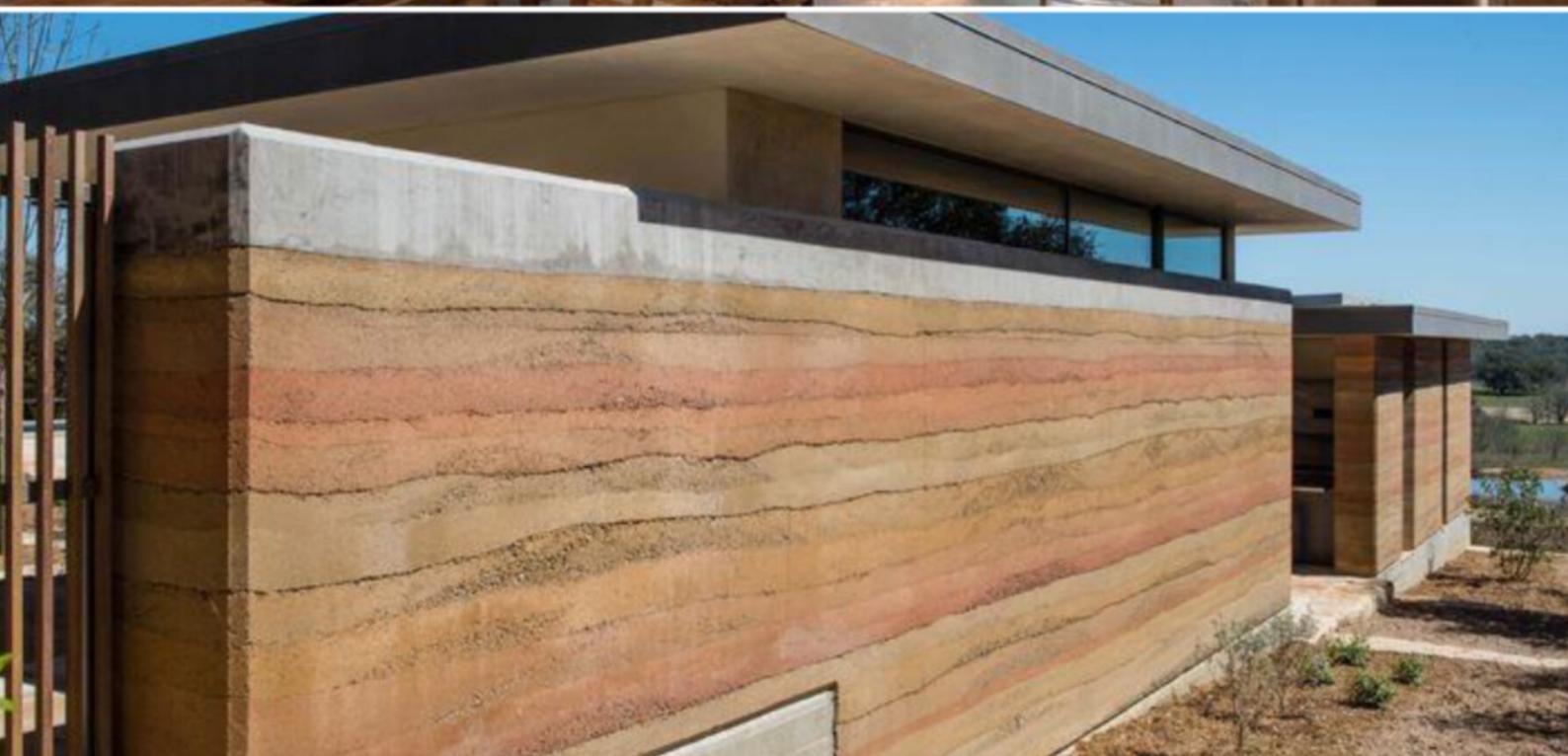


# THE ULTIMATE GUIDE TO THE ENTERPRISE





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ulaman eco resort -Bali



## Why do we call ourselves "Mud Beaver Sikkim"?

First, let us talk about our gentle and adorable mascots who usually find themselves on the naughty lists of farmers, the beavers.



