

GREEN FOREST

BY BEN BROWN - GREENSCHOOL - BALI - 2012

When Dr. Cam Webb, eminent Forest Restoration Ecologist from Harvard University, spoke to upper grade's Green Studies students last May regarding Bali's forests, he laid out a special challenge.

It is no secret that deforestation has taken its toll around the world. Globally, 1 (one) hectare of tropical rainforest disappears every second with tragic consequences for both developing and industrial countries.

Long ago Bali enjoyed dense forests, comprised of around 3000 species of native trees. Nowadays, there is not much forest left, with the last dense section of jungle located around Mt. Batukaru in Tabanan. Lowland forest is mostly gone except for patches located in gorges in places such as the Bali Barat National Park.

But Dr Webb pointed out, there are also small patches of relict forests associated with sacred sites and temples, which are high in diversity, and play the important role of preserving the physical memory of Balinese forests, for a time when restoring Bali's native forests is taken more seriously.

One such forest occurs 20 minutes drive from the Greenschool, known as the Sanggeh Monkey Forest. Although only several hectares in size, the Sanggeh forest is highly diverse, containing several hundred species of trees (a single hectare of tropical rainforest may contain up to 750 species of trees).

"The Sanggeh Forest," stated Dr. Webb, "should be considered a reference. Students should study its structure, and species composition, then take cuttings, wild seedlings (called wildings), and seeds from the forest floor (many lying dormant in the upper layers of the soil), back to the Greenschool, to grow out in a nursery for future planting."

Arnold Arboretum Senior Research Scientist and tropical biologist **Dr. Cam Webb** spoke last year to senior Green Studies students on the biodiversity of tropical forests, challenging them with the same action research question that he and his colleagues are studying in West Kalimantan; "*How do we restore diverse forest on deforested tropical land?*"



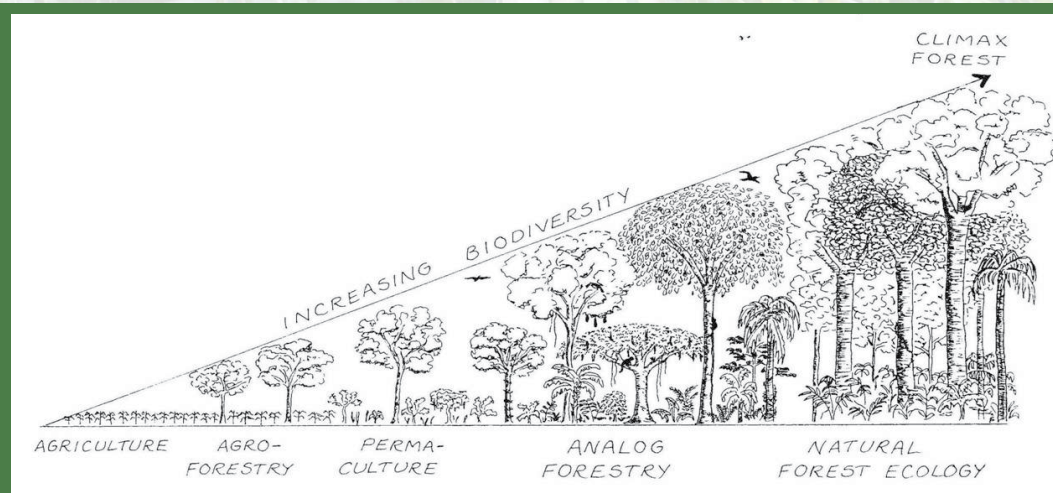
Photo: Khoo Min Sheng

Last years Green Studies students began to investigate an area of land ripe for forest restoration. This triangle-shaped parcel lies North of the bamboo bridge and vortex, on the Western bank of the Ayung River. The land is already home to some large trees, as well as a farmland terraces. It is one of the last "wild" feeling places on campus and it's proximity to the Ayung lends itself to conservation, in-line with Indonesian law on forested "Riparian" (riverside) greenbelts (which should be at least 15 meters wide).

Cam Webb explained that the original forest type along this section of the Ayung is known as "Lowland Deciduous Tropical Rainforest." It is the same type of forest that exists in Sanggeh, so we can consider the Sanggeh Forest as an *analog* or a reference for our site. By studying the structure and

composition of the analogue forest, you can re-create a similar forest at the Greenschool.

