CERES Global

The Jamnya Project
‘Living and Learning for a Sustainable Rural India’

MODUS Architects
Contents

1 Introduction
   1.1 Background and Rationale
   1

2 Site Visit and Data Gathering (January 2013)
   2.1 Summary of Objectives
   2.2 Progress Summary
   2.3 Key Achievements
   14

3 Project Planning & Design Consolidation Phase
   3.1 Summary of Objectives
   3.2 Progress Summary
   3.3 Key Achievements
   4

4 Construction Phase
   4.1.1 Summary of Objectives
   4.1.2 Progress Summary
   4.1.3 Key Achievements
   5

5 Key Aims for remainder of 2014
   7

6 Key Aims for 2015
   7

List of Figures
   Figure 1: Location of Jamnya
   Figure 2: Site Selection

List of Appendices
   Appendix A: Photo Records
   Appendix B: Final Architectural Plans
1 Introduction

CERES Global’s primary aim is to engage with the issue of global equity and the well-being of all people on the planet. It has a special focus in working with remote village communities in areas of education, health, sustainable agriculture, climate change and women’s empowerment. So far, CERES Global has worked on developing and delivering environmental education programs in various village schools, teacher training for teachers for remote village teachers, organising and setting up discussions around domestic violence with women’s groups, educating in women’s and children’s health, researching and delivering alternative fuel for cooking in remote rural villages.

CERES Global has developed a close working relationship with Satpudas Vikas Mandal (SVM) a community organisation based in Maharashtra, India who are devoted to working with tribal groups in the remote Satpuda Ranges surrounding the village of Pal. The organisation operates a farm on approximately 150 acres where they research, develop and implement new techniques in water harvesting and storage, irrigation, new varieties of crops and organic farming techniques. SVM also manages six schools in Pal and surrounding villages including Jamnya, a rural village approximately 25 km from Pal.

The nature and purpose of the project embody the ENVIRON Foundations key purpose of ‘protection of human health and a sustainable global environment,’ whereby the intention of the project is to address critical sustainability and public health issues within the region and more broadly across many parts of rural India.

The outcome of the project will be a model dwelling for replication which has been designed and will be constructed to address pressing environmental sustainability issues such as natural resource depletion, domestic water management and quality issues and insufficient, non-renewable energy supply. Critical human health issues such as spread of disease due to lack of adequate sanitation facilities and consumption of contaminated water will be addressed by incorporating a safe, clean water supply and an effluent treatment system into the dwelling.

1.1 Background and Rationale

Jamnya is a rural village in the Satpuda Mountain Ranges in northern Maharashtra, close to the Madhya Pradesh border consisting predominantly of people from the Powarah tribe. The village is surrounded by conservation reserve forest, village housing and agricultural land. The people of Jamnya are predominantly employed in farming (wheat in the summer months and gram/maize cotton during the winter months). Village water supply is from an open pit groundwater well and water is directly used from this supply. Electricity supply is from mains power, which is supplied inconsistently for approximately 12 hours a day in the evening. The climate is largely varied, with four months of monsoon (heavy rains and high winds) and 8 months of dry hot weather. Daily temperatures can vary between 2 and as high as 35 degrees Celsius. There is currently no practice of rainwater harvesting.

The Jamnya Primary School consists of 400 students from first to tenth standard, about equal boys and girls. There are 14 teachers, of which there is only one female teacher. The majority of students board at school, and the existing 7 classrooms are used as dormitories. Each classroom sleeps 11 students side by side on the floor and there is limited space for personal storage or space between the students. The current school consists of two standalone brick buildings and a separate toilet block (one for boys and one for girls). The toilets are not currently used, and students go to the surrounding mountains. The teacher’s accommodation consists of small, dilapidated bamboo thatched structures. Currently, sewage and wastewater from the school and teacher’s quarters drain into a creek on the western periphery of the site. The majority of homes and the school kitchen use indoor tradition wood
fired stoves to cook meals and heat water. The incomplete combustion of biomass in these traditional stoves releases pollutants like carbon monoxide and respirable particulate matter which cause considerable damage to health, especially of women and children who are exposed.

