

# Newsletter

Hunnarshala Foundation  
for Building Technology  
& Innovation  
Issue IV

## Share, Reflect, Critique

We at Hunnarshala started taking baby steps to reach out with our activities and initiatives last year by setting up this quarterly newsletter. For the last three issues we had reported about different projects, collaborations and research. However, the larger issues that we have been trying to address through these remain unstated. The slum housing program for redevelopment of 314 houses in Bhuj, housing for riots affected in Muzzafarnagar, setting up new artisan companies, training school dropouts in Karigarshala are not mere projects but ideas addressing issues that we all collectively believe in, the concerns in the society that deeply unsettle us enough to try and make a difference.

From this issue onwards we would try to communicate not just what we do but also why we do and how we do. The issue feature brings out the experience of owner driven approach to tackle the proliferation slums in our cities, a photo essay exploring the relationship of lakes and people in urban areas and, a conversation with an artisan from Muzzaffarnagar on shallow domes. We also continue with updates on our projects, workshops, and experiments.

We are still trying, we are still learning and we hope this quarterly newsletter becomes a medium to share, reflect and critique as a community of dreamers, thinkers and doers.

Happy Reading!

The Editorial Team

Prajesh Jethwa  
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# Slums and the City

## Owner-Driven Rehabilitation in Bhuj, Gujarat

By Bhawna Jaimini

Babubhai sits on a charpoy spread inside the courtyard of this newly constructed home. He directs me to the one corner of the courtyard where few tile samples are lying, to be laid in the bathroom. The house, under the finishing stage, is built on a 65 square metre of plot. The satiation can be seen on his face when he lights up his beedi and exclaims, “Ramdev Nagar would no longer be called a Jhopad Patti. We are a society now.” Babubhai is one of 314 house owners who are building their houses under the central government’s scheme for slum rehabilitation, Rajiv Awas Yojana (RAY).

Slums became synonymous with cities after the onset of industrial revolutions. Rural to urban migration became rampant and slums started proliferating in cities. By 2011, the slum population of India was about 65 millions, expected to touch 100 million by 2017. As per a survey conducted by Setu, Bhuj based organisation working on issues of governance, 33% of Bhuj population lives in slums. This figure amounts 11000 households spread over 76 slums and roughly occupying 6% of the land.

### Envisaging Slum-Free Bhuj

RAY was launched in 2009 to provide housing and services to the urban poor living in slums in the major cities of India. Bhuj being a smaller city was not under the scheme then. Hunnarshala Foundation, at that time, along with the supporting NGOs had started working with the slums of the city through a collaborative program called ‘Homes in the City’ (HIC). Under the HIC program, financial and technical assistance for building houses was given to 120 families living in different slums of Bhuj. This was done through the leadership of Self Help Groups (SHGs) active in the slums. Kutch Mahila Vikas Sangathan (KMVS), partner organisation working on the agenda of women empowerment was facilitating formation of SHGs in the slums. The network of SHGs was instrumental in identifying vulnerable families and provide them loans, which, in addition to the grants available under HIC was used to build 120 houses.

### Homes in the City

The 'Homes in the City' (HIC) is a project implemented by five like-minded organisations in the city of Bhuj in Gujarat and supported by Misereor. The broad goal of the project has been to develop Bhuj to be a city where the citizens, particularly the urban poor, improve their socio-economic condition and access basic civic services through political participation in local governance.

‘Homes in the City’ is being implemented by the following organisations:

1. Kutch Mahila Vikas Sangathan (KMVS)
2. Sahjeevan
3. Arid Communities and Technology (ACT)
4. Urban Setu
5. Hunnarshala Foundation

In addition these organisations, Bhuj Bole Chhe is the social media and interactive platform for HIC.

Though this was a major development towards providing housing for urban poor, there was a need for a larger government intervention which coupled with capacities and knowledge of local organisations and citizen groups, can yield effective solutions to the issue of slums. After constant advocacy with the local ULB, local politicians, state and central government agencies and officials, RAY was extended to Bhuj in 2012.

Most of the slum redevelopment models practiced in other cities across the country were developer based, where the slum dweller is given a housing unit usually in a multi-storey building on either a part of the land occupied by the slum or in a neighbourhood somewhere else in the city. The context of Bhuj was different than other cities; the context was required to be understood in greater depth before coming up with a suitable model of the city. Hunnarshala invited students from Centre for Environmental Planning and Technology (CEPT), Ahmedabad to study the slums of Bhuj. The study revealed that most of the slum households occupied 60-80 square metre of land; any model that offered less than this would not be accepted. A hypothetical planning exercise done as part of the study showed that if all the slums were to be regularised by giving each family a 65 square metre of plot, about 60 hectares of land would be freed for the city and only 20% of the slum population would require relocation.

