



**THEY'LL MATCH YOU! SEE THE BACK PAGE**

## MATT EXPLORES HABITAT CREATION

What follows is a rare genre for the *Acorn*: an interview. Chris asked Matt questions; Matt usually answered them. Chris edits the *Acorn* and is President of the Sangha; Matt is our Executive Director. The interview has been edited for clarity and brevity. We tried, anyway. This is a father / son effort! Here goes:

**Chris:** What is this habitat refuge program that you've got going in various parks?

**Matt:** It's a way of doing very dense plantings to protect them from invasives and deer, because deer are the biggest drivers of degradation in our forests —

**C:** Is it just for forests?

**M:** No, no. We're doing them in meadows too. Actually earlier

this spring I was mentoring a student who put in several meadow habitat refuges at Justice Park. We have a test plot at the Marie Butler Leven Preserve that's about 150 feet in circumference — that's forest edge. We planted trees but it's grassy right now. And at Dewey's Creek in Prince William County, we planted trees, shrubs, forbs and graminoids. The technique is based on applied nucleation —

**Photos:** above, in November, our crew fences deer out of an "applied nucleation" planting along Dewey's Creek in Prince William County, Virginia. Below and also in November, a field trip! Students from our Tree Bank project area in the Dominican Republic prepare to plant native trees, grown at the Tree Bank's nursery.







**C:** What's that?

**M:** So it's a restoration technique that really got started by ecologists studying reforestation in tropical settings, in central America. Where it differentiates itself is that, unlike a traditional plantation style of reforestation, which is what people by and large have been practicing, especially for forests that have a commercial use, where they just go in, slam in a whole bunch of loblolly pine or whatever it may be, and working in a grid, right, and even if you're trying to work in a little diversity, you're effectively trying to cover the whole site. And that is still the paradigm for most reforestation globally. So the idea of applied nucleation is instead of treating the entire landscape, you plant really densely in pockets and that will drive successional change across the site over time.

**C:** What does that mean "driving change . . . "?

**M:** So what happens and this is something they've studied in these tropical systems but we know that this is happening locally too: you're producing seed that's going to spread from that site in one way or another. So in a meadow context, those could be your warm-season grasses, or goldenrods, or bonesets, and essentially they'll take back the rest of the area, even if you're not densely planting or planting it at all. And in forest contexts over time, the oak seedlings that you put in — they're going to start dropping acorns and that's going to produce more seedlings. Obviously that's a far ways away. But on a shorter time period what's happening is that you're creating habitat — you're bringing seed dispersers back into the site.

**C:** Could you talk a little more about seed dispersers?

**M:** Sure. It's any critter that moves seed around.

**C:** So like squirrels?

**M:** Exactly. And it's important to differentiate between seed dispersers and seed predators, right?

**C:** I would imagine so. But maybe squirrels are not the best example?

**M:** Squirrels are great. They do both. So squirrels are really important agents of seed dispersal for oaks and hickories and a lot of species that otherwise would not move into new habitat very well on their own. I read a really interesting study of oak conservation in Hong Kong, of all places. So they have a native oak there but the small mammal that moves acorns around has

**Photo:** in October, Joey Santore and Al Scorch from *Crime Pays but Botany Doesn't* stopped by our Wild Plant Nursery to chat about native plants and killing lawns for Season Two of *Kill Your Lawn*. Of course.

been extirpated because this is a highly urbanized area and it was not well adapted to urban spaces, unlike our gray squirrel, which is phenomenally well adapted for urban and suburban landscapes — and what they found is that there is a lot of wind pollination connecting these islands of oak habitat for these trees, but the acorns are more or less just growing where they fall. So we're very lucky here. Obviously our oaks and hickories are also wind pollinated and we get a lot of oaks moving around. But we — we have seed dispersers. We have blue jays we have crows, our squirrels and chipmunks which are the primary movers for us, right. And they're good at this. That's partly because they forget, so they cache these acorns and actually the acorns germinate better when they're buried by squirrels than if they're just left on the surface. And by getting them off the surface too, you're removing them from the deer diet. Deer are not dispersers of acorns. They're just seed predators of acorns.