Wood is collected from the surrounding areas, and despite the attempts to preserve native forest areas, deforestation and unsustainable harvesting practices are a key concern for the local authorities and SVM. Road access from larger neighboring villages (Pal and Garkheda) is via unsealed, dirt tracks and there is no heavy vehicle access.

With many students boarding at the school and away from their families, the teachers provide support and care for the students. Being in a remote location, the school has difficulty attracting teachers, particularly female teachers. Based on conversations with teachers and the local community, the lack of adequate and permanent accommodation for teachers is a barrier in attracting female teachers. The current teacher’s living quarters are viewed as unsafe to live alone and insufficient space to accommodate families.

In response to the identified need to attract female teachers to the school by providing adequate housing, the housing quarters will be designed to:

- Provide safe, durable and comfortable housing for two teacher and their families, including a safe water supply and private sanitation facilities for each dwelling;
- Incorporate efficient, hygienic and low costs household water management and effluent treatment systems; and
- Incorporate sustainable design principles - renewable energy systems to provide a consistent, reliable source of power for lighting; alternatives to the heavy reliance on burning wood for cooking and heating water; and maximize local and low emission intensive building materials
2 Site Visit and Data Gathering (January 2013)

2.1 Summary of Objectives

The first phase to be implemented in January of 2013, will involve research undertaken by an architect and housing project coordinator and a team of volunteers. Tasks in this initial phase will include the following:

- Liaise with builders and craftsmen in India in order to research and develop the most appropriate building techniques that draw on traditional and new technologies.
- Find and mark out a site for the pilot house.
- Liaise with SVM in regard to project tasks they need to undertake before the group returns in January 2014
- Adjusted the housing location/orientation as needed.

2.2 Progress Summary

In 2013 a team from CERES including a Project Architect and Project Coordinator travelled to Jamnya to meet with representatives from SVM and the Jamnya School to commence the consultation and planning phase of the project. Project plans were discussed and a site for the dwelling was selected in consultation with teachers consultation was held with the following groups:

- Key personnel from SVM
- Key personnel from the Forestry Department, Maharashtra
- Local member of the Maharashtra Legislative Council
- Local architects – Vivek Kulkarni
- Local civil engineer – Anhil Chaudhari (Sagar Construction)
- Director of Dhananjay Power – Nilesh Chaudhari
- Teachers and students of the Jamnya Primary School to understand the local need and cultural dimensions of the build

Information was documented about the project site such as topography, surface drainage, geology and soils, access to water, metrological condition, access to local materials, a survey of existing materials and techniques.

Although the focus of this project is to construct a model dwelling, discussions with SVM also indicated that they are also seeking assistance for improvements and expansion of the Jamnya School including boarding facilities, staff accommodation, support facilities and the teacher's quarters. CERES will provide this assistance and the model dwelling will form part of the master plan from the upgrade of the school.

2.3 Key Achievements

- Finalisation of project plans, project schedule and architectural drawings.
- Collection of environmental data and local knowledge
- Set-up/handover of weather station and its operation to log annual meteorological data
- Consultation with key project stakeholders and communities in relevant areas of India
3 Project Planning & Design Consolidation Phase

3.1 Summary of Objectives
Following the Site Visit and Data Gathering Phase in Milestone 1, the following tasks were to be completed to plan for the January 2014 construction phase.

- Monthly technical scoping and planning meetings with the project working group.
- Finalising details and technical specifications of small scale renewable energy options for the house, building materials and design concepts, sewage, waste and water management options.
- Finalising project designs and materials specifications in collaboration with Paul Adams, consulting architect for the project for peer review.
- Developing project website and fundraising platform

3.2 Progress Summary
Monthly meetings were held at CERES with the project team and project logistics and design specifics were discussed in preparation for the construction phase. Swinburne University also joined the project team offering further technical expertise, experience in the region and a team of skilled labourers who would travel to India in 2014. Plans were conveyed to SVM and project plans were sent across to them for approval. A website was established to raise awareness of the project, share project successes and learnings. Arrangements were also made for the Project Architect and Swinburne construction volunteers to visit the Auroville Earth Institute in Pitchandikulum to further research culturally appropriate and innovative building techniques in India.