Based on the findings of the study, the first Detailed Project Report (DPR) was prepared and submitted to the central and the state government for the redevelopment of three slums; Bhimrao Nagar, Ramdev Nagar, and GIDC where 314 houses shall be rebuilt on 65 square metre of plot through an owner driven process. The DPR was approved and sanctioned, making Bhuj Nagarpalika one of the very few municipalities to implement Rajiv Awas Yojana

**“ If all the slums were to be regularised by giving each family a 65 square meter of plot, about 60 hectares of land would be freed for the city and only 20% of the slum population would require relocation ”**

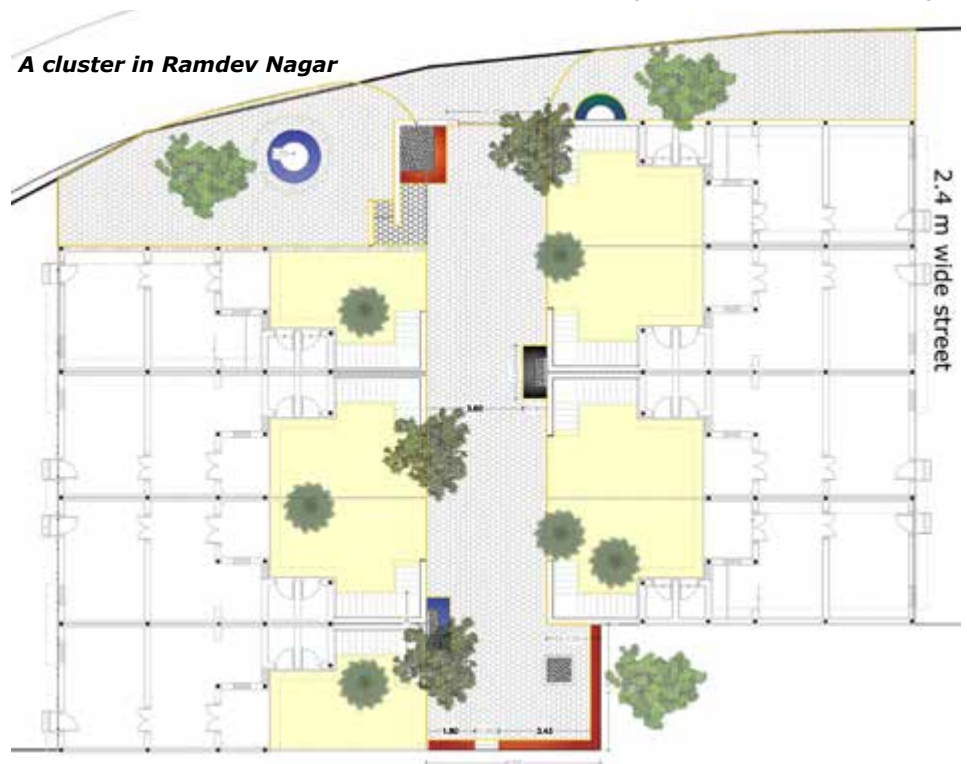
through an owner driven model where 314 slum dwellers are receiving funds directly from the Nagarpalika to build their houses, for which they will hold tenable rights.

**Rehabilitating Slums, Creating Neighbourhoods**

GIDC-I is a temporary resettlement colony that came up after the devastating earthquake of 2001. The shelters were allotted to victims of the earthquake, who moved away after rebuilding their houses and the shelters were occupied by people coming to Bhuj. About 300 families from different communities across religions live in these shelters, of which 156 are being rehabilitated in the first phase.

The resettlement plan being implemented is not just limited to inclusion of housing and services but addresses the need of elevating the overall quality of life by creating a neighbourhood. Each housing unit is a part of a cluster of 10-15 houses sharing a common open space where children can play under vigilance of their parents or where smaller social gatherings can happen. The resettlement plan also includes a community center and shops to cater to day-to-day needs of the residents.