**C:** OK I get the general picture.

**M:** But to comment on say the meadows, you know that we have native mice that are seed dispersers of, say broomsedge. They gather up the seed and they like to line their nests with it. They're not eating all of it. And so that's a way that those things get moved around. And they're not just moving the seed from the plants we grew; because they're coming in to exploit that habitat, they're bringing seed with them from nearby areas, so they're causing this mixing.

**C:** You obviously think that this is an approach that would work in northern Virginia.

**M:** Yes. We're not even the first people to try this in northern Virginia. Meghan Fellows worked on this technique at Fairfax County.

**M:** Another element of this is the Miyawaki gardens — that's another thing that we looked at as well.

**C:** What are they?

**M:** So it's not too different from applied nucleation if you follow it to the letter. This was developed in Japan and it's been popular in Asia. They've done these in south Asia and all the way into Africa. The idea is pretty similar but they're very focused on getting to a forest



end-state. They plant very densely, and with a lot of diversity, and the idea is you force the stand to go into stem exclusion much more rapidly so —

**C:** Stem exclusion is a phase in the development of forest. It's where some pole-sized trees die because they can't get enough light.

**M:** Right. And so the idea is that you can speed forest establishment. Miyawaki gardens, if they're done in the style that was prescribed by Miyawaki himself, they involve things like soil amendment which we wouldn't do on a typical restoration project, but I do think that we can learn some important lessons there about planting density and rapid growth.

**C:** Enough of this has already been done in our region to suggest that it could be a major way forward in restoration?

**M:** I think so. At the Sangha we've been trying out habitat refuges on different sites. We have some at Mason District Park, for example, where we're working in an area that has a chestnut oak canopy but that's in decline. That area is missing some key components but it has relatively intact understory. In terms of species diversity the coverage is a little thin, but we were able to replant and fence out the deer. We have another, at Deerlick Park, just across the street from the office.

**C:** And you have something in Prince William County?

**M:** Yes we have our work at Dewey's Creek. And in Fairfax County, we're also planning on doing something at the meadow planting at Green Spring, and then we have three of these plantings at Marie Butler Leven. Also the McLean Trees Foundation has done

**Photo:** in September, volunteers help restore chestnut oak (*Quercus montana*) to the forest floor of Mason District Park in Fairfax County, Virginia. Chestnut oaks once dominated much of this forest but they are losing ground to deer and invasives. (These seedlings were caged to ward off deer.)

similar work with us at Lewinsville and Churchill Road Parks. So there are a lot of opportunities to plant and learn, even just to watch what's happening in these places.

**C:** When you look at these plantings can you see that things are percolating?

**M:** Our oldest one is only a year old; that's our big one at Marie Butler Leven.

**C:** How big is it?

**M:** It's 150 feet in circumference. But we're doing more at 95 feet.

**C:** And that's just to keep the deer off?

**M:** Yes. You know, writ large in northern Virginia, deer are probably our biggest driver of degradation and loss — after paving — and I would say —

**C:** Asphalt is first, then deer?

**M:** Then deer and then I would say invasive species and the reason I rank them that way is because deer are opening up space for more invasive species.

**C:** Right.

**M:** But what we're seeing at the Marie Butler Leven planting is good regeneration, good protection of what we did. We're not seeing any deer browse on the things we planted and it's been a year, so if they were going to —

**C:** How tall is the fencing?

**M:** Six feet.

**C:** Oh, that's some pretty serious wire.

**M:** It's up there. I mean a committed adult deer could leap that if it really wanted to but they're not doing that and I think that's partly because our deer populations are not particularly healthy. There are a lot of deer but they're not particularly strong deer. And they're relatively small. So it is keeping the deer out, and we're seeing some





