http://architerrealgerie.com/> ■



CAPTerre team and Lara teaching hands on workshops (© Meriem Medjamia)



The exhibition "Architecture en terre d'aujourd'hui" and 1-day sensitization program for students and professionals (© Meriem Medjamia)

Laterite: Earth Construction in Orissa

Lara and Hilary paid a visit this month to KiiT University, Kalinga Institute of Medical Sciences (KIMS) and Kalinga Institute of Social Sciences (KISS) to visit KIMS pro-chancellor Dr. Subrat Acharya. While the visit was not specifically for work purposes, especially on the urging of some close colleagues, I could not help speculating about the viability of earth construction in the Bhubaneswar area...

Orissa is a state very well known for its abundance of lateritic soils and its traditional construction techniques with laterite block. Examples of well known laterite constructions in Bhubaneswar include the very first temple structures at the city's famous Lingaraj Temple complex, built around 6th or 7th century. Laterite's superabundance has also made it a common traditional construction material in villages across the state. Today, in the city, it is commonly used for the construction of boundary walls, but rarely for contemporary buildings. That said, laterite's properties make it an extraordinary material for use in constructions of today, and it is worth speculating how the culture of this forgotten material may be reinvigorated.

Laterite is a soil occurring in hot/humid monsoon-prone

climates, which has high levels of iron oxides and "self hardening" properties. Lateritic soils are formed progressively over millions of years in which monsoon rains percolate through the soils and insoluble iron oxides and aluminum/ silica sulfates are leached out to concentrate in bedded layers of the soil. On account of its unique chemistry,

laterite, when exposed to the air, goes through a hardening reaction known as "induration". This carbonization reaction turns this soil virtually into "stone", with strengths many times greater than CSEB, country fired brick, and concrete. Laterite blocks can be excavated in a soft soil state, then stacked and exposed to the air to harden (called plinthite). Or it can



Examples of laterite block (above), and laterite block uncovered during an archaeological excavation at Vabanishankar Temple in Bhubaneswar (below)

have gone through this reaction while already underground, in which case blocks are excavated similarly to how stone is quarried (call petroplinthite).

This process of excavating laterite is becoming a lost art in India; the decline of laterite in Kerala is a good example of this. When this

knowledge is lost, its excavation can become prohibitively costly. Yet it appears that this knowledge still exists among the tribal groups of Orissa. This makes it a possible hopeful candidate for reappropriation at socially conscious educational institutions such as the pioneering Kalinga Institute

of Social Sciences (KISS), a groundbreaking school for the education of tribal youth which is a sister school of the university. Older traditional laterite constructions of high quality – like most masonry – tend to have very regular masonry blocks and very fine mortar joints which demonstrate the skill of the mason. Newer constructions however have much more roughly hewn blocks than in the past, making it harder to lay in a good quality masonry wall. Further, large and heavy block is less handleable by masons, more labor intensive, and consequently costlier in construction (the common module in Bhubaneswar is ~ 1' x 2' x 9"). Laterite excavation is in any case very labor intensive, therefore investing proportionately more in skilled employment (rather than material) and in local economies (rather than import economies). This cost factor can be challenging in today's competitive, concrete-dominated market. Nevertheless, if this art of excavation is resurrected, a small laterite construction industry could thrive in this area.

We can also imagine modest innovative hybrids of traditional laterite masonry, which could sidestep the costly and complicated excavation process but still make use of the material as a low-cost/ low-carbon alternative to e.g. country fired brick or cement block.

→

Laterite wall at KISS, and 6th-7th century laterite constructions at Lingaraj temple



Compressed Stabilized Earth Block (CSEB) makes use a mechanical press to compress soils, therefore achieving a denser soil matrix and higher compressive strength. In heavy monsoon climates, soils are often further stabilized with the addition of cement or lime to increase water resistance and strength.