We all know that a beaver is a giant rat found across the world. So, this begs the question "why beavers?".

Well here's an interesting fact for you, beavers are widely known as "ecosystem engineers" because they create and help restore the ecosystem.

How?



BBC NEWS

### How beavers are reviving wetlands

By Navin Singh Khadka  
Environment correspondent, BBC World Service

5 February 2023

Los Angeles Times

California says the beaver can be superhero in fighting climate change

abcNEWS

### How beavers could help the Colorado River survive future droughts

Humans can take a lesson from beavers' engineering on how to conserve water.

Los Angeles Times

LA Times Today: California says the beaver can be superhero in fighting climate change

By Stephanie Ebbs



**They construct dams that outweigh the damaging influence of the climate change, so they have next to no carbon footprint.**



Now that we have talked about the “why”, lets discuss about the “who” and the “how”?

We are a group of individuals who have taken up the moniker “Mud Beavers” not just because we think they are cute (which they are), but because we are inspired by how their construction helps restore the ecosystem, while not compromising on the effectiveness and the purpose of the construction.

How do we accomplish such a tall task?

Well that's where our project comes in.

Our project is going to deal with construction of sustainable earthen structures (which involves a huge pile of mud). along with the introduction & setting up of green practices that can be embraced such as - Aquaponics, rainwater harvesting, zero waste management, solar energy harnessing, & much more.

While using local sourced sustainable materials.

The services we aim to provide will help and preserve nature. Doing this not only means we and the beavers are on the same planet, this will mean we are on the same page as well.

**Mudbeaver as a whole is based  
in Sikkim.**

Sikkim is in fact, best known for tourism and agriculture, but why stop here. We as Mud beavers aim to put Sikkim on the map for sustainable construction as well.

# ABOUT US

## THE ENTERPRISE

Mud Beaver Sikkim is a socio-sustainable construction enterprise focussing on specialisation in research, development, promotion and transfer of earth based building technologies.

We construct timeless, unique traditional, vernacular, cost effective, low carbon embodied, climate responsive, energy efficient dwellings alongside designing and implementing green products & practices to sustainably contribute as a part of the project but development as a whole.

## MISSION

To build earthen dwellings of timeless, natural beauty, contributing to quality sustainable homes that will continue to be a pleasure to live for generations to come with an absolute positive future impact.

## VISION

We believe in “building future”, a “green future” of natural beauty, resilient and green regenerative structure & system's designed & built to live, endure and honour many generation to come.

We believe in bringing positive and proper changes within the building industry in context of constructional practises being carried.

We look forward in creating physical expression of our love for the planet and our future along with green practices to accept/embrace.



# Our Values

## INNOVATION

*"Genuine curiosity to learn and improve."*

4 years of research and development has taught us one thing, that the pursuit of excellence never ends, but greatness can happen along the way.

## DURABILITY

*"We build things that last."*

We build to withstand extreme weather, fire and earthquakes, uniquely capable of enduring the test of time, with very least maintenance.

## BEAUTY

*"A big chunk of layers of pretty surface."*

We believe in building things that are strong from the inside and has that quirky eye appealing surface from the outside.

## SUSTAINABLE TO THE CORE

*"We strive to achieve greenbuilding in the truest sense of the term."*

We believe that currently, most greenbuilding is just not that. In the current dominant building model, one or two environmental benefits are typically advertised with a lot of greenwashing.

## LOCAL SOURCED MATERIALS

*"Sustainability is only achieved if we use locally sourced materials."*

We believe nature has gifted us more than we require, all the sustainable approaches only come handy when we use the resources that are found around us, doing that we can help ourselves economically, socially & can sustain our lives for more future to come but with responsibility.

## PROPER METHODOLOGY

*"Getting things done the right way."*

At every stage of execution we don't compromise on the code of practice that is to be followed, from the moment we think of doing a certain project everything will be done how it should be done.

## LOCAL/STUDENT EMPOWERMENT

*"An opportunity will go a long way."*

We don't believe in hiring but making someone a part of what we do, where in we share camaraderie to learn, improve and grow together by providing opportunities specially to the student's and the local's.