That's the challenge and that's the plan. This year, Grade 8 students as part of Pak Noan's Green Studies class are going to study the Sanggeh forest along with forest guardian Pak Ngurah, and begin the process of ecological restoration on the Greenschool campus. The plan is to enhance the area with as much natural diversity as possible, restoring the riparian greenbelt, and connecting the forest right up to the main campus (see Google Earth image on page 4).



ANALOG FORESTRY is a system of forest management that combines the values of local forest biodiversity with organic crop cultivation. It seeks to establish a forest type environment, analogous in architectural structure and ecological function to the original forest ecosystems that once existed in the area.

Our 8th graders are learning the arts of Analog Forestry, and Ecological Restoration. They will plant key species that attract wildlife (especially birds like *bulbuls* and other seed dispersers) and let nature continue on her own. They will have to suppress weeds, apply mulch, and water some trees during the dry, and of course learn much about the role of a forest; in stabilizing soil, absorbing rainwater to refill aquifers, storing carbon, providing homes for wildlife, and products for humans.

But analog forestry is only one part of an important triangle. Forest managers of the future can no longer be concerned with simply calculating biomass, or labelling soil horizons. Aside from *ecological* factors, an understanding of *social* and *economic* factors that determine a forest's fate are essential.

Upper grades Green Studies students, under the guidance of Brynn Goforth, will be engaged in collecting baseline data on the interactions between the local community of Sibang and the forest. During this process, students will employ a variety of **Participatory Rural Appraisal** techniques.

PARTICIPATORY RURAL APPRAISAL (PRA) is a family of approaches and methods to enable local people to share, enhance, and analyze their knowledge of life and conditions, to plan, and to act.
-Robert Chambers

PRA methods serve multiple purposes. They provide information to outsiders who wish to understand how the community uses and manages its resources and they provide information for the collective community to evaluate its resource management practices. The process of collecting PRA information is as important as the data itself, as it triggers dialogue with the community, foresters, NGOs, and local government to examine existing resource use practices, problems, conflicts, and opportunities, providing a basis for developing more sustainable and productive management systems. This will also provide the added opportunity for cross-cultural exchange, and improved understanding between the Greenschool and its neighbors.

Examples of PRA activities that the students will lead include; Semi-Structured Interviews, Group Discussions, Seasonal Calendar, Historical Transect, List Making of Forest Products, Stakeholder Analysis and Community Sketch Mapping.

The forest area in question is made up of a variety of small sections, some owned by the local community, some owned or leased by the Greenschool, and the riverside area under regulation by a variety of government

agencies. Add to that, regulations from the local Banjar Abian Kering (a group which oversees dryland agriculture and forest management), and you will see that the students have a lot to uncover.

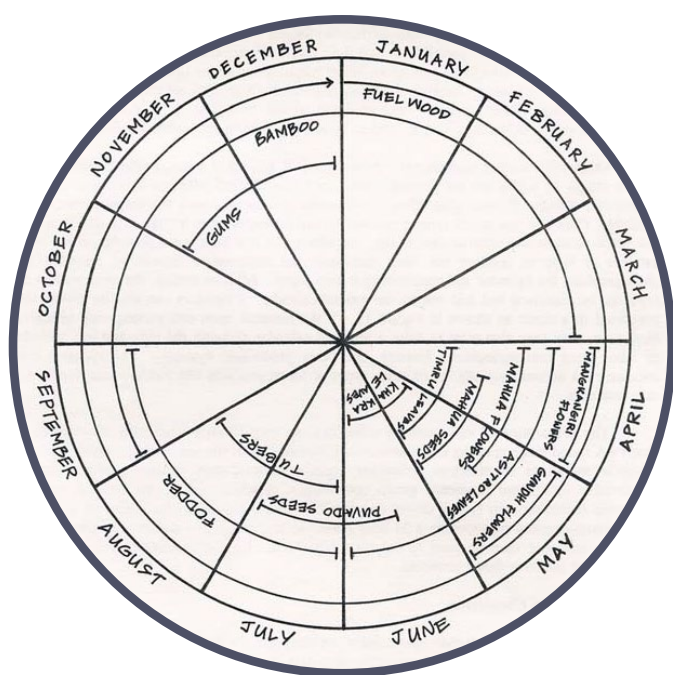
The Greenschool itself exhibits competing interests with regards to how this land may be used. The site was once considered for the construction of a Yoga studio which now stands near the Middle School. Vegetable gardens surround the area, and there will always be pressure to build more classrooms as the student body grows.