3.3 Key Achievements
- Development of a web platform/twitter feed acknowledging sponsors and tracking progress and reporting of project developments. Also provided an platform for donation and subscription to
online newsletters: thejamnyaproject.org

- Project partners Swinburne University joined the projected receiving funding and nominated skilled Swinburne Trade School Carpentry and Plumbing Apprentices to join the team.
- Finalisation of volunteer team, logistics and schedule for January 2014

4 Construction Phase (January 2014)

4.1.1 Summary of Objectives

Construction of the dwelling to commenced in January 2014 with a hand-over to local laborers.

4.1.2 Progress Summary

In January 2014 the CERES Global team returned to Jamnya with a group of enthusiastic and skilled Swinburne Trade School carpentry and plumbing apprentices. En route to Jamnya, the group spent time in South India investigating innovative sustainable building technologies at Auroville and Pitchandikulam, CERES Global’s other partner organisation in India.

The team achieved significant outcomes at the Jamnya school this year. The two main areas of activity that took place were: to make improvements to some of the existing school infrastructure, particularly the toilets and water supply for sanitation; and to continue consultation and commence construction of the teachers’ quarters.

4.1.3 Key Achievements

Collect compile & analyse weather station data

- The previous 12 months of weather station data was downloaded and checked against manual readings taken throughout the year.
- All weather data was collated in a single spreadsheet

Toilets & water for sanitation

- Complete repair & refurbishment work on boys toilets
- Installed new water tanks for hand washing at the location of the toilets
- Installed an in-ground sand filter to manage the outflow from the septic system.
- Existing leaky water taps were also repaired throughout the school
- Major pipe leaks were repaired, saving thousands of litres of water per year.

Materials & techniques research

- Investigations focused on local practices and locally available materials, including varieties of compressed earth brick and locally grown bamboo
- Case studies were visited and studied in the local area and South India
- Existing locally manufactured fired bricks were analysed for their environmental impact. Current brick production is uses coal fired kilns, of which coal is transported 45km from a coal depot. The direct emissions associated from coal firing are estimated to be 0.062tCO2-e/’000 bricks. This is a highly emissions intensive and water using process compared to earth brick construction, which does not require any coal firing.
- Local bamboo plantations were assessed for suitability for construction. Bamboo is locally available. The traditional practice is to harvest the bamboo and naturally treating the bamboo by
submerging it in a flowing river for several weeks. This process reduces the sap content and minimize the risk of termites or material degradation.

- Local soil samples were taken and sent to the Earth Institute in Auroville for analysis to determine appropriate mixtures for compressed earth brick construction.
- Compressed earth brick press organised for next trip
- Footing system using locally sourced rock combined with cement mortar mix proved to be the most efficient and economical method
- Local contractors were consulted and their expertise incorporated in the method for constructing footings

This process has resulted in a clear strategy to use these locally available materials of earth and bamboo combined with local skillsets to create beautiful, appropriate and resilient buildings with a low environmental impact.

Consultation and finalise design with teachers/community members

- Consultations were held with the teachers as a group as well as a specific discussion with the only female teacher
- Consultation with the local woman’s group in Jamnya and surrounding villages to understand the perceptions of female education and local hygiene/sanitation practices
- Consultations were also held with local community members to keep them updated on the progress of the project
- The final layout of the proposed housing was discussed with the teachers and some minor modifications made to accommodate feedback.
- We were able to finalise the building layout and location and details of internal details for cooking, bathroom, sleeping, living and outdoor areas.

The existing teachers’ quarters are below standard by anyone’s measure and do not provide adequate shelter, cooking or washing facilities. The dedication of the existing teachers is remarkable considering the conditions of their accommodation. They were extremely excited and grateful that work was beginning on one of their new houses.