# WHY CHOOSE US?

## Carbon footprint issues can be tackled

Our project provides an alternative to conventional (concrete) construction. Since concrete is used to build most roads, bridges, dams, and other structures worldwide, it emits a significant quantity of CO<sub>2</sub>. Aside from water, it is the most consumed product on the planet. This industry will continue to harm the environment with over 4 billion tonnes of carbon dioxide annually until global emissions are reduced.

G20 and sustainable goals can be attained.

**Facts-**  
Sikkim monthly consumes approx 20-25 thousand tons of cement just through trade market i.e equivalent to 2250 tons of carbon emmission!

## Fight climate change

All of the projects various techniques and features are provided with the aim of sustainable construction and the future in mind. This basically boils down to the fact that our project helps to bring about a positive change in the ecosystem. This, in turn helps in fighting the glaring problem we face as a species, that is the climate change.

(Being self responsible for the planet)

## Our project aims to introduce waste management techniques

When we talk about waste management, we cannot do so without talking about segregation of wastes, however segregation can be done properly only if it starts from the home where the wastes are produced. We will introduce a well-designed flow chart or a system that will have segregation of wastes as its core.

**Facts-**  
We lack a proper segregation, treatment system for our waste, therefore our net zero waste system that start's from a household itself will not let our waste to reach the landfill's.

**Fact-**  
A state that has half a year of monsoon season & receives approx of 400-550 mm of rainfall monthly has a lot pf potential to harvest free rain and use it for our household & drinking purpose.

## Free water via Rain water harvesting

With rain water harvesting, we aim to help in the ever increasing demand for water and reduce the need for imported water. This will help in both water and energy conservation, as well as help in reducing the water bill.

## The excess of soil from landslides can be reused by us at MudBeaver.

Landslides being a common occurrence and problem in our state, we offer some semblance of silver lining in the fact that we can put the soil from such landslides to better use through sustainable construction.

**Facts -**  
As stated above, us experiencing monsoon bring lot's of landslide all around the state, producing tons of mud which are generally thrown or dumped!

**Facts-**  
**Being an organic state, growing food should not be limited only to our farmer's, everyone should try to home grow, own food!**

## To be introduced to and become a part of our permaculture project

With this project we want to help design and set up small-scale or large-scale fields for the purpose of self-sustaining irrigation. This will help provide food for oneself and their families. This will be achieved through application of various features and techniques namely, aquaponics, drip irrigation and mixed cropping to name a few.

## Workshops/awareness camps for sustainable lifestyle

After we build a sustainable infrastructure around us, if we don't realise & accept a sustainable lifestyle the effort put may only be a mere percentage, therefore a proper change in mentality, lifestyle is needed so after we finish building green systems, we'll be hosting and giving workshops on how we can attain a total sustainability by accepting a new dimension of habits and living.

**Fact-**  
**To attain sustainability and to transcend the whole sustainable approach we should walk, talk, wear & eat keeping planet as our first priority cause it's critical high time right now.**

**Fact -**  
**With average temperature ranging from 18 to 32 degree celsius we have a lot of potential in harnessing free renewable sun energy from the nature.**

## Solar harnessing as part of the project

Most of the present day resources of energy are limited and irreplaceable. The next generation will face acute energy crisis if alternate resources of energy are not developed concurrently. Increasing cost and import of conventional resources have bad effect on the economy of a country, and the only cheaper solution is "unlimited power" from the sun.

## Preserving traditional/vernacular designs

The construction techniques and materials we seek to incorporate into our structures will reintroduce feasible traditional features. This not only rekindles one's love for traditional structures, it will help in spreading cultural importance that has been gradually fading over time.

Facts -  
With close encounter and observation made with the laid back improper construction practices done, a positive change within the industry is needed!

## Improper construction practises

Fact -  
Our locally sourced material approach will reduce the building cost by 30%-40% cause we don't have to capitalize much on our hero material i.e "MUD".