An exciting potential development for the area has been discussed, in the creation of a "Tree-tops" like ropes course. Although the ropes course would require the construction of physical infrastructure, it would also generate revenue and create opportunities to interact with the forest from a unique perspective, such as atop a canopy walk or hidden in an observation blind.

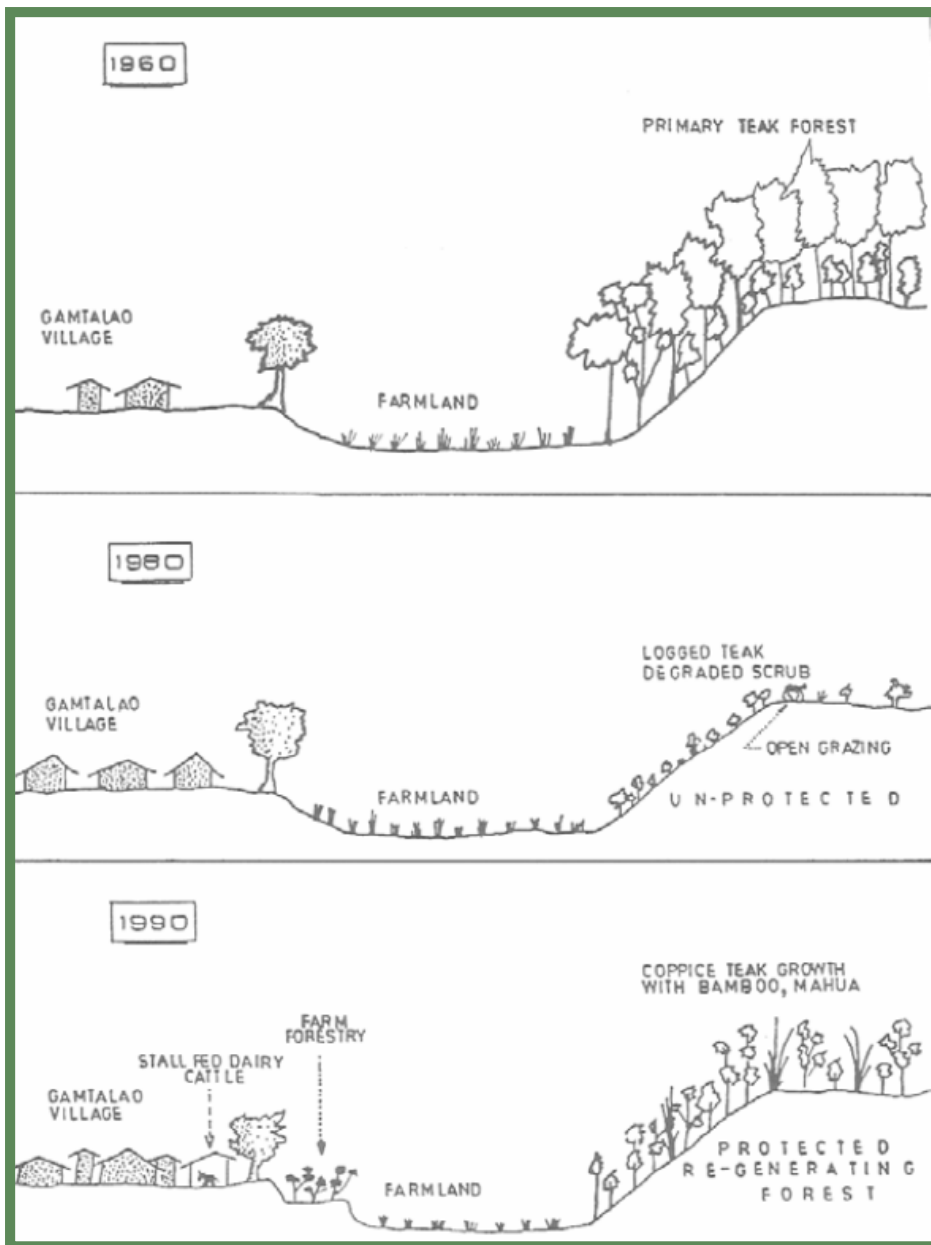
Students will have opportunity to discuss the pros and cons of competing land uses as they study the forest, and the desires of various stakeholders.

But before the future of the forest can be planned, its past and present needs to be understood, and that is the main function of PRA.

All of these activities will help students interact with the local community, to determine the future course of management of the Green Forest. At the same time allowing students to develop the skills, attitudes, values, and knowledge that will be needed by forest managers in an ever inter-connected world.



The **SEASONAL CALENDAR** documents the flow of forest products over time and how product collection changes over the season. This information can contribute to an estimation of yields.



