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Anamnesis

I am poised in front of my computer, trying to connect through printed words with my silent readers — a small, but much valued group of loyal supporters of our Nectandra Institute cloud forest conservation work in Costa Rica. I have met all of them, not all at once, but as an intermittent procession over the years. Most of them were drawn to our preserve by their love of nature in general and a curiosity about cloud forest in particular. But my readers are not mere former visitors, they are a special group of individuals touched by what they saw and felt, then generously extended their hands. For me, they became kinfolks, connected by their help, moral support and love of natural beauty.

I met many of them when they visited Nectandra to experience the magic of clouds and a forest so dense that sunlight does not penetrate. On these occasions, the connection between visitors and Nectandra was frustratingly short, a few hours at most. As their guide, I had so much information to impart, so little time to do it. Their level of interest ranged widely — from a sheepish confession that "I am an engineer. I don't know what I am doing here. I came only because of my wife" to the excited intensity of a second grader, in love with snakes, who was literally praying to have an encounter with one at Nectandra. (He did).

In an ideal world, the visitors would learn during their visits all aspects of cloud forest — climate, natural history, ecology, biology, the works. Ideally, as their guide, I would have time to convey all the wonders I have seen and learned. For example, I could talk about the rarest and commonest species, on the evolutionary oldest land plant (liverwort) or animal (velvet worm), about the ecology of ferns and cactus (why they grow on the same tree), of the importance of the 30 odd wild begonia species in the multimillion dollar business of nursery begonias, or on the ability of decapitated ants to bivouac for hours because of the ants' neurobiology, and thousands of other topics. But ours is not an ideal world. My actual real-life conversations with my visitors barely touch the tip of the iceberg. Alas, their attention is not limitless and they have places to go.

I have since learned to make the best of my opportunities, to balance more show with less tell, to let Nature speak and touch hearts. Then, and only then, will the visitors hear my urgent take-home message — that cloud forest is the most endangered of ecosystems. In 1977, 11% of the world's woodland was in cloud forest, 2.5% in 1998 when Nectandra got started, down to 1% today. Yes, the very last 1%.

When the four Nectandra founders first envisioned the reason for the preserve, we simplistically wished to save a piece of cloud forest and, if feasible, study it. But after a very short time learning about the cloud forest, it dawned that we were not ambitious enough. We must reverse the shrinking trend and include regeneration in our goal. If we have one dollar to spend, wouldn't we want the biggest bang for the buck? Cloud forests are extraordinarily rich in species, estimated to be ~1000X the diversity of a temperate forest. Investing in one unit of tropical cloud forest is equivalent to gaining the biodiversity a 1000 units of non-tropical forest.

Once this central idea of regenerating cloud forest took hold, we entered in what I call our crayfish homing phase. It is the food hunting behavior I observed while catching these crustaceans in the Carmel River in California many years ago. The bait (chicken liver) was tethered to a piece of string lowered into the flowing stream. A crayfish downstream would come within range. I could always tell when a crayfish sensed the bait. It would stop on its track, turned until it faced the bait straight on. Once aligned, it purposefully marched toward its potential meal, never in a straight line, but always at an angle. Slowly it zigged forward until too far from the straight and lost the scent, then zagged sharply at an angle in the opposite direction, until it can no longer sense the bait. Zigging and zagging thus forward, it unerringly reached the bait every single time (where I had my net ready to scoop). The crayfish homing strategy was so effective and accurate that I had never forgotten it.

So the early Nectandra team zigged and zagged, exploring different ideas and approaches to find a workable plan. A start up organization needs a clear and concise mission statement. That was easy. We wasted no discussion. The early draft was "To promote the conservation and restoration of the montane cloud forest of Costa Rica through conservation and research".

The primary working objective was also clear. It was to regenerate cloud forests, which required several *a priori* conditions: 1) availability and affordability of unforested land in the cloud forest zone, 2) a big pot of money to buy the land, 3) a plan to reforest, manage and protect the purchase, 4) a scheme to sustain 1 through 3. At once, we were stymied. We were stumped not because of a lack of

ideas or experience. After all, one member of our team, Alvaro Ugalde, founded and directed the Costa Rican National Park Service for years. He, together with fellow founder Mario Boza (see following article), spent a career creating the network of 28 national parks that put 25 % of the country under environmental protection. No one else in the world had more experience in saving biodiversity and forest.

The glaring incongruity of our small size against the enormity of the goals was inescapable. Yet, doubt never seeped in. We did not lose heart and were optimistic that the lightbulb would come on eventually. So, we kept busy developing the reserve, its trails, facilities, and started organizing scientific surveys of its fauna and flora. In the meanwhile, we kept two imaginary hats — a Yes Hat to throw in various ideas and fancies, and a NO Hat for issues that we did NOT like or want. It didn't take long for the NO Hat to overtake the Yes Hat, both in content and importance.

The items in the Yes Hat were reflections of our different cultures, training and experiences. The best efforts to think outside our personal boxes ranged from the practical to fanciful. The zaniest included a brightly painted converted bus, piping lively music, moving through the countryside, setting up festive tents to promote reforestation. All these ideas actually sprung from four sane and serious brains! In the end, all were deemed insufficiently innovative to excite all four of us.