It is no secret that the construction process of a common man's home in Sikkim has long been in need of an overhaul. The construction usually is not done with proper survey and technical tests, thumb rules are followed for construction in completely different conditions of sites. These are only but a few problems being highlighted. These improper practises can prove fatal in the long run. We aim to raise awareness against it and introduce proper procedures to be followed.

## Pocket friendly

The construction materials that we will be using in our techniques mainly revolves around mud and this can be locally sourced or even be available free of cost. This means lesser cost of transportation, faster construction and increase in efficiency. This all contributes to the fact that the net cost of construction decreases substantially.

Facts -  
Tourism being our flag bearing attraction, with average annual visit of 15-17 lakhs tourist, we would like work to step up through sustainable tourism with our approach!

Facts-  
With 7.3% unemployed rate being the nation's problem we bring in opportunities for livelihood to local's and youths of Sikkim also collaboration with SHG's all around the state!

Facts-  
With Sikkim solely producing thousands of engineering graduates every year, we want to provide student's with intern opportunities and start the culture of internships to help students with skill building & stipend motivation!

## Promote local tourism

The structures we aim to erect are going to look the part as well as carry the tag of a green building. This, due to its rarity and uniqueness can generate interest from locals and tourists alike. This will in turn help in increasing the local tourism of the state.

## Attain sustainable developments goals

The state we work out of, that is Sikkim is known as the first organic state of India.

This being the case, there are various goals and objectives set by the state for further improvement in this field. Our project will contribute heavily into attaining the said goals.

### Fact -

With G20 summit just passing by and us being a part of it we fit in perfectly for all the sustainable goals that the summit formulated.

Facts -  
We believe in certifying every dwellings that we build with a green building certification such as GRIHA, IGBC, LEED!

## Make people feel proud & responsible through green certifications

The construction of structures we are going to be responsible for, will warrant a green certificate that certifies the ownership of green buildings. This serves to invoke pride and responsibility of the owner for owning a green building.

## Awareness & avail scheme's related to constructing green buildings

Since sustainability is need of an hour to tackle all the climate priorities, the government have provided with various schemes in relation to the construction of green buildings. This well help in the availing of various subsidies that will help alleviate/reduce the cost of construction of the said green building.

### Facts -

We would like to work with the Govt. as-well as help people avail scheme's that support's construction of green building and practises.

## Introduction to Aquaponics

With our aquaponic services we aim to provide all-natural fertilizer from waste produced by fishes. Without any reliance on mined or manufactured fertilizers, efficient, sustainable and highly productive irrigation can be done. The waste water from the fishes excretion can be used as nutrient rich water for plants. This water which is technically filtered can then again be cycled into the tank containing fishes. This cycle goes on thereby proving to be a great self-sustaining process.

### Fact-

A permaculture technique where you produce veggies along with 2-3 kg of fish every month, for self sustaining your life!

### Facts-

From private housing to govt housing and quarters Sikkim has comparatively a good percentage of buildings entering the scrap period.

## Concrete Buildings nearing their scrap period

Various old structures all over the state are nearing the end of their life span. The resultant waste products from their eventual demolition's can be a huge problem and could use up a huge area for landfills, therefore our regenerative mud houses through us at MudBeaver can greatly reduce the burden to the ecosystem in the state.

# OUR SERVICES

## Sustainable consultant.

We not only put on a lot of labour on building a den for our client but foremost we are here to give suggestion's & advise for individuals who are interested in diving in to this world of sustainability, from advice's dealing with just building a green home to the selection of materials/ products, technology used, etc and to actually practicing and living a sustainable lifestyle, we are here to thoroughly help you on your journey.



## Traditional/vernacular sustainable designs.

Providing design which are inspired from rich & aesthetically looking traditional buildings, preserving the local culture and heritage with a zest of passive design principles which helps the dwellings designed to be structural and climate responsive.



## Green design optimisation.

Apart from building fresh mud structure and systems, we also indulge ourselves on re-designing and renovating existing conventional structures with various passive & sustainable principle's & practices that makes a dwelling more climate responsive, green, resulting it to be energy efficient, self sufficient& much more.

## Green building certifications

Since the services we provide helps a great deal in attaining sustainability, which also ticks off a lot of criteria and norms for a building to be certified as green, therefore we are also here to get you certified for building & living the green way to show how responsible & caring you're towards our planet EARTH..