The design of the dwelling unit is based on the traditional housing typology prevalent in and around Bhuj. The central feature of the typology is the shaded courtyard which is a multi-purpose space used for cooking, washing, socialising in the day and sleeping in the night. The courtyard, in myriad of ways is an extension of the community life in Kutch where two or more families share a single courtyard. The design of the unit revolves around this idea and allows for families to share their courtyard at their will. The unit plan also acclimates the future needs of a growing family by allowing for incremental change.





This would also help in achieving higher densities without going vertical, a model followed by most of the cities in India. The census of 2011 states the density of Bhuj at 75 people per hectare, and the present redevelopment plan without going vertical achieves the density of 320 people per hectare, which with the incremental value offered by the unit can go up to 600.

### Beneficiaries to Owners

“Iska photo khichon (Take of photograph of this)”, Karsanbhai proudly points to a house where the roof slab was casted the previous day, as he comes out of the foundation trench of another in Ramdev Nagar. Karsanbhai, a plumber by profession is a resident of Ramdev Nagar who is now using his experience in construction work in rebuilding the houses in Ramdev Nagar. The owner-driven format of reconstruction has allowed the people to build together amidst all the delays that happen in a government funded program. The Sakhi Sangini Federation, a network of women Self Help Groups in the slums of Bhuj has been instrumental in this direction by providing loans to the house owners. “After the stage completion reports are sent, it takes a few weeks time for Bhuj Nagarpalika to process the reports and release the next installment. The house owner is unable to work further for this period before the payment is released. The loans from SHGs are preventing the construction from stalling.” Rupesh Hurmade, Project Coordinator for the slum redevelopment program explains. The members of these SHGs are also house owners who are willingly providing financial assistance not just to build their own house but also of their relatives in the community. These collaborations are not only instilling a sense of ownership amongst the dwellers but also setting an example of looking at the house owner outside term of a “beneficiary”.

The representation of house owners as equal stakeholders has led



to remarkable additions to the program by building a house with higher carpet area within the limited funding. The scheme entitles each beneficiary a sum of INR 3 lakhs for building a house and INR 75 thousand for infrastructure. The net value of each dwelling unit with built up area between 31 to 35 square meters is 4.50 lakhs. The owners are bridging the gap by financial contribution, recycling materials, and, working as labour and contractors.

About 100 houses are in the final stage of completion, and the rest are following up too. After the construction of houses is complete, the implementation of infrastructure that includes roads, community spaces, drainage lines etc will begin. The slum committees, which were formed at the conception of the DPR, are being trained to do the implementation of infrastructure in all the three areas. These committees registered as Residents Welfare Association (RWAs) will not only implement the infrastructure but will also maintain it using the funds available under Operation and Management component of the project. The slum committees have been one of the main supporting pillars of the program. The committee’s role has evolved from the conception stage, where it was helping with the preparation of DPR, to the implementation stage where it is working to oversee the whole process by resolving social disputes and technical issues.

**“The present redevelopment plan achieves the density of 320 people per hectare, which with the incremental value offered by the unit can go up to 600 people per hectare”**

### Manoeuvring through Challenges

“We are trying our best to finish the construction before the monsoons”, Shankarbhai, a resident of Bhimrao Nagar talks with an anxious tone. Bhimrao Nagar is settlement of 45 families from Marwada community who were given the land to settle by then ruling king of Bhuj. While the house construction in Ramdev Nagar and GIDC-I started in June 2015, the residents of Bhimrao Nagar could not start with the construction even after receiving their first installment until November because the status of the land they occupied was not clear. Some government records indicated it to be privately owned land while it was under the revenue department. The residents had to go on a hunger strike demanding immediate action. The house owners from Ramdev Nagar and GIDC-I also came to show their solidarity even though the implementation work had started there.

**Two finished houses with common courtyard in Ramdev Nagar**



“After the Chief Minister of Gujarat, Anandiben Patel came to inaugurate the project in February 2015, I demolished my house to make way for new construction but nothing happened for months. We were uselessly paying rent,” Jassuben, one of the residents who went for the hunger strike explains.

The District Collector then ordered the concerned departments to fast track the procedure for land allotment. The Affordable Housing Mission at the Gujarat state level also intervened in the matter by providing the much-required push in getting the land cleared within a month, after the slum dwellers went on strike. The designs were once again revised for the allotted land for redevelopment. We had to revise everything.” Dinesh Charan, a community architect working on the project describes the process of designing and how the plans kept evolving over the course of the project, not just in the case of Bhimrao Nagar but Ramdev Nagar and GIDC-I as well. “When you are working with a community, their needs and aspirations should be well reflected in your design solutions which can’t be achieved in one day.

