Photographs: Green School Bali

Green School in Bali

Recently voted the Greenest School on Earth by the US Green Building Council, here is a snapshot of the curriculum and some of the projects currently underway

By **Ben Macrory**

DRIVING NORTH FROM Bali's chaotic capital city of Denpasar on one of the main roads heading north towards Ubud, it's difficult to get a sense of the magic that lies ahead. One still glimpses rice fields and Hindu temples, but the Bali of old is increasingly giving way to motorcycle dealerships, internet shops and garishly lit 24-hour mini-marts that have replaced traditional, family-owned *warung*. However, upon reaching the village of Sibang Kaja and taking a turn down a 500 meter bumpy, rutted road, another side of the Island of the Gods comes into view. Standing in the parking area overlooking the pristine Ayung River valley, the first structure visible through the jungle foliage is a stunning covered bamboo bridge, built in a style reminiscent of the Minang people of Sumatra, with curved roof ends jutting up towards the sky like the prow of a ship. To paraphrase "The Wizard of Oz", Dorothy, we're not in Kuta anymore…

Welcome to Green School Bali, one of the most unique international schools on the planet!

After nearly five years of operation, Green School has garnered attention and acclaim from all over the world for its pioneering efforts to interweave academic learning with environmentally sustainable practices. (In fact, it was recently named "Greenest School on Earth" by the U.S. Green Building Council, the organization that provides LEED certification for environmentally friendly buildings.) Green School boasts one of the most beautiful campuses imaginable, with extraordinary bamboo structures rising out of the jungle, surrounded by lush organic gardens and bisected by the Ayung River. Green School serves an international population of 270 students from 55 countries in Pre-K through Grade 12, with boarding available for Grades 6 and up. The school also supports a scholarship program for local Balinese children who would otherwise not be able to afford the fees; these currently represent about 10% of the population although through a fund-raising program Green School hopes to raise this figure to 20%.

Green School offers a student-centered curriculum designed to cultivate and challenge all aspects of a child's human capacities. It includes all of the traditional subjects, but academic education at Green School comes wrapped in rich layers of experiential, environmental, and entrepreneurial learning plus the creative arts. As much as possible, lessons at Green School are taken out of the classroom and applied in hands-on ways that have a connection to the natural world. The school's goals are simple but ambitious: to provide its students with the skills and content to be effective and successful competitors in an ever-shrinking world while at the same time expanding their sense of being more environmentally responsible citizens with a different sense of possibilities for how we can continue to develop as a fragile planet.

The campus has been designed and built to have as small an impact as possible on the environment. Therefore, only a handful of trees were cut down, and most of those were successfully replanted elsewhere (several structures still feature live trees growing through their roofs!), and buildings were erected according to the natural topography of the land, so no moving of the earth was required. Environmentally friendly bamboo is the primary structural material used, but other local, natural, and renewable elements are also employed, including alang-alang thatch, volcanic stone, rammed earth, and traditional Balinese mud wall.

Open air structures allow for natural light and ventilation, and aided by ceiling fans and an innovative system of enclosable, air-conditioned bubbles, stay cool even during the hottest days in the jungle. Green School grows much of the food it consumes, including organic rice, fruit, and vegetables, and the school is in the process of getting off the grid through a combination of solar, micro-hydro power, and biogas systems.

The solar project consists of 108 photo-voltaic panels mounted on bamboo poles and arrayed on a slope between the cathedral-like Heart of School building (it contains over six kilometers of bamboo!) and several of the primary classrooms in a formation that suggests a landscape art installation rather than a source of energy that already powers much of the campus. Primary and middle school students helped design and build creative bamboo frames in animal shapes to house the panels, while students in the high school assisted with the grant-writing proposal to help fund the project.

The hydro-project is called a Gravitational Water Vortex and is known in daily use as the Vortex. It's a very innovative yet simple technology invented by an Austrian engineer named Franz Zotloterer who realized that you could harness a relatively flat river like the Ayung for electricity without building a big, invasive dam. His solution was to dig a small tunnel that diverts a very small percentage of the river's water down into a large cylinder. Both the tunnel and the cylinder were carved from locally quarried stone, and through a combination of gravity and centrifugal force, the water comes down and gets pushed into a very powerful vortex or whirlpool that will soon be used to spin a turbine that sits in the middle of the structure. (It looks like a big, flushing toilet!) The water then goes out a hole in the bottom of the cylinder and right back into the river. Between the solar project and the Vortex, Green School expects to be supplying all of its own energy needs through clean, renewable sources by the end of 2013.

Green School students take part in a number of other innovative environmental initiatives on-campus, including a project in association with the Begawan Foundation to breed several endangered bird species. The centerpiece of the project are the Bali Starlings, lovely white birds with a distinctive blue mask around their eyes. It's thought that in the wilds of Bali today there may be as few as twenty adults left! Farmers kill them because they are seen as a pest, and they fetch high prices on the black markets of Asia by collectors who like to keep them in cages. Students in Grade 2 learn about the Bali Starlings in the classroom, breed meal worms to feed the birds, do art projects about them and then get to take a mini-field trip within the campus to study them up close and in person. Within the next few months they will get involved in a wild-release project. Pretty amazing!