## Solar energy harvesting

We provide services on capturing and storing solar energy emitted by the sun is known as solar energy harvesting. Subsequently, the thermal and light energy is transformed into electrical energy by an appropriate technique providing you with on-grid as well as off grid electric system for a free energy to run your dwelling.

## Rain water harvesting

One of many fields our project touches is the application of rain water harvesting. The practice of gathering rainfall runoff from a catchment (the region where water falls into bodies) in order to store it in above-ground ponds or aquifers for later use or to utilise immediately for household purposes, irrigation water level regeneration and much more. To put it simply, harvesting water involves directly collecting rainfall.



## Permaculture using Aquaponics

The creation of an ecologically sound way of life in our homes, gardens, communities, and enterprises is the core of permaculture. With this project we want to help design and set up small-scale or large-scale fields for the purpose of self-sustaining irrigation. This will help provide food for oneself and their families

Aquaponics is the cultivation of plants without soil in a recirculating environment that combines hydroponics (growing plants without soil) and aquaculture (raising fish and other aquatic creatures). In aquaponics, the waste produced by the fish is transformed into nutrients for the plants by nitrifying bacteria. To flourish, plant roots take up these nutrients. For the fish to survive, the plant roots purify and filter the water.



## Net Waste management

One of the many problems being faced as of now might be the issues with the proper disposal of waste through lack of segregation etc. We will introduce a well-designed flow chart or a system that will have segregation of wastes as its core. Self-help groups will be introduced to act in the field and take the initiative to fulfil the introduced system's objectives.

## Sustainable landscaping

We also plan and design spaces around with a critical consideration of preserving soils, land use, topography, etc. that heightens water management and thoughtful local flora/vegetation choices.



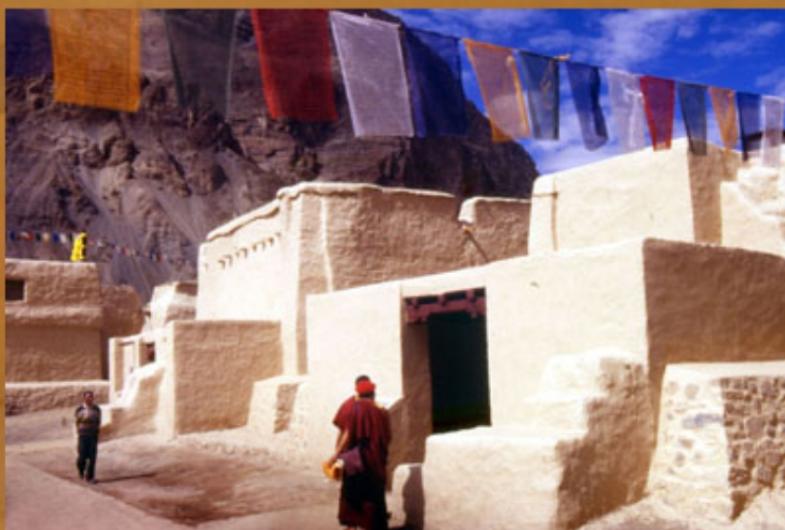
## Sustainable interior designing

The structures that we build are of course a work of art due to a lot of enriching factors but what really matters at the end of the day is how ambient and cool it is from the inside, therefore we use locally produced products (sometimes recycled) that we design to fill in those spaces inside that will narrate the story of their own.

# OUR TECHNIQUES.

## BUILDING WITH EARTH

Traditional earth building material, were the mainstay of significant portion of pastsocieties, including the Sikkimese society, from building earthen heritage structures alongwith stone masonry (monasteries, cottages), use of earth mortar mixed with fires to plaster up the walls (Ikra/wattle & daub techniques), building up an earth stove & also use of the earthen clayey slurry (red soil/ratamoto) to finish & protect the earth floorsand walls.