We kept on going back and forth on the designs with the community before reaching the implementation stage”, Dinesh Charan adds further.

#### **Way Forward**

The implementation of 314 houses shall be complete in the next few months. Another proposal for rehabilitation of 237 slum households has been submitted under the new PMAY-HFA.

The project has received tremendous support from the state and central government and once the implementation is complete, post occupancy data shall be generated to advocate the approach of people-centric slum redevelopment to other cities as well.

**The inside of the newly finished house in Ramdev Nagar**





# Community Empowerment

## Urban Interventions



### Slum Redevelopment

Team: Rupesh Hurmade, Dinesh Charan, Karamshi Rangani, Dhiraj Thakkar, Khimji Chavda, Hiren Gohil, Ramesh Chauhan, Madhu Jora

Hunnarshala is working to organise the people of slum in getting access to housing and services through an inclusive and people centric process. The first step towards this approach is being implemented through the central government's scheme for slum rehabilitation, Rajiv Awas Yojana (RAY), now revised to Pradhan Mantri Awas Yojana-Housing for All (PMAY-HFA). About 100 houses have been completed till the roof slab level in GIDC and Ramdev Nagar, and about 27 houses in Bhimrao Nagar have been completed till the lintel level.

Two new proposals for the second phase of the program have already been submitted to the Bhuj Nagarpallika (BNP), and are awaiting approvals. The second phase includes 237 houses at three sites and the beneficiaries come from four slum.

### Slum Archiving

Team: Bhawna Jaimini, Jai Anjaria (Bhuj Bole Chhe)

Slum archiving was conceived with the idea of understanding slum communities in the context of their relationship with the rest of the city. The term 'slum dwellers' often limits the representation to poor and needy people living in dirty shoddy quarters of the city. However, being a slum dweller is a part of the identity of the people of slums. Their cultures, traditions, languages, changing livelihoods and struggles make them who they are. And it is very important to understand and recognise this complex reality before we start looking for solutions to grapple with the deprivation faced by these people.

To deepen the engagement and understanding with the slum communities which were being rehabilitated in the first phase of the slum rehabilitation,

Community empowerment is the core initiative of Hunnarshala where master artisans and our building professionals work together to develop contemporary solutions using traditional materials and building knowledge to empower communities. Communities that have been displaced and affected due to various reasons like natural disasters, acts of vandalism, communal violence etc. The objective of this initiative is to use the process of design and building as a means of empowerment and strengthening communities.

Bhimrao Nagar was archived. A small booklet and a short film on the community was produced. Similarly, Ramdev Nagar being rebuilt in the first phase, inhabited by the community of Devi Pujaks and Vansfoda, a community of bamboo weavers proposed for rehabilitation in the next phase, are being archived.



**Vansfoda**

**Shelter for Urban Homeless**

Team: Dinesh Charan, Pratik Zaveri

Urban homeless are one of the major challenges faced by the cities today, as a result of in-migration. As per a study done and supported by Tata Institute of Social Sciences, Mumbai; Bhuj has a total population of about 1,800-2,000 homeless spread over the city in six major clusters. This population fluctuates as some go back to their native places during the cropping season. A housing scheme with rentable dwelling units is seen as an effective solution for these homeless. One of these clusters, RTO site, has been taken as the pilot project for the same.

The proposal for developing rental housing for homeless migrants at RTO site has been completed and submitted to the Bhuj Nagarpallika for approval. The proposal includes various typologies of rental housing like family shelter, accommodation for singles and shelter for people with special needs. The program comes under the National Urban Livelihoods Mission’s (NULM) ‘Shelter for Homeless’ scheme.



**Proposed Shelter for Homeless in Bhuj**

**Vendors Formalisation and Traffic Management**

Team: Aditya Singh, Bhawna Jaimini

Vendors are essential service providers in the Indian cities. The services provided by them are affordable and create an economic equity for the citizens. Vendors also form a major chunk of informal economy of the city.

Hunnarshala had initiated work for formalisation of road-side vendors a few months ago. The proposal comes under National Urban Livelihood Mission’s scheme for street vendors. This included basic survey of vendors and activity mapping, allotment of space, provision of infrastructure and services. The proposal for the same has already been submitted to Bhuj Nagarpallika. The scope of the intervention has, however, now been further expanded

to incorporate management of traffic as it was realised that any proposal for vendors cannot exclude the adjacent traffic flow. Hence, a larger stretch of the street, which also includes a major junction, has now been taken for the study and proposal.