Starting from the Kindergarten, every class at Green School has its own veggie garden, which the students help to design at the beginning of the school year. "We think it's important for kids to know where their food comes from, something many of us in the developed world have no idea about anymore", says Green Studies teacher Noan Fesnoux. "Our children make their own compost using organic waste, prepare the ground, plant the gardens, tend them and then later harvest and eat what they have grown". Last year's Grade 3 class planted a pizza garden consisting of tomatoes, basil, peppers and other veggies. At the end of the term they invited the whole school to attend a pizza party!

Grade 2 teachers Mona Dalmia and Yulie Lim worked with their students this year to build solar ovens, which they used to roast vegetables from their garden. For dessert they baked chocolate chip cookies using chocolate the kids made themselves from the school's 200 organic cacao trees.

Bali, like many parts of Asia, grows rice as its staple crop. But more than a food, rice is in many ways the cultural backbone of the island. Primary students at Green School therefore study the role of rice in Balinese art, mythology, history, and society, but as per the school's goals, the learning is not restricted to the classroom. At the beginning of the year, every class from Grade 1 to Grade 8 gets its own rice field, which students plant, ten d (including using recycled materials in art class to make scarecrows), harvest and eat. "Chances are that very few of our students, including the Balinese children here, will grow up to become rice farmers," says Green Studies teacher Matt Shroads. "Our hope is that this project will serve to reinforce some of the classroom academic learning, but also give these kids a sense of appreciation for the very hard work that goes into planting rice, a better idea of how the food they eat is produced, and a sense of closer connection to the natural world."

Students in Grade 5 participated in one of the year's most interesting projects interweaving traditional academic learning with environmental sustainability: an attempt to calculate the school's carbon footprint and figure out how much bamboo would need to be planted to offset that carbon production. "The kids had to go all around the school and find out what kind of appliances are being used, how many of them are there, how much power do they consume, working on communication schools in English and Bahasa Indonesia", recounts teacher Eva Green. "Then it became a big maths problem, converting and calculating to come up with total usage." Following this, the students worked on their persuasive writing and visual art skills to come up with a marketing campaign encouraging people to plant bamboo as a way to off-set carbon production. One of the findings was that the single largest drain on electricity was a slushy machine in the school's Green Warung used to make yummy iced fruit drinks, a favorite treat on the campus. "I was really proud of my students", says Eva. "They took their report to the student council, who voted unanimously to get rid of the machine as a result." What a great example of integrated learning and community action!

Green School is located in the middle of the jungle in a country where regulatory framework is quite loose, and much of what happens there could not be easily replicated in other parts of the world due to more demanding physical and political climates. But there are many things teachers can do to incorporate environmental sustainability into their practice no matter where they are located.

A partial list follows—all of these things are currently happening at Green School :

- Find an area at school to grow your own vegetables and have students design and plant a garden.
- Help students design and conduct an audit of your school's energy and water use; look for ways to reduce your consumption.
- Design and implement a school-wide recycling program.
- Create art or architecture projects from found materials, both organic and inorganic.
- Take students into a natural setting and encourage them to write songs or poems inspired by the environment.
- Learn about local flora and fauna species and take part in conservation efforts to protect them.
- Take part in a clean-up of a local beach or park.

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Noan Fesnoux

Coconutty Classes

A profile of a 3 week thematic unit for grades 6-8 that focuses on a tropical fruit that masquerades as a nut.

By **Noan Fesnoux**

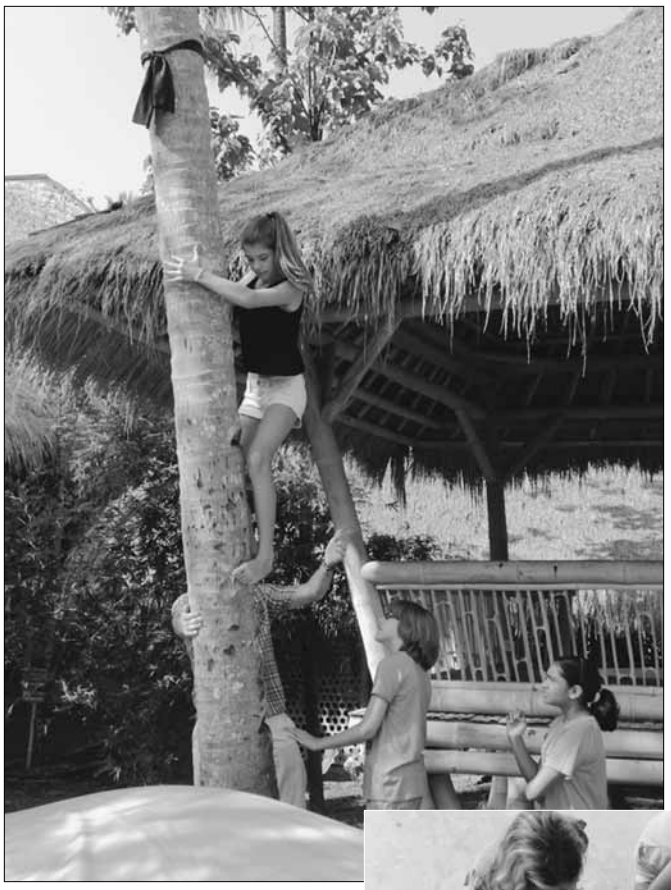
When a picture of an open air school such as ours is shown to people, most don't realize that the greatest environmental impact on the students occurs in the space between the buildings. It is in these jungle spaces that Green Studies is commonly taught. A mix of environmental science, sustainability studies, and agriculture, Green Studies are an important part of Green School. But they are not the only distinguishing factor for this bamboo-based learning center.