*In India, the oldest earthen building is Tabo Monastery, in Spiti valley - Himachal Pradesh. It was also built with adobe and has withstood Himalayan winters since 996 AD.*



*The worlds oldest earthen building still standing is about 3,300 years old. The Ramasseum, made of adobes, was built around 1,300 BC in the old city of Thebes. It can still be visited on the left shore of the Nile, opposite Luxor.*

## RAMMED EARTH

Also known in French as pisé de terre or simply pisé has been used since ages worldwide like many other earth techniques. The earth is mixed thoroughly with water to get a homogeneous humid mix. This humid earth is poured in a form in thin layers and then rammed to increase its density. The increase of density increases as well the compressive strength and the water resistance. Ramming was traditionally done by hand. Since a few decades, ramming is being done mechanically with pneumatic rammers.



Soil stabilization gave a great input to rammed earth as well as mechanization. The traditional wooden rammer has been replaced by pneumatic rammers. Heavy wooden formworks evolved into light composite ones, made of plywood, wood and steel or sometimes aluminium. Pneumatic rammers, dumpy loaders, mixers, ban conveyors, etc. allowed to build faster and get a better quality finish. Structures are most of the time built with pier walls, meaning that walls are built up to their full height at once. This way of building changed totally the design pattern of structures.

The worldwide tradition of rammed earth construction has shown that it is possible to achieve long lasting and majestic buildings from single to multi storey. Wonderful heritage can be found in countries such as France, Spain, Morocco, China, and all over the Himalayan area. One can see numerous and wonderful examples with all kinds of buildings:

- Farms, or rural houses, chateaux and apartments in Europe
- Entire villages in North Africa
- Parts of the great wall of China
- Buildings in most of the Himalayan regions of Tibet, Bhutan, Nepal, Ladakh
- Widespread examples in South America.



## WATTLE AND DAUB

A techniques that has been our go to way to construct using earth and bamboo, .

A load bearing structure, generally made with wood, is closed with infill wall panels. The latter are made of a lattice plastered on both sides with a plastic soil.

The lattice frame holds the soil and gives rigid panels. This lattice is often made of reeds, sticks or bamboo. It has been extensively used in many parts of the world: in developing countries as well as in Europe. In France (Normandie& Bretagne) the earth was often stabilized with the urine of horse: the ammonia contained in the urine gave water resistant properties, to a certain extent, to the soil.



*Somalia, Genale - Village huts*



*France, Bresse, Saint Triviers de Court  
- Farm house*

## STACKED EARTH (COB)

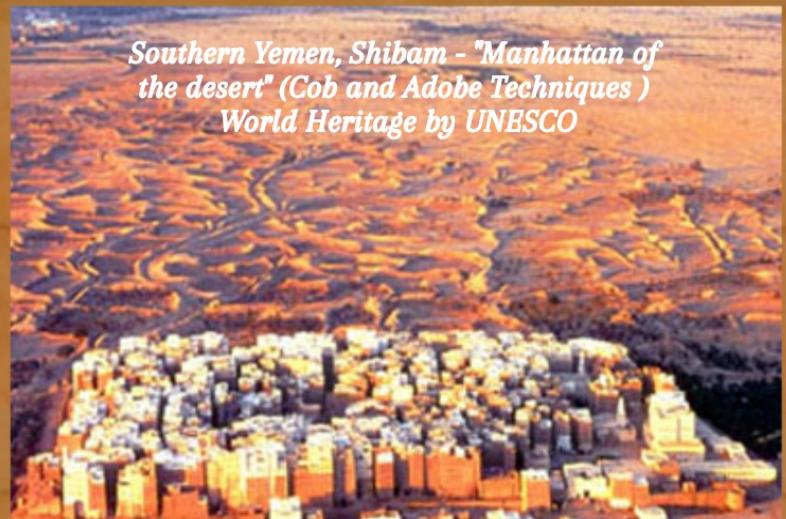
Plastic soil is usually formed in balls, which are freshly stacked upon each other. This technique has been used a lot long ago in Europe, where it was named cob in England and bauge in France.



This technique is still used a lot in Africa, India and in Saudi Arabia, where beautiful examples can be seen. The most beautiful examples are encountered in Yemen with Shibam.