To further understand the social, political and economic structure of vending in the city, a study was jointly conducted with students of Tata Institute of Social Sciences (TISS). The students studying National Urban Policy and Governance at TISS were supported by teams from Hunnarshala and Urban Setu in understanding the vending fabric of the Bhuj city. Within the period of 10 days, all the major vending zones of Bhuj cities were covered and the results were formulated in a report.



**Existing**



**Proposed Lane Management**



## Animal Hostels

Team: Aditya Singh, Nita Khupchandani (Sahjeevan), Sandeep Kanojia (Sahjeevan)

The Gujarat State Government has a scheme for providing funds to construct cattle sheds. Sahjeevan, an organisation based in Bhuj, is leading the program, with Hunnarshala helping out with the design and layout of the sheds. Overall there are four locations all around Bhuj city, each catering to 1000-1500 animals. The pilot project includes sheds for about 500 animals located on Mundra Road in the southern part of the city. The site for the sheds has been chosen such that it comes in the slum relocation of one of the cattle owner communities from Machhu Nagar.

## Lakefront Development

### Desalsar Lake

Team: Aditya Singh with support of ACT

In its effort to expand the scope of urban interventions, Hunnarshala will prepare a proposal for development of Desalsar lakefront. Desalsar is a lake in Bhuj that is located quite close to the older parts of the city. It has a considerable amount of solid waste and sewage intake from the surrounding land-use. Arid Communities and Technologies (ACT), another organisation based in Bhuj, has already submitted a proposal for interventions to improve the water quality and treat the watershed. Hunnarshala will provide additional support to ACT for land use organisation and transport management. The work has just been initiated and within next few months a workable proposal shall be developed.

## Disaster Response

### Housing for Riots Affected in Muzaffarnagar

Team: Hardika Dayalani, Malaram Bishnoi, Narayan Paswan

The rehabilitation and reconstruction work at Muzaffarnagar in Uttar Pradesh, for riot affected



*A house under construction in Muzaffarnagar*

communities, supported by Misereor continues. At Aryapuri, basic construction and house finishes for all the houses has finished. A viable solution for sanitation and drainage is being worked out with the community. Since it is difficult to ascertain the future rise in population at this point, open drains and an interim disposal system will take care of community's needs. The services also include paved streets and will be implemented by end of May.

At Kandhla, 98 out of 100 houses have finished basic construction. Of these 75 have also completed finishes of their houses and another 23 are in the process of plastering and painting their walls, laying floors, etc. Of the sanctioned 64 toilets, 24 have been constructed and another 35 are under construction. The remaining toilets will start construction soon. The implementation of services will soon start. The services include paved streets, open drains and a main drain connecting the site to the main sewerage system.

At Bassikalan, the work encompasses retrofitting and improvement of the already constructed houses. The work has finished for 27 of 100 houses and has begun in the second phase for another 29 houses.

## Reconstruction in Nepal

Team: Mahavir Acharya, Tapas Upadhyay, Tanvi Choudhari, Marina Boaretto, Bibilal Vijayadev, Kishore Chawda

The reconstruction of a village, supported by American Jewish World Society (AJWS) in Bhakhang, inhabited by about 170 Tibetan nuns has started. The village situated on the Nepal-Tibet border was destroyed in the devastating earthquake that wrecked Nepal in April 2015. Almost all the houses fell after the earthquake and the nuns were living in an interim shelter. The houses deployed poor quality stone masonry in mud mortar.

As the Village is quite remote and vehicular access is limited, redevelopment technique uses the locally available stones and mud mortar with galvanised wire mesh laid at every 2 feet in the masonry. The technique was developed with Prof. K.S Jagadish and was subjected to a shock table test in NIRMA University to understand its performance in an earthquake. The local masons are being trained in the technique to build the houses. About 60 houses are currently under construction, which were designed with participation of the nuns.