regeneration. What we're also seeing, and I think this is really interesting, is the invasives that seem to be driven primarily by deer tracking in seed, eating natives, opening up the habitat for invasives like stiltgrass, which is the biggest one that fits this pattern. So anyway, we didn't do any aggressive stiltgrass control within that enclosure this year. We just didn't have the time. But there is less stiltgrass — I don't have any numbers, this is anecdotal — but there is less stiltgrass in that enclosure than there had been in years past and I think that's because the native species that were already in there — the herbaceous stuff that was already in there, that the deer couldn't kill but consistently ate and dwarfed — a lot of those are our tough asters, you know, things like *Symphytotrichum racemosum* and *S. lateriflorum*: they're much bigger. They're taking up space. And we're seeing other herbaceous things start to come up. For example, the *Salvia lyrata* is looking a lot happier there. I don't think it's going to extirpate stiltgrass from the stand but I think what we're going to see is an intact native herbaceous plant community with pockets of stiltgrass invasion. And those will be much easier to manage. The other advantage to this technique, the way we're doing it, is cheaper deer exclusion. You know, we were already caging individual trees where we could —

**C:** With six foot high?

**M:** Four foot high, so they were still a little bit more susceptible to deer. A committed deer could reach in or even smash the cage to get at things that it wants to eat, and what we found is, one, you're not able to protect any herbaceous plant material with individual caging. Right? It's just not cost-effective. But with the woodies, we were paying on average somewhere around twelve to fifteen dollars a stem. That's barely cost effective either. I should mention that we had started using enclosures about 95 feet in circumference. That lets us make good use of 100-foot rolls, and it's about the size that was being used effectively in those tropical systems, so it's evidence-based, and our costs dropped to about three dollars a stem, and that's without taking into account all the herbaceous stuff that we were saving as well, so this is a far more efficient use of our money.

**C:** So if you could get a large area under that kind of management, what would the results be like?

**M:** So my hope is to roll these out where we're pocketing a landscape across the gradients that exist on the site. For instance at Mason District Park, we're working right now on the drier spots,

right, and we're doing that in part because we have a specific conservation target —

**C:** The chestnut oaks?

**M:** Yeah, our chestnut oak forest which is what makes up a good part of the habitat there — they're in bad shape and they're the canopy so this is the time to intervene and try to protect that component. But longterm, I think it's just a question of working with what's already there. For instance, there are streams that flow through that park, and there are a lot of little valleys, there are interesting pockets of spring ephemerals on some of the more mesic slopes as you move into other forest types. And there are some non-alluvial wetlands.

**C:** Obviously, a big part of success is just not losing what you already have.

**M:** Yeah, obviously. For example, one of the things we're trying to do at Mason District is manage the ground layer in ways that favor all the blueberries that are growing there. The ground cover in parts of this park is nearly 100% blueberries, but they're like, eight inches tall because the deer mow them down, and they very rarely flower because of that. And fruit is even more rare. So they're not providing the ecological value that one would hope for. There's not a lot of food for migratory birds on these blueberries. There aren't many flowers, which is a shame because Doug Tallamy singled out *Vaccinium* as a genus of great importance to our pollinators, right, especially the native bees that spend time in and around forest. They're looking for *Vaccinium*, but they're not finding it. And that's just one small change among many. So it's not just a matter of protecting plant communities. We have to think about many different changes overlapping with each other. Did you know that we've started having wildfires in Virginia? There's a huge one burning right now, just west of here. We've had a couple of very small spontaneous grass fires or brush fires whatever you want to call them, in Annandale just this last year. And our colleagues in Fairfax County forestry, just this year, they identified a disease of beech trees that is new to this region and that's going to dramatically change a lot of our forests. I could go on but you get the idea. I think we need to focus on rebuilding the resilience of our natural systems. Plant communities are a good place to start, but we need to completely reinvent our relationships with the landscapes that support us, that we depend on for everything. And the sooner we can do this, the better.



**Photo:** A session of Matt's "Sunday Morning Botany Club" in progress at the Wild Plant Nursery in November.

# Not Always Good News

The Earth Sangha's Tree Bank program has been working with a community of small-holder farmers in the Dominican Republic, near the border with Haiti, since June 2006. Our Tree Bank Hispaniola program seeks to improve farmers' incomes while restoring native forest on parts of their land. Almost every year, the program expands by one metric or another — in terms of plantings or forest area in care, or in terms of farm credit available or shade-coffee production.