Construction commences

- The building site was assessed and the building set-out finalised.
- SVM directors and local representatives approved the location and building layout and levels
- A blessing ceremony launched construction.
- The CERES Global team, local trades, teachers and students all joined in to dig the trenches for the new footings.
- Local manual methods were employed to mix cement and handle materials
- The rock and cement footings were built using local low-impact practices.

There was enthusiastic interest and contribution from students, teachers and local villagers. All of the work was completed using manual labour and hand tools. The limited availability of electricity and machinery allowed teamwork to flourish.

- Work will continue through the year under the coordination of a local contractor to complete the footings and building base.
Decorating the boys and girls toilets

- To engage the students and promote the use of the toilets, some of our artists joined with the students to decorate the toilet buildings and tank stands.
- They painted murals on the walls and the water tank stands were adorned with a decorative mosaic using pebbles from the surrounding areas.
- Once the work was done, team members gave demonstrations to the children on how to use the new water facilities for sanitation and toilet cleaning.

The involvement from the students was fantastic, their enthusiasm and energy was amazing.

5 Key Aims for remainder of 2014

Work has commenced on detailed design of the building.
- Project architect and engineers will finalise the structural methodology using bamboo and earth brick construction methods.
- Soil sample results from Auroville will dictate final sourcing of soil and quantities of cement for stabilizing compressed earth bricks.
- Project manager will return to Jannya to facilitate training workshop with local trades using earth compressor to commence manufacture of bricks for use in construction.
- Bamboo will be harvested for treatment during the monsoon period in time for use in construction.
- The overall project will continue to look at the broader context surrounding the teacher’s quarters to improve the livelihoods of the teachers and community. Detailed project work to develop ideas and timelines for a number of projects include: rainwater harvesting & storage, centralised school water treatment, a community solar hot water system, ventilation strategies for solid fuel based cooking, general revegetation, kitchen garden, and alternative biomass for cooking.

6 Key Aims for 2015

In 2015 the team will reassemble and return to continue supporting and building the project. The key aim for 2015 is to have the building completed for occupation by the teachers.

As teacher’s living conditions improve and the school evolves, CERES Global will work with the teachers and local community to develop culturally appropriate infrastructure and a curriculum which addresses and educates about universally relevant topics also found in the CERES Sustainable Schools programs.
Photo 1: Site selected for dwelling construction (January 2013)

Photo 2: Existing teachers housing (photo taken January 2013)
Photo 3: Weather Station Installation (taken January 2013)

Photo 4: Consultation with local experts about building materials and local techniques (taken January 2013)
Photo 5: Research at the Auroville Earth Institute (Jan 2014)

Photo 6: Brick press for use in the project (photo taken Jan 2014)
Photo 7: Local bamboo plantation harvested for use in the teachers quarters (taken Jan 2014)

Photo 8: Local fired brick production methods are highly polluting (taken Jan 2014)
Photo 9: The team is welcomed at Jamnya School (Jan 2014)

Photo 10: Experimental air-dried bricks tested for stability (photo taken Jan 2014)
Photo 11: Soil samples gathered for analysis at Auroville Earth Institute (taken Jan 2014)

Photo 12: Water quality samples taken and leaking taps timed to calculate water wastage (taken Jan 2014)
Photo 13: Teacher’s existing accommodation remains in poor condition (Jan 2014)

Photo 14: Consultation with teachers (photo taken Jan 2014)
Photo 15: Teachers quarters building setout (taken Jan 2014)

Photo 16: Blessing ceremony to commence construction (taken Jan 2014)
Photo 17: Work on site using manual labour and teamwork (Jan 2014)

Photo 18: The team of volunteers and contractors (photo taken Jan 2014)
Photo 19: Excavation complete and footings commenced (taken Jan 2014)

Photo 20: Footings will be completed in early 2014 (taken Jan 2014)
Photo 21: Water tank installed for hand washing and sanitation (Jan 2014)

Photo 22: Newly decorated boys toilets and students (photo taken Jan 2014)
Photo 23: Girls toilets during refurbishment (taken Jan 2014)

Photo 24: Farewell to the Jamnya School teachers, see you again in 2015 (taken Jan 2014)