**Participatory planning with nuns in Bhakhang, Nepal**



**A house under construction in Bhakhang, Nepal**



## Rural Housing

### **Indira Awas Yojana, Jharkhand**

Team: Hardika Dayalani, Aditya Singh, Pratik Zaveri, Shruti Nikhar

Hunnarshala undertook a study of rural houses of the state of Jharkhand. The main aim of the study was to understand the traditional processes of house construction in rural settlements, and thus influence the implementation of Indira Awas Yojna (IAY). IAY is one of the largest schemes in the world that looks after providing houses to rural poor. The scheme allots a certain amount of money to the selected beneficiaries for house construction. The study was done in collaboration with two partner organisations, People In Centre from Ahmedabad and Dustudio from Auroville. The study was supported by United Nations Development Programme (UNDP), and was done for Ministry of Rural Development (MoRD). The three organisations are also carrying out similar study for two other states, West Bengal and Chhattisgarh.

Two visits have been made to the site. The first visit was to study and document the prevalent traditional houses. Supported by the learning from the first visit, several improvements were designed as well as several already existing techniques proposed to be allowed under IAY. The second visit majorly aimed at discussions with various stakeholders on the proposed improvements. The stakeholders included the house owners, NGOs, government officials, academicians, architects etc. Currently the final report is being compiled which further incorporates the suggestions received in the second visit. The project will complete with a state level stakeholders' workshop, where the final proposals will be explained discussed in detail.

### Institutional Projects

#### GIC School, Pithoragarh, Uttarakhand

Team: Pratik Zaveri, Roman Pradhan

A new project to design a school at a scenic site in Uttarakhand has been taken up by Hunnarshala. The school is for about 600 students in secondary and higher secondary levels. The site is spread over 1.5 Hectares of land. Currently work on the design proposal is going on, while the preliminary cost estimate has already been submitted to the client. The scope of work includes retrofitting of existing facilities as well as construction of new structures as per the necessary requirements. The project is funded by the Tata Relief Committee.



*A Pahariya tribe woman drawing her dream house*



*A Santhal House in Jharkhand*



*Existing school in Baram, Uttarakhand*



# Artisan Empowerment



Building artisans have a deep understanding of traditional materials and techniques which has been passed onto them through generations. However, they stand on the brink of becoming obsolete due to fierce competition from modern materials and construction techniques. Hunnarshala understands the potential and capabilities of these artisans and thus has involved them in different projects so that they can demonstrate their skills with dignity and not just as mere labourers.

## Buddhist Centre, Sakarwadi

Team: Tejas Kotak, Mukesh Tank, Bharat Chauhan, Hemant Dhudhaiya

Based on the design of architect Sameep Padora, the artisan entrepreneur companies completed the construction of “Buddha Vihaar”, the Buddhist Community Centre at Sakarwadi, Maharashtra. Stabilized rammed earth walls, wooden roof understructure, mud rolls and exposed RCC beams were implemented by “Layers”, Ozari Joinery, Matha Chhaj and “Lustre” respectively. This project belonged to Somaiya Vidyavihar, Mumbai and was inaugurated in February.

A research activity was conducted to ascertain the rafter load of the proposed wooden roof understructure for the “Buddha Vihar”. The test was successfully performed with good results. The wooden understructure was built at Sakarwadi will be based on the results obtained from this test.



## Penha de Franca, Goa

Team: Tejas Kotak, Bharat Chauhan

The restoration work at The Church - Penha de Franca in Goa is ongoing. The application of lime plaster works on the interior walls, exterior walls and ceiling are complete. The artisans of “Lustre- specialists in finishes” are working on application of Lime plaster on the exterior surface of vaults.



Penha d' Franca, Goa

## Institute for Studies and Transformation, Ahmedabad

Team: Tejas Kotak, Mukesh Tank, Hemant Dhudhaiya

The Institute for Studies and Transformation (IST) in Sanand Ahmedabad is being designed by Architect Hiten Kakariya and built by the artisan empowerment unit. The facilities include guesthouse, kitchen, dining and training halls.

The construction work majorly includes rammed earth walls and wooden roof understructures.

“Layers- The rammed earth construction company” completed casting of stabilized rammed earth walls in the ground floor and first floor of the designed facilities.



Institute for Studies and Transformation, Ahmedabad

## Venus: The Art for Love, Karjat

Team: Tejas Kotak, Jignesh Gor

Based on the design of Kiran Vaghela - “Studiopot”, the artisan entrepreneur companies constructed a Recreation Centre, kitchen, dining and guest rooms at Karjat near Mumbai. Construction techniques like thatch roofing, wooden understructure, stabilized rammed earth and adobe walls have been incorporated in the design and implemented by various artisan entrepreneur groups. The first phase of the project is completed. At present the doors and windows work is in progress.