That's real progress but unfortunately, it's not the whole story. Over the years, we have encountered many set-backs as well — in all sorts of flavors and sizes. (For our most recent difficulties, see the July / August 2023 *Acorn*.) Our worst moment came in September 2014, with the unexpected death of Gaspar Pérez Aquino, a cofounder of the program. There have also been droughts and heavy storms, minor truck mishaps, bank problems, uncooperative debtors, a couple of earthquakes, and coffee diseases to spare.

So you'll be pleased to learn that the past four months or so have been quiet ones for the Tree Bank — except for the controversy over an important piece of legal equipment: the papers of incorporation for our Dominican partner, the local farmers' association. These

papers have to be reviewed periodically. At present, they are in our lawyer's possession, where they have resided for some 19 months. Our lawyer is supposed to be renewing them but he has made little progress, and without clean papers, we cannot export our farmers' coffee.

It's true that to a considerable degree the system is working. Over the past 17 years or so, we have planted thousands of shade-coffee trees. Many of these little trees are now bearing fruit and our farmers are making money from this production. They are also validating a basic premise of the program: that it makes economic sense to preserve even low-quality remnant forest, which is where the coffee is planted. But we could sell our farmers' coffee for a lot more if we could bring it into the US. Our farmers are aware of this; that's why our lawyer is *persona non grata* in Association meetings, where he is the object of extended bouts of poisonous invective. Not from me, of course, although I am irritated with him for over-promising and misleading people repeatedly. Still, apart from the time, he hasn't cost us much — his retainer was under \$200. But it seems that, even in a poor province of a poor country, cheap lawyers may be a false economy.