The items in the NO Hat turned out to be more significant. They were items for which we had strong feelings, albeit in the negative. In retrospect, many were analogous to the turning points in the crayfish homing. They were limits-setting sign posts. They forced us to look in a new direction, each with a new focus and propelled us toward inapparent sources of solutions. In so doing, they aligned us closer toward our goals. So, what were the main issues in the NO Hat?

• Organization size: We didn't want a big, unwieldy, inflexible organization. Alvaro was very familiar with the downsides of the deep bureaucracy in governmental agencies. At the opposite end, the two former virologists on board knew that small can be a strength. Small can be powerful. We just needed to find a balance coupled to tipping points in the system. Correctly applied, a small action could yield big effects.

• Fundraising: We didn't want fundraising to commandeer limited resources from the true mission. But, buying land means money and lots of it. Land in the area of interest is expensive. Deforested or cleared land is even more so. Our plan to buy expensive real estate and revert it to cheaper forested land is counter to all investment wisdom. For potential investors, we must come up with indispensable incentives.

• Land ownership: We didn't want to own more land. Imagine the enormous responsibility, cost, and labor to protect the land for perpetuity. Even the federal government couldn't thrive with its resources. What can we hope to accomplish with our miniscule team?

• Circular system: We didn't want to be improvident. For example, many non-profit organizations channel donations into endowment funds, *i.e.,* funds to generate investment income. Each year, 5% of the invested income is withdrawn to support the organization's mission. The donors' money is technically used purely to profit the organization and only indirectly for the programs. Worse yet, the amount available is dictated by the prevailing financial economy, and not according to program needs. In the meantime, there sits a large pot of money not being used for the cause. In a more effectual alternative, the donated money supports programs, but by a mechanism designed to maintain the fund's value through reuse, *e.g.,* a revolving fund.

The outcome of all of our zigging and zagging is the Nectandra Institute Eco-Loan Program, in operation since 2006.

The magic "indispensable investment incentive" turned out to be water, the commodity for which even the poorest of poor would be willing to part with his/her colones. When we looked into the distribution of water in our local area, we were startled (even Alvaro, who grew up on San Jose municipal water) to learn that potable water in rural Costa Rica was not provided by government agencies, but by local volunteer community water associations known as ASADAS's.

For example, my residence is located in the tiny hamlet of Angeles Norte (~pop 450). It joined three other adjacent villages to form the ASADAS Angeles Norte-Alto Villegas in 1997. A core of two dozens or so local volunteers does all the administration, management and infrastructure construction to service 510 homes. These men have day jobs, do farming or run dairies. From 4 am on, they milk, till, care for their families, but still volunteer for the community water-related causes — collecting users fees, reading meters, fixing cracked mains, maintaining water quality, manual trenching for pipe and meter installations, maintaining water quality etc.

Our ASADAS was unlucky in its early years with its choice of springs. The first nearby spring became contaminated by cattle and farm chemicals. So was the second further away. A third was finally located 17 km

away, higher on the slope. Each replacement spring catchment meant more pipes, holding tanks and more trenching in rugged terrain. Several of our Nectandra garden staff vividly remembered volunteering on their days off for the arduous manual trenching. With each relocation, everyone's worries increased and the frustration deepened. The ASADAS was eager for a permanent solution.

In most of rural Costa Rica, springs are the only sources of potable water. The springs sit on private land. Water rights belong to the state, not the property owner, and must be shared by law with the surrounding community. The ASADAS has access to the spring, but not control over the owner's land uses. To avoid a third water crisis for the ASADAS, the obvious solution was to buy the property. The 12 Ha (30 A) former dairy finally came up for sale in 2006, but the ASADAS did not have the funds to buy it.

On hearing the news, our lightbulb came on! Overnight, everything came together, with all the pieces practically self assembling — a positive sign for our nascent scheme. We finally had a functional framework. Our doldrums were over.

The lynchpin for our plan was the role of (cloud) forest in sustaining running springs. The forest is the indispensable sponge that soaks up rainwater, thereby slowing its seaward rush. Thanks to the trees, rainwater is detained long enough to filter into the natural ground seeps that feed the springs. If there are no trees, there wouldn't be springs. We wanted the forest, the ASADAS needed the water, what better matching possible for a partnership?

Within days, Nectandra Institute made a proposal to the ASADAS. We loan it the money to purchase the property with zero interest. The latter was the extra carrot to tempt the borrowers, and a way to untangle the loan from usury laws. We had the property inspected, a loan agreement drafted and the title confirmed by our lawyer (there were no realtors or title companies). While we were working on the documents, the ASADAS presented the proposal to a special general meeting, and the quorum representing the 510 residences approved the loan. Each household was willing to pitch in. After that, only the lawyer and legal representatives from the respective organizations were needed to seal the deal. At the closing, Nectandra Institute handed over a check to the ASADAS , which was passed on to the owner. Done. Since 2007, this experience with ASADAS Angeles Norte Algo Villegas have been repeated 15 times with minor variations.