Construction in progress at Karjat



# Karigarshala

## The Artisan's School



*Sketch of Karigarshala Campus made by a student*

The students of Karigarshala completed their on-campus learning period in their respective courses of carpentry and walling systems. 7 students were enrolled in the carpentry course while the walling system had 19 students. Both the batches also learnt and studied basic mathematics, life sciences and sketching along with the basics of plumbing and electrical work.

After finishing the on-campus learning period, the students are working on a live project to gain experience as professionals before starting out on their own. Both the batches are jointly building a school in Devpar, Nakhatrana. The walling students are building the structure while the carpentry students are making floorboards, doors and windows. The students are also implementing the electrical and plumbing work. The hands-on training imparted to students gave confidence to the students to execute a project independently.

The walling system students are also working on a project in Kukeri with the team from Ozari. Karigarshala introduced a new format of learning this year where the students built a room from sub-structure to super-structure in different masonry units. Carpentry students on the other hand are making windows for test chambers built for research with Massachusetts Institute of Technology in Paraspar.

Team: Atul Vyas, Visanji Gajjar, Hiralal Suthar, Pangu Singh

The objective of starting “Karigarshala” was to develop a platform where students who have to discontinue their studies and dropped out of the formal education system due to various reasons, can have a chance to learn and develop hand skills in a specific trade. It is an attempt to rebuild confidence in the students who have higher chances of getting exploited as child labourers and lead them to live a dignified life as professionals in the future.

# Research

## Shallow Domes

Team: Mahavir Acharya, Hardika Dayalani, Tapas Upadhyay, Dhiraj Thakkar

The work with riots affected families in Muzzafarnagar lead to the discovery of the age-old tradition of building shallow domes with burnt bricks in the northern parts of India. Hunnarshala along with Mrinmayee, Bangalore documented the shallow domes of the region and started the process of scientifically validating the technique, as it can be a sustainable alternative to R.C.C roofs.

Two tests were conducted in the Hunnarshala campus to understand the behavior and strength of the dome by subjecting it to static loading. Nawab, an artisan from Muzzaffarnagar who has been making the shallow domes was called to make these domes. The data generated from the first test was analysed and subsequent alterations and changes were made to the dome before testing it the second time. This shallow dome built with Compressed Stabilised Earth Blocks (CSEB) took five times the live load stated for residential buildings and would now be tested for dynamic loading.



*Construction of Dome in process at the Hunnarshala Campus*

## Mud Concrete Blocks

Team: Rupesh Hurmade, Tapas Upadhyay, Nikhil Shah, Bibilal Vijaydev, Anuja Bhandari

The construction waste generated amounts to 25% of the solid waste generated in India per annum. The disposal of this waste is a constant challenge as it causes pollution and environmental deterioration. In Bhuj, tons of debris was generated due to the devastating earthquake that caused destruction of thousands of houses. Debris walls were developed at that time to use the construction waste.

To increase the application and recycle the construction waste in more ways, mud concrete blocks were made and tested. These blocks developed as an alternative to other walling units like bricks and stones, have strength of 70kg/cm<sup>2</sup> while the required strength of any building block for a load bearing structure is 50kg/cm<sup>2</sup>.



*Mud Concrete Blocks*



### The Craft of Making

#### Shallow Domes

By Nipun Prabhakar

Nawab is the artisan who built the 5 brick-domes for a house owner in Muzzaffarnagar. Born and brought up in the Kutba village of Muzaffarnagar, he belongs to a community of blacksmiths. He learnt the art of masonry from his uncle, also his Ustaad (Master). Nawab is now working with Hunnarshala in taking the technique of building shallow domes forward. This is an excerpt from the conversation with Nawab and his master on the art of brick domes.



*Nawab and Ustaad*

#### How did you first learn about building the brick domes?

Ustaad: About 20 years ago I went to Berna village. There I saw a Brick dome in a house. I was very impressed by it. I couldn't find the mason who made it so I decided to make it myself in my village, Kutba. The first two attempts were unsuccessful but I succeeded the third time. It is still standing there in the village. Later I taught the skill to Nawab and another student who belongs to the kumbhar community.

#### Did you do any modification in the structure/aesthetics or just repeated what you saw?

Ustaad: Yes I did. The dome that I saw was not strong enough. Masons used to put a bar from below; it looked ugly so I added 12mm reinforcement bars hooked together on the walls at the perimeter of the roof. It made the roof stronger.