However, if plinthite was available in Orissa, this lateritic soil could be used in a modern block production line, excavated in a “soft” state, and compressed mechanically in a press to produce an excellent quality masonry block. More importantly, these soils would not require the addition of cement or other stabilizer for its resistance and strength, and it would require NO curing (therefore conserving water). If such an innovative approach to this amazing traditional technique could be undertaken, it could add markets, renew the viability of vernacular laterite construction, and celebrate one of the truly awesome techniques – sustainable before its time – of the traditional tribal people. ■



Laterite at Lingaraj temple

AVEI in Indian Architect & Builder

Indian Architect & Builder (IA&B) magazine, a progressive monthly periodical covering news relevant to professionals in architecture, interior design and building industry, has recently included two articles of note for the Earth Institute.

The May Issue included a write up about Phase I of the Sri Aurobindo Society’s Sharanam project with text and photos from architect Jateen Lad. The article details the innovative design of the building, combining traditional elements of Tamil vernacular architecture and sustainable technologies for natural cooling, rainwater harvesting, etc. The Earth Institute has been involved as a technical design consultant and training partner throughout Phase I, and has led the design

and construction of Phase II, soon to be completed.

The July issue of *IA&B* featured an article written by Lara about the Kaza Eco-Community Centre, entitled, “A local response to climate change: Kaza Eco-Community Centre”. This piece boldly looks at the realities of changing climate in this remote Himalayan town, and how vernacular traditions play an important role in mitigating climate change at a local level. It also discusses the revalorization of traditional building methods through modest adaptation and hybridization. The photos from the construction process illustrate the unique skills of the region’s craftsmen and the low-tech/ low environmental impact techniques employed.

https://issuu.com/iabeditorial/docs/july_pdf ■



July issue article on the Kaza project, “A local response to climate change”

Re-approaching *Katcha* and *Pakka*

An editorial by Radhika Soni

In India today, *katcha* houses are often deemed to be ‘temporary, traditional, backward, and tedious to maintain’ and *pakka* houses to be ‘permanent, modern, and maintenance free’. Literally, in Hindi, *katcha* means “uncooked or raw” and *pakka* means “cooked or ripe”. Correspondingly, *katcha* houses are built with materials like mud, bamboo, wood, rubble, etc. and *pakka* houses with fired bricks, steel and concrete. If we further ponder this concept, by promoting *pakka* constructions we are basically baking or *pakka*fyng our blue-green planet.

The Industrial Revolution has led to the standardisation of construction methods, particularly with materials like concrete and steel. The marketers of these construction materials advertise

strength and durability; but the importance of these qualities is relatively questionable, taking into account their relevance to context, embodied energy and socio-cultural impact. Not to be neglected, these industries are generally corporate entities that are trying to carpet over their liabilities, for instance by using fly ash in cement, in the name of recycling a waste material which is in fact hazardous waste. Finally, people opt for *pakka* constructions mostly because they are unaware of the ecological, economic and aesthetic consequences. Government or other decision making bodies do not take any serious action with respect to the disappearing knowledge of vernacular construction techniques.

Certainly, *katcha* constructions require more frequent maintenance to be sturdy and durable; hence they demand greater time investments from their occupants. With the changing lifestyles, traditional maintenance processes are difficult to con-

tinue. On the other hand using the standard *pakka* construction techniques – which are most frequently unresponsive to climate – increases the use of mechanical systems to regulate indoor environments, ultimately utilising tremendous energy. A very common example is the increasing use of air conditioners, even in hot and dry climates where dehumidification of air is absolutely unnecessary. Generally, with these kinds of buildings, society as a whole strongly relies on centralised infrastructure which can make people vulnerable in cases of energy price hikes, blackouts, attacks, etc. This kind of system represents a pernicious cradle to grave cycle.

Mud or earth however demonstrates an amazing cradle to cradle cycle. After demolition it can be easily reused or it regenerates itself by disintegrating back to the source.