In exchange for the money, the ASADAS agreed to reforest the entire property, eliminate and prevent contamination, but more importantly, it committed to a collaboration on tree husbandry, reforestation and watershed management.

Officers of ASADAS Angeles Norte-Alto Villegas inspecting the ecoloan check from Nectandra Institute. March 2007.

How well has the Ecoloan Program fulfilled the objectives?

• Organization size: With a laser focus on our mission, we concentrated on being catalysts, enablers and coordinators. Our professional two-person field staff, through their daily presence among the communities, provided steady and ready technical support. With time, Nectandra Institute has become an essential part of the regional environmental and water systems. Our ASADAS did their job and we did ours with a helping hand.

The Nectandra Institute staff size has not exceeded 4 persons in all these years.

• Land ownership: Our partners did all the work assessing and negotiating for their purchases. Our role started and stopped with the loans. While we had the ASADAS attention and cooperation, seedlings went into the ground, trees flourished (sometimes not). Sensitive to their needs, we minimized the paperwork, but emphasized the tangible work to our mutual benefits. In return, the loan capital flowed back to Nectandra Institute like oiled clockwork, punctually and without glitches, ready for the next loan application. The partnerships work and work well.

On inspection the actual land area, 250 Ha (625A), purchased with ecoloans seems modest. However, this figure is not the whole story. The ELF concept has slowly spread since our inauguration. Nectandra Institute has now two clones making interest-free ecoloans. The birth of the first — a federation of 12 ASADAS — was no accident. Nectandra Institute helped and supported its formation. The second clone was quite a surprise. One of our earlier borrowers, a Costa Rican watershed land

acquisition non-profit, decided to go from the borrowing to the ecoloaning business!

The infectiousness of the concept has taken hold.

• Fundraising and Circular System: Alvaro gets the credit for providing us with the needed contacts and influence to get the initial capital to get off the ground. Private donations (largely contributed by the readers of this newsletter) were added to the pot every subsequent year. The combination has kept the program going all these years. The Ecoloan fund is continuously repaid and reloaned. A large fraction of the 2007 dollars have gone around the block several times and are still working hard for the cause.

To this day, our main energy has not waived from cloud reforestation, research, education and watershed stewardship.

In memoriam of Mario Boza Loría (1942-2021)

Guest contributor: Pedro Leon
(Photo credit: Mario Boza via LinkedIn**)**

Costa Rica's prominent system of national parks and wildlife preserves owes its existence to two indisputable leaders, Álvaro Ugalde and Mario Boza. Álvaro passed away in 2015, while Mario has recently left us (October 29, 2021) with a legacy that will endure as a huge green footprint in the midst of an increasingly degraded world. Many mourned his departure, including Costa Rican President Carlos Alvarado, who posted a statement of support for his family, recognizing Mario's contribution to the creation and care of the protected areas housed in the Ministry of the Environment.

Mario was trained as an agronomist at UCR and went on to CATIE, where he was mentored by Kenton Miller and Gerardo Budowski in the production of a thesis on the Volcan Poás National Park. Kenton had just done a similar study for the emerging Santa Rosa National Park. In 1969, Mario became involved in writing and lobbying Congress to pass the Forestry Law that established the System of National Parks (SPN) and the Forestry Department, enacted in 1970. Mario was asked to lead the SPN and soon connected with Álvaro, who was finishing his degree in biology at UCR. Both Álvaro and Mario took a training tour, led by Miller, to the US National Parks that transformed their lives. They both found their vision and vocation.

During the following decades, Mario and Álvaro consolidated and augmented representative rain forest types, volcanoes, and wetlands into a functional system tied to academic institutions, such as the Tropical Science Center and OTS, and to nature tourism. Mario and Álvaro then created, with the help of a couple of fellow biologists (Luis Diego Gómez and myself), the National Parks Foundation (FPN), along with José María Rodriguez. The FPN, with substantial help from IUCN, TNC, and many other partners, raised funds to buy inholdings that were exerting strong legal and political pressures for compensation. Also, in partnership with OTS, it purchased an extension of the Braulio Carrillo National Park to connect it with La Selva Research Station that generated an altitudinal gradient of unique biological importance. Finally, FPN was a leader, between 1988 and 1990, in the conversion of national debt into local funds for conservation, the so-called "debt-for-nature swaps." FPN catalyzed four swaps with donations from private donors, foundations, AID and the Swedish Developmental Agency for $46 million, for land purchase and operations during the following years. Mario was also Vice Minister of the Environment for a short time during the Presidency of Calderón Fournier. Remarkably, he remained active and always critical of the problems that protected areas confront with encroaching human presence.

This obituary appeared in e-Canopy News for the OTS (Organization for Tropical Studies) Community, December 2021
(https://canopy.org/about-us/publications/recent-e-news)

Added Note:

To hear more about Mario Boza from Alvaro Ugalde himself, please visit our website (Nectandra.org), Alvaro Ugalde Retrospective, In Alvaro's words, Audio recording #7