#### Why do you prefer domes to other roofing styles?

Nawab: I think the Domes are the strongest of all the roofs.

They evenly distribute the load and are able to withstand collapse of a wall. Due to this property it does not need to have thicker walls and hence the cost is less.

#### What are the advantages of brick domed roofs over RCC slabs?

Nawab: RCC slabs are temporary. The life depends on the life of steel bars. As soon as the reinforcement bars corrode, the roof is gone. In domes there is no such thing. It will remain strong as long as it is in compression and the key is well set.

#### After you make the dome, how do you level it from the top?

Nawab: We can do three things; either we can put earth on it followed by a layer of gutka (thin brick tiles). Or we can put fine aggregate and do flooring on it. The best thing would be using the residue of the over burnt bricks from the kilns. It is light in weight and porous.

#### One common criticism of domes, which lead many people to take other roofing options, is that domes are prone to leakage, in your experience how do you counter this argument?

Nawab: Out of all the domes I have built, only one client has complained about leakage. This is because when

I make a dome I always cover the dome up. But certain people want to be miser. This particular client felt that by leaving the masonry exposed he could be a little thrifty. Well it backfired on him!

Ustaad: Obviously the mortar will hold the dome! Magic won't hold the bricks together, mortar will. You cannot be miser and expect good work.

#### You said that you have been making shallow domes for last 18 years, what were the techniques used before that?

Ustaad: Yes, before that there were plank and joist roofs, there were girder and stone sill roofs, vaults with mud mortar, proper hemispherical domes, back then there were arches too. I have expertise in arches and the arched staircases as well.

#### Now people prefer RCC roofs. Do they still give importance to the domed roofs?

Nawab: We only make domes at the places where people like it and admire it. We never force anyone.

### Students on Campus

By Nikhil Shah, Sanjana Ravi, Tanvi Aggarwal, Bibilal Vijaydev, Shail Joshi, Anuja Bhandari

Being here as interns brings lots of opportunity to explore materials and techniques ourselves. All of us wanted to engage ourselves with something hands-on and at the same time add something to the campus. While we were searching for the unfinished nooks and corners around the campus, we came across parking space that had space frame mounted over but without any panels.

We brainstormed over exploring different materials and techniques through which we could cover it. While we were in the middle of this, a workshop on bamboo basket weaving was organised. The workshop gave us interesting insights into bamboo weaves, which we could use, a potential covering material. We experimented with different weaves to come up with panels.





# Desalsar

By Aditya Singh, Dishant Manik,  
Shruti Nikhar



Lakes have always been a very important and necessary element of human settlements around the world, through ages. They were a major source of water, as well as formed a vital community space for the settlements. They often held a religious importance for the community. However, with the advent of industrialisation and piped water supply, slowly the settlements turned their backs toward these lakes. Now often the urban lakes are filled-up to get more land for construction, or are used as dumping area for garbage and sewage. Desalsar is one such lake situated in the City of Bhuj.



As the stories go, Desalsar was created by king Desalji, and used by travellers coming to Bhuj to refresh themselves. It was chiefly used by Bakali community for their water requirements, including agricultural.



Currently Desalsar lies hidden surrounded by various small shops and informal settlements. Several of the activities around the lake are contributing towards degradation of the lake. Along with sewage inflow and garbage dumping, vehicle service centres around the lake can be seen as major threats to the lake ecology.





The informal settlements around the lake are dependent on it to wash clothes and bathe cattle. However, they do not use it as a source of drinking water as the water quality is severely compromised due to heavy sewage inflow.



One of the most defining activities around the lake edge is the feeding of a large number of cattle. Leelo Charo (green fodder) is collected early morning from several sources and then fed to the cattle. The activity lasts till early afternoon.

Desalsar is also home to several bird species, which makes it a very lively space. The presence of some amount of water all throughout the year in this largely arid region, gives a staple supply of food to these birds.



The rampant degradation of urban lakes has become a common story around the country. One of the major reasons for it is the false belief that the lakes have become irrelevant in the urban context, and their usefulness is slowly getting forgotten, generally limited to waste dumping. There is a need look back towards these lakes as a valuable resource for the cities, instead of turning our backs towards them. The several important functions of these lakes need to be acknowledged and conserved, making them more useful to the citizens as well as birds and animals.









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