



Figure 4. A view of the Las Cruces landscape. Note the early successional habitat in the foreground (part of the most recent land acquisition), the secondary forest in the center of the image (former pasture—approximately ten years since abandonment), and the primary forest of Las Cruces in the background. In all, Las Cruces now protects 325 ha. Photo by R.A. Zahawi

available digital herbarium project, which is creating a comprehensive flora database of the entire region ([www.ots.ac.cr/herbarium](http://www.ots.ac.cr/herbarium)), a state-of-the-art meteorological weather station ([www.ots.ac.cr/meteoro](http://www.ots.ac.cr/meteoro)), and numerous GIS resources including thousands of historic aerial photographs, satellite images, and other digitized geographic information.

Finally, engaging local landowners and regional groups in the broader conservation objectives that the station has promoted over the last few years ties all of these approaches together. For example, starting in late 2006, LCBS initiated an ambitious land acquisition program to extend protected areas, reconnect neighboring forest fragments by establishing corridors, and ultimately link the station with the Guaymí indigenous reserve—the largest in the immediate area (Figure 3). These landscape-scale objectives not only protect additional threatened habitat and reconnect isolated smaller fragments around Las Cruces, but by virtue of being made up of mostly degraded pasture lands, they also provide land for restoration and conservation research (Figure 4).

Most funds have been raised at Las Cruces by providing talks that highlight our conservation efforts to natural history guests, who make up 40% of visitors. More than \$250,000 has been raised since the campaign began, leading to two land purchases that increased the LCBS area by about 25%. Land parcels are acquired at market prices and located on steep, agriculturally poor terrain. Accordingly, farmers who sell (and most are interested in doing so) are then able to purchase land in areas that are more productive for agriculture. The campaign forms part of a broader regional conservation initiative that is being coordinated by several Costa Rican national and regional NGOs, educational institutions, and local stakeholders

to create a corridor linking La Amistad Biosphere Reserve in the central mountain range on the Panamanian border with the Piedras Blancas National Park on the Pacific coast (Figure 3).

Thus, with this wide-ranging approach, Las Cruces strives to significantly augment regional conservation efforts and further the outreach and education mission, particularly in conservation biology and restoration ecology. This approach is critical to any biology-oriented field institution, especially in the tropics where conservation initiatives and resources are often limited. For more information on LCBS, including conservation campaigns, regional research opportunities, and general information on the station, please visit the LCBS website ([www.ots.ac.cr/lascruces](http://www.ots.ac.cr/lascruces)).



## Networking, Habitat Restoration, and Restoration Education in Sydney, Australia

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The Sydney Basin bioregion lies on the east coast of Australia and covers 3,624,000 hectares, which makes it a little larger than Maryland, USA. This is one of the most species-rich bioregions in Australia in all major groups of organisms. There are also 92 “vulnerable” and 60 “endangered” plant species listed under the *Threatened Species Conservation Act* (NSW 1995), as well as many species of endangered animals. Major threats to the biota are grazing in agricultural areas and expanding development in Sydney and the seven other population centers within the bioregion.

Sydney, with its beautiful harbor and a population of just over 4.2 million people, has remnant natural areas along its streams and in isolated parks. These consist of forests, woodlands, and scrub (that is, shrubland), collectively called “bush.” Many of these areas are on rocky sandstone, which produces a spectacular landscape. Urban natural areas are generally long and narrow and suffer edge effects from the “built environment,” including nutrient enrichment and weeds that wash in from gardens and roadsides. These areas are managed by local governments called councils, of which there are 34 in Sydney. My local councils are Ryde and Hunter’s Hill (as I live almost on their boundary).

In 1999, while working as a contract bush regenerator and seeing the extent of the degradation of our bushland, I established the Volunteer Bush Regenerators’ Network



Figure 1. We have been promoting the Habitat Network through a variety of interactive activities, including stalls at community events, such as the Moocooboola Fair in Boronia Park, Hunter's Hill (pictured here). Kids are attracted by our competition (and bring mum and dad with them) where they have to match birds and other animals to habitat. Answers are provided so everyone is a winner. Winners take home a native habitat plant to grow in their garden. Note the new Habitat Network logo visible in the display. Photo by Bev Debrincat

in the Ryde council area. The purpose was to pull together all volunteers who were working quietly—and at that time were mostly without supervision or ecological training—to try to establish a bushcare program within our local council area. Our group applied for and won a grant from the Australian Government to fund the first part-time bushcare officer to organize volunteers in Ryde for a two-year period. This venture was so successful that our council took over funding this position and extended it to full time, and it has been running ever since.

I also saw a need to educate the wider community about environmental issues generally. With friends, I established the International Environmental Weed Foundation (IEWF), a nonprofit organization, in 2003. Our objective is to educate people about non-native invasive plants, their impacts, and control techniques.

In 2005, during a discussion of conservation issues, my friend Pepe, who runs a large orchid nursery in Ecuador, became excited and said that I must speak immediately to another friend of his in France—James Aronson—as our ideas were so closely aligned. James introduced me to the concept of restoring natural capital (RNC) (Aronson et al. 2007), which looks at the function of the whole landscape and works with local communities to find achievable and affordable ways to restore the goods and services that nature provides for the benefit of the environment, production systems, and the people.