Following is one of the verses from *Bhagwat Gita* which empha-



Pakka house construction material production: most commonly fired brick production leading to deforestation and global warming



Katcha house construction material production: numerous possibilities of climate responsive vernacular earthen construction



Pakka house construction material production: most commonly cement industries emitting greenhouse gases

sises a quality of a material body:

अन्तवन्त इमे देहा
नत्तियस्योक्ताः शरीरणिः ।

अनाशनीऽप्रमेयस्य
तस्माद्युध्यस्व भारत ॥ 18॥

Translation:

BG 2.18: "Only the material body is perishable; the embodied soul within is indestructible, immeasurable, and eternal. Therefore, fight, O descendent of Bharat."

Similarly, the materials of any building are perishable by nature. It may perish immediately or after some years; it is only a question of time. The only eternal is in the spirit. If we look to a corresponding western concept, in Roman mythology, the protective spirit of a place is a *genius loci*. We can clearly identify this *genius loci* in vernacular construction. Bhunga houses in Kutch are charming examples of indigenous engineering for earthquake resistance; they use locally available earth to

make heavy thermal mass adobe walls, with small openings for reduced energy gain/ loss. Similarly, in coastal regions, locally grown palm is dissected for major structural elements, with trunks becoming columns and beams and leaves becoming thatched roofing. These examples show how the intangible spirit of the place evolves from its local conditions (rather than unsuitable standardised options).

Further responsible development calls for composite construction systems which take advantage of robust *katcha* technologies and also the technological achievement of *pakka* technologies; balanced systems where combinations of innovative and low-energy consuming technologies are appropriately used. Houses must become energy independent and actively regenerate the local ecosystem by purifying the surrounding air and water, and producing energy and food for daily needs. It is high

time for government and architects to re-approach the terms, *katcha* and *pakka*:

Katcha = Uncooked, pure, adaptive, rooted & climate responsive, evolving, sustainable, affordable, reusable, alive, breathable, low embodied energy,

Pakka = Cooked, hot, fixed, transported, hence climate unresponsive, unsustainable, costlier, unbreathable, high embodied energy.

Selected bibliography:

<http://thepfectslum.blogspot.in/2014/02/kacca-pucca-and-vernacular-architecture.html>

Genius Loci in the Space-Age, 2006, Andreas Vogler, Arturo Vitorri

"Reviewing the Indira Awas Yojana, the politics of an Awas", *Context* Vol. XI 2015, Shardul Patil

Thank You, Paul!

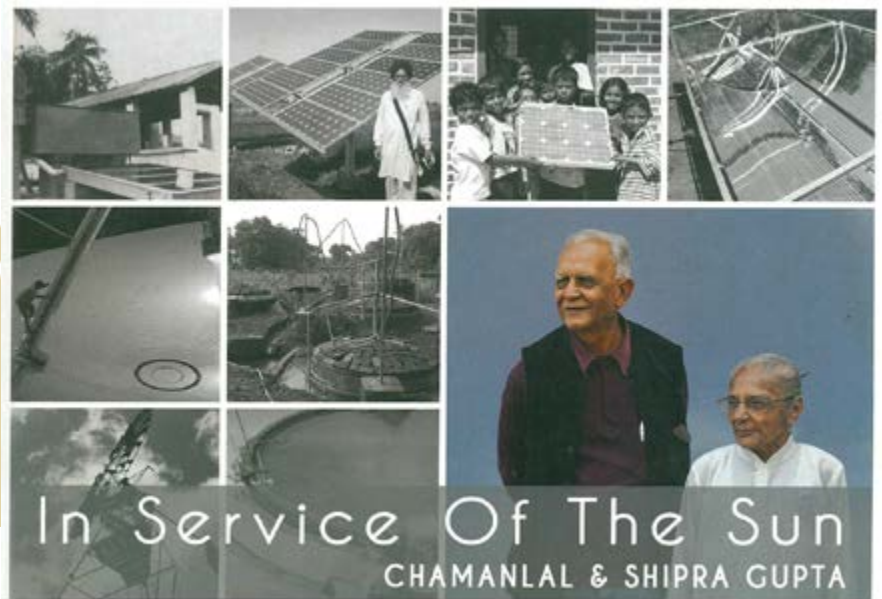
The whole Earth Institute team extends its heartfelt thanks to Paul Leguigner, web development intern from 2011, for his continued technical support. After an apache version update to the website server, our online library catalog became unavailable until Paul upgraded us to the 2017 version of the library software! Thank you, Paul, for coming to our aide across the world!