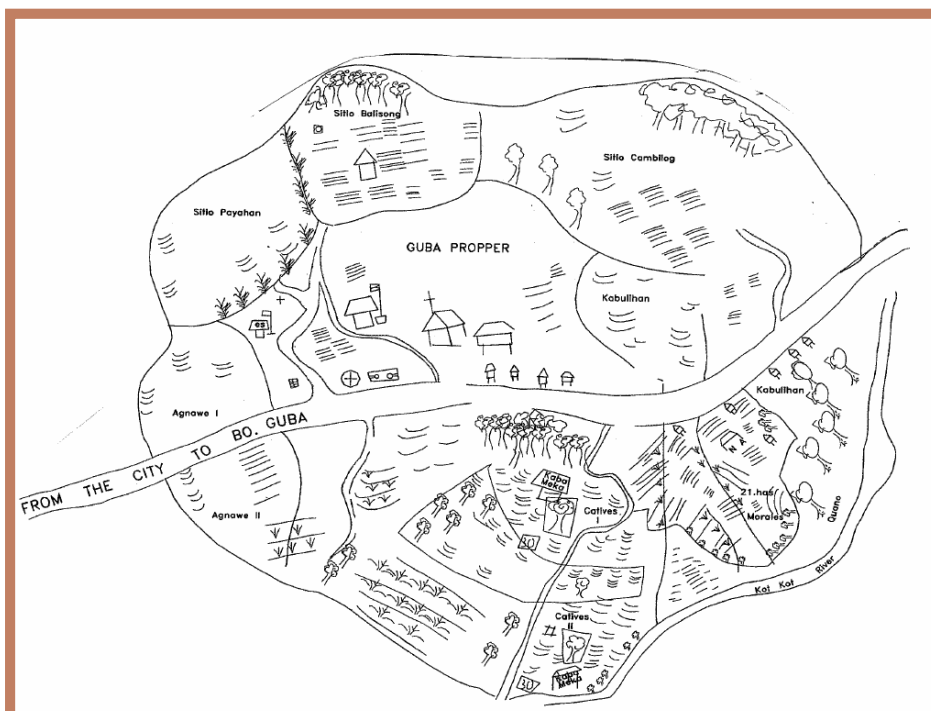
HISTORICAL TRANSECT

Working with villagers to construct a transect of the area helps to identify successful and unsuccessful management systems of the past and present. This allows all stakeholders to create a future vision of the forest, and a plan to achieve that vision.

As an example, in the past many tree species were replaced with trees that provided easily marketable products. One such tree is the sugar palm which provides sap for the making of palm wine, and thatch for temple roofs. But with the presence of the Greenschool, new markets for small amounts of non-timber forest may exist, making it economically viable for communities to restore a natural diversity of trees.

COMMUNITY SKETCH MAPPING

Participatory mapping techniques involve facilitating community members in developing spatial representations of their areas by creating maps on the ground or on a large piece of paper. Such maps reflect the locations of villages, forests, agricultural land, water resources, as well as management issues. The process of making the map and the discussions that occur while it is being made are important outputs of the exercise. Map information can be transferred to a paper and digitized so that it is documented for future reference.



Sketch maps provide a rapid visual representation of the forest system that is easily understood by villagers and students alike. Sketch maps also provide a means to identify the sources of forest products as well as to gain better information on the forest's conditions and patterns of use. This information can be used for a spatial analysis of the management area, as a basis to create future management plans.



Ecological Forest Restoration

The area shown above in **yellow** is the proposed **Green Forest**, adjacent to organic garden terraces (above in **blue**). A ropes course is being considered to transverse the area, potentially offering unique opportunities for forest canopy studies, and a way to move through the forest without compacting the soil below.

Some of the goals of forest restoration will be to close the canopy, enhance tree species, and develop 4 or more canopy layers. Currently, the forest canopy remains quite open and uniform in height, with coconuts, sugar palm, and bamboos dominating (*upper right*). These species can be augmented by planting native trees, including rare and even endemic species some of which are found in the Sanggeh Monkey Forest. It is also intended to highlight species with **non-timber forest product (NTFP)** potential.



The riparian area next to the river is currently in a state called scrub-shrub (*lower right*). By planting secondary and tertiary successional stage trees, and suppressing grassy pioneers, students will directly practice the process of ecological restoration.

For more information on the **Green Forest**, feel free to contact the Green Studies gang (Brynn, Matt and Noan) or Ben Brown.