In 2012, Green School adopted a concept called the 3 frame day. This form of teaching marries holistic learning with a more academic approach to teaching. The first part is the most unique: the thematic lesson. Then, in the heart of the school day, lies the proficiency block. This is an allotment of time that allows students to work predominantly on Mathematics, English, and Languages. Each day generally concludes with experiential learning: whether planting gardens, creating artwork or working on enterprise projects.

A thematic approach to subjects is not new, but thematic lessons at Green School differ in that they attempt to address students' 4 key intelligences: interpersonal, intrapersonal, intelligence, and kinesthetic. All our themes pertain to the natural world and our relation to it. As the Green Studies teacher, one of my favorite themes to teach is about coconuts.

It is said that Indonesian islands are all dependent on the BBC. No, not the media outlet, but bamboo, bananas, and coconut. These three plants can provide food, shelter, and water with ease to those living in the tropics. For example, the coconut has dozens of practical and ritualistic applications across Indonesia. The water of a young coconut is the closest natural substance to blood plasma: the tropical world would be very different had this wonderful nut not graced its shores.

This was the impetus to create a 3 week long exploratory journey of the coconut tree, a tree whose fruits masquerade as nuts. Planning this unit took much foresight and discussion with my peers. With only 12 classes to help students learn as much about these fruits as possible, I thought of



Green School Bali

the main topics that I wanted to cover in each lesson. I also let my mind wander into the creative realms. How could I incorporate, music, art, physical education, and personal reflection into this unit? To help guide me, I focused on how the Balinese use coconuts. For example, they use coconut fronds to create offerings to Balinese gods. Why not have students create offerings and silently pledge these offerings to all we are thankful for? I topped this off with some western-influenced, coconut-inspired ideas. Pina coladas were out of the question, considering the students were in Grade 7, but songs like "Lime in the coconut" would do just fine.

On the first day of teaching the coconut unit, I started with a kinesthetic challenge. Maybe it is the fresh air here, but many Green School students thrive in active and energetic activities. I set up a crash pad from the high jump next to a coconut tree, and had three flags placed at different levels in the tree. Before touching a coconut in our unit, we needed to learn how to climb a coconut tree. At heights of 15 meters, I decided to keep our climbing goals fairly low, but the activity gave the students the experience of a coconut tree climber and helped to maintain a solid interest on the topic.

Throughout the 3 weeks, other kinesthetic activities were performed, such as husking and grating coconut flesh to make coconut milk and coconut oil. I found that working in 10 minutes of kinesthetic activity into every other lesson really helped to keep the students on track and on the ball.

To harness the emotional intelligence of the students, several activities were performed. First we sang "lime in the coconut" using coconut shells as primitive drums. We then used the shells to create characters, which we later used in skits as mannequins.

The most challenging coconut activities to develop were the intrapersonal ones. The one I regularly used was to give students coconut - in forms such as toasted, oil, rotting, husked and fermented - to smell and to write entries in their journals. With smell being most connected to memory, I was taken aback at how many memories these cues evoked, and how happily my students shared them with the class.

Sustainability and ecology should never be separated from any facet of science and learning about the coconut was no exception. The theme of sustainability was addressed continuously throughout the unit. By the end, students understood how this plant has helped to maintain low impact communities throughout the tropics. They also learned about the coconuts many uses, including as a building material and its importance to local diets. Finally, students even processed their own oil and soap from locally harvested coconuts.

During the unit, students were exposed to both sides of issues associated with coconuts, thus ensuring they had a well rounded understanding of the plant. For example, they learned of islands where coconuts had disrupted natural ecosystem, while on others, coconuts had been lauded as an important energy solution.

My evaluation of the students occurred largely in-class and was focused on how engaged were the students and how well they worked with their peers. However, to complete my evaluation, I had each student hand in some projects. One such project was a poster describing the virtues of coconuts. The instructions were differentiated, allowing a simple informational poster to be handed in, while other students worked extensively on digitally-created infographics. These portrayed critical data about coconuts in a presentable and readable format.

Three weeks went by in a flash and I was yearning for more time to teach about coconuts. I would have loved to explore the production of biodiesel, using raw materials the students plucked from the trees. In future, I would also like to provide students with the high ropes challenge of climbing a coconut tree.

With a thoroughly enjoyable format, these lessons have since been replicated for many other themes that are taught at several grade levels.

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