From this meeting, our Foundation decided to expand its vision to act more holistically and pursue the restoration of degraded ecosystems and the natural capital they represent. We received a grant in mid-2008 to develop the RNC approach to urban restoration in Sydney. Our partners in



Figure 2. Riverglade Reserve planting day on National Tree Day with an enthusiastic group of 75 volunteers—most of whom are members of the Habitat Network. This planting will provide an important link for small birds to travel from one bushland area to another. Photo by Bev Debrincat

this project are the councils of Ryde and Hunter's Hill. We also have the support of the Field of Mars Environmental Education Centre and the Ryde–Hunter's Hill Flora and Fauna Preservation Society.

The first activities under the grant were to develop and run an RNC workshop. The workshop involves explaining RNC, showing practical examples of RNC projects happening around the world, helping attendees identify a “vision” for their local area, facilitating the identification of possible local projects to fulfill this vision, and then planning the first steps for either extending an existing project or creating a new project. In the latter part of 2008 we letterboxed target areas and had both councils promote the three planned workshops in the local newspapers. We ran these one-day workshops for small groups of 15–20 people, which allow effective communication and exchange of ideas—everyone has the opportunity to be heard. The participants (local residents) looked at aerial photos of their local area, determined what natural capital was being lost, and came up with appropriate and affordable actions that the community could undertake for its recovery.

The participants of these first workshops noted that they were rapidly losing small native birds from gardens around their homes and were unsure about the local native plants (what they are or how to grow them). This realization inspired the “Habitat Network” project. The vision for this project is to create a network of native habitats across our yards that will interconnect and extend to bushland in public parks and reserves. With that goal in mind, we set about building a network of interested people. We showed people, at all sorts of events, how to incorporate pockets of native vegetation into gardens to provide habitat (Figure 1). People and community groups are eager to participate once they learn how to build native habitat for birds in their own gardens.



Now we have over 300 members and 13 schools participating in the Habitat Network. Our smallest member is a household. Our largest member is a community organization with 1,000 members. Membership is free; our members simply need to commit to creating some native habitat. We now have people seeking us out to become members of the Habitat Network and we are networking with other councils and related organizations. This project is easy to promote here in Australia, because almost everyone has seen birdlife in their gardens diminish and feels concerned. Our members have also planted native shrubs on public lands to create new bushland islands and to eliminate open bushland edges and thereby reduce exposure of small bird populations to predation from larger birds.

This is a stimulating project that allows us to engage people from all walks of life. We have spread the word about the Habitat Network wherever opportunities arise, including environmental and sustainability forums, council-run events, children's playgroups, and school groups. We have organized and run bush walks, talks, planting days (Figure 2), and nursery visits. We are happy to arrange any activity that is appropriate to increase the knowledge of our members about natural capital, especially native habitat corridors, and to attract new members. Home visits are popular, where we go to houses, apartments, schools and businesses to discuss the good, the bad, and the ugly invasive plants in people's gardens and to suggest how they can incorporate habitat areas and sustainable practices.

We collaborate with businesses that wish to establish native habitat around their offices, and with a diversity of civic groups whose interests range from gardening and permaculture to youth outreach and care for the aged. We recently built raised garden beds for a mental health unit for the elderly at Gladesville Hospital, whose patients now grow fruits and vegetables along with native habitat plants, some of which are edible. To date the Habitat Network community has planted over 7,000 local provenance native plants. These plantings not only build habitat but also improve many other aspects of our natural capital, such as native plant corridor connections that benefit pollinators and plant genetic diversity, improved erosion control and water infiltration, and other benefits to the community relating to aesthetics, air quality, and building social capital.

The only restriction to growing this project is time, as all IEWF members including myself work full time at other jobs and everything is done in our "spare" time. However, this project is creating a momentum of its own and seems to be destined to grow. We are now preparing a 50-page booklet to help spread the ideas and techniques we have developed.

Early on we ran a schools drawing competition to design a logo for the Habitat Network. Prizes for the competition were presented by our local federal government's Member of Parliament. A graphics designer friend redrafted the prize-winning entries into a colorful logo which graces our

promotional materials (Figure 1). Preservation of Sydney's rich biodiversity will depend on connecting and restoring our remaining bushland. The Habitat Network is doing just that. These connections are important not only for small birds but also pollinators and the genetic diversity of bushland vegetation. In addition, it is connecting community and bringing the positive message and the personal and social benefits of engaging in ecological restoration and RNC to public attention in a direct and hands-on way.

For more information contact Bev at [info@iewf.org](mailto:info@iewf.org).

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## Reforestation and Restoration at the Cloud Forest School in Monteverde, Costa Rica: Learning by Doing

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The Cloud Forest School (Centro de Educación Creativa [CEC]) of Monteverde, Costa Rica, has educated local Costa Rican students since 1991. We teach environmental science and land management through students' direct involvement in cloud forest restoration. The CEC's education-restoration model includes science, math, and art. The success of our methodology is measured through our students' commitment to conservation and, starting last year, through monitoring the 10,000 trees planted by students since 1999.

The CEC ([www.cloudforestschool.org](http://www.cloudforestschool.org)) was founded by a group of North American and Costa Rican parents who sought to develop an academically sound, bilingual, and environmentally focused program for kindergarten through eleventh grade for local children in Monteverde. The CEC's first step was to purchase 42 ha of neotropical cloud forest situated atop the Tilarán Mountains. Year-round precipitation, 2.5 m in rain per year and 25% more