Since a while, cob is getting known again with some development in USA, as well as in other parts of the world. We show hereafter only worldwide traditional developments.

This old historic capital of Southern Yemen has been named “The Manhattan of the Desert”. Shibam was recorded by UNESCO as a world heritage site. In fact Shibam was built with a combination of cob and with adobe.



## EARTH FILLED IN

Humid soil was traditionally poured into wooden lattice works. Thus, it gave some thermal mass to light structures as well as some acoustic insulation. In recent times, dry soil has been poured into synthetic textiles (bags) which are held outside by wooden poles driven into the ground.



*USA, California, Cal-Earth - Filling Superadobe*



*USA, California, Cal-Earth - Eco-dome under construction*

Dry soil is also being poured into long synthetic tubes, which are staked upon each other. Cal-Earth (The California Institute of Earth Art and Architecture) which was founded and headed by the architect Nader Khalili does an extensive use of filled in technique. They call it Superadobe construction and they are building what is called Eco-domes.

Superadobe structures are an excellent example of green building techniques. They use Tubular roll of sandbag-type material which are filled with earth. A barbed wire is used to bind the earth tube together. Later on the earth tubes are plastered with stabilised earth plaster.



*USA, California, Cal-Earth - Eco-domes*



# Our Team



**Prajwal Tamang**  
– CEO & Founder.

Diploma, B.Tech in Civil Engineering.  
Earth & Bamboo tech specialised, trained from  
Auroville Earth Institute & Bamboo Centre  
Auroville, Tamil Nadu.



**Lhakden Lepcha –**  
**Managing Director/**  
**Landscape Designer.**

Diploma, B.Tech in Civil Engineering.



**Aasha Tamang**  
– President.

Former Community facilitator under North East Rural Livelihood Project.  
Block resource person under Sikkim Rural Livelihood Mission.



**Prakash Tamang –**  
**Finance manager/**  
**Permaculture executive.**

Bachelor's in Commerce.  
20 years of administrative experience at finance section.



**Salina Rai – Creative**  
**Director / Product**  
**designer/HR**

Diploma, B.Tech in Civil Engineering.  
Certification on Graphic designing



**Bhoomika Chaudhari**  
– Architect

\*Bachelor's in Architecture (A.O.A, Mumbai)  
Specialises in Sustainable Architecture  
Worked as intern at Dus Studio, Auroville.



### Sanskaar Rai- Structural Engineer (Earth)

Diploma, B.Tech in Civil Engineering.

\*M.Tech in Structural Engineering (S.M.I.T, Majitar)



### Nedup Zangpo Lepcha – Structural Engineer (Bamboo).

Diploma, B.Tech in Civil Engineering.

\*M.Tech in Structural Engineering (S.M.I.T, Majitar)



### Pratap Tamang – Project manager, Sikkim Region.

15 years of experience in civil works.

Specialised in Traditional/Vernacular civil construction.



### Indra kr Tamang – Project Manager , West Bengal Region.

15 years of experience in civil works.

Specialised in traditional/vernacular carpentry, bamboo works.



### Kaji man Tamang – Project manager, Nepal.

15 years of experience in civil works.

Conventional civil works.



### Nania Ngute Tamin - Project manager, Arunachal Pradesh/Assam region.

Diploma, B.Tech in Civil Engineering.



### Ashutosh Tiwari – Aquaponics guru

Bachelor's in Fisheries.  
Specialised with ornamental  
(aquarium) fishes & aquaculture.



### Amit Rai – zero waste management guru

Diploma, B.Tech in Civil Engineering.  
Certification on Waste management.



### Achong Lepcha – Solar energy solution guru.

Diploma, B.Tech in Civil Engineering.



### Pravesh Pradhan – Rainwater harvesting solution guru.

Diploma, B.Tech in Civil Engineering.  
Worked as technician for RWH project's.



### Nandeshwar Rabha – Head Technician

15 year's of masonry experience.  
Trained with earthen building  
techniques.



Rammed earth building in Bhutan

Impressed yet? Or the curiosity just getting  
the better of you?

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&  
meet the family and purpose of beavers  
behind the project

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