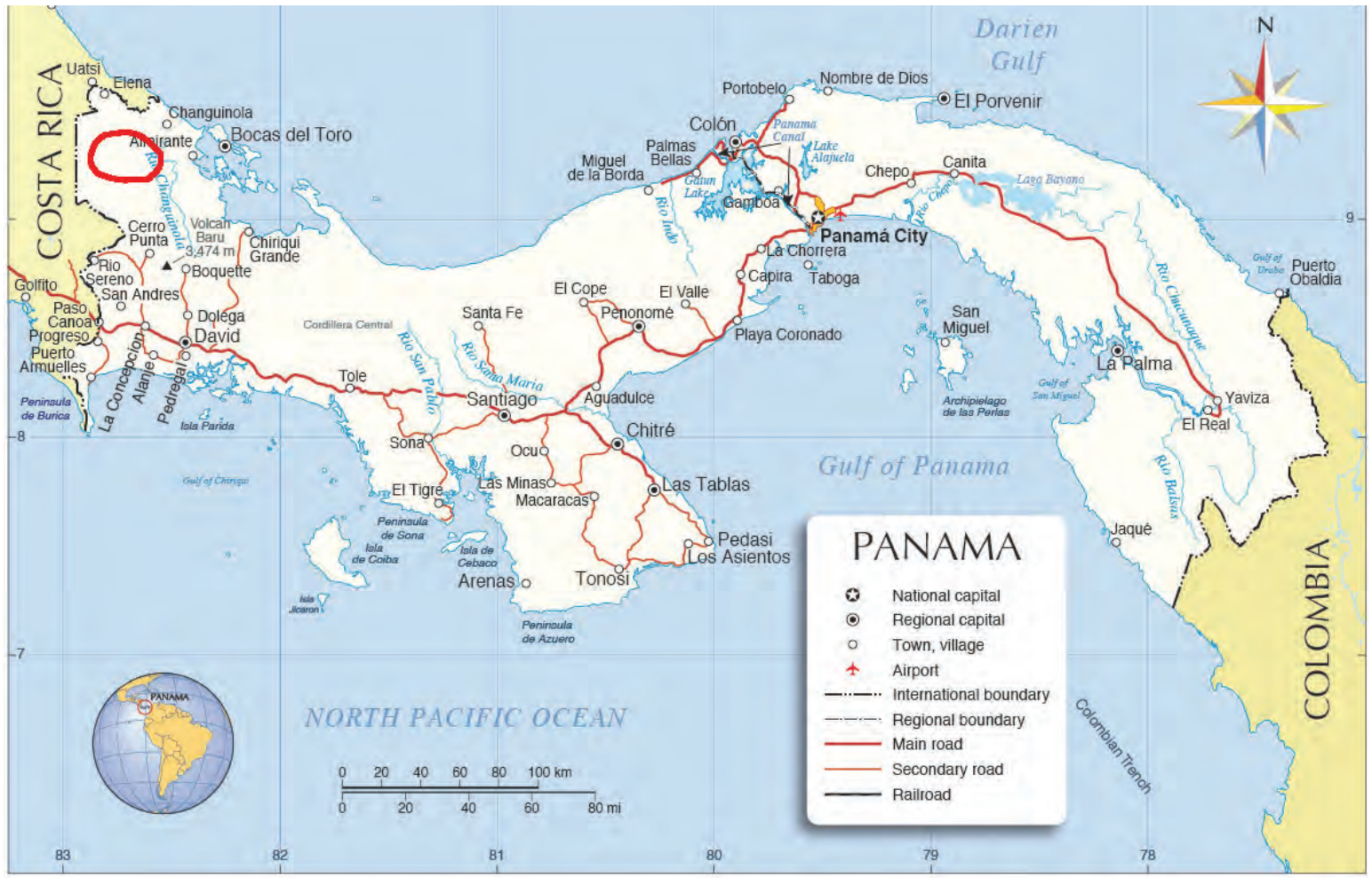
—Chris Bright, President

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**Map:** where exactly is the Hispaniolan branch of the Tree Bank? Here's a little geographic orientation. We're in the Dominican Republic, which occupies a little less than two thirds of the island of Hispaniola. The other third is Haiti. Our project lies close to the border, in the north. Look for the red oval in the map. That's us, more or less. We're in border country. From our Tree Bank nursery, you can see the barren hills of Haiti on the horizon. There's an ecological border here as well. As the map suggests, we're in a transition zone: the scraps of forest to the north are mostly lowland broadleaf; to the south, remnant forest is upland, much drier, and dominated by a single species, the Hispaniolan pine (*Pinus occidentalis*).





## Panama: Our Tree Bank Has Sprouted Another Branch!

In September 2023, we began the process of opening a second branch of the Tree Bank, this time in western Panama, on the Caribbean side of the isthmus, not far from the border with Costa Rica, and only about 20 miles or so, as the harpy eagle flies, from the Caribbean Sea. These two branches are different in many respects, but they share a common theme: both seek to improve economic well-being by conserving or reestablishing native forest.

This new branch will work with the Naso, one of several indigenous peoples who live in that region. Our partnership is based on a shared belief that indigenous peoples have a crucial role to play in the conservation of their homelands — and not just for their own benefit. Many of these homelands are now of global importance in the struggle against climate change and biodiversity loss. That is definitely true of the Naso homeland.

**Please note:** this article is an excerpt from a note that I wrote for our website. To read the complete note, go to [earthsangha.org](http://earthsangha.org), choose “Tree Bank” from the banner menu and click on “Tree Bank Panama.” If you’d like to read more about how our DC-area and international programs connect, check out Matt’s blog post, also on our website. It’s entitled “Northern Virginia, Hispaniola, and Panama: What’s the Connection?” It’s not yet clear how the current unrest in Panama will affect indigenous peoples and their land.

**Map:** Our Panamanian project area is marked above, roughly. It’s in the red oval near the border with Costa Rica, at the top of the page.

The Naso homeland (their “comarca,” to use the Panamanian legal term) consists of 400,000 acres of old growth rainforest and rivers. That’s about about 625 square miles. (A local comparison: the land area of Fairfax County amounts to 391 square miles.) But there’s more forest than that; the comarca lies within a group of very large protected areas.

Most of this is in Panama but one huge park, the Parque Internacional La Amistad (the International Friendship Park), is partly in Costa Rica. On the Panamanian side of the border, these protected areas cover 663,679 acres as far as I can tell. (That includes the Naso comarca.) The Costa Rican side adds another 250,000 acres, for a total of 913,679 acres or 1,428 square miles. An important consequence of this large size: there is likely enough habitat here to preserve stable populations of even the most demanding of the native range-demanding species, like the jaguar or the harpy eagle. That’s the good news. But I should also mention that not all of the official protection has succeeded; illegal encroachment is claiming some forests, although thus far very little in the Naso comarca.