Once again, you can browse our vast collection of over three thousand books, reports, periodicals, and other materials relevant to the field in our library catalog: http://www.earth-auroville.com/pmb/opac_css/



Hilary's Book Corner

Auroville Design Consultants' principal architect Suhasini Ayer-Guigan has recently released a publication, *In Service of the Sun: Chamanlal & Shipra Gupta*. This detailed collection of reminiscences, technical excerpts, and photos illustrates the exceptional life and contribution of these two devoted pioneering individuals to the field of alternative energy in Auroville, at the Sri Aurobindo Ashram, and throughout India.



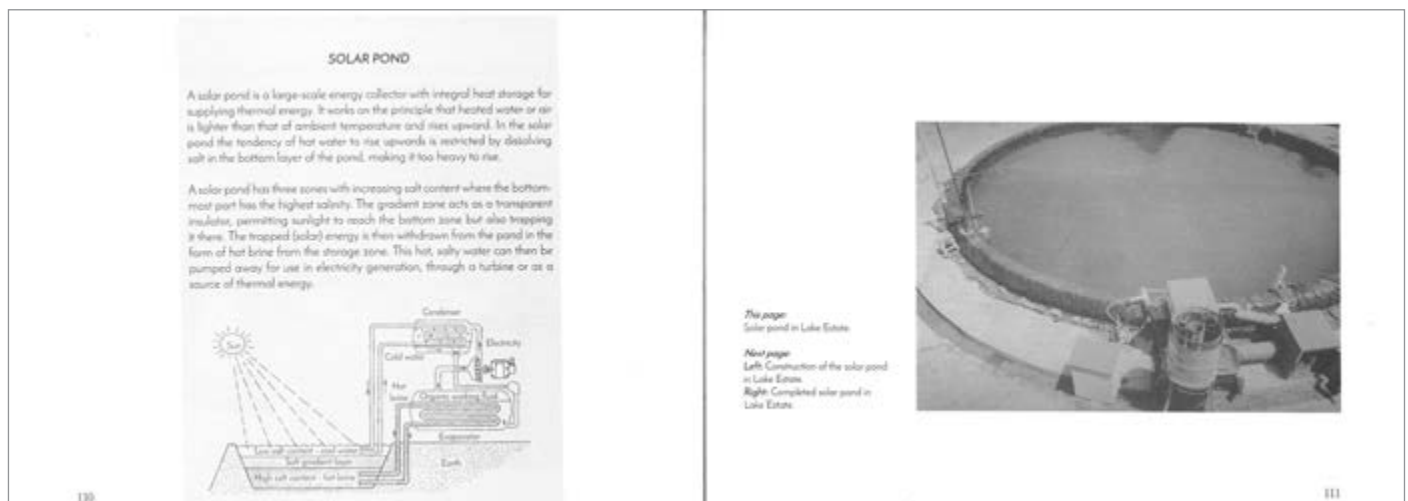
With stellar academic careers in research, this physicist and his librarian spouse followed Mother's call to the Sri Aurobindo Ashram, where they continued their work to develop and implement alternative energy technologies, particularly emphasizing de-centralized, individual-scaled solutions. This led to innovative projects and collaborations with government bodies and research initiatives such as The Energy & Resources Institute (TERI).