These reserves, including the Naso comarca, support an extremely diverse flora and fauna, much of it threatened or endangered. For example, the complement of mammals includes five of the ten neotropical cats; there are also monkeys, sloths, peccaries, the coati-mundi (a kind of tropical raccoon), the olingo (an arboreal fruit-eating relative of the raccoon), tapirs (these look a little like pigs but with long, prehensile snouts), the tayra (a kind of big weasel),

and lots of bats. The bird diversity is just as astonishing and offers some of the best birding anywhere in the world. Amistad may be home to as many as 600 bird species. You can see quetzals, toucans, parrots, eagles and many less famous species. Diversity at ground-level is no less impressive. The region is home to the magnificent little poison dart frogs (don't touch! There's a reason they're called that). There are at least 263 species of amphibians and reptiles, including at least seven amphibian species that are thought to be endemic (they don't occur naturally anywhere else). And over 10,000 flowering plant species are known for Amistad alone.

Apart from its biological diversity, the Naso realm is remarkable in another way as well: its governance. Over the course of the past couple of decades, land under Naso control has had a deforestation rate of only 0.4 percent, as opposed to the region's parkland under federal control, where the rate was 1.8 percent, or more than four times as great. Partly in recognition of this achievement, but mostly as a consequence of a court decision in 2020, the Naso have won the right to govern their own lands, but they do that in partnership with their federal government.

Our first project focuses on an urgent problem, one that could affect much of the comarca, if allowed to fester. We need to stop or at least greatly reduce the poaching of the comarca's wild animals. We plan to start by focussing on a sacred area called the Cave of the Jaguar. This area is part of a 160-acre tract controlled by the family of our Naso colleague, Reinaldo (that's him in the photo). Reinaldo is very familiar with the area, and is organizing our project. The Naso recognize sacred areas here and there throughout their realm; that may eventually help us expand our work. The cave tract is home to a huge quantity of game animals — but that's not entirely a good thing, since the hunters are driving more and more game into this tract from neighboring areas that are increasingly poached out. And we know that poaching now occurs in the Jaguar Cave area because Reinaldo and his family have encountered the poachers.

This hunting is entirely illegal and may occur at any time of the year. The hunters use modern equipment — rifles and shotguns — so they're very efficient. Dogs are also brought in to track game, and of course the dogs cause additional disturbance. The hunters will take just about anything that they find, from little "painted rabbits" on up to the big creatures in the forest canopy — the monkeys and birds. Some of the resulting bushmeat is consumed by the hunters' families but most of it is sold outside the comarca, at local markets. Unfortunately, it commands a very good price.

This poaching threatens the forest on several ecological levels, because the animals and the trees need each other. Sorry to sound like a children's book, but it's true! The animals pollinate, disperse seed, and renew soil. In return, the trees create habitat for the animals. Damage to one side of this equation inevitably results in damage to the other side as well.

So that's our first big challenge. And we need to stop this while there are still populations of game animals that could recolonize the area. The remedy that Reinaldo has devised — but not yet implemented for lack of funding — is to take advantage of the local topography to discourage the hunters, who prefer secrecy for obvious reasons. Here's how this would work: the Jaguar Cave area has a high point, where visitors can see most of the surrounding forest, including areas not visible from the little nearby "forest farms" growing

cocoa and other shade crops in the forest understory. (The poachers don't like those areas because of the people.) That high point is where Reinaldo plans to build a little, three-room "casa de vigilancia" — a "watch-tower house," except without the tower. From this shelter, "forest stewards" can use the casa as their base when they walk the trails of the cave area, and the casa could perhaps also be used as a rest area for hikers and birders and other harmless visitors. Based on prior encounters with the poachers, Reinaldo is reasonably confident that this intermittent presence of "forest stewards" will discourage much of the poaching. It may not eliminate poaching completely but it will be a good, solid first step in that direction.

The Naso are offering us a role in a long-term social experiment that could prove crucial for conserving many tropical forests: are indigenous reserves better for conservation than regular parks? Perhaps not in every instance but the Naso experience is producing fresh evidence in favor of indigenous management, at least when it comes to tropical forest.