The words of Chamanlal's former students testify to his influence. He inspired them to greater work through his measured questioning of their research, which allowed them to discover solutions and answers themselves. From students working in his research labs to Aurovilian researchers seeking his advice during his weekly visits by bicycle, his wisdom has shaped several generations of scientists who have come into contact with him.

This publication is a moving testimony to the vision, influence, and research of a pivotal actor in the field of innovative energy alternatives.

It is available by contacting Auroville Design Consultants at: <http://www.aurovilledesign.com/>

And a video is available here: <https://vimeo.com/211273065>



A set of pages showing Chamanlal's achievements and an inset describing the technology implemented

Visit of Federica Greco

Federica Greco, engineer and research intern at the Getty Conservation Institute in Los Angeles, recently visited the Earth Institute to participate in the AVD course and to explore historic masonry preservation in the area of Pondicherry. A past student and researcher for leading specialist in structural restoration, Paulo Lourenço, she has worked extensively on the Getty's project on seismic retrofitting for historic buildings in Peru.

Federica's visit raised the bar and emphasized how crucial it is for masonry engineers, preservation specialists, and builders to continue to work together to unlock the mysteries of historic buildings.

<http://www.getty.edu/conservation/> ■



Semicircular arch

Recent Training Courses

During the month of June, the Earth Institute conducted three weeks of training courses for students and professionals. At the beginning of June, a week-long ferrocement course took place, during which participants gained theoretical and practical experience on how to cast various ferrocement elements, including channels, doors, planters, etc. This course was attended by 35 students and professionals.

The week after, two weeks of Arches, Vaults, and Domes (AVD) training courses were given. The first week on AVD Theory, with participants learning how to design and assess the stability of vaulted structures and looking at notable case studies from around the world. The second week continued with practical sessions where participants built arches and domes with CSEB, putting into use their theoretical knowledge learned the week before. The first week was attended by 31 trainees and the second week by 27 trainees.

With Satprem and Ayyappan in Sri Lanka and the Sharanam construction site in full swing, the next training courses will not take place until the end of August. See the following page for the full training course schedule for the rest of 2017.

http://www.earth-auroville.com/training_dates_and_info_en.php ■

New Team Member

The Earth Institute has welcomed a new intern!

Ananya

Hi, my name is Ananya and I am currently pursuing my 5th year of bachelors of architecture at Manipal School of Architecture and Planning, Karnataka. I always had an inclination towards the vernacular architecture of various states in India where earth is a predominant material. But, advanced earth construction was somewhat a new concept for me at architecture school and a new field of interest since then.

Scientists have found 40-45 regional cases, where potential 'tipping points' have been crossed. Due to global warming, abrupt climatic shifts are occurring and there is no going back. We know that the climate on earth has oscillated between long ice ages and much 'shorter' period of warmth (like now). So, we might just be on an accelerated journey towards the next ice age. 2016 was the warmest year recorded (3rd consecutive year of a new highest) which suggests that the situation is critical.

There have been many developments in the field of earth architecture that have led to more flexibility in terms of design and structure. Therefore, the act of creating/adding more concrete →

and other unsustainable construction materials on earth myself, as an architect, is something I want to minimize in future.

I wished to train at AVEI to pursue this further and do my bit for the planet as soon as possible (I wouldn't say before it's too late because it already is!). Witnessing the way of living here at Auroville has helped me make my thoughts and ideas towards sustainability clearer and I am glad I got this opportunity. On a closing note,

"Study nature, love nature, stay close to nature. It will never fail you."

- Frank Lloyd Wright ■

**AVEI Training Course
Schedule for 2017**

September
28/8 to 2nd: CSEB Production
4th to 9th: CSEB Masonry
11th to 16th: AVD Theory
18th to 23rd: AVD Masonry

October
16th to 28th: Bioclimatic Earth

December
4th to 9th: CSEB Intensive
11th to 16th: AVD Intensive

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A warm thanks and congratulations to the crew of Sharanam who have been working with dedication and skill to complete the double-story units, the PEC road, and the conference hall. Thank you!