For additional details, take a look at the web version of this note. Also, see page 8 of this *Acorn* if you would like to help us with the project, and thanks for reading this!

— Chris Bright, President



Our partner in Panama, Reinaldo González Gamarra, is a member of the Naso people, an indigenous people who live in western Panama.



# Three Ways to Help

Your gift will make a big difference to the program of your choice.

## Tree Bank Panama: help us equip the “Casa de Vigilancia.”

The watch-tower Casa, described on page 7, is our best bet for dealing with the poaching that is decimating bird and mammal populations in our 160-acre rainforest site in western Panama. To get the Casa up and running, we will need, among other things, a solar cell and battery, field equipment, and some furnishing for the casa itself. We also have about 2 miles of rough trail work in front of us — and our workers aren't going to do that for free.

## Tree Bank Hispaniola: help our farmers improve their cocoa!

Cocoa and chocolate are grown from the seeds of the cacao tree, a little understory tree native to southern Mexico and south to northern Amazonia (probably). Our farmers plant acres of degraded forest in shade coffee, and cacao can be grown that way too (but with different light and moisture requirements). Like coffee, cacao is a high-value, non-invasive, forest-compatible crop. Cacao profits can make it worthwhile to preserve the canopy that shades it. Our Tree Bank nursery is already producing cacao tree seedlings. Your support would go to training farmers, purchasing nursery materials, marketing, and costs associated with the Tree Bank pickup truck.

## DC-Area: help us grow more rare and declining species!

In our region, many native-plant species are in widespread decline — both forest plants like huckleberries and pinxterbloom, and meadow plants like butterfly weed and purple milkweed (see the photo and caption below). To help these species, we'll need to increase the amount of seed, spores, and cuttings that we collect; we will also need to experiment with various propagation techniques, some of them new to us. We'll need to develop extra-care procedures at our nursery, and we'll need to buy some specialty equipment, everything from dunnage racks for improving drainage at the nursery, to high-tech tissue-culture equipment. And to do all of this, we'll need to invest a lot of volunteer and staff time learning new propagation techniques and employing them.

## THEY'LL MATCH YOUR DONATION!

Two very generous donors will match the first \$50 of your gift! You give at least \$50, we get at least \$100 — and you can designate the full amount for either our DC-area work or one of the Tree Bank projects. See the enclosed reply card, or give on-line at [earthsangha.org](http://earthsangha.org). The match runs through January 2. One \$50 match per household.

**Photo:** A flower of purple milkweed (*Asclepias purpurascens*) from a wild stand in Fairfax County's Elklick Woodlands Natural Area Preserve. The photo was taken in June of 2020. Purple milkweed is officially listed as rare in Virginia. At Elklick, we have been working with Fairfax County ecologists for several years, to help preserve or restore rare species like this milkweed. It's probably obvious from its appearance that it supports a lot of pollinators. Our work in northern Virginia natural areas helps to keep such connections healthy.



# EARTH SANGHA

founded 1997

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The Earth Sangha is a nonprofit 501(c)(3) charity based in the Washington, DC, area and devoted to ecological restoration. We work in the spirit of Buddhist practice, but our members and volunteers come from a wide variety of religious and secular backgrounds.

Want to contact us or make a donation? You can support our work by becoming a member. Membership starts at \$35 per year. Donations are tax-deductible. You can mail us a check (made out to “Earth Sangha”) or donate on our website. We will send you a receipt and include you in our mailings. (If your name and address are correct on your check, there is no need to send us anything else.) To donate specifically to our DC-Area programs, write “DC- Area” on the check memo line; to donate specifically to the Tree Bank, write “Tree Bank” on the memo line. Contact us at: Earth Sangha, 5101 I Backlick Road, Annandale, VA 22003 | (703) 333-3022 | [earthsangha.org](http://earthsangha.org). Complete program information is available on our website. Want to volunteer with us? We work with volunteers at our Wild Plant Nursery and our field sites in northern Virginia. For more information see our website or call Matt Bright at (703) 333